



VIMAL JYOTHI ENGINEERING COLLEGE

JYOTHI NAGAR, CHEMPERI – 670632, KANNUR, KERELA

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ISO 9001: 2015 Certified | Accredited by Institution of Engineers (India), NBA, NAAC
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NAAC Cycle 2

Criterion: 3.2.1

Published Patents



S.No	APPLICANT	Inhaler	Application Number	List of Inventers	Date of Filing	Date of Publication	Status
1	Dr.G.Glan Devadhas, Vimal Jyothi Engineering College	Solar powered oxygen depletion level alerting device	362875-001	Dr.G.Glan Devadhas, Mary Synthia Regis Prabha D M	20/04/2022	21/09/2022	Design Patent Issued
2	Dr.G.Glan Devadhas, Vimal Jyothi Engineering College	Solar Energy storage system	385812-001	Dr.G.Glan Devadhas, Mary Synthia Regis Prabha D M	05-09-2023	31/07/2023	Design Patent Issued
3	Dr.Roshni T V Vimal Jyothi Engineering College	Inhaler	315151-001	Renjith V ravi,Dr.kamal Raj Subramaniam, Dr.Ashwin M,Dr.Roshni T V		26/02/2019,	Design Patent Issued
4	D. Anto Sahaya Dhas of Professor Vimal Jyothi Engineering, College State Highway 59, Jyothi Nagar Kannur	A SYSTEM AND METHOD FOR PERSON DETECTION IN AERIAL IMAGERY USING SEMANTIC SEGMENTATION	2021103130	M. Rajeswari ,D. Vaduganathan, A. Sureshkumar,R.V. Aswiga, S. Priya, V. Vijikal,D. Anto Sahaya Dhas ,R. Divya,Princy T D,Rehna Baby Joseph	06-04-2021	9 March 2022,	Australian Innovation Patent Granted
2	District Chemperi Kerala 670632 India	A Device, System and Method for Automated Sorting of Waste Materials in Public Places	202241052379 A	Mr. MELVIN K JIJI, Mr. NIVED P, Mr. SHAHIN GAFOOR, Mr. SREERAG M, Dr. SREEKANTH M P , Prof. GOKULNATH R	:14/09/2022	23/09/2022	Published
3	Vimal Jyothi Engineering College	A Smart and Artificially Intelligent System to Predict and Prevent Causalities of Landslides	202241052377 A	1. TINTU GEORGE 2. LALY JAMES 3. TINU FRANCIS 4. TEENA GEOGE 5. JIJO JOSEPH,	:14/09/2022	23/09/2022	Published
4	Vimal Jyothi Engineering College	An Image Processing Based Method to Classify Brain Tumors	202241053309 A	1. ATHIRA M THOMAS 2. LALY JAMES 3. ANKITHA SEBASTIAN 4. PRABIN JAMES 5. JIJO JOSEPH 6)Junaid	:18/09/2022	14/10/2022	Published

5	Vimal Jyothi Engineering College	A Smart Bedding System for Monitoring Incapacitated Patients	202241052378 A	1. JYOTHI JOSEPH 2. LALY JAMES 3. TINTU GEORGE 4. TINU FRANCIS 5. ANKITHA SEBASTIAN	:14/09/2022	23/09/2022	Published
6	Vimal Jyothi Engineering College	A Neural Network Based System for Automated Tracking of Wind Energy	202241052380 A	1. Dr. TEENA GEORGE 2. Dr. JAYAPRAKASH P.	:14/09/2022	23/09/2022	Published
7	Vimal Jyothi Engineering College	A Compact and Portable Thermoelectric Refrigerator	202241053310 A	Mr. JERIN SAJI, Mr. MEJO M. FRANCIS, Aswin K. P, Sreeprasad P. C., Vaishak C, Vishal Pittan	:18/09/2022	14/10/2022	Published
8	Vimal Jyothi Engineering College	A Trackable and Communicative Helmet Device for Miners	202241053321 A	Ms. Namitha P, 2) Abin Babu 3) Ashique Prem 4) Deekshith C, 5) Sonu Paul	18/09/2022	23/09/2022	Published
9	Vimal Jyothi Engineering College	An Artificially Intelligent System for Waste Segregation	202241053307 A	Ms. Vidhya S.S., C. M. Nived Raj, Jinto Jose, Thejas Sujith, Vignesh P. V.	:18/09/2022	14/10/2022	Published
10	Vimal Jyothi Engineering College	An Optical Fiber Based System and Method to Detect Adulteration in Fuels	202241053315 A	Mr. Abdul Latheef, 2) Aryananda P, 3) Meriam Philip, 4) Namrutha Raj, 5) Unnimaya	:18/09/2022	14/10/2022	Published
11	Vimal Jyothi Engineering College	A System for Transforming Finger Gestures into Other Communication Health Monitoring of Differently	202241053313 A	Ms. DIVYA K., 2) Immanuel Monson, 3) Abhijith B. Lal, 4) Anusree Chithrabhanu, 5) Sanitha K. P.	:18/09/2022	14/10/2022	Published
12	Vimal Jyothi Engineering College	A DEVICE AND SYSTEM FOR AUTOMOBILES TO DISTINGUISH AND IDENTIFY	No.202241053314 A	Ms. Asha Baby, 2) Anusurya Bhacko, 3) Sreelakshmi A. K., 4) Rose Alphons Benny	:14/09/2022	23/09/2022	Published

13	Vimal Jyothi Engineering College	A System for Automated Cleaning and Sanitization of Toilets	202241053378 A	1)Shinu M. M.,2)Dr. Glan Devadhas G., 3)Sreehari 4)Akshay P.5)Amal Raj P.6)Anandhu Prakash	19/09/2022	23/09/2022	Published
14	Vimal Jyothi Engineering College	An Image Processing Based System to Predict Passwords from Lip sinks	202241052381 A	Ms. Ambili M.A, Theertha P,Uthara Narayanan C. K.Kavya K. K.	:14/09/2022	23/09/2022	Published
15	Vimal Jyothi Engineering College	A System for Indoor Navigation of the Visually Impaired	202241053319 A	Dr. Jeethu V. Devasia, 2)Ashly K. P.3)Devika K.4)Nivedya Susil	:14/09/2022	23/09/2022	Published
16	Vimal Jyothi Engineering College	An Image Processing Based Smart System for Reading and Communication of the Visually Challenged	No.202241053316 A	Ms. Akhila Mathew, 2)Nived P. P., 3)Anusree Rajagopal M.,4)Sreelakshmi Suresh Kumar P. P.	:18/09/2022	14/10/2022	Published
17	Vimal Jyothi Engineering College	A System and Method of Efficient Driving	202241053317A	,Dr. Glan Devadhas G.,Robin Jose,Jis Mathew,Shinu M. M.,Shamya A.,Jinsa Mathew,	18/09/2022	14/10/2022	Published
18	Vimal Jyothi Engineering College	Assistance and Navigation for Vehicles	202241053306 A	Glan Devadhas G, Anu Sajeev, Shinu M M,Dhanoj M, Reshma, Shamya	:18/09/2022	14/10/2022	Published
19	Vimal Jyothi Engineering College	An Image Processing Based System for Incubation Candling of Eggs in a Poultry Farm	202241053308 A	Shinu M M, Sebastian Jacob, Glan Devadhas ,Dhanoj M, Reshma , Jinsa	:18/09/2022	14/10/2022	Published
20	Vimal Jyothi Engineering College	A Helmet Operated Smart Control System for Two Wheeled Automotive	202241053320 A	Dr Reema Mathew A, Mr Manoj K.C, Ms.Anjitha Satheesan T.K, Ms Jesna K, Ms.Jinita Elisa Augustine	18/09/2022	:23/09/2022	Published



Australian Government

IP Australia

CERTIFICATE OF GRANT INNOVATION PATENT

Patent number: 2021103130

The Commissioner of Patents has granted the above patent on 9 March 2022, and certifies that the below particulars have been registered in the Register of Patents.

Name and address of patentee(s):

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Title of invention:

A SYSTEM AND METHOD FOR PERSON DETECTION IN AERIAL IMAGERY USING SEMANTIC SEGMENTATION

Name of inventor(s):

Rajeswari, M.; Vaduganathan, D.; Sureshkumar, A.; Aswiga, R.V.; Priya, S.; Vijikala, V.; Sahaya Dhas, D. Anto; Divya, R.; T D, Princy and M.B., Lakshmi

Term of Patent:

Eight years from 4 June 2021



Dated this 9th day of March 2022

Commissioner of Patents

PATENTS ACT 1990

The Australian Patents Register is the official record and should be referred to for the full details pertaining to this IP Right.



Australian Government

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CERTIFICATE OF GRANT INNOVATION PATENT

Patent number: 2021103130

NOTE: This Innovation Patent cannot be enforced unless and until it has been examined by the Commissioner of Patents and a Certificate of Examination has been issued. See sections 120(1A) and 129A of the Patents Act 1990, set out on the reverse of this document.

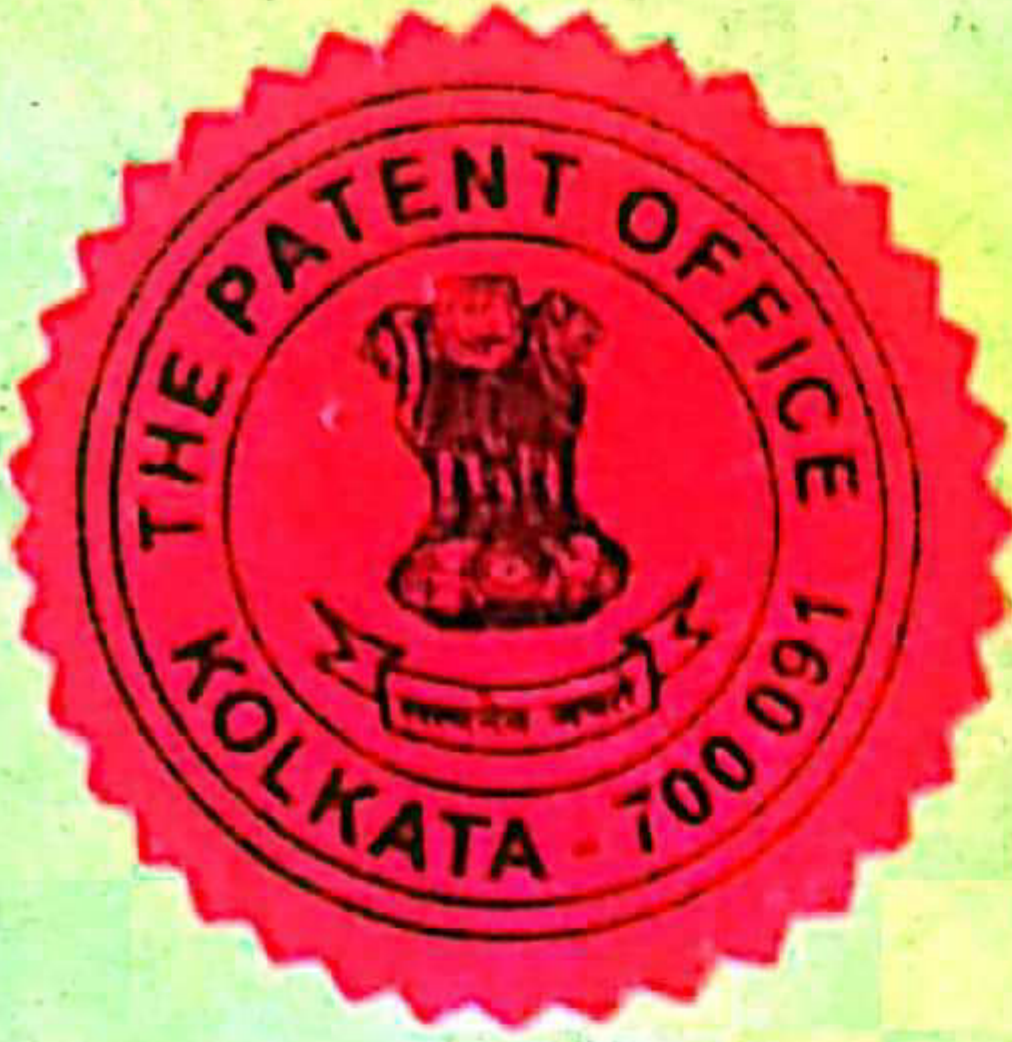


Dated this 9th day of March 2022

Commissioner of Patents

PATENTS ACT 1990

The Australian Patents Register is the official record and should be referred to for the full details pertaining to this IP Right.



ORIGINAL

No. 74208

भारत सरकार
GOVERNMENT OF INDIA
पेटेंट कार्यालय
THE PATENT OFFICE

CERTIFICATE OF REGISTRATION OF DESIGN

Design No. 315151-001
Date 26/02/2019
Reciprocity Date*
Country

Certified that the design of which a copy is annexed hereto has been registered as of the number and date given above in class 24-04 in respect of the application of such design to INHALER in the name of I.RENJITH V RAVI, SOUPARNIKA, VAYALAPPALLIL HOUSE, KUMARANALLOOR.P.O, PIN 686 016, KOTTAYAM DISTRICT, KERALA STATE, INDIA 2. DR. KAMALRAJ SUBRAMANIAM 2ND STREET, 3/18, ANNAL INDIRA NAGAR, SIDCO POST, COIMBATORE, PIN 641 021, TAMILNADU STATE, INDIA 3. DR. ASHWIN M S/O. C MUNIYAPPAN, 1/60 B, PULIAMPATTI, D THURINJIPATTI.P.O, DHARMAPURI (D.T) & (T.K), PIN 635 202, TAMILNADU STATE, INDIA 4. DR. ROSHNI T V MUTHUKUDA, PATTUVAM.P.O, PIN 670143, KANNUR DISTRICT, KERALA STATE, INDIA

in pursuance of and subject to the provisions of the Designs Act, 2000 and the Designs Rules, 2001.

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AYYANTHOLE, THRISSUR-680 003, KERALA STATE,
INDIA

Date of Issue 24/04/2019 11:27:00



ORIGINAL

No. 117006

भारत सरकार
GOVERNMENT OF INDIA
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CERTIFICATE OF REGISTRATION OF DESIGN

Design No. 362875-001
Date 20/04/2022 20:27:03
Reciprocity Date*
Country

Certified that the design of which a copy is annexed hereto has been registered as of the number and date given above in class 24-01 in respect of the application of such design to SOLAR POWERED OXYGEN DEPLETION LEVEL ALERTING DEVICE in the name of 1.DR.G.GLAN DEVADHAS, PROFESSOR & HOD, DEPARTMENT OF ELECTRONICS AND INSTRUMENTATION ENGINEERING, VIMAL JYOTHI ENGINEERING COLLEGE, JYOTHI NAGAR, CHEMPERI, TALIPARAMBA THALUK, KANNUR DISTRICT, KERALA 670632 2. DR.MARY SYNTHIA REGIS PRABHA D M, ASSOCIATE PROFESSOR, EEE DEPARTMENT, NOORUL ISLAM CENTRE FOR HIGHER EDUCATION, KUMARACOIL, 629168 , KANYA KUMARI DISTRICT, TAMIL NADU 3. DR. MANJUNATH, RESEARCH SCHOLAR, DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING, MALNAD COLLEGE OF ENGINEERING, HASSAN -573202, KARNATAKA 4. DR. RAGHVENDRAPRASAD DESHPANDE, ASSOCIATE PROFESSOR, GSSS INSTITUTE OF ENGINEERING AND TECHNOLOGY FOR WOMEN, MYSURU, KARNATAKA 570016

in pursuance of and subject to the provisions of the Designs Act, 2000 and the Designs Rules, 2001.

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Date of Issue 21/09/2022 13:19:02



ORIGINAL
क्रम सं/ Serial No. : 141300



पेटेंट कार्यालय, भारत सरकार

The Patent Office, Government Of India

डिजाइन के पंजीकरण का प्रमाण पत्र | Certificate of Registration of Design

डिजाइन सं. / Design No. : 385812-001

तारीख / Date : 09/05/2023

पारस्परिकता तारीख / Reciprocity Date* :

देश / Country :

प्रमाणित किया जाता है कि संलग्न प्रति में वर्णित डिजाइन जो **SOLAR ENERGY STORAGE SYSTEM** से संबंधित है, का पंजीकरण, श्रेणी 13-04 में 1.Dr. D. M. Mary Synthia Regis Prabha 2. Dr. G. Glan Devadhas के नाम में उपर्युक्त संख्या और तारीख में कर लिया गया है।

Certified that the design of which a copy is annexed hereto has been registered as of the number and date given above in class 13-04 in respect of the application of such design to **SOLAR ENERGY STORAGE SYSTEM** in the name of 1.Dr. D. M. Mary Synthia Regis Prabha 2. Dr. G. Glan Devadhas.

डिजाइन अधिनियम, 2000 तथा डिजाइन नियम, 2001 के अधधीन प्रावधानों के अनुसरण में।

In pursuance of and subject to the provisions of the Designs Act, 2000 and the Designs Rules, 2001.



(Signature)

महानियंत्रक पेटेंट, डिजाइन और व्यापार चिह्न
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जारी करने की तिथि : 26/07/2023
Date of Issue

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VIMAL JYOTHI ENGINEERING COLLEGE

JYOTHI NAGAR, CHEMPERI – 670632, KANNUR, KERELA

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NAAC Cycle 2

Criterion: 3.2.1

Granted Patents



पेटेंट कार्यालय
शासकीय जर्नल

**OFFICIAL JOURNAL
OF
THE PATENT OFFICE**

निर्गमन सं. 38/2022
ISSUE NO. 38/2022

शुक्रवार
FRIDAY

दिनांक: 23/09/2022
DATE: 23/09/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

**(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS**

23rd SEPTEMBER, 2022

(54) Title of the invention : A Smart and Artificially Intelligent System to Predict and Prevent Causalities of Landslides

(51) International classification :G08B0021100000, G06Q0050260000, G08B0021200000, G08G0001095000, G05B0023020000

(86) International Application No Filing Date :PCT// :01/01/1900

(87) International Publication No : NA

(61) Patent of Addition to Application Number Filing Date :NA :NA

(62) Divisional to Application Number Filing Date :NA :NA

(71)Name of Applicant :
1)VIMAL JYOTHI ENGINEERING COLLEGE
 Address of Applicant :Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. Chemperi -----

Name of Applicant : NA
 Address of Applicant : NA

(72)Name of Inventor :
1)Tintu George
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5)Jijo Joseph
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6)Sharan Rathnakumar
 Address of Applicant :Student, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

(57) Abstract :
 The present invention relates to the field of disaster prediction and management and more particularly it refers to an advanced and artificially intelligent system working through a cloud based platform to anticipate and alarm the people in locations prone to landslides with the information of safe hubs. The system generates an alert when there is a sign of flood and notifies the installed user hence reduces the impact, gadget which can send real time water information from a remote location to a monitoring station of the disaster. The flood detection system is designed to be an intelligent which could be at a distance away, regardless of time. The flood observatory system can be linked to a visual and audio unit to display warnings and alerts the user via text display or traffic light system in an event of flooding. The implementation cost is invaluable to the efficiency and usefulness of the system towards humankind. The practicality of the system helps to minimize the overheads due floods and prevents catastrophe at flood prone locations.

No. of Pages : 22 No. of Claims : 6



Application Filing Receipt

**Government of India
Patent Office**
Intellectual Property Office Building,
G.S.T. Road, Guindy,
Chennai -600032
Phone- 044-22502081-84
Fax: 044-22502066
e-mail: chennai-patent@nic.in

CBR Number : 36821

CBR date: 14-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
VIMAL JYOTHI ENGINEERING COLLEGE
Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting to be an application for patent numbered 202241052377 dated 14-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to A Smart and Artificially Intelligent System to Predict and Prevent Causalities of Landslides together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority or date of filing, whichever is earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority or date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

(For Controller of Patents)



Office of the Controller General of Patents, Designs & Trade Marks
Department of Industrial Policy & Promotion,
Ministry of Commerce & Industry,
Government of India

(<http://ipindia.nic.in/index.htm>)



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Application Details

APPLICATION NUMBER	202241052377
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	14/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	A Smart and Artificially Intelligent System to Predict and Prevent Causalities of Landslides
FIELD OF INVENTION	ELECTRONICS
E-MAIL (As Per Record)	patents@allinnov.org
ADDITIONAL-EMAIL (As Per Record)	allinnovrnd@gmail.com
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	14/09/2022
PUBLICATION DATE (U/S 11A)	23/09/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:
Filing Date:
Amount of Fee Paid:
CBR No.:
Signature:

1. APPLICANT(S):

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6	Sharan Rathnakumar	India	Student, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College,	India	Kerala	Kannur	Chemperi

			Chemperi (PO), Kannur – 670632, Kerala, India.				
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3. TITLE OF THE INVENTION: A Smart and Artificially Intelligent System to Predict and Prevent Causalities of Landslides

**4. ADDRESS FOR CORRESPONDENCE OF APPLICANT /
AUTHORISED PATENT AGENT IN INDIA:**

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5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Titile of the Invention
--------	---------	--------------------	-------------	-----------------------	-------------------------

6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application
-------------------------------------	--

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application
-----------------------------------	------------------------------------

9. DECLARATIONS:

(i) Declaration by the inventor(s)

I/We ,Tintu George,Laly James,Tinu Francis,Dr. Teena George,Jijo Joseph,Sharan Rathnakumar, is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Tintu George,Laly James,Tinu Francis,Dr. Teena George,Jijo Joseph,Sharan Rathnakumar

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the singnatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- **The Complete specification relationg to the invention is filed with this application.**
- **I am/We are, in the possession of the above mentioned invention.**
- **There is no lawful ground of objection to the grant of the Patent to me/us.**
- **I am/We are, the assignee or legal representative to true first inventors.**

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Land Slide (3).pdf
2	DRAWINGS	Drawings - Land Slide (3).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hering are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

To The Controller of Patents

The Patent office at CHENNAI

This form is electronically generated.

FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

A Smart and Artificially Intelligent System to Predict and Prevent Causalities of Landslides

2. APPLICANT(S)

NAME(S)	NATIONALITY	ADDRESS
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VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

**A SMART AND ARTIFICIALLY INTELLIGENT SYSTEM TO PREDICT
AND PREVENT CAUSALITIES OF LANDSLIDES**

FIELD OF INVENTION

[001] The present invention relates to the field of disaster prediction and management and
5 more particularly it refers to an advanced and artificially intelligent system working
through a cloud based platform to anticipate and alarm the people in locations prone
to landslides with the information of safe hubs.

BACKGROUND OF INVENTION

[002] Background description includes information that may be useful in understanding
10 the present invention. It is not an admission that any of the information provided
herein is prior art or relevant to the presently claimed invention, or that any
publication specifically or implicitly referenced is prior art.

[003] Floods and Landslides are natural disasters that occur frequently all over the world
that have two seasons of summer and rain. But in recently the climate change is
15 already transforming world to the extreme summer and heavy rainfall above
average rainfall. The effects of these disasters have damaged property and also took
the lives of people during the rescue operation. Problems like this can be prevented
by warning directly to the public, especially those living near the drainage.

[004] The disasters are affecting more areas quickly once its originated. Only a few
20 people or no one is alerted of flood generation. There is no proper system or method

to reduce the after effects of flood. The main problem is that, the government officials or authorities cannot themselves tackle the necessities, the only solution is to provide coordinated support to the affected people. There is shortage of food and fresh drinking water after flood. There are no proper medical facilities for affected people and children at the and there are chances for epidemics and other diseases to happen. The nearby shelters are not known to the people. There is no system to know the trapped people inside their houses or buildings. The lack of proper communication facilities also makes the situation adverse. The lack of transportation facilities to reach the affected people is also a major issue. These are only major problems within the existing system a lot of them are unsounded.

[005] This project is an approach to dealing with flood and landslide risk based on the notion that risks cannot be taken away entirely but only partially and always at expense of other social goals. The aim of this system is thus to reduce the consequences of floods and landslide, in ways that balance this aim against other considerations. The ideated system consists of a software (Application) and a hardware (Water level and soil moisture sensor). To minimize the extent of damages caused by floods warning system to inform the people of the disaster should be implemented in high-risk areas. This system will be able to reduce the damages of flood.

[006] 20 The system is designed to detect the rising level of water so appropriate warnings to the authorities and the public can be sent. A wireless sensor (WSN) has several features like a group of low cost, multifunctional, low power, etc. The sensors are

commonly used to monitor physical or environmental conditions such as temperature, sound, water level, pressure, etc. In this project, we use water level sensor for monitoring and detection in disaster areas. Consequently, we are developing the system which is suitable to give continuous alert information to the people by SMS and social network especially at critical situations. The system is able to detect a level of water and sent that data to the main flood control centre even if it is close or far away from the sensor that detect the level of water. The main features of the mobile application are it has mark and safe button, sos button, first aid button, weather report button. So accordingly, the need of persons, they can use the app.

[007] However, there is a pressing need for a better and efficient system to further improvise the overall requirement and hence we come up with the present invention.

[008] Further limitations and disadvantages of conventional and traditional approaches will become apparent to one of skill in the art through comparison of described systems with some aspects of the present disclosure, as set forth in the remainder of the present application and with reference to the drawings.

[009] In some embodiments, the numbers expressing quantities or dimensions of items, and so forth, used to describe and claim certain embodiments of the invention are to be understood as being modified in some instances by the term “about.” Accordingly, in some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending

upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad
5 scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiments of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0010]0 As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

[0011] The recitation of ranges of values herein is merely intended to serve as a shorthand
15 method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or
20 exemplary language (e.g. “such as”) provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the

specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0012] Groupings of alternative elements or embodiments of the invention disclosed herein are not to be construed as limitations. Each group member can be referred to and
5 claimed individually or in any or a combination with other members of the group or other elements found herein. One or more members of a group can be included in, or deleted from, a group for reasons of convenience and/or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all groups used in
10 the appended claims.

OBJECTS OF THE INVENTION:

[0013] The main objectives of this system are to design a new system for flood and landslide alert detection system integration in android application. In addition, to provide real-time information about the increase of drainage nearest and provide an
15 alert notifications system to end user. And also, for managing post disaster impacts, for that we incorporate several features in the mobile application as well as in website such as nearby shelter, hospital etc. during disaster.

[0014] These features and advantages of the present disclosure may be appreciated by reviewing the following description of the present disclosure, along with the
20 accompanying figures wherein like reference numerals refer to like parts.

[0015] Various objects, features, aspects and advantages of the inventive subject matter will become more apparent from the following detailed description of the preferred

embodiments, along with the accompanying drawing figures in which the numerals represent the like components.

[0016] Within the scope of this application it is expressly envisaged that the various aspects, embodiments, examples, alternatives set out in the preceding paragraphs, 5 in the claims and/or the following description and drawings, and in particular the individual features thereof, may be taken independently or in any or a combination. Features described in connection with one embodiment are applicable to all embodiments, unless such features are incompatible.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017]10 The accompanying drawings are included to provide a further understanding of the present disclosure and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0018]15 A complete understanding of the system and method of the present invention may be obtained by reference to the following drawings:

FIG. 1 illustrates an exemplary block diagram of the present system.

DETAILED DESCRIPTION

[0019] The following is a detailed description of embodiments of the disclosure depicted 20 in the accompanying drawings. The embodiments are in such detail as to clearly communicate the disclosure. However, the amount of detail offered is not intended

to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0020] In the following description, numerous specific details are set forth in order to
5 provide a thorough understanding of embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0021] Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be
10 embodied in machine-executable instructions, which may be used to cause a general-purpose or special purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0022] Various methods described herein may be practiced by combining one or more
15 machine-readable storage media containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a single computer) and storage systems containing or having network access to
20 computer program(s) coded in accordance with various methods described herein, and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

[0023] The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0024] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

[0025] Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those of ordinary skill in the art. The invention disclosed may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein.

[0026] Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific
5 examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary
10 embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives, modifications and equivalents consistent with the principles and features disclosed. For purpose of clarity, details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not
15 to unnecessarily obscure the present invention.

[0027] Thus, for example, it will be appreciated by those of ordinary skill in the art that the diagrams, schematics, illustrations, and the like represent conceptual views or processes illustrating systems and methods embodying this invention. The functions of the various elements shown in the figures may be provided through the
20 use of dedicated hardware as well as hardware capable of executing associated software. Similarly, any switches shown in the figures are conceptual only. Their function may be carried out through the operation of program logic, through dedicated logic, through the interaction of program control and dedicated logic, or

even manually, the particular technique being selectable by the entity implementing this invention. Those of ordinary skill in the art further understand that the exemplary hardware, software, processes, methods, and/or operating systems described herein are for illustrative purposes and, thus, are not intended to be
5 limited to any particular named element.

[0028] Embodiments of the present invention may be provided as a computer program product, which may include a machine-readable storage medium tangible embodying thereon instructions, which may be used to program a computer (or other electronic devices) to perform a process. The term “machine-readable storage
10 medium” or “computer-readable storage medium” includes, but is not limited to, fixed (hard) drives, magnetic tape, floppy diskettes, optical disks, compact disc read-only memories (CD-ROMs), and magneto-optical disks, semiconductor memories, such as ROMs, PROMs, random access memories (RAMs), programmable read-only memories (PROMs), erasable PROMs (EPROMs),
15 electrically erasable PROMs (EEPROMs), flash memory, magnetic or optical cards, or other type of media/machine-readable medium suitable for storing electronic instructions (e.g., computer programming code, such as software or firmware). A machine-readable medium may include a non-transitory medium in which data may be stored and that does not include carrier waves and/or transitory
20 electronic signals propagating wirelessly or over wired connections.

[0029] Examples of a non-transitory medium may include, but are not limited to, a magnetic disk or tape, optical storage media such as compact disk (CD) or digital

versatile disk (DVD), flash memory, memory or memory devices. A computer-program product may include code and/or machine-executable instructions that may represent a procedure, a function, a subprogram, a program, a routine, a subroutine, a module, a software package, a class, or any combination of
5 instructions, data structures, or program statements. A code segment may be coupled to another code segment or a hardware circuit by passing and/or receiving information, data, arguments, parameters, or memory contents. Information, arguments, parameters, data, etc. may be passed, forwarded, or transmitted via any suitable means including memory sharing, message passing, token passing, network
10 transmission, etc.

[0030] Furthermore, embodiments may be implemented by hardware, software, firmware, middleware, microcode, hardware description languages, or any combination thereof. When implemented in software, firmware, middleware or microcode, the program code or code segments to perform the necessary tasks (e.g., a computer-
15 program product) may be stored in a machine-readable medium. A processor(s) may perform the necessary tasks.

[0031] Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the pertinent art have given that term as reflected in printed publications and issued
20 patents at the time of filing.

[0032] The present invention will now be described more fully hereinafter. This invention may, however, be embodied in many different forms and should not be construed

as being limited to the embodiment set forth herein. Rather, the embodiment is provided so that this disclosure will be thorough, and will fully convey the scope of the invention to those skilled in the art.

[0033] The present disclosure is best understood with reference to the detailed figures and
5 description set forth herein. Various embodiments have been discussed with reference to the figures. However, those skilled in the art will readily appreciate that the detailed descriptions provided herein with respect to the figures are merely for explanatory purposes, as the methods and systems may extend beyond the described embodiments. For instance, the teachings presented and the needs of a
10 particular application may yield multiple alternative and suitable approaches to implement the functionality of any detail described herein. Therefore, any approach may extend beyond certain implementation choices in the following embodiments.

[0034] References to “one embodiment,” “at least one embodiment,” “an embodiment,”
15 “one example,” “an example,” “for example,” and so on indicate that the embodiment(s) or example(s) may include a particular feature, structure, characteristic, property, element, or limitation but that not every embodiment or example necessarily includes that particular feature, structure, characteristic, property, element, or limitation. Further, repeated use of the phrase “in an embodiment” does not necessarily refer to the same embodiment.

[0035] Methods of the present invention may be implemented by performing or completing
20 manually, automatically, or a combination thereof, selected steps or tasks. The term “method” refers to manners, means, techniques and procedures for accomplishing

a given task including, but not limited to, those manners, means, techniques, and procedures either known to, or readily developed from known manners, means, techniques and procedures by practitioners of the art to which the invention belongs. The descriptions, examples, methods, and materials presented in the claims and the specification are not to be construed as limiting but rather as illustrative only. Those skilled in the art will envision many other possible variations within the scope of the technology described herein.

[0036] Floods and landslides are universal and it has become a common scenario nowadays. People all around the world are victims of these calamities in massive numbers. This project is about predicting floods-landslides using cloud computing and providing the users with early warnings, alerts and help them manage the crisis with the least impact. We are using both software and hardware to alternate the existing system and it consists of latest technologies such as LoRa technology, water level sensor, soil moisture sensor etc.

[0037] NDMA constituted a Task Force for the formulation of national and local level strategy for landslide risk reduction. This strategy document is also fulfilling the fifth target of Sendai Framework for Disaster Risk Reduction (2015-30) i.e., Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020. Strategy document addresses all the components of landslide disaster risk reduction and management such as hazard mapping, monitoring and early warning system, awareness programmes, capacity building and training, regulations and policies, stabilization and mitigation of landslide etc.

This strategy document envisages specific recommendations for the concerned nodal Agency, Ministries / Departments, States and other stakeholders, so as to avert or reduce the impact of future landslide calamities

[0038] The project consists of two phases. The first phase is prediction. For predicting
5 flood-landslides, we are using the AWS-AI model. We use 5-year weather data both during floods and normal days to make predictions based on weather data. Apart from this, real-time data from sensors is also used to improve the quality of prediction. Water level sensors are placed at river sides, dams and we will be analysing the rate of rise of water level and soil moisture sensors will be placed at
10 slanting areas, low level areas to get the moisture content of soil. Each soil has a different water holding capacity and when the moisture levels exceed the capacity, then the water starts accumulating. Based on this data, this prediction is made and then the locations of vulnerable spots will be updated in the flood map.

[0039] The next phase of the project is the management phase. First, users at vulnerable
15 locations will be warned, and risk value will be updated for the users and concerned authorities to take proper measures. A mobile application has been developed to provide the relevant information such as nearby shelter, hospital etc. The position of the users at vulnerable locations will be identified and will be provided to the authorities in real time. A web interface is also made for the authorities to update
20 the shelter map and to provide other notifications, warnings etc.,

[0040] FIG. 1 illustrates an exemplary block diagram of the present system. This system consists of ultrasonic sensor, soil moisture sensor interfaced with the

microcontroller (Node MCU) which senses real time water level and soil moisture content respectively, which will be send to the AWS database along with the real time weather data's, these data are processed using the AI model created on AWS. There is a web Interface option for the authorities/Admin to upload flood map, warnings and other notifications to the user, there is another web page along with the mobile application for the users, the data from AWS will be send to this mobile app and will be updated in the user website.

[0041] The user interface of the system provides people in susceptible regions with the data, alerts, flood map and other government notifications. Consists of district wise risk factor and the most vulnerable spots, nearby shelters (updated by the authorities), weather notifications etc.

[0042] Admin Interface includes option to receive the implemented sensors output, the details of the users and their live location, option to add notifications for the user, flood occurrence chance (prediction done from AWS AI model).

[0043] FLAPP is a mobile application developed for the users, it includes weather updates, nearby hospital location system, nearby shelter (Updated by the authority), risk value of the present location, SOS button to inform the authority with current location of the user and mark as safe option to inform the authority the user location is safe, also there is an option in which when the battery level of the user is less than 5% the app sends the location of the user to the authority if he/she is in a vulnerable place.

[0044] The system generates an alert when there is a sign of flood and notifies the installed user hence reduces the impact, gadget which can send real time water information from a remote location to a monitoring station of the disaster. The flood detection system is designed to be an intelligent which could be at a distance away, regardless
5 of time. The flood observatory system can be linked to a visual and audio unit to display warnings and alerts the user via text display or traffic light system in an event of flooding. The implementation cost is invaluable to the efficiency and usefulness of the system towards humankind. The practicality of the system helps to minimize. Overheads due floods and prevents catastrophe at flood prone
10 locations. A system for flood monitoring and alert system is developed especially for critical flood prone remote location to ensure humankind safety and savings to all sectors.

[0045] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the
15 basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions, or examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge available to the person.

20

#####DIGITALLY SIGNED#####
PREM CHARLES I
Registered Patent Agent INPA-3311
Patent Agent On Behalf of the Applicants

CLAIMS

We claim,

1. A smart and artificially intelligent system to predict and prevent causalities of landslides, comprising:
 - 5 a plurality of sensors;
 - at least one communication module;
 - one or more processors;
 - one or more memory modules coupled to a database; and
 - a GPS module .
- 10 2. The system as claimed in claim 1 wherein, the said plurality of sensors are preferably ultrasonic sensors configured to read water levels at storage locations and soil moisture sensors configured to collect the change in soil parameters.
- 15 3. The system as claimed in claim 1 wherein, the said communication module preferably is operatively coupled to a GSM based network to send alerts to the people before floods and landslides.
4. The system as claimed in claims 1, 2 and 3 wherein, the said processor is preferably a Raspberry Pi operatively coupled to the sensors to collect

related data and further operatively coupled to the GSM module to pass alert messages to the people.

5. The system as claimed in claims 1, 3 and 4 wherein, the people's contact details on risk is fetched from a cloud database.

5 6. The system as claimed in claims 1 and 5 wherein, the said GPS module is configured and operatively coupled to the said processor thereby characterized to send a message through commands received from the processor based on the geotags.

10

#####DIGITALLY SIGNED#####
PREM CHARLES I
Registered Patent Agent INPA-3311
Patent Agent On Behalf of the Applicants

15

20

ABSTRACT

A SMART AND ARTIFICIALLY INTELLIGENT SYSTEM TO PREDICT AND PREVENT CAUSALITIES OF LANDSLIDES

The present invention relates to the field of disaster prediction and management and
5 more particularly it refers to an advanced and artificially intelligent system working
through a cloud based platform to anticipate and alarm the people in locations prone
to landslides with the information of safe hubs. The system generates an alert when
there is a sign of flood and notifies the installed user hence reduces the impact,
gadget which can send real time water information from a remote location to a
10 monitoring station of the disaster. The flood detection system is designed to be an
intelligent which could be at a distance away, regardless of time. The flood
observatory system can be linked to a visual and audio unit to display warnings and
alerts the user via text display or traffic light system in an event of flooding. The
implementation cost is invaluable to the efficiency and. usefulness of the system
15 towards humankind. The practicality of the system helps to minimize the overheads
due floods and prevents catastrophe at flood prone locations.

#####DIGITALLY SIGNED#####
PREM CHARLES I
Registered Patent Agent INPA-3311
Patent Agent On Behalf of the Applicants

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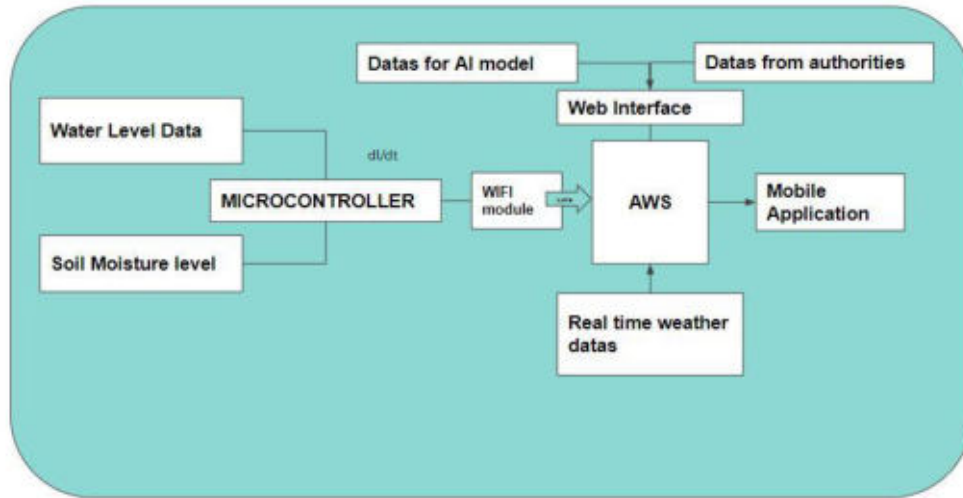


FIGURE 1

#####DIGITALLY SIGNED#####
PREM CHARLES I
Registered Patent Agent INPA-3311
Agent on Behalf of the Applicants

FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241052377 dated 14-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:


NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 14th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241052377** Dated **14th day of Sep , 2022** are

INVENTOR (S):

1	a) Name: b) Nationality: c) Address:	Tintu George Indian Associate Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
2	a) Name: b) Nationality: c) Address:	Laly James Indian Associate Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
3	a) Name: b) Nationality: c) Address:	Tinu Francis Indian Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
4	a) Name: b) Nationality: c) Address:	Dr. Teena George Indian Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
5	a) Name: b) Nationality: c) Address:	Jijo Joseph Indian Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
6	a) Name: b) Nationality: c) Address:	Sharan Rathnakumar Indian Student, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

Dated This 14thday ofSep,2022

Signature,



NAME: PREM CHARLES I(INPA 3311)

PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

To,

The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu- 600032

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/59837/2022-CHE

Dated **13/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

Name of the signatory

To,
The Controller of Patents,
The Patent Office,
At Chennai

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FORM 18

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST/EXPRESS REQUEST FOR EXAMINATION OF APPLICATION FOR PATENT

[See section 11B and rules 20(4) (ii),24B (1) (i)]

1. APPLICANT(S)/OTHER INTERESTED PERSON(S):

APPLICANT(S)

Sr.	Name	Nationality	Address
1	VIMAL JYOTHI ENGINEERING COLLEGE	India	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

2. STATEMENT IN CASE OF REQUEST FOR EXAMINATION MADE BY THE APPLICANT(S)

I/We VIMAL JYOTHI ENGINEERING COLLEGE hereby request that my/our application for patent application number TEMP/E-1/59837/2022-CHE filed on for the titled shall be examined under section 12 and 13 of the Act.

4. ADDRESS FOR SERVICE

Dated this(Final Payment Date):-----

Signature
Name of the signatory

To,
The Controller of Patents,
The Patent Office
At Chennai

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Welcome PREM CHARLES [Sign out](#)**Controller General of Patents, Designs & Trade Marks**

G.S.T. Road, Guindy, Chennai-600032
 Tel No. (091)(044) 22502081-84 Fax No. 044 22502066
 E-mail: chennai-patent@nic.in
 Web Site: www.ipindia.gov.in



सत्यमेव जयते

G.A.R.6
 [See Rule 22(1)]
 RECEIPT



Docket No 87227

Date/Time 2022/09/14 04:48:37

To
 PREM CHARLES

UserId: prem1987

360E, SENTHUR MURUGAN KOVIL
 STREET, OPPOSITE SM MAHAL,
 OLDPET

CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	E-106/5456/2022/CHE	202241052377	0	----	FORM28	
2	R20224033541	202241052377	4000	36821	FORM 18	----
3	202241052377	TEMP/E-1/59837/2022-CHE	1600	36821	FORM 1	A Smart and Artificially Intelligent System to Predict and Prevent Causalities of Landslides
4	E-12/6944/2022/CHE	202241052377	2500	36821	FORM 9	----

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001022004	Online Bank Transfer	1409220000341	8100.00	1475001020000001

Total Amount : ₹ 8100.00

Amount in Words: Rupees Eight Thousand One Hundred Only

Received from PREM CHARLES the sum of ₹ 8100.00 on account of Payment of fee for above mentioned Application/Forms.

* This is a computer generated receipt, hence no signature required.

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Controller General of Patents, Designs & Trade
Marks
G.S.T. Road, Guindy, Chennai-600032
Tel No. (091)(044) 22502081-84 Fax No. 044 22502066
E-mail: chennai-patent@nic.in
Web Site: www.ipindia.gov.in



Docket No 88045

Date/Time 15/09/2022

To
PREM CHARLES

User Id: prem1987

360E, SENTHUR MURUGAN KOVIL
STREET, OPPOSITE SM MAHAL,
OLDPET

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241052378	E-5/3721/2022/CHE	0	----	FORM 5	
2	202241052378	E-3/28961/2022/CHE	0	----	FORM 3	
3	202241052377	E-5/3722/2022/CHE	0	----	FORM 5	
4	202241052377	E-3/28962/2022/CHE	0	----	FORM 3	

Total Amount : ₹ 0

Amount in Words: Rupees Only

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शासकीय जर्नल

**OFFICIAL JOURNAL
OF
THE PATENT OFFICE**

निर्गमन सं. 38/2022
ISSUE NO. 38/2022

शुक्रवार
FRIDAY

दिनांक: 23/09/2022
DATE: 23/09/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

**(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS**

23rd SEPTEMBER, 2022

(54) Title of the invention : A Smart Bedding System for Monitoring Incapacitated Patients

(51) International classification :A61B0005000000, A61B0005021000, A61B0005020500, G16H0040200000, G10L0015220000

(86) International Application No Filing Date :PCT// :01/01/1900

(87) International Publication No : NA

(61) Patent of Addition to Application Number Filing Date :NA :NA

(62) Divisional to Application Number Filing Date :NA :NA

(71)**Name of Applicant :**
1)VIMAL JYOTHI ENGINEERING COLLEGE
 Address of Applicant :Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. Chemperi -----

Name of Applicant : NA
Address of Applicant : NA

(72)**Name of Inventor :**
1)Jyothi Joseph
 Address of Applicant :Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

2)Laly James
 Address of Applicant :Associate Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

3)Tintu George
 Address of Applicant :Associate Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

4)Tinu Francis
 Address of Applicant :Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

5)Ankita Sebastian
 Address of Applicant :Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

6)Aleena Benny
 Address of Applicant :Student, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

(57) Abstract :
 The present invention relates to the field of biomedical engineering and more particularly it refers to a smart bed assembly integrated with voice control modules and vital sign monitoring systems in order to enable the ease of monitoring the patients. This is the system of voice activated hospital bed using the voice commands of patient developed with the speech recognition application and it works automatically by using voice command, given by patient requirement. Also the monitoring system has been installed in the application such as heartbeat, temperature and oxygen level which will be continuously displayed on the Android application. If the patient crosses any normal temperature, heartbeat or oxygen level, one alert notification will send to the Doctor or relative person whose number has been saved in the application and also the buzzer will horn. Thus the overall system will be a great asset to the bedridden patients.

No. of Pages : 28 No. of Claims : 6



Application Filing Receipt

**Government of India
Patent Office**
Intellectual Property Office Building,
G.S.T. Road, Guindy,
Chennai -600032
Phone- 044-22502081-84
Fax: 044-22502066
e-mail: chennai-patent@nic.in

CBR Number : 36822

CBR date: 14-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
VIMAL JYOTHI ENGINEERING COLLEGE
Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting to be an application for patent numbered 202241052378 dated 14-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to A Smart Bedding System for Monitoring Incapacitated Patients together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority or date of filing, whichever is earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority or date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

(For Controller of Patents)



Office of the Controller General of Patents, Designs & Trade Marks
Department of Industrial Policy & Promotion,
Ministry of Commerce & Industry,
Government of India

(<http://ipindia.nic.in/index.htm>)



(<http://ipindia.nic.in/index.htm>)

Application Details

APPLICATION NUMBER	202241052378
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	14/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	A Smart Bedding System for Monitoring Incapacitated Patients
FIELD OF INVENTION	BIO-MEDICAL ENGINEERING
E-MAIL (As Per Record)	patents@allinnov.org
ADDITIONAL-EMAIL (As Per Record)	allinnovrnd@gmail.com
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	14/09/2022
PUBLICATION DATE (U/S 11A)	23/09/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)

&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:
Filing Date:
Amount of Fee Paid:
CBR No.:
Signature:

1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	VIMAL JYOTHI ENGINEERING COLLEGE	India	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

2. INVENTOR(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	Jyothi Joseph	India	Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
2	Laly James	India	Associate Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632,	India	Kerala	Kannur	Chemperi

			Kerala, India.				
3	Tintu George	India	Associate Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
4	Tinu Francis	India	Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
5	Ankita Sebastian	India	Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
6	Aleena Benny	India	Student, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College,	India	Kerala	Kannur	Chemperi

			Chemperi (PO), Kannur – 670632, Kerala, India.			
--	--	--	---	--	--	--

3. TITLE OF THE INVENTION: A Smart Bedding System for Monitoring Incapacitated Patients

4. ADDRESS FOR CORRESPONDENCE OF APPLICANT / Telephone No.:
AUTHORISED PATENT AGENT IN INDIA:

Allinnov Innovation and Intellectual Property Services, #360E,
First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri -
635001, Tamil Nadu, India.

Fax No.:
Mobile No: 9790586194
E-mail: patents@allinnov.org

5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Titile of the Invention
--------	---------	--------------------	-------------	-----------------------	-------------------------

6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application
-------------------------------------	--

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application
-----------------------------------	------------------------------------

9. DECLARATIONS:

(i) Declaration by the inventor(s)

I/We ,Jyothi Joseph,Laly James,Tintu George,Tinu Francis,Ankita Sebastian,Aleena Benny, is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Jyothi Joseph,Laly James,Tintu George,Tinu Francis,Ankita Sebastian,Aleena Benny

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the singnatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- **The Complete specification relating to the invention is filed with this application.**
- **I am/We are, in the possession of the above mentioned invention.**
- **There is no lawful ground of objection to the grant of the Patent to me/us.**
- **I am/We are, the assignee or legal representative to true first inventors.**

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Bed (5).pdf
2	DRAWINGS	Drawings - Bed(5).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hering are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

To The Controller of Patents

The Patent office at CHENNAI

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

A Smart Bedding System for Monitoring Incapacitated Patients

2. APPLICANT(S)

NAME(S)

NATIONALITY

ADDRESS

VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

A SMART BEDDING SYSTEM FOR MONITORING INCAPACITATED PATIENTS

FIELD OF INVENTION

[001] The present invention relates to the field of biomedical engineering and more
5 particularly it refers to a smart bed assembly integrated with voice control modules
and vital sign monitoring systems in order to enable the ease of monitoring the
patients.

BACKGROUND OF INVENTION

[002] Background description includes information that may be useful in understanding
10 the present invention. It is not an admission that any of the information provided
herein is prior art or relevant to the presently claimed invention, or that any
publication specifically or implicitly referenced is prior art.

[003] Electric medical beds have accumulated almost one hundred years of history. An
essential part of the healthcare environment, the medical bed is also used as a
15 measure of its reach, its efficiency, development and diversity. For the case of
automated, electric devices such as these, technological and contextual factors have
resulted in significant changes to their appearance and their expected functionality
over this period, while retaining original features that have guided the first
exponents of this medical device. It is, however, in the twenty-first century, that an
20 unprecedented, innovative stage in the development of these devices has peaked,
taking advantage of all technological means at the disposal of developers, and

resulting in new vectors of added value for these products: this stage can be referred to as the time of smart medical beds. Previous work has detailed the evolution of medical beds from initial, push-button models, to the year 2000, dividing such period into two stages: electric beds (1940's to 1980's) and mechatronic beds (1990's). Mechatronic beds became a reality in the 90's, when inventions, commercial products (i.e. Hill-Rom TotalCare-1998), and dedicated research work accumulated ergonomics, functions and accessories (alternative actuators, pressure mattresses, weighing scales), incorporating informatics and communications into these devices.

[004] 10 In the past decades, the medical-bed market has further changed, responding to also-changing structural, functional, and social-economic demands concerning the performance of medical beds. From the year 2000 to the present, these highly elaborate mechatronic devices have consolidated into what can be called the segment of smart mechatronic beds or smart beds, a term that describes a comprehensive synthesis between new materials, design and higher functionality and autonomy for these systems, all under advanced user interfaces. Smart beds implement new technologies (graphical interfaces, novel environment-aware sensors and actuating solutions, etc.), to provide a higher level of service and function, like real-time monitoring, caregiver and patient assistance, automated functions and positions (chair, assisted bed exit), and data logging, as well as more advanced means of communication.

[005] Now a day many people are bedridden due to various diseases, accidents, surgeries, and other health issues or age-related problems. Due to lack of technology, the patients who are bedridden need a bystander to take care of them. Caring for a bedridden patient can be difficult, and requires a great deal of patience and understanding. Most of these patients have a hard time adjusting to this lifestyle and may develop significant health problems. As a caregiver, it is responsible to help the patient adjust and help the patient with numerous daily tasks. The bedridden patients need frequent assistance in all tasks. The caring tasks generally involve the lifting of patients or other movements.

[006] 10 As reported in the literature, manual handling of patients is one of the major causes of musculoskeletal disorders in the nursing staff and caretakers. Apart from the chances of musculoskeletal disorders for the caretakers, one major problem encountered in caring for bedridden patients is the bedsores or pressure ulcers. It was observed that managing bedridden patients is an important issue as many people are involved in it and patients need the proper assistance. A bed with special arrangements for such patients is needed to solve problems of such patients and their relatives. A bedridden patient is unable to move or sit, therefore, an attempt is necessary to reduce the amount of assistance required in managing these patients by designing a new bed.

[007] 20 In order to overcome this situation, it is clear that there is a definite need to provide special equipment or beds for bedridden patient care to minimize assistance required for the patients to make the patient comfortable, prevent bedsores, and

reduce the risk of musculoskeletal disorders for the caretakers. The patient should feel totally comfortable, so concentrating on patient's asset and safety we have designed this system.

[008] This invention presents a special bed for bedridden patients. It has provision for
5 adjust the bed movement by a specially designed android application and it also
monitor the health condition of the patient. This system could manage the daily
tasks of the patient and detect the emergency conditions where a medical support is
needed from the doctor. The bed can reduce discomfort for the patients, chances of
bedsores, and efforts of the caretaker. Such arrangement will also reduce the risk of
10 musculoskeletal disorders to the caregivers as patient handling is reduced. We
designed a multi-purpose automated bed which can be controlled by patient itself
and can be enable using voice commands. They can lift the head and leg part of bed
as required. It also records variation in their temperature, oxygen level, and heart
rate. A buzzer will be automatically activated during the panic situation of patient.
15 The alert message will sent to the close relatives, doctors. This type of bed can be
by patient to set angle changes as well as to monitor physical parameters such as
heart rate, oxygen level and temperature. The need for care taker can be avoided by
this technology.

[009] A researcher stated, now a day due to increasing in some many problems based on
20 medical, so the patient expects so many advance facilities in hospital. The patient
should feel totally comfortable in hospital. Smart bed is increasingly popular,
because of its ease of use and extensive operating capabilities. Smart bed is a way

to human homework using technology so that it can provide a sense of comfort, an easier life and more quiet time, especially for the parents (elderly) and those has disabilities or paralysis.

[0010] Another researcher stated, smart bed can also provide improved quality of life for
5 people who might otherwise need caregivers or nurses. Integrating voice recognition technology into Smart bed makes the system more user-friendly and easy to operate. Smart bed is very necessary and provides will great assistance to meet the needs and comfort of people have physical disabilities, disabilities or paralysis. They are a way to simplify homework, especially for the elderly (elderly)
10 and those who have physical disabilities, disabilities or paralysis. They can move the height of the bed according to their needs and comfort.

[0011] Yet another researcher stated that, there have been several researches and developments on the smart bed systems. Recent scientific achievements and technological advances have brought forward a massive display of new or updated
15 medical devices, enabled with highly-developed embedded-control functions and interactivity. From the final decade of the twentieth century, medical beds have particularly been affected by this surge, taking on new forms and functions, while accommodating to established properties that have become well-known for these devices.

[0012] Yet another researcher stated that the past fifteen years have also brought forward changes to conceptual frameworks, concerning the product design and

manufacturing processes (standards), as well as the patient (perspectives on patient-care environments and accessibility).

[0013] Yet another researcher stated that functional, aesthetic and interactive features are presented, and the current global market for medical beds and related standards are
5 also assessed. Finally, discussions concerning rising challenges and opportunities for these systems are explored, with the potential for adding further monitoring and assistive implementations into medical devices and environments being highlighted.

[0014] Yet another researcher stated, Smart medical beds are integrated solutions for
10 patient care, assistance and monitoring, based on a comprehensive, multidisciplinary design approach.

[0015] Yet another researcher stated, Research in this field is critical in a context of global ageing, and powered by a surge in opportunities for accessibility solutions. Smart beds, seamlessly integrated into the healthcare system, have a unique opportunity
15 in enabling more efficient efforts for caregivers, and more responsive environments for patients.

[0016] However, there is a pressing need for a better and efficient system to further improvise the overall requirement and hence we come up with the present invention.

[0017] Further limitations and disadvantages of conventional and traditional approaches will become apparent to one of skill in the art through comparison of described

systems with some aspects of the present disclosure, as set forth in the remainder of the present application and with reference to the drawings.

[0018] In some embodiments, the numbers expressing quantities or dimensions of items, and so forth, used to describe and claim certain embodiments of the invention are
5 to be understood as being modified in some instances by the term “about.”
Accordingly, in some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the
10 number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiments of the invention may contain
15 certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0019] As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in”
20 and “on” unless the context clearly dictates otherwise.

[0020] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the

specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g. “such as”) provided with respect to certain embodiments
5 herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0021] Groupings of alternative elements or embodiments of the invention disclosed herein
10 are not to be construed as limitations. Each group member can be referred to and claimed individually or in any or a combination with other members of the group or other elements found herein. One or more members of a group can be included in, or deleted from, a group for reasons of convenience and/or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain
15 the group as modified thus fulfilling the written description of all groups used in the appended claims.

OBJECTS OF THE INVENTION:

[0022] The major object of designing the system is to feel patient relief from each Hassel and also to make sure of each safety. The system is very helpful for paralysis and
20 physically damaged person in hospital to control their bed height by themselves. The microcontroller is capable of communicating with all input and output modules. The voice recognition system which is the input module to the

microcontroller takes the voice instruction gives by the user as input and the controller judges whether the instruction is to lift upward or to the downward and according to the users voice command, the appropriate action will be performed. To control the bed height two dc motors are used. One motor for head side and
5 another for leg side. Also the heartbeat, temperature and oxygen level of the patient is continuously monitored on the android application.

[0023] This system also has a buzzer alarm system which is horned with heartbeat, temperature or oxygen level falls or rises above normal, if patient crosses the normal health condition and if it feels panicked. The system is very helpful for
10 paralysis and physically damaged person. The system allows the automatic movement of bed by using voice through Google assistant. Heartbeat, oxygen level and temperature have been continuously displayed on application. If there is any change in the normal level of health condition, one alert SMS will send to the doctor or relative person whose number has been saved in the app and also the buzzer
15 alarm will horn.

[0024] These features and advantages of the present disclosure may be appreciated by reviewing the following description of the present disclosure, along with the accompanying figures wherein like reference numerals refer to like parts.

[0025] Various objects, features, aspects and advantages of the inventive subject matter
20 will become more apparent from the following detailed description of the preferred embodiments, along with the accompanying drawing figures in which the numerals represent the like components.

[0026] Within the scope of this application it is expressly envisaged that the various aspects, embodiments, examples, alternatives set out in the preceding paragraphs, in the claims and/or the following description and drawings, and in particular the individual features thereof, may be taken independently or in any or a combination.

5 Features described in connection with one embodiment are applicable to all embodiments, unless such features are incompatible.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The accompanying drawings are included to provide a further understanding of the present disclosure and are incorporated in and constitute a part of this specification.

10 The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0028] A complete understanding of the system and method of the present invention may be obtained by reference to the following drawings:

15 FIG. 1 illustrates an exemplary block diagram of the present system.

FIG. 2 represents an apropos photographic view of the prototyped product.

FIG. 3 represents an apropos view of the user interface of the mobile application.

DETAILED DESCRIPTION

[0029] The following is a detailed description of embodiments of the disclosure depicted

20 in the accompanying drawings. The embodiments are in such detail as to clearly

communicate the disclosure. However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0030]5 In the following description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0031] Embodiments of the present invention include various steps, which will be
10 described below. The steps may be performed by hardware components or may be embodied in machine-executable instructions, which may be used to cause a general-purpose or special purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0032]5 Various methods described herein may be practiced by combining one or more machine-readable storage media containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a
20 single computer) and storage systems containing or having network access to computer program(s) coded in accordance with various methods described herein,

and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

[0033] The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the
5 ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0034]0 Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to
15 obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

[0035] Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are
20 shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those of ordinary skill in the art. The invention disclosed

may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein.

[0036] Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives, modifications and equivalents consistent with the principles and features disclosed. For purpose of clarity, details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not to unnecessarily obscure the present invention.

[0037] Furthermore, embodiments may be implemented by hardware, software, firmware, middleware, microcode, hardware description languages, or any combination thereof. When implemented in software, firmware, middleware or microcode, the program code or code segments to perform the necessary tasks (e.g., a computer-

program product) may be stored in a machine-readable medium. A processor(s) may perform the necessary tasks.

[0038] Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the pertinent art have given that term as reflected in printed publications and issued patents at the time of filing.

[0039] The present invention will now be described more fully hereinafter. This invention may, however, be embodied in many different forms and should not be construed as being limited to the embodiment set forth herein. Rather, the embodiment is provided so that this disclosure will be thorough, and will fully convey the scope of the invention to those skilled in the art.

[0040] The present disclosure is best understood with reference to the detailed figures and description set forth herein. Various embodiments have been discussed with reference to the figures. However, those skilled in the art will readily appreciate that the detailed descriptions provided herein with respect to the figures are merely for explanatory purposes, as the methods and systems may extend beyond the described embodiments. For instance, the teachings presented and the needs of a particular application may yield multiple alternative and suitable approaches to implement the functionality of any detail described herein. Therefore, any approach may extend beyond certain implementation choices in the following embodiments.

[0041] References to “one embodiment,” “at least one embodiment,” “an embodiment,” “one example,” “an example,” “for example,” and so on indicate that the

embodiment(s) or example(s) may include a particular feature, structure, characteristic, property, element, or limitation but that not every embodiment or example necessarily includes that particular feature, structure, characteristic, property, element, or limitation. Further, repeated use of the phrase “in an
5 embodiment” does not necessarily refer to the same embodiment.

[0042] Methods of the present invention may be implemented by performing or completing manually, automatically, or a combination thereof, selected steps or tasks. The term “method” refers to manners, means, techniques and procedures for accomplishing a given task including, but not limited to, those manners, means, techniques, and
10 procedures either known to, or readily developed from known manners, means, techniques and procedures by practitioners of the art to which the invention belongs. The descriptions, examples, methods, and materials presented in the claims and the specification are not to be construed as limiting but rather as illustrative only. Those skilled in the art will envision many other possible variations within the scope of
15 the technology described herein.

[0043] FIG. 1 illustrates an exemplary block diagram of the present system. In this system, we bring automatic movements of a bed. The present design allows programming an ordered series of movements of the robotic bed that are executed automatically through voice commands of a patient on the bed. The practical results show that the
20 movements are vital in preventing bed-sores in patients who lay in bed for long periods of time. To give the command, system has used Bluetooth module to connect speech recognition application and Arduino. This arrangement allows the

movement of bed according to patient requirement. Also the heartbeat, temperature and oxygen level of the patient is continuously monitored. The speech recognition system app is installed in mobile. The voice activated bed makes use of the speech recognition application, servomotors, microcontroller (Atmega328), Bluetooth module (HC-05), temperature sensor (LM35), Pulseoximeter (MAX30102) and a voltage regulator.

[0044] The system is very helpful for paralysis and physically damaged persons. It allows the automatic movement of bed by using voice i.e. commands according to patient requirement. Monitoring system was set up in the system as an application such as heartbeat, temperature and oxygen level which has been continuously displayed on the android. If the patient crosses any normal temperature, heartbeat or oxygen level, alert notification will be send to the doctor or relative person whose number has been saved in the system and also the buzzer alarm will horn. An alert mechanism is also developed in the application for informing the food and medicine time.

[0045] FIG. 2 represents an apropos photographic view of the prototyped product. This bed can be operated using Bluetooth communication from Android mobile phone to Atmega 328 Microcontroller takes the voice instruction given by the user to lift the patient bed up and down. Here two servomotors are used to control the height of the bed. HC05 Bluetooth device is connected to the Arduino and android device. An alert system is set to provide notification for the relatives or caretaker to give medicine and food to the patient at fixed time. MAX30102 Pulseoximeter detects

the oxygen level and heartbeat of the patient. Continuous temperature measurement is taken by the LM35. The sensors which are connected to Arduino board display the corresponding measured rates and keep on updating for every second. A voltage regulator is used to give 5V to IC .If the patient feels panicked or the measured values by the sensors became high or low, buzzer alarm will horn and an alert message will sent to the doctor or the relatives by the android application.

[0046] Atmega 328- Atmega 328 controls the whole action of the system such as bed movement, health monitoring and alerting etc. Bed control system- Bed control system consist of two servo motors for head and leg portions, ie., head and leg servo. Buzzer- Buzzer produces alert sounds during emergency conditions. Power supply- 12 V adapter is used for the power supply. Heart beat sensor &Blood oxygen sensor – MAX30102 pulse oximeter is used for measuring both heartbeat and oxygen level of the patient. Temperature Sensor-In order to measuring the temperature, LM35 temperature sensor is used. Bluetooth Module-A Bluetooth module HC-05 is used in the hardware to connect the system to the android application for controlling the hardware. Its communication is via serial communication which makes an easy way to interface with controller or PC and an android app-for the bed position adjustment and getting alert messages on the required time, an application named “Voice activated bed” app is developed.

[0047] This bed can be operated using blue tooth communication from Android mobile phone. Microcontroller takes the voice instruction given by the user to lift the patient bed up and down. Here two servomotors are used to control the height of

the bed. Bluetooth device is connected to the Arduino and android device. An alarm is set to provide alert for the relatives or caretaker to give medicine and food to the patient at fixed time. PulseOximeter detects the oxygen level and heartbeat of the patient. Continuous temperature measurement is taken by the LM35. The sensors
5 which are connected to Arduino board display the corresponding measured rates and keep on updating for every second. If the patient's measured health rates are not in the normal range, alert notifications will be sent to the relatives or doctor via the android app and also buzzer alarm will horn at the same time.

[0048] FIG. 3 represents an apropos view of the user interface of the mobile application.

10 We used MIT app inventor to developing an application for controlling the bed movements and monitoring the health conditions. We can create application by dragging and dropping components into a design view and using a visual blocks language to program application behavior. Developers can use to test and adjust the behavior of their apps in real time. In this way, we can quickly build a mobile app
15 and immediately begin to iterate and test. In our application we had used different type of features that helps the user for adjusting his position and getting alert messages for critical conditions and managing his daily tasks.

[0049] The fundamental aim of developing this voice activated bed was to helping the bedridden people. This invention was made by developing an android application.

20 The android application is developed such that it could control the bed movement through arduino by giving voice commands. There is a Bluetooth module which helps in connecting the android app and the Arduino. The application also shows

the health rates such as heart rate, temperature and the oxygen level. It also provides an alerting system by which message notifications are sent to the user's relatives or doctor when the health rate crosses above or below the normal level. The user and their relatives are also able to recognize the time for food and medicine by the time alert technique created in the application. The bed movement can be controlled either by voice or by switches, since there are both these modes are available in the android app.

[0050] This is the system of voice activated hospital bed using the voice commands of patient developed with the speech recognition application. It was prepared with the aim of overcoming the man power. In previous systems, the movement of bed was controlled manually but in this system, it works automatically by using voice command, given by patient requirement. Also the monitoring system has been installed in the application such as heartbeat, temperature and oxygen level which will be continuously displayed on the Android application. The application will also help in indicating the patient's food and medicine time. If the patient crosses any normal temperature, heartbeat or oxygen level, one alert notification will send to the Doctor or relative person whose number has been saved in the application and also the buzzer will horn. Thus the overall system will be a great asset to the bedridden patients.

[0051] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that

follow. The invention is not limited to the described embodiments, versions, or examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge available to the person.

5

#####DIGITALLY SIGNED#####
PREM CHARLES I
Registered Patent Agent INPA-3311
Patent Agent On Behalf of the Applicants

10

CLAIMS

We claim,

1. A smart bedding system for monitoring incapacitated patients, comprising:
 - a plurality of sensors;
 - 5 at least one motor module;
 - one or more pulse oximeters;
 - at least one buzzer module;
 - a communication module;
 - one or more processors; and
 - 10 a user interface.
2. The system as claimed in claim 1 wherein, the said plurality of sensors is preferably a temperature sensor configured to collect the body temperature of the patient.
3. The system as claimed in claim 1 wherein, the said motor module is
15 preferably a servo motor operatively coupled to a battery module configured to raise and lower the bedding system as required.

4. The system as claimed in claim 1 wherein, the said pulse oximeter is configured to collect information on the vital parameters of the heart and lungs to be communicated.

5. The system as claimed in claim 1 wherein, the said buzzer module is configured to raise an alarm in case of emergency attention requirement to the person by the caretaker and the said Bluetooth module is configured to be operatively coupled to a mobile phone towards communicating the patient data.

6. The system as claimed in claims 1, 2, 3, 4 and 5 wherein, the said processor is preferably an Atmega328 configured to receive inputs from the sensors and other components, process the same and deliver the notifications to the user interface through a mobile application.

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Patent Agent On Behalf of the Applicants

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ABSTRACT

A SMART BEDDING SYSTEM FOR MONITORING INCAPACITATED PATIENTS

The present invention relates to the field of biomedical engineering and more
5 particularly it refers to a smart bed assembly integrated with voice control modules
and vital sign monitoring systems in order to enable the ease of monitoring the
patients. This is the system of voice activated hospital bed using the voice
commands of patient developed with the speech recognition application and it
works automatically by using voice command, given by patient requirement. Also
10 the monitoring system has been installed in the application such as heartbeat,
temperature and oxygen level which will be continuously displayed on the Android
application. If the patient crosses any normal temperature, heartbeat or oxygen
level, one alert notification will send to the Doctor or relative person whose number
has been saved in the application and also the buzzer will horn. Thus the overall
15 system will be a great asset to the bedridden patients.

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Patent Agent On Behalf of the Applicants

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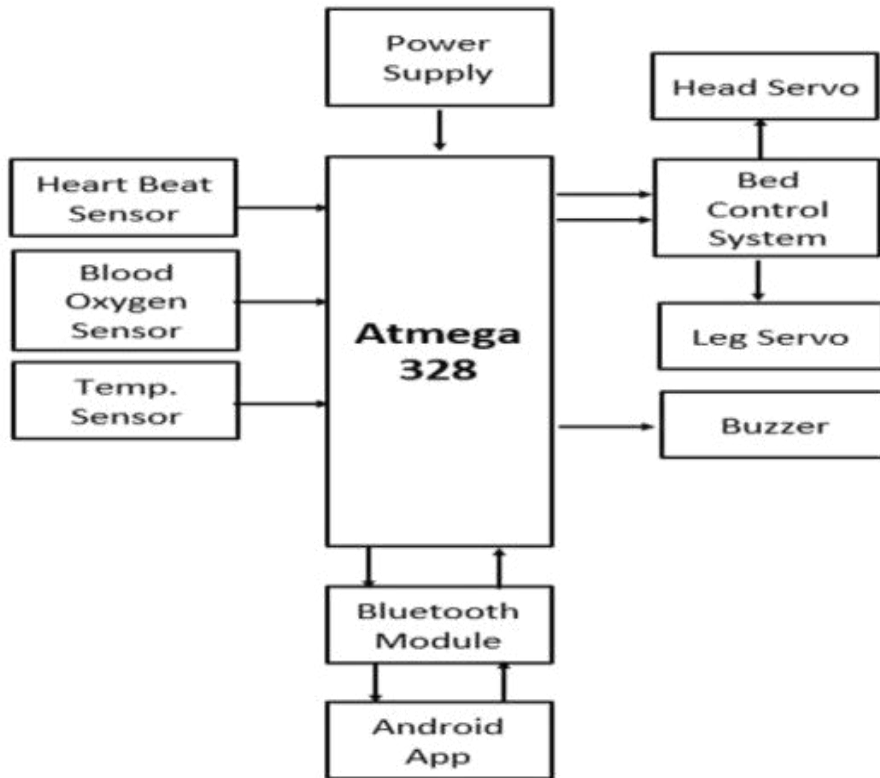


FIGURE 1

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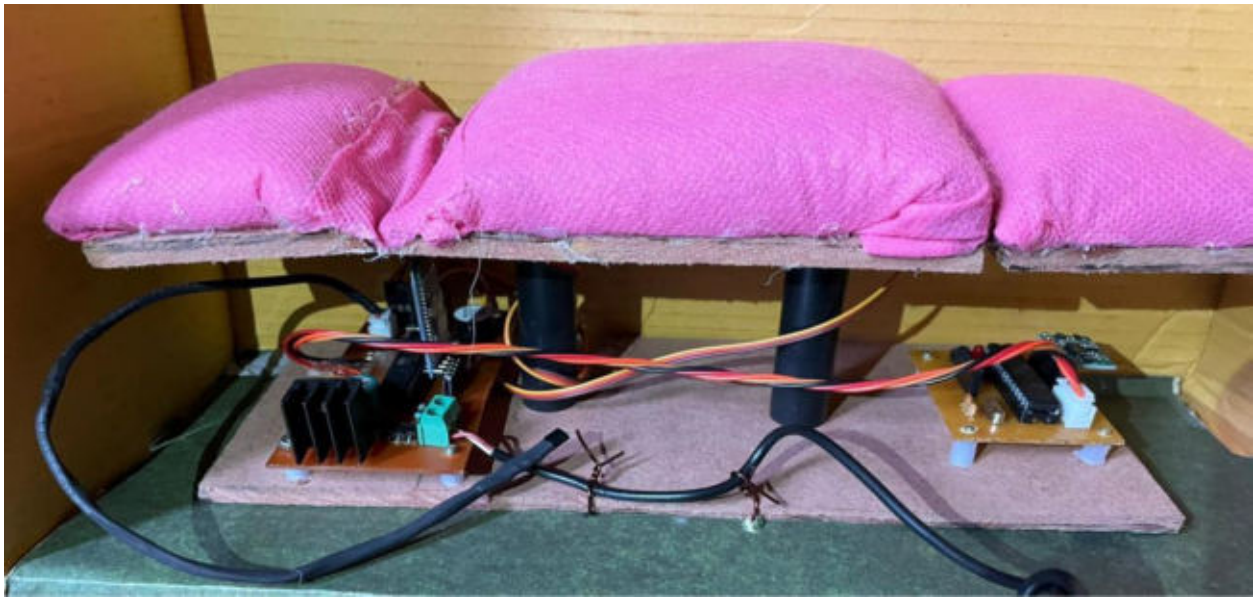


FIGURE 2

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FIGURE 3

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Agent on Behalf of the Applicants

FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241052378 dated 14-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:

NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 14th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241052378** Dated **14th day of Sep , 2022** are

INVENTOR (S):

1	a) Name: b) Nationality: c) Address:	Jyothi Joseph Indian Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
2	a) Name: b) Nationality: c) Address:	Laly James Indian Associate Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
3	a) Name: b) Nationality: c) Address:	Tintu George Indian Associate Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
4	a) Name: b) Nationality: c) Address:	Tinu Francis Indian Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
5	a) Name: b) Nationality: c) Address:	Ankita Sebastian Indian Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
6	a) Name: b) Nationality: c) Address:	Aleena Benny Indian Student, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

Dated This 14thday ofSep,2022

Signature,



NAME: PREM CHARLES I(INPA 3311)

PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

To,

The Controller of Patents, Intellectual Property
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Theni Hwy, Guindy, Chennai, Tamil Nadu- 600032

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/59839/2022-CHE

Dated **13/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

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Name of the signatory

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FORM 18

THE PATENT ACT, 1970
(39 of 1970)
&
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REQUEST/EXPRESS REQUEST FOR EXAMINATION OF APPLICATION FOR PATENT

[See section 11B and rules 20(4) (ii),24B (1) (i)]

1. APPLICANT(S)/OTHER INTERESTED PERSON(S):

APPLICANT(S)

Sr.	Name	Nationality	Address
1	VIMAL JYOTHI ENGINEERING COLLEGE	India	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

2. STATEMENT IN CASE OF REQUEST FOR EXAMINATION MADE BY THE APPLICANT(S)

I/We VIMAL JYOTHI ENGINEERING COLLEGE hereby request that my/our application for patent application number TEMP/E-1/59839/2022-CHE filed on for the titled shall be examined under section 12 and 13 of the Act.

4. ADDRESS FOR SERVICE

Dated this(Final Payment Date):-----

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Name of the signatory

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The Controller of Patents,
The Patent Office
At Chennai

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CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241052378	TEMP/E-1/59839/2022-CHE	1600	36822	FORM 1	A Smart Bedding System for Monitoring Incapacitated Patients
2	E-12/6945/2022/CHE	202241052378	2500	36822	FORM 9	----
3	E-106/5457/2022/CHE	202241052378	0	----	FORM28	----
4	R20224033542	202241052378	4000	36822	FORM 18	----

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001022005	Online Bank Transfer	1409220000351	8100.00	1475001020000001

Total Amount : ₹ 8100.00

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Docket No 88045

Date/Time 15/09/2022

To
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Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241052378	E-5/3721/2022/CHE	0	----	FORM 5	
2	202241052378	E-3/28961/2022/CHE	0	----	FORM 3	
3	202241052377	E-5/3722/2022/CHE	0	----	FORM 5	
4	202241052377	E-3/28962/2022/CHE	0	----	FORM 3	

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निर्गमन सं. 38/2022
ISSUE NO. 38/2022

शुक्रवार
FRIDAY

दिनांक: 23/09/2022
DATE: 23/09/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS

23rd SEPTEMBER, 2022

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202241052379 A

(19) INDIA

(22) Date of filing of Application :14/09/2022

(43) Publication Date : 23/09/2022

(54) Title of the invention : A Device, System and Method for Automated Sorting of Waste Materials in Public Places

(51) International classification :B65F0001140000, B30B0009300000, B65F0001000000, B65F0001160000, B65F0003000000

(86) International Application No Filing Date :PCT/// :01/01/1900

(87) International Publication No : NA

(61) Patent of Addition to Application Number Filing Date :NA :NA

(62) Divisional to Application Number Filing Date :NA :NA

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(57) Abstract :

The present invention relates to a waste management systems. More particularly, the present disclosure pertains to a smart waste sorting system that automatically divides the waste materials collected in public places and a method thereof. The AWSM has four compartments for collecting the wastes. These are for collecting invention, plastics, metals, and food wastes. First, the waste will be deposited into the trap door with sliding mechanism through waste hatch open. After identification using the developed program, trap door will be moved above the corresponding compartment with the help of sliding mechanism and waste will be deposited in that. Trap door will be closed using a spring mechanism after depositing the waste in the corresponding compartment and move back to the waste hatch open.

No. of Pages : 20 No. of Claims : 7



Application Filing Receipt

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CBR Number : 36823

CBR date: 14-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
VIMAL JYOTHI ENGINEERING COLLEGE
Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting be to an application for patent numbered 202241052379 dated 14-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to A Device, System and Method for Automated Sorting of Waste Materials in Public Places together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority of date of filing, whichever earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority of date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

(For Controller of Patents)



Office of the Controller General of Patents, Designs & Trade Marks
Department of Industrial Policy & Promotion,
Ministry of Commerce & Industry,
Government of India

(<http://ipindia.nic.in/index.htm>)



(<http://ipindia.nic.in/index.htm>)

Application Details

APPLICATION NUMBER	202241052379
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	14/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	A Device, System and Method for Automated Sorting of Waste Materials in Public Places
FIELD OF INVENTION	MECHANICAL ENGINEERING
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E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	23/09/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:

Filing Date:

Amount of Fee Paid:

CBR No.:

Signature:

1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	VIMAL JYOTHI ENGINEERING COLLEGE	India	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

2. INVENTOR(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
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			Assistant Professor, Department of Mechanical Engineering, Vimal				

2	Gokulnath R.	India	Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
3	Melvin K. Jiji	India	Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
4	Nived P.	India	Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
5	Shahin Gafoor	India	Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632,	India	Kerala	Kannur	Chemperi

			Kerala, India.				
6	Sreerag M.	India	Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

3. TITLE OF THE INVENTION: A Device, System and Method for Automated Sorting of Waste Materials in Public Places

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5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Title of the Invention
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6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT// /	

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7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application
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8. PARTICULARS FOR FILING PATENT OF ADDITION:**Main Application / Patent Number:****Date of Filing of Main Application****9. DECLARATIONS:****(i) Declaration by the inventor(s)**

I/We ,Sreekanth M..P.,Gokulnath R.,Melvin K. Jiji,Nived P.,Shahin Gafoor,Sreerag M., is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Sreekanth M..P.,Gokulnath R.,Melvin K. Jiji,Nived P.,Shahin Gafoor,Sreerag M.

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the singnatory: VIMAL JYOTHI ENGINEERING COLLEGE,VIMAL JYOTHI ENGINEERING COLLEGE,VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- I am/We are, in the possession of the above mentioned invention.
- There is no lawful ground of objection to the grant of the Patent to me/us.
- I am/We are, the assignee or legal representative to true first inventors.

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	REQUEST FOR EARLY PUBLICATION (FORM-9)	Req. for Publication - Waste Sorting (2).pdf
2	FORM 1	Application for Patent - Waste Sorting (2).pdf
3	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Waste Sorting (2).pdf
4	DRAWINGS	Drawings - Waste Sorting(2).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters

stated hering are correct and I/We request that a patent may be granted to me/us for the said invention.
Dated this(Final Payment Date): -----
Signature:
Name: PREM CHARLES
To The Controller of Patents
The Patent office at CHENNAI

This form is electronically generated.

FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

A Device, System and Method for Automated Sorting of Waste Materials in Public Places

2. APPLICANT(S)

NAME(S)

NATIONALITY

ADDRESS

VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

**A DEVICE, SYSTEM AND METHOD FOR AUTOMATED SORTING OF
WASTE MATERIALS IN PUBLIC PLACES**

TECHNICAL FIELD

[0001] The present invention relates to a waste management systems. More
5 particularly, the present disclosure pertains to a smart waste sorting system that
automatically divides the waste materials collected in public places and a method
thereof.

BACKGROUND OF THE INVENTION

[0002] Background description includes information that may be useful in
10 understanding the present invention. It is not an admission that any of the information
provided herein is prior art or relevant to the presently claimed invention, or that any
publication specifically or implicitly referenced is prior art.

[0003] Waste Management is the process of collecting, treating and disposal of
waste materials. It includes biodegradable and non-biodegradable waste materials.
15 Planning the waste management and recycling all of the rubbish produced in this
country is an enormous task which involves both logistical planning and scientific
knowledge and understanding in order to balance the impact on the environment and
the cost effectiveness of the process. It plays an essential role in the global cleanliness
and sustainability.

20 [0004] The Automatic Waste Sorting Machine or AWSM is developed with the
vision of making the process of waste sorting easier, faster and cheaper. The literature
shows that the necessity of segregation of waste effectively. By keeping this in mind,

design, analysis and fabrication of AWSM is completed. Based on the design calculation and analysis, PVC foam is selected as the material for fabrication. The analysis shows that base of the machine is capable of withstanding the load as von Mises stress (209 N/m²) is less than the yield strength of the material (8.58 10⁶ N/m²),
5 which is the value obtained after applying a factor of safety of 6. Furthermore, testing of the machine is done successfully using the program.

[0005] The actual process behind the sorting mechanism is done using a custom image dataset and accompanying python program running on a raspberry pi 4 micro pc. The custom image dataset was created using Edge Impulse and a modified version of
10 its python SDK was used. The program is based off of python3 and uses the attached pi camera in the raspberry pi to carryout live detection of samples. To allow for the program to identify each internal bins, individual IR sensors where placed next to each bin. These sensors where assigned fixed names inside the program which was based on their connected pin numbers. The 5V rails onboard the raspberry pi 4 was used to power
15 all of these IR sensors using a common breadboard as the connecting dock.

[0006] Two separate motors are used with a high torque DC geared motor acting as the belt drive for moving the trap box while a basic servo motor acts as the door operator. The DC motor is controlled using a separate controller which is in turn operated by the raspberry pi while the servo motor is directly connected to the GPIO
20 pins in the raspberry pi. A 12V power plug supplies the power for the DC motor while the servo motor is powered by the 5V pin in the raspberry pi 4.

[0007] There remains a pressing requirement for a better and efficient system to address the present day requirements and problems and hence this invention provides a solution for the same.

[0008] As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

[0009] In some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiments of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0010] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise

clearly contradicted by context. The use of any and all examples, or exemplary language (e.g. "such as") provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as
5 indicating any non-claimed element essential to the practice of the invention.

[0011] Groupings of alternative elements or embodiments of the invention disclosed herein are not to be construed as limitations. Each group member can be referred to and claimed individually or in any combination with other members of the group or other elements found herein. One or more members of a group can be included
10 in, or deleted from, a group for reasons of convenience and / or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all groups used in the appended claims.

OBJECTS OF THE INVENTION

15 **[0012]** In this disclosure, whenever a composition, an element or a group of elements is preceded with the transitional phrase "comprising", it is understood that we also contemplate the same composition, element or group of elements with transitional phrases "consisting essentially of, "consisting", "selected from the group of consisting of, "including", or "is" preceding the recitation of the composition, element or group of
20 elements and vice versa.

[0013] An object of the invention is to design the base of the machine according to the design load and select appropriate material for it, to identify the wastes generated

generally in parks and develop a program for automatically sorting and placing it in the appropriate bin and to analyze, fabricate, and test the automatic waste sorting machine for parks.

BRIEF DESCRIPTION OF THE DRAWINGS

5 **[0014]** The accompanying drawings are included to provide a further understanding of the present disclosure, and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

10 **[0015]** So that the manner in which the above recited features of the present invention can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings.

15 **[0016]** It is to be noted, however, that the appended drawings illustrate only typical embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

Figure 1 discloses a dimensional line sketch of the device in the present invention.

Figures 2A and 2B discloses an apropos photographic representation of the present invention.

DETAILED DESCRIPTION

[0017] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to clearly communicate the disclosure. However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0018] In the following description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0019] Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be embodied in machine-executable instructions, which may be used to cause a general-purpose or special-purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0020] Various methods described herein may be practiced by combining one or more machine-readable storage media containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a single computer)

and storage systems containing or having network access to computer program(s) coded in accordance with various methods described herein, and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

5 **[0021]** The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and arrangement of
10 elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0022] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For
15 example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

20 **[0023]** Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the scope of the

invention to those of ordinary skill in the art. The invention disclosed may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other
5 embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e.,
10 any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives, modifications and equivalents consistent with the principles and features disclosed. For purpose of clarity,
15 details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not to unnecessarily obscure the present invention.

[0024] Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the
20 pertinent art have given that term as reflected in printed publications and issued patents at the time of filing.

[0025] Waste management is the process of collecting, treating, and disposal of waste materials. It includes biodegradable and non-biodegradable waste materials.

Planning the waste management and recycling all of the rubbish produced in the country like India is an enormous task which involves both logistical planning and scientific knowledge and understanding in order to balance the impact on the environment and the cost effectiveness of the process. It plays an essential role in the global cleanliness and sustainability.

[0026] Figure 1 discloses a dimensional line sketch of the device in the present invention. The AWSM or the Automated Waste Sorting Machine is developed in the vision of sorting out the waste materials which is collected for disposal. Usually, the process involves a large human force for this task. But AWSM makes it easier for the separation of biodegradable and non-biodegradable waste materials from the waste collecting bin itself making the further task of disposing easier.

[0027] During the collection of waste materials for disposal, the main part of the task is separation of waste materials according to its category. The process includes the categorization of waste into biodegradable and non-biodegradable waste.

[0028] Figures 2A and 2B discloses an apropos photographic representation of the present invention. Biodegradable waste are wastes that rot completely in the environment with the bacterial action on it. Whereas, non-biodegradable waste is those waste material that do not rot in environment or does not degrade naturally. Both biodegradable and non-biodegradable waste have to be sorted separately and it requires human workforce.

[0029] In the fabrication process of the invention, aluminium tubes were riveted together to give shape and structure. PVC Foam boards attached to the frame using

rivets. Aluminium channels serve as guideways for movement mechanism. DC Geared motor attached to the frame and wired up for power. Rubber belt attached between motor and pulley to pull trap box Separate motion mechanism for opening trapdoor attached. Waste bins fabricated out of boards and IR sensors placed behind each and control units placed on the platform behind the belt drive and whole setup powered up.

[0030] Conventional waste segregation is tedious and dangerous job. It cost more time and there is a chance of potential harm to the person involved in the task. Moreover, the cost and manpower required is high.

[0031] Even-though, there are different bins provided according to the material category at the public places for the public to dispose waste, the lack of proactiveness from general public has made this task very complicated. Also, adaptability of the segregation system is slow.

[0032] The raspberry pi 4 was loaded with Raspbian buster OS which included necessary python programming environment. After performing a system update necessary pre-requisites were installed including Edge Impulse and its associated SDK.

[0033] The included python3 program was modified with commands added for motor control and sensor data acquisition. Based on initial tests, sensor data and motors were calibrated.

[0034] A custom image dataset was created by collecting dozens of images of waste materials ranging from invention to plastic bottles. These data were fed into the Edge Impulse FOMO model for training and validation. Once the model had attained an accuracy rating of greater than 89% it was packaged and downloaded onto the

development board. The program tested using the fabricated machine worked satisfactorily. Program written using Python is displayed below

[0035] Having noticed the difficulty in the conventional method of waste segregation it is suggested to use an automatic waste sorting machine that could identify the type of waste and segregate it. The machine is portable and more economical when compared to its industrial versions that are even more large in size. The machine uses a combination of image recognition and sensor data to identify and sort the materials. The image data set can be switched out depending on the needs.

[0036] The AWSM has four compartments for collecting the wastes. These are for collecting invention, plastics, metals, and food wastes. First, the waste will be deposited into the trap door with sliding mechanism through waste hatch open. After identification using the developed program, trap door will be moved above the corresponding compartment with the help of sliding mechanism and waste will be deposited in that. Trap door will be closed using a spring mechanism after depositing the waste in the corresponding compartment and move back to the waste hatch open.

[0037] It should be apparent to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the scope of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms “comprises” and “comprising” should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present,

or utilized, or combined with other elements, components, or steps that are not expressly referenced. Where the specification claims refers to at least one of something selected from the group consisting of A, B, Cand N, the text should be interpreted as requiring only one element from the group, not A plus N, or B plus N, etc. The
5 foregoing description of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of
10 equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the scope of the appended claims.

15 **[0038]** All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0039] The invention is not restricted to the details of the foregoing embodiment(s).
20 The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

[0040] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions or examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge available to the person having ordinary skill in the art.

10

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

CLAIMS

We claim:

1. A device, system and method for automated sorting of waste materials in public places, comprising
 - 5 an image capturing device;
 - a plurality of sensors;
 - one or more processors;
 - a plurality of compartmented boxes arranged; and
 - at least one mechanically operated door arrangement.
- 10 2. The device as claimed in claim 1 wherein, the said image capturing device is preferably a camera configured to capture images at a higher rate of FPS and characterized in that is a continuous image capturing system.
3. The device as claimed in claim 1 wherein, the said plurality of sensors may include a bio sensor configured to detect biodegradable and non-biodegradable
 - 15 materials.
4. The device as claimed in claim 1 wherein, the said processor is preferably as Raspberry Pi operatively coupled to the said sensors and image capturing devices.
5. The device as claimed in claims 1 and 4 wherein, the said processor is
 - 20 characterized to have a collection of photographs aiming at processing the images so collected by the image capturing device.
6. The device as claimed in claim 1 wherein, the said plurality of boxes are preferably 4 in numbers and the system is configured to sort the collected waste

in such way as to be split and sorted to each compartment through a mechanical arrangement within.

7. The device as claimed in claims 1 and 6 wherein, the said mechanically operated door arrangement is configured to be operated by the said processor operatively coupled with and further characterized to automatically open and close the door as per the availability of the corresponding category of waste.

10

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent On Behalf of the Applicants

ABSTRACT

**A DEVICE, SYSTEM AND METHOD FOR AUTOMATED SORTING OF
WASTE MATERIALS IN PUBLIC PLACES**

The present invention relates to a waste management systems. More particularly, the
5 present disclosure pertains to a smart waste sorting system that automatically divides
the waste materials collected in public places and a method thereof. The AWSM has
four compartments for collecting the wastes. These are for collecting invention,
plastics, metals, and food wastes. First, the waste will be deposited into the trap door
with sliding mechanism through waste hatch open. After identification using the
10 developed program, trap door will be moved above the corresponding compartment
with the help of sliding mechanism and waste will be deposited in that. Trap door will
be closed using a spring mechanism after depositing the waste in the corresponding
compartment and move back to the waste hatch open.

15

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Patent Agent On Behalf of the Applicants

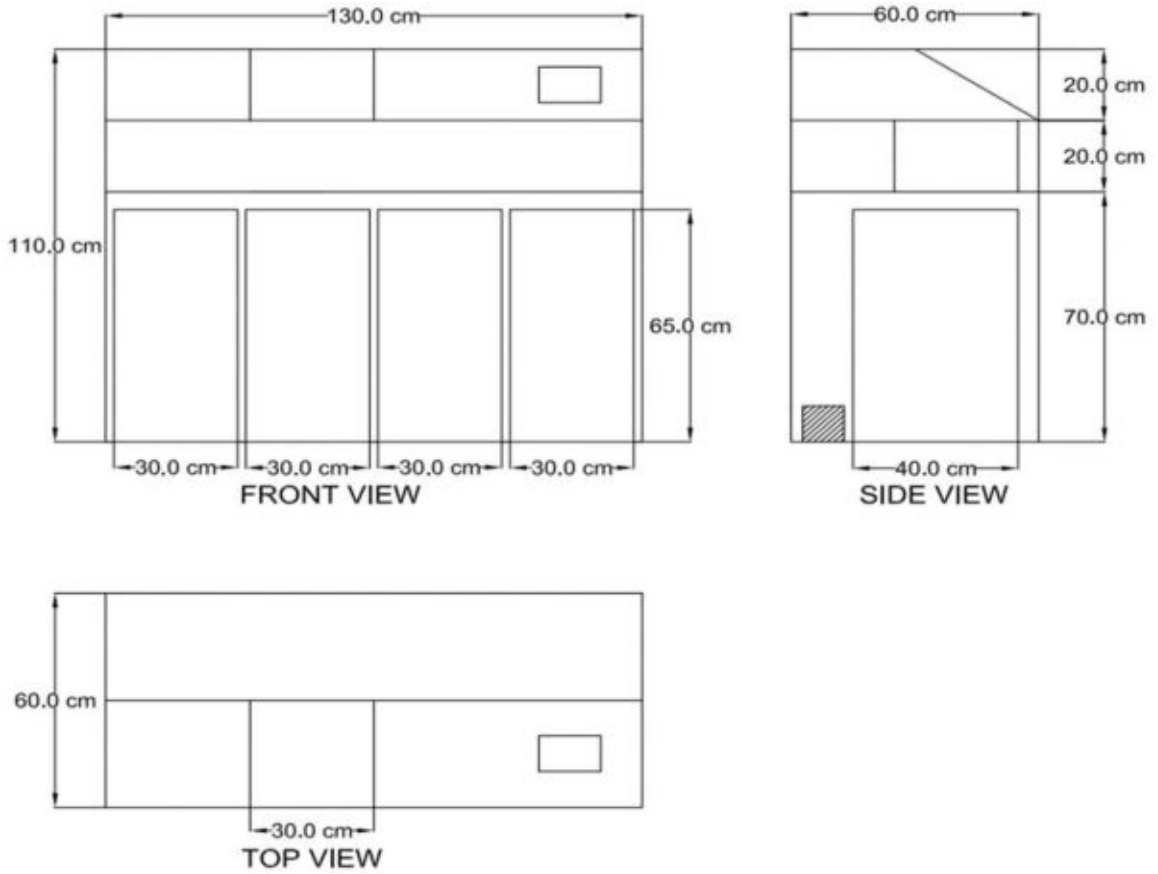


FIGURE 1

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

Applicant(s):
Vimal Jyothi Engineering College.

Total Sheets 2

Patent application No.: 202241052379

Sheet 2 of 2



FIGURE 2A



FIGURE 2B

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Patent Agent On Behalf of the Applicants

FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241052379 dated 14-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:

NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 14th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241052379** Dated **14th day of Sep , 2022** are

INVENTOR (S):

1	a) Name: b) Nationality: c) Address:	Sreekanth M. P. Indian Assistant Professor, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
2	a) Name: b) Nationality: c) Address:	Gokulnath R. Indian Assistant Professor, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
3	a) Name: b) Nationality: c) Address:	Melvin K. Jiji Indian Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
4	a) Name: b) Nationality: c) Address:	Nived P. Indian Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
5	a) Name: b) Nationality: c) Address:	Shahin Gafoor Indian Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
6	a) Name: b) Nationality: c) Address:	Sreerag M. Indian Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

Dated This 14thday ofSep,2022

Signature,



NAME: PREM CHARLES I(INPA 3311)

PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

To,

The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu- 600032

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/58786/2022-CHE

Dated **08/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

Name of the signatory

To,
The Controller of Patents,
The Patent Office,
At Chennai

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G.A.R.6
[See Rule 22(1)]
RECEIPT



Docket No 87237

Date/Time 2022/09/14 06:29:21

To
PREM CHARLES

UserId: prem1987

360E, SENTHUR MURUGAN KOVIL
STREET, OPPOSITE SM MAHAL,
OLDPET

CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241052379	TEMP/E-1/58786/2022-CHE	1600	36823	FORM 1	A Device, System and Method for Automated Sorting of Waste Materials in Public Places
2	202241052380	TEMP/E-1/58787/2022-CHE	1600	36823	FORM 1	A Neural Network Based System for Automated Tracking of Wind Energy
3	202241052381	TEMP/E-1/58789/2022-CHE	1600	36823	FORM 1	An Image Processing Based System to Predict Passwords from Lip sinks
4	E-106/5458/2022/CHE	202241052380	0	----	FORM28	----
5	E-106/5459/2022/CHE	202241052381	0	----	FORM28	----
6	E-106/5460/2022/CHE	202241052379	0	----	FORM28	----
7	E-12/6947/2022/CHE	202241052380	2500	36823	FORM 9	----
8	E-12/6946/2022/CHE	202241052381	2500	36823	FORM 9	----
9	E-12/6948/2022/CHE	202241052379	2500	36823	FORM 9	----

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001022006	Online Bank Transfer	1409220000446	12300.00	147500102000001

Total Amount : ₹ 12300.00

Amount in Words: Rupees Twelve Thousand Three Hundred Only

Received from PREM CHARLES the sum of ₹ 12300.00 on account of Payment of fee for above mentioned Application/Forms.

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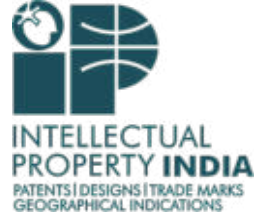
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E-mail: chennai-patent@nic.in
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सत्यमेव जयते



Docket No 88046

Date/Time 15/09/2022

To
PREM CHARLES

User Id: prem1987

360E, SENTHUR MURUGAN KOVIL
STREET, OPPOSITE SM MAHAL,
OLDPET

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241052379	E-5/3723/2022/CHE	0	----	FORM 5	
2	202241052379	E-3/28963/2022/CHE	0	----	FORM 3	
3	202241052380	E-5/3724/2022/CHE	0	----	FORM 5	
4	202241052380	E-3/28964/2022/CHE	0	----	FORM 3	
5	202241052381	E-5/3725/2022/CHE	0	----	FORM 5	
6	202241052381	E-3/28965/2022/CHE	0	----	FORM 3	

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**OFFICIAL JOURNAL
OF
THE PATENT OFFICE**

निर्गमन सं. 38/2022
ISSUE NO. 38/2022

शुक्रवार
FRIDAY

दिनांक: 23/09/2022
DATE: 23/09/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS

23rd SEPTEMBER, 2022

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202241052380 A

(19) INDIA

(22) Date of filing of Application :14/09/2022

(43) Publication Date : 23/09/2022

(54) Title of the invention : A Neural Network Based System for Automated Tracking of Wind Energy

(51) International classification :G06N0003080000, G01R0021000000, G06K0009000000, G16H0050200000, B60W0010080000

(86) International Application No :PCT//
Filing Date :01/01/1900

(87) International Publication No : NA

(61) Patent of Addition to Application Number :NA
Filing Date :NA

(62) Divisional to Application Number :NA
Filing Date :NA

(71)Name of Applicant :

1)VIMAL JYOTHI ENGINEERING COLLEGE

Address of Applicant :Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. Chemperi -----

Name of Applicant : NA

Address of Applicant : NA

(72)Name of Inventor :

1)Dr. Teena George

Address of Applicant :Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

2)Dr. Jayaprakash P

Address of Applicant :Professor, Department of Electrical and Electronics Engineering, Government Engineering College, Wayanad, Mananthavady, Wayanad,- 670644, Kerala, India. Mananthavady -----

(57) Abstract :

The present invention relates to energy production and distribution management systems. More particularly, the present disclosure pertains to an intelligent system based on neural networks that enables automated tracking of wind energy. The power output of generator is calculated based on the instantaneous active and reactive power theory or the p-q theory. The power output of generator is calculated based on the instantaneous active and reactive power theory or the p-q theory. It consists of four layers, Input Layer, Self-Recurrent Wavelet Layer, Rule Layer and Output Layer. The online learning algorithm for constructing the SRWNN model consists of structural learning and a parameter learning algorithms. Initially, there are no wavelet bases in the SRWNN model.

No. of Pages : 22 No. of Claims : 5



Application Filing Receipt

**Government of India
Patent Office**
Intellectual Property Office Building,
G.S.T. Road, Guindy,
Chennai -600032
Phone- 044-22502081-84
Fax: 044-22502066
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CBR Number : 36823

CBR date: 14-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
VIMAL JYOTHI ENGINEERING COLLEGE
Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting to be an application for patent numbered 202241052380 dated 14-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to A Neural Network Based System for Automated Tracking of Wind Energy together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority or date of filing, whichever is earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority or date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

(For Controller of Patents)



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Department of Industrial Policy & Promotion,
Ministry of Commerce & Industry,
Government of India

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Application Details

APPLICATION NUMBER	202241052380
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	14/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	A Neural Network Based System for Automated Tracking of Wind Energy
FIELD OF INVENTION	COMPUTER SCIENCE
E-MAIL (As Per Record)	patents@allinnov.org
ADDITIONAL-EMAIL (As Per Record)	allinnovrnd@gmail.com
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	23/09/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:

Filing Date:

Amount of Fee Paid:

CBR No.:

Signature:

1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	VIMAL JYOTHI ENGINEERING COLLEGE	India	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

2. INVENTOR(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	Dr. Teena George	India	Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
2	Dr. Jayaprakash P	India	Professor, Department of Electrical and Electronics Engineering, Government Engineering College, Wayanad, Mananthavady,	India	Kerala	Wayanad	Mananthavady

Wayanad,- 670644, Kerala, India.
--

3. TITLE OF THE INVENTION: A Neural Network Based System for Automated Tracking of Wind Energy

4. ADDRESS FOR CORRESPONDENCE OF APPLICANT / Telephone No.:
AUTHORISED PATENT AGENT IN INDIA: Fax No.:
 Allinnov Innovation and Intellectual Property Services, #360E, Mobile No: 9790586194
 First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - E-mail: patents@allinnov.org
 635001, Tamil Nadu, India.

5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Title of the Invention
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6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application
-------------------------------------	--

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application
-----------------------------------	------------------------------------

9. DECLARATIONS:

(i) Declaration by the inventor(s)

I/We ,Dr. Teena George,Dr. Jayaprakash P, is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Dr. Teena George, Dr. Jayaprakash P

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the singnatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- The Complete specification relating to the invention is filed with this application.
- I am/We are, in the possession of the above mentioned invention.
- There is no lawful ground of objection to the grant of the Patent to me/us.

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Wind Tracking (6).pdf
2	DRAWINGS	Drawings - Wind Tracking(6).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hering are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

To The Controller of Patents

The Patent office at CHENNAI

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

A Neural Network Based System for Automated Tracking of Wind Energy

2. APPLICANT(S)

NAME(S)

NATIONALITY

ADDRESS

VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

A NEURAL NETWORK BASED SYSTEM FOR AUTOMATED TRACKING OF WIND ENERGY

TECHNICAL FIELD

[0001] The present invention relates to energy production and distribution
5 management systems. More particularly, the present disclosure pertains to an intelligent
system based on neural networks that enables automated tracking of wind energy.

BACKGROUND OF THE INVENTION

[0002] Background description includes information that may be useful in
understanding the present invention. It is not an admission that any of the information
10 provided herein is prior art or relevant to the presently claimed invention, or that any
publication specifically or implicitly referenced is prior art.

[0003] Conventional electrical power generation systems like thermal power plants
are facing problems due to insufficient fossil fuels and emission of green house gases.
Increased electrical energy consumption rate and constraints on increasing the
15 generation of electrical energy from conventional sources leads the world to focus on
alternative renewable energy sources. Renewable energy sources are clean and
inexhaustible. They provides reliable power supplies and fuel diversification, which
enhance energy security, and reduce the need for imported fuels. Moreover, they
produce neither greenhouse gases, which cause climate change, nor polluting
20 emissions. Their costs are also falling at a sustainable rate, whereas the general cost
trend for fossil fuels is in the opposite direction in spite of their present volatility.

[0004] The aim of goal of the Sustainable Development Goals (SDG) is to correct the enormous imbalance in economic growth, social equity, and environmental sustainability by ensuring access to affordable, reliable, and modern energy services by the year 2030. Among renewable energy sources, electrical energy from wind energy conversion system (WECS) has achieved remarkable growth in the past decade. The reason for quick growth is their eco-friendliness when it comes to attain a lower carbonized electricity generation and new policies for increasing the development of new renewable generators.

[0005] The output power of the WECS relies upon the efficacy by which available wind is harnessed to meet the electricity demands. A lot of literature are reported to improve the performance of the WECS and discusses assessing wind energy potential, site matching of wind turbines, and improvement in the design of wind turbines to extract more energy from wind. Wind conditions and geometrical parameters of a wind turbine determine the power generation from wind.

[0006] The machine side converter (MSC) of Type-IV WECS performs functions like maximum power point tracking (MPPT), increasing the voltage level at the dc link to meet the grid requirement, and ensuring sinusoidal current profile in the generator windings. The sinusoidal current profile is maintained by Vienna rectifier used as MSC. The rotational speed of wind generator turbine is to be controlled for maximum power extraction under varying wind speeds. Hence, an MPPT controller is mandatory to trace the particular speed so as to harvest the maximum power from WECS. The MPPT control ensure the wind turbine system to achieve maximum wind energy utilization and maintain maximal aerodynamic efficiency. The wind generator must operate in variable-speed variable-frequency mode to realize maximum wind power extraction.

The malfunction of wind speed sensors cause lot of errors in MPPT control of WECS. Presence of sensors for wind speed measurement, rotor speed and rotor position increase the system cost and, size. Therefore, number of control algorithms are developed with sensor less concept using rotor position speed estimators. This work
5 focuses on the study of the heuristic algorithm called self-recurrent neural network for extraction of maximum power from wind energy conversion systems. The technique do not require the exact model of the system and the measurement of wind speed.

[0007] As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly
10 dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

[0008] In some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some
15 embodiments, the numerical parameters should be construed in light of the number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable. The numerical
20 values presented in some embodiments of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0009] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein can
5 be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g. "such as") provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as
10 indicating any non-claimed element essential to the practice of the invention.

[0010] Groupings of alternative elements or embodiments of the invention disclosed herein are not to be construed as limitations. Each group member can be referred to and claimed individually or in any combination with other members of the group or other elements found herein. One or more members of a group can be included
15 in, or deleted from, a group for reasons of convenience and / or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all groups used in the appended claims.

OBJECTS OF THE INVENTION

20 [0011] In this disclosure, whenever a composition, an element or a group of elements is preceded with the transitional phrase "comprising", it is understood that we also contemplate the same composition, element or group of elements with transitional phrases "consisting essentially of", "consisting", "selected from the group of consisting

of, "including", or "is" preceding the recitation of the composition, element or group of elements and vice versa.

[0012] An object of the invention is to design an efficient self learning system to track and assume the maximum wind energy in a wind power generation system.

5 BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The accompanying drawings are included to provide a further understanding of the present disclosure, and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0014] So that the manner in which the above recited features of the present invention can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings.

15 [0015] It is to be noted, however, that the appended drawings illustrate only typical embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

Figure 1 discloses a circuitry layout of type 4 wind energy conversion system.

Figures 2 discloses the circuitry of the control layout for the present invention.

20 Figure 3 discloses an exemplary representation of the structure of present invention's system.

Figure 4 discloses an apropos learning algorithm of present invention's system.

DETAILED DESCRIPTION

[0016] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to
5 clearly communicate the disclosure. However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0017] In the following description, numerous specific details are set forth in order
10 to provide a thorough understanding of embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0018] Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be
15 embodied in machine-executable instructions, which may be used to cause a general-purpose or special-purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0019] Various methods described herein may be practiced by combining one or
20 more machine-readable storage media containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may

involve one or more computers (or one or more processors within a single computer) and storage systems containing or having network access to computer program(s) coded in accordance with various methods described herein, and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a
5 computer program product.

[0020] The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be
10 understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0021] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary
15 skill in the art that the embodiments may be practiced without these specific details. For example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid
20 obscuring the embodiments.

[0022] Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes and so that

this disclosure will be thorough and complete and will fully convey the scope of the invention to those of ordinary skill in the art. The invention disclosed may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Various modifications will be readily apparent to persons
5 skilled in the art. The general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include
10 both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives, modifications and
15 equivalents consistent with the principles and features disclosed. For purpose of clarity, details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not to unnecessarily obscure the present invention.

[0023] Various terms as used herein are shown below. To the extent a term used in
20 a claim is not defined below, it should be given the broadest definition persons in the pertinent art have given that term as reflected in printed publications and issued patents at the time of filing.

[0024] Figure 1 discloses a circuitry layout of type 4 wind energy conversion system. In a traditional neural network, all inputs and outputs are assumed as independent of each other. But for many control systems, the variables are dependent. Recurrent neural networks perform the same task for every element of a sequence, with the output being dependent on the previous computations. They have a memory element that captures information about the previous states. SRWNN hidden neurons contain local selffeedback loops, which provides it with the memory feature and the necessary information of past values of the signals, which allows it to handle the time-varying inputs, changes occurring in the control environment, etc. The presence of temporal feature makes SRWNN structure simple since a smaller number of neurons is required.

[0025] The wind turbine is connected to permanent magnet synchronous generator and the power generated is fed to the grid through a machine side converter (MSC) and grid side converter (GSC). The control of MSC is designed to achieve maximum power extraction during varying wind speeds. The GSC is controlled to deliver active power available from the wind and it also improves the grid power quality at the point of interconnection (POI) by mitigating the harmonic/reactive demand of the local loads. GSC is also responsible for keeping the constant voltage in the DC-link. In the WECS, Vienna rectifier is controlled for sinusoidal current profile as well as maximum power extraction from the wind. The system is connected to the grid and a local load.

[0026] Figures 2 discloses the circuitry of the control layout for the present invention. The power output of generator is calculated based on the instantaneous active and reactive power theory or the p-q theory. The power output of generator is calculated based on the instantaneous active and reactive power theory or the p-q theory.

[0027] Figure 3 discloses an exemplary representation of the structure of present invention's system. It consists of four layers.

[0028] Layer 1: Input Layer - Layer 1 consists of two inputs, the PMSG power output and generator speed. Nodes in layer 1 transmit the input signals to the second layer. It also transfer input to the output layer with a weight. The input and output of j^{th} node remain same.

[0029] Layer 2: Self-Recurrent Wavelet Layer- In this layer each node includes a mother wavelet and a self-feedback loop. The first derivative of the Gaussian function as the mother wavelet function.

10 [0030] The input signal to any neuron of Layer-2 consists of the signal coming from the input layer plus its own unit delayed weighted output,

[0031] Layer 3: Rule Layer - This layer represents one wavelet rule.

[0032] Layer 4: Output Layer - The output of this layer gives net value of the incoming signals from Layer-3 and Layer-1.

15 [0033] Figure 4 discloses an apropos learning algorithm of present invention's system. The online learning algorithm for constructing the SRWNN model consists of structural learning and a parameter learning algorithms. Initially, there are no wavelet bases in the SRWNN model.

[0034] The first step is to decide when a new wavelet base is generated. For each
20 incoming pattern x_i , the firing strength of a wavelet base can be considered as the degree of the incoming pattern belonging to the corresponding wavelet. An input pattern x_i

with a higher firing strength indicates that its spatial location is nearer to the center of the wavelet base b_{ij} ($i = 1, \dots, n; j = 1, \dots, m$), than those with smaller firing strength. Based on this, the firing strength obtained and in the rule layer can be used as the degree measure. Based on this concept, the firing strength was obtained from Eqn. (6) in the rule layer can be used as the degree measure.

[0035] For generating new wavelet base for a new incoming data, the steps are:

[0036] Step 1: Define a threshold value for the degree measure. The threshold is set between zero and one. A low threshold value generates a smaller number of rules, whereas a high threshold value generates a larger number of rules. Therefore, the selection of the threshold value F_{th} will directly affect the results of dynamic response.

[0037] In the structural learning for SRWNN, F_{th} is set to 0.45, after testing the system with different values between 0 and 1.

[0038] Step 2: Find the maximum degree $F_{max} = \max(F_j) (j = 1, 2, \dots, n)$

[0039] Step 3: Check whether $F_{max} \leq F_{th}$. If $F_{max} \leq F_{th}$, Then a new wavelet base is generated, where F_{th} is a pre-specified threshold that should decay during the learning process, limiting the size of the SRWNN model.

[0040] Step 4: Assign the initial translation and dilation to the new wavelet base and the corresponding weights for the links. The translation, dilation and weights are all adjustable in the parameter learning phase as the aim is to minimize an objective function.

[0041] Hence, the translation, dilation and weights for the new wavelet base are set as below: $d_{jk}(t + 1) = x_i(t)$ (4.33) $m_{jk}(t + 1) = m_{int}$ (4.34) $w_{sj}(t + 1) = w_{4j}(t + 1) = w_{3j}(t + 1) = w_0$ where $x_i(t)$ is the new incoming data at time t ; the connection weight of the output layer and feedback weights are initially selected as a random variable in the
5 range between -1 and 1. The dilation factor is selected as m_{int} pre-specified constant.

[0042] Step 5: Continue step 3 and Step 4, till $F_{max} > F_{th}$. The structure of the SRWNN is adjusted by structural learning according to the current pattern, then the network begins to adjust the parameters of the SRWNN such as selfrecurrent weight, connection weights, and feedback weight optimally with the same training pattern by
10 using parameter learning method. In the parameter learning algorithm, the weights are updated so as to minimize the energy function. The output obtained from SRWNN is the reference speed of generator corresponding to the maximum power output from the wind turbine.

[0043] It should be apparent to those skilled in the art that many more modifications
15 besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the scope of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms “comprises” and “comprising”
20 should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined with other elements, components, or steps that are not expressly referenced. Where the specification claims refers to at least one of something

selected from the group consisting of A, B, Cand N, the text should be interpreted as requiring only one element from the group, not A plus N, or B plus N, etc. The foregoing description of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily
5 modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.
10 Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the scope of the appended claims.

[0044] All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or
15 process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0045] The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and
20 drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

[0046] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the

basic scope thereof. The scope of the invention is determined by the claims that follow.

The invention is not limited to the described embodiments, versions or examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge available to the person

5 having ordinary skill in the art.

#####DIGITALLY SIGNED#####

PREM CHARLES I

REGISTERED PATENT AGENT INPA-3311

Patent Agent On Behalf of the Applicants

10

CLAIMS

We claim:

1. A neural network based system and setup for automated tracking of wind energy, comprising
5 a self recurrent wavelet neural network;
 unit sine template generation; and
 a plurality of layers;
2. The system as claimed in claim 1 wherein, the said self recurrent neural network is configured to perform its functions through an artificial intelligence based
10 algorithm.
3. The system as claimed in claims 1 and 2 wherein, the said unit sine template generation is performed within the controller in order to ensure the algorithm perform in varied input energies.
4. The system as claimed in claim 1 wherein, the said plurality of layers of the
15 system are configured to be four in numbers.
5. The system as claimed in claims 1 and 4 wherein, the said plurality of layers are It consists of four layers, Input Layer, Self-Recurrent Wavelet Layer, Rule Layer and Output Layer.

20

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent On Behalf of the Applicants

ABSTRACT

A NEURAL NETWORK BASED SYSTEM FOR AUTOMATED TRACKING OF WIND ENERGY

The present invention relates to energy production and distribution management
5 systems. More particularly, the present disclosure pertains to an intelligent system
based on neural networks that enables automated tracking of wind energy. The power
output of generator is calculated based on the instantaneous active and reactive power
theory or the p-q theory. The power output of generator is calculated based on the
instantaneous active and reactive power theory or the p-q theory. It consists of four
10 layers, Input Layer, Self-Recurrent Wavelet Layer, Rule Layer and Output Layer. The
online learning algorithm for constructing the SRWNN model consists of structural
learning and a parameter learning algorithms. Initially, there are no wavelet bases in the
SRWNN model.

15

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Patent Agent On Behalf of the Applicants

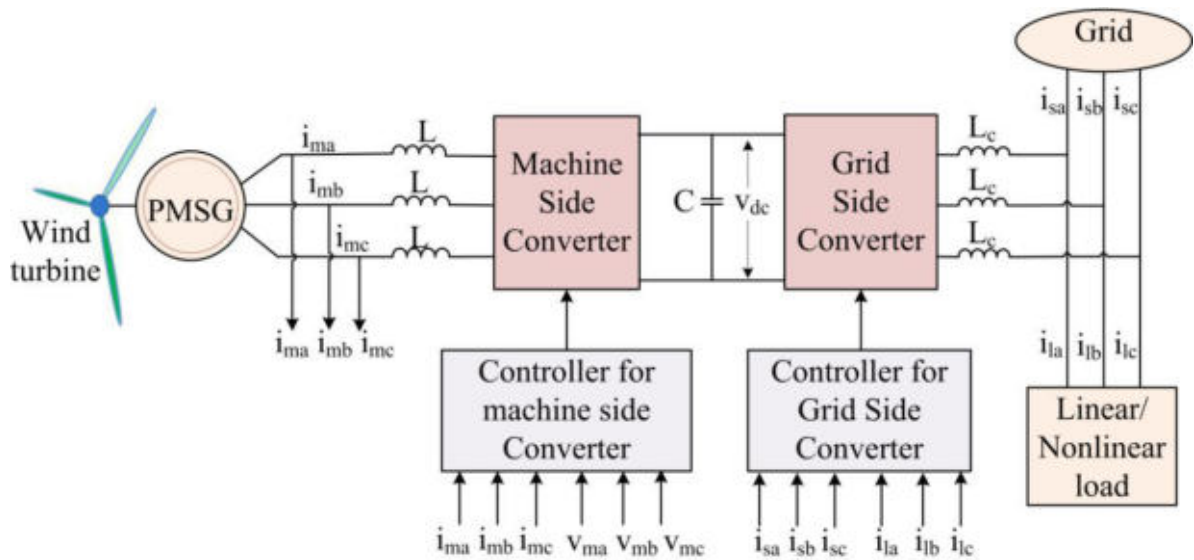


FIGURE 1

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Patent Agent On Behalf of the Applicants

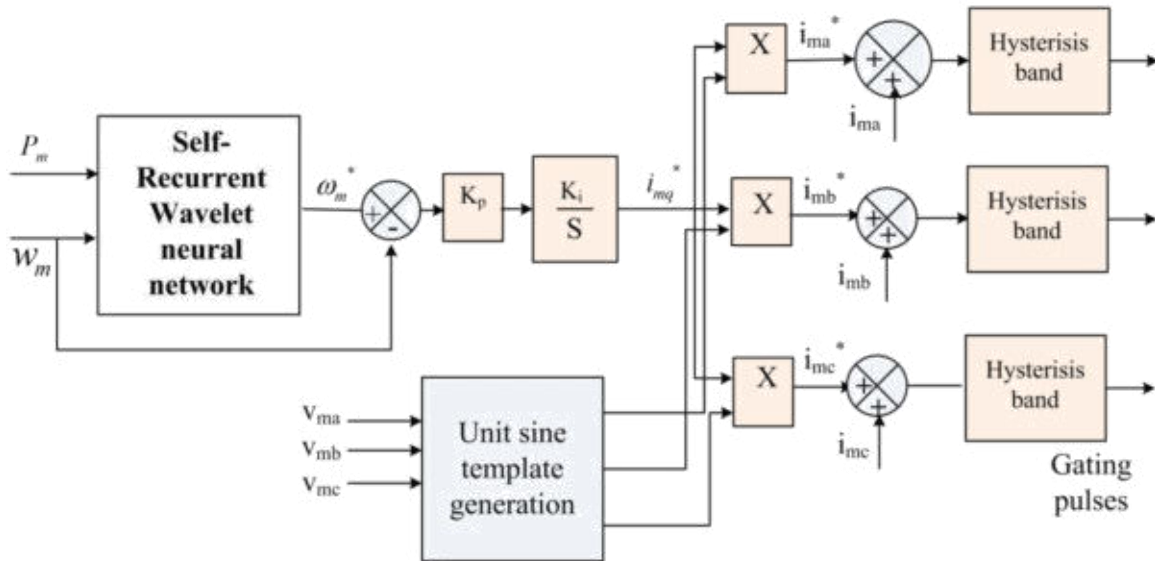


FIGURE 2

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Patent Agent On Behalf of the Applicants

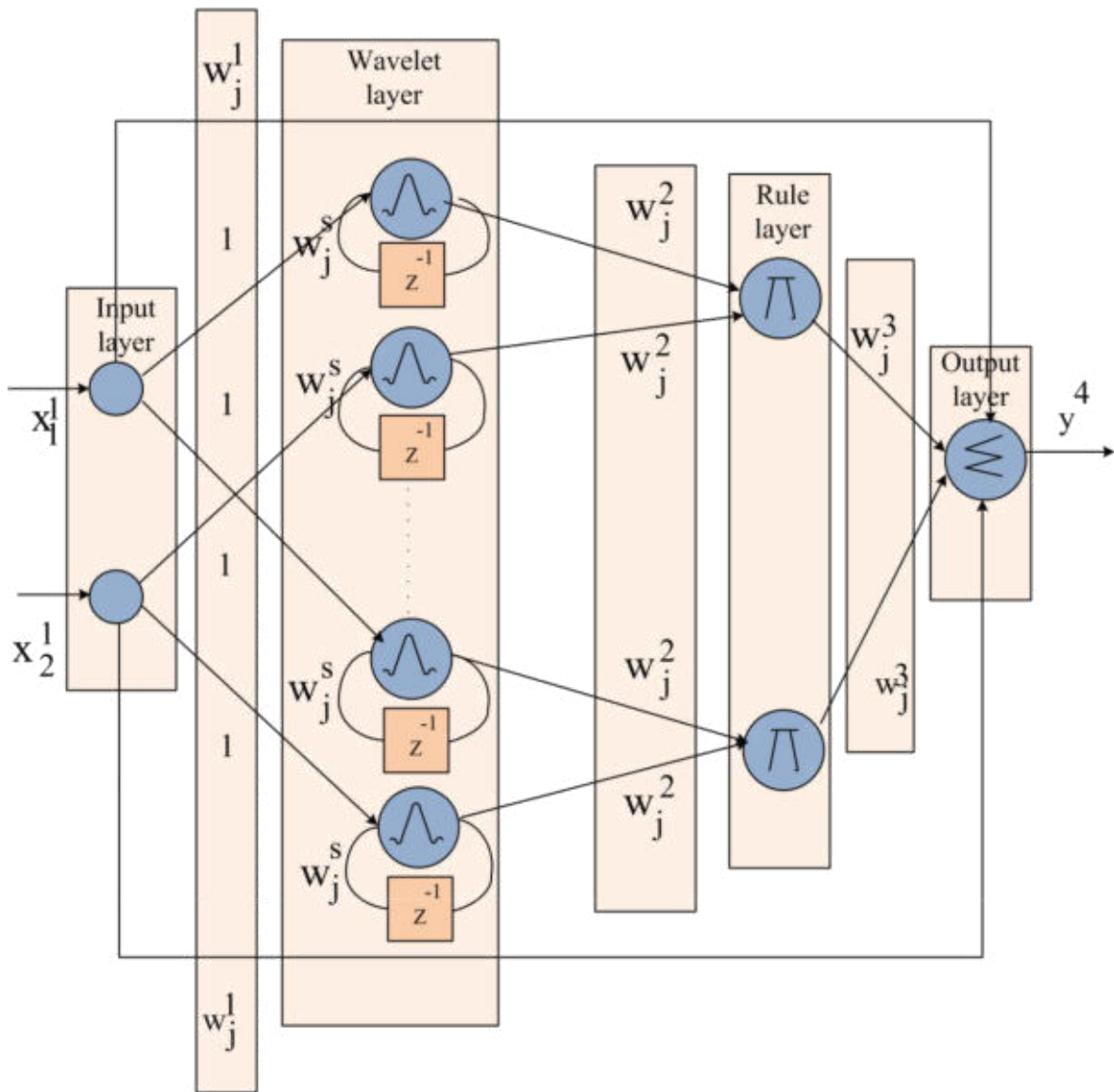


FIGURE 3

#####DIGITALLY SIGNED#####
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Patent Agent On Behalf of the Applicants

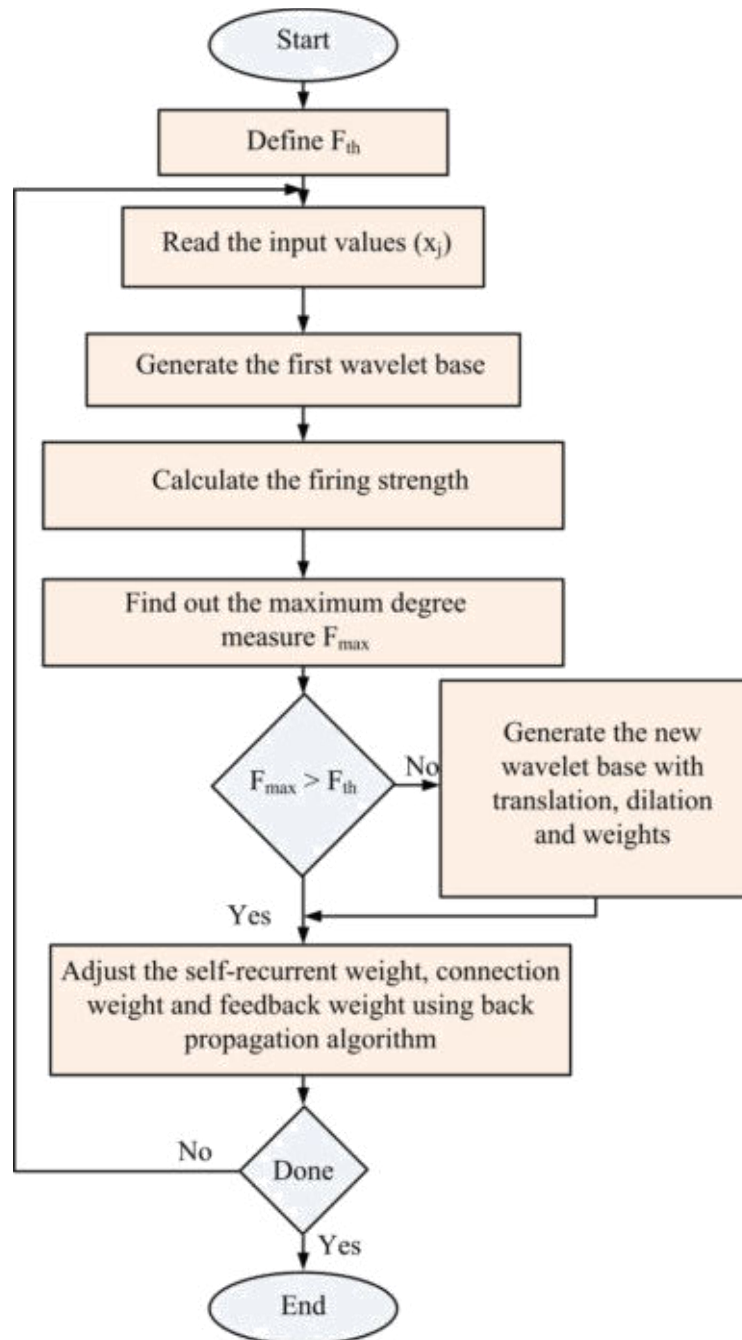


FIGURE 4

#####DIGITALLY SIGNED#####
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Patent Agent On Behalf of the Applicants

FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241052380 dated 14-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:

NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 14th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241052380** Dated **14th day of Sep , 2022** are

INVENTOR (S):

1 a) Name:

Dr. Teena George

b) Nationality:

Indian

c) Address:

Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

2 a) Name:

Dr. Jayaprakash P

b) Nationality:

Indian

c) Address:

Professor, Department of Electrical and Electronics Engineering, Government Engineering College, Wayanad, Mananthavady, Wayanad,- 670644, Kerala, India.

Dated This 14th day of Sep, 2022

Signature,



NAME: PREM CHARLES I (INPA 3311)

PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A.-

To,

The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu- 600032

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/58787/2022-CHE

Dated **08/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

Name of the signatory

To,
The Controller of Patents,
The Patent Office,
At Chennai

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सत्यमेव जयते

G.A.R.6
[See Rule 22(1)]
RECEIPTController General of Patents, Designs & Trade
Marks

Docket No 87237

Date/Time 2022/09/14 06:29:21

To
PREM CHARLES

UserId: prem1987

360E, SENTHUR MURUGAN KOVIL
STREET, OPPOSITE SM MAHAL,
OLDPET

CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241052379	TEMP/E-1/58786/2022-CHE	1600	36823	FORM 1	A Device, System and Method for Automated Sorting of Waste Materials in Public Places
2	202241052380	TEMP/E-1/58787/2022-CHE	1600	36823	FORM 1	A Neural Network Based System for Automated Tracking of Wind Energy
3	202241052381	TEMP/E-1/58789/2022-CHE	1600	36823	FORM 1	An Image Processing Based System to Predict Passwords from Lip sinks
4	E-106/5458/2022/CHE	202241052380	0	----	FORM28	----
5	E-106/5459/2022/CHE	202241052381	0	----	FORM28	----
6	E-106/5460/2022/CHE	202241052379	0	----	FORM28	----
7	E-12/6947/2022/CHE	202241052380	2500	36823	FORM 9	----
8	E-12/6946/2022/CHE	202241052381	2500	36823	FORM 9	----
9	E-12/6948/2022/CHE	202241052379	2500	36823	FORM 9	----

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001022006	Online Bank Transfer	1409220000446	12300.00	1475001020000001

Total Amount : ₹ 12300.00

Amount in Words: Rupees Twelve Thousand Three Hundred Only

Received from PREM CHARLES the sum of ₹ 12300.00 on account of Payment of fee for above mentioned Application/Forms.

* This is a computer generated receipt, hence no signature required.

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G.S.T. Road, Guindy, Chennai-600032
Tel No. (091)(044) 22502081-84 Fax No. 044 22502066
E-mail: chennai-patent@nic.in
Web Site: www.ipindia.gov.in



सत्यमेव जयते



Docket No 88046

Date/Time 15/09/2022

To
PREM CHARLES

User Id: prem1987

360E, SENTHUR MURUGAN
KOVIL STREET, OPPOSITE SM
MAHAL, OLDPET

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241052379	E-5/3723/2022/CHE	0	----	FORM 5	
2	202241052379	E-3/28963/2022/CHE	0	----	FORM 3	
3	202241052380	E-5/3724/2022/CHE	0	----	FORM 5	
4	202241052380	E-3/28964/2022/CHE	0	----	FORM 3	
5	202241052381	E-5/3725/2022/CHE	0	----	FORM 5	
6	202241052381	E-3/28965/2022/CHE	0	----	FORM 3	

Total Amount : ₹ 0

Amount in Words: Rupees Only

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**OFFICIAL JOURNAL
OF
THE PATENT OFFICE**

निर्गमन सं. 38/2022
ISSUE NO. 38/2022

शुक्रवार
FRIDAY

दिनांक: 23/09/2022
DATE: 23/09/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS

23rd SEPTEMBER, 2022

(54) Title of the invention : An Image Processing Based System to Predict Passwords from Lip sinks

(51) International classification :G06K0009000000, G06K0009460000, G06K0009620000, G06F0021320000, G06T0007246000

(86) International Application No Filing Date :PCT// / :01/01/1900

(87) International Publication No : NA

(61) Patent of Addition to Application Number Filing Date :NA :NA

(62) Divisional to Application Number Filing Date :NA :NA

(71)**Name of Applicant :**
1)VIMAL JYOTHI ENGINEERING COLLEGE
 Address of Applicant :Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. Chemperi -----

Name of Applicant : NA
Address of Applicant : NA

(72)**Name of Inventor :**
1)Ambili M. A.
 Address of Applicant :Assistant Professor, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

2)Theertha P.
 Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

--

3)Uthara Narayanan C. K.
 Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

--

4)Kavya K. K.
 Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

--

(57) Abstract :
 The present invention relates to a computer vision and image processing and more particularly, the present disclosure pertains to an intelligent system to predict the passwords from a person using the lip movements. The present methodology exploits visual information by means of feature detector and descriptor techniques. This system is not an alternative to biometric verification. Biometric verification is the best possible verification system of all methods. This is an alternative to enter the password. It reduces keyboard based password theft. System will take time because it involves video processing and deep learning. If we use powerful systems, time will reduce.

No. of Pages : 26 No. of Claims : 4



Application Filing Receipt

**Government of India
Patent Office**
Intellectual Property Office Building,
G.S.T. Road, Guindy,
Chennai - 600032
Phone- 044-22502081-84
Fax: 044-22502066
e-mail: chennai-patent@nic.in

CBR Number : 36823

CBR date: 14-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
VIMAL JYOTHI ENGINEERING COLLEGE
Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting to be an application for patent numbered 202241052381 dated 14-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to An Image Processing Based System to Predict Passwords from Lip prints together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority or date of filing, whichever is earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority or date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

(For Controller of Patents)



Office of the Controller General of Patents, Designs & Trade Marks
Department of Industrial Policy & Promotion,
Ministry of Commerce & Industry,
Government of India

(<http://ipindia.nic.in/index.htm>)



(<http://ipindia.nic.in/index.htm>)

Application Details

APPLICATION NUMBER	202241052381
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	14/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	An Image Processing Based System to Predict Passwords from Lip sinks
FIELD OF INVENTION	COMPUTER SCIENCE
E-MAIL (As Per Record)	patents@allinnov.org
ADDITIONAL-EMAIL (As Per Record)	allinnovrnd@gmail.com
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	23/09/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:

Filing Date:

Amount of Fee Paid:

CBR No.:

Signature:

1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	VIMAL JYOTHI ENGINEERING COLLEGE	India	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

2. INVENTOR(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	Ambili M. A.	India	Assistant Professor, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
			Student, Department of Computer Science and Engineering, Vimal Jyothi				

2	Theertha P.	India	Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
3	Uthara Narayanan C. K.	India	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
4	Kavya K. K.	India	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

3. TITLE OF THE INVENTION: An Image Processing Based System to Predict Passwords from Lip sinks

**4. ADDRESS FOR CORRESPONDENCE OF APPLICANT /
AUTHORISED PATENT AGENT IN INDIA:**
Allinnov Innovation and Intellectual Property Services, #360E,
First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri -
635001, Tamil Nadu, India.

Telephone No.:

Fax No.:

Mobile No: 9790586194

E-mail: patents@allinnov.org

5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Title of the Invention
--------	---------	--------------------	-------------	-----------------------	------------------------

6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT// /	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application
-------------------------------------	--

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application
-----------------------------------	------------------------------------

9. DECLARATIONS:**(i) Declaration by the inventor(s)**

I/We ,Ambili M. A.,Theertha P.,Uthara Narayanan C. K.,Kavya K. K., is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Ambili M. A.,Theertha P.,Uthara Narayanan C. K.,Kavya K. K.

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the singnatory: VIMAL JYOTHI ENGINEERING COLLEGE,VIMAL JYOTHI ENGINEERING COLLEGE,VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- I am/We are, in the possession of the above mentioned invention.
- There is no lawful ground of objection to the grant of the Patent to me/us.
- I am/We are, the assignee or legal representative to true first inventors.

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Password Grabber(13).pdf
2	DRAWINGS	Drawings - Password Grabber(13).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hereing are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

To The Controller of Patents

The Patent office at CHENNAI

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

An Image Processing Based System to Predict Passwords from Lip sinks

2. APPLICANT(S)

NAME(S)

NATIONALITY

ADDRESS

VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

AN IMAGE PROCESSING BASED SYSTEM TO PREDICT PASSWORDS FROM LIP SINKS

TECHNICAL FIELD

[0001] The present invention relates to a computer vision and image processing and
5 more particularly, the present disclosure pertains to an intelligent system to predict the
passwords from a person using the lip movements.

BACKGROUND OF THE INVENTION

[0002] Background description includes information that may be useful in
understanding the present invention. It is not an admission that any of the information
10 provided herein is prior art or relevant to the presently claimed invention, or that any
publication specifically or implicitly referenced is prior art.

[0003] One of the best methods for preventing security breaches from penetrating
confidential information is by choosing a strong password. Lip analysis is considered
an appealing methodology for different researchers because it has the ability to
15 understand audio and visual information. The proposed methodology exploits visual
information by means of feature detector and descriptor techniques. The visual
information is encoded as a set of feature descriptors for the selected visual source.
These descriptors are fed into classification model in order to identify corresponding
English words(digits) from a predefined lexicon based on input features.

20 **[0004]** Here, three techniques have been employed for visual feature detection and
description. Such techniques are SURF (Speeded Up Robust Features), HoG
(Histogram of Oriented Gradient) and Haar for extracting lip contour features from

visual source. In order to recognize the digits from visual sources, the feature vectors produced from the aforementioned techniques, are fed separately into a unit named 3DCNN(3D convolutional neural network), which identifies corresponding English figures from a predefined lexicon based on input features. The proposed silent password framework is divided into two directions; the first direction is used for extracting features from captured lip image that relies on using image recognition technologies and the second direction is used for modeling sequence of lip movements to capture a sequence of words or phonemes that relies on time-series machine learning technologies. The traditional image recognition algorithms such as SURF, Hog, and Haar have been chosen based on their remarkable efficacy and reported accuracy in image recognition.

[0005] The proposed system begins with the creation of a dataset that consists of several recorded video or image samples of digits from zero to nine. A registered user can enter into his/her system using an initially created username and password. User verification is based on two basic modules: closed set module and open set module. The closed set module is used for identifying users who are stored in database while the users of the open set module are not stored in database. Once the initial authentication is completed, the system performs second authentication which uses a silent password that overcomes most of written password attacks. This depends mainly on capturing face features and then extracts the lip movements at the same time. The original stored user lip password is recalled from the host server and is matched with the entered lip password. If both lip passwords are matched, the user is granted access to the system; otherwise access is denied.

[0006] Securing data either written or spoken is a challenging issue in which the data could be easily stolen. Hence a system is introduced as an alternative to protect users privacy from the above mentioned issues by using lip movement.

[0007] A prior art proposed a neural network based lip reading system that is
5 designed to lip read sentences covering a wide range of vocabulary and to recognise words that may not be included in system training. The system contains a viseme classifier to classify spoken visemes from people speaking in silent videos and a word detector to perform viseme to word conversion using perplexity analysis. A CNN based detector SSD can be used for detecting face appearances and to recognise facial
10 landmarks.

[0008] Data preprocessing stage where the region of interest is extracted from the videos using facial landmark detection to provide the input to the Visual Frontend. A spatial-temporal visual frontend that inputs a sequence of images of lip regions and outputs one feature vector per frame. A sequence processing module known as the
15 viseme classifier that inputs the sequence of per-frame feature vectors and outputs a sequence of visemes. Finally a module that matches visemes to words and predicts the uttered sentence using perplexity analysis. The first architecture is used for viseme classification that consists of spatial-temporal visual frontend with an attention based transformer and the predicted visemes provide the input of next architecture. The
20 second architecture is also an attention-based transformer used to predict the spoken words given the uttered visemes using a calculated metric called perplexity. Both the viseme classifier and the word detector consist of common blocks including fully connected layers, self-attention layers and feed-forward layers. The transformer model has an encoder-decoder structure with multi-head attention layers used as building

blocks. The encoder used is a stack of self-attention layers, where the input tensor serves as the attention queries, keys and values at the same time. The decoder has 3 fully connected layer blocks and decoder produces character probabilities which are directly matched to the ground truth labels.

5 [0009] Another prior art proposed a Speaker Authentication network based on Dynamic Talking Habit (SA-DTH-Net in short) is be used to examine whether the lip subsequence complies to the client's talking habit when pronouncing a specific word.

[0010] Yet another prior art proposed that mutual information (MI) is a fundamental quantity for measuring the relationship between two random variables.
10 MI-based constraint is a promising tool for learning good features in an unsupervised way. CNN layer is applied on the raw frames, in order to perform an initial spatial temporal alignment in the sequence for effective recognition. LMIM and GMIM to make the model to pay more attention to the speech content and less to various noises appeared in the speaking process.

15 [0011] Yet another prior art stated that One of the challenging tasks in Lip Reading for numerous reasons. First, the video data set consists of multiple videos for each class. The primary goal is to achieve a compromise between the ability of the features to accurately replicate the shape, contour, and orientation of the lips and at the same time being efficient, as the model is trained using these features. Face representation at
20 different angles gives less information about facial representation than the frontal full image. Patch Based Partial Representation (PBPR) is used for face recognition at different poses. This method is comprised of three stages such as face pose normalization, unoccluded facial texture detection, and patch-wise feature extraction.

[0012] With the help of orthographic inventionion and five stable points on the face such as the centers of the eyes, the tip of the nose and two mouth corners are used to create a 3D generic shape model from 2D faces image at different angles. From unoccluded facial texture detection, it is possible to recover the texture lost by occlusion. Then, Dual-cross patterns feature combined with PCA processing is used to recover face images from unoccluded patches.

[0013] Though the prior arts have addressed the issue considerable levels, there is still a pressing requirement to develop a system which is far more efficient and better compared to the existing ones and the present invention provides a solution.

[0014] As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

[0015] In some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiments of the invention may contain certain errors

necessarily resulting from the standard deviation found in their respective testing measurements.

[0016] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g. “such as”) provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0017] Groupings of alternative elements or embodiments of the invention disclosed herein are not to be construed as limitations. Each group member can be referred to and claimed individually or in any combination with other members of the group or other elements found herein. One or more members of a group can be included in, or deleted from, a group for reasons of convenience and / or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all groups used in the appended claims.

OBJECTS OF THE INVENTION

[0018] In this disclosure, whenever a composition, an element or a group of elements is preceded with the transitional phrase "comprising", it is understood that we also contemplate the same composition, element or group of elements with transitional phrases "consisting essentially of, "consisting", "selected from the group of consisting
5 of, "including", or "is" preceding the recitation of the composition, element or group of elements and vice versa.

[0019] The objects of the present invention are to design a lip reading based user authentication to prevent users privacy from leakage and to enhance privacy protection and to create a lip reading based password analyzer as an alternative to entered
10 password. The lip reading recognition model can be trained on datasets of real-time broadcast videos, including video samples from news broadcasts to explore the proposed approach for speaker independent video speech recognition system.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The accompanying drawings are included to provide a further understanding
15 of the present disclosure, and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0021] So that the manner in which the above recited features of the present
20 invention can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings.

[0022] It is to be noted, however, that the appended drawings illustrate only typical embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

Figure 1 discloses the overall architecture of the present system.

5 Figures 2 represents the use case diagram of the present system.

Figures 3A, 3B and 3C represents exemplary block diagrams of the data flow diagram for the present system at levels 0, 1 and 2 respectively.

DETAILED DESCRIPTION

[0023] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to clearly communicate the disclosure. However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

15 [0024] In the following description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0025] Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be embodied in machine-executable instructions, which may be used to cause a general-

purpose or special-purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0026] Various methods described herein may be practiced by combining one or more machine-readable storage media containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a single computer) and storage systems containing or having network access to computer program(s) coded in accordance with various methods described herein, and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

[0027] The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0028] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For example, circuits, systems, networks, processes, and other components may be shown

as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

5 **[0029]** Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those of ordinary skill in the art. The invention disclosed may, however,
10 be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as
15 well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary
20 embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives, modifications and equivalents consistent with the principles and features disclosed. For purpose of clarity, details relating to technical material that is known in the technical fields related to the

invention have not been described in detail so as not to unnecessarily obscure the present invention.

[0030] Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the pertinent art have given that term as reflected in printed publications and issued patents at the time of filing.

[0031] Initially the images are captured from the webcam. In video streaming, a series of images are captured in the form of frames. All the images are captured and similar images are omitted, thus displays only one image from the similar type of image set. The captured frames are subdivided into segments and each segment is matched with the predefined cascade feature classifier of the faces. Each pixel value in the respective segment of the image is matched with inbuilt haar-like feature set. If any of the features is matched with predefined set then the segments will be considered otherwise they will be rejected

[0032] SURF is a fast and robust algorithm for local, similarity invariant representation and comparison of images. It is composed of three steps which are feature extraction, feature description, and feature matching. SURF descriptors have been used to locate and recognize objects, people or faces, to reconstruct 3D scenes, to track objects and to extract points of interest.

[0033] HoG is a technique that counts events of gradient orientation in a specific portion of an image or region of interest. It focuses on the structure of the object and extracts the information of the edges magnitude as well as the orientation of the edges.

For a wide image, crop the image to the specific part in which HOG feature extraction is to be applied, and then resize it to the appropriate shape. After resizing, the gradients in the x and y directions are calculated. For a function $f(x,y)$, the gradient is the vector (f_x, f_y) . These vectors have direction $\tan^{-1}(f_y/f_x)$ and magnitude.

5 **[0034]** Figure 1 discloses the overall architecture of the present system. Module 1: Speaker utters the first digit such as "zero" of the silent password by moving the lips, without making any noise. Module 2: Upon obtaining the lip motions, face detection and lip localization is applied to it. Module 3: By using feature extraction algorithms namely SURF, HoG and Haar, the necessary features are extracted. Module 4: The
10 extracted features are then separately fed into different Gated Recurrent Units for the prediction of digits and Module 5: The predicted digits are then added to a register and the above four modules are repeated until the entire password is uttered correctly by the user.

[0035] Dataset is created by recording video of lip movements for various digits.
15 The dataset consists of up to several utterances of all the digits from zero to nine, spoken by different speakers. All videos are almost of the same length, and the word occurs in the middle of the video.

[0036] Using openCV, the face and lip of the user is detected and the region of interest of the lip is cropped out. Color space is represented by three different channels
20 Red, Green, and Blue. The three primary colors are added to produce 16.777.216 distinct colors in an 8-bit per channel RGB system. In OpenCV, images are converted into multidimensional arrays, which greatly simplifies their manipulation. For instance, a gray scale image is interpreted as a 2D array with pixels varying from 0 to 255.

[0037] The cropped area is subjected to three types of feature extraction techniques: Hog feature extraction, SURF feature extraction and Haar feature extraction

[0038] In the three methods, the feature parameters are given in an array of vectors with variable length (based on the employed technique), that represents the descriptors of lip contour. The Surf feature vector is obtained by dividing the lip rectangle into 4 main sub-regions that represent the key points of the lip in the x and y directions. For each sub-region, Surf calculates the gradient of the 4 corner in 4 directions to produce a total of 16 dimensions' feature vector. For all 4 sub-regions, a total of 64 feature vector is produced whole the whole lip rectangle.

[0039] For HoG feature descriptor, the technique works by dividing the image into small connected regions called cells, and for each cell compute a histogram of gradient directions or edge orientations for the pixels within the cell and discretizing each cell into angular bins according to the gradient orientation. Moreover, adjacent cells are grouped together in spatial regions to form blocks. The grouping of cells into a block is the basis for grouping and normalization of histograms. To obtain feature description of lip region, HoG normalizes the group of histograms represented in the block histogram. The set of these block histograms represents the descriptor.

[0040] Haar-like feature extract and describe lip region by considering adjacent rectangular regions at a specific location in a detection window, then sums up the pixel intensities in each region using integral image, and calculates the feature value, which is the difference between these sums. The feature value is then compared to a learned threshold that separates non objects from objects (e.g. lips).

[0041] 3DCNN based model is created. This model construct features from both spatial and temporal dimensions by performing 3D convolutions. 3D convolutions applies a 3 dimensional filter to the dataset and the filter moves 3-direction (x, y, z) to calcuate the low level feature representations. Their output shape is a 3 dimensional volume space such as cube or cuboid. They are helpful in event detection in videos, 3D medical images etc. They are not limited to 3d space but can also be applied to 2d space inputs such as images.

[0042] Train the 3DCNN model using HOG, SURF and HAAR features and save each of these models. The present framework combines two passwords: one normal password and one for lip reading. The normal password method will be a textual password. The original stored user password is checked with the entered password. If both passwords are matched, the user is granted access to the system; otherwise denied. The lip password is also entered during the registration phase which may or may not be the same as that of the first password.

[0043] Figures 2 represents the use case diagram of the present system. A use case diagram is a graphical depiction of a user's possible interactions with a system. The user first register into the system using username and two passwords (one for normal authentication and one for lip reading). After the login phase, the system captures the video of the user speaking various digits. Using openCV, the face and lip of the user is detected and the region of interest of the lip is cropped out. OpenCV is an open source library used to perform tasks like face detection, object tracking etc. The cropped area is subjected to three types of feature extraction technique such as Hog,Surf and Haar.

The digits spoken by the user is predicted using the 3DCNN model and the predicted digits is checked with the users password to grant access.

[0044] Figures 3A, 3B and 3C represents exemplary block diagrams of the data flow diagram for the present system at levels 0, 1 and 2 respectively. A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination.

[0045] DFD Level 0 is also called a Context Diagram. It's a basic overview of the whole system or process being analyzed or modeled. It's designed to be an at-a-glance view, showing the system as a single high-level process, with its relationship to external entities.

[0046] Initially, the user login to the system using their username and password which contains alpha-numeric contents. Then it takes to the next level of authentication. Face detection is performed and the lip region is extracted which is the region of interest. If the provided password is matching, then the user is authenticated as shown in DFD Level 1.

[0047] DFD Level 1 provides a more detailed breakout of pieces of the Context Level Diagram. It will highlight the main functions carried out by the system, as you break down the high-level process of the Context Diagram into its subprocesses.

[0048] Initially the user logs into the system using registered username and password which completes normal authentication. The captured video of the user is

passed for preprocessing using openCV. The region of interest of the lip obtained from preprocessing is subjected to three types of feature extraction techniques(HoG, Haar,

[0049] The extracted features are checked with the initially created dataset of the user and prediction is carried out. If a match is found, the system verifies the user and
5 lip authentication is ensured.

[0050] Samples containing lip movements for digits from 0 to 9 is captured from various users as shown. Videos are recorded in different backgrounds with almost the similar resolution. Videos with or without sound can be considered for dataset creation. User registers into the tkinter application by providing username, password1, pass-
10 word2, age etc. User logs into the Tkinter application using the registered username and password which completes the initial authentication. Dataset consists of separate folders for each digits from zero to nine, where each folder contains recorded videos of different users of that corresponding digit ie, the folder "0" contains videos of different users uttering the digit zero and so on. The selected video is subjected for preprocessing.
15 Using openCV, the face and lip of the user is detected and the region of interest of the lip is cropped out. Each video will be converted into 60 frames. The four parameters that are obtained after the conversion are the frames, image width, image height and RGB data. The digits spoken by the user will be predicted after conversion.

[0051] The present methodology exploits visual information by means of feature
20 detector and descriptor techniques. This system is not an alternative to biometric verification. Biometric verification is the best possible verification system of all methods. This is an alternative to enter the password. It reduces keyboard based

password theft. System will take time because it involves video processing and deep learning. If we use powerful systems, time will reduce.

[0052] It should be apparent to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except 5 in the scope of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms “comprises” and “comprising” should be interpreted as referring to elements, components, or steps in a non-exclusive 10 manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined with other elements, components, or steps that are not expressly referenced. Where the specification claims refers to at least one of something selected from the group consisting of A, B, C ...and N, the text should be interpreted as requiring only one element from the group, not A plus N, or B plus N, etc. The 15 foregoing description of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of 20 equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the scope of the appended claims.

[0053] All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

5 [0054] The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

10 [0055] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions or examples, which are included to enable a person having ordinary skill in the art to make and use the
15 invention when combined with information and knowledge available to the person having ordinary skill in the art.

20 **#####DIGITALLY SIGNED#####**
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

CLAIMS

We claim:

1. An image processing based system to predict passwords from lip sinks,
comprising
5 an image capturing device; and

 one or more processors;
2. The system as claimed in claim 1 wherein, the said image capturing device is preferably a camera configured to capture images at a higher rate of FPS and characterized in that is a continuous image capturing system.
- 10 3. The system as claimed in claim 1 wherein, the said processor is preferably as core i5 operatively coupled to the said image capturing devices.
4. The system as claimed in claims 1, 2 and 3 wherein, the cameras and the processor are configured to run an image processing algorithm capable of reading the lip movements of a person in an effective manner so as to predict
15 the passwords using the lip movements of a person.

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20 Patent On Behalf of the Applicants

ABSTRACT

**AN IMAGE PROCESSING BASED SYSTEM TO PREDICT PASSWORDS
FROM LIP SINKS**

The present invention relates to a computer vision and image processing and more
5 particularly, the present disclosure pertains to an intelligent system to predict the
passwords from a person using the lip movements. The present methodology exploits
visual information by means of feature detector and descriptor techniques. This system
is not an alternative to biometric verification. Biometric verification is the best possible
verification system of all methods. This is an alternative to enter the password. It
10 reduces keyboard based password theft. System will take time because it involves video
processing and deep learning. If we use powerful systems, time will reduce.

15

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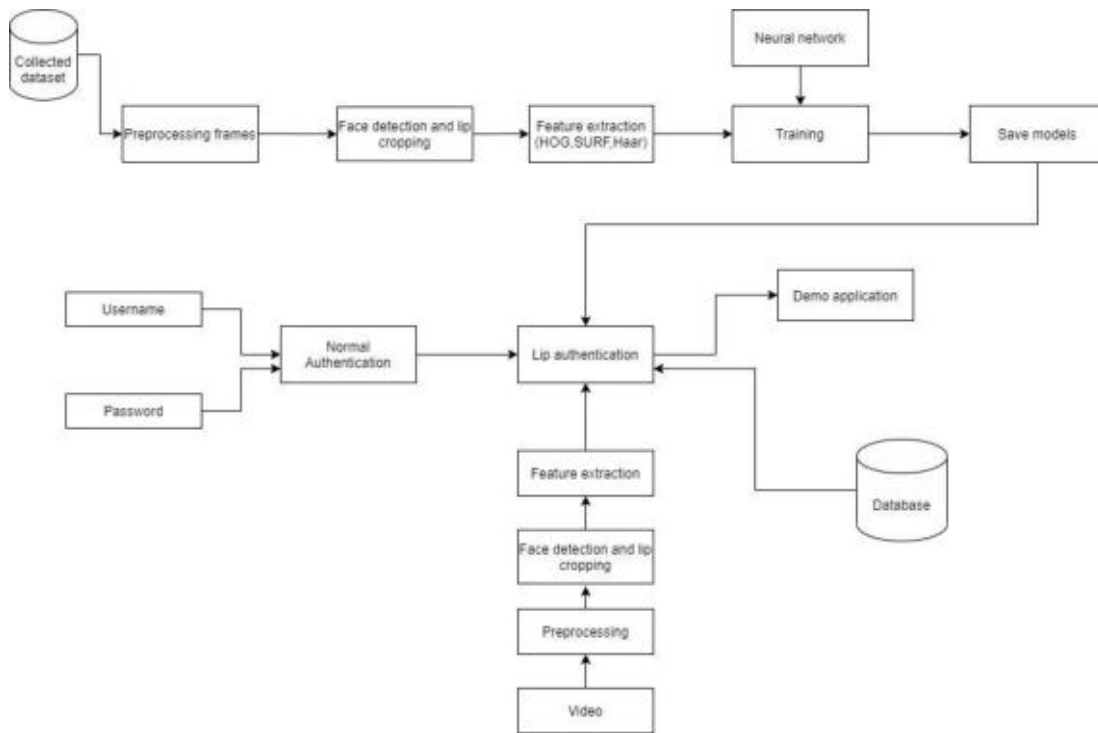


FIGURE 1

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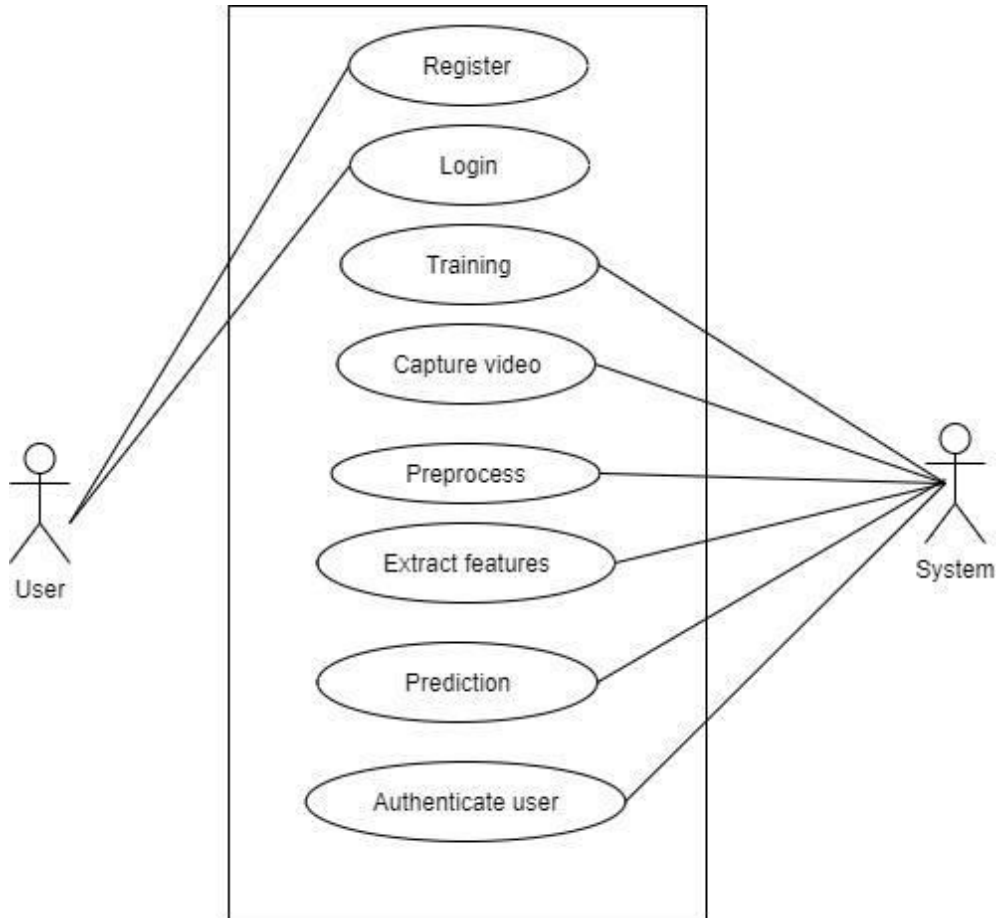


FIGURE 2

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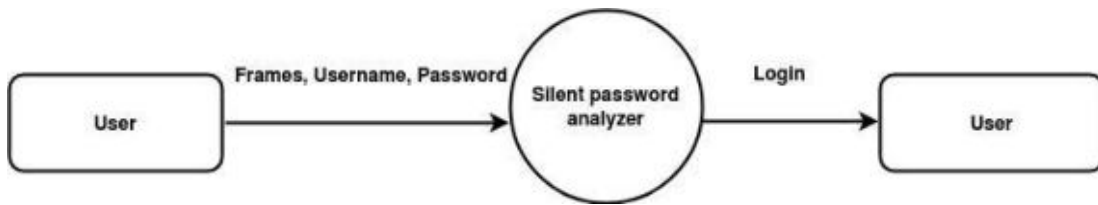


FIGURE 3A

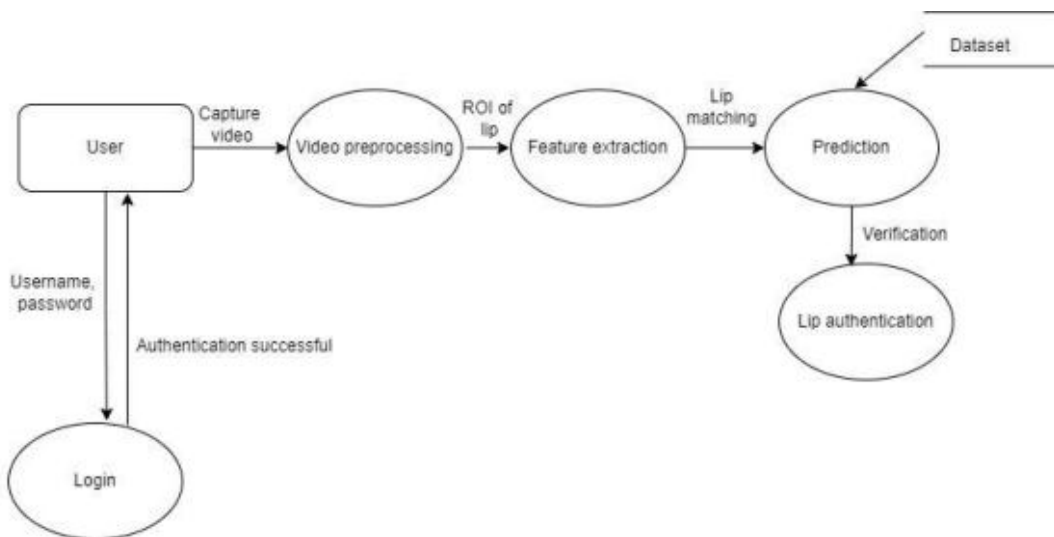


FIGURE 3B

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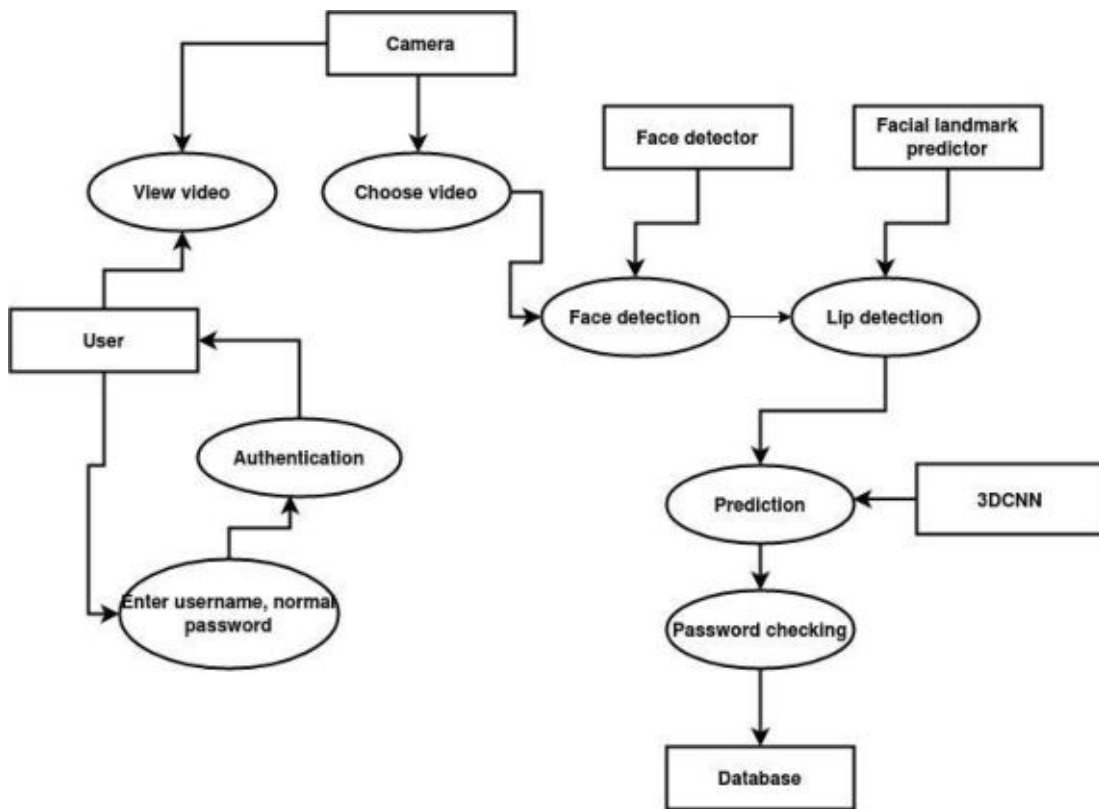


FIGURE 3C

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FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241052381 dated 14-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:


NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 14th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241052381** Dated **14th day of Sep , 2022** are

INVENTOR (S):

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Dated This 14th day of Sep, 2022

Signature,



NAME: PREM CHARLES I (INPA 3311)

PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

To,

**The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu- 600032**

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/58789/2022-CHE

Dated **08/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

Name of the signatory

To,
The Controller of Patents,
The Patent Office,
At Chennai

This form is electronically generated.



सत्यमेव जयते

G.A.R.6
[See Rule 22(1)]
RECEIPTController General of Patents, Designs & Trade
Marks

Docket No 87237

Date/Time 2022/09/14 06:29:21

To
PREM CHARLES

UserId: prem1987

360E, SENTHUR MURUGAN KOVIL
STREET, OPPOSITE SM MAHAL,
OLDPET

CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241052379	TEMP/E-1/58786/2022-CHE	1600	36823	FORM 1	A Device, System and Method for Automated Sorting of Waste Materials in Public Places
2	202241052380	TEMP/E-1/58787/2022-CHE	1600	36823	FORM 1	A Neural Network Based System for Automated Tracking of Wind Energy
3	202241052381	TEMP/E-1/58789/2022-CHE	1600	36823	FORM 1	An Image Processing Based System to Predict Passwords from Lip sinks
4	E-106/5458/2022/CHE	202241052380	0	----	FORM28	----
5	E-106/5459/2022/CHE	202241052381	0	----	FORM28	----
6	E-106/5460/2022/CHE	202241052379	0	----	FORM28	----
7	E-12/6947/2022/CHE	202241052380	2500	36823	FORM 9	----
8	E-12/6946/2022/CHE	202241052381	2500	36823	FORM 9	----
9	E-12/6948/2022/CHE	202241052379	2500	36823	FORM 9	----

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001022006	Online Bank Transfer	1409220000446	12300.00	1475001020000001

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Docket No 88046

Date/Time 15/09/2022

To
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User Id: prem1987

360E, SENTHUR MURUGAN
KOVIL STREET, OPPOSITE SM
MAHAL, OLDPET

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241052379	E-5/3723/2022/CHE	0	----	FORM 5	
2	202241052379	E-3/28963/2022/CHE	0	----	FORM 3	
3	202241052380	E-5/3724/2022/CHE	0	----	FORM 5	
4	202241052380	E-3/28964/2022/CHE	0	----	FORM 3	
5	202241052381	E-5/3725/2022/CHE	0	----	FORM 5	
6	202241052381	E-3/28965/2022/CHE	0	----	FORM 3	

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**OFFICIAL JOURNAL
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निर्गमन सं. 41/2022
ISSUE NO. 41/2022

शुक्रवार
FRIDAY

दिनांक: 14/10/2022
DATE: 14/10/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

**(PROF. (DR) UNNAT P. PANDIT)
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14nd OCTOBER, 2022

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202241053306 A

(19) INDIA

(22) Date of filing of Application :18/09/2022

(43) Publication Date : 14/10/2022

(54) Title of the invention : A Device for Automated Tapping of Rubber from Trees

(51) International classification :A01G0023140000, A01G0023120000, A01G0023100000, G16H0040630000, C21C0007060000
(86) International Application No :PCT//
Filing Date :01/01/1900
(87) International Publication No : NA
(61) Patent of Addition to Application Number :NA
Filing Date :NA
(62) Divisional to Application Number :NA
Filing Date :NA

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(57) Abstract :

The present invention relates to agricultural machinery and more precisely, it refers to an automated device capable of collecting the rubber from the trees without great effort and with higher efficiency. The Automated Rubber Tapering Machine is fixed to the rubber tree and the device operation is performed. The results were up to the expectations. A highly skilled labour needs about 40 seconds to tap a tree, whereas the machine could do it in 20-30 seconds. By installing the machine on every single rubber tree in the farm, the entire tapping process could be done within minutes. A manual labour takes hours to complete the same job. The flow of latex is maximum during early mornings. from 3A.M. to 6A.M. Tapping using the automated rubber tapering machine yields maximum latex as the machine could be turned on as early in the morning as desired using the RTC.

No. of Pages : 24 No. of Claims : 7



Application Filing Receipt

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Patent Office**
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G.S.T. Road, Guindy,
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CBR Number : 37509

CBR date: 18-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
VIMAL JYOTHI ENGINEERING COLLEGE
Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting be to an application for patent numbered 202241053306 dated 18-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to A Device for Automated Tapping of Rubber from Trees together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority of date of filing, whichever is earlier.
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Government of India

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Application Details

APPLICATION NUMBER	202241053306
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	18/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	A Device for Automated Tapping of Rubber from Trees
FIELD OF INVENTION	MECHANICAL ENGINEERING
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E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	14/10/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)

&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:
Filing Date:
Amount of Fee Paid:
CBR No.:
Signature:

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3. TITLE OF THE INVENTION: A Device for Automated Tapping of Rubber from Trees

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5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Title of the Invention
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6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application
-------------------------------------	--

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application
-----------------------------------	------------------------------------

9. DECLARATIONS:**(i) Declaration by the inventor(s)**

I/We ,Dr. Glan Devadhas G.,Anu Sajeev,Shinu M. M. ,Dhanoj M.,Reshma K. V.,Shamya A., is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Dr. Glan Devadhas G.,Anu Sajeev,Shinu M. M. ,Dhanoj M.,Reshma K. V.,Shamya A.

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the signatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- The Complete specification relating to the invention is filed with this application.
- I am/We are, in the possession of the above mentioned invention.
- There is no lawful ground of objection to the grant of the Patent to me/us.
- I am/We are, the assignee or legal representative to true first inventors.

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Rubber Tapping(17).pdf
2	DRAWINGS	Drawings - Rubber Tapping(17).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hereing are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

A Device for Automated Tapping of Rubber from Trees

2. APPLICANT(S)

NAME(S)

NATIONALITY

ADDRESS

VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

A DEVICE FOR AUTOMATED TAPPING OF RUBBER FROM TREES

TECHNICAL FIELD

[0001] The present invention relates to agricultural machinery and more precisely, it refers to an automated device capable of collecting the rubber from the trees without
5 great effort and with higher efficiency.

BACKGROUND OF THE INVENTION

[0002] Background description includes information that may be useful in understanding the present invention. It is not an admission that any of the information provided herein is prior art or relevant to the presently claimed invention, or that any
10 publication specifically or implicitly referenced is prior art.

[0003] Rubber tree is identified as the dominating plantation crop grown in the southern states of India. Especially in the state of Kerala, about 11.5 Lakh planters are engaged in this sector and among them the small scale planters are the major part of this population. According to the recent trends shown by this sector, it is evident that
15 there is a gradual decrease in the price of natural rubber, which affected mainly the small scale planters in the state. In the present scenario, these planters finds it uneconomical to continue tapping as the income from their plantations will only suffice to feed the laborers and to meet the other agriculture expense. Also Rubber tree tapping is considered to be a skill oriented job and the availability of such labors are getting
20 worse day by day. This is considered to be the one of the reason which affected the natural rubber productivity from Indian plantations. During tapping, the taper will make a controlled incision on the tree bark to extract the white cloudy liquid called latex. In the microscopic view of the tree bark, there are several layers of vessels called

lactiferous vessels which contain the latex. So cut is to be made into these vessels to extract the latex. Very close to these lactiferous vessels, there exists a thin invisible layer called Cambium. While tapping care should be taken to avoid tool to go deep into the bark and damage the cambium. Tree responds to cambium damages either by the formation of bulging or by exposing the underlying wood layer to the microbial attack which will damage the tree. Thus the productive life of the tree will be affected by this cambium damage.

[0004] At the same time, many of the Asian countries such as India and Malaysia have steered themselves to be the world's largest natural rubber producers. Meanwhile, the technically advanced western world has focused their attention on the production of synthetic rubber which has overtaken the role of natural rubber over the last few decades. Due to its high tech driven low-cost mass production capability compared to the highly labour intensive small scale production of natural rubber, synthetic rubber is preferred wherever possible. Labour intensiveness in the tapping process for the natural rubber and also the introduction of synthetic rubber has paved the way to the downfall of the natural rubber industry in Sri Lanka. Furthermore, the export oriented industries like garments have further absorbed the labour force; hence rubber industry has become a dying industry.

[0005] Even though the synthetic rubber is a good substitution for many of the natural rubber based products, there are some products which still appreciate the unique properties of natural rubber. This requirement has paved way to a considerable market segment left for the developing nations with agriculture based economics to compete in. On the other hand, with a low level technological background, unable to compete

with the synthetic rubber producers, but would be able to compete in the natural rubber market under sufficient technological involvement.

[0006] A prior art disclosed that natural rubber is widely used in human life because of its excellent quality. At present, manual tapping is still the main way to obtain natural rubber. There is a sore need for intelligent tapping devices in the tapping industry, and the autonomous navigation technique is of great importance to make rubber-tapping devices intelligent.

[0007] To realize the autonomous navigation of the intelligent rubber-tapping platform and to collect information on a rubber forest, the sparse point cloud data of tree trunks are extracted by the low-cost LiDAR and a gyroscope through the clustering method. The point cloud is fitted into circles by the Gauss–Newton method to obtain the center point of each tree. Then, these center points are threaded through the Least Squares method to obtain the straight line, which is regarded as the navigation path of the robot in this forest. Moreover, the Extended Kalman Filter (EKF) algorithm is adopted to obtain the robot’s position. In a forest with different row spacings and plant spacings, the heading error and lateral error of this robot are analyzed and a Fuzzy Controller is applied for the following activities: walking along one row with a fixed lateral distance, stopping at fixed points, turning from one row into another, and collecting information on plant spacing, row spacing, and trees’ diameters. Then, according to the collected information, each tree’s position is calculated, and the geometric feature map is constructed.

[0008] In a forest with different row spacings and plant spacings, three repeated tests have been carried out at an initial speed of 0.3 m/s. The results show that the Root

Mean Square (RMS) lateral errors are less than 10.32 cm, which shows that the proposed navigation method provides great path tracking. The fixed-point stopping range of the robot can meet the requirements for automatic rubber tapping of the mechanical arm, and the average stopping error is 12.08 cm. In the geometric feature
5 map constructed by collecting information, the RMS radius errors are less than 0.66cm, and the RMS plant spacing errors are less than 11.31 cm.

[0009] These results show that the method for collecting information and constructing a map recursively in the process of navigation proposed in the paper provides a solution for forest information collection. The method provides a low-cost,
10 real-time, and stable solution for forest navigation of automatic rubber tapping equipment, and the collected information not only assists the automatic tapping equipment to plan the tapping path, but also provides a basis for the informationization and precise management of a rubber plantation.

[0010] Another prior art disclosed that rubber tree tapping is considered to be a
15 skill oriented job and the availability of such labors are getting worse day by day. This is considered to be the one of the reason which affected the natural rubber productivity from Indian plantations. Even though cheap unskilled labors are available, they cannot be used for tapping by using the traditional V groove knife or Jabong knife. So this paper discusses about a low semi automatic rubber tree tapping machine which can be
20 used by an unskilled labor to perform tapping on the rubber tree by preserving the tree health. The proposed machine is fabricated and tested on the tree. Also a comparative study is made on the effort required to operate the machine with the traditional tapping knives used for the purpose.

[0011] Yet another prior art disclosed that the tapping panel dryness (TPD) in *Hevea brasiliensis* is a complex physiological syndrome and seriously affects the yield of the natural latex from rubber tree. Using image segmentation technology, the proportion of cut and latex area in rubber tree image are calculated to determine grade of TPD. According to the principle of two-dimensional maximum entropy, the global search of genetic algorithm and simulated annealing local hill climbing performance are synthetically selected to determine the optimal segmentation threshold. 276 images selected from the experimental base were tested. The experimental results showed that the method quickly and efficiently realized the extraction of the rubber tree cutting marks and the separation of rubber latex. The accuracy rate of TPD grade was as high as 92.4%, which could effectively prevent the further spread of TPD, and had certain experimental value.

[0012] Yet another prior art disclosed a robotic cell rotation method based on the minimum rotation force is presented to adjust oocyte orientation in biological applications. In this method, the minimum rotation force, which can control the rotation angle (RA) of the oocyte quantitatively and generate minimum oocyte deformations, is derived through a force analysis on the oocyte in rotation. To exert this force on the oocyte, the moving trajectories (MT) of the injection micropipette(IM), are determined using mechanical properties of the oocytes. Further, by moving the IM along the designed MT, the rotation force control is achieved. To verify the feasibility of this method, a robotic rotation experiment for batch porcine oocytes are performed. Experimental results demonstrate that this system rotates the oocyte at an average speed of 28.6s/cell and with a success rate of 93.3%. More importantly, this method can generate much less oocyte deformations during cell rotation process compared with

the manual method, while the average control error of RA in each step is only 1.2 (versus averagely 8.3 in manual operation), which demonstrates that our method can effectively reduce cell deformations and improve control accuracy of the RA.

[0013] There remains a pressing requirement for a better and efficient system to address the present day requirements and problems and hence this invention provides a solution for the same.

[0014] As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

[0015] In some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiments of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0016] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein can
5 be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g. "such as") provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as
10 indicating any non-claimed element essential to the practice of the invention.

[0017] Groupings of alternative elements or embodiments of the invention disclosed herein are not to be construed as limitations. Each group member can be referred to and claimed individually or in any combination with other members of the group or other elements found herein. One or more members of a group can be included
15 in, or deleted from, a group for reasons of convenience and / or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all groups used in the appended claims.

OBJECTS OF THE INVENTION

20 **[0018]** In this disclosure, whenever a composition, an element or a group of elements is preceded with the transitional phrase "comprising", it is understood that we also contemplate the same composition, element or group of elements with transitional phrases "consisting essentially of, "consisting", "selected from the group of consisting

of, "including", or "is" preceding the recitation of the composition, element or group of elements and vice versa.

[0019] The major object of the present invention is to design and incorporate an autonomous device for the collection of rubber from trees.

5 BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The accompanying drawings are included to provide a further understanding of the present disclosure, and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0021] So that the manner in which the above recited features of the present invention can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings.

15 [0022] It is to be noted, however, that the appended drawings illustrate only typical embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

Figure 1 discloses a block diagram of the present system.

Figures 2 discloses a schematic mechanical model of the present system.

20 Figure 3 discloses an exemplary representation of the circuitry for the present system.

DETAILED DESCRIPTION

[0023] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to clearly communicate the disclosure. However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0024] In the following description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0025] Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be embodied in machine-executable instructions, which may be used to cause a general-purpose or special-purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0026] Various methods described herein may be practiced by combining one or more machine-readable storage media containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a single computer)

and storage systems containing or having network access to computer program(s) coded in accordance with various methods described herein, and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

5 **[0027]** The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and arrangement of
10 elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0028] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For
15 example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

20 **[0029]** Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the scope of the

invention to those of ordinary skill in the art. The invention disclosed may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other
5 embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e.,
10 any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives, modifications and equivalents consistent with the principles and features disclosed. For purpose of clarity,
15 details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not to unnecessarily obscure the present invention.

[0030] Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the
20 pertinent art have given that term as reflected in printed publications and issued patents at the time of filing.

[0031] Figure 1 discloses a block diagram of the present system. A mechanical model is prepared such a way that it performs the process automatically. There are

mainly two support structures, vertical rods and circular rods with geared teeth, which are used to hold the entire device setup on the rubber tree. Those are fixed to the tree using the belt. Two dc motors are used to provide two dimensional movements for the tapping blade. The position of the tapping blade is precisely controlled by the dc motors
5 driven by the microcontroller.

[0032] Figures 2 discloses a schematic mechanical model of the present system. The power supply used here is 12V DC. The relay board is used here to drive the 2 DC motors. Four relays are used in a bridge configuration to control the speed and the direction of the 2 DC motors. The relay is controlled with 5V signal and needs a supply
10 of 12V. Two DC motors are used for vertical and horizontal movement of the tapering blade. The horizontal movement is controlled by a geared DC motor which has a 60rpm drive and a base motor drive of 6000rpm. The vertical motor has a 200rpm drive and a base motor drive of 10000rpm.

[0033] A real-time clock module is used for time keeping. Also, to set the desired
15 time to initiate the working of the tapper. Arduino Uno R3 is a microcontroller board based on ATmega328. It has 14 digital input/output pins, 6 analog inputs, a 16Mhz ceramic resonator, a USB connection, a power jack, and a reset button. It contains everything needed to support the microcontroller. The Arduino is programmed for the movement of the vertical and horizontal motors, which in turn controls the movement
20 of the tapering blade. The limit switch marks the starting and the ending point for the blade movement.

[0034] Figure 3 discloses an exemplary representation of the circuitry for the present system. The main goal of the Automated Rubber Tapering machine is to make

an incision on the rubber tree every alternate day. For this purpose, we have used a Real-Time Clock. Using which when an alarm is set the tapering process is started automatically. The Arduino Uno R3 is the microcontroller used in this device. It is the heart of the device. The Arduino is interfaced with the RTC, the Relays and the 2 geared DC motors using the relay driver IC. It is programmed using the Arduino IDE. The functions specified by the programs include generation PWM signals for the motor speed control and also to match the analog time signals from the RTC to switch on the device at the set time. The SCL and SDA Pins of the RTC are connected to the Analog Pins A5 & A4 of the Arduino. The RTC maintains the Time.

10 **[0035]** It has a backup battery, where in if it loses external power it could still maintain the clock accurately. We can set an alarm by programming the Arduino. Say if we need to set an alarm at 4 A.M. for the automatic rubber tapering machine to make an incision on the tree trunk, the same is programmed into the Arduino. The Arduino Compares the time at which the alarm is set with that of the time maintained from the RTC. When both the time is matched then the device is turned on. There are 2 Limit Switches used, which helps to determine the end points for the motor movements. Also helps to switch states of the motors. Initially the blade is in its default positions. the top left corner of the tapering area. The Arduino is connected to the relays using the relay driver ULN2803. The relay driver is used to control the relay. The relay driver gets its control signal from the Arduino which is of 5V.

[0036] The digital pins from the Arduino i.e. D8,D9,D10,D11 is connected to the input pins I5, I6,I7 and I8. The output pins from the Relay Driver i.e. O5, O6,O7,O8 are connected to the relays 1,3,2,4 respectively. A relay is an electromechanical switch

which controls the power supply to the motor. The relays R1 and R3 are connected to H-motor which is responsible for the horizontal movement of the tapering blade. The relays R2 & R4 are connected to V-motor which is responsible for the vertical movement of the blade. The combined movement of the 2 motors gives a downward half spiral movement of the blade along the tree trunk. The relays are in H bridge configuration through which the direction is controlled. The speed of the DC motors is controlled using PWM techniques.

[0037] The entire set up of the automated rubber tapering machine is mounted on the rubber tree with the help of supporting rods and is fastened by a belt. There are 2 spur gears used with a larger diameter that encloses the tree. This acts as a path for the horizontal movement of the motor blade. The vertical movement uses a threaded lead screw with guide ways which is used for the vertical movement of the blade. There is also a blade adjustment rod that is used to adjust the point of contact of the blade with the tree trunk.

[0038] The Automated Rubber Tapering Machine is fixed to the rubber tree and the device operation is performed. The results were up to the expectations. A highly skilled labour needs about 40 seconds to tap a tree, whereas the machine could do it in 20-30 seconds. By installing the machine on every single rubber tree in the farm, the entire tapping process could be done within minutes. A manual labour takes hours to complete the same job. The flow of latex is maximum during early mornings from 3A.M. to 6A.M. Tapping using the automated rubber tapering machine yields maximum latex as the machine could be turned on as early in the morning as desired using the RTC.

[0039] It should be apparent to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the scope of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms “comprises” and “comprising” should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined with other elements, components, or steps that are not expressly referenced. Where the specification claims refers to at least one of something selected from the group consisting of A, B, C ...and N, the text should be interpreted as requiring only one element from the group, not A plus N, or B plus N, etc. The foregoing description of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the scope of the appended claims.

[0040] All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or

process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0041] The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

[0042] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions or examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge available to the person having ordinary skill in the art.

15

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

20

CLAIMS

We claim:

1. A device for automated tapping of rubber from trees, comprising
a timer device;
5 a plurality of motors;
at least one blade arrangement;
one or more processors; and
one or more combinations of mechanical arrangements.
2. The device as claimed in claim 1 wherein, the said the said timer is preferably
10 an analog watch configured to activate the device at intervals.
3. The device as claimed in claim 1 wherein, the said plurality of motors are
preferably arranged in combination of vertical and horizontal directions which
are operatively coupled to the said timer.
4. The device as claimed in claims 1, 2 and 3 wherein, the said blade arrangement
15 is operatively coupled to the said motors to get actuated through a set of spur
gears in order to create an indent to the tree trunk.
5. The device as claimed in claim 1 wherein, the said processor is preferably an
Arduino operatively coupled to the timer and the motor arrangements.
6. The device as claimed in claim 1 wherein, the said combination of mechanical
20 arrangement along with the screws in combination provides to hold the device
to the tree's trunk.
7. The device as claimed in claims 1 and 6 wherein, the said mechanically
components are configured to be operated by the said processor operatively

coupled with and further characterized to automatically actuate the device as scheduled through the timer.

5

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent On Behalf of the Applicants

ABSTRACT

A DEVICE FOR AUTOMATED TAPPING OF RUBBER FROM TREES

The present invention relates to agricultural machinery and more precisely, it refers to an automated device capable of collecting the rubber from the trees without great effort and with higher efficiency. The Automated Rubber Tapering Machine is fixed to the rubber tree and the device operation is performed. The results were up to the expectations. A highly skilled labour needs about 40 seconds to tap a tree, whereas the machine could do it in 20-30 seconds. By installing the machine on every single rubber tree in the farm, the entire tapping process could be done within minutes. A manual labour takes hours to complete the same job. The flow of latex is maximum during early mornings, from 3A.M. to 6A.M. Tapping using the automated rubber tapering machine yields maximum latex as the machine could be turned on as early in the morning as desired using the RTC.

15

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Patent Agent On Behalf of the Applicants

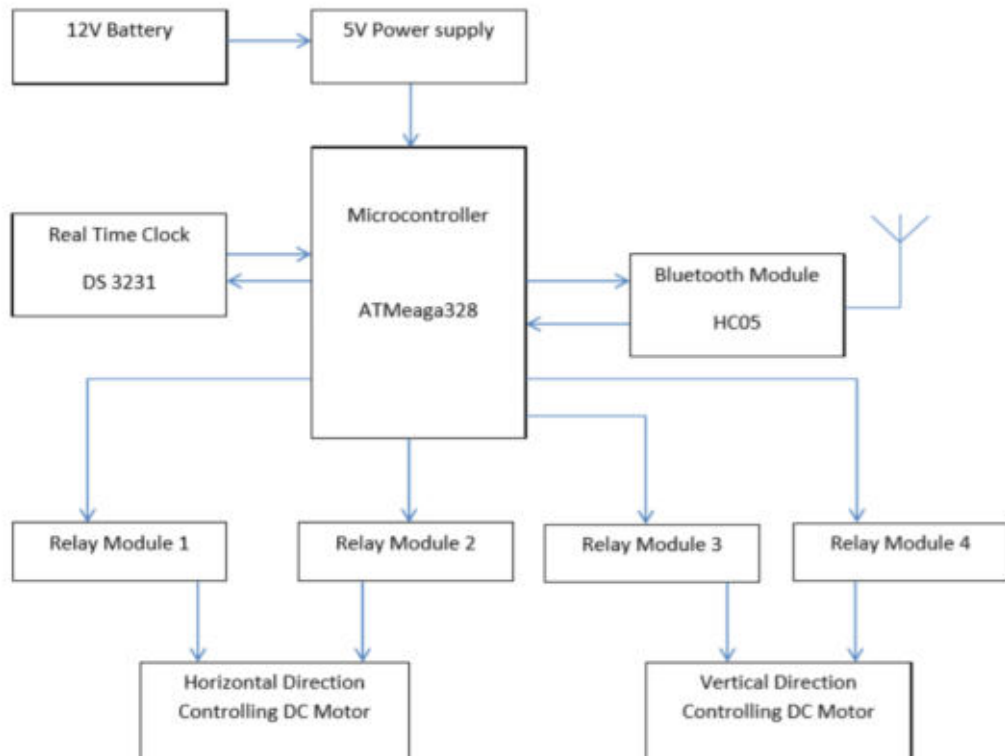


FIGURE 1

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Patent Agent On Behalf of the Applicants

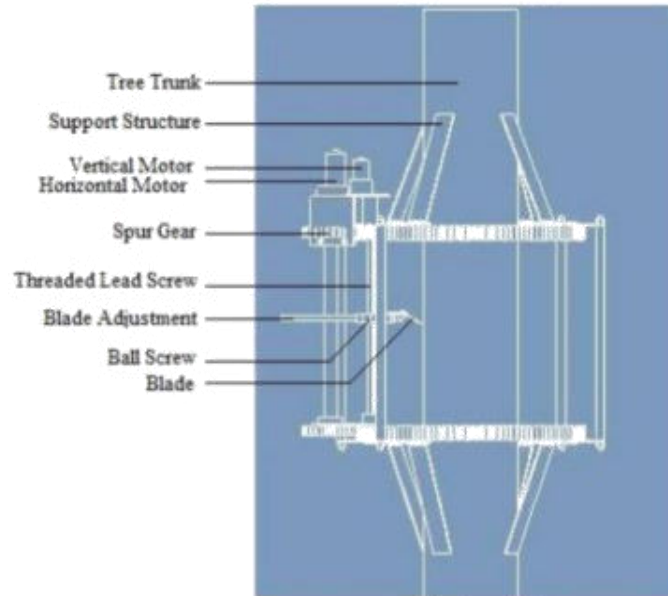


FIGURE 2

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241053306 dated 18-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:

NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 18th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241053306** Dated **18th day of Sep , 2022** are

INVENTOR (S):

1	a) Name: b) Nationality: c) Address:	Dr. Glan Devadhas G. Indian Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
2	a) Name: b) Nationality: c) Address:	Anu Sajeev Indian Student, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
3	a) Name: b) Nationality: c) Address:	Shinu M. M. Indian Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
4	a) Name: b) Nationality: c) Address:	Dhanoj M. Indian Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
5	a) Name: b) Nationality: c) Address:	Reshma K. V. Indian Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
6	a) Name: b) Nationality: c) Address:	Shamya A. Indian Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

Dated This 18thday ofSep,2022

Signature,



NAME: PREM CHARLES I(INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

To,

**The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu- 600032**

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/59435/2022-CHE

Dated **11/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

Name of the signatory

To,
The Controller of Patents,
The Patent Office,
At Chennai

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Controller General of Patents, Designs & Trade Marks
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Tel No. (091)(044) 22502081-84 Fax No. 044 22502066
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Web Site: www.ipindia.gov.in



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G.A.R.6
[See Rule 22(1)]
RECEIPT



Docket No 89672

Date/Time 2022/09/18 19:09:17

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STREET, OPPOSITE SM MAHAL,
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CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	E-12/7066/2022/CHE	202241053306	2500	37509	FORM 9	
2	E-12/7063/2022/CHE	202241053308	2500	37509	FORM 9	----
3	E-12/7064/2022/CHE	202241053310	2500	37509	FORM 9	----
4	E-12/7067/2022/CHE	202241053309	2500	37509	FORM 9	----
5	E-12/7065/2022/CHE	202241053307	2500	37509	FORM 9	----
6	202241053306	TEMP/E-1/59435/2022-CHE	1600	37509	FORM 1	A Device for Automated Tapping of Rubber from Trees
7	202241053308	TEMP/E-1/59436/2022-CHE	1600	37509	FORM 1	An Image Processing Based System for Incubation Candling of Eggs in a Poultry Farm
8	202241053310	TEMP/E-1/59438/2022-CHE	1600	37509	FORM 1	A Compact and Portable Thermoelectric Refrigerator
9	202241053309	TEMP/E-1/59439/2022-CHE	1600	37509	FORM 1	An Image Processing Based Method to Classify Brain Tumors
10	202241053307	TEMP/E-1/59495/2022-CHE	1600	37509	FORM 1	An Artificially Intelligent System for Waste Segregation
11	E-106/5535/2022/CHE	202241053306	0	----	FORM28	----
12	E-106/5538/2022/CHE	202241053308	0	----	FORM28	----
13	E-106/5536/2022/CHE	202241053310	0	----	FORM28	----
14	E-106/5539/2022/CHE	202241053309	0	----	FORM28	----
15	E-106/5537/2022/CHE	202241053307	0	----	FORM28	----

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001024381	Online Bank Transfer	1809220004921	20500.00	1475001020000001

Total Amount : ₹ 20500.00

Amount in Words: Rupees Twenty Thousand Five Hundred Only

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E-mail: chennai-patent@nic.in
Web Site: www.ipindia.gov.in



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Docket No 89677

Date/Time 18/09/2022

To
PREM CHARLES

User Id: prem1987

360E, SENTHUR MURUGAN KOVIL
STREET, OPPOSITE SM MAHAL,
OLDPET

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241053310	E-5/3763/2022/CHE	0	----	FORM 5	
2	202241053310	E-3/29313/2022/CHE	0	----	FORM 3	
3	202241053309	E-5/3764/2022/CHE	0	----	FORM 5	
4	202241053309	E-3/29314/2022/CHE	0	----	FORM 3	
5	202241053308	E-3/29315/2022/CHE	0	----	FORM 3	
6	202241053308	E-5/3765/2022/CHE	0	----	FORM 5	
7	202241053307	E-3/29316/2022/CHE	0	----	FORM 3	
8	202241053307	E-5/3766/2022/CHE	0	----	FORM 5	
9	202241053306	E-5/3767/2022/CHE	0	----	FORM 5	
10	202241053306	E-3/29317/2022/CHE	0	----	FORM 3	

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**OFFICIAL JOURNAL
OF
THE PATENT OFFICE**

निर्गमन सं. 41/2022
ISSUE NO. 41/2022

शुक्रवार
FRIDAY

दिनांक: 14/10/2022
DATE: 14/10/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

**(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS**

14nd OCTOBER, 2022

(54) Title of the invention : An Artificially Intelligent System for Waste Segregation

(51) International classification :G06N0020000000, B65F0003000000, B65F0001140000, G06N0003040000, G06Q0010000000

(86) International Application No :PCT//
Filing Date :01/01/1900

(87) International Publication No : NA

(61) Patent of Addition to Application Number :NA
Filing Date :NA

(62) Divisional to Application Number :NA
Filing Date :NA

(71)**Name of Applicant :**
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 Address of Applicant :Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. Chemperi -----

Name of Applicant : NA
Address of Applicant : NA

(72)**Name of Inventor :**
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4)Thejas Sujith
 Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

--

5)Vignesh P. V.
 Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

--

(57) Abstract :

The present invention relates to the field of waste management and more particularly it refers to a smart system integrated with artificial intelligence and machine learning modules to segregate wastes as per the classification. The waste segregation system using machine learning and IoT are implemented using three modules. The waste collection and segregation module , waste data module and the web interface module. The circuit is made up of a raspberry pi connected to two relay that distributes power to the two servo motors in the system. The servo motors are used to drive the conveyor belt as well as the arm to flick the waste material to there respective bins. The amount of waste material collected displayed on the web interface with help of a graph. The data collected form the system in the form of count of the waste material collected and segregated is displayed in the web interface.

No. of Pages : 22 No. of Claims : 7



Application Filing Receipt

**Government of India
Patent Office**
Intellectual Property Office Building,
G.S.T. Road, Guindy,
Chennai -600032
Phone- 044-22502081-84
Fax: 044-22502066
e-mail: chennai-patent@nic.in

CBR Number : 37509

CBR date: 18-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
VIMAL JYOTHI ENGINEERING COLLEGE
Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting be to an application for patent numbered 202241053307 dated 18-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to An Artificially Intelligent System for Waste Segregation together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority of date of filing, whichever earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority of date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

(For Controller of Patents)



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Government of India

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Application Details

APPLICATION NUMBER	202241053307
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	18/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	An Artificially Intelligent System for Waste Segregation
FIELD OF INVENTION	COMPUTER SCIENCE
E-MAIL (As Per Record)	patents@allinnov.org
ADDITIONAL-EMAIL (As Per Record)	allinnovrnd@gmail.com
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	14/10/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:
Filing Date:
Amount of Fee Paid:
CBR No.:
Signature:

1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	VIMAL JYOTHI ENGINEERING COLLEGE	India	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

2. INVENTOR(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
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2	C. M. Nived Raj	India	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
3	Jinto Jose	India	Student,	India	Kerala	Kannur	Chemperi

			Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.				
4	Thejas Sujith	India	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
5	Vignesh P. V.	India	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

3. TITLE OF THE INVENTION: An Artificially Intelligent System for Waste Segregation

4. ADDRESS FOR CORRESPONDENCE OF APPLICANT / AUTHORISED PATENT AGENT IN INDIA:

Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

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5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Titile of the Invention
--------	---------	--------------------	-------------	-----------------------	-------------------------

6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application

9. DECLARATIONS:

(i) Declaration by the inventor(s)

I/We ,Vidhya S. S.,C. M. Nived Raj,Jinto Jose,Thejas Sujith,Vignesh P. V., is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Vidhya S. S.,C. M. Nived Raj,Jinto Jose,Thejas Sujith,Vignesh P. V.

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the singnatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- The Complete specification relating to the invention is filed with this application.
- I am/We are, in the possession of the above mentioned invention.
- There is no lawful ground of objection to the grant of the Patent to me/us.
- I am/We are, the assignee or legal representative to true first inventors.

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Waste Segregation (8).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hereing are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

To The Controller of Patents

The Patent office at CHENNAI

This form is electronically generated.

FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

An Artificially Intelligent System for Waste Segregation

2. APPLICANT(S)

NAME(S)

NATIONALITY

ADDRESS

VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

AN ARTIFICIALLY INTELLIGENT SYSTEM FOR WASTE

SEGREGATION

TECHNICAL FIELD

[0001] The present invention relates to the field of waste management and more particularly it refers to a smart system integrated with artificial intelligence and machine learning modules to segregate wastes as per the classification.

BACKGROUND OF THE INVENTION

[0002] Background description includes information that may be useful in understanding the present invention. It is not an admission that any of the information provided herein is prior art or relevant to the presently claimed invention, or that any publication specifically or implicitly referenced is prior art.

[0003] The Internet of Things (IoT) and machine learning are technological developments. Each device is assigned a singular identity (IP address) and is fortified with the potential to allocate data over the network automatically without human-human or human-computer interaction. Therefore, any entity within the physical world which could be referred to with an IP address to empower data transmission over a network is often part of the IoT system by establishing them with electronic hardware like sensors, software, and networking equipment.

[0004] IoT provides advanced connectivity of diverse sorts of equipment, various services, numerous protocols, and different applications. The IoT technology integrates various devices connected during a network and sharing and flexibly exchanging resources. To tackle the manual segregation of waste, the IoT technology gives an

automated answer, and no human intervention is required. Waste management may be a vital part of city management particularly where it's become significant to rethink cities for environmental sustainability. One cannot imagine a sensible city without a sensible waste management system. The main sources of waste are collected from households. The organic or inorganic waste materials are produced out of economic or household activities. The dustbin is the only means to collect the waste of households and await a segregation system to sort the waste into different categories.

[0005] A prior art proposed a household waste management system using IoT and machine learning techniques deals with the main problem of the rapidly growing population in urban areas is waste segregation and management Daily waste disposal to gain a more lifelike environment. A system can provide advance information about tank filling to notify the relevant authority, so that action can be taken to empty the bin in time and safeguard the environment. In the proposed system, the infrared sensor on the front of the smart trash can detects the user's distance and automatically opens and closes the lid according to the recommended setting.

[0006] The smart trash can lids are controlled by actuators. At level 1, two ultrasonic sensors inside the lid continuously monitor waste levels in the bin's biodegradable and non-biodegradable compartments. The distance between the sensor and the object can be calculated by using a sound wave to strike an object and reflect it back to the sensor, taking the time (T) and the velocity of the sound (C). At level 1, the MQ-4 gas sensor is used to detect harmful gas such as methane in a biodegradable compartment behind the lid. Non- biodegradable segregation is monitored by proximity inductive sensors and capacitance proximity sensors installed beneath the level 2 conveyor belt.

[0007] The inductive proximity sensor identifies metal objects without physical touch and is mounted beneath the conveyor belt at level 2, while the capacitance proximity sensor can detect plastic and wood and is also fixed beneath the conveyor belt at level 2. The data from the various sensors is collected by the Raspberry Pi and sent via Wi-Fi to the Adafruit IO free online service, which connects IFTTT (If This Then That) and Facebook Messenger, as well as send messages and conduct the appropriate action. The data is also monitored on the mobile as well as the adafruit IO GUI at key phases. Adafruit.io is a cloud-based service that may be accessed via the Internet. It connects the two web services. It also makes storing data useful. To predict 'decision' directly from the training data set, use the K-nearest neighbour (KNN) technique.

[0008] Another prior art proposed a system deals with garbage separation rather than garbage collection. It consists of an internal implementation to evaluate the behavior of the waste under common assumptions. The next scenario is outdoor, where garbage bins equipped with the IoT sensors are made available in a public place like a park. The purpose of this proposal was to meet the growing demand for smart services in an ever-growing urban environment.

[0009] Based on this study, a waste management system was developed to evaluate how the overall architecture adapts to specific implementations to address specific challenges related to smart cities. This case study was chosen because waste management is an important issue in large cities and also provides an opportunity to explore two assessment scenarios, indoor and outdoor. Based on the waste management scenarios, the architecture was implemented alongside three different protocols designed to supply secure communication, namely CoAP, HTTPS, and MQTT. The

resulting system was evaluated taking into consideration energy consumption, latency, Jitter, and throughput as evaluation metrics. Based on the results obtained, the scalability was also analyzed taking into account the impact of the simultaneous increasing number of bins in the system.

5 **[0010]** Yet another researcher focuses on separation of wastes into categories such as paper, plastic and metals through the developed system which is capable of identifying by a variety of sensors can be used to identify substances, including proximity sensors, inductive sensors, and capacitive sensors. Integrating these sensors into an Arduino can be used to systematically control a robotic arm. This integration
10 mechanism also provides information through IoT systems with sensors.

[0011] The system allows you to read, collect and transmit huge amounts of data over the Internet, as well as share it with the help of robots. Waste materials are moving through a conveyor belt in which sensors are installed. Sensors detect the type of the waste material and pass information to the robotic arm. Robotic arm picks the waste
15 material and puts in the corresponding dust bin set for a particular type of waste material. Robotic arm works based on pick and place mechanism as per the information provided by the sensors.

[0012] Metallic components, which are hidden within and buried within the objects of the range of 0–3 cm are detected by making use of an inductive sensor. Capacitive
20 sensors operate by noting the change in the capacitance read by the sensor. Arduino uno 2560 microcontroller board that has 54 digital input/output pins, 16 analog inputs, 16 MHz oscillator along with a push button is made use of in order to communicate processed information in order to drive the robotic arm. This system makes use of three

separate bins to receive the respective materials, the stepper motor connected to the bin is programmed to receive the respective waste in the bins. Now the Robotic arm picks and places the waste items wherever that material is to be dumped and Once waste items are filled in the bin ,by the continues checking of the ultrasonic sensor, which
5 measures the level of waste in the bin and at the same time information is communicated through GSM module in order to alert the authority to replace the bin.

[0013] Yet another prior art proposed a machine to segregator waste that is it provides a facility to segregation waste and also at the same time introduces the concept of rewarding the disposer of points, in a way to encourages them to practice the clean
10 way of disposing waste waste into the machine.

[0014] This system implements an automatic waste segregating machine which utilizes Artificial Neural Network (ANN) algorithm to do the learning of data collected and also is embedded with the concept of “Basura Advantage Points”. Here the ANN is the brain of the system inorder to sort the plastic bottles as one category and the rest
15 of waste in another category. The concept of Basura Advantage Points is such that when a person disposes waste into the system the, they automatically earn points from the system .These points can be redeemed for coupons .This system can encourage the practice of recycling.

[0015] Though the prior arts have addressed the issue to a good extent, there is a
20 pressing need for a better, intelligent and efficient system to address the current need and hence this invention is disclosed as a solution.

[0016] As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly

dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

[0017] In some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the
5 desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set
10 forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiments of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0018] The recitation of ranges of values herein is merely intended to serve as a
15 shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language
20 (e.g. “such as”) provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0019] Groupings of alternative elements or embodiments of the invention disclosed herein are not to be construed as limitations. Each group member can be referred to and claimed individually or in any combination with other members of the group or other elements found herein. One or more members of a group can be included
5 in, or deleted from, a group for reasons of convenience and / or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all groups used in the appended claims.

OBJECTS OF THE INVENTION

10 [0020] In this disclosure, whenever a composition, an element or a group of elements is preceded with the transitional phrase "comprising", it is understood that we also contemplate the same composition, element or group of elements with transitional phrases "consisting essentially of, "consisting", "selected from the group of consisting
15 of, "including", or "is" preceding the recitation of the composition, element or group of elements and vice versa.

[0021] An object of the invention is based on IoT and machine learning, to create a system to segregate waste into different categories based on there recycle ability of the material. Different categories of waste are separated to recyclable and non-recyclable item from waste materials disposed into the system to be segregated. The
20 data collected form the segregation stage is collected and displayed on a web interface. In effect reducing the manual work of segregation, which is the main inefficiency of the current system being used.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] The accompanying drawings are included to provide a further understanding of the present disclosure, and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0023] So that the manner in which the above recited features of the present invention can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings.

[0024] It is to be noted, however, that the appended drawings illustrate only typical embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

Figure 1 discloses an exemplary block diagram of the overall system.

Figure 2A and 2B discloses apropos photographic representations of the circuitry of the overall system and the hardware assembly respectively.

DETAILED DESCRIPTION

[0025] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to clearly communicate the disclosure. However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the

intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0026] In the following description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0027] Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be embodied in machine-executable instructions, which may be used to cause a general-purpose or special-purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0028] Various methods described herein may be practiced by combining one or more machine-readable storage media containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a single computer) and storage systems containing or having network access to computer program(s) coded in accordance with various methods described herein, and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

[0029] The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0030] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

[0031] Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those of ordinary skill in the art. The invention disclosed may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other

embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include
5 both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives, modifications and
10 equivalents consistent with the principles and features disclosed. For purpose of clarity, details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not to unnecessarily obscure the present invention.

[0032] Various terms as used herein are shown below. To the extent a term used in
15 a claim is not defined below, it should be given the broadest definition persons in the pertinent art have given that term as reflected in printed publications and issued patents at the time of filing.

[0033] In the present system, it aims to help the segregation of waste into recyclable and non-recyclable waste items. The current method followed to segregate waste
20 material are time consuming and labour intensive task. It also human beings to work in polluted environment. The world is changing with the help of growing technologies like Iot and machine learning. In this system, it uses image recognition by model trained using random forest algorithm, to classify waste into recyclable and non-recyclable

waste item. It uses a data set of recyclable and non-recyclable waste material to classify the waste. The system mainly contains steps such as collection of a waste material from the user passing the waste material a conveyor belt, identifying the material using image recognition model trained by a random forest algorithm. It also collect information
5 about the no of material segregated and displays the detail on a web interface.

[0034] Figure 1 discloses an exemplary block diagram of the overall system. The system makes use of image processing model developed from a data-set of recyclable and non-recyclable waste material using a random forest algorithm. The image processing model acts as the classifier of waste material collected by the system to
10 distinguish the material form one another and also separate them using a mechanical arm. Once identifies whether the material is recyclable or non-recyclable ,the system then separate the waste and at the same time collect information form the sorting section of the system the count the number of waste materials sorted. The data collected is send to web interface provided with Think-speak to display the details of the collected waste
15 materials.

[0035] Figure 2A and 2B discloses apropos photographic representations of the circuitry of the overall system and the hardware assembly respectively. The waste bin acts as the source to take in waste material form the user of the system and pass to the conveyor belt. The waste materials collected by the waste material lands on the
20 conveyor belt and starts moving forwards passing the various stages of the system until each waste material are sorted into recyclable and non-recyclable. This system consist of two IR sensor, which are placed along the conveyor belt. These two IR sensor detect the arrival of waste material at the two stages in the conveyor belt i.e at the camera and

the sorting section. Here camera is used to capture the image of the waste materials passing through the conveyor belt .The image collected is sent to the raspberry pi. It is the main device that processes the program to read the input from the camera and the IR sensors. Using a model generated by using the random forest algorithm, the model
5 classifies the material in the image and gives the out put to the raspberry pi. these small compartment to capture the segregated item ,which is flicked by an metal arm. The collected data of the waste collection is displayed on think-speak web interface.

[0036] The waste segregation system utilizes an image classification model developed using a random forest algorithm. The model is trained using image data-set
10 comprised of recyclable and non-recyclable waste materials.

[0037] The waste segregation system using machine learning and IoT are implemented using three modules. The waste collection and segregation module , waste data module and the web interface module. The circuit is made up of a raspberry pi connected to two relay that distributes power to the two servo motors in the system.
15 The servo motors are used to drive the conveyor belt as well as the arm to flick the waste material to there respective bins. The amount of waste material collected displayed on the web interface with help of a graph. The data collected form the system in the form of count of the waste material collected and segregated is displayed in the web interface.

[0038] The proposed model is very helpful for maintaining the health, hygiene and over all a clean environment of societies with the help of machine learning approach. The overall accuracy of the random forest model is 89.6%. Using this model the waste material where successfully segregated into recyclable and non-recyclable materials.
20

The model created with the dataset created with the images of everyday household material, which can be categorized, as recyclable and non-recyclable. The system uses the information from the segregation to maintain a web interface where it displays the information collected in the form of graph to depict the amount of segregated recyclable and non-recyclable materials. This system is useful to maintain a clean, hygiene, and a environment which is comfortable for the people of the society in the smart way. This helps to make the society green smart society which is helpful to make city as smart city.

[0039] It should be apparent to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the scope of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms “comprises” and “comprising” should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined with other elements, components, or steps that are not expressly referenced. Where the specification claims refers to at least one of something selected from the group consisting of A, B, Cand N, the text should be interpreted as requiring only one element from the group, not A plus N, or B plus N, etc. The foregoing description of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications

should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Therefore, while the embodiments herein have been described in terms of preferred
5 embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the scope of the appended claims.

[0040] The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and
10 drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

[0041] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow.
15 The invention is not limited to the described embodiments, versions or examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge available to the person having ordinary skill in the art.

20

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

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CLAIMS

We claim:

1. An artificially intelligent system for waste segregation, comprising
an image capturing device;
5 one or more processors;
a plurality of bins; and
at least one mechanically operated sorter.
2. The device as claimed in claim 1 wherein, the said image capturing device is
preferably a camera configured to capture images at a higher rate of FPS and
10 characterized in that is a continuous image capturing system.
3. The device as claimed in claim 1 wherein, the said plurality of sensors may
include an IR sensor configured to detect non-biodegradable materials in the
bin.
4. The device as claimed in claim 1 wherein, the said processor is preferably as
15 Raspberry Pi operatively coupled to the said sensors and image capturing
devices.
5. The device as claimed in claims 1 and 4 wherein, the said processor is
characterized to have a collection of photographs aiming at processing the
images so collected by the image capturing device.
- 20 6. The device as claimed in claim 1 wherein, the said plurality of bins are
preferably arranged for sorting non-biodegradable waste materials and the rest
materials are passed to another conveyor for further processing.

7. The device as claimed in claims 1 and 6 wherein, the said mechanically operated sorter arrangement sorts out only the non-biodegradable waste to the bins.

5

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent On Behalf of the Applicants

ABSTRACT

AN ARTIFICIALLY INTELLIGENT SYSTEM FOR WASTE SEGREGATION

The present invention relates to the field of waste management and more particularly it
5 refers to a smart system integrated with artificial intelligence and machine learning
modules to segregate wastes as per the classification. The waste segregation system
using machine learning and IoT are implemented using three modules. The waste
collection and segregation module , waste data module and the web interface module.
The circuit is made up of a raspberry pi connected to two relay that distributes power
10 to the two servo motors in the system. The servo motors are used to drive the conveyor
belt as well as the arm to flick the waste material to there respective bins. The amount
of waste material collected displayed on the web interface with help of a graph. The
data collected form the system in the form of count of the waste material collected and
segregated is displayed in the web interface.

15

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20 Patent Agent On Behalf of the Applicants



FIGURE 1

#####DIGITALLY SIGNED#####
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Patent Agent On Behalf of the Applicants

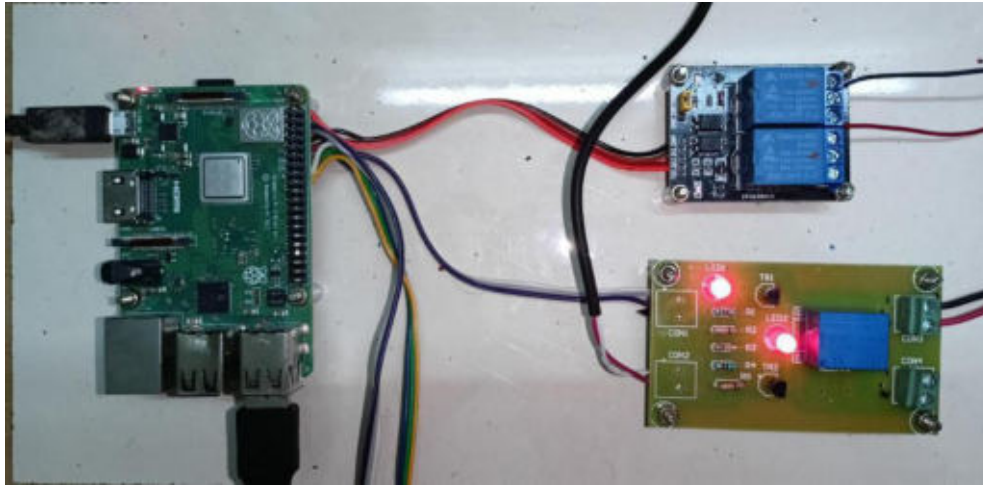


FIGURE 2A

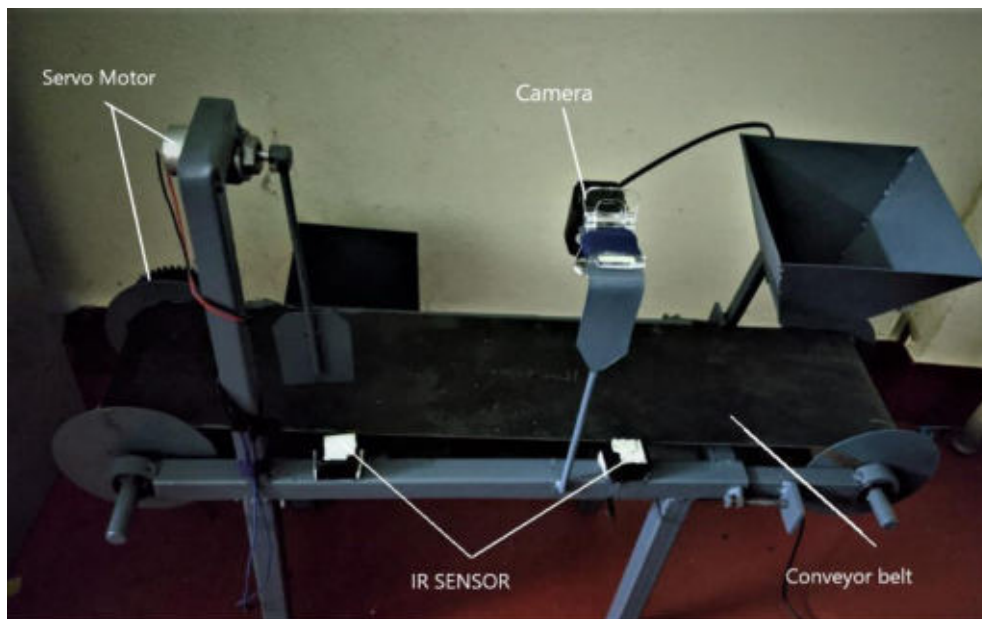


FIGURE 2B

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Patent Agent On Behalf of the Applicants

FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241053307 dated 18-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:

NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 18th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241053307** Dated **18th day of Sep , 2022** are

INVENTOR (S):

1 **a) Name:**

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b) Nationality:

Indian

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Dated This 18thday ofSep,2022

Signature,



NAME: PREM CHARLES I(INPA 3311)

PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

To,

**The Controller of Patents, Intellectual Property
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Theni Hwy, Guindy, Chennai, Tamil Nadu- 600032**

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/59495/2022-CHE

Dated **12/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

Name of the signatory

To,
The Controller of Patents,
The Patent Office,
At Chennai

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Controller General of Patents, Designs & Trade Marks
G.S.T. Road, Guindy, Chennai-600032
Tel No. (091)(044) 22502081-84 Fax No. 044 22502066
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Web Site: www.ipindia.gov.in



सत्यमेव जयते

G.A.R.6
[See Rule 22(1)]
RECEIPT



Docket No 89672

Date/Time 2022/09/18 19:09:17

To
PREM CHARLES

UserId: prem1987

360E, SENTHUR MURUGAN KOVIL
STREET, OPPOSITE SM MAHAL,
OLDPET

CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	E-12/7066/2022/CHE	202241053306	2500	37509	FORM 9	
2	E-12/7063/2022/CHE	202241053308	2500	37509	FORM 9	----
3	E-12/7064/2022/CHE	202241053310	2500	37509	FORM 9	----
4	E-12/7067/2022/CHE	202241053309	2500	37509	FORM 9	----
5	E-12/7065/2022/CHE	202241053307	2500	37509	FORM 9	----
6	202241053306	TEMP/E-1/59435/2022-CHE	1600	37509	FORM 1	A Device for Automated Tapping of Rubber from Trees
7	202241053308	TEMP/E-1/59436/2022-CHE	1600	37509	FORM 1	An Image Processing Based System for Incubation Candling of Eggs in a Poultry Farm
8	202241053310	TEMP/E-1/59438/2022-CHE	1600	37509	FORM 1	A Compact and Portable Thermoelectric Refrigerator
9	202241053309	TEMP/E-1/59439/2022-CHE	1600	37509	FORM 1	An Image Processing Based Method to Classify Brain Tumors
10	202241053307	TEMP/E-1/59495/2022-CHE	1600	37509	FORM 1	An Artificially Intelligent System for Waste Segregation
11	E-106/5535/2022/CHE	202241053306	0	----	FORM28	----
12	E-106/5538/2022/CHE	202241053308	0	----	FORM28	----
13	E-106/5536/2022/CHE	202241053310	0	----	FORM28	----
14	E-106/5539/2022/CHE	202241053309	0	----	FORM28	----
15	E-106/5537/2022/CHE	202241053307	0	----	FORM28	----

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001024381	Online Bank Transfer	1809220004921	20500.00	1475001020000001

Total Amount : ₹ 20500.00

Amount in Words: Rupees Twenty Thousand Five Hundred Only

Received from PREM CHARLES the sum of ₹ 20500.00 on account of Payment of fee for above mentioned Application/Forms.

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Docket No 89677

Date/Time 18/09/2022

To
PREM CHARLES

User Id: prem1987

360E, SENTHUR MURUGAN
KOVIL STREET, OPPOSITE SM
MAHAL, OLDPET

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241053310	E-5/3763/2022/CHE	0	----	FORM 5	
2	202241053310	E-3/29313/2022/CHE	0	----	FORM 3	
3	202241053309	E-5/3764/2022/CHE	0	----	FORM 5	
4	202241053309	E-3/29314/2022/CHE	0	----	FORM 3	
5	202241053308	E-3/29315/2022/CHE	0	----	FORM 3	
6	202241053308	E-5/3765/2022/CHE	0	----	FORM 5	
7	202241053307	E-3/29316/2022/CHE	0	----	FORM 3	
8	202241053307	E-5/3766/2022/CHE	0	----	FORM 5	
9	202241053306	E-5/3767/2022/CHE	0	----	FORM 5	
10	202241053306	E-3/29317/2022/CHE	0	----	FORM 3	

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**OFFICIAL JOURNAL
OF
THE PATENT OFFICE**

निर्गमन सं. 41/2022
ISSUE NO. 41/2022

शुक्रवार
FRIDAY

दिनांक: 14/10/2022
DATE: 14/10/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

**(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS**

14nd OCTOBER, 2022

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202241053308 A

(19) INDIA

(22) Date of filing of Application :18/09/2022

(43) Publication Date : 14/10/2022

(54) Title of the invention : An Image Processing Based System for Incubation Candling of Eggs in a Poultry Farm

(51) International classification :G01N0033080000, A01K0045000000, H04N0005232000, A01K0043000000, A01K0041040000
(86) International Application No :PCT//
Filing Date :01/01/1900
(87) International Publication No : NA
(61) Patent of Addition to Application Number :NA
Filing Date :NA
(62) Divisional to Application Number :NA
Filing Date :NA

(71)Name of Applicant :

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Name of Applicant : NA

Address of Applicant : NA

(72)Name of Inventor :

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6)Jinsa Mathew

Address of Applicant :Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

(57) Abstract :

The present invention relates to the field of biomedical engineering and more particularly it discloses a system for incubation candling of eggs in a poultry farm towards detection of fertile and infertile eggs through image processing. The present system is divided into three main units, Temperature and Humidity Control Unit, Automatic Egg Turning Mechanism and Automatic Candling and Egg Fertility Detection Unit. A camera system is implemented by using Pi Camera and Raspberry Pi Module. The image captured by the camera system is taken for the processing. This step consists of two main processes, egg's location and fertile eggs detection.

No. of Pages : 28 No. of Claims : 4



Application Filing Receipt

**Government of India
Patent Office**

Intellectual Property Office Building,
G.S.T. Road, Guindy,
Chennai -600032

Phone- 044-22502081-84

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CBR Number : 37509

CBR date: 18-09-2022

Application Type: ORDINARY APPLICATION

Priority Number:

Priority Date:

Priority Country: Not Selected

To,

VIMAL JYOTHI ENGINEERING COLLEGE

Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting to be an application for patent numbered 202241053308 dated 18-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to An Image Processing Based System for Incubation Candling of Eggs in a Poultry Farm together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority of date of filing, whichever is earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority of date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

(For Controller of Patents)



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Ministry of Commerce & Industry,
Government of India

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Application Details

APPLICATION NUMBER	202241053308
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	18/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	An Image Processing Based System for Incubation Candling of Eggs in a Poultry Farm
FIELD OF INVENTION	FOOD
E-MAIL (As Per Record)	patents@allinnov.org
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E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	14/10/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:
Filing Date:
Amount of Fee Paid:
CBR No.:
Signature:

1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
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2. INVENTOR(S):

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3	Dr. Glan Devadhas G.	India	Professor, Department of Electronics and Instrumentation Engineering,	India	Kerala	Kannur	Chemperi

			Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.				
4	Dhanoj M.	India	Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
5	Reshma K. V.	India	Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
6	Jinsa Mathew	India	Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

3. TITLE OF THE INVENTION: An Image Processing Based System for Incubation Candling of Eggs in a Poultry Farm

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5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Title of the Invention
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6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application
-------------------------------------	--

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application
-----------------------------------	------------------------------------

9. DECLARATIONS:**(i) Declaration by the inventor(s)**

I/We, Shinu M. M., Sebastian Jacob, Dr. Glan Devadhas G., Dhanoj M., Reshma K. V., Jinsa Mathew, is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Shinu M. M., Sebastian Jacob, Dr. Glan Devadhas G., Dhanoj M., Reshma K. V., Jinsa Mathew

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the signatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- The Complete specification relating to the invention is filed with this application.
- I am/We are, in the possession of the above mentioned invention.
- There is no lawful ground of objection to the grant of the Patent to me/us.
- I am/We are, the assignee or legal representative to true first inventors.

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Incubation Candeling(18).pdf
2	DRAWINGS	Drawings - Incubation Candeling(18).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hereing are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

To The Controller of Patents

The Patent office at CHENNAI

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

An Image Processing Based System for Incubation Candling of Eggs in a Poultry Farm

2. APPLICANT(S)

NAME(S)	NATIONALITY	ADDRESS
---------	-------------	---------

VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

AN IMAGE PROCESSING BASED SYSTEM FOR INCUBATION

CANDLING OF EGGS IN A POULTRY FARM

FIELD OF INVENTION

[001] The present invention relates to the field of biomedical engineering and more
5 particularly it discloses a system for incubation candling of eggs in a poultry farm
towards detection of fertile and infertile eggs through image processing.

BACKGROUND OF INVENTION

[002] Background description includes information that may be useful in understanding
the present invention. It is not an admission that any of the information provided
10 herein is prior art or relevant to the presently claimed invention, or that any
publication specifically or implicitly referenced is prior art.

[003] India is a densely populated country having predominantly agricultural economy.
Almost every part of our country is suitable for poultry farming. During the past
few years poultry industry have gained enormous potential particularly in and
15 around major cities and towns.

[004] However, the most important factor of chicken production is the number of day-old
chicks that supply to all scale of this industry's operation. Incubation industry is the
day-old chicks' supplier, a significant factor that highly influences the chicken
industry. Incubation industry is totally dependent on the fertility and hatchability of
20 eggs. Fertility is a ratio of fertile eggs to incubated eggs, while hatchability refers

to a ratio of fertile eggs that hatch to all fertile eggs. Early detection infertile and absence of development eggs could allow hatcheries to improve hatching rates, saving incubator spaces, handling cost and preventing the spread of infections from exploder eggs. Candling hatching eggs during incubation are convenient tool for
5 analysing poor hatches with recognizing the dead embryos or clear eggs.

[005] In this method, the light source is illuminated and sharpened to the eggs in dark box, resulting in the inner side of eggs can be visible and one can distinguish infertile eggs and early dead embryos from fertility one. If the inside of an egg is a black spot near the centre alongside with some blood vessel, it is considered as a fertile
10 egg, while the inside of an infertile egg is wholly clear without any blot. Nowadays, the candling process is labour employing; the vast number of eggs are randomly candled about 5%. Nevertheless, the thousands of eggs per day are checked by labours, leading to the loss of capability due to fatigue and sight mistake of employers. In addition, the separation between fertility and non-fertility of eggs
15 must be operated by expert workers. Recently, many researchers have been proposed the different methods for non-destructive automatic detection of fertile eggs.

[006] Although, the proposed methods using hyper spectral imaging, ultrasound, heart rate detection, oxygen flux detection, visible/near infrared transmittance
20 spectroscopy and thermal imaging, which are showed high accuracies and abilities to detect fertility in early, but those techniques are expensive and complicated. Low-cost detecting fertility instruments using light-dependent resistor and

temperature sensor has also been proposed. Like the methods that mentioned in above, the process for classifying between fertilized and nonfertilized of them are sophisticated. It can be seen that the automated systems using computer vision for detecting fertility have not only been obtained high accuracy, but also achieved
5 low-cost implementation.

[007] However, only single egg can be inspected by the methods above. Nowadays, the convolutional neural network is becoming more popular method to practically classify objects in image. Many researchers have been applied CNN in different fields, such as agriculture, medical, robotic, traffic enforcement and so on. This
10 invention presents multi fertile egg detection simultaneously based on image processing technique and CNN. The egg's location and sorting can be accomplished by image processing, producing resized images fed into pre-trained CNN model to classify between fertile and infertile eggs.

[008] A prior art disclosed a non-destructive fertility detection of multiple chicken eggs
15 in incubation industry based on image processing technique and convolutional neural network (CNN). The classification between fertility and non-fertility of multi eggs is proposed in this paper. There are two main processes, egg's location and fertile eggs detection. In location process, image processing technique is used to pre-processing image and cropped eggs ROI. The CNN pre-trained model is
20 implemented for distinguish eggs non-fertility from fertility one. The experimental results show 100% accuracies of both location and fertile detection for 240 mixed sample eggs. In this paper, the fertile eggs of day 7-9 are inspected and compared

the results with expert. Experimental results showed that the proposed technique can be suitably applied to incubation industry. However, early classification between fertile and infertile eggs of day 1- 6 will develop in the future.

[009] Another prior art disclosed a spectral wavelength of 580 nm proved to be favourable
5 for the detection of egg embryos, inspiring us to use a 5-W LED lamp with a wavelength of 590 nm as the detection light source, as the LED lamp has a wavelength closer to 580 nm. Using this device, we extracted data on 150 eggs, with ROC curves and AUC values used as a reference to obtain the daily optimal discrimination threshold values suitable for detecting unfertilized and dead-in-shell
10 eggs. The detection device developed in this study was verified using another 150 eggs and was found to be capable of identifying the unfertilized eggs on the seventh day with an accuracy of 98% and a sensitivity of 82% at a screening threshold of 190.5, while dead-in-shell eggs could be identified on the ninth day with an accuracy of 100% and a sensitivity of 100% at a screening threshold of 74. At
15 present, most vaccines are made from eggs, which are generally screened and delivered by the hatchery personnel to vaccine suppliers by the 10th day. Therefore, if 182.5 and 74 are used as the screening thresholds, unfertilized and dead-in-shell eggs, which are not suitable for vaccine culture, could be removed on the ninth day. With the developed screening thresholds introduced into the detection device, 150
20 eggs could be detected at a time—the eggs were detected at a speed of 30 s per tray, or five eggs per second, at an accuracy of 100%. The detected eggs were then marked with inventioned colours, which enabled the users to effectively screen eggs. This research provides a fast and accurate detection method. If commercial

detection equipment is developed in the future, the target sample can be effectively detected using the research results' screening threshold.

[0010] Yet another prior art disclosed a study that was made to apply both image processing and fuzzy logic for egg fertility detection. The study has is divided into
5 two parts: a morphological technique for feature extraction and fuzzy logic algorithm based on the information gathered by the first part. Thus by implementing the Image Processing and FLC in the MATLAB with the help of MATLAB programming and fuzzy logic toolbox can determine the egg fertility. These results show the perspective of the fuzzy logic algorithm and kNN as a classifier of the
10 chicken eggs' fertility rate. The models determined very useful for fast and efficient classification of the fertility of the chicken eggs images. The results showed that all in all the image processing, fuzzy logic, and K-nearest neighbour can be used to determine the chicken eggs' fertility rate.

[0011] Yet another prior art disclosed a system which predicts the fertility of the egg before
15 the incubation period using image processing techniques. The image processing techniques help in predicting the size of the yolk based on which fertility is predicted. This automated system for the prediction of fertility of egg, increases the profit of hatcheries by reducing the incubation cost. The eggs once incubated cannot be used for edible purpose. So, this system brings profit by classifying those eggs
20 into fertile and infertile. The proposed system does not use any harmful radiations as the previous systems. Hence the efficiency is better than the existing system.

[0012] Yet another prior art disclosed a system in which they designed and implemented a very cheap and feasible machine vision system to detect the fertile eggs in the incubation industry. A mechatronic machine was fabricated for acquiring good quality images of eggs without harming them. An appropriate light source was also
5 used for illuminating the eggs, which potentially enabled the system to obtain accurate images from inner side of the eggs. Finally, a robust machine vision algorithm was developed to process the acquired images and distinguish fertile eggs from infertile ones. This progress in fertility detection can lead to a good profit in the industry, and also prevents damage caused by contaminated eggs inside the
10 incubators. In addition, due to very low power consumption by the imaging light source proposed in this study, the energy usage in this machine is less than the other common candling machines. Moreover, highly accurate images taken by this system can be used in other research related to the incubation industry or any other fields that could be useful. The proposed machine vision system can be studied and
15 developed from different aspects from which detecting died embryos from other healthy embryos during the incubation process is the most important one. It is better to know that the embryos that die in incubation machines do not have any blood veins and stick to the eggshell, and usually a pink ring, so called blood ring, surrounds it¹. This fact can be a good starting point for future research in this
20 industry.

[0013] Yet another prior art disclosed an electric powered incubator using a forced draft principle was developed using the available local materials and it was tested with hatchable hen egg. The aim was to produce a low-cost incubator and increase the

production of day-old chicks for small and medium scale poultry farmers. The incubator has the hatching capacity of 540 eggs. Factors that were considered during the performance evaluation of the incubator were humidity, 55% and temperature, 37 ° C during the first 18 days and was maintained at 37.5 ° C till hatching. Turning of eggs was achieved with the use of tilting trays mechanism using an electric gear motor (0.5 h p). The trays were lifted through an angle of 40° either side of horizontal at every hour and lasted for four minutes. 420 clean, healthy, well developed and matured hatchable eggs were used to test the incubator.

[0014] However, there is a pressing need for a better and efficient system to further improvise the overall requirement and hence we come up with the present invention.

[0015] Further limitations and disadvantages of conventional and traditional approaches will become apparent to one of skill in the art through comparison of described systems with some aspects of the present disclosure, as set forth in the remainder of the present application and with reference to the drawings.

[0016] In some embodiments, the numbers expressing quantities or dimensions of items, and so forth, used to describe and claim certain embodiments of the invention are to be understood as being modified in some instances by the term “about.” Accordingly, in some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the

number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable.

5 The numerical values presented in some embodiments of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0017] As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly dictates
10 otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

[0018] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the
15 specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g. “such as”) provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a
20 limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0019] Groupings of alternative elements or embodiments of the invention disclosed herein are not to be construed as limitations. Each group member can be referred to and claimed individually or in any or a combination with other members of the group or other elements found herein. One or more members of a group can be included
5 in, or deleted from, a group for reasons of convenience and/or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all groups used in the appended claims.

OBJECTS OF THE INVENTION:

[0020]10 A general object of the present invention is to design an intelligent image processing based system to incubation candle eggs in a poultry farm at higher rate in comparison to the existing systems.

[0021] These features and advantages of the present disclosure may be appreciated by reviewing the following description of the present disclosure, along with the
15 accompanying figures wherein like reference numerals refer to like parts.

[0022] Various objects, features, aspects and advantages of the inventive subject matter will become more apparent from the following detailed description of the preferred embodiments, along with the accompanying drawing figures in which the numerals represent the like components.

[0023]20 Within the scope of this application it is expressly envisaged that the various aspects, embodiments, examples, alternatives set out in the preceding paragraphs, in the claims and/or the following description and drawings, and in particular the

individual features thereof, may be taken independently or in any or a combination. Features described in connection with one embodiment are applicable to all embodiments, unless such features are incompatible.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024]5 The accompanying drawings are included to provide a further understanding of the present disclosure and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0025]10 A complete understanding of the system and method of the present invention may be obtained by reference to the following drawings:

FIG. 1 illustrates an exemplary block diagram of the present system.

FIG. 2 represents another exemplary block diagram of the camera assisted candling system.

15 FIG. 3 represents an apropos photographic image of the output from the system.

DETAILED DESCRIPTION

[0026] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to clearly communicate the disclosure. However, the amount of detail offered is not intended
20 to limit the anticipated variations of embodiments; on the contrary, the intention is

to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0027] In the following description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present invention. It will
5 be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0028] Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be embodied in machine-executable instructions, which may be used to cause a
10 general-purpose or special purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0029] Various methods described herein may be practiced by combining one or more machine-readable storage media containing the code according to the present
15 invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a single computer) and storage systems containing or having network access to computer program(s) coded in accordance with various methods described herein,
20 and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

[0030] The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0031] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

[0032] Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those of ordinary skill in the art. The invention disclosed may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein.

[0033] Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific
5 examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary
10 embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives, modifications and equivalents consistent with the principles and features disclosed. For purpose of clarity, details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not
15 to unnecessarily obscure the present invention.

[0034] Thus, for example, it will be appreciated by those of ordinary skill in the art that the diagrams, schematics, illustrations, and the like represent conceptual views or processes illustrating systems and methods embodying this invention. The functions of the various elements shown in the figures may be provided through the
20 use of dedicated hardware as well as hardware capable of executing associated software. Similarly, any switches shown in the figures are conceptual only. Their function may be carried out through the operation of program logic, through dedicated logic, through the interaction of program control and dedicated logic, or

even manually, the particular technique being selectable by the entity implementing this invention. Those of ordinary skill in the art further understand that the exemplary hardware, software, processes, methods, and/or operating systems described herein are for illustrative purposes and, thus, are not intended to be
5 limited to any particular named element.

[0035] Embodiments of the present invention may be provided as a computer program product, which may include a machine-readable storage medium tangible embodying thereon instructions, which may be used to program a computer (or other electronic devices) to perform a process. The term “machine-readable storage
10 medium” or “computer-readable storage medium” includes, but is not limited to, fixed (hard) drives, magnetic tape, floppy diskettes, optical disks, compact disc read-only memories (CD-ROMs), and magneto-optical disks, semiconductor memories, such as ROMs, PROMs, random access memories (RAMs), programmable read-only memories (PROMs), erasable PROMs (EPROMs),
15 electrically erasable PROMs (EEPROMs), flash memory, magnetic or optical cards, or other type of media/machine-readable medium suitable for storing electronic instructions (e.g., computer programming code, such as software or firmware). A machine-readable medium may include a non-transitory medium in which data may be stored and that does not include carrier waves and/or transitory
20 electronic signals propagating wirelessly or over wired connections.

[0036] Examples of a non-transitory medium may include, but are not limited to, a magnetic disk or tape, optical storage media such as compact disk (CD) or digital

versatile disk (DVD), flash memory, memory or memory devices. A computer-program product may include code and/or machine-executable instructions that may represent a procedure, a function, a subprogram, a program, a routine, a subroutine, a module, a software package, a class, or any combination of
5 instructions, data structures, or program statements. A code segment may be coupled to another code segment or a hardware circuit by passing and/or receiving information, data, arguments, parameters, or memory contents. Information, arguments, parameters, data, etc. may be passed, forwarded, or transmitted via any suitable means including memory sharing, message passing, token passing, network
10 transmission, etc.

[0037] Furthermore, embodiments may be implemented by hardware, software, firmware, middleware, microcode, hardware description languages, or any combination thereof. When implemented in software, firmware, middleware or microcode, the program code or code segments to perform the necessary tasks (e.g., a computer-
15 program product) may be stored in a machine-readable medium. A processor(s) may perform the necessary tasks.

[0038] Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the pertinent art have given that term as reflected in printed publications and issued
20 patents at the time of filing.

[0039] The present invention will now be described more fully hereinafter. This invention may, however, be embodied in many different forms and should not be construed

as being limited to the embodiment set forth herein. Rather, the embodiment is provided so that this disclosure will be thorough, and will fully convey the scope of the invention to those skilled in the art.

[0040] The present disclosure is best understood with reference to the detailed figures and
5 description set forth herein. Various embodiments have been discussed with reference to the figures. However, those skilled in the art will readily appreciate that the detailed descriptions provided herein with respect to the figures are merely for explanatory purposes, as the methods and systems may extend beyond the described embodiments. For instance, the teachings presented and the needs of a
10 particular application may yield multiple alternative and suitable approaches to implement the functionality of any detail described herein. Therefore, any approach may extend beyond certain implementation choices in the following embodiments.

[0041] References to “one embodiment,” “at least one embodiment,” “an embodiment,”
15 “one example,” “an example,” “for example,” and so on indicate that the embodiment(s) or example(s) may include a particular feature, structure, characteristic, property, element, or limitation but that not every embodiment or example necessarily includes that particular feature, structure, characteristic, property, element, or limitation. Further, repeated use of the phrase “in an embodiment” does not necessarily refer to the same embodiment.

[0042] Methods of the present invention may be implemented by performing or completing
20 manually, automatically, or a combination thereof, selected steps or tasks. The term “method” refers to manners, means, techniques and procedures for accomplishing

a given task including, but not limited to, those manners, means, techniques, and procedures either known to, or readily developed from known manners, means, techniques and procedures by practitioners of the art to which the invention belongs. The descriptions, examples, methods, and materials presented in the claims and the specification are not to be construed as limiting but rather as illustrative only. Those skilled in the art will envision many other possible variations within the scope of the technology described herein.

[0043] FIG. 1 illustrates an exemplary block diagram of the present system. The inputs in the system of this invention are the temperature and humidity sensors, the camera which will capture the image of the egg during candling process and the power source. Automatic control of the temperature and humidity inside the incubator is controlled by the XH-M452 Controller.

[0044] The Controller XH-M452 measures the temperature and humidity of the incubator. Once the temperature drops below the threshold, the controller turns on the incandescent lamp and turns off if temperature exceeds threshold. Similarly, when the humidity drops below the threshold value, the controller turns on the humidifier and turns off if it exceeds threshold.

[0045] The egg turning mechanism is designed in such a way that the tray can be tilted 45 degrees upward and downward by using stepper motor. Also, it was suitable for the space requirement since the design does not need much space to cover for installation inside the incubator.

[0046] The modified tray has LED lights below where eggs can be illuminated without removing the eggs from the tray has been installed. Egg turning mechanism that employs a stepper motor that turns the eggs 45 degrees both sides every 8 hours per day. The timing program is uploaded in the Raspberry Pi Controller. The stepper
5 motor is installed with a fan cooling system partnered with heat sink to reduce the heat the motor is experiencing. An egg turning system is needed in order for the growing embryo to not bind into the membrane of the eggshell.

[0047] FIG. 2 represents another exemplary block diagram of the camera assisted candling system. Multi eggs are placed on a tray inside dark box. LED light source is
10 illuminated and sharped to all eggs under a tray, enabling the inner side of eggs can be visible. It should be noted that 12 eggs are placed on a tray with 3 rows and 4 columns, resulting the present system can be inspected all of eggs simultaneously. A Pi Camera is then captured eggs image with resolution of 1280x960 pixels. Captured image can be removed the noises with Gaussian average filter and eroded
15 pixels with 7x7 mask, called pre-processing task. The canny technique is applied to find the edges of each egg in the pre-processed image. Then, the locations of each egg are achieved by Hough circle transform. However, the present sorting algorithm is taken to rearrange each egg's location into correct order of rows and columns. It makes the detection system can be known in each location whether egg
20 available or not. Each detected eggs area is cropped and resized corresponding to the size of input of pre-trained CNN model. Finally, the predictor classifies each egg images whether fertility or non-fertility, and label results related to eggs sorted location.

[0048] FIG. 3 represents an apropos photographic image of the output from the system. A hardware prototype is developed for hatching, candling and detecting infertile eggs among fertile eggs. The prototype consists of a Raspberry Pi module which acts as a controller and a PiCamera to take the image. Two push buttons are interfaced with the Raspberry Pi in order to control the camera actions. Pressing one of the push buttons will capture the image and pressing other will close the image and repeat the process. Also, a XH-M452 controller is used which controls the temperature and humidity inside the incubator box. A stepper motor is interfaced with the Raspberry Pi using L298N motor driver which provides suitable rotational motion for Egg Turning Mechanism. The candling of eggs is done by using LEDs placed beneath them. Here we use 12, 3W LEDs connected in series and can be powered up by a 48 Volt constant current driver.

[0049] The CNN model is trained and tested using the website Teachable Machine. 50 images of fertile and infertile eggs are used to train the model. The trained model is then tested and converted to tensorflow lite format. This is because, lower variants of Raspberry Pi support only tensorflow lite model. The converted model is then downloaded and used as pre-trained CNN model in the fertility detection program.

[0050]

[0051] Also, a Python program is developed to distinguish the non-fertile eggs from fertile one. The image taken by the PiCamera is used as the input image. This image is processed into various stages such as gray-scaling, thresholding and binary

conversion in order to identifying and extracting each egg from the tray. By using contour edge detection method, each egg can be extracted from the input image and is given to the CNN pre-trained model as input image. The CNN classifier model determines whether the egg is fertile or infertile.

[0052] 5 12 eggs are tested and observed using our incubator. Out of 12 eggs, 8 eggs were predicted as 'fertile' and remaining 4 eggs as 'infertile' during the incubation period of first 1-3 days with an average probability of prediction 85%. This probability increases day by day and we obtained results with probability after 5 days of incubation. These test results ensures that our system can distinguish the fertile eggs
10 from infertile eggs within 5 days of incubation accurately.

[0053] The present system is divided into three main units, Temperature and Humidity Control Unit, Automatic Egg Turning Mechanism and Automatic Candling and Egg Fertility Detection Unit. A camera system is implemented by using PiCamera and Raspberry Pi Module. The image captured by the camera system is taken for
15 the processing. This step consists of two main processes, egg's location and fertile eggs detection.

[0054] A Python program is developed to distinguish the non-fertile eggs among fertile eggs. A CNN Model of tensorflow lite format is attached with the program, so that this model can be used as a classifier in order to check the fertility of eggs. The
20 system shows 80 % of accuracy in the prediction during the 1-3 days of incubation and 95 % after 5 days of incubation.

[0055] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions, or
5 examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge available to the person.

10

#####DIGITALLY SIGNED#####
PREM CHARLES I
Registered Patent Agent INPA-3311
Patent Agent On Behalf of the Applicants

CLAIMS

We claim,

1. An image processing based system for incubation candling of eggs in a poultry farm, comprising:

5 at least one image capturing device;

 one or more processors;

 a plurality of sensors.

2. The system as claimed in claim 1 wherein, the image capturing device is preferably a Pi camera configured to detect egg fertility.

10 3. The system as claimed in claims 1 and 2 wherein, the said processor is preferably a Raspberry Pi characterized in that is an algorithm configured to read the images captured by the said image capturing device and detect the fertility levels.

15 4. The system as claimed in claim 1 wherein, the said sensor is a temperature sensor configured to incubate the eggs in the intelligent incubator in a correct environment for fertilization.

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PREM CHARLES I

Registered Patent Agent INPA-3311

Patent Agent On Behalf of the Applicants

20

ABSTRACT

AN IMAGE PROCESSING BASED SYSTEM FOR INCUBATION CANDLING OF EGGS IN A POULTRY FARM

The present invention relates to the field of biomedical engineering and more
5 particularly it discloses a system for incubation candling of eggs in a poultry farm
towards detection of fertile and infertile eggs through image processing. The
present system is divided into three main units, Temperature and Humidity Control
Unit, Automatic Egg Turning Mechanism and Automatic Candling and Egg
Fertility Detection Unit. A camera system is implemented by using Pi Camera and
10 Raspberry Pi Module. The image captured by the camera system is taken for the
processing. This step consists of two main processes, egg's location and fertile eggs
detection.

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Patent Agent On Behalf of the Applicants

15

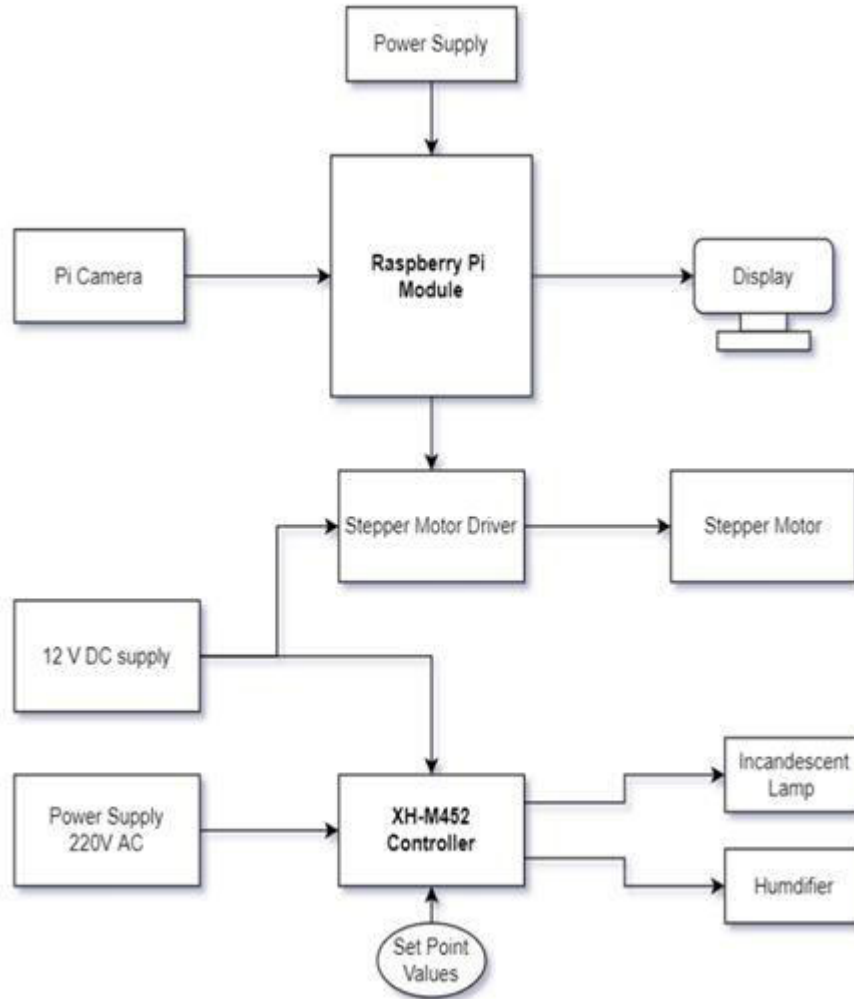


FIGURE 1

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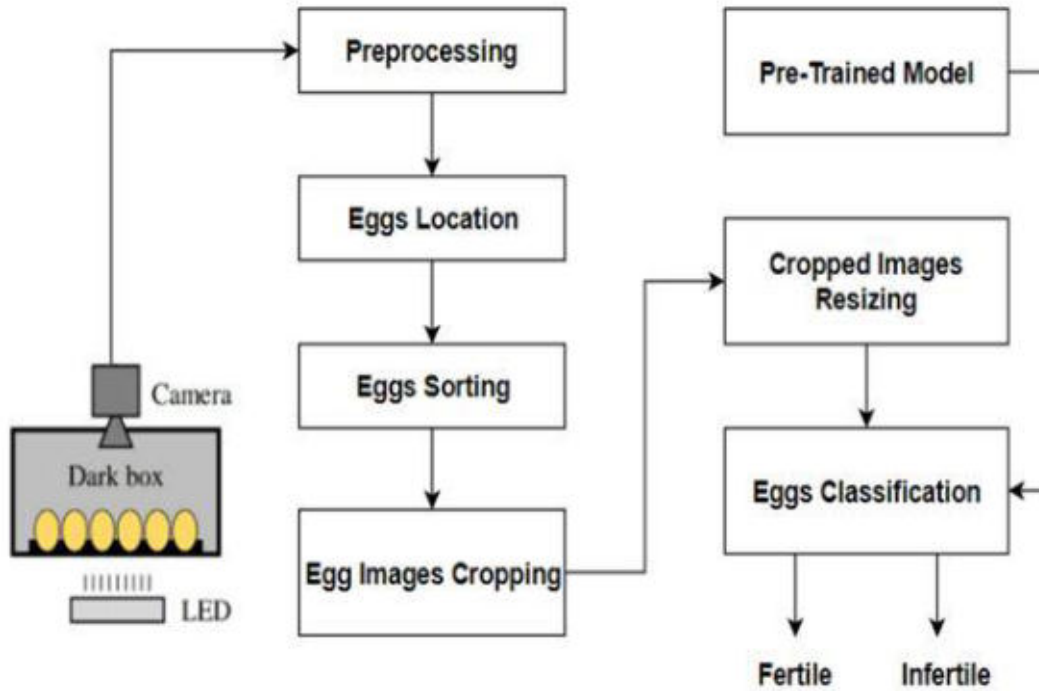


FIGURE 2

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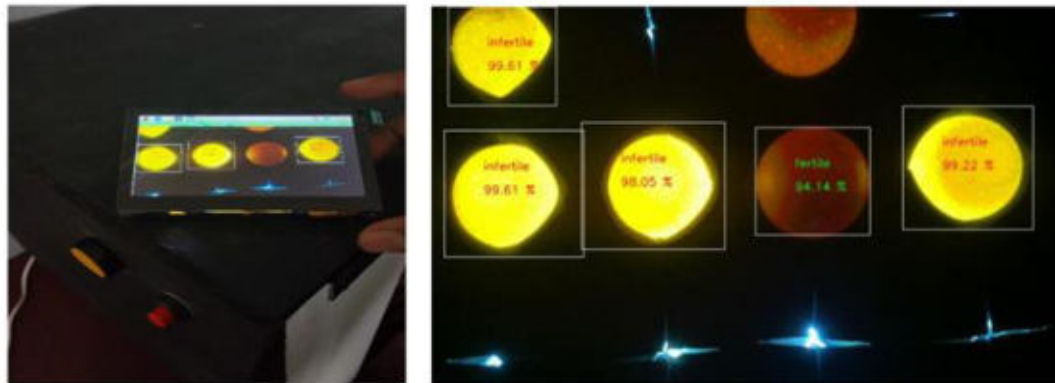


FIGURE 3

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FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241053308 dated 18-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:


NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 18th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241053308** Dated **18th day of Sep , 2022** are

INVENTOR (S):

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2	a) Name: b) Nationality: c) Address:	Sebastian Jacob Indian Student, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
3	a) Name: b) Nationality: c) Address:	Dr. Glan Devadhas G. Indian Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
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5	a) Name: b) Nationality: c) Address:	Reshma K. V. Indian Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
6	a) Name: b) Nationality: c) Address:	Jinsa Mathew Indian Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

Dated This 18thday ofSep,2022

Signature,



NAME: PREM CHARLES I(INPA 3311)

PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

To,

**The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu- 600032**

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/59436/2022-CHE

Dated **11/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

Name of the signatory

To,
The Controller of Patents,
The Patent Office,
At Chennai

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सत्यमेव जयते

G.A.R.6
[See Rule 22(1)]
RECEIPT



Docket No 89672

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UserId: prem1987

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CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	E-12/7066/2022/CHE	202241053306	2500	37509	FORM 9	
2	E-12/7063/2022/CHE	202241053308	2500	37509	FORM 9	----
3	E-12/7064/2022/CHE	202241053310	2500	37509	FORM 9	----
4	E-12/7067/2022/CHE	202241053309	2500	37509	FORM 9	----
5	E-12/7065/2022/CHE	202241053307	2500	37509	FORM 9	----
6	202241053306	TEMP/E-1/59435/2022-CHE	1600	37509	FORM 1	A Device for Automated Tapping of Rubber from Trees
7	202241053308	TEMP/E-1/59436/2022-CHE	1600	37509	FORM 1	An Image Processing Based System for Incubation Candling of Eggs in a Poultry Farm
8	202241053310	TEMP/E-1/59438/2022-CHE	1600	37509	FORM 1	A Compact and Portable Thermoelectric Refrigerator
9	202241053309	TEMP/E-1/59439/2022-CHE	1600	37509	FORM 1	An Image Processing Based Method to Classify Brain Tumors
10	202241053307	TEMP/E-1/59495/2022-CHE	1600	37509	FORM 1	An Artificially Intelligent System for Waste Segregation
11	E-106/5535/2022/CHE	202241053306	0	----	FORM28	----
12	E-106/5538/2022/CHE	202241053308	0	----	FORM28	----
13	E-106/5536/2022/CHE	202241053310	0	----	FORM28	----
14	E-106/5539/2022/CHE	202241053309	0	----	FORM28	----
15	E-106/5537/2022/CHE	202241053307	0	----	FORM28	----

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001024381	Online Bank Transfer	1809220004921	20500.00	1475001020000001

Total Amount : ₹ 20500.00

Amount in Words: Rupees Twenty Thousand Five Hundred Only

Received from PREM CHARLES the sum of ₹ 20500.00 on account of Payment of fee for above mentioned Application/Forms.

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Docket No 89677

Date/Time 18/09/2022

To
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User Id: prem1987

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KOVIL STREET, OPPOSITE SM
MAHAL, OLDPET

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241053310	E-5/3763/2022/CHE	0	----	FORM 5	
2	202241053310	E-3/29313/2022/CHE	0	----	FORM 3	
3	202241053309	E-5/3764/2022/CHE	0	----	FORM 5	
4	202241053309	E-3/29314/2022/CHE	0	----	FORM 3	
5	202241053308	E-3/29315/2022/CHE	0	----	FORM 3	
6	202241053308	E-5/3765/2022/CHE	0	----	FORM 5	
7	202241053307	E-3/29316/2022/CHE	0	----	FORM 3	
8	202241053307	E-5/3766/2022/CHE	0	----	FORM 5	
9	202241053306	E-5/3767/2022/CHE	0	----	FORM 5	
10	202241053306	E-3/29317/2022/CHE	0	----	FORM 3	

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निर्गमन सं. 41/2022
ISSUE NO. 41/2022

शुक्रवार
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दिनांक: 14/10/2022
DATE: 14/10/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

**(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS**

14nd OCTOBER, 2022

(54) Title of the invention : An Image Processing Based Method to Classify Brain Tumors

(51) International classification :G06T0007000000, G06K0009620000, G06T0007110000, G06T0015000000, G06T0007130000

(86) International Application No Filing Date :PCT// :01/01/1900

(87) International Publication No : NA

(61) Patent of Addition to Application Number Filing Date :NA :NA

(62) Divisional to Application Number Filing Date :NA :NA

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Name of Applicant : NA
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(57) Abstract :
 The present invention relates to medical image processing systems. More particularly, the present disclosure pertains to an artificial intelligence based method of image processing to autonomously and accurately classify tumours in brain. Brain MRI images of various kinds are obtained from local hospitals. They are scanned for any discrepancies in the normal brain architecture. Image is loaded into the GUI. Median Filtering takes place when preprocessing button is applied. Segmentation is then applied which is where the classification using the kernel SVM algorithm occurs. The tumor is classified as either benign or malignant. Clustering is another important segmentation technique used widely in the image processing. Here segmentation is performed using the Otsu’s algorithm. Taking the value of k as 4, four possible clustered regions are detected in the brain MRI image. The first two clusters show the boundary region and the last two clusters show the tumor region. Finally the Output button delineates the location of the tumor region.

No. of Pages : 21 No. of Claims : 5



Application Filing Receipt

**Government of India
Patent Office**
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CBR Number : 37509

CBR date: 18-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
VIMAL JYOTHI ENGINEERING COLLEGE
Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting be to an application for patent numbered 202241053309 dated 18-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to An Image Processing Based Method to Classify Brain Tumors together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority of date of filing, whichever is earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority of date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

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Application Details

APPLICATION NUMBER	202241053309
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	18/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	An Image Processing Based Method to Classify Brain Tumors
FIELD OF INVENTION	COMPUTER SCIENCE
E-MAIL (As Per Record)	patents@allinnov.org
ADDITIONAL-EMAIL (As Per Record)	allinnovrnd@gmail.com
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	14/10/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)

&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:
Filing Date:
Amount of Fee Paid:
CBR No.:
Signature:

1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
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2. INVENTOR(S):

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3	Ankita Sebastian	India	Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
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5	Jijo Joseph	India	Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
6	Junaid	India	Student, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College,	India	Kerala	Kannur	Chemperi

			Chemperi (PO), Kannur – 670632, Kerala, India.			
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3. TITLE OF THE INVENTION: An Image Processing Based Method to Classify Brain Tumors

4. ADDRESS FOR CORRESPONDENCE OF APPLICANT / Telephone No.:
AUTHORISED PATENT AGENT IN INDIA:

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5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Titile of the Invention
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6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application
-------------------------------------	--

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application
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9. DECLARATIONS:

(i) Declaration by the inventor(s)

I/We ,Athira M. Thomas,Laly James,Ankita Sebastian,Prabin James,Jijo Joseph,Junaid, is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Athira M. Thomas,Laly James,Ankita Sebastian,Prabin James,Jijo Joseph,Junaid

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the signatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- **The Complete specification relating to the invention is filed with this application.**
- **I am/We are, in the possession of the above mentioned invention.**
- **There is no lawful ground of objection to the grant of the Patent to me/us.**
- **I am/We are, the assignee or legal representative to true first inventors.**

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Brain Tumor (4).pdf
2	DRAWINGS	Drawings - Brain Tumor (4).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hereing are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

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The Patent office at CHENNAI

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

An Image Processing Based Method to Classify Brain Tumors

2. APPLICANT(S)

NAME(S)

NATIONALITY

ADDRESS

VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

AN IMAGE PROCESSING BASED METHOD TO CLASSIFY BRAIN

TUMORS

TECHNICAL FIELD

[0001] The present invention relates to medical image processing systems. More particularly, the present disclosure pertains to an artificial intelligence based method of image processing to autonomously and accurately classify tumours in brain.

BACKGROUND OF THE INVENTION

[0002] Background description includes information that may be useful in understanding the present invention. It is not an admission that any of the information provided herein is prior art or relevant to the presently claimed invention, or that any publication specifically or implicitly referenced is prior art.

[0003] A brain tumor occurs when abnormal cells form within the brain. There are two main types of tumors: malignant tumors and benign (non-cancerous) tumors. These can be further classified as primary tumors, which start within the brain, and secondary tumors, which most commonly have spread from tumors located outside the brain, known as metastatic tumors. The reason for these tumors could be due to hereditary or birth defects. Nevertheless, the cause of brain tumors is not clearly defined. Some general symptoms are headaches, nausea, behavioral changes, memory decline, double vision, lethargy, swallowing difficulties, hand tremors etc. If left unchecked, brain tumors can lead to complications resulting in death. It is imperative to diagnose the brain for any tumors in the earliest stages. Cerebral images can be obtained from a variety of methods, including computed tomography (CT scan) and Magnetic Resonance Imaging (MRI).

[0004] MRI is an imaging technique that produces high quality images of of the human body, and provides rich information for clinical diagnosis and biomedical research. MRI consists of T1 weighted, T2 weighted and PD (proton density) weighted images and are processed by a system which integrates fuzzy based technique with multispectral analysis. Pre-processing of MRI images is the primary step in image analysis which perform image enhancement and noise reduction techniques which are used to enhance the image quality, then some morphological operations are applied to detect the tumor in the image. The morphological operations are basically applied on some assumptions about the size and shape of the tumour and in the end the tumour is mapped onto the original gray scale image with 255 intensity to make visible the tumour in the image. The algorithm has been tried on a number of patients MRI data of brain tumour images. Since its development in the 1970s and 1980s, MRI has proven to be a versatile imaging technique. While MRI is most prominently used in diagnostic medicine and biomedical research, it also may be used to form images of non-living objects, such as mummies. Diffusion MRI and functional MRI extend the utility of MRI to capture neuronal tracts and blood flow respectively in the nervous system, in addition to detailed spatial images.

[0005] MATLAB is a programming language and computing environment developed by MathWorks. MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, and interfacing with programs written in other languages. Simulink, adds graphical multidomain simulation and model-based design for dynamic and embedded systems. Within MATLAB, Support Vector Machine (SVM) algorithm is used for classifying tumors into either benign or malignant. The features of the tumor are first extracted using Discrete Wavelet

Transform – which converts time domain signals into sinusoidal frequencies. This is detailed in the forthcoming chapters. As of 2021, MATLAB has more than 4 million users worldwide.

[0006] A prior art used to perform automatic image thresholding. In the simplest form, the algorithm returns a single intensity threshold that separate pixels into two classes, foreground and background. This threshold is determined by minimizing intra-class intensity variance, or equivalently, by maximizing inter-class variance. Otsu's method is a one-dimensional discrete analog of Fisher's Discriminant Analysis, is related to Jenk's Optimization Method, and is equivalent to a globally optimal K-means performed on the intensity histogram. The extension to multi-level thresholding was described in the original paper, and computationally efficient implementations have since been proposed.

[0007] Another prior art Support Vector Machine (SVM) is a milestone in machine learning. The advantages include high accuracy, elegant mathematical tractability, and direct geometric interpretation. SVM is a supervised machine learning algorithm that can be used for both classification challenges. In the SVM algorithm, we plot each data item as a point in n-dimensional space with the value of each feature being the value of a particular coordinate. Then, we perform classification by finding the hyper-plane that differentiates the two classes very well. Suppose some prescribed data points each belong to one of two classes, and the goal is to classify which class a new data point will be located in. Here a data point is viewed as a pdimensional vector, and our task is to create a (p-1)-dimensional hyperplane. There are many hyperplanes that might classify the data successfully. One reasonable choice as the best hyperplane is the one that represents the largest distance between the two classes, since we could expect better

behavior with respect to unseen data during training. Therefore, we choose the hyperplane from it to the nearest data point on each side.

[0008] Yet another prior art, Fourier transform (FT) is a technique in signal processing which breaks down a time domain signal into constituent sinusoidal frequencies, thus, transforming the signal from time domain to frequency domain. 5 However, FT has a serious drawback in that it is time-independent. For example, analyst cannot tell when a particular event took place in a Fourier spectrum. Thus, the classification accuracy decreases due to loss of time information. Therefore, Fourier Transform is adapted to analyze only a small part of the signal at a time. The technique 10 is called windowing or short time Fourier transform (STFT). It provides some information about both time and frequency domain. However, the precision of the information is limited by the size of the window. Wavelet transform (WT) represents the variable sized windowing technique. Thus, it preserves both time and frequency information of the signal. Another advantage of WT is that it produces a time-scale 15 view of the signal.

[0009] Yet another prior art Morphological Operations is a broad set of image processing operations that process digital images based on their shapes. In a morphological operation, each image pixel is corresponding to the value of other pixel in its neighborhood. By choosing the shape and size of the neighborhood pixel, you can 20 construct a morphological operation that is sensitive to specific shapes in the input image. Morphological operations apply a structuring element called strel in Matlab, to an input image, creating an output image of the same size.

[0010] Though the prior arts have considerably solved the requirement, there is a pressing need for a better system and the invention is presented addressing the same.

[0011] As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly
5 dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

[0012] In some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some
10 embodiments, the numerical parameters should be construed in light of the number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable. The numerical
15 values presented in some embodiments of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0013] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the
20 range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language

(e.g. “such as”) provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the invention.

5 [0014] Groupings of alternative elements or embodiments of the invention disclosed herein are not to be construed as limitations. Each group member can be referred to and claimed individually or in any combination with other members of the group or other elements found herein. One or more members of a group can be included in, or deleted from, a group for reasons of convenience and / or patentability. When any
10 such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all groups used in the appended claims.

OBJECTS OF THE INVENTION

[0015] In this disclosure, whenever a composition, an element or a group of
15 elements is preceded with the transitional phrase "comprising", it is understood that we also contemplate the same composition, element or group of elements with transitional phrases "consisting essentially of, "consisting", "selected from the group of consisting of, "including", or "is" preceding the recitation of the composition, element or group of elements and vice versa.

20 [0016] A general object of the present invention is to create a program in MATLAB that will detect and analyze brain tumors, to implement a classification

algorithm that will classify brain tumors into different types, to automate segmentation process in scanning MRI images and to extract features of tumors.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The accompanying drawings are included to provide a further understanding
5 of the present disclosure, and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0018] So that the manner in which the above recited features of the present
10 invention can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings.

[0019] It is to be noted, however, that the appended drawings illustrate only typical
15 embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

Figure 1 discloses an exemplary block diagram representation of the overall system.

Figures 2A and 2B discloses an apropos photographic representation the image processed normal and benign tumour brains respectively.

DETAILED DESCRIPTION

20 [0020] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to

clearly communicate the disclosure. However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

5 **[0021]** In the following description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

10 **[0022]** Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be embodied in machine-executable instructions, which may be used to cause a general-purpose or special-purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

15 **[0023]** Various methods described herein may be practiced by combining one or more machine-readable storage media containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a single computer)
20 and storage systems containing or having network access to computer program(s) coded in accordance with various methods described herein, and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

[0024] The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0025] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

[0026] Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those of ordinary skill in the art. The invention disclosed may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other

embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include
5 both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives, modifications and
10 equivalents consistent with the principles and features disclosed. For purpose of clarity, details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not to unnecessarily obscure the present invention.

[0027] Various terms as used herein are shown below. To the extent a term used in
15 a claim is not defined below, it should be given the broadest definition persons in the pertinent art have given that term as reflected in printed publications and issued patents at the time of filing.

[0028] Tumor diagnosis is done manually by the doctors and sometimes the MRI technicians involved. A lot of tests are conducted on the patient for screening, including
20 physical tests, biopsy and MRI scans. A dye is injected into a vein for MRI scanning. All of this can cause duress for the patient as these are invasive procedures. Moreover, since it is done manually, it is ripe for misdiagnosis. To reduce time taken for diagnosis which would therefore improve patient outcomes, we decided to create a simulation

that that would detect and classify brain tumors without any need for these invasive procedures. The accuracy would be above 90% and has a capacity for learning and improving.

[0029] Figure 1 discloses an exemplary block diagram representation of the overall system. A Graphical User Interface (GUI) is created on MATLAB 2018b that is used to detect MRI images. Brain MRI images are browsed and scanned before preprocessing. Initially pre-processing of given MRI image is done then edge detection of brain is conducted and finally, segmentation displays the tumor region vividly .

[0030] The algorithm is detailed as follows:- Input MRI image of brain; Convert it to gray scale image; Apply preprocessing operations; Compute image segmentation using Otsu's method; Compute morphological operation; Finally output will be the detected tumor; The features of the tumor are extracted; Train the kernel SVM for predicting and classifying tumors; Submit new MRI brains to the trained kernel SVM, and output the prediction.

[0031] Image pre-processing aims in noise removal and to improve the clarity of image or altering the quality of image for a purpose. The functions performed at the preprocessing stage are described as follows.

[0032] RGB to Grayscale Conversion: As the name indicates, the image may consist of shades of grey. A grey color is one in which the red, green and blue elements have equal intensity in RGB space. These images need to be converted into grayscale image which range from 0 to 255 pixel values where range 0 means image is pure black and range 255 defines pure white color.

[0033] Median Filtering: Filtering is a method used for eliminating the noise inherent in an image. During image conversion, noise creeps into the image. It is applied to eradicate the noises such as salt and pepper from the converted grayscale image.

[0034] Image Enhancement And Contrast: The received image may have defects such as poor contrast and noise. When contrast is poor, the contrast enhancement technique is used. In this case, the pixel gray level is scaled for improving the contrast. The visualization of the MRI image is improved through contrast enhancement technique.

[0035] Edge Detection: it is an image processing approach used for mapping the boundaries of an object within the image. The algorithm works by finding drastic rise or decline in each pixel intensity and displaying only those sudden changes in the pixels. This change in the pixel is passed through appropriate convolution masks and the outcome is represented as the image edge. Sobel Edge Detection Technique comes to play. Sobel operator is a gradient is attained in the smaller spur gear. As the gear is connected with the generator, power generation is done. The generated power is stored up in the battery. While using it, it must be inverted operator. The relative gradient magnitude can be obtained by applying this operator in the input image. Setting convolution mask $c=2$, we get two Sobel operators M_x and M_y by sending it through 3×3 convolution masks. The process of adding an individual element of the image to its neighbors weighted by a kernel is called convolution.

[0036] Figures 2A and 2B discloses an apropos photographic representation the image processed normal and benign tumour brains respectively. The simulation is developed in MATLAB 2018b version. Brain MRI images of various kinds are obtained

from local hospitals. They are scanned for any discrepancies in the normal brain architecture. Image is loaded into the GUI. Median Filtering takes place when preprocessing button is applied. Segmentation is then applied which is where the classification using the kernel SVM algorithm occurs. The tumor is classified as either
5 benign or malignant. Clustering is another important segmentation technique used widely in the image processing.

[0037] Here segmentation is performed using the Otsu's algorithm. Taking the value of k as 4, four possible clustered regions are detected in the brain MRI image. The first two clusters show the boundary region and the last two clusters show the tumor
10 region. Finally the Output button delineates the location of the tumor region. For feature extraction, The three levels of wavelet decomposition greatly reduce the input image size. The top left corner of the wavelet coefficients image denotes the approximation coefficients of level-3, whose size is only $32 \times 32 = 1024$ and we are able to successfully predict and classify the images as either benign, malignant or non-tumorous with
15 greater than 90% accuracy. Radial Basis Function (RBF) accuracy and linear accuracy together measure the strength of the kernel SVM algorithm. We then packaged the simulation as an app using app compiler.

[0038] The simulation defines the properties, location and type of the brain tumors based on machine learning techniques. Its accuracy and speed is expected to improve
20 over time with usage Chances of misdiagnoses are significantly lowered, and therefore less burden rests on the doctors.

[0039] It should be apparent to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive

concepts herein. The inventive subject matter, therefore, is not to be restricted except in the scope of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms “comprises” and “comprising” should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined with other elements, components, or steps that are not expressly referenced. Where the specification claims refers to at least one of something selected from the group consisting of A, B, C ...and N, the text should be interpreted as requiring only one element from the group, not A plus N, or B plus N, etc. The foregoing description of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the scope of the appended claims.

[0040] All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0041] The invention is not restricted to the details of the foregoing embodiment(s).
The invention extends to any novel one, or any novel combination, of the features
disclosed in this specification (including any accompanying claims, abstract and
drawings), or to any novel one, or any novel combination, of the steps of any method
5 or process so disclosed.

[0042] While the foregoing describes various embodiments of the invention, other
and further embodiments of the invention may be devised without departing from the
basic scope thereof. The scope of the invention is determined by the claims that follow.
The invention is not limited to the described embodiments, versions or examples, which
10 are included to enable a person having ordinary skill in the art to make and use the
invention when combined with information and knowledge available to the person
having ordinary skill in the art.

15 **#####DIGITALLY SIGNED#####**
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

CLAIMS

We claim:

1. An image processing based method to classify brain tumors, comprising
an image capturing device;
5 one or more processors; and
a plurality of algorithms configured to read the MRI images.
2. The system as claimed in claim 1 wherein, the said image capturing device is preferably a camera configured to capture images of the MRI and analyse it through the image processing algorithm.
- 10 3. The system as claimed in claim 1 wherein, the said algorithm is capable of detecting brain tumors and also classifying the same into benign and malignant types.
4. The system as claimed in claim 1 wherein, the said processor is a computing device configured to be operatively coupled to the said image capturing device
15 so as to take inputs to the system.
5. The system as claimed in claims 1 and 4 wherein, is capable of classifying brain tumors thereby reducing the time taken in manual analysis while also making fool proof diagnosis of the disease.

20

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent On Behalf of the Applicants

ABSTRACT

**AN IMAGE PROCESSING BASED METHOD TO CLASSIFY BRAIN
TUMORS**

The present invention relates to medical image processing systems. More particularly,
5 the present disclosure pertains to an artificial intelligence based method of image
processing to autonomously and accurately classify tumours in brain. Brain MRI
images of various kinds are obtained from local hospitals. They are scanned for any
discrepancies in the normal brain architecture. Image is loaded into the GUI. Median
Filtering takes place when preprocessing button is applied. Segmentation is then
10 applied which is where the classification using the kernel SVM algorithm occurs. The
tumor is classified as either benign or malignant. Clustering is another important
segmentation technique used widely in the image processing. Here segmentation is
performed using the Otsu's algorithm. Taking the value of k as 4, four possible
clustered regions are detected in the brain MRI image. The first two clusters show the
15 boundary region and the last two clusters show the tumor region. Finally the Output
button delineates the location of the tumor region.

20

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

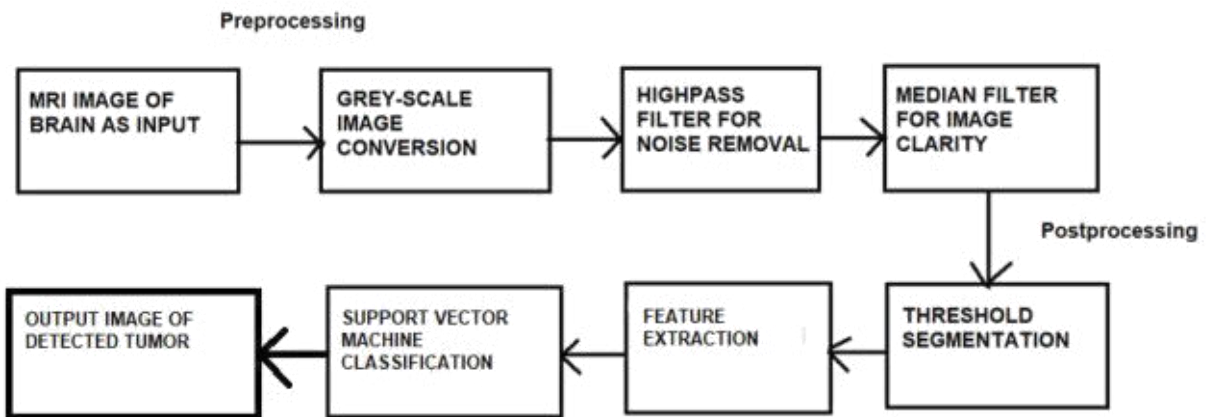


FIGURE 1

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

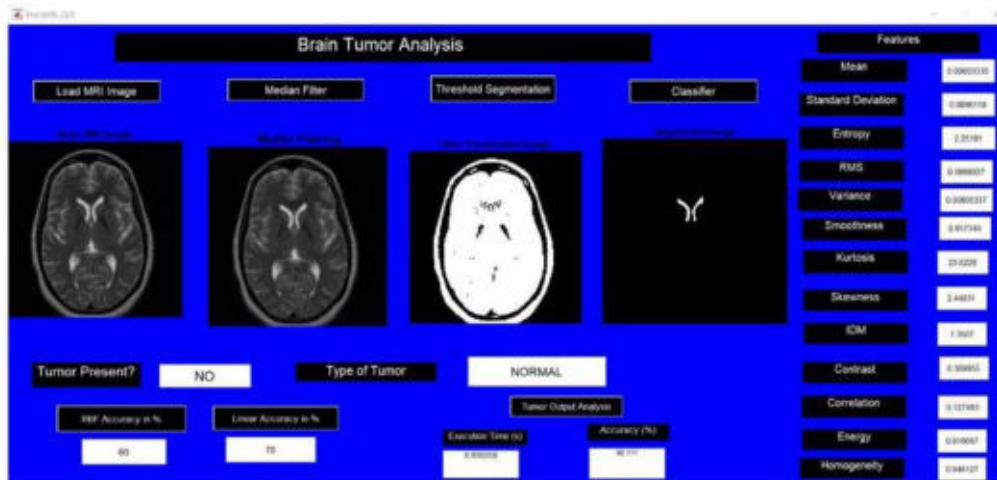


FIGURE 2A

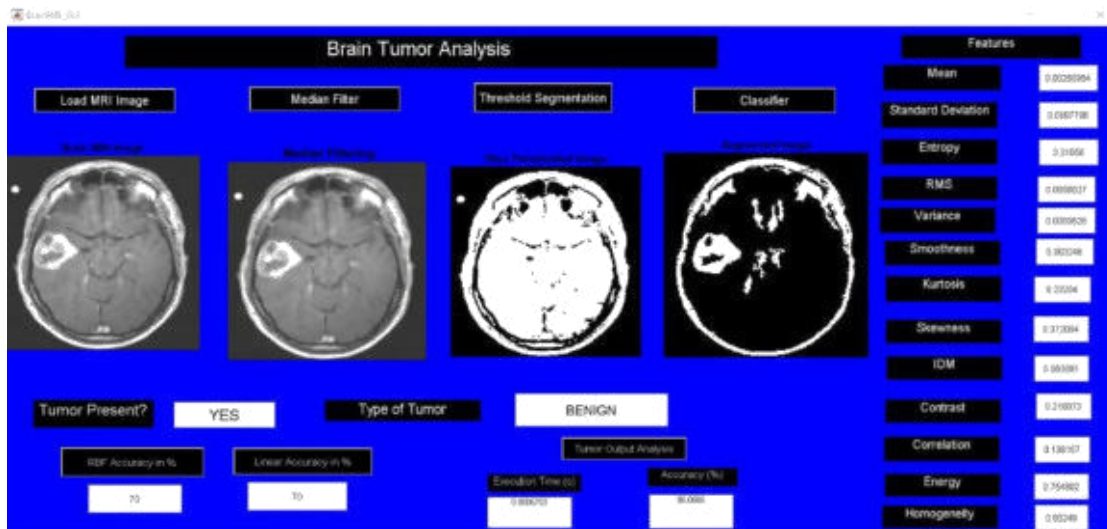


FIGURE 2B

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PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241053309 dated 18-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:

NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 18th day of Sep, 2022



Signature,
NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241053309** Dated **18th day of Sep , 2022** are

INVENTOR (S):

1	a) Name: b) Nationality: c) Address:	Athira M. Thomas Indian Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
2	a) Name: b) Nationality: c) Address:	Laly James Indian Associate Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
3	a) Name: b) Nationality: c) Address:	Ankita Sebastian Indian Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
4	a) Name: b) Nationality: c) Address:	Prabin James Indian Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
5	a) Name: b) Nationality: c) Address:	Jijo Joseph Indian Assistant Professor, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
6	a) Name: b) Nationality: c) Address:	Junaid Indian Student, Department of Electrical and Electronics Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

Dated This 18thday ofSep,2022

Signature,



NAME: PREM CHARLES I(INPA 3311)

PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

To,

The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu- 600032

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/59439/2022-CHE

Dated **11/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

Name of the signatory

To,
The Controller of Patents,
The Patent Office,
At Chennai

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Controller General of Patents, Designs & Trade Marks
G.S.T. Road, Guindy, Chennai-600032
Tel No. (091)(044) 22502081-84 Fax No. 044 22502066
E-mail: chennai-patent@nic.in
Web Site: www.ipindia.gov.in



सत्यमेव जयते

G.A.R.6
[See Rule 22(1)]
RECEIPT



Docket No 89672

Date/Time 2022/09/18 19:09:17

To
PREM CHARLES

UserId: prem1987

360E, SENTHUR MURUGAN KOVIL
STREET, OPPOSITE SM MAHAL,
OLDPET

CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	E-12/7066/2022/CHE	202241053306	2500	37509	FORM 9	
2	E-12/7063/2022/CHE	202241053308	2500	37509	FORM 9	----
3	E-12/7064/2022/CHE	202241053310	2500	37509	FORM 9	----
4	E-12/7067/2022/CHE	202241053309	2500	37509	FORM 9	----
5	E-12/7065/2022/CHE	202241053307	2500	37509	FORM 9	----
6	202241053306	TEMP/E-1/59435/2022-CHE	1600	37509	FORM 1	A Device for Automated Tapping of Rubber from Trees
7	202241053308	TEMP/E-1/59436/2022-CHE	1600	37509	FORM 1	An Image Processing Based System for Incubation Candling of Eggs in a Poultry Farm
8	202241053310	TEMP/E-1/59438/2022-CHE	1600	37509	FORM 1	A Compact and Portable Thermoelectric Refrigerator
9	202241053309	TEMP/E-1/59439/2022-CHE	1600	37509	FORM 1	An Image Processing Based Method to Classify Brain Tumors
10	202241053307	TEMP/E-1/59495/2022-CHE	1600	37509	FORM 1	An Artificially Intelligent System for Waste Segregation
11	E-106/5535/2022/CHE	202241053306	0	----	FORM28	----
12	E-106/5538/2022/CHE	202241053308	0	----	FORM28	----
13	E-106/5536/2022/CHE	202241053310	0	----	FORM28	----
14	E-106/5539/2022/CHE	202241053309	0	----	FORM28	----
15	E-106/5537/2022/CHE	202241053307	0	----	FORM28	----

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001024381	Online Bank Transfer	1809220004921	20500.00	1475001020000001

Total Amount : ₹ 20500.00

Amount in Words: Rupees Twenty Thousand Five Hundred Only

Received from PREM CHARLES the sum of ₹ 20500.00 on account of Payment of fee for above mentioned Application/Forms.

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Tel No. (091)(044) 22502081-84 Fax No. 044 22502066
E-mail: chennai-patent@nic.in
Web Site: www.ipindia.gov.in



Docket No 89677

Date/Time 18/09/2022

To
PREM CHARLES

User Id: prem1987

360E, SENTHUR MURUGAN
KOVIL STREET, OPPOSITE SM
MAHAL, OLDPET

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241053310	E-5/3763/2022/CHE	0	----	FORM 5	
2	202241053310	E-3/29313/2022/CHE	0	----	FORM 3	
3	202241053309	E-5/3764/2022/CHE	0	----	FORM 5	
4	202241053309	E-3/29314/2022/CHE	0	----	FORM 3	
5	202241053308	E-3/29315/2022/CHE	0	----	FORM 3	
6	202241053308	E-5/3765/2022/CHE	0	----	FORM 5	
7	202241053307	E-3/29316/2022/CHE	0	----	FORM 3	
8	202241053307	E-5/3766/2022/CHE	0	----	FORM 5	
9	202241053306	E-5/3767/2022/CHE	0	----	FORM 5	
10	202241053306	E-3/29317/2022/CHE	0	----	FORM 3	

Total Amount : ₹ 0

Amount in Words: Rupees Only

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शासकीय जर्नल

**OFFICIAL JOURNAL
OF
THE PATENT OFFICE**

निर्गमन सं. 41/2022
ISSUE NO. 41/2022

शुक्रवार
FRIDAY

दिनांक: 14/10/2022
DATE: 14/10/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

**(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS**

14nd OCTOBER, 2022

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202241053310 A

(19) INDIA

(22) Date of filing of Application :18/09/2022

(43) Publication Date : 14/10/2022

(54) Title of the invention : A Compact and Portable Thermoelectric Refrigerator

(51) International classification :F25B0021020000, F25D0023120000, F25D0011000000, C09K0005040000, F25D0023020000

(86) International Application No Filing Date :PCT// :01/01/1900

(87) International Publication No : NA

(61) Patent of Addition to Application Number Filing Date :NA :NA

(62) Divisional to Application Number Filing Date :NA :NA

(71)Name of Applicant :

1)VIMAL JYOTHI ENGINEERING COLLEGE

Address of Applicant :Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. Chemperi -----

Name of Applicant : NA

Address of Applicant : NA

(72)Name of Inventor :

1)Jerin Saji

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Address of Applicant :Assistant Professor, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

3)Aswin K. P.

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Address of Applicant :Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

6)Vishal Pittan

Address of Applicant :Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

(57) Abstract :

The present invention relates to refrigeration systems. More particularly, the present disclosure pertains to a smart, compact and a portable refrigerator configured to work using a thermoelectric replacing the greenhouse gases. The product consists of thermoelectric module, an insulated cabin, thermostat and charging unit. The present refrigerator perform the same cooling function as the freon-based vapour compression or absorption refrigerators. The thermoelectric refrigerator developed is based on the principle of thermoelectric module (i.e., Peltier effect) to create a hot side and a cold side. The cold side of the thermoelectric module is used for refrigeration purposes.

No. of Pages : 20 No. of Claims : 5



Application Filing Receipt

**Government of India
Patent Office**
Intellectual Property Office Building,
G.S.T. Road, Guindy,
Chennai -600032
Phone- 044-22502081-84
Fax: 044-22502066
e-mail: chennai-patent@nic.in

CBR Number : 37509

CBR date: 18-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
VIMAL JYOTHI ENGINEERING COLLEGE
Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting be to an application for patent numbered 202241053310 dated 18-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to A Compact and Portable Thermoelectric Refrigerator together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority of date of filing, whichever is earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority of date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

(For Controller of Patents)



Office of the Controller General of Patents, Designs & Trade Marks
Department of Industrial Policy & Promotion,
Ministry of Commerce & Industry,
Government of India

(<http://ipindia.nic.in/index.htm>)



(<http://ipindia.nic.in/index.htm>)

Application Details

APPLICATION NUMBER	202241053310
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	18/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	A Compact and Portable Thermoelectric Refrigerator
FIELD OF INVENTION	ELECTRICAL
E-MAIL (As Per Record)	patents@allinnov.org
ADDITIONAL-EMAIL (As Per Record)	allinnovrnd@gmail.com
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	14/10/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:
Filing Date:
Amount of Fee Paid:
CBR No.:
Signature:

1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	VIMAL JYOTHI ENGINEERING COLLEGE	India	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

2. INVENTOR(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	Jerin Saji	India	Assistant Professor, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
2	Mejo M. Francis	India	Assistant Professor, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

3	Aswin K. P.	India	Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
4	Sreeprasad P. C.	India	Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
5	Vaishak C.	India	Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
6	Vishal Pittan	India	Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

3. TITLE OF THE INVENTION: A Compact and Portable Thermoelectric Refrigerator

4. ADDRESS FOR CORRESPONDENCE OF APPLICANT / Telephone No.:
AUTHORISED PATENT AGENT IN INDIA:

Allinnov Innovation and Intellectual Property Services, #360E,
First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri -
635001, Tamil Nadu, India.

Fax No.:
Mobile No: 9790586194
E-mail: patents@allinnov.org

5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Title of the Invention
--------	---------	--------------------	-------------	-----------------------	------------------------

6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application
-------------------------------------	--

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application
-----------------------------------	------------------------------------

9. DECLARATIONS:

(i) Declaration by the inventor(s)

I/We ,Jerin Saji,Mejo M. Francis,Aswin K. P.,Sreeprasad P. C.,Vaishak C.,Vishal Pittan, is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Jerin Saji,Mejo M. Francis,Aswin K. P.,Sreeprasad P. C.,Vaishak C.,Vishal Pittan

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the singnatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- **The Complete specification relating to the invention is filed with this application.**
- **I am/We are, in the possession of the above mentioned invention.**
- **There is no lawful ground of objection to the grant of the Patent to me/us.**
- **I am/We are, the assignee or legal representative to true first inventors.**

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Portable Refrigerator (19).pdf
2	DRAWINGS	Drawings - Portable Refrigerator (19).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hereing are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

To The Controller of Patents

The Patent office at CHENNAI

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)

&

The Patent Rules, 2003

COMPLETE SPECIFICATION

(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

A Compact and Portable Thermoelectric Refrigerator

2. APPLICANT(S)

NAME(S)

NATIONALITY

ADDRESS

VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

A COMPACT AND PORTABLE THERMOELECTRIC REFRIGERATOR

TECHNICAL FIELD

[0001] The present invention relates to refrigeration systems. More particularly, the present disclosure pertains to a smart, compact and a portable refrigerator configured to work using a thermoelectric replacing the greenhouse gases.

BACKGROUND OF THE INVENTION

[0002] Background description includes information that may be useful in understanding the present invention. It is not an admission that any of the information provided herein is prior art or relevant to the presently claimed invention, or that any publication specifically or implicitly referenced is prior art.

[0003] The conventional refrigeration method such as vapour compression and vapour absorption refrigeration are detrimental to the environment. This may eventually cause major problems in the use and disposal of chlorofluorocarbons (CFCs) and hydro chlorofluorocarbons (HCFCs); ozone layer depletion being the worst-case scenario. This refrigerator consists of thermoelectric module as cooling generator along with insulated cabin, thermostat and charging unit. Thermo electric refrigerator uses the Peltier effect. When the electricity is allowed to pass through the couple, it transfers heat from one side of the couple to another side. It increases the temperature of one side of the couple (hot region) and lower other side (colder region) based on the direction of current flow. The cold side of the thermoelectric module is used for refrigeration purpose. On the other hand, the heat from hot side of the module is rejected to the surrounding. As a result, there will be less power consumption and totally eco-friendly refrigerator compared to conventional refrigerator with the same refrigeration effect.

[0004] Refrigeration and cooling is an important industrial process for many applications including preservation and storage of food products, dairy products, medicines, electronic devices and automobile air conditioning. There are many methods of refrigeration such as non-cyclic, cyclic based on thermodynamic cycles and thermo-
5 electric. The conventional refrigeration methods such as vapour compression and vapour absorption refrigeration are detrimental to environment. Many researches are being carried out to find out alternate methods of refrigeration to avoid environmental pollution.

[0005] The release of chlorofluorocarbon (CFCs) and hydro chlorofluorocarbon
10 (HCFCs) due to leakage or wear and tear is the main issue of today's world climatic changes. These man-made compound such as CFCs and HCFCs destroy ozone layer in the upper atmosphere.

[0006] There remains a pressing requirement for a better and efficient system to address the present day requirements and problems and hence this invention provides a
15 solution for the same.

[0007] As used in the description herein and throughout the claims that follow, the meaning of "a," "an," and "the" includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of "in" includes "in" and "on" unless the context clearly dictates otherwise.

20 **[0008]** In some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the number of

reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiments of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0009] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g. “such as”) provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0010] Groupings of alternative elements or embodiments of the invention disclosed herein are not to be construed as limitations. Each group member can be referred to and claimed individually or in any combination with other members of the group or other elements found herein. One or more members of a group can be included in, or deleted from, a group for reasons of convenience and / or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the

group as modified thus fulfilling the written description of all groups used in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The accompanying drawings are included to provide a further understanding
5 of the present disclosure, and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0012] So that the manner in which the above recited features of the present
10 invention can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings.

[0013] It is to be noted, however, that the appended drawings illustrate only typical
15 embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

Figure 1 discloses an exemplary representation of the refrigerator's design in line sketch.

Figures 2A and 2B discloses an apropos three dimensional pictorial representations of outer and assembled views of the system.

20 Figure 3 discloses the circuitry of the overall system.

DETAILED DESCRIPTION

[0014] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to clearly communicate the disclosure. However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0015] In the following description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0016] Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be embodied in machine-executable instructions, which may be used to cause a general-purpose or special-purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0017] Various methods described herein may be practiced by combining one or more machine-readable storage media containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a single computer)

and storage systems containing or having network access to computer program(s) coded in accordance with various methods described herein, and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

5 **[0018]** The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and arrangement of
10 elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0019] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For
15 example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

20 **[0020]** Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the scope of the

invention to those of ordinary skill in the art. The invention disclosed may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other
5 embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e.,
10 any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives, modifications and equivalents consistent with the principles and features disclosed. For purpose of clarity,
15 details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not to unnecessarily obscure the present invention.

[0021] Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the
20 pertinent art have given that term as reflected in printed publications and issued patents at the time of filing.

[0022] Figure 1 discloses an exemplary representation of the refrigerator's design in line sketch. The design of the refrigerator is based on the principle of thermoelectric

module (Peltier effect) to create a hot and a cold side. Thermoelectric refrigerator not use any type refrigerant and thus the problems of emissions can be avoided. Thermoelectric refrigerator has small size and thus has less weight and is portable. It also does not have any moving parts such as compressor and thus can be operated using
5 DC power supply.

[0023] Figures 2A and 2B discloses an apropos three dimensional pictorial representations of outer and assembled views of the system. The objectives of the invention were to produce a more efficient and cheaper thermoelectric refrigerator. To design the refrigerator in such a manner that, it can be easily operated by a person
10 having less technical experience. To design the refrigerator in such manner it is to use pose no hazard to the operator during its operation. To safely store medicines while travelling or in case of any emergency situation like power- failure, environmental adversities like flood, earth-quake etc.

[0024] Figure 3 discloses the circuitry of the overall system. Two designs of the
15 casing of the refrigerator are made. The design is selected for additive manufacturing. The number of fins required for cooling and critical thickness of casing of the refrigerator is calculated based on the assumption of forced convection. The various components required for this mini portable refrigerator such as thermoelectric (Peltier element TEC1- 12706)) module, heat sink for cold side and hot side, fans, thermostat
20 (W1209 digital temperature controller) for controlling the temperature of about 5 to 10C in the refrigerator space, a 12V/5A DC power adapter for power supply and assembling in the cylindrical casing. The casing material used is polylactide (PLA) which is biodegradable. The casing is fabricated by 3D printing (additive

manufacturing) known as fused deposition modeling (FDM). Since this manufacturing process has many advantages such as freedom to design as per the customer requirement, green manufacturing, weight savings and useful for mass production, this process is selected to fabricate the casing. The insulation material “Styrofoam” is a
5 trademarked brand of closed-cell extruded polystyrene foam (XPS), commonly called "Blue Board" is used to insulate the interior side of the wall of the casing.

[0025] The thermoelectric refrigerator consists of various components such as thermoelectric (Peltier element TEC1-12706) module, heat sink for cold side and hot side, fans, thermostat (W1209 digital temperature controller), DC power adapter. The
10 casing material used is polylactide (PLA) which is biodegradable. The casing is fabricated by 3D printing (additive manufacturing) known as fused deposition modelling (FDM). All the components are assembled in the casing and the insulation material is Styrofoam. The thermostat is used for controlling the temperature of about 5 to 10 degrees Celsius. Thermoelectric unit works based on the principle of Peltier
15 effect. When the electric current flow through the junction connecting two material it will emit or absorb heat per unit time at the junction to balance the difference in the chemical potential of the two materials. Peltier module is placed between the fan and heat sink. When the supply is given one side of the Peltier module will be cold and other side will be hot. The cold side will act as the refrigerator as the other side will
20 reject heat.

[0026] A thermoelectric refrigerator was designed and fabricated. The product consists of thermoelectric module, an insulated cabin, thermostat and charging unit. The present refrigerator perform the same cooling function as the freon-based vapour

compression or absorption refrigerators. The thermoelectric refrigerator developed is based on the principle of thermoelectric module (i.e., Peltier effect) to create a hot side and a cold side. The cold side of the thermoelectric module is used for refrigeration purposes.

5 [0027] Based on experiment conducted in our system using Peltier unit (TEC1-12706) for a volume 1.13 liter of storage. Minimum temperature obtained with insulated cabin is about 21°C for a time of 60min. Minimum temperature obtained without insulated cabin is about 24°C for time of 60min. The maximum temperature on the hot side reaches about 45°C and remains almost constant after that the max
10 temperature.

[0028] It should be apparent to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except
15 and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms “comprises” and “comprising” should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined with other elements, components, or steps that are not
20 expressly referenced. Where the specification claims refers to at least one of something selected from the group consisting of A, B, C ...and N, the text should be interpreted as requiring only one element from the group, not A plus N, or B plus N, etc. The foregoing description of the specific embodiments will so fully reveal the general nature

of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the scope of the appended claims.

10 **[0029]** All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0030] The invention is not restricted to the details of the foregoing embodiment(s).
15 The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

[0031] While the foregoing describes various embodiments of the invention, other
20 and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions or examples, which are included to enable a person having ordinary skill in the art to make and use the

invention when combined with information and knowledge available to the person having ordinary skill in the art.

5

#####DIGITALLY SIGNED#####
PREM CHARLES I
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Patent Agent On Behalf of the Applicants

CLAIMS

We claim:

1. A compact and portable thermoelectric refrigerator, comprising
at least one cover arrangement;
5 at least one thermostat;
one or more air vents; and
at least one thermocouple.
2. The refrigerator as claimed in claim 1 wherein, the cover arrangement is provided on the top of the assembly configured to insulate the structure.
- 10 3. The refrigerator as claimed in claim 1 wherein, the said thermostat is preferably a W1209 configured in it is a fan arrangement that gets automatically activated in order to maintain the temperature within the refrigerator.
4. The refrigerator as claimed in claim 1 wherein, the said air vents are provided of the heat generated or preserved to be expelled from the system.
- 15 5. The device as claimed in claims 1 and 3 wherein, the said thermocouple is placed above the refrigeration compartment which collects the temperature information inside the compartment.

20

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REGISTERED PATENT AGENT INPA-3311
Patent On Behalf of the Applicants

ABSTRACT

A COMPACT AND PORTABLE THERMOELECTRIC REFRIGERATOR

The present invention relates to refrigeration systems. More particularly, the present disclosure pertains to a smart, compact and a portable refrigerator configured to work using a thermoelectric replacing the greenhouse gases. The product consists of thermoelectric module, an insulated cabin, thermostat and charging unit. The present refrigerator perform the same cooling function as the freon-based vapour compression or absorption refrigerators. The thermoelectric refrigerator developed is based on the principle of thermoelectric module (i.e., Peltier effect) to create a hot side and a cold side. The cold side of the thermoelectric module is used for refrigeration purposes.

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15

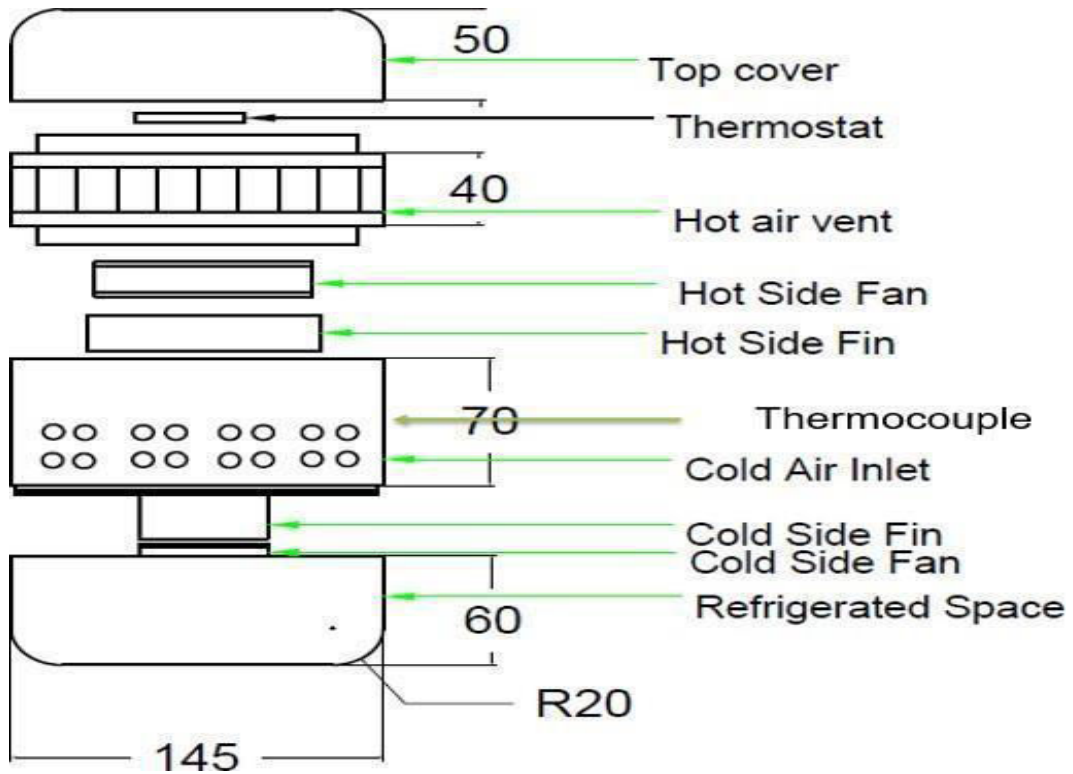


FIGURE 1

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Applicant(s):
Vimal Jyothi Engineering College.

Total Sheets 4

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Sheet 2 of 4



FIGURE 2A

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Patent application No.: 202241053310

Sheet 3 of 4



FIGURE 2B

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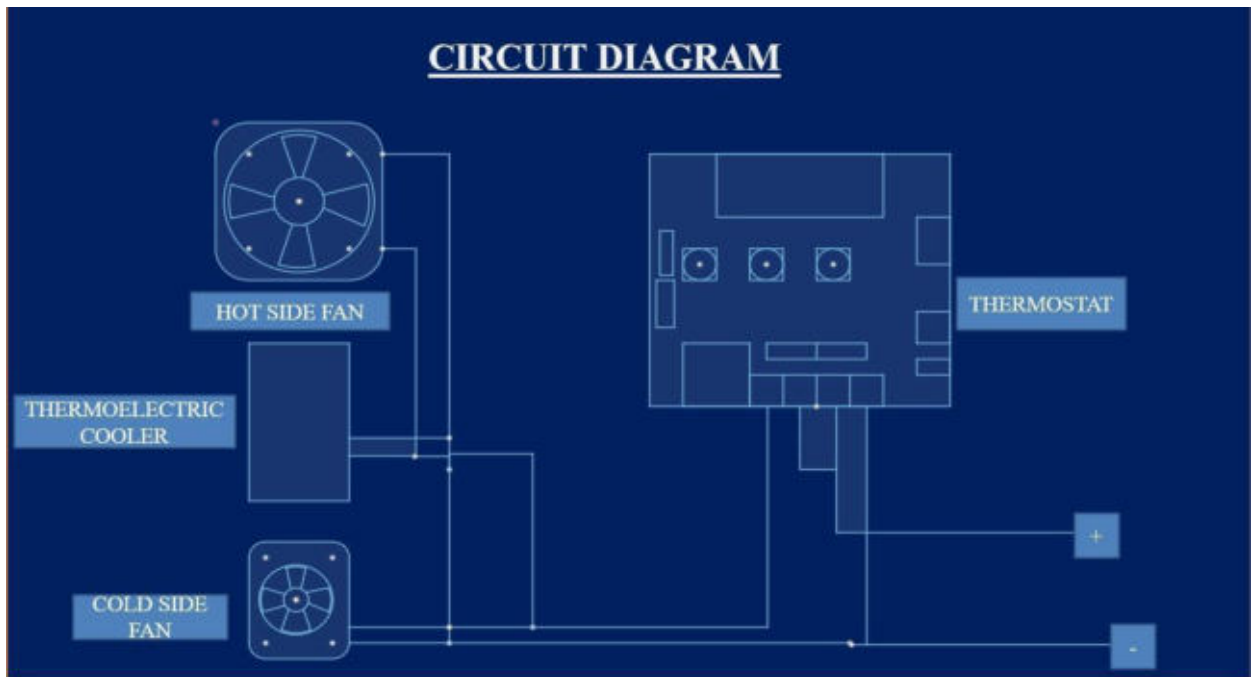


FIGURE 3

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FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241053310 dated 18-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:

NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 18th day of Sep, 2022



Signature,
NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241053310** Dated **18th day of Sep , 2022** are

INVENTOR (S):

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3	a) Name: b) Nationality: c) Address:	Aswin K. P. Indian Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
4	a) Name: b) Nationality: c) Address:	Sreeprasad P. C. Indian Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
5	a) Name: b) Nationality: c) Address:	Vaishak C. Indian Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
6	a) Name: b) Nationality: c) Address:	Vishal Pittan Indian Student, Department of Mechanical Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

Dated This 18thday ofSep,2022

Signature,



NAME: PREM CHARLES I(INPA 3311)

PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

To,

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Theni Hwy, Guindy, Chennai, Tamil Nadu- 600032**

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/59438/2022-CHE

Dated **11/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

Name of the signatory

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Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	E-12/7066/2022/CHE	202241053306	2500	37509	FORM 9	
2	E-12/7063/2022/CHE	202241053308	2500	37509	FORM 9	----
3	E-12/7064/2022/CHE	202241053310	2500	37509	FORM 9	----
4	E-12/7067/2022/CHE	202241053309	2500	37509	FORM 9	----
5	E-12/7065/2022/CHE	202241053307	2500	37509	FORM 9	----
6	202241053306	TEMP/E-1/59435/2022-CHE	1600	37509	FORM 1	A Device for Automated Tapping of Rubber from Trees
7	202241053308	TEMP/E-1/59436/2022-CHE	1600	37509	FORM 1	An Image Processing Based System for Incubation Candling of Eggs in a Poultry Farm
8	202241053310	TEMP/E-1/59438/2022-CHE	1600	37509	FORM 1	A Compact and Portable Thermoelectric Refrigerator
9	202241053309	TEMP/E-1/59439/2022-CHE	1600	37509	FORM 1	An Image Processing Based Method to Classify Brain Tumors
10	202241053307	TEMP/E-1/59495/2022-CHE	1600	37509	FORM 1	An Artificially Intelligent System for Waste Segregation
11	E-106/5535/2022/CHE	202241053306	0	----	FORM28	----
12	E-106/5538/2022/CHE	202241053308	0	----	FORM28	----
13	E-106/5536/2022/CHE	202241053310	0	----	FORM28	----
14	E-106/5539/2022/CHE	202241053309	0	----	FORM28	----
15	E-106/5537/2022/CHE	202241053307	0	----	FORM28	----

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Total Amount : ₹ 20500.00

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Docket No 89677

Date/Time 18/09/2022

To
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User Id: prem1987

360E, SENTHUR MURUGAN
KOVIL STREET, OPPOSITE SM
MAHAL, OLDPET

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241053310	E-5/3763/2022/CHE	0	----	FORM 5	
2	202241053310	E-3/29313/2022/CHE	0	----	FORM 3	
3	202241053309	E-5/3764/2022/CHE	0	----	FORM 5	
4	202241053309	E-3/29314/2022/CHE	0	----	FORM 3	
5	202241053308	E-3/29315/2022/CHE	0	----	FORM 3	
6	202241053308	E-5/3765/2022/CHE	0	----	FORM 5	
7	202241053307	E-3/29316/2022/CHE	0	----	FORM 3	
8	202241053307	E-5/3766/2022/CHE	0	----	FORM 5	
9	202241053306	E-5/3767/2022/CHE	0	----	FORM 5	
10	202241053306	E-3/29317/2022/CHE	0	----	FORM 3	

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**OFFICIAL JOURNAL
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निर्गमन सं. 41/2022
ISSUE NO. 41/2022

शुक्रवार
FRIDAY

दिनांक: 14/10/2022
DATE: 14/10/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

**(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS**

14nd OCTOBER, 2022

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202241053313 A

(19) INDIA

(22) Date of filing of Application :18/09/2022

(43) Publication Date : 14/10/2022

(54) Title of the invention : A System for Transforming Finger Gestures into Other Communication Health Monitoring of Differently Abled

(51) International classification :G06F0003010000, G10L0015260000, G09B0021000000, G06K0009000000, G06F0003160000

(86) International Application No :PCT//
Filing Date :01/01/1900

(87) International Publication No : NA

(61) Patent of Addition to Application Number :NA
Filing Date :NA

(62) Divisional to Application Number :NA
Filing Date :NA

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 --

(57) Abstract :

The present invention relates to a translation systems. More particularly, the present disclosure pertains to an intelligent system capable of collecting the finger gestures of differently abled people and to transform it into voice or script modes of communication for effective interaction with people. It consists of a hand glove for user experience and a interactive device is used to convert sign language into voice format or voice-to-text with a wireless connection. Health Monitoring System helps to monitor the primary health condition and ensure the safety of elderly, paralyzed, or disabled people. It is lightweight and easy to carry for elderly and disabled people. So by comparing cost and efficiency, this system can be a good peer for old and disabled people. By considering the sign language recognition part, sign languages are the language that helps to convey meaning to other people.

No. of Pages : 29 No. of Claims : 5



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CBR Number : 37515

CBR date: 18-09-2022

Application Type: ORDINARY APPLICATION

Priority Number:

Priority Date:

Priority Country: Not Selected

To,

VIMAL JYOTHI ENGINEERING COLLEGE

Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting to be an application for patent numbered 202241053313 dated 18-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to A System for Transforming Finger Gestures into Other Communication Health Monitoring of Differently Abled together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority or date of filing, whichever is earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority or date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

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Application Details

APPLICATION NUMBER	202241053313
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	18/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	A System for Transforming Finger Gestures into Other Communication Health Monitoring of Differently Abled
FIELD OF INVENTION	COMPUTER SCIENCE
E-MAIL (As Per Record)	patents@allinnov.org
ADDITIONAL-EMAIL (As Per Record)	allinnovrnd@gmail.com
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	14/10/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)

&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:
Filing Date:
Amount of Fee Paid:
CBR No.:
Signature:

1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
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2. INVENTOR(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
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5	Sanitha K. P.	India	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

3. TITLE OF THE INVENTION: A System for Transforming Finger Gestures into Other Communication Health Monitoring of Differently Abled

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5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Titile of the Invention
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6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application

9. DECLARATIONS:

(i) Declaration by the inventor(s)

I/We ,Divya K.,Immanuel Monson,Abhijith B. Lal,Anusree Chithrabhanu,Sanitha K. P., is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Divya K.,Immanuel Monson,Abhijith B. Lal,Anusree Chithrabhanu,Sanitha K. P.

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the singnatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- The Complete specification relationg to the invention is filed with this application.
- I am/We are, in the possession of the above mentioned invention.
- There is no lawful ground of objection to the grant of the Patent to me/us.
- I am/We are, the assignee or legal representative to true first inventors.

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Navigation for Blind (10).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hereing are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

To The Controller of Patents

The Patent office at CHENNAI

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)

&

The Patent Rules, 2003

COMPLETE SPECIFICATION

(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

A System for Transforming Finger Gestures into Other Communication Health Monitoring of
Differently Abled

2. APPLICANT(S)

NAME(S)

NATIONALITY

ADDRESS

VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

**A SYSTEM FOR TRANSFORMING FINGER GESTURES INTO OTHER
COMMUNICATION HEALTH MONITORING OF DIFFERENTLY ABLED**

TECHNICAL FIELD

[0001] The present invention relates to a translation systems. More particularly, the
5 present disclosure pertains to an intelligent system capable of collecting the finger
gestures of differently abled people and to transform it into voice or script modes of
communication for effective interaction with people.

BACKGROUND OF THE INVENTION

[0002] Background description includes information that may be useful in
10 understanding the present invention. It is not an admission that any of the information
provided herein is prior art or relevant to the presently claimed invention, or that any
publication specifically or implicitly referenced is prior art.

[0003] Effective communication helps to reduce the gap between mute and normal
people, sign language will act as a bridge between them and act as the main
15 communication method for those who cannot express themselves. For communication
systems, Hand glove for user experience and interactive device is used to convert sign
language into voice format or voice-to-text with iOS and Android platforms.
Maintaining the body's temperature is an important part of looking after one's health
condition. The device is designed to notify their position and temperature in case of
20 emergency with the help of a Buzzer. Older and disabled people are facing lots of
difficulties, to look after their health. For that reason, elder and disabled people need
something, that helps them to monitor every second. In this work, we are introducing a
new system for disabled people that can use both hand gestures as well as health

monitoring. The hand gesture can be used to communicate with normal people and reduce the gap between them. Sign language is used as input. A Health monitoring system is used to monitor the patient each second and update the health condition on the server. Same Arduino, Node MCU, and interactive device are used for both systems.

5 It is a light weighted system and can carry with them where ever he/she wants. It is an effective system for disabled people.

[0004] A prior art proposed that to establish communication between multiple disabled patients and nurse a low cost real time implementable system in hospital. Device of every patient will be centrally linked to the receiver point at nurse's end by
10 wireless medium using SPI transmission.

[0005] Another prior art stated that sign languages are the language that helps to convey meaning to other people. Sign language may consist of hand gestures, expressions of the face, arms, or body, position of the fingers, and convey ideas of people. So we can develop our sign language according to our comfort. Sign language
15 is a very efficient and popular way to make communication between hearing and speech impaired people without the need of an interpreter.

[0006] Another prior art proposed a system simulation has been done by temperature sensor with microcontroller and led display. From temperature the Arduino UNO received sensor analog signal, the UNO converted this signal into digital signal,
20 and LCD screen shows all the data. For different temperature display showed the different value. Individual simulation has done with the individual sensor. Here different sensors shows different data.

[0007] Yet another prior art proposed a model which is designed with the help of flex sensors and the instructions are fed into the Arduino Uno board. The finger gesture is captured by the flex sensor and a corresponding output is displayed in the form of a sentence in the Android app and output is also displayed as an audio output [6]. The overall process is carried out by Arduino Uno, Raspberry Pi and GSM module [7]. The Data transmission between the Arduino Uno and Raspberry Pi is done with the help of a wireless serial port module. An alert message will be sent through the GSM module during emergency situation to the emergency contact. The smart gloves are used by the deaf and dumb people to communicate their basic needs. The movement in the finger is converted into command. The movement is captured by the flex sensor and based upon the movement the corresponding command. The flex sensors are connected to Arduino uno and the information is stored. GSM and wireless serial port modules are also connected with the Arduino. By the movement in the flex sensor, the corresponding command is captured and with the help of the Lora transceiver the command is communicated to the raspberry pi. The instructions are displayed on the webpage and the output is also in the form of audio. The output is also displayed through a mobile app as shown in fig 2.9. So that the attender or the person's help can be notified as soon as the person does a movement. The attender can be notified even when he is far away from the disabled person. In case of emergency, a unique and easy movement is done by the disabled person. So, during an emergency, an alert is sent in the form of an email and message to the person's emergency contact and the attender as shown in fig 2.10. So, this method would be easy to keep a check on the disabled person. The disabled person can also voice out through these gloves even if they have the disability of speaking or hearing.

[0008] After implementing individual simulation, it combined with each other through the microcontroller. so from individual simulation ,step by step we go for final simulation.

[0009] Though steps have been taken in the past to address the issue, an advanced
5 and an efficient system is required to address the needs of the future and hence this system presents the solution.

[0010] As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of “in” includes
10 “in” and “on” unless the context clearly dictates otherwise.

[0011] In some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the number of
15 reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiments of the invention may contain certain errors
20 necessarily resulting from the standard deviation found in their respective testing measurements.

[0012] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein can
5 be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g. "such as") provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as
10 indicating any non-claimed element essential to the practice of the invention.

[0013] Groupings of alternative elements or embodiments of the invention disclosed herein are not to be construed as limitations. Each group member can be referred to and claimed individually or in any combination with other members of the group or other elements found herein. One or more members of a group can be included
15 in, or deleted from, a group for reasons of convenience and / or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all groups used in the appended claims.

OBJECTS OF THE INVENTION

20 **[0014]** In this disclosure, whenever a composition, an element or a group of elements is preceded with the transitional phrase "comprising", it is understood that we also contemplate the same composition, element or group of elements with transitional phrases "consisting essentially of", "consisting", "selected from the group of consisting

of, "including", or "is" preceding the recitation of the composition, element or group of elements and vice versa.

[0015] An effective communication system, with the help of a wearable hand glove and a interactive device can convert sign language into voice format. A health monitoring system, consists of body temperature and heartbeat measurement which will monitor the current health condition and give proper care rapidly.

[0016] The objects of this invention are to develop an effective communication system by a hand glove and an interactive device to convert sign language into voice format, and a wireless communication helps to connect between them. Health monitoring system which provide care and attend to paralyzed and disabled people without 24 hours monitoring for each and every patient with the help of sensors and interactive device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The accompanying drawings are included to provide a further understanding of the present disclosure, and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0018] So that the manner in which the above recited features of the present invention can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings.

[0019] It is to be noted, however, that the appended drawings illustrate only typical embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

Figure 1 discloses an exemplary architecture diagram of the present system.

5 Figure 2 discloses a use case diagram of the present system.

Figure 3 discloses a data flow diagram of the present system at level 0.

Figure 4 discloses a data flow diagram of the present system at level 1.

Figure 5 discloses a data flow diagram of the present system at level 2.

Figure 6A and 6B discloses apropos photographic representations of the prototypes for
10 hand gesture and health monitoring system.

Figure 7 discloses an exemplary flow diagram of the present system.

DETAILED DESCRIPTION

[0020] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to
15 clearly communicate the disclosure. However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0021] In the following description, numerous specific details are set forth in order
20 to provide a thorough understanding of embodiments of the present invention. It will

be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0022] Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be embodied in machine-executable instructions, which may be used to cause a general-purpose or special-purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0023] Various methods described herein may be practiced by combining one or more machine-readable storage media containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a single computer) and storage systems containing or having network access to computer program(s) coded in accordance with various methods described herein, and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

[0024] The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and arrangement of

elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0025] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

[0026] Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those of ordinary skill in the art. The invention disclosed may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e.,

any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives, modifications and equivalents consistent with the principles and features disclosed. For purpose of clarity, details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not to unnecessarily obscure the present invention.

[0027] Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the pertinent art have given that term as reflected in printed publications and issued patents at the time of filing.

[0028] Many systems help deaf and dumb people to communicate with others. But currently, there is no effective system that provides two-way communication between them and normal people.

[0029] Figure 1 discloses an exemplary architecture diagram of the present system. In this work, the sign language of deaf and dumb people is converted to audio or text as output and can be displayed through a smartphone. In the same way communication between normal people to deaf people can be enabled by converting speech to audio and text. The gestures are converted into text messages or voice format for communication. Several techniques are used to convert these gestures into the required output. The system consists of five Flex Sensors, Accelerometer, Arduino, Node MCU, and interactive device. According to user requirements, the Input will be Sign Language

and the output will be the text-or-voice format. It is a light weighted system and easy to carry from one place to another and can communicate with people without any gap.

[0030] As well as disabled people need an effective health monitoring system that helps them to monitor their health every second. The system consists of body temperature and heartbeat measurement. the system used different sensors like heartbeat sensor, temperature sensor, are used as inputs of this ARDUINO. The components are used to make the smartboard system in which a patient's body parameters are monitored. The system is connected with some preset value, when the value exceeds, that means patient becomes sick or in danger. A Buzzer is fixed over an Arduino for an emergency condition. If the sensor value exceeds the preset value, the Buzzer makes sound.

[0031] Figure 2 discloses a use case diagram of the present system. It consist of two parts, one is for the disabled people sign language recognition and the other one is for the health monitoring of disabled people. In first part, the disabled people will perform a gesture and flex sensor capture these signals .And the signals recognized by Arduino. The interactive device convert these signal into text or audio format which is sent to normal people.

[0032] The next part is health monitoring of disabled people. The health condition of diasbled people is continously monitored the and the values stored in a database for future purpose.

[0033] In Dataflow Diagram, there are three levels, level 0 and level 1 and level 2.

[0034] Figure 3 discloses a data flow diagram of the present system at level 0. Level 0 consists of Arduino, Health monitoring part, interactive device and server. The hand gesture performed by the dumb person is sent to Arduino and then it is transmitted to interactive device module to convert the signal as text or audio output. And the health condition of disabled people is continuously monitored the and the values stored in a database server for future purpose

[0035] Figure 4 discloses a data flow diagram of the present system at level 1. In level 1, it includes the flex sensors which is used to capture the gesture signals performed by the disabled person .The sensor values are connected to the Arduino and then it is transmitted to the interactive device to convert these signals into text or audio output. The health monitoring system includes different sensors like temperature sensor, heartbeat sensor, the sensor values sent to Arduino and then it is transmitted to smartphone module and stored in a database server. And a Buzzer sound can be used in case of critical situation of the patient.

[0036] Figure 5 discloses a data flow diagram of the present system at level 2. In level 2, includes the application for the health monitoring part and communication part. In sign language recognition part, the signals are converted into text or voice format by the interactive device. And in health monitoring session the monitored values are stored in database server. If the person is not registered in that application it will go to the registration part.

[0037] The implementation is divided into two sections. That is sign recognition and health monitoring of disabled people. An effective communication system is done by a hand glove and a interactive device to convert sign language into voice format,

and a wireless communication helps to connect between them. Health monitoring system which provide care and attend to paralyzed and disabled people without 24 hours monitoring for each and every patient with the help of sensors.

[0038] Figure 6A and 6B discloses apropos photographic representations of the prototypes for hand gesture and health monitoring system. The present system is designed to identify and translate the hand gestures into a digital voice as the final outcome. In this system the gestures are converted into text messages for communication. Several techniques are used to convert these gestures into required output. The basic concept involves the use of data gloves worn by disabled people. These gloves are designed using Flex sensors.

[0039] The flex sensors are normally attached to the glove. It helps to reduce the gap between mute and normal people, sign language will act as a bridge between them and act as the main communication method for those who cannot express their voice. In the implementation, the system is consists of a software module and a hardware module .Accelerometer, flex sensors, and Arduino board include in the hardware module. We use five flex sensors, that are fixed in five fingers of a hand glove whereas an accelerometer detects the hand movements. The gesture recognition is done using a flexible, resistive sensor known as Flex Sensor. These sensors were sewn into pockets running over each joint and could measure the flexing of fingers and wrists. The main principle of a Flex sensor is that the change in resistance gives the respective amount of change in voltage.

[0040] A flex sensor is designed such that as the sensor is bent, the resistance of the sensor alters. The resistance of a 45-degree bend is different from that of a 90-degree

bend of a sensor. A 3-axis accelerometer measures the accelerations that take place to the 3 Cartesian coordinate axes. Sensor gloves are hand-worn devices with inbuilt sensors that can capture information about the movements and positioning of the user's hands.

5 **[0041]** The framework considerably encompasses the segments like heart beat sensor, temperature sensor and Arduino. This introduces a ton of plans that consolidated into the effectiveness of this device in order to reveal required components like cost, plan comprehensive nature, programming innovation, size, weight, deficiency of flexibility etc. This configuration utilizes a scaled down sensors, which have been
10 enhanced for extremely precise detecting of changes in the heart beat and temperature. A buzzer is fixed over an Arduino for emergency condition.

[0042] By using sensors, raw data of patient's medical parameters are sensed and transferred to back-end server. In this system , simulation has been done by temperature sensor. From temperature sensor, analog signal was received by the Arduino and
15 convert this signal into digital signal. For different temperature, display shows the different value. In this system, different sensors like heartbeat sensor, temperature sensor are used as inputs of this Arduino. These types of sensors are used for monitoring the primary health condition of elderly and disabled people. The sensor data will be uploaded in website. The doctor can view this data by this website. And if the sensor
20 values exceeds with some preset value, the Buzzer makes sound.

[0043] Figure 7 discloses an exemplary flow diagram of the present system. The overall process is carried out in the following steps, check if hand gesture system or health monitoring service is selected. If Hand Gesture System is selected. Then check

for the Signature move. If movement is detected then flex sensor value is measured and the word is detected, else go step stop the program Send the data through bluetooth to interactive device and stop the program. If health monitoring is selected, then check if the person is already registered or not. If already registered, then monitor the health
5 condition of the patient using sensors, otherwise, register new profile and take the temperature and pulse rate readings of the person. If it exceeds it send a alert message to Doctor and store values in Database.

[0044] The present system aims to design an easily usable and cost effective system. The system includes two sessions. The first session is a combination of a
10 interactive device that can translate the sign language into digital voice and an IoT enabled, light-weighted wearable glove. It provides a better user experience by voice-to-text feature to reduce the communication gap within mute and non-mute communities and health monitoring session includes different sensors to record the health of the person and it is stored in a database server for future retrieval.

15 **[0045]** It should be apparent to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the scope of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner
20 consistent with the context. In particular, the terms “comprises” and “comprising” should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined with other elements, components, or steps that are not

expressly referenced. Where the specification claims refers to at least one of something selected from the group consisting of A, B, Cand N, the text should be interpreted as requiring only one element from the group, not A plus N, or B plus N, etc. The foregoing description of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the scope of the appended claims.

[0046] All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0047] The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

[0048] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions or examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge available to the person having ordinary skill in the art.

10

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

CLAIMS

We claim:

1. A system for transforming finger gestures into other communication health monitoring of differently abled, comprising
5 a plurality of sensors;
one or more processors;
at least one I/O module;
a plurality of biosensors; and
a pair of gloves.
- 10 2. The device as claimed in claim 1 wherein, the said plurality of sensors are preferably flex sensors and accelerometers configured to detect the finger flexures and the velocity and the rate of change in velocity of hand gestures.
3. The device as claimed in claims 1 and 2 wherein, the said processor is preferably an Arduino operatively coupled with the said sensors to collect data from the
15 said sensors and process the same to translate the same to a readable or listenable format.
4. The device as claimed in claims 1 and 3, wherein the said I/O module is a LCD display further configured to be coupled operatively with the said processor as the output module to display the translated command.
- 20 5. The device as claimed in claims 1 and 3 wherein, the said gloves are wearable in hands of the person which is further configured to collect the health related data of the person pertaining but not limited to the temperature, pulse rate and

saturation levels so as to enable monitoring the person from remote places without the caretakers being normally available nearby.

5

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent On Behalf of the Applicants

ABSTRACT

**A SYSTEM FOR TRANSFORMING FINGER GESTURES INTO OTHER
COMMUNICATION HEALTH MONITORING OF DIFFERENTLY ABLED**

5 The present invention relates to a translation systems. More particularly, the present disclosure pertains to an intelligent system capable of collecting the finger gestures of differently abled people and to transform it into voice or script modes of communication for effective interaction with people. It consists of a hand glove for user experience and a interactive device is used to convert sign language into voice format or voice-to-text with a wireless connection. Health Monitoring System helps to monitor the primary
10 health condition and ensure the safety of elderly, paralyzed, or disabled people. It is lightweight and easy to carry for elderly and disabled people. So by comparing cost and efficiency, this system can be a good peer for old and disabled people. By considering the sign language recognition part, sign languages are the language that helps to convey meaning to other people.

15

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

20

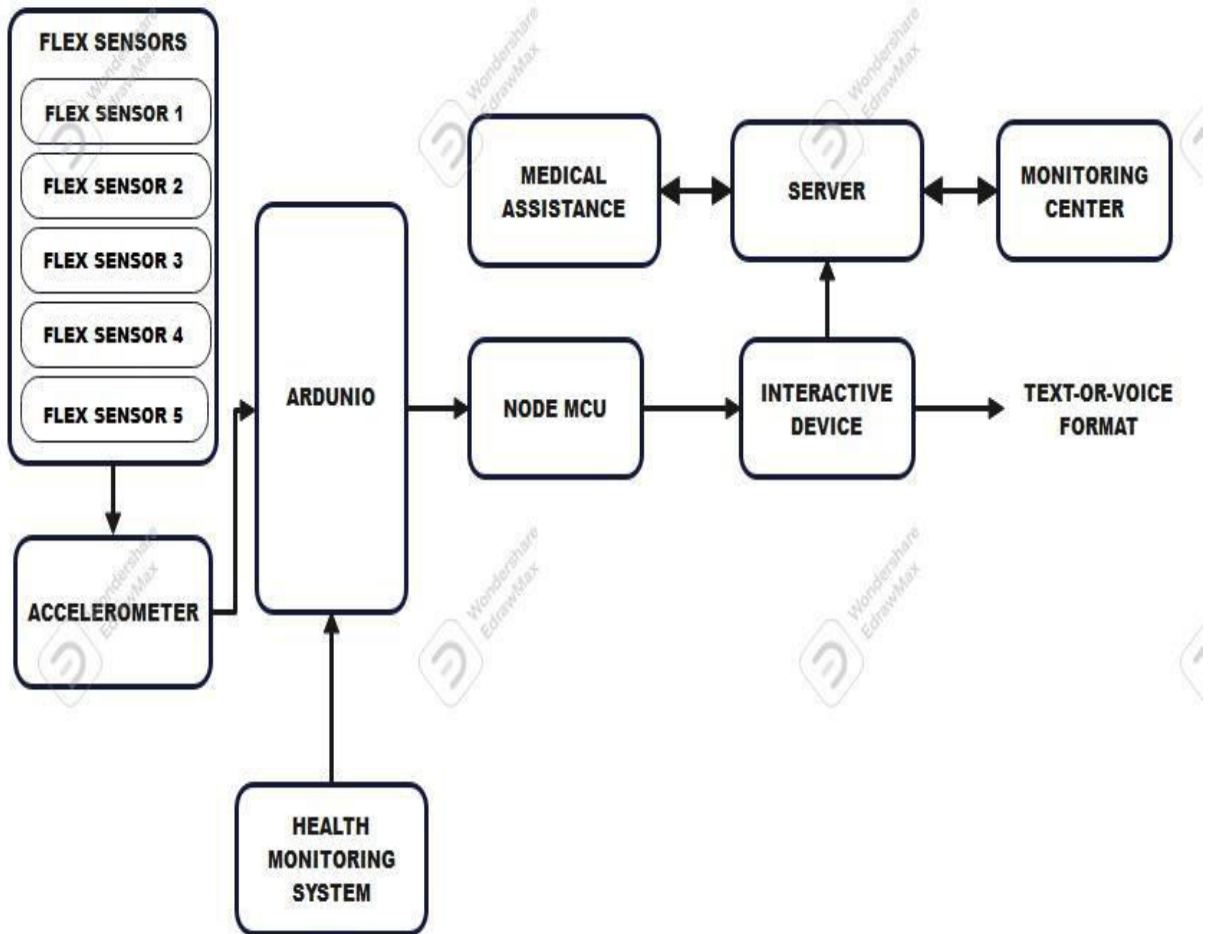


FIGURE 1

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

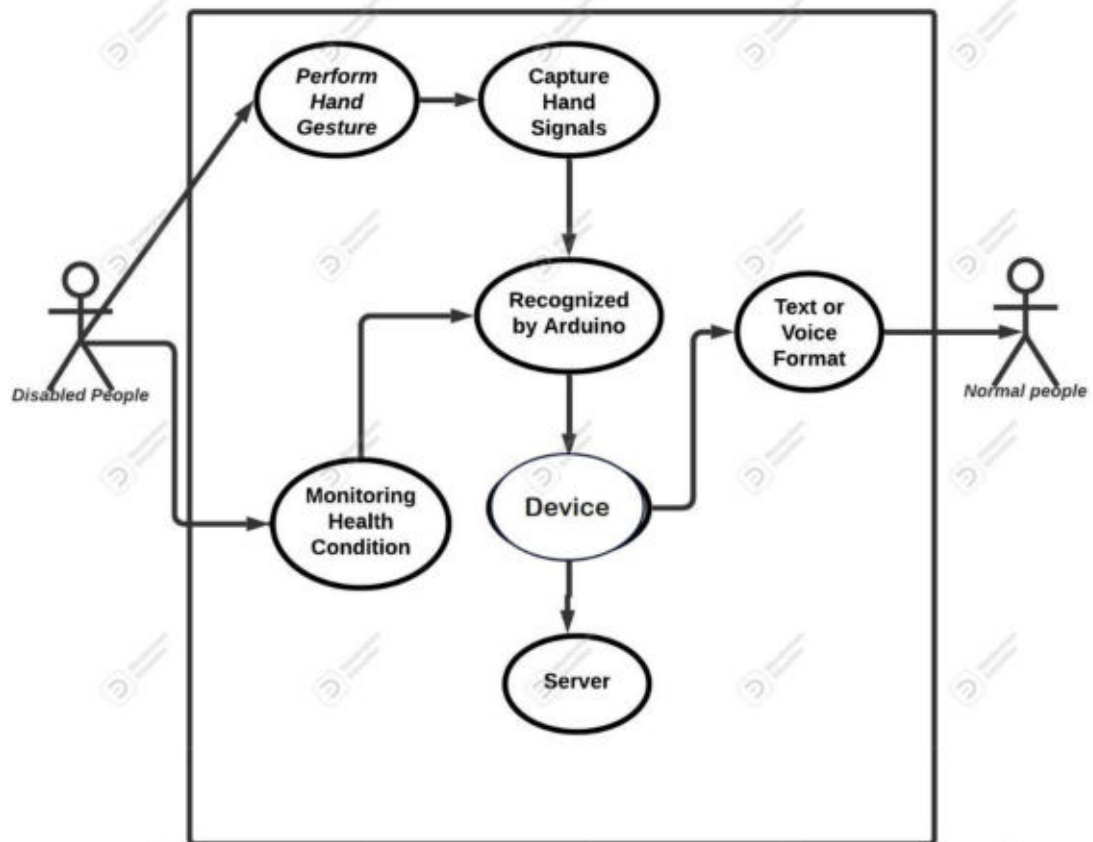


FIGURE 2

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

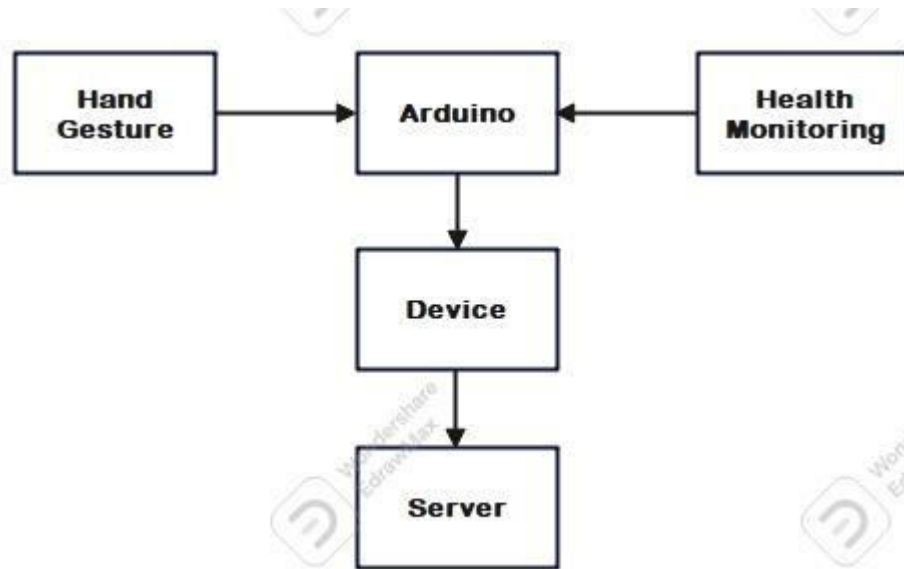


FIGURE 3

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

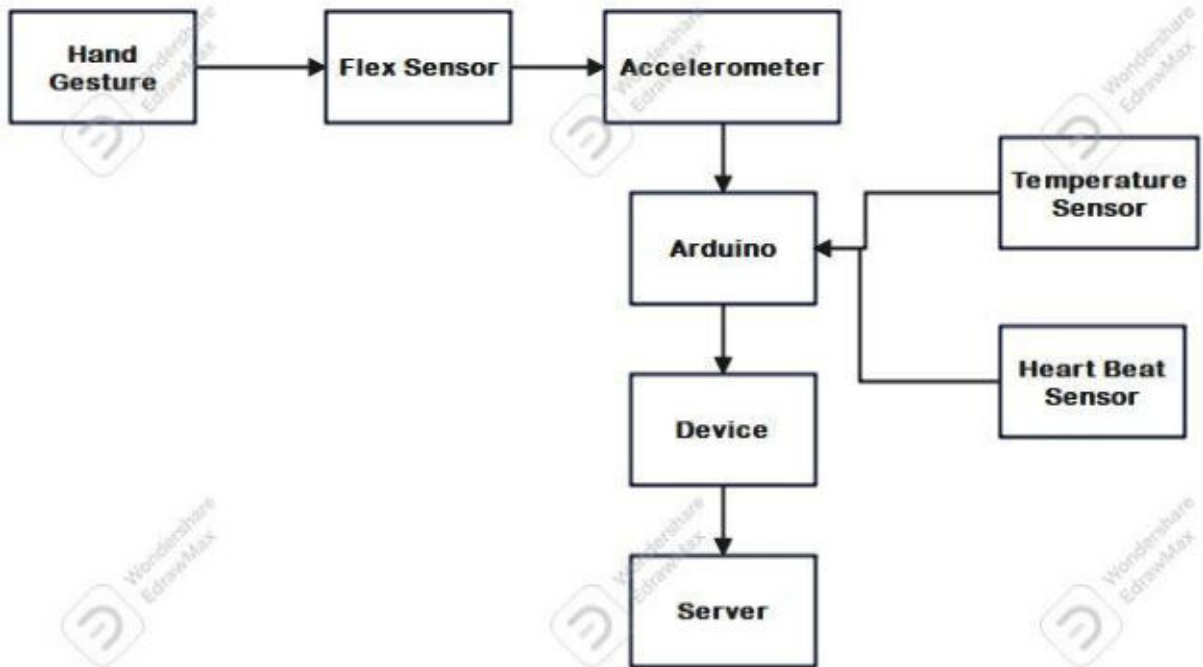


FIGURE 4

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

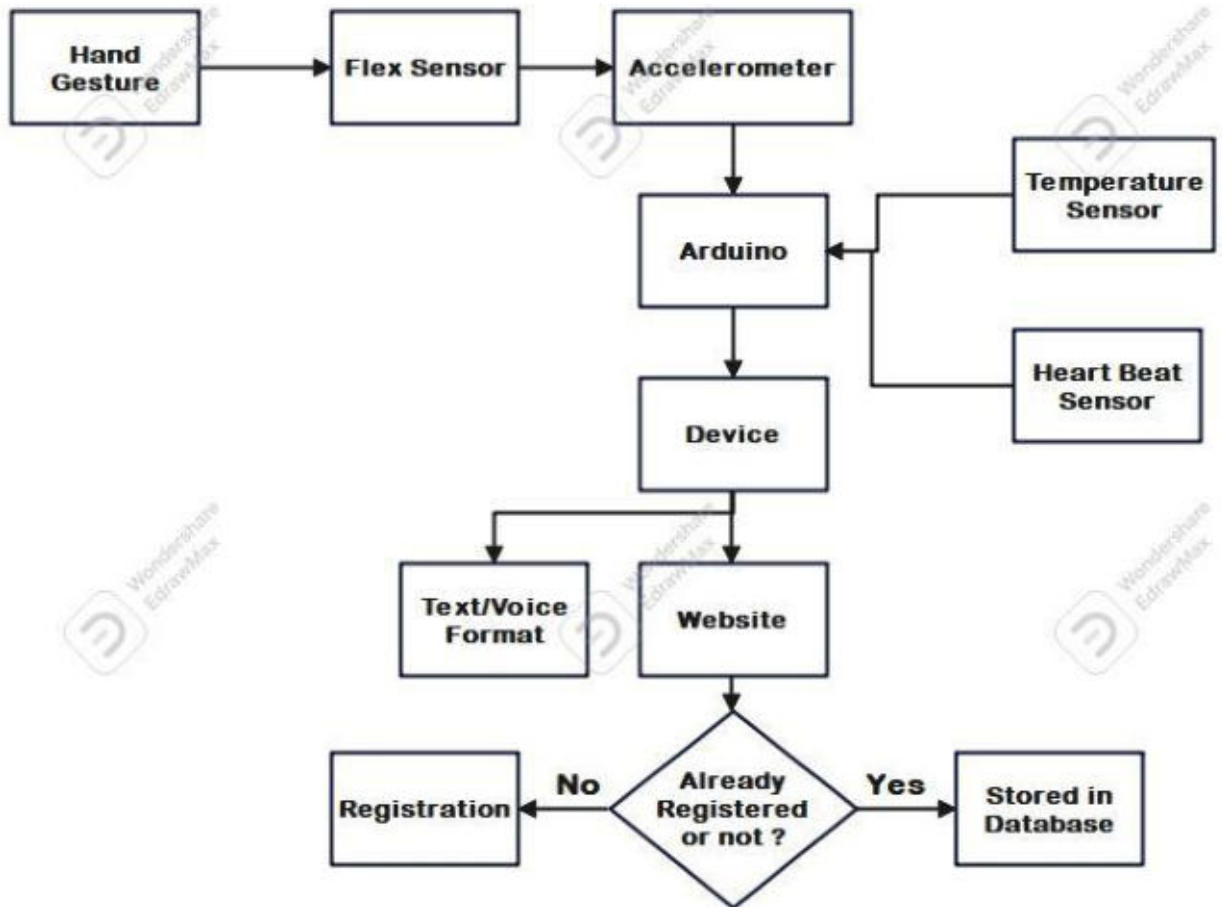


FIGURE 5

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

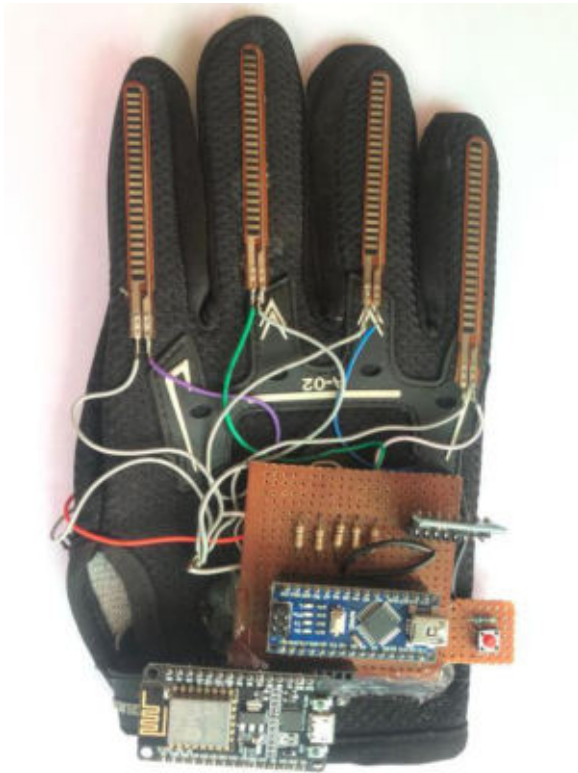


FIGURE 6A



FIGURE 6B

#####DIGITALLY SIGNED#####
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Patent Agent On Behalf of the Applicants

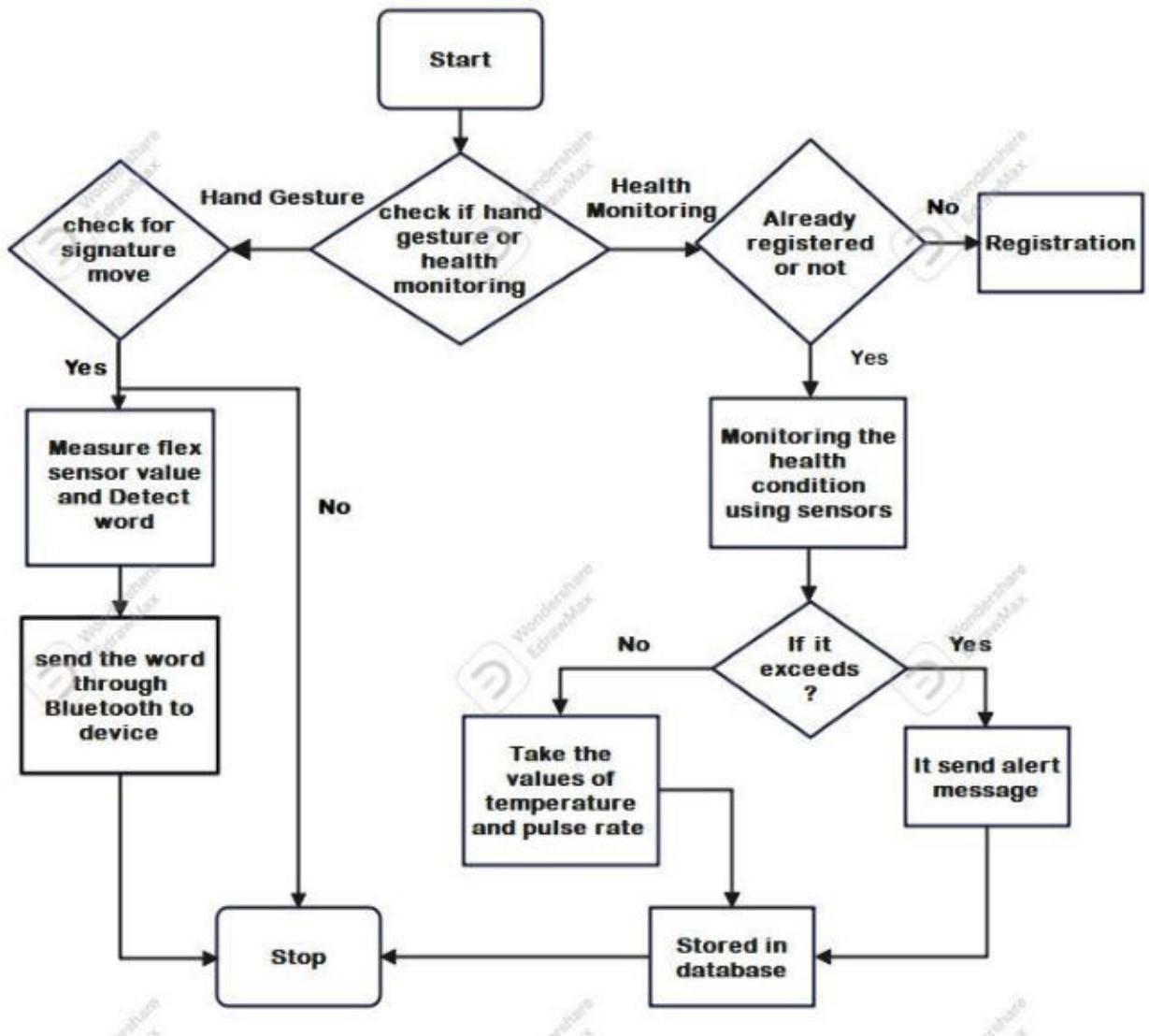


FIGURE 7

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241053313 dated 18-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:


NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 18th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241053313** Dated **18th day of Sep , 2022** are

INVENTOR (S):

1 **a) Name:**

Divya K.

b) Nationality:

Indian

c) Address:

Assistant Professor, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

2 **a) Name:**

Immanuel Monson

b) Nationality:

Indian

c) Address:

Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

3 **a) Name:**

Abhijith B. Lal

b) Nationality:

Indian

c) Address:

Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

4 **a) Name:**

Anusree Chithrabhanu

b) Nationality:

Indian

c) Address:

Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

5 **a) Name:**

Sanitha K. P.

b) Nationality:

Indian

c) Address:

Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

Dated This 18thday ofSep,2022

Signature,



NAME: PREM CHARLES I(INPA 3311)

PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

To,

The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu- 600032

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/59431/2022-CHE

Dated **11/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

Name of the signatory

To,
The Controller of Patents,
The Patent Office,
At Chennai

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Controller General of Patents, Designs & Trade
Marks
G.S.T. Road, Guindy, Chennai-600032
Tel No. (091)(044) 22502081-84 Fax No. 044 22502066
E-mail: chennai-patent@nic.in
Web Site: www.ipindia.gov.in



सत्यमेव जयते
G.A.R.6
[See Rule 22(1)]
RECEIPT



Docket No 89679

Date/Time 2022/09/18 19:54:07

To
PREM CHARLES

UserId: prem1987

360E, SENTHUR MURUGAN KOVIL
STREET, OPPOSITE SM MAHAL,
OLDPET

CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	E-106/5540/2022/CHE	202241053315	0	----	FORM28	
2	E-106/5541/2022/CHE	202241053313	0	----	FORM28	----
3	E-106/5543/2022/CHE	202241053314	0	----	FORM28	----
4	E-106/5544/2022/CHE	202241053316	0	----	FORM28	----
5	E-106/5542/2022/CHE	202241053317	0	----	FORM28	----
6	E-12/7069/2022/CHE	202241053315	2500	37515	FORM 9	----
7	E-12/7073/2022/CHE	202241053313	2500	37515	FORM 9	----
8	E-12/7070/2022/CHE	202241053314	2500	37515	FORM 9	----
9	E-12/7071/2022/CHE	202241053316	2500	37515	FORM 9	----
10	E-12/7072/2022/CHE	202241053317	2500	37515	FORM 9	----
11	202241053315	TEMP/E-1/59430/2022-CHE	1600	37515	FORM 1	An Optical Fiber Based System and Method to Detect Adulteration in Fuels
12	202241053313	TEMP/E-1/59431/2022-CHE	1600	37515	FORM 1	A System for Transforming Finger Gestures into Other Communication Health Monitoring of Differently
13	202241053314	TEMP/E-1/59432/2022-CHE	1600	37515	FORM 1	A Device and System for Automobiles to Distinguish and Identify Authorized and Unauthorized Parking
14	202241053316	TEMP/E-1/59433/2022-CHE	1600	37515	FORM 1	An Image Processing Based Smart System for Reading and Communication of the Visually Challenged
15	202241053317	TEMP/E-1/59434/2022-CHE	1600	37515	FORM 1	A System and Method of Efficient Driving Assistance and Navigation for Vehicles

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001024387	Online Bank Transfer	1809220005196	20500.00	1475001020000001

Total Amount : ₹ 20500.00

Amount in Words: Rupees Twenty Thousand Five Hundred Only

Received from PREM CHARLES the sum of ₹ 20500.00 on account of Payment of fee for above mentioned Application/Forms.

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Marks
G.S.T. Road, Guindy, Chennai-600032
Tel No. (091)(044) 22502081-84 Fax No. 044 22502066
E-mail: chennai-patent@nic.in
Web Site: www.ipindia.gov.in



सत्यमेव जयते



Docket No 89681

Date/Time 18/09/2022

To
PREM CHARLES

User Id: prem1987

360E, SENTHUR MURUGAN
KOVIL STREET, OPPOSITE SM
MAHAL, OLDPET

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241053317	E-3/29318/2022/CHE	0	----	FORM 3	
2	202241053317	E-5/3768/2022/CHE	0	----	FORM 5	
3	202241053316	E-3/29319/2022/CHE	0	----	FORM 3	
4	202241053316	E-5/3769/2022/CHE	0	----	FORM 5	
5	202241053315	E-3/29320/2022/CHE	0	----	FORM 3	
6	202241053315	E-5/3770/2022/CHE	0	----	FORM 5	
7	202241053314	E-3/29321/2022/CHE	0	----	FORM 3	
8	202241053314	E-5/3771/2022/CHE	0	----	FORM 5	
9	202241053313	E-5/3772/2022/CHE	0	----	FORM 5	
10	202241053313	E-3/29322/2022/CHE	0	----	FORM 3	

Total Amount : ₹ 0

Amount in Words: Rupees Only

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पेटेंट कार्यालय
शासकीय जर्नल

**OFFICIAL JOURNAL
OF
THE PATENT OFFICE**

निर्गमन सं. 38/2022
ISSUE NO. 38/2022

शुक्रवार
FRIDAY

दिनांक: 23/09/2022
DATE: 23/09/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

**(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS**

23rd SEPTEMBER, 2022

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202241053314 A

(19) INDIA

(22) Date of filing of Application :18/09/2022

(43) Publication Date : 23/09/2022

(54) Title of the invention : A DEVICE AND SYSTEM FOR AUTOMOBILES TO DISTINGUISH AND IDENTIFY AUTHORIZED AND UNAUTHORIZED PARKING LOCATIONS

(51) International classification :G08G0001140000, H04L0029080000, G09B0021000000, G01C0021360000, A61G0003060000
(86) International Application No :NA
Filing Date :NA
(87) International Publication No : NA
(61) Patent of Addition to Application Number :NA
Filing Date :NA
(62) Divisional to Application Number :NA
Filing Date :NA

(71)Name of Applicant :

1)VIMAL JYOTHI ENGINEERING COLLEGE

Address of Applicant :Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. Chemperi -----

Name of Applicant : NA

Address of Applicant : NA

(72)Name of Inventor :

1)Asha Baby

Address of Applicant :Assistant Professor, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

2)Anusurya Bhacko

Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

--

3)Sreelakshmi A. K.

Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

--

4)Rose Alphons Benny

Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

--

(57) Abstract :

The present invention relates to the field of automobile electronics and more particularly it discloses an Internet of Things based system and a device for four and higher wheeled automobiles to identify and distinguish authorized and unauthorized parking sites in cities and roadways. The system is designed in such a way that it gives separate assistance for disabled as well as normal users. The assistance differs according to the account used to login. If the user is a disabled person he uses his own account to login into the application. For a disabled person when his vehicle enters into a reserved parking location the application confirms it as parking location for the disabled person. In the case of an ordinary person, when his vehicle approaches a reserved parking area the application identify it as an area reserved for disabled person. Thus, he is not allowed to park in that area.

No. of Pages : 30 No. of Claims : 4



Application Filing Receipt

**Government of India
Patent Office**
Intellectual Property Office Building,
G.S.T. Road, Guindy,
Chennai - 600032
Phone- 044-22502081-84
Fax: 044-22502066
e-mail: chennai-patent@nic.in

CBR Number : 37515

CBR date: 18-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
VIMAL JYOTHI ENGINEERING COLLEGE
Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting to be an application for patent numbered 202241053314 dated 18-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to A DEVICE AND SYSTEM FOR AUTOMOBILES TO DISTINGUISH AND IDENTIFY AUTHORIZED AND UNAUTHORIZED PARKING LOCATIONS together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority or date of filing, whichever is earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority or date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

(For Controller of Patents)



Office of the Controller General of Patents, Designs & Trade Marks
Department of Industrial Policy & Promotion,
Ministry of Commerce & Industry,
Government of India

(<http://ipindia.nic.in/index.htm>)



(<http://ipindia.nic.in/index.htm>)

Application Details

APPLICATION NUMBER	202241053314
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	18/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	A DEVICE AND SYSTEM FOR AUTOMOBILES TO DISTINGUISH AND IDENTIFY AUTHORIZED AND UNAUTHORIZED PARKING LOCATIONS
FIELD OF INVENTION	ELECTRONICS
E-MAIL (As Per Record)	patents@allinnov.org
ADDITIONAL-EMAIL (As Per Record)	allinnovrnd@gmail.com
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	23/09/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:
Filing Date:
Amount of Fee Paid:
CBR No.:
Signature:

1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	VIMAL JYOTHI ENGINEERING COLLEGE	India	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

2. INVENTOR(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	Asha Baby	India	Assistant Professor, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
2	Anusurya Bhacko	India	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
3	Sreelakshmi A.	India	Student,	India	Kerala	Kannur	Chemperi

	K.		Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.				
4	Rose Alphons Benny	India	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

3. TITLE OF THE INVENTION: A Device and System for Automobiles to Distinguish and Identify Authorized and Unauthorized Parking Locations

4. ADDRESS FOR CORRESPONDENCE OF APPLICANT / Telephone No.:
AUTHORISED PATENT AGENT IN INDIA: Fax No.:

Allinnov Innovation and Intellectual Property Services, #360E,
 First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri -
 635001, Tamil Nadu, India.

Mobile No: 9790586194
 E-mail: patents@allinnov.org

5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Title of the Invention
--------	---------	--------------------	-------------	-----------------------	------------------------

6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application
--	---

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application
--	---

9. DECLARATIONS:

(i) Declaration by the inventor(s)

I/We ,Asha Baby,Anusurya Bhacko,Sreelakshmi A. K.,Rose Alphons Benny, is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Asha Baby,Anusurya Bhacko,Sreelakshmi A. K.,Rose Alphons Benny

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the singnatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- **The Complete specification relating to the invention is filed with this application.**
- **I am/We are, in the possession of the above mentioned invention.**
- **There is no lawful ground of objection to the grant of the Patent to me/us.**
- **I am/We are, the assignee or legal representative to true first inventors.**

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Parking Identification(11).pdf
2	DRAWINGS	Drawings - Parking Identification (11).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hering are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

To The Controller of Patents

The Patent office at CHENNAI

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

A Device and System for Automobiles to Distinguish and Identify Authorized and Unauthorized
Parking Locations

2. APPLICANT(S)

NAME(S)	NATIONALITY	ADDRESS
---------	-------------	---------

VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

**A DEVICE AND SYSTEM FOR AUTOMOBILES TO DISTINGUISH AND
IDENTIFY AUTHORIZED AND UNAUTHORIZED PARKING
LOCATIONS**

FIELD OF INVENTION

[001] 5 The present invention relates to the field of automobile electronics and more particularly it discloses an Internet of Things based system and a device for four and higher wheeled automobiles to identify and distinguish authorized and unauthorized parking sites in cities and roadways.

BACKGROUND OF INVENTION

[002] 10 Background description includes information that may be useful in understanding the present invention. It is not an admission that any of the information provided herein is prior art or relevant to the presently claimed invention, or that any publication specifically or implicitly referenced is prior art.

[003] In the last decade, due to increasing the population of cities and the physical spatial
15 expansion of the cities, vehicles are being used progressively, which has caused many problems for the cities including traffic increase, chaos in finding urban parking lots, an increase in environmental pollution, a decrease of citizen's satisfaction, and so on. Meanwhile, one of the paradigms that have focused on this issue in recent years is the smart city paradigm, which has offered smart parking.
20 This paradigm believes that a smart parking system must be an essential part of a smart city and can help urban management. Now let us consider a person who

comes to a city where he is new and is not aware of the parking locations. Thus, this particular person may have a tendency to park near the road or in a no-parking zone. This may lead to traffic issues as the car parked near the road reduces the space on the road for other vehicles to pass. This will lead to traffic congestion. Due to traffic congestion, there is a high chance of pollution as many vehicles will be waiting without turning off their engine.

[004] This issue cannot be solved easily, the solution must be starting from the base root. As discussed earlier the main reason for traffic congestion is population so smart parking systems must be established in offices as well as college premises. This invention aims to implement a system for schools, offices as well as colleges that alert the user if the vehicle is in no parking area and helps the driver to find the nearest vacant parking slots and protect the vehicle using the virtual lock. The system also focuses on disabled drivers thus navigating them to their authorized parking locations.

[005] 15 A prior art disclosed a system has LED indicators which helps the drivers to understand whether the slot is available or not. Initially the LED will be green indicating that the slot is free and is ready to be occupied. When a car enters to this area the LED starts blinking red to indicate that the system is verifying the unknown vehicle. Now the RFID reader will check for the tag and if found this tag is scanned. 20 Now the system checks the database to find a match. If a match is found then the LED is set to blue. If match is not found then LED is set to red and sms will be sent to the security office. Here ThingSpeak, a cloud-based analysis, and app tool is used

to perform the analysis and create a visual dashboard that represents the various parking statuses. This dashboard is accessible via a web interface and an app to allow security to monitor the status of various parking spaces in real-time. Also IFTTT cloud services were used to create and send alert messages.

[006] 5 Another prior art a system, an intelligent device for vehicle for Traffic Congestion Detection called Traffic Detector. The system will work basically work on major components as: Traffic Congestion Detection, Alert Traffic Avoidance The System will helps to calculate road traffic data and provide an easy platform to analyze the traffic congestion and fuel availability. Traffic Detector is a rapidly deployed, cost
10 effective and easily maintainable traffic congestion detection system that combines GPS and GSM technologies. Complete with the necessary hardware and software components, the systems strength lies in its portability and reliable wireless data communication. The vehicle unit consist of GPS receiver that used for receiving geographic position, graphical display to displays the position and path to the
15 traveller has follow to reach destination. The system works on embedded configurable software in charge of sending vehicle positioning and alarm traffic congestion information through the GSM by receiving control orders from monitoring system. In this case application server is used to display real-time traffic and fuel level information in electronic map. When the monitor system send live
20 traffic information in command form, it must translate that command in protocol format which can be understood by the GPS terminal. The communication route is in opposite to the data receiving route.

[007] Yet another prior art disclosed a system wherein the vehicle tracked has to transfer certain information to the receiver such as the location and speed through a device that is installed inside the vehicle. The tracking system on the moving vehicle works on the basis of the satellite through which the signals are being transmitted and received. The most important part of this invention is the transmission of the signals from the GSM module to the GPS receiver. Hence an Arduino UNO has been used to manage the entire mechanism of the vehicle tracking system. Since a receiver and a transmitter are required for the tracking system, the GSM module has been used to act as a transmitter. The GPS will identify the coordinates of the location at which the vehicle is, while the GSM module transmits those coordinates to ThingSpeak via SIM card internet data. A16x2 LCD connected to Arduino UNO display the detected coordinates and show status messages of the detected coordinates. ThingSpeak is utilized as the platform where it stores the coordinates that GSM module send to it and Freeboard as the platform for the user to seek their vehicle location.

[008] Yet another prior art disclosed a system to provide additional security to the vehicle, the biometric authentication is used along with the standard key mechanism to turn the engine on. The fingerprint sensor can hold up to 200 fingerprints in its database, thereby allowing the owner to permit as many numbers of people to have their fingerprints registered and hence have access to the vehicle. The user can enroll their fingerprints in the Fingerprint sensor with the help of an Arduino microcontroller.

[009] In the case of theft, which could occur by bypassing the Biometric and key, the GPS module installed in a secure place in the vehicle would send the location coordinates of the current position to the owner via GSM thereby allowing the owner to track the vehicle and take necessary actions if required.

[0010] 5 Yet another prior art disclosed a system with two main paths to getting a parking space. The first path is taken when a car drives into the car park with no prior reservation, and the second when a slot is reserved using the mobile application. The system will then analyse the user information by checking if they have a blue badge. All blue badge users get allocated the disabled reserved spaces
10 automatically, while other users go through a registration number check to get assigned a space depending on fuel type. After running the registration number through the allocation, the user will get allocated a parking space. The allocation uses a classification system called Equa index to categorise cars depending on CO2 emissions. If the car fails to arrive on time the parking space will automatically
15 become available and the booking will be cancelled. In the same way, the driver can cancel their reserved space at any point if they cannot arrive on time. Charge is added to cancelled reservations to improve utilisation and avoid void bookings. The car is then set to occupy the spot on arrival.

[0011] Yet another prior art disclosed a system in which at first, a vehicle needs to be
20 registered to gain access in restricted zone and the parking area. So they are first registered by the RFID reader in the main entry. If a vehicle is to be cancelled out of registration, it is also done in the main entry RFID reader. Then if the car is

registered, it punches the RFID tag to the main entry and the gate opens recording the time of the entrance. From then on wards, a time of 5 minutes is started to check whether the vehicle leaves or enters the parking lot. If the vehicle remains in the no parking area, an SMS is sent to the owner and authority informing about the illegal act and fine is charged. With the timer crossing its limit, a buzzer starts alarming. If the vehicle punches the card for the parking entry, then the timer is stopped and the time of parking entrance is noted. When the car punches the RFID reader in the parking entry again, then the time is noted and parking charge according to the duration of parking is charged. And from then onward, another timer starts to check if the vehicle leaves within the given time, otherwise the buzzer will go on, an SMS will be sent and fine will be charged. When the car finally punches the main entry RFID, then the time is noted and kept into account in the database and the car leaves the restricted area.

[0012] However, there is a pressing need for a better and efficient system to further improvise the overall requirement and hence we come up with the present invention.

[0013] Further limitations and disadvantages of conventional and traditional approaches will become apparent to one of skill in the art through comparison of described systems with some aspects of the present disclosure, as set forth in the remainder of the present application and with reference to the drawings.

[0014] In some embodiments, the numbers expressing quantities or dimensions of items, and so forth, used to describe and claim certain embodiments of the invention are

to be understood as being modified in some instances by the term “about.” Accordingly, in some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In
5 some embodiments, the numerical parameters should be construed in light of the number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable.

10 The numerical values presented in some embodiments of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0015] As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly dictates
15 otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

[0016] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the
20 specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g. “such as”) provided with respect to certain embodiments

herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0017] 5 Groupings of alternative elements or embodiments of the invention disclosed herein are not to be construed as limitations. Each group member can be referred to and claimed individually or in any or a combination with other members of the group or other elements found herein. One or more members of a group can be included in, or deleted from, a group for reasons of convenience and/or patentability. When
10 any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all groups used in the appended claims.

OBJECTS OF THE INVENTION:

[0018] This invention aims to implement a system which alerts the user if the vehicle is in
15 no parking area and helps the driver to find nearest vacant parking slots and protect the vehicle using virtual lock. The system also focuses on disabled drivers thus navigating them to their authorised parking locations

[0019] General objects of the present invention is to prevent vehicle from parking at no-
parking areas; to provide assistance to the disabled drivers to park on their reserved
20 parking areas for disabled user; to guide the user to an available parking location and to implement a virtual lock that acts as an anti-theft feature.

[0020] These features and advantages of the present disclosure may be appreciated by reviewing the following description of the present disclosure, along with the accompanying figures wherein like reference numerals refer to like parts.

[0021] Various objects, features, aspects and advantages of the inventive subject matter
5 will become more apparent from the following detailed description of the preferred embodiments, along with the accompanying drawing figures in which the numerals represent the like components.

[0022] Within the scope of this application it is expressly envisaged that the various aspects, embodiments, examples, alternatives set out in the preceding paragraphs,
10 in the claims and/or the following description and drawings, and in particular the individual features thereof, may be taken independently or in any or a combination. Features described in connection with one embodiment are applicable to all embodiments, unless such features are incompatible.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023]15 The accompanying drawings are included to provide a further understanding of the present disclosure and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0024]20 A complete understanding of the system and method of the present invention may be obtained by reference to the following drawings:

FIG. 1 illustrates an exemplary architecture of the present system.

FIG. 2 represents a use case diagram of the present system.

FIGs. 3A, 3B and 3C represents the data flow diagrams at level 0, level 1 and level 2 respectively.

5 FIG. 4 discloses an apropos representation of the app notifications provided by the system.

DETAILED DESCRIPTION

[0025] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to clearly
10 communicate the disclosure. However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0026] In the following description, numerous specific details are set forth in order to
15 provide a thorough understanding of embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0027] Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be
20 embodied in machine-executable instructions, which may be used to cause a

general-purpose or special purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0028] Various methods described herein may be practiced by combining one or more
5 machine-readable storage media containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a single computer) and storage systems containing or having network access to
10 computer program(s) coded in accordance with various methods described herein, and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

[0029] The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the
15 ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0030] Specific details are given in the following description to provide a thorough
20 understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these

specific details. For example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

[0031] Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those of ordinary skill in the art. The invention disclosed may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein.

[0032] Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary embodiments and should not be considered limiting. Thus, the present invention is

to be accorded the widest scope encompassing numerous alternatives, modifications and equivalents consistent with the principles and features disclosed. For purpose of clarity, details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not
5 to unnecessarily obscure the present invention.

[0033] Thus, for example, it will be appreciated by those of ordinary skill in the art that the diagrams, schematics, illustrations, and the like represent conceptual views or processes illustrating systems and methods embodying this invention. The functions of the various elements shown in the figures may be provided through the
10 use of dedicated hardware as well as hardware capable of executing associated software. Similarly, any switches shown in the figures are conceptual only. Their function may be carried out through the operation of program logic, through dedicated logic, through the interaction of program control and dedicated logic, or even manually, the particular technique being selectable by the entity implementing
15 this invention. Those of ordinary skill in the art further understand that the exemplary hardware, software, processes, methods, and/or operating systems described herein are for illustrative purposes and, thus, are not intended to be limited to any particular named element.

[0034] Embodiments of the present invention may be provided as a computer program
20 product, which may include a machine-readable storage medium tangible embodying thereon instructions, which may be used to program a computer (or other electronic devices) to perform a process. The term “machine-readable storage

medium” or “computer-readable storage medium” includes, but is not limited to, fixed (hard) drives, magnetic tape, floppy diskettes, optical disks, compact disc read-only memories (CD-ROMs), and magneto-optical disks, semiconductor memories, such as ROMs, PROMs, random access memories (RAMs),
5 programmable read-only memories (PROMs), erasable PROMs (EPROMs), electrically erasable PROMs (EEPROMs), flash memory, magnetic or optical cards, or other type of media/machine-readable medium suitable for storing electronic instructions (e.g., computer programming code, such as software or firmware). A machine-readable medium may include a non-transitory medium in
10 which data may be stored and that does not include carrier waves and/or transitory electronic signals propagating wirelessly or over wired connections.

[0035] Examples of a non-transitory medium may include, but are not limited to, a magnetic disk or tape, optical storage media such as compact disk (CD) or digital versatile disk (DVD), flash memory, memory or memory devices. A computer-
15 program product may include code and/or machine-executable instructions that may represent a procedure, a function, a subprogram, a program, a routine, a subroutine, a module, a software package, a class, or any combination of instructions, data structures, or program statements. A code segment may be coupled to another code segment or a hardware circuit by passing and/or receiving
20 information, data, arguments, parameters, or memory contents. Information, arguments, parameters, data, etc. may be passed, forwarded, or transmitted via any suitable means including memory sharing, message passing, token passing, network transmission, etc.

[0036] Furthermore, embodiments may be implemented by hardware, software, firmware, middleware, microcode, hardware description languages, or any combination thereof. When implemented in software, firmware, middleware or microcode, the program code or code segments to perform the necessary tasks (e.g., a computer-
5 program product) may be stored in a machine-readable medium. A processor(s) may perform the necessary tasks.

[0037] Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the pertinent art have given that term as reflected in printed publications and issued
10 patents at the time of filing.

[0038] The present invention will now be described more fully hereinafter. This invention may, however, be embodied in many different forms and should not be construed as being limited to the embodiment set forth herein. Rather, the embodiment is provided so that this disclosure will be thorough, and will fully convey the scope of
15 the invention to those skilled in the art.

[0039] In this work, a smart parking system is present for providing assistance for the users in a campus. The system will detect whether the vehicle is in a no parking area or in a parking area and also shows the areas that are available for parking. The system provides separate parking assistance for abled and disabled person.

[0040] FIG. 1 illustrates an exemplary architecture of the present system. The GPS will recognize the geo-location of the vehicle after a period of every 5 seconds. Each geo-location will be compared with the last geo-location by calculating its distance

and if I got the distance less than 5 meters for at least 3 or more times then the device will send that geo-location to the server with the request to check the status of that vehicle. If the vehicle has similar geo-location for 3 or more times it will consider as the vehicle has stopped moving and will send the request to check the status.

[0041] When the vehicle will stop moving, the server will check whether the vehicle is in the parking zone or in the no-parking zone or in an unknown zone. The server will compare the current location with each saved parking no-parking location stored on the cloud database by measuring the distance between the current location saved location The location of the parking or no-parking area radius of that slot is also stored on the cloud database. The status of the vehicle will be defined by comparing this radius and the calculated distance between the current location and the saved location. If that distance is within 15 meters from the saved location, the status of the vehicle will be set according to the saved location type (Parking/No-Parking). This status will be sent to the device in the form of a response to the request sent by the device.

[0042] On the mobile application the available parking areas near to the vehicle is listed as requested by the user. User can see them in the decreasing order of distance. The android application provided the facility to locate the listed parking areas. Normal people cannot access the areas that are reserved for disabled persons. Only the disabled person can access the reserved space through the application.

[0043] If the user wishes to enable the virtual lock, the user can turn it on by using the mobile application. After enabling the virtual lock, an entry will be added in the database which will be fetched by the device. The device will constantly recognize that whether the vehicle has changed its location or not by measuring the distance
5 between location inserted at the time of virtual lock and recent location. If the distance is more than 5 meters the status will be set to change. If the vehicle has changed its location then the buzzer of the device will turn on and the device will request the server to send alert to the user on the mobile application. Users will be able to turn off the buzzer as well as the virtual lock through the mobile application.

[0044]0 FIG. 2 represents a use case diagram of the present system. A dynamic and behavioral diagram in UML is use case diagram. Use cases are basically set of actions, services which are used by the system. To visualize the functionality requirement of the system this use case diagram are used. The internal and external events or party that may influence the system are also picturized. Use case diagram
15 specify how the system acts on any action without worrying to know about the details how that functionality is achieved.

[0045] There are only two actors User and Authorized person. User is the person who is benefited through the system and authorized person is the person who can make changes to the database according to the changes in that particular parking
20 locations.

[0046] Inside the system boundary we have three set of actions to be performed. User Registration is the initial stage which is done by the user in order to register to the

system. Virtual Lock is a safety measure acts as an anti-theft feature in which system continuously checks the current location of the vehicle and if the vehicle is moved from the parked location, then it will alert the user. No parking Area Detection alert the user if the vehicle is in no-parking area whenever the vehicle
5 stops.

[0047] FIGs. 3A, 3B and 3C represents the data flow diagrams at level 0, level 1 and level 2 respectively. A Data Flow Diagram (DFD) is a visual representation of the information flows within a system. It provides information on how data enters and leaves the system, the changes in the system and where the data is stored. The level
10 in the data flow 0, 1, 2 or beyond.

[0048] In level 0 is also known as fundamental system model. It represents the entire software requirement as a single bubble with input and output data denoted by incoming and outgoing arrows.

[0049] Here, Level 0 is the entire representation of the system. It contain a system called
15 ZeroPark application. The user must be register the user details and ZeroPark get location from vehicle. System will process and evaluate and the parking information provided to the user.

[0050] In level 1 DFD, the context diagram is decomposed into multiple processes. In this level, we highlight the main functions of the system and breakdown the high-level
20 process of 0-level DFD into subprocesses.

[0051] In Level 1 DFD, if the vehicle is in the no parking zone, then the server will send an alert to the user. It will also provide assistance to the abled and disabled user. It provide a virtual lock and that act as an anti-theft feature.

[0052] Level 2 of DFD goes one process deeper into parts of Level 1. It can be used to
5 invention or record the necessary detail about the system's functioning. It shows that user login the application then the parking system contain the GPS sensor and it will provide the vehicle location and it will check whether the vehicle is in the parking zone or non parking zone. If it is a disabled person than the application also provide the available parking area for the disabled users. If it is the user is not a
10 disabled person then the system also provide in available parking location. The virtual lock act as an anti-theft features. After enabling the virtual of the device will check whether the vehicles in changed or not. In case the vehicle is change it's position then it provide the alert to the user and vehicle.

[0053] FIG. 4 discloses an apropos representation of the app notifications provided by the
15 system. The vehicle application alerts the user if the vehicle is stopped in a no parking area. Here the user will be alerted through a voice message using google text to speech.

[0054] The vehicle application is designed in such a way that it gives separate assistance for disabled as well as normal users. The assistance differs according to the account
20 used to login. If the user is a disabled person he uses his own account to login into the application. For a disabled person when his vehicle enters into a reserved parking location the application confirms it as parking location for the disabled

person. In the case of an ordinary person, when his vehicle approaches a reserved parking area the application identify it as an area reserved for disabled person. Thus, he is not allowed to park in that area.

[0055] Virtual lock is a safety feature provided by the application so as to ensure that the
5 vehicle is safe at the place where it is being parked. When a person park in a parking area and turn on the virtual lock then the application starts to detect whether the vehicle is moving from the last parked location. If found moving it alerts the owner of the vehicle with a notification as well as a beep sound.

[0056] While the foregoing describes various embodiments of the invention, other and
10 further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions, or examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge
15 available to the person.

#####DIGITALLY SIGNED#####
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Patent Agent On Behalf of the Applicants

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CLAIMS

We claim,

1. A device and system for automobiles to distinguish and identify authorized and unauthorized parking locations, comprising:
 - 5 a plurality of transceivers;
 - one or more processors;
 - at least one I/O devices;
 - a GPS module and a mobile application.
2. The system as claimed in claim 1 wherein, the said transceivers to
10 communicate with the said system to identify parking locations in a roadway.
3. The system as claimed in claims 1 and 2 wherein, the said processor is preferably an Arduino configured to be operatively coupled with the said transceivers and further with the GPS module in identification of nearby
15 parking slots and their availabilities
4. The system as claimed in claim 1 wherein, the said mobile application provides a user interface and ease of access and also is configured to provide a virtual locking system for the vehicle parked in a parking slot thereby providing an option to detect and be informed on any movements of the said

vehicle from the parked location so as to ensure prevention from theft and
falsely seizures.

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ABSTRACT

**A DEVICE AND SYSTEM FOR AUTOMOBILES TO DISTINGUISH AND
IDENTIFY AUTHORIZED AND UNAUTHORIZED PARKING
LOCATIONS**

5 The present invention relates to the field of automobile electronics and more particularly it discloses an Internet of Things based system and a device for four and higher wheeled automobiles to identify and distinguish authorized and unauthorized parking sites in cities and roadways. The system is designed in such a way that it gives separate assistance for disabled as well as normal users. The
10 assistance differs according to the account used to login. If the user is a disabled person he uses his own account to login into the application. For a disabled person when his vehicle enters into a reserved parking location the application confirms it as parking location for the disabled person. In the case of an ordinary person, when his vehicle approaches a reserved parking area the application identify it as an area
15 reserved for disabled person. Thus, he is not allowed to park in that area.

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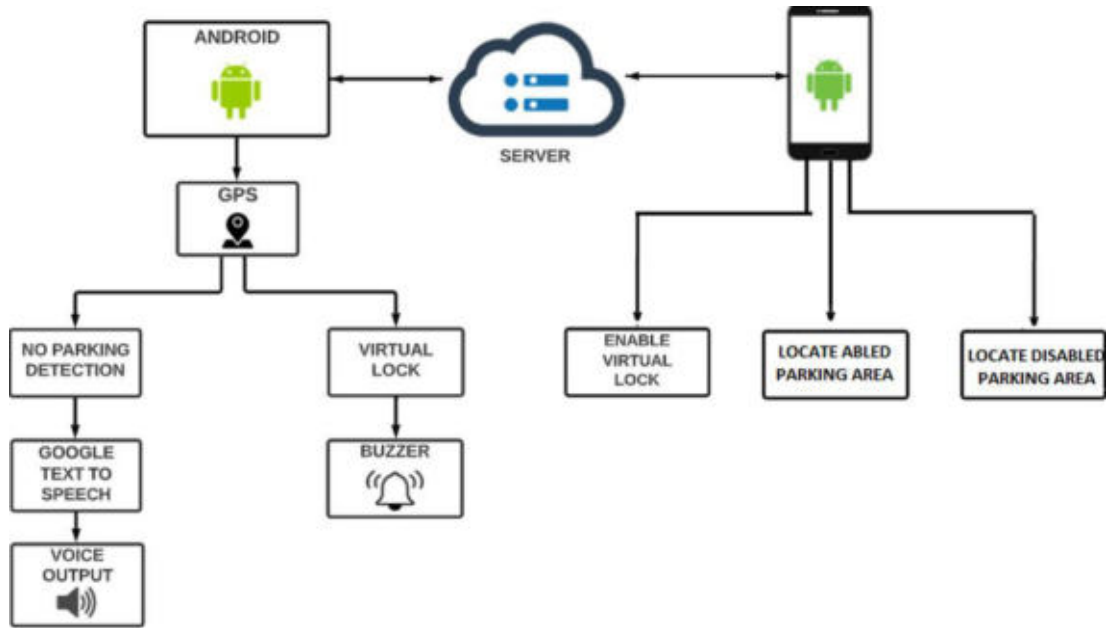


FIGURE 1

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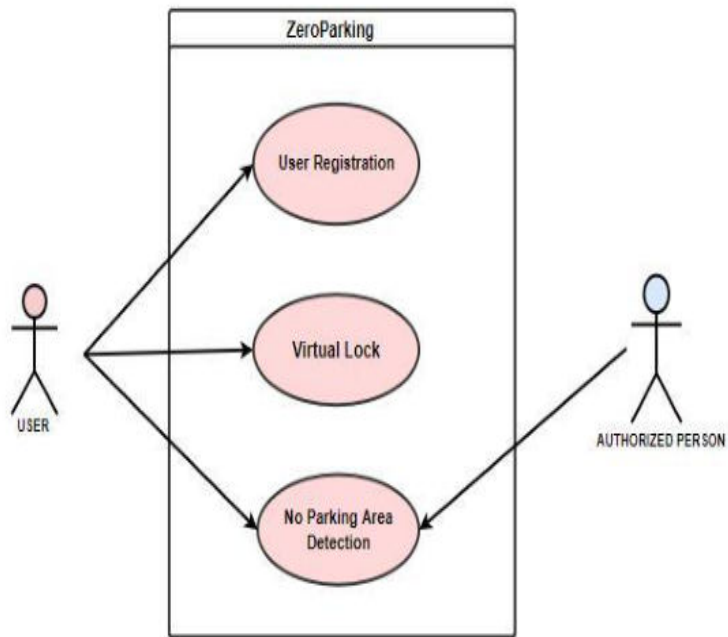


FIGURE 2

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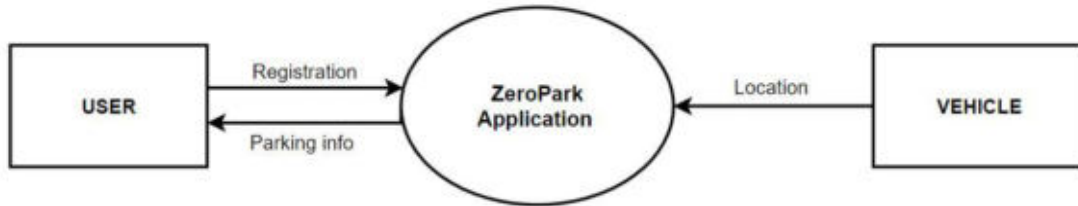


FIGURE 3A

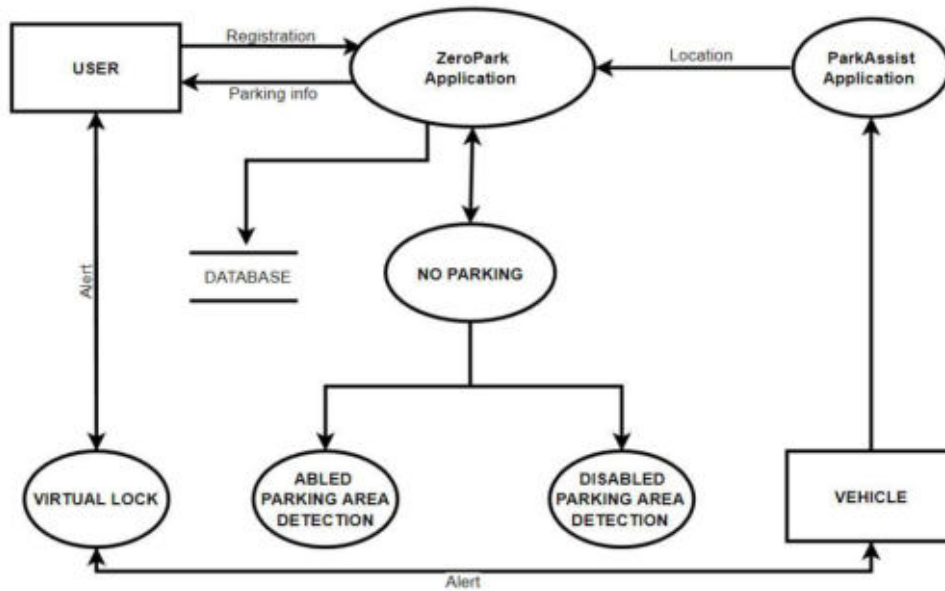


FIGURE 3B

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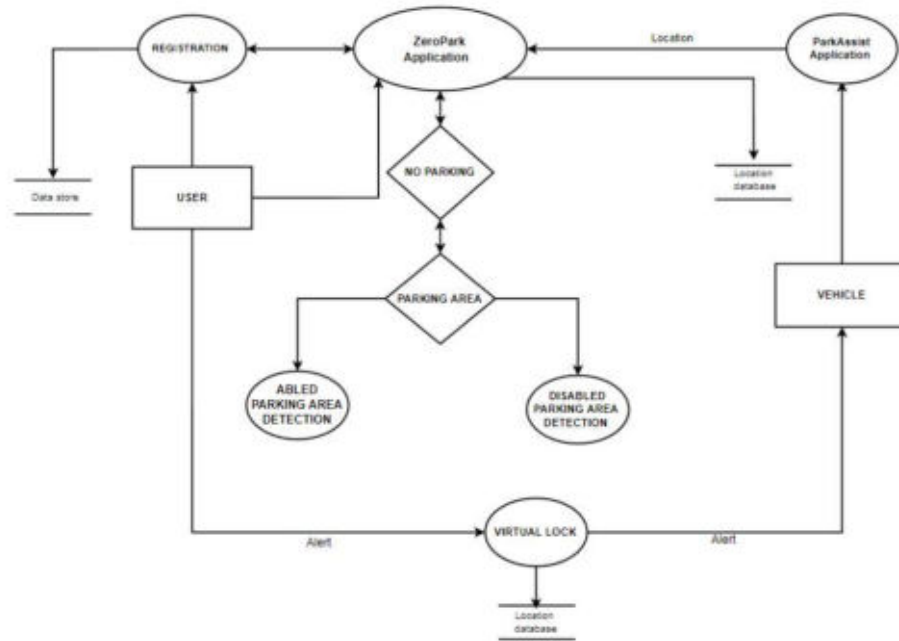


FIGURE 3C

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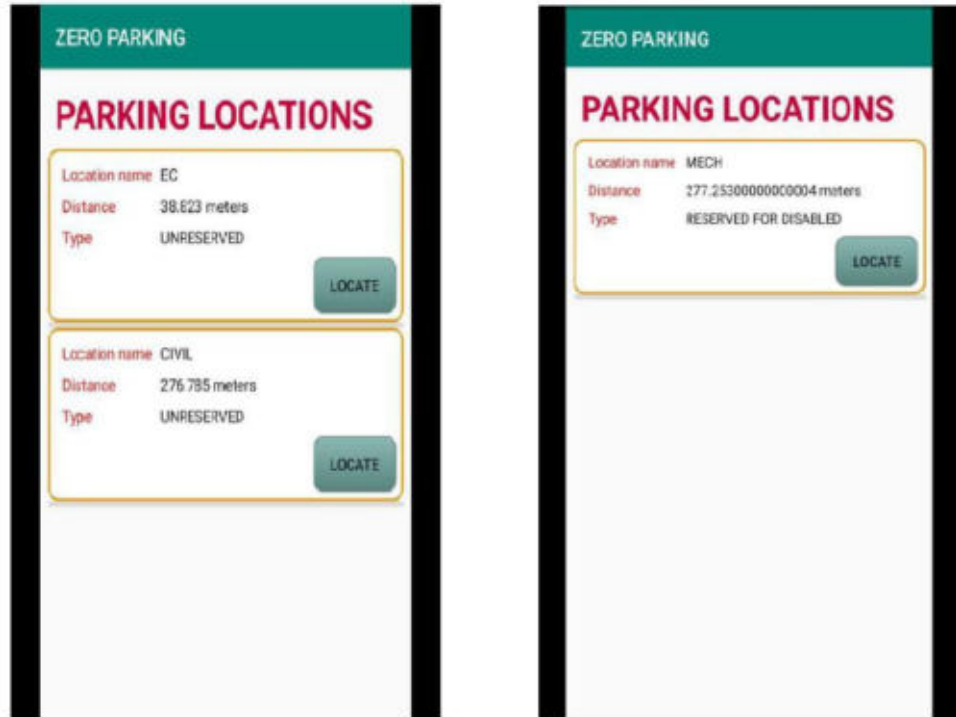


FIGURE 4

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FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241053314 dated 18-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:

NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 18th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241053314** Dated **18th day of Sep , 2022** are

INVENTOR (S):

1 a) Name:	Asha Baby
b) Nationality:	Indian
c) Address:	Assistant Professor, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
2 a) Name:	Anusurya Bhacko
b) Nationality:	Indian
c) Address:	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
3 a) Name:	Sreelakshmi A. K.
b) Nationality:	Indian
c) Address:	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
4 a) Name:	Rose Alphons Benny
b) Nationality:	Indian
c) Address:	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

Dated This 18th day of Sep, 2022

Signature,



NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

To,

**The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu- 600032**

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/59432/2022-CHE

Dated **11/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

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सत्यमेव जयते
G.A.R.6
[See Rule 22(1)]
RECEIPT



Docket No 89679

Date/Time 2022/09/18 19:54:07

To
PREM CHARLES

UserId: prem1987

360E, SENTHUR MURUGAN KOVIL
STREET, OPPOSITE SM MAHAL,
OLDPET

CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	E-106/5540/2022/CHE	202241053315	0	----	FORM28	
2	E-106/5541/2022/CHE	202241053313	0	----	FORM28	----
3	E-106/5543/2022/CHE	202241053314	0	----	FORM28	----
4	E-106/5544/2022/CHE	202241053316	0	----	FORM28	----
5	E-106/5542/2022/CHE	202241053317	0	----	FORM28	----
6	E-12/7069/2022/CHE	202241053315	2500	37515	FORM 9	----
7	E-12/7073/2022/CHE	202241053313	2500	37515	FORM 9	----
8	E-12/7070/2022/CHE	202241053314	2500	37515	FORM 9	----
9	E-12/7071/2022/CHE	202241053316	2500	37515	FORM 9	----
10	E-12/7072/2022/CHE	202241053317	2500	37515	FORM 9	----
11	202241053315	TEMP/E-1/59430/2022-CHE	1600	37515	FORM 1	An Optical Fiber Based System and Method to Detect Adulteration in Fuels
12	202241053313	TEMP/E-1/59431/2022-CHE	1600	37515	FORM 1	A System for Transforming Finger Gestures into Other Communication Health Monitoring of Differently
13	202241053314	TEMP/E-1/59432/2022-CHE	1600	37515	FORM 1	A Device and System for Automobiles to Distinguish and Identify Authorized and Unauthorized Parking
14	202241053316	TEMP/E-1/59433/2022-CHE	1600	37515	FORM 1	An Image Processing Based Smart System for Reading and Communication of the Visually Challenged
15	202241053317	TEMP/E-1/59434/2022-CHE	1600	37515	FORM 1	A System and Method of Efficient Driving Assistance and Navigation for Vehicles

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001024387	Online Bank Transfer	1809220005196	20500.00	1475001020000001

Total Amount : ₹ 20500.00

Amount in Words: Rupees Twenty Thousand Five Hundred Only

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Docket No 89681

Date/Time 18/09/2022

To
PREM CHARLES

User Id: prem1987

360E, SENTHUR MURUGAN
KOVIL STREET, OPPOSITE SM
MAHAL, OLDPET

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241053317	E-3/29318/2022/CHE	0	----	FORM 3	
2	202241053317	E-5/3768/2022/CHE	0	----	FORM 5	
3	202241053316	E-3/29319/2022/CHE	0	----	FORM 3	
4	202241053316	E-5/3769/2022/CHE	0	----	FORM 5	
5	202241053315	E-3/29320/2022/CHE	0	----	FORM 3	
6	202241053315	E-5/3770/2022/CHE	0	----	FORM 5	
7	202241053314	E-3/29321/2022/CHE	0	----	FORM 3	
8	202241053314	E-5/3771/2022/CHE	0	----	FORM 5	
9	202241053313	E-5/3772/2022/CHE	0	----	FORM 5	
10	202241053313	E-3/29322/2022/CHE	0	----	FORM 3	

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**OFFICIAL JOURNAL
OF
THE PATENT OFFICE**

निर्गमन सं. 41/2022
ISSUE NO. 41/2022

शुक्रवार
FRIDAY

दिनांक: 14/10/2022
DATE: 14/10/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

**(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS**

14nd OCTOBER, 2022

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202241053315 A

(19) INDIA

(22) Date of filing of Application :18/09/2022

(43) Publication Date : 14/10/2022

(54) Title of the invention : An Optical Fiber Based System and Method to Detect Adulteration in Fuels

(51) International classification :G01N0033280000, G06K0009460000, G06T0007900000, G01N0033220000, G01N0021357700
(86) International Application No :PCT//
Filing Date :01/01/1900
(87) International Publication No : NA
(61) Patent of Addition to Application Number :NA
Filing Date :NA
(62) Divisional to Application Number :NA
Filing Date :NA

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Name of Applicant : NA

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(57) Abstract :

The present invention relates to the field of image processing applications and more particularly it discloses a system based on optical fibers for effective detection of adulteration in fuel and a method thereof. It consist of mainly two phases. One is for training and other one is for testing. The results obtained are adulterated, pure and false. Fuel adulteration is the process of contamination of fuel with adulterants like kerosene and other substances. The aim of our invention is to find out whether the given fuel sample is adulterated or not. Here, we use image processing techniques to extract the features and a mean value is calculated. The result is calculated with respect to the mean values obtained. Visualization is used to represent pure and adulterated images.

No. of Pages : 29 No. of Claims : 4



Application Filing Receipt

**Government of India
Patent Office**
Intellectual Property Office Building,
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Chennai -600032
Phone- 044-22502081-84
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CBR Number : 37515

CBR date: 18-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
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Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting be to an application for patent numbered 202241053315 dated 18-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to An Optical Fiber Based System and Method to Detect Adulteration in Fuels together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority of date of filing, whichever is earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority of date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

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Ministry of Commerce & Industry,
Government of India

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Application Details

APPLICATION NUMBER	202241053315
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	18/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	An Optical Fiber Based System and Method to Detect Adulteration in Fuels
FIELD OF INVENTION	BIO-MEDICAL ENGINEERING
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E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	14/10/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:
Filing Date:
Amount of Fee Paid:
CBR No.:
Signature:

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3	Meriam Philip	India	Student,	India	Kerala	Kannur	Chemperi

			Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.				
4	Namrutha Raj	India	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
5	Unnimaya	India	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

3. TITLE OF THE INVENTION: An Optical Fiber Based System and Method to Detect Adulteration in Fuels

4. ADDRESS FOR CORRESPONDENCE OF APPLICANT / AUTHORISED PATENT AGENT IN INDIA:
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Mobile No: 9790586194
E-mail: patents@allinnov.org

5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Titile of the Invention
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6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application

9. DECLARATIONS:

(i) Declaration by the inventor(s)

I/We ,Abdul Latheef ,Aryananda P.,Meriam Philip,Namrutha Raj,Unnimaya, is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Abdul Latheef ,Aryananda P.,Meriam Philip,Namrutha Raj,Unnimaya

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the singnatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- **The Complete specification relationg to the invention is filed with this application.**
- **I am/We are, in the possession of the above mentioned invention.**
- **There is no lawful ground of objection to the grant of the Patent to me/us.**
- **I am/We are, the assignee or legal representative to true first inventors.**

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Fuel Adultration (9).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hereing are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

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The Patent office at CHENNAI

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

An Optical Fiber Based System and Method to Detect Adulteration in Fuels

2. APPLICANT(S)

NAME(S)

NATIONALITY

ADDRESS

VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

**AN OPTICAL FIBER BASED SYSTEM AND METHOD TO DETECT
ADULTERATION IN FUELS**

FIELD OF INVENTION

[001] The present invention relates to the field of image processing applications and more
5 particularly it discloses a system based on optical fibers for effective detection of
adulteration in fuel and a method thereof.

BACKGROUND OF INVENTION

[002] Background description includes information that may be useful in understanding
the present invention. It is not an admission that any of the information provided
10 herein is prior art or relevant to the presently claimed invention, or that any
publication specifically or implicitly referenced is prior art.

[003] Adulterants alter the chemistry of base fuel so the product will not meet its
requirements and specifications which in turn affect the internal combustion
engines giving harmful pollutants in the atmosphere Fuel adulteration are rampant
15 globally and is surreptitious operation in which higher priced fuel is mixed with
cheaply available substitutes. Petroleum products are commonly adulterated with
cheap solvents by the dealers to earn large profit. Earlier, kerosene was the most
common adulterant for petroleum products because of large difference of rates and
due to its ease at mixing. Now when steps have been taken by the authorities to
20 prevent adulteration of kerosene by changing its colour etc, Solvents like naphtha,
raffinate, slop etc that are unknown to the common man are nowadays being used

to adulterate petrol and diesel. These adulterants damage the automobile engines and also lead to environmental pollution. It will not be an exaggeration if it is said that world's economy is hugely governed by these petrochemicals (petrol/diesel).

[004] The technologically advanced automobile industry ultimately relies on one final
5 product i.e. petrochemicals. Life of any automobile is primarily dependent on the quality of the fuel being used. A bad quality or adulterated fuel will not only lead to the degradation in the performance of the machine but is also very much hazardous/ toxic for our environment. The huge emission of carbon dioxide pollutes the environment on one side and on the other side it also increases the overall
10 temperature of the earth causing global warming.

[005] In many south Asian countries, there is a huge difference in the prices of the petrol, diesel and kerosene. Kerosene being a fuel for domestic uses is relatively much cheaper than petrol/diesel. The one important quality of the kerosene is that it can easily be mixed with petrol/diesel. It is seen that many people due to their tendency
15 of earning money by unlawful means, mixes the kerosene into petrol/diesel. This admixture is then supplied to many automobile users and also many electricity generators required to be used for agricultural purposes. Use of this adulterated petrol/diesel causes huge emission of carbon dioxide and other hazardous/toxic gases which are slowly being dissolved into our environment polluting our air,
20 water and soil which in turn leads towards several diseases. This is harm at the human/environment level. On the other side, the appliance in which it is used also deteriorates and their performance level falls as it was primarily optimized for pure

petrol/diesel. It is therefore the need of the hour to develop a mechanism at the scientific level which can detect the amount of adulteration in petrol/ diesel by kerosene, quantitatively. Here a method has been proposed to check fuel adulteration in petrochemicals. Fuel adulteration has become a very important and global issues nowadays. The system tries to characterize different samples of automobile fuel. Images of different samples are captured using a camera and image processing is employed to extract the trends of measures of texture analysis.

[006] A prior art discussed that adulteration is an illegal introduction of any foreign substance into any product leading to the noncompliance with its standard specification. Adulteration of petroleum based automotive fuels is a serious concern globally and a menace in the developing economies. The fuel quality is an important parameter for environmental assessment and a measure of public health, essential for the developing economies. It is attempted to organize the literature information on this subject with an emphasis to identify and optimize methods suitable for monitoring adulteration.

[007] Another prior art disclosed a fleeting wave optical fiber sensor is used, and is connected to an interface controller in order to identify fuel mixing proportion through refractive index change. Fiber optic sensors are used for the process of collecting the data which are then classified accordingly. The fiber optic sensor employed uses optical fibers as a means of transmitting signals to the electronic devices that further process them.

[008] Yet another prior art disclosed a dual core photonic crystal fiber (DCPCF) consisting single analytic channel is used for the detection of petrol adulteration. The sensing probe is numerically studied using finite element method. An anisotropic perfectly match layer is placed around the fiber to reduce radiation loss.

5 The adulterated petrol sample is infiltrated in circular analytic channel which is situated at the center of the fiber between two solid light guiding cores. The mode coupling between these two cores as well as sensitivity of the designed probe are investigated by varying adulteration level of petrol.

[009] Yet another prior art disclosed a surface plasmon resonance (SPR) based fiber optic sensor for the detection of adulteration in petrochemicals. The refractive index of the petrol and diesel changes if kerosene is mixed in the petrol or diesel. The system consists of probe fabrication, sample preparation, experimental setup, PR curves and measurement of resonance wavelengths. The SPR technique can quantitatively measure the percentage of kerosene mixed in petrol and diesel using calibration

15 curves between resonance wavelength and refractive indices of the samples.

[0010] Yet another system is based on statistical analysis of the data samples. Fuel adulterant mixtures in different proportions by volume are prepared and individually tested. It consists of high resolution camera, statistical feature approach, local database, histogram analysis plots and peak signal to noise ratio.

20 Histogram plot shows the differences of standard and adulterated concentrations and indicates fuel adulteration.

[0011] However, there is a pressing need for a better and efficient system to further improvise the overall requirement and hence we come up with the present invention.

[0012] Further limitations and disadvantages of conventional and traditional approaches
5 will become apparent to one of skill in the art through comparison of described systems with some aspects of the present disclosure, as set forth in the remainder of the present application and with reference to the drawings.

[0013] In some embodiments, the numbers expressing quantities or dimensions of items, and so forth, used to describe and claim certain embodiments of the invention are
10 to be understood as being modified in some instances by the term “about.” Accordingly, in some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the
15 number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiments of the invention may contain
20 certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0014] As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly dictates

otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

[0015] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range.

5 Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g. “such as”) provided with respect to certain embodiments
10 herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0016] Groupings of alternative elements or embodiments of the invention disclosed herein
15 are not to be construed as limitations. Each group member can be referred to and claimed individually or in any or a combination with other members of the group or other elements found herein. One or more members of a group can be included in, or deleted from, a group for reasons of convenience and/or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain
20 the group as modified thus fulfilling the written description of all groups used in the appended claims.

OBJECTS OF THE INVENTION:

[0017] A bad quality or adulterated fuel will lead to the degradation in the performance of the machine. Checking fuel adulteration will help to tackle the situation and reduce the problems caused by fuel adulteration. It is therefore the need to develop a
5 mechanism which can detect the adulteration in petrol or diesel by kerosene.

[0018] The objects of the invention are to develop an innovative approach to check adulteration effectively using image processing techniques, the images of adulterated petrol samples are analysed to find out whether it is adulterated or not and multiple users can register and use the system. The system uses easily
10 deployable techniques and is cost effective

[0019] These features and advantages of the present disclosure may be appreciated by reviewing the following description of the present disclosure, along with the accompanying figures wherein like reference numerals refer to like parts.

[0020] Various objects, features, aspects and advantages of the inventive subject matter
15 will become more apparent from the following detailed description of the preferred embodiments, along with the accompanying drawing figures in which the numerals represent the like components.

[0021] Within the scope of this application it is expressly envisaged that the various aspects, embodiments, examples, alternatives set out in the preceding paragraphs,
20 in the claims and/or the following description and drawings, and in particular the individual features thereof, may be taken independently or in any or a combination.

Features described in connection with one embodiment are applicable to all embodiments, unless such features are incompatible.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] The accompanying drawings are included to provide a further understanding of the
5 present disclosure and are incorporated in and constitute a part of this specification.
The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0023] A complete understanding of the system and method of the present invention may
10 be obtained by reference to the following drawings:

FIG. 1 illustrates an exemplary block diagram of the present system.

FIG. 2 represents a use case diagram of the role of administrator in the system.

FIG. 3 represents a use case diagram of the role of user in the system.

15 FIGs. 4A, 4B and 4C represents the data flow diagrams of the present invention at level 0, level 1.1 and level 1.2 respectively.

FIG. 5 represents an apropos flow representation of working of the system.

DETAILED DESCRIPTION

[0024] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to clearly

communicate the disclosure. However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0025]5 In the following description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0026] Embodiments of the present invention include various steps, which will be
10 described below. The steps may be performed by hardware components or may be embodied in machine-executable instructions, which may be used to cause a general-purpose or special purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0027]5 Various methods described herein may be practiced by combining one or more machine-readable storage media containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a
20 single computer) and storage systems containing or having network access to computer program(s) coded in accordance with various methods described herein,

and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

[0028] The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the
5 ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0029]10 Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to
15 obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

[0030] Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are
20 shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those of ordinary skill in the art. The invention disclosed

may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein.

[0031] Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives, modifications and equivalents consistent with the principles and features disclosed. For purpose of clarity, details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not to unnecessarily obscure the present invention.

[0032] Thus, for example, it will be appreciated by those of ordinary skill in the art that the diagrams, schematics, illustrations, and the like represent conceptual views or processes illustrating systems and methods embodying this invention. The functions of the various elements shown in the figures may be provided through the use of dedicated hardware as well as hardware capable of executing associated

software. Similarly, any switches shown in the figures are conceptual only. Their function may be carried out through the operation of program logic, through dedicated logic, through the interaction of program control and dedicated logic, or even manually, the particular technique being selectable by the entity implementing this invention. Those of ordinary skill in the art further understand that the exemplary hardware, software, processes, methods, and/or operating systems described herein are for illustrative purposes and, thus, are not intended to be limited to any particular named element.

[0033] Examples of a non-transitory medium may include, but are not limited to, a magnetic disk or tape, optical storage media such as compact disk (CD) or digital versatile disk (DVD), flash memory, memory or memory devices. A computer-program product may include code and/or machine-executable instructions that may represent a procedure, a function, a subprogram, a program, a routine, a subroutine, a module, a software package, a class, or any combination of instructions, data structures, or program statements. A code segment may be coupled to another code segment or a hardware circuit by passing and/or receiving information, data, arguments, parameters, or memory contents. Information, arguments, parameters, data, etc. may be passed, forwarded, or transmitted via any suitable means including memory sharing, message passing, token passing, network transmission, etc.

[0034] Furthermore, embodiments may be implemented by hardware, software, firmware, middleware, microcode, hardware description languages, or any combination

thereof. When implemented in software, firmware, middleware or microcode, the program code or code segments to perform the necessary tasks (e.g., a computer-program product) may be stored in a machine-readable medium. A processor(s) may perform the necessary tasks.

[0035] 5 Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the pertinent art have given that term as reflected in printed publications and issued patents at the time of filing.

[0036] The present invention will now be described more fully hereinafter. This invention
10 may, however, be embodied in many different forms and should not be construed as being limited to the embodiment set forth herein. Rather, the embodiment is provided so that this disclosure will be thorough, and will fully convey the scope of the invention to those skilled in the art.

[0037] The present disclosure is best understood with reference to the detailed figures and
15 description set forth herein. Various embodiments have been discussed with reference to the figures. However, those skilled in the art will readily appreciate that the detailed descriptions provided herein with respect to the figures are merely for explanatory purposes, as the methods and systems may extend beyond the described embodiments. For instance, the teachings presented and the needs of a
20 particular application may yield multiple alternative and suitable approaches to implement the functionality of any detail described herein. Therefore, any approach may extend beyond certain implementation choices in the following embodiments.

[0038] References to “one embodiment,” “at least one embodiment,” “an embodiment,” “one example,” “an example,” “for example,” and so on indicate that the embodiment(s) or example(s) may include a particular feature, structure, characteristic, property, element, or limitation but that not every embodiment or
5 example necessarily includes that particular feature, structure, characteristic, property, element, or limitation. Further, repeated use of the phrase “in an embodiment” does not necessarily refer to the same embodiment.

[0039] Methods of the present invention may be implemented by performing or completing manually, automatically, or a combination thereof, selected steps or tasks. The term
10 “method” refers to manners, means, techniques and procedures for accomplishing a given task including, but not limited to, those manners, means, techniques, and procedures either known to, or readily developed from known manners, means, techniques and procedures by practitioners of the art to which the invention belongs. The descriptions, examples, methods, and materials presented in the claims and the
15 specification are not to be construed as limiting but rather as illustrative only. Those skilled in the art will envision many other possible variations within the scope of the technology described herein.

[0040] FIG. 1 illustrates an exemplary block diagram of the present system. It consists of dataset creation, feature extraction, image conversions, training and testing of data.
20 Hundred images of adulterated and non-adulterated petrol sample is taken and is used to create the database. The most important features like entropy, contrast, correlation, energy of the images are extracted by the feature extraction process.

RGB image is converted to grayscale image and then again converted into GLCM. GLCM is a gray level co-occurrence matrix. A GLCM is a histogram of co-occurring grayscale values at a given offset over an image.

[0041] Using random forest algorithm the system is trained to determine the adulterated
5 and the unadulterated petrol samples. The mean value of input image is compared with the previous mean values of the adulterated and unadulterated images. The mean value of the images are calculated by using a package called numpy. Then using a function mean, the mean values can be computed and a message is printed on the screen as adulterated or unadulterated depending on the mean value
10 comparison. For visualization circle is used to represent pure and square is used for adulterated image.

[0042] FIG. 2 represents a use case diagram of the role of administrator in the system. The use case diagram consist of two parts, one is for the admin and the other one is for the user. In order to maintain confidentiality only admin and the registered users
15 can use the system to check adulteration of automobiles. The user and admin has different roles. Any number of users can register and use the system.

[0043] The role of admin is to train and test the dataset. From the dataset the admin needs to take pure and adulterated images. Then mean values are calculated. Then the system is trained according to the mean values calculated from the matrix of each
20 features of the images. In order to test the admin has to take the image uploaded by the user. And in the end testing is carried out by the admin to determine the result based on the comparison of mean values.

[0044] The admin can also view the users who have been registered and their login credentials stored in the database. The admin can view the complaints of the user regarding the system difficulties faced during the use of system and results. The admin can reply to the users about their complaints. Also it has the authority to
5 change the password of the system.

[0045] FIG. 3 represents a use case diagram of the role of user in the system. Multiple users can register in the system. Only after registering the users can use the system. The user login details will be stored for future purposes. After registering the use can make use of the system at any time after verifying the login credentials. Main role
10 of user is to upload image to the system and to check if it is adulterated or unadulterated. The user can view the corresponding result on the screen in the form of a message. If the user has any complaint regarding login or result, the user can send complaint to the admin. Also the user can view the reply from the admin about the complaint.

[0046]15 FIGs. 4A, 4B and 4C represents the data flow diagrams of the present invention at level 0, level 1.1 and level 1.2 respectively. Mainly there are two levels, level 0 and level 1. Level 0 consists of admin, user and a database. A database is an organized collection of structured information, or data, stored electronically in a computer system. From the database the data can then be accessed, managed, modified,
20 updated, controlled, and organized. The admin and user can check the adulteration of fuel samples. Also can view and store the result in the database.

[0047] The level 1 is again divided into level 1.1 and level 1.2. The Level 1.1 represents the role of admin. The admin has to login into the system. While login the values in the login table verifies the login credentials of the admin. Then the admin has to train and test dataset. The admin can view the users who are registered. The user details will be stored in the user table. Also, admin can view the complaint from the user and give reply to the user. These complaints are stored in the complaint table. Only the admin has the authority to change the password of the system.

[0048] In level 1.2 the first step is registration. The user has to register before using the system. The registration and login table stores the registration details of the user. After the registration the user can login at any time. During login it checks the login details and compares it with user table to verify if it matches the user. After verification the user can input the image to check if it is adulterated or not. Then can view the result. If the user has any complaint user can send it to the admin and also view the reply from the admin.

[0049] FIG. 5 represents an apropos flow representation of working of the system. Dataset contains adulterated images and pure images of the petrol sample. From the dataset it is uploaded to the system. Then features like entropy, contrast, energy, correlation are extracted for training purposes.

[0050] After the feature extraction, RGB image is converted to grayscale image. A grayscale image is simply one in which the only colors are shades of gray. The reason for differentiating such images from any other sort of color image is that less information needs to be provided for each pixel. The grayscale image is again

converted into GLCM. A GLCM is a histogram of co-occurring grayscale values at a given offset over an image. The GLCM functions characterize the texture of an image by calculating how often pairs of pixel with specific values and in a specified spatial relationship occur in an image, creating a GLCM. Each extracted features
5 contains a GLCM .Then the mean values will be calculated from the matrix. Adulterated images and unadulterated images contains corresponding mean values.

[0051] Using Random forest classifier algorithm the system is trained. The Random Forest algorithm is a supervised classification algorithm. It is based upon the concept of decision trees. That is using the mean values of adulterated and unadulterated image
10 samples the system is trained to know that a specific range of mean value implies it is adulterated or unadulterated. It consists of mean values calculated from each dataset folders.

[0052] For testing the user has to input an image to the system. The image should be taken from the top view using any camera for better accuracy. The next step is feature
15 extraction. Using open cv-python the features like entropy, contrast, energy, correlation of the image are extracted. The captured image will be in RGB format.

[0053] The RGB image is converted to grayscale image. Then the grayscale image is converted to gray level co-occurrence matrix. It examines the spatial relationship among pixels and defines how frequently a combination of pixels are present in an
20 image. The mean values of each matrix of the extracted features of the input image is calculated. Then using random forest algorithm the mean values of the input image is compared with the mean values from the trained mean values of the

system. Then the output is displayed on the screen as adulterated or unadulterated depending on the comparison of mean values in the form of a message.

[0054] In the comma separated value file there are five features being extracted. The five features are energy, homogeneity, dissimilarity, contrast and correlation. The x axis represents energy. The y axis represents homogeneity and z axis represents the dissimilarity. Contrast is represented with the help of marker size. Correlation is represented with marker color. Marker shape represents label. The circle shape represents pure and square represents adulterants.

[0055] This invention is based on image processing. It consist of mainly two phases. One is for training and other one is for testing. The results obtained are adulterated, pure and false. Fuel adulteration is the process of contamination of fuel with adulterants like kerosene and other substances. The aim of our invention is to find out whether the given fuel sample is adulterated or not. Here, we use image processing techniques to extract the features and a mean value is calculated. The result is calculated with respect to the mean values obtained. Visualisation is used to represent pure and adulterated images. The circle shape represents pure and square represents adulterants. As already stated, the results can be adulterated, pure and false. The system is also trained with pictures other than fuels like trees, bottles etc. So when a user attaches a file which contains an images which is not a fuel, the system rejects that image and displays the output as false. The system is trained to recognise false images during the training phase. The mean values of adulterated,

pure and false is collected and the system is trained to give the result based on that values.

[0056] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions, or examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge available to the person.

10

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Patent Agent On Behalf of the Applicants

15

CLAIMS

We claim,

1. An optical fiber based system and method to detect adulteration in fuels,
comprising:
5 at least one sensor module;

 one or more processors; and

 at least one output module.
2. The system as claimed in claim 1 wherein, the said sensor is an optical fiber
based sensor configured to sense the adulteration in a liquid medium
10 preferably a fuel.
3. The system as claimed in claims 1 and 2 wherein, the said processor is a
computing device configured to be programmed to carry, run and execute
an algorithm preferably an image processing algorithm to receive and
process the data from the said sensors.
- 15 4. The system as claimed in claim 1 wherein, the said output module is a
display unit configured with the said processor and operatively coupled to
display the fuel characteristic to the user and the admin.

20

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ABSTRACT

AN OPTICAL FIBER BASED SYSTEM AND METHOD TO DETECT ADULTERATION IN FUELS

The present invention relates to the field of image processing applications and more
5 particularly it discloses a system based on optical fibers for effective detection of
adulteration in fuel and a method thereof. It consist of mainly two phases. One is
for training and other one is for testing. The results obtained are adulterated, pure
and false. Fuel adulteration is the process of contamination of fuel with adulterants
like kerosene and other substances. The aim of our invention is to find out whether
10 the given fuel sample is adulterated or not. Here, we use image processing
techniques to extract the features and a mean value is calculated. The result is
calculated with respect to the mean values obtained. Visualization is used to
represent pure and adulterated images.

15

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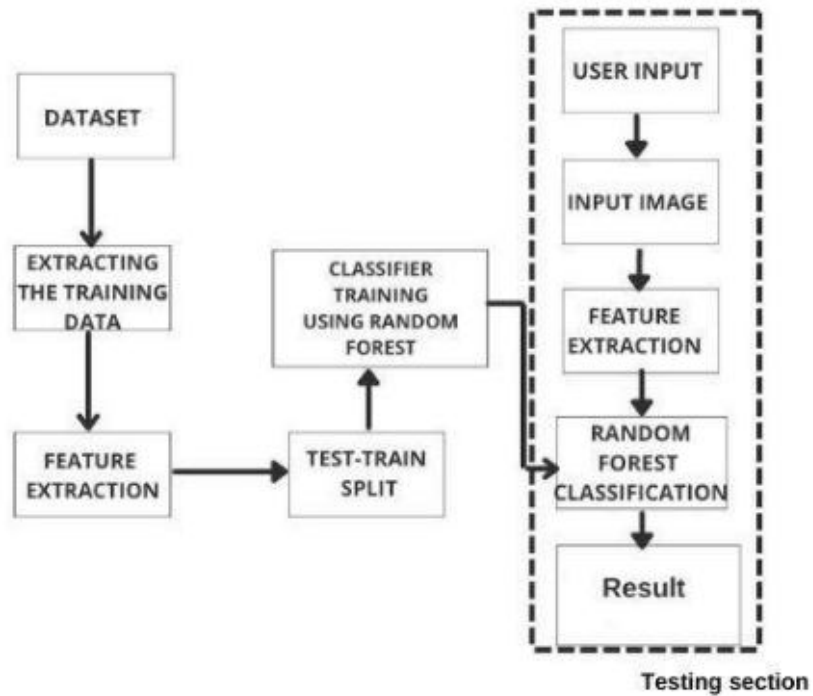


FIGURE 1

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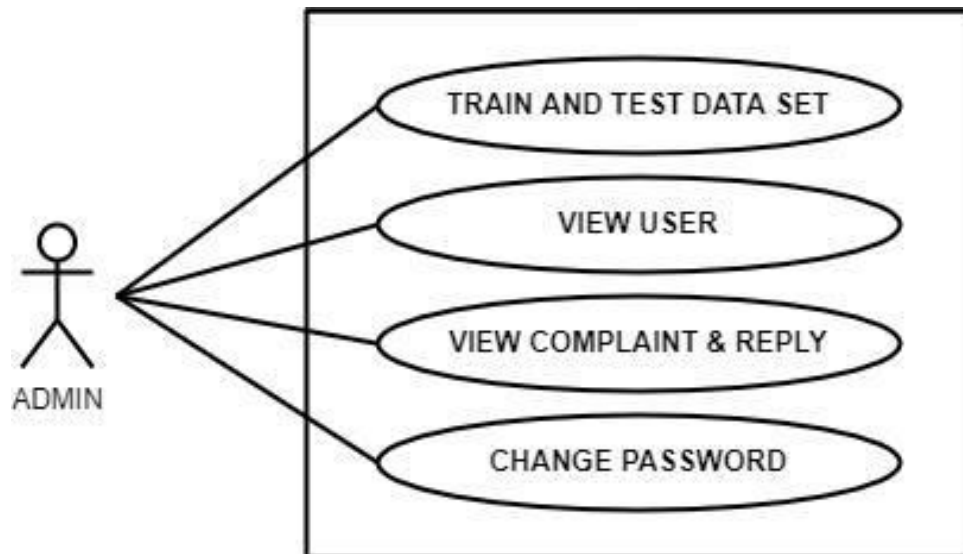


FIGURE 2

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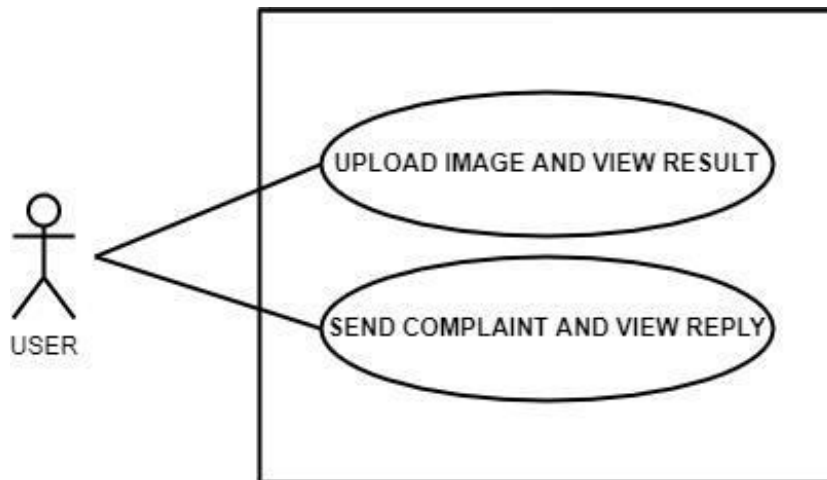


FIGURE 3

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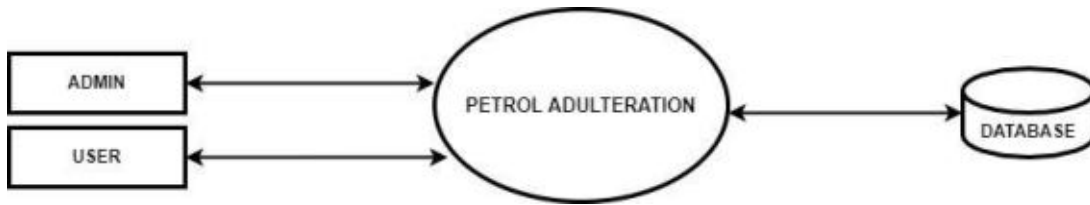


FIGURE 4A

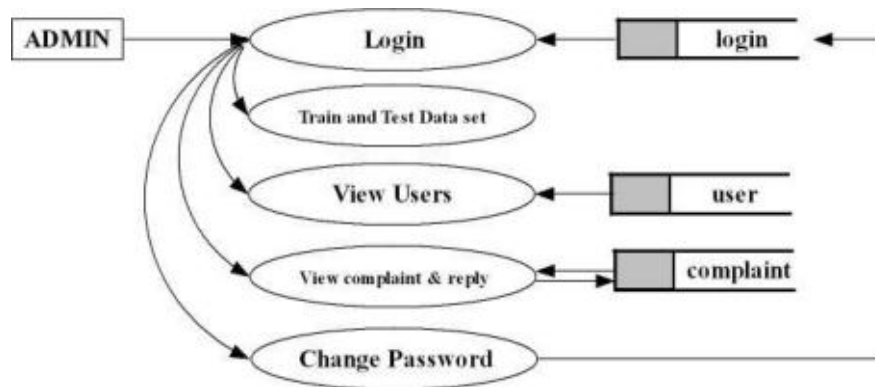


FIGURE 4B

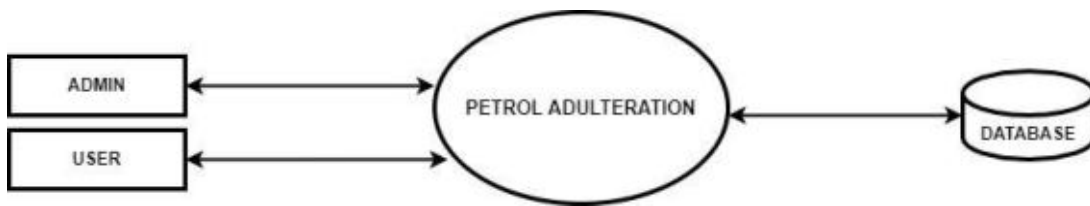


FIGURE 4C

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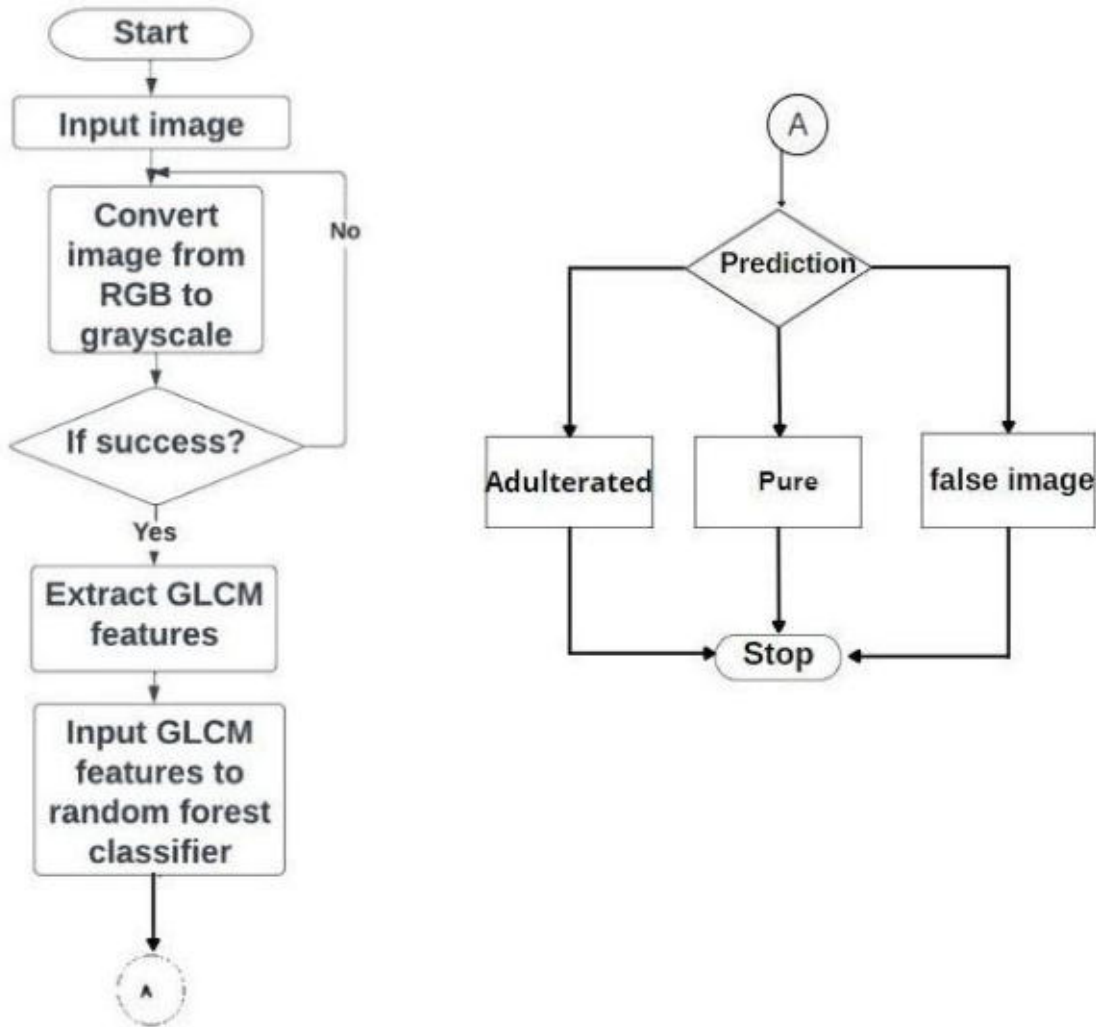


FIGURE 5

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Agent on Behalf of the Applicants

FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241053315 dated 18-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:

NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 18th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
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To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241053315** Dated **18th day of Sep , 2022** are

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b) Nationality:

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Dated This 18thday ofSep,2022

Signature,



NAME: PREM CHARLES I(INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

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FORM 9

THE PATENT ACT, 1970
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&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/59430/2022-CHE

Dated **11/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

Name of the signatory

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RECEIPT



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CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	E-106/5540/2022/CHE	202241053315	0	----	FORM28	
2	E-106/5541/2022/CHE	202241053313	0	----	FORM28	----
3	E-106/5543/2022/CHE	202241053314	0	----	FORM28	----
4	E-106/5544/2022/CHE	202241053316	0	----	FORM28	----
5	E-106/5542/2022/CHE	202241053317	0	----	FORM28	----
6	E-12/7069/2022/CHE	202241053315	2500	37515	FORM 9	----
7	E-12/7073/2022/CHE	202241053313	2500	37515	FORM 9	----
8	E-12/7070/2022/CHE	202241053314	2500	37515	FORM 9	----
9	E-12/7071/2022/CHE	202241053316	2500	37515	FORM 9	----
10	E-12/7072/2022/CHE	202241053317	2500	37515	FORM 9	----
11	202241053315	TEMP/E-1/59430/2022-CHE	1600	37515	FORM 1	An Optical Fiber Based System and Method to Detect Adulteration in Fuels
12	202241053313	TEMP/E-1/59431/2022-CHE	1600	37515	FORM 1	A System for Transforming Finger Gestures into Other Communication Health Monitoring of Differently
13	202241053314	TEMP/E-1/59432/2022-CHE	1600	37515	FORM 1	A Device and System for Automobiles to Distinguish and Identify Authorized and Unauthorized Parking
14	202241053316	TEMP/E-1/59433/2022-CHE	1600	37515	FORM 1	An Image Processing Based Smart System for Reading and Communication of the Visually Challenged
15	202241053317	TEMP/E-1/59434/2022-CHE	1600	37515	FORM 1	A System and Method of Efficient Driving Assistance and Navigation for Vehicles

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001024387	Online Bank Transfer	1809220005196	20500.00	1475001020000001

Total Amount : ₹ 20500.00

Amount in Words: Rupees Twenty Thousand Five Hundred Only

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Docket No 89681

Date/Time 18/09/2022

To
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User Id: prem1987

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MAHAL, OLDPET

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241053317	E-3/29318/2022/CHE	0	----	FORM 3	
2	202241053317	E-5/3768/2022/CHE	0	----	FORM 5	
3	202241053316	E-3/29319/2022/CHE	0	----	FORM 3	
4	202241053316	E-5/3769/2022/CHE	0	----	FORM 5	
5	202241053315	E-3/29320/2022/CHE	0	----	FORM 3	
6	202241053315	E-5/3770/2022/CHE	0	----	FORM 5	
7	202241053314	E-3/29321/2022/CHE	0	----	FORM 3	
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10	202241053313	E-3/29322/2022/CHE	0	----	FORM 3	

Total Amount : ₹ 0

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निर्गमन सं. 41/2022
ISSUE NO. 41/2022

शुक्रवार
FRIDAY

दिनांक: 14/10/2022
DATE: 14/10/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

**(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS**

14nd OCTOBER, 2022

(54) Title of the invention : An Image Processing Based Smart System for Reading and Communication of the Visually Challenged

(51) International classification :G06K0009000000, G09B0021000000, G06K0009200000, H04N0005225000, G06K0009180000

(86) International Application No Filing Date :PCT// :01/01/1900

(87) International Publication No : NA

(61) Patent of Addition to Application Number Filing Date :NA :NA

(62) Divisional to Application Number Filing Date :NA :NA

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(57) Abstract :
 The present invention relates to the field of biomedical engineering and particularly it discloses a smart system for the visually impaired people to communicate with others and read text with the help of image processing. This system consist of pi camera for capturing images which is used for text scanning or facial expression recognition based on user choice. The entire system is deployed on raspberry pi 4. For facial expression recognition CNN algorithm is used and text scanning is done by using OCR. The system can be easily used. It can be used in different environment to understand the facial expression of individuals. It can also give a better reading experience.

No. of Pages : 30 No. of Claims : 5



Application Filing Receipt

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G.S.T. Road, Guindy,
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CBR Number : 37515

CBR date: 18-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
VIMAL JYOTHI ENGINEERING COLLEGE
Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting be to an application for patent numbered 202241053316 dated 18-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to An Image Processing Based Smart System for Reading and Communication of the Visually Challenged together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority of date of filing, whichever earlier.
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4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

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Application Details

APPLICATION NUMBER	202241053316
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	18/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	An Image Processing Based Smart System for Reading and Communication of the Visually Challenged
FIELD OF INVENTION	COMPUTER SCIENCE
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ADDITIONAL-EMAIL (As Per Record)	allinnovrnd@gmail.com
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	14/10/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:
Filing Date:
Amount of Fee Paid:
CBR No.:
Signature:

1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	VIMAL JYOTHI ENGINEERING COLLEGE	India	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

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4	Sreelakshmi Suresh Kumar P. P.	India	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

3. TITLE OF THE INVENTION: An Image Processing Based Smart System for Reading and Communication of the Visually Challenged

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5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Title of the Invention
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6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application
--	---

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application
--	---

9. DECLARATIONS:

(i) Declaration by the inventor(s)

I/We ,Akhila Mathew,Nived P. P.,Anusree Rajagopal M.,Sreelakshmi Suresh Kumar P. P., is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Akhila Mathew,Nived P. P.,Anusree Rajagopal M.,Sreelakshmi Suresh Kumar P. P.

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the singnatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- **The Complete specification relating to the invention is filed with this application.**
- **I am/We are, in the possession of the above mentioned invention.**
- **There is no lawful ground of objection to the grant of the Patent to me/us.**
- **I am/We are, the assignee or legal representative to true first inventors.**

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Vision Assit for Blind (15).pdf
2	DRAWINGS	Drawings - Vision Assist for Blind (15).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hering are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

To The Controller of Patents

The Patent office at CHENNAI

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

An Image Processing Based Smart System for Reading and Communication of the Visually
Challenged

2. APPLICANT(S)

NAME(S)	NATIONALITY	ADDRESS
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VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

**AN IMAGE PROCESSING BASED SMART SYSTEM FOR READING
AND COMMUNICATION OF THE VISUALLY CHALLENGED**

FIELD OF INVENTION

[001] The present invention relates to the field of biomedical engineering and particularly
5 it discloses a smart system for the visually impaired people to communicate with
others and read text with the help of image processing.

BACKGROUND OF INVENTION

[002] Background description includes information that may be useful in understanding
the present invention. It is not an admission that any of the information provided
10 herein is prior art or relevant to the presently claimed invention, or that any
publication specifically or implicitly referenced is prior art.

[003] The number of blind persons in India in 2000 was estimated to be 18.7 million of
which 9.5 million were cataract-related and 3 million refractive error- related. Most
of the visually impaired people are aged 50 years and above. The burden of visual
15 impairment in India is estimated at 62 million; of these, 54 million persons have
low vision, and 8 million are blind. India is now home to the world's largest number
of blind people. Of the 37 million people across the globe who are blind, over 15
million are from India. Out of many problems faced by blind two issues are facial
expression recognition and reading text.

[004] There is no way for a blind person to understand what the expression of the other person is, other than to understand it from their tone of speech. Also to read books they need to use Braille or take help from another person. Braille is a system of writing and printing by means of raised dots corresponding to letters, numbers, and punctuation to enable the blind to read by touch. Another means by which blind can read is by using audio book which is a recording of a book or other work being read out loud.

[005] Our system is to give a technical solution to these two issues by developing a facial expression detector and text scanner which is handy, small and portable. The entire system is deployed on Raspberry pi4. The system has two parts - AI part for facial expression recognition and OCR part for text scanning.

[006] It is difficult for blind to understand the facial expression of the person standing in front and also to read without the help from a third person or using braille. For old aged people it is difficult to learn the braille system. This system helps them to detect the expression and also aids them in reading text.

[007] A prior art disclosed a system that helps blind and visually impaired people with indoor independent travel. The system focuses on obstacle detection and real time path planning. An indoor map editor is used to parse geometric information from architectural models and generate a semantic map consisting of a global 2D traversable grid map layer and context-aware layers. A map alignment algorithm is used to bridge the visual ADF and semantic map to achieve semantic localization. Using the on-board RGB-D camera, an efficient obstacle detection and avoidance

approach is developed based on a TSM-KF algorithm. A multi-modal HMI is designed with speech-audio interaction and robust haptic interaction through an electronic SmartCane. Finally, the experiments demonstrate that the system provides an effective tool to help blind individuals with indoor navigation and wayfinding.

[008] Another prior art disclosed a smart stick assistive navigation system to help blind and visually impaired people with outdoor and indoor travel. Blindness is one of the more important issue in this evolving world. Blind people relay on some people for their work to be done. Virtual eye in the form of smart stick to the blind people so that they can lead their own life without the help of the other people. The Smart stick consists of a camera and raspberry pie attached to it which helps in the detection of the object which is present as an obstacle to the blind people, can be easily identified and informed to the blind people by the earphones which is directly attached to the blind people. In addition to the speech warning and another sensor is also placed at the bottom of the stick for the sake of avoiding the puddles. This can be achieved by using Yolo and Dark flow algorithm. The goal here is to develop a system that will provide guidance for visually impaired individuals to reach desired destinations and to live an independent life.

[009] Yet another prior art disclosed a system that helps blind people walk to the destination efficiently and safely in indoor environment. A dynamic sub-goal selecting strategy is used to guide the users to the destination and help them bypass obstacles at the same time. The entire system is deployed on a pair of wearable

optical see-through glasses for the ease of use of blind people's daily walks. The visually impaired people usually have difficulties in walking in an unfamiliar and complex place independently. To provide them an automatic navigation device with effective guidance on their move, three problems should be considered- Where is the person, Where does the person want to go?, How does the person get there?.

5 The aim is to find the shortest path to the destination without collision.

[0010] Yet another prior art disclosed that visually impaired people are often unaware of dangers in front of them, even in familiar environments. Furthermore, in unfamiliar environments, such people require guidance to reduce the risk of colliding with obstacles. This study proposes a simple smartphone-based guiding system for solving the navigation problems for visually impaired people and achieving obstacle avoidance to enable visually impaired people to travel smoothly from a beginning point to a destination with greater awareness of their surroundings. In this study, a computer image recognition system and smartphone application were integrated to form a simple assisted guiding system. Two operating modes, online mode and offline mode, can be chosen depending on network availability. When the system begins to operate, the smartphone captures the scene in front of the user and sends the captured images to the backend server to be processed. The backend server uses the faster region convolutional neural network algorithm or the you only look once algorithm to recognize multiple obstacles in every image, and it subsequently sends the results back to the smartphone.

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[0011] Yet another prior art disclosed a system to identify ways and means to make the lives of blind people much easier. This system will help blind people identify obstacles and make their next movement according to presence or absence of obstacle. This paper mainly focus on a SOS based Navigation system which is developed with a Raspberry pi which is the brain of this system. A pi Cam which is used for video streaming, A SOS button which is to switch to get help through video streaming technique.

[0012] With the help of ultrasonic sensors are used for sensing the obstacle in and around them and the sensor passes the data to micro-controller and the micro-controller then process the data and calculates if obstacle how close enough. Additionally an SOS Navigation system is embedded to it which the blind can get help from others through a video streaming. This video is streamed through an Android application.

[0013] Yet another prior art disclosed a navigation system that combines positioning and obstacle detection has been actively researched and developed. The radio frequency identifier (RFID) can be positioned with an error of about 10 mm. The user charges for installing RFID tags on the floor. However, RFID is the most accurate of current positioning methods. Obstacles are mainly detected by applying simultaneous localization and mapping (SLAM) to the camera images. These obstacle detection methods can be detected with high accuracy in low-traffic passages. However, when these obstacle detection methods are used in high-traffic passages, since many pedestrians cause an occlusion problem that obstructs the shape and color of obstacles, these obstacle detection methods significantly decrease in accuracy.

[0014] To solve this a Follow me Application is recommended for a safe route by machine learning the gait and walking route of many pedestrians obtained from the monocular camera image of a smartphone.

[0015] However, there is a pressing need for a better and efficient system to further
5 improvise the overall requirement and hence we come up with the present invention.

[0016] Further limitations and disadvantages of conventional and traditional approaches will become apparent to one of skill in the art through comparison of described systems with some aspects of the present disclosure, as set forth in the remainder
10 of the present application and with reference to the drawings.

[0017] In some embodiments, the numbers expressing quantities or dimensions of items, and so forth, used to describe and claim certain embodiments of the invention are to be understood as being modified in some instances by the term “about.” Accordingly, in some embodiments, the numerical parameters set forth in the
15 written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad
20 scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiments of the invention may contain

certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0018] As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly dictates
5 otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

[0019] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the
10 specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g. “such as”) provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a
15 limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0020] Groupings of alternative elements or embodiments of the invention disclosed herein are not to be construed as limitations. Each group member can be referred to and
20 claimed individually or in any or a combination with other members of the group or other elements found herein. One or more members of a group can be included in, or deleted from, a group for reasons of convenience and/or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain

the group as modified thus fulfilling the written description of all groups used in the appended claims.

OBJECTS OF THE INVENTION:

[0021] The objects of the invention are to develop a low cost and user friendly emotion
5 detector cum text reader system for the blind which helps the user to recognize the
and facial expression of person standing in front and also to help them read books
or text without the help from any other people. People in different environment can
use this to identify the facial expression of people coming in front. It is really
helpful for old age people to read books and newspapers without the help from other
10 people. This can be used in blind schools and college. Not only for the blind, it also
helps the illiterate people.

[0022] These features and advantages of the present disclosure may be appreciated by
reviewing the following description of the present disclosure, along with the
accompanying figures wherein like reference numerals refer to like parts.

[0023] 5 Various objects, features, aspects and advantages of the inventive subject matter
will become more apparent from the following detailed description of the preferred
embodiments, along with the accompanying drawing figures in which the numerals
represent the like components.

[0024] Within the scope of this application it is expressly envisaged that the various
20 aspects, embodiments, examples, alternatives set out in the preceding paragraphs,
in the claims and/or the following description and drawings, and in particular the
individual features thereof, may be taken independently or in any or a combination.

Features described in connection with one embodiment are applicable to all embodiments, unless such features are incompatible.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The accompanying drawings are included to provide a further understanding of the present disclosure and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0026] A complete understanding of the system and method of the present invention may be obtained by reference to the following drawings:

FIG. 1 illustrates a representation of the block diagram for the present system.

FIG. 2 illustrates a representation of the use case diagram for the present system.

FIG. 3 illustrates an exemplary block diagram of the optical character reading process in the present system.

15 FIGs. 4A and 4B discloses the block diagram and the flow process of the face recognition module in the system.

DETAILED DESCRIPTION

[0027] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to clearly communicate the disclosure. However, the amount of detail offered is not intended

to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0028] In the following description, numerous specific details are set forth in order to
5 provide a thorough understanding of embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0029] Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be
10 embodied in machine-executable instructions, which may be used to cause a general-purpose or special purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0030] Various methods described herein may be practiced by combining one or more
15 machine-readable storage media containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a single computer) and storage systems containing or having network access to
20 computer program(s) coded in accordance with various methods described herein, and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

[0031] The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It
5 should be understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0032] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of
10 ordinary skill in the art that the embodiments may be practiced without these specific details. For example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without
15 unnecessary detail in order to avoid obscuring the embodiments.

[0033] Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the
20 scope of the invention to those of ordinary skill in the art. The invention disclosed may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein.

[0034] Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific
5 examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary
10 embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives, modifications and equivalents consistent with the principles and features disclosed. For purpose of clarity, details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not
15 to unnecessarily obscure the present invention.

[0035] Thus, for example, it will be appreciated by those of ordinary skill in the art that the diagrams, schematics, illustrations, and the like represent conceptual views or processes illustrating systems and methods embodying this invention. The functions of the various elements shown in the figures may be provided through the
20 use of dedicated hardware as well as hardware capable of executing associated software. Similarly, any switches shown in the figures are conceptual only. Their function may be carried out through the operation of program logic, through dedicated logic, through the interaction of program control and dedicated logic, or

even manually, the particular technique being selectable by the entity implementing this invention. Those of ordinary skill in the art further understand that the exemplary hardware, software, processes, methods, and/or operating systems described herein are for illustrative purposes and, thus, are not intended to be
5 limited to any particular named element.

[0036] Embodiments of the present invention may be provided as a computer program product, which may include a machine-readable storage medium tangible embodying thereon instructions, which may be used to program a computer (or other electronic devices) to perform a process. The term “machine-readable storage
10 medium” or “computer-readable storage medium” includes, but is not limited to, fixed (hard) drives, magnetic tape, floppy diskettes, optical disks, compact disc read-only memories (CD-ROMs), and magneto-optical disks, semiconductor memories, such as ROMs, PROMs, random access memories (RAMs), programmable read-only memories (PROMs), erasable PROMs (EPROMs),
15 electrically erasable PROMs (EEPROMs), flash memory, magnetic or optical cards, or other type of media/machine-readable medium suitable for storing electronic instructions (e.g., computer programming code, such as software or firmware). A machine-readable medium may include a non-transitory medium in which data may be stored and that does not include carrier waves and/or transitory
20 electronic signals propagating wirelessly or over wired connections.

[0037] Examples of a non-transitory medium may include, but are not limited to, a magnetic disk or tape, optical storage media such as compact disk (CD) or digital

versatile disk (DVD), flash memory, memory or memory devices. A computer-program product may include code and/or machine-executable instructions that may represent a procedure, a function, a subprogram, a program, a routine, a subroutine, a module, a software package, a class, or any combination of
5 instructions, data structures, or program statements. A code segment may be coupled to another code segment or a hardware circuit by passing and/or receiving information, data, arguments, parameters, or memory contents. Information, arguments, parameters, data, etc. may be passed, forwarded, or transmitted via any suitable means including memory sharing, message passing, token passing, network
10 transmission, etc.

[0038] Furthermore, embodiments may be implemented by hardware, software, firmware, middleware, microcode, hardware description languages, or any combination thereof. When implemented in software, firmware, middleware or microcode, the program code or code segments to perform the necessary tasks (e.g., a computer-
15 program product) may be stored in a machine-readable medium. A processor(s) may perform the necessary tasks.

[0039] Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the pertinent art have given that term as reflected in printed publications and issued
20 patents at the time of filing.

[0040] The present invention will now be described more fully hereinafter. This invention may, however, be embodied in many different forms and should not be construed

as being limited to the embodiment set forth herein. Rather, the embodiment is provided so that this disclosure will be thorough, and will fully convey the scope of the invention to those skilled in the art.

[0041] The present disclosure is best understood with reference to the detailed figures and
5 description set forth herein. Various embodiments have been discussed with reference to the figures. However, those skilled in the art will readily appreciate that the detailed descriptions provided herein with respect to the figures are merely for explanatory purposes, as the methods and systems may extend beyond the described embodiments. For instance, the teachings presented and the needs of a
10 particular application may yield multiple alternative and suitable approaches to implement the functionality of any detail described herein. Therefore, any approach may extend beyond certain implementation choices in the following embodiments.

[0042] References to “one embodiment,” “at least one embodiment,” “an embodiment,”
15 “one example,” “an example,” “for example,” and so on indicate that the embodiment(s) or example(s) may include a particular feature, structure, characteristic, property, element, or limitation but that not every embodiment or example necessarily includes that particular feature, structure, characteristic, property, element, or limitation. Further, repeated use of the phrase “in an embodiment” does not necessarily refer to the same embodiment.

[0043] Methods of the present invention may be implemented by performing or completing
20 manually, automatically, or a combination thereof, selected steps or tasks. The term “method” refers to manners, means, techniques and procedures for accomplishing

a given task including, but not limited to, those manners, means, techniques, and procedures either known to, or readily developed from known manners, means, techniques and procedures by practitioners of the art to which the invention belongs. The descriptions, examples, methods, and materials presented in the claims and the specification are not to be construed as limiting but rather as illustrative only. Those skilled in the art will envision many other possible variations within the scope of the technology described herein.

[0044] FIG. 1 illustrates a representation of the block diagram for the present system. The system consist of 2 parts. They are facial expression and gender recognition and text scanning. The entire system is deployed on Raspberry pi. There are two switches for the user to decide which functionality to choose. The input is the visual captured by the pi camera- it can be the visual of people standing in front or any text document to be read by the user.

[0045] If the functionality chosen is facial expression and gender detection, then the classification module comes into action. The visual input is captured and classified for various emotions and gender. The output is the name of the emotion and the gender of the person.

[0046] If the functionality chosen is text scanning then the OCR engine comes into place. From the captured image the text will be extracted and read out to the user. The output will be fed to the user as audio cues via headphones.

[0047] FIG. 2 illustrates a representation of the use case diagram for the present system. Detection of emotions and gender requires classifying the image captured against

the training data that is fed. Facial expression recognition is the task of classifying the expressions on face images into various categories such as anger, fear, surprise, sadness, happiness and so on. Facial expression recognition or computer-based facial expression recognition system is important because of its ability to mimic human coding skills. Facial expressions and other gestures convey nonverbal communication cues that play an important role in interpersonal relations.

[0048] Gender detection is same as facial expression detection where the captured image is classified as male or female based on the dataset. This is done by using the Convolution Neural Network(CNN) algorithm. In deep learning, a convolutional neural network is a class of deep neural network, most commonly applied to analyze visual imagery. A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other.

[0049]15 FIG. 3 illustrates an exemplary block diagram of the optical character reading process in the present system. The first step is the one in which the document is placed under the camera and the camera captures an image of the placed document. The quality of the image captured will be high so as to have fast and clear recognition due to the high resolution camera.

[0050]20 The pre-processing stage consists of three steps: Skew Correction, Linearization, and Noise Removal. The captured image is checked for skewing. There are possibilities of the image getting skewed with either left or right orientation. Here

the image is first brightened and binarized. The function for skew detection checks for an angle of orientation between -15 degrees and if detected then a simple image rotation is carried out till the lines match with the true horizontal axis, which produces a skew corrected image. The noise introduced during capturing or due to
5 the poor quality of the page has to be cleared before further processing.

[0051] The ASCII values of the recognized characters are processed by Raspberry Pi board. Here each of the characters is matched with its corresponding template and saved as normalized text transcription. This transcription is further delivered to the audio output.

[0052]10 The text to Speech module is initiated with the conclusion of the receding module of Character Recognition. The module performs the task of conversion of the transformed text to audible form. The Raspberry Pi has an on-board audio jack, the on-board audio is generated by a PWM output and is minimally filtered. A USB audio card can greatly improve the sound quality and volume. As the recognition
15 process is completed, the character codes in the text file are processed using Raspberry Pi device on which recognize a character using Tesseract algorithm and python programming, the audio output listens.

[0053] FIGs. 4A and 4B discloses the block diagram and the flow process of the face recognition module in the system. Facial expression is one of the most important
20 features of human emotion recognition. Images are high-dimensional objects. Facial features over high-dimensional space can be counter-intuitive. CNN extracts larger features in a hierarchical set of layers.

[0054] Facial expression recognition is done by using CNN(Convolution Neural Network) algorithm. The image is captured by the pi camera and is sent to the classification module, where CNN is applied to the image. In basic image processing, a filter is applied to the input image and then it is compared with the original image to identify the highlighting edges. These edges corresponds to various emotions and is classified based on the datasets given.

[0055] It is necessary to learn the system to detect various emotions. The accuracy increases with the number of datasets given. The datasets are already classified for various features. The input image is compared with the dataset to detect the emotions. The image is captured using camera which is preprocessed further to feed the neural networks. The captured image is modelled using network architecture to build and train the dataset for identification and emotion classification. The captured image is bounded in a box and converted in to binary pattern to specify it as feature vector and stored in database. The images are trained to match the input image and also classify the expression of facial features as sad, angry, happy, disgust and neutral.

[0056] In the training process loading dataset, preprocessing, augmenting the data as feature vector, building and compiling the design model, training and storing the feature vector and validating the test model take place. First step a pi camera is used to capture the human face and detect the exact location of face by a bounding box coordinates for the face detected in real-time. This step involves face detection using with open CV library.

[0057] The images detected have shapes, objects and landscapes etc. In this phase human face is detected and face features are extracted and stored in the database for face recognition. The CNN model match the face from the database and recognize with the name for the face detected. Faces are recognized from the database and are compared to identify or detect the face through embedding vectors. The distribution platform use python software in processing face detection, recognition and classification. The image features in the tesseract, opencv libraries. First face is detected and then recognized with the database features and matching using CNN model training and testing database. Finally the recognized human face is classified based on the expression in real time as Angry, fear, disgust, happy, neutral and surprise.

[0058] The algorithm used here is CNN algorithm. In deep learning, a convolutional neural network (CNN, or ConvNet) is a class of deep neural networks, most commonly applied to analyzing visual imagery. They are also known as shift invariant or space invariant artificial neural networks (SIANN), based on their shared-weights architecture and translation invariance characteristics. They have applications in image and video recognition, recommender systems, image classification, medical image analysis, natural language processing, brain-computer interfaces, and financial time series. The Convolutional Neural Network is trained using Stochastic Gradient De-scent with Momentum. The network consists of an input layer, followed by three convolutional and average pooling layers and followed by a soft max fully connected output layer to extract features.

[0059] The design and development of system for facial expression recognition text scanning is presented. This system consist of pi camera for capturing images which is used for text scanning or facial expression recognition based on user choice. The entire system is deployed on raspberry pi 4. For facial expression recognition CNN
5 algorithm is used and text scanning is done by using OCR.

[0060] The system can be easily used. It can be used in different environment to understand the facial expression of individuals. It can also give a better reading experience. The scope of the system also extends to its use in blind schools and colleges. Not only for blind, it can also be used as a reading aid for illiterate people who finds it di cult
10 to read.

[0061] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions, or
15 examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge available to the person.

20

#####DIGITALLY SIGNED#####
PREM CHARLES I
Registered Patent Agent INPA-3311
Patent Agent On Behalf of the Applicants

CLAIMS

We claim,

1. An image processing based smart system for reading and communication for the visually challenged, comprising:
 - 5 at least an image capturing module;
 - one or more processors;
 - a plurality of output modules.
2. The system as claimed in claim 1 wherein, the said image capturing module is preferably a pi camera configured to detect facial expressions and optical
10 characters from a person and any reading materials respectively.
3. The system as claimed in claims 1 and 2 wherein, the said processor is preferably a Raspberry Pi configured in it is an artificial intelligence algorithm capable of receiving the data from the image capturing module on the type of expressions and classify them accordingly based on the
15 images captured.
4. The system as claimed in claims 2 and 3 wherein, the said algorithm is further configured to read the optically identified characters as words through a loud speaker configured to read the text and convert it as a speech through the text-to-speech module.

5. The system as claimed in claim 1 wherein, the said optical character reader module is configured to work with the pi camera thereby providing a real-time visual expression to the visually challenged person.

5

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Registered Patent Agent INPA-3311
Patent Agent On Behalf of the Applicants

10

15

20

ABSTRACT

AN IMAGE PROCESSING BASED SMART SYSTEM FOR READING AND COMMUNICATION FOR THE VISUALLY CHALLENGED

The present invention relates to the field of biomedical engineering and particularly
5 it discloses a smart system for the visually impaired people to communicate with
others and read text with the help of image processing. This system consist of pi
camera for capturing images which is used for text scanning or facial expression
recognition based on user choice. The entire system is deployed on raspberry pi 4.
For facial expression recognition CNN algorithm is used and text scanning is done
10 by using OCR. The system can be easily used. It can be used in different
environment to understand the facial expression of individuals. It can also give a
better reading experience.

15

#####DIGITALLY SIGNED#####
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Registered Patent Agent INPA-3311
Patent Agent On Behalf of the Applicants

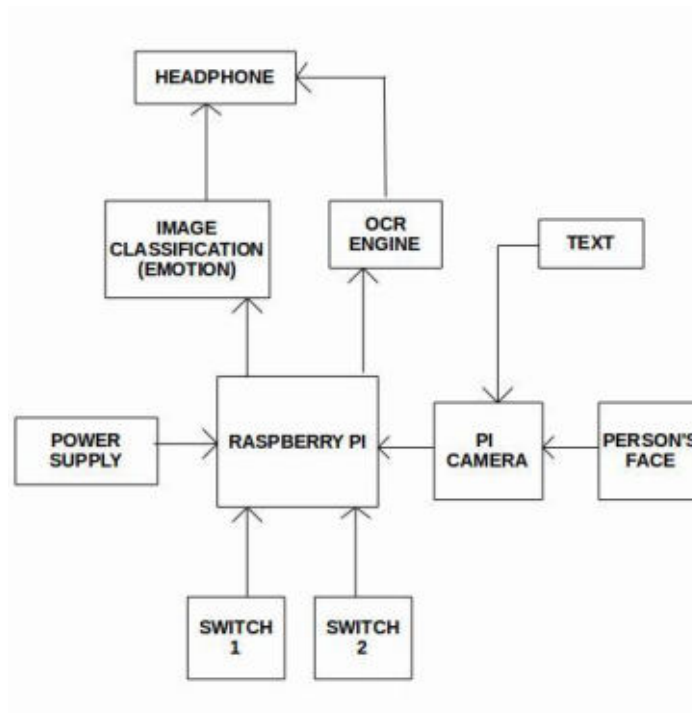


FIGURE 1

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Agent on Behalf of the Applicants

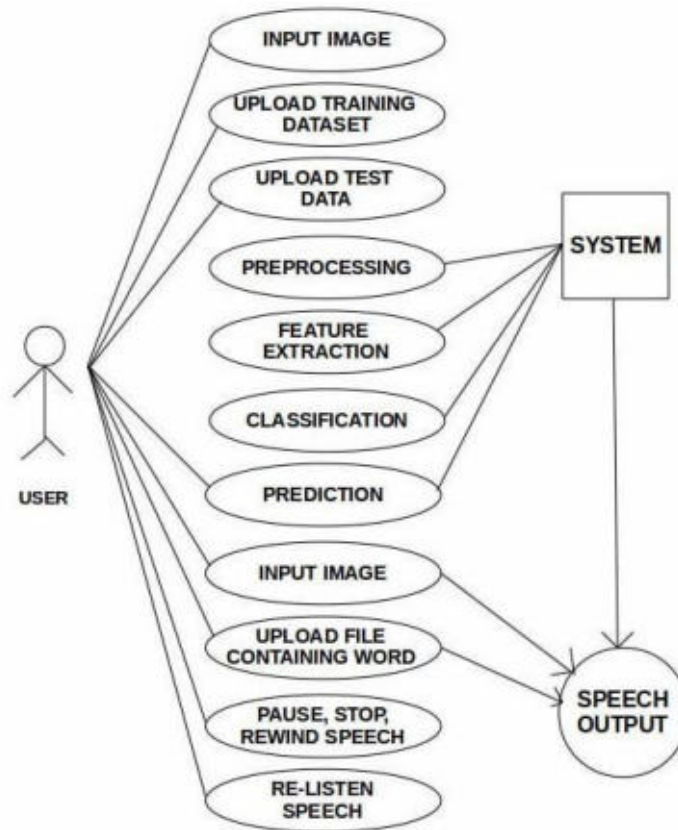


FIGURE 2

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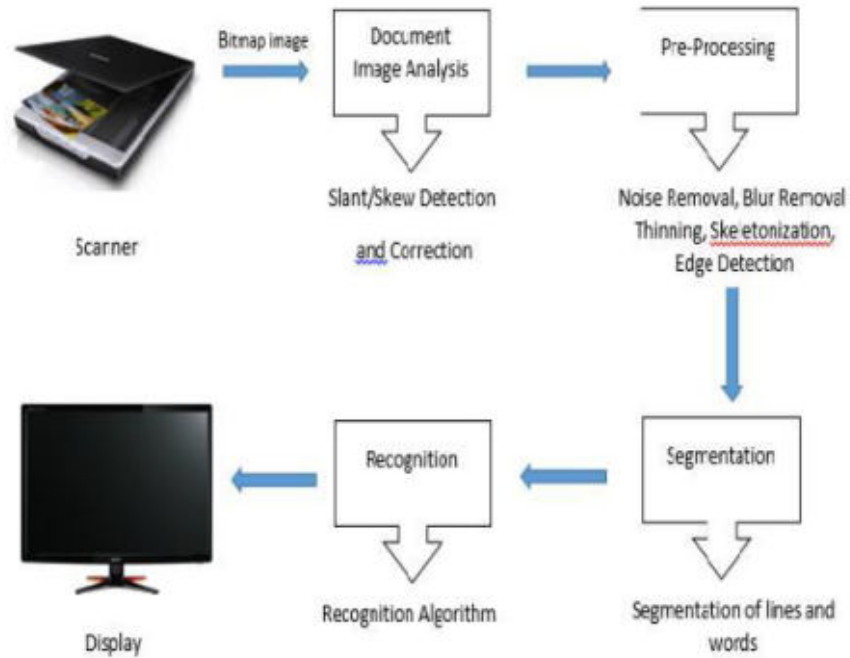


FIGURE 3

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Agent on Behalf of the Applicants

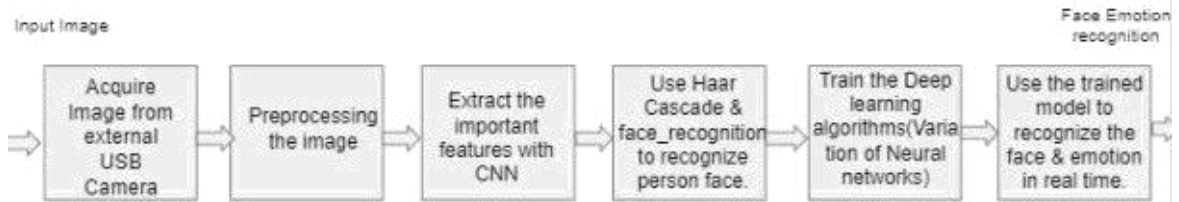


FIGURE 4A

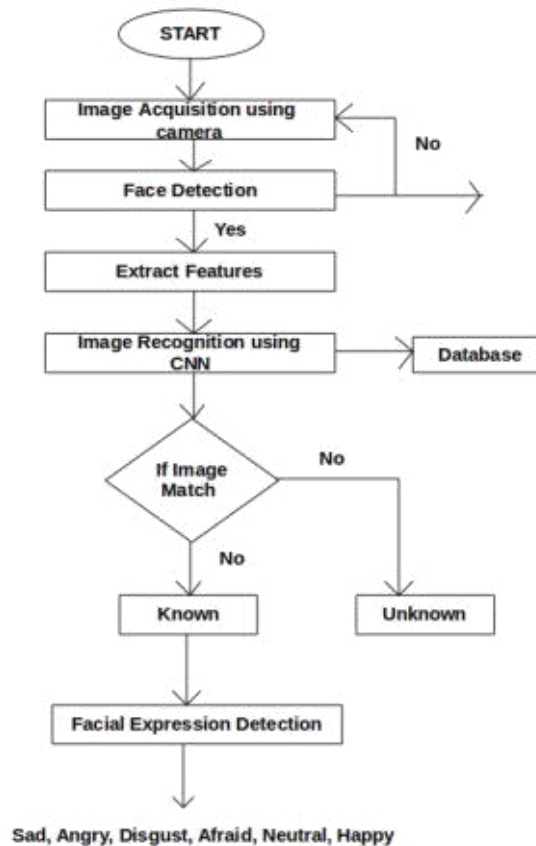


FIGURE 4B

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Agent on Behalf of the Applicants

FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241053316 dated 18-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:

NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 18th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241053316** Dated **18th day of Sep , 2022** are

INVENTOR (S):

1 a) Name:	Akhila Mathew
b) Nationality:	Indian
c) Address:	Assistant Professor, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
2 a) Name:	Nived P. P.
b) Nationality:	Indian
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3 a) Name:	Anusree Rajagopal M.
b) Nationality:	Indian
c) Address:	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
4 a) Name:	Sreelakshmi Suresh Kumar P. P.
b) Nationality:	Indian
c) Address:	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

Dated This 18th day of Sep, 2022

Signature,



NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

To,

The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu- 600032

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/59433/2022-CHE

Dated **11/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

Name of the signatory

To,
The Controller of Patents,
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At Chennai

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E-mail: chennai-patent@nic.in
Web Site: www.ipindia.gov.in



सत्यमेव जयते
G.A.R.6
[See Rule 22(1)]
RECEIPT



Docket No 89679

Date/Time 2022/09/18 19:54:07

To
PREM CHARLES

UserId: prem1987

360E, SENTHUR MURUGAN KOVIL
STREET, OPPOSITE SM MAHAL,
OLDPET

CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	E-106/5540/2022/CHE	202241053315	0	----	FORM28	
2	E-106/5541/2022/CHE	202241053313	0	----	FORM28	----
3	E-106/5543/2022/CHE	202241053314	0	----	FORM28	----
4	E-106/5544/2022/CHE	202241053316	0	----	FORM28	----
5	E-106/5542/2022/CHE	202241053317	0	----	FORM28	----
6	E-12/7069/2022/CHE	202241053315	2500	37515	FORM 9	----
7	E-12/7073/2022/CHE	202241053313	2500	37515	FORM 9	----
8	E-12/7070/2022/CHE	202241053314	2500	37515	FORM 9	----
9	E-12/7071/2022/CHE	202241053316	2500	37515	FORM 9	----
10	E-12/7072/2022/CHE	202241053317	2500	37515	FORM 9	----
11	202241053315	TEMP/E-1/59430/2022-CHE	1600	37515	FORM 1	An Optical Fiber Based System and Method to Detect Adulteration in Fuels
12	202241053313	TEMP/E-1/59431/2022-CHE	1600	37515	FORM 1	A System for Transforming Finger Gestures into Other Communication Health Monitoring of Differently
13	202241053314	TEMP/E-1/59432/2022-CHE	1600	37515	FORM 1	A Device and System for Automobiles to Distinguish and Identify Authorized and Unauthorized Parking
14	202241053316	TEMP/E-1/59433/2022-CHE	1600	37515	FORM 1	An Image Processing Based Smart System for Reading and Communication of the Visually Challenged
15	202241053317	TEMP/E-1/59434/2022-CHE	1600	37515	FORM 1	A System and Method of Efficient Driving Assistance and Navigation for Vehicles

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001024387	Online Bank Transfer	1809220005196	20500.00	1475001020000001

Total Amount : ₹ 20500.00

Amount in Words: Rupees Twenty Thousand Five Hundred Only

Received from PREM CHARLES the sum of ₹ 20500.00 on account of Payment of fee for above mentioned Application/Forms.

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सत्यमेव जयते



Docket No 89681

Date/Time 18/09/2022

To
PREM CHARLES

User Id: prem1987

360E, SENTHUR MURUGAN
KOVIL STREET, OPPOSITE SM
MAHAL, OLDPET

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241053317	E-3/29318/2022/CHE	0	----	FORM 3	
2	202241053317	E-5/3768/2022/CHE	0	----	FORM 5	
3	202241053316	E-3/29319/2022/CHE	0	----	FORM 3	
4	202241053316	E-5/3769/2022/CHE	0	----	FORM 5	
5	202241053315	E-3/29320/2022/CHE	0	----	FORM 3	
6	202241053315	E-5/3770/2022/CHE	0	----	FORM 5	
7	202241053314	E-3/29321/2022/CHE	0	----	FORM 3	
8	202241053314	E-5/3771/2022/CHE	0	----	FORM 5	
9	202241053313	E-5/3772/2022/CHE	0	----	FORM 5	
10	202241053313	E-3/29322/2022/CHE	0	----	FORM 3	

Total Amount : ₹ 0

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शासकीय जर्नल

**OFFICIAL JOURNAL
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निर्गमन सं. 41/2022
ISSUE NO. 41/2022

शुक्रवार
FRIDAY

दिनांक: 14/10/2022
DATE: 14/10/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

**(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS**

14nd OCTOBER, 2022

(54) Title of the invention : An Image Processing Based Smart System for Reading and Communication of the Visually Challenged

(51) International classification :G06K0009000000, G09B0021000000, G06K0009200000, H04N0005225000, G06K0009180000

(86) International Application No Filing Date :PCT// :01/01/1900

(87) International Publication No : NA

(61) Patent of Addition to Application Number Filing Date :NA :NA

(62) Divisional to Application Number Filing Date :NA :NA

(71)**Name of Applicant :**
1)VIMAL JYOTHI ENGINEERING COLLEGE
 Address of Applicant :Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. Chemperi -----

Name of Applicant : NA
Address of Applicant : NA

(72)**Name of Inventor :**
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2)Nived P. P.
 Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

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3)Anusree Rajagopal M.
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4)Sreelakshmi Suresh Kumar P. P.
 Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

--

(57) Abstract :
 The present invention relates to the field of biomedical engineering and particularly it discloses a smart system for the visually impaired people to communicate with others and read text with the help of image processing. This system consist of pi camera for capturing images which is used for text scanning or facial expression recognition based on user choice. The entire system is deployed on raspberry pi 4. For facial expression recognition CNN algorithm is used and text scanning is done by using OCR. The system can be easily used. It can be used in different environment to understand the facial expression of individuals. It can also give a better reading experience.

No. of Pages : 30 No. of Claims : 5



Application Filing Receipt

**Government of India
Patent Office**
Intellectual Property Office Building,
G.S.T. Road, Guindy,
Chennai -600032
Phone- 044-22502081-84
Fax: 044-22502066
e-mail: chennai-patent@nic.in

CBR Number : 37515

CBR date: 18-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
VIMAL JYOTHI ENGINEERING COLLEGE
Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting be to an application for patent numbered 202241053317 dated 18-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to A System and Method of Efficient Driving Assistance and Navigation for Vehicles together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority of date of filing, whichever is earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority of date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

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Office of the Controller General of Patents, Designs & Trade Marks
Department of Industrial Policy & Promotion,
Ministry of Commerce & Industry,
Government of India

<http://ipindia.nic.in/index.htm>



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Application Details

APPLICATION NUMBER	202241053317
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	18/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	A System and Method of Efficient Driving Assistance and Navigation for Vehicles
FIELD OF INVENTION	COMMUNICATION
E-MAIL (As Per Record)	patents@allinnov.org
ADDITIONAL-EMAIL (As Per Record)	allinnovrnd@gmail.com
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	14/10/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:
Filing Date:
Amount of Fee Paid:
CBR No.:
Signature:

1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	VIMAL JYOTHI ENGINEERING COLLEGE	India	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

2. INVENTOR(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	Dr. Glan Devadhas G.	India	Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
2	Robin Jose	India	Student, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
3	Jis Mathew	India	Student, Department of Electronics and Instrumentation Engineering, Vimal Jyothi	India	Kerala	Kannur	Chemperi

			Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.				
4	Shinu M. M.	India	Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
5	Shamya A.	India	Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
6	Jinsa Mathew	India	Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

3. TITLE OF THE INVENTION: A System and Method of Efficient Driving Assistance and Navigation for Vehicles

4. ADDRESS FOR CORRESPONDENCE OF APPLICANT / AUTHORISED PATENT AGENT IN INDIA:
Allinnov Innovation and Intellectual Property Services, #360E,
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635001, Tamil Nadu, India.

Telephone No.:
Fax No.:
Mobile No: 9790586194
E-mail: patents@allinnov.org

5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Title of the Invention
--------	---------	--------------------	-------------	-----------------------	------------------------

6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application
-------------------------------------	--

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application
-----------------------------------	------------------------------------

9. DECLARATIONS:**(i) Declaration by the inventor(s)**

I/We ,Dr. Glan Devadhas G.,Robin Jose,Jis Mathew,Shinu M. M.,Shamya A.,Jinsa Mathew, is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Dr. Glan Devadhas G.,Robin Jose,Jis Mathew,Shinu M. M.,Shamya A.,Jinsa Mathew

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the signatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- The Complete specification relating to the invention is filed with this application.
- I am/We are, in the possession of the above mentioned invention.
- There is no lawful ground of objection to the grant of the Patent to me/us.
- I am/We are, the assignee or legal representative to true first inventors.

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Road Safety (16).pdf
2	DRAWINGS	Drawings - Road Safety (16).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hereing are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

To The Controller of Patents

The Patent office at CHENNAI

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

A System and Method of Efficient Driving Assistance and Navigation for Vehicles

2. APPLICANT(S)

NAME(S)	NATIONALITY	ADDRESS
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VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

A SYSTEM AND METHOD OF EFFICIENT DRIVING ASSISTANCE AND NAVIGATION FOR VEHICLES

TECHNICAL FIELD

[0001] The present invention relates to driving systems in automobiles. More
5 particularly, the present disclosure pertains to an artificially intelligent driving
assistance system integrated with a navigation system and a method thereof.

BACKGROUND OF THE INVENTION

[0002] Background description includes information that may be useful in
understanding the present invention. It is not an admission that any of the information
10 provided herein is prior art or relevant to the presently claimed invention, or that any
publication specifically or implicitly referenced is prior art.

[0003] Within the last decades, navigation assistance systems have become a much
popular and widely used device in vehicles. Their variability and complexity has
increased manifold in the past years. The demand for automobile safety has increased
15 since humans started using vehicles. Automotive collision accidents account for a
severe threat to human lives and property loss. Manufacturers have long been in the
process of designing vehicles based on principles of reliability and safety. However,
due to reasons such as human error, circumstantial error and negligence, accidents still
frequently occur.

20 [0004] Automakers are completely indulged in making new fancy products along
with advanced adaptive technology for ease of customers. There are many technologies
which serve to save our lives. Some of them are airbags, Anti-Lock brakes, Electronic

Stability control system, Adaptive headlight, Traction control. These systems can be classified as active and passive. Besides of this, there are many advanced technologies like Adaptive Cruise Control, Proactive Accident protection system, and Emergency assist.

5 **[0005]** But driving experience should not be compromised. Some people drive just because they like to. We should not miss our driving experience due to the enjoyment of these technologies. Learning driver behavior is an important issue in the development of intelligent automobiles. Driver support systems may provide the driver comfort and safety by using some of the predictions related to driver behavior.

10 **[0006]** Night driving requires lots of concentration, which can be tiring and presents very different challenges as compared to driving during the daytime. Also, the human eye requires proper lighting to see the roads clearly. When talking about night driving, glaring due to the high beams becomes one of the main difficulties. An estimated 90 percent of all driver decisions are made based on what they see. Therefore,
15 night driving is a top cause of accidents.

[0007] The most suited way for this problem is to develop an automatic system for controlling light intensities. Many Computer vision based solutions are present by considering these problems, which use image processing as a remedy. Together with night driving foggy driving conditions also under the topic of road safety. The driver is
20 unaware of the risks hidden in the dense fogs. Overtaking, sudden breaking can become unpredictable and may lead to accidents.

[0008] We are focused on reaching our destination as early as possible while we are travelling. Poor roadway maintenance also contributes to accidents. But still many

people continue to neglect and ignore the danger involved in the accidents. There are various circumstances on the road because of which vehicle may fall unexpectedly. Some of them are potholes, bumps, lane change. We are not aware of these factors while travelling. One of the methods is to do the manual analysis of the road conditions and upload them to the central server. But this method requires expensive equipment .As machine learning algorithms can be used for classification of data, we can use it for better prediction of road bumps.

[0009] India is a developing country, which is highly populated and all these advanced technologies can't be implemented all of a sudden. Most of the technologies which already exist are mainly focused on developed countries which have better road infrastructures. These solutions are not applicable in countries like India or Nepal, because of the slow development of transport infrastructures.

[0010] Prevention is always better than cure. It's always better to avoid the chance to get things bad, than making it correct after anything happens wrong. The invention is mainly focused on 3 main parts, which are as follows: Adaptive headlight control for night driving conditions, V2V communication with collision warning for reducing risk while overtaking and in foggy driving situations and to study Machine learning algorithms to classify roads for road survey and smooth driving.

[0011] A prior art system disclosed, driving at night is one of the most dangerous things. It may be difficult to tell whether a black shape in front of your headlights is a pedestrian or not when you're driving late at night. According to the National Safety Council, vehicle death rates at night are three times higher than during the day. One problem is vision. Almost 90% of a driver's reaction depends on it. Also, a driver should

take care of vehicles, lanes, pedestrians and traffic signs while controlling vehicle speed and directions. All these works cause an increase in physical and mental workload and induce a dangerous situation. In order to prevent an accident while night driving, A system is proposed which offers forward collision warning information by means of implementation of augmented reality using HUD. the proposed system extracts dynamic pedestrians and vehicles and recognizes dangerous situations, and then it provides a driver with warning information by inventing virtual warning signs overlapped with real world and mapped to the viewpoint of the driver. It should help driver's hazard event detection. The proposed augmented reality system consists of sensor, decision and presentation parts.

[0012] Another prior art disclosed a vehicle headlight automation with a smart energy management system takes care of both the problems. The proposed system uses a Light Dependent Resistor (LDR) sensor for sensing a high beam of the opposite vehicle and inputs to Arduino UNO to make a decision to dim the high beam. This technique completely avoids both the drivers from glaring effect. The smart energy management system placed in electric poles controls the electric power consumptions and avoids manpower. The smart energy management system with PIR sensor detects the movement of a vehicle or any object on street and turns ON only a particular street light ahead of vehicle or object, and switches OFF the light as the vehicle or object moves which saves the energy. As soon the sun rises, light is sensed by LDR and automatically switches OFF street lights.

[0013] Yet another prior disclosed a fuzzy control is proposed for the anti-forward collision warning. The work brought out a fuzzy control model for automobile longitudinal anti-collision systems. Considering distinct running conditions of the front

vehicle, the mathematical model for safety distance calculating was constructed. After being given the fuzzy controller model and algorithm, it designed the physics system of anti-collision control. By simulation with Lab View and MATLAB, the fuzzy control based on the model considered conditions of the front vehicle is proved to agree with
5 real traffic conditions.

[0014] Yet another prior art focuses on classification of three main class labels-smooth road, potholes, and deep transverse cracks. We hypothesize that using features from all three axes of the sensors provides more accurate results as compared to using features from only one axis. The paper also investigates the performance of deep neural
10 networks to classify road conditions with and without explicit manual feature extraction. The results indicate that models trained with features from all axes of the smartphone sensors outperform models that use only one axis. We also observe that the use of neural networks provides a significantly improved data classification. The machine learning approach discussed here can be implemented on a larger scale to
15 monitor roads for defects that present a safety risk to commuters as well as to provide maintenance information to relevant authorities.

[0015] Yet another prior art is based on Mahalanobis Taguchi system (MTS), leveraging smartphones for data collection and involving the correlation between characteristics. An application is developed to collect and process the data, and then
20 classify road quality conditions. The experimental test was carried out on city roads in Xi'an, Shaanxi. Experiment results reveal that the road surface conditions, including manhole cover, pothole, and speed bump, can be well differentiated with the method based on MTS. To a certain extent, the strategy of marking road conditions to the

navigation map can effectively improve not only driving experience and traveling comfort but also driving safety, thereby more support for the maintenance units.

[0016] However, there remains a pressing requirement for a better and efficient system to address the present day requirements and problems and hence this invention
5 provides a solution for the same.

[0017] As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of “in” includes
“in” and “on” unless the context clearly dictates otherwise.

10 **[0018]** In some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some
embodiments, the numerical parameters should be construed in light of the number of reported significant digits and by applying ordinary rounding techniques.
15 Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiments of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing
20 measurements.

[0019] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the

range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language 5 (e.g. “such as”) provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0020] Groupings of alternative elements or embodiments of the invention 10 disclosed herein are not to be construed as limitations. Each group member can be referred to and claimed individually or in any combination with other members of the group or other elements found herein. One or more members of a group can be included in, or deleted from, a group for reasons of convenience and / or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the 15 group as modified thus fulfilling the written description of all groups used in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The accompanying drawings are included to provide a further understanding 20 of the present disclosure, and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0022] So that the manner in which the above recited features of the present invention can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings.

5 [0023] It is to be noted, however, that the appended drawings illustrate only typical embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

Figure 1 discloses an exemplary block diagram of the present invention.

Figures 2A and 2B discloses apropos architectures of the system in the host vehicle and
10 the guest vehicle respectively.

Figure 3 illustrates a flow diagram of the graphical user interface in the present system.

Figures 4A and 4B discloses the architectures of the vehicle to vehicle communication in the host vehicle and the guest vehicle respectively.

DETAILED DESCRIPTION

15 [0024] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to clearly communicate the disclosure. However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the
20 spirit and scope of the present disclosure as defined by the appended claims.

[0025] In the following description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

5 **[0026]** Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be embodied in machine-executable instructions, which may be used to cause a general-purpose or special-purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software,
10 and firmware and/or by human operators.

[0027] Various methods described herein may be practiced by combining one or more machine-readable storage media containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may
15 involve one or more computers (or one or more processors within a single computer) and storage systems containing or having network access to computer program(s) coded in accordance with various methods described herein, and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

20 **[0028]** The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be

understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0029] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

[0030] Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those of ordinary skill in the art. The invention disclosed may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include

both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives, modifications and equivalents consistent with the principles and features disclosed. For purpose of clarity, details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not to unnecessarily obscure the present invention.

10 **[0031]** Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the pertinent art have given that term as reflected in printed publications and issued patents at the time of filing.

[0032] Figure 1 discloses an exemplary block diagram of the present invention. The invention proposes a Graphical User Interface (GUI) based approach, so as to improve the user experience. It consists of six blocks namely Sensing, Data Acquisition, Data Processing, Computations and Evaluations, Actions & Control, and the last but not the least, The Graphical User Interface block. The sensing block consists of all the sensors and buttons which includes camera, nRF, ultrasonic sensors, Bluetooth module and accelerometer.

20 **[0033]** The values from the sensors are sorted according to the system architecture and are preprocessed in the data acquisition block. The images captured by the camera are splitted into three different frames, which makes further processing easier. Inputs

from the Graphical User Interface also come under this block. The preprocessed data is then further applied to the third block where all the major processing is done.

[0034] The images from the camera are processed with the Haar cascade method using the open CV library. The openCV is an open source library supported by python and most commonly used by developers for computer vision, machine learning, and image processing and now it plays a major role in real-time operation which is very important in today's systems. The Haar Cascade is an Object Detection Algorithm used to identify faces in an image or a real time video. The algorithm uses edge or line detection features proposed by Viola and Jones in their research paper “Rapid Object Detection using a Boosted Cascade of Simple Features” published in 2001. This method is used to detect a car in front and control the headlight intensity to reduce the glaring effects hence reducing the chance for accidents.

[0035] Similar to OpenCV, Tensor flow is also an open source software library for Machine Learning which is supported by python. It can be used across a range of tasks but has a particular focus on training and inference of deep neural networks. Tensorflow is a symbolic math library based on dataflow and differentiable programming. Tensorflow and OpenCV together are used to train the system to implement the headlight controlling and to classify the roads.

[0036] The second phase of the processing block is handled by the microcontroller, in this case the Arduino Mega 2560 is used. The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), and a 16 MHz crystal oscillator, which makes it best suited for the invention.

[0037] The Processor which runs the python script communicates with the Arduino microcontroller using the serial port. For this the pyserial library is used. In the fourth block all the decisions are made according to the processed data. The variables generated during the processing stage are compared with the preset values and control signals are passed to actuators. The Graphical User Interface (GUI) keeps track of all these processes. The user will get live feedback on what's going on at the backend. The User also can access the trained data using the Graphical User Interface.

[0038] Figures 2A and 2B discloses apropos architectures of the system in the host vehicle and the guest vehicle respectively. For practical implementation and testing two separate systems (vehicles) are built which are here referred to as car1 (or host car) and car2 (or guest car). Both the systems are equipped with the intelligent headlight control features. For the host vehicle, an Intel i5 processor is used to run the high end programs. The Arduino mega is used to control the actuators and output modules like servo, LED and button. nRF24L01 is used as a transceiver. For interfacing nRF with i5 processors and Arduino Uno is used. The system is programmed with python 3.7 and Arduino 1.8.15. KivyMD is used as the library for the User Interface designing. Together with this some libraries like matplotlib, garden.mapview, pyserial, pyfirmata, are also used plotting graphs, communicating with microcontrollers,

[0039] For the guest vehicle, Raspberry Pi 3 Model B is used for image processing. An Arduino mega is used for all other controls. The nRF24L01 is used as a transceiver. Besides From a GUI as in the host car, a 16x2 LCD display is used instead together with some LEDs and a buzzer are used for the indications and alerts

[0040] The Raspberry pi 3 model B is used as the master controller. The raspberry pi 3 model B has Quad Core 1.2GHz Broadcom BCM2837 64bit CPU, 1 GB RAM, BCM43438 wireless LAN and Bluetooth Low Energy (BLE) on board Raspberry pi night vision camera is used for capturing image/video and image processing is done by Raspberry Pi The raspberry pi is loaded with the python script and trained data from the Intel i5 processor.

[0041] The image captured by the camera is fetched and the frames are split into 3 sections, namely left right and center. The python algorithm uses Haar cascade to detect the vehicle. Depending on the position of the vehicle detected it is allotted to any of the three frames which is made by splitting the frames into 3 sections. By using this method, the vehicle in front of the Host Vehicle is detected and depending on the position of the detected vehicle with respect to the host vehicle the python program generates some variables and which is then transferred to the Arduino microcontroller for further control. The Arduino controller that receives the data, sets the mode for the led matrix to control the light intensity. Arduino act as the slave controller. Under the control of Arduino Uno, the light in the region of interest (ROI) will be decreased by using a LED Matrix

[0042] Headlight (LED matrix) is placed on the servos (either sides). Now first the Rotary encoder gives out the values according to the steering angle rotation whether left or right. The change in steering is perceived by Arduino Mega which then analyses this reading and then maps it from 0 to 179, and gives a PWM signal to the corresponding servo motors to turn. The degree of rotation in the horizontal direction for LEDs is +90 to -90.

[0043] Figure 3 illustrates a flow diagram of the graphical user interface in the present system. The graphical user interface or GUI shows the live update of the process running in the system. Unlike other normal display screens which only show usual text-based or command-based communication, the present GUI helps the user to configure, control and access data. It allows the user to interact with the electronic devices in the automobile.

[0044] The Kivy library, specifically KivyMD of python is used to build the User interface (UI). Kivy is an open source, cross-platform Python framework for the development of applications that makes use of innovative, multi-touch user interfaces. KivyMD is a collection of Material Design compliant widgets for use with Kivy, a framework for cross-platform, touch-enabled graphical applications. The invention's goal is to approximate Google's Material Design spec as close as possible without sacrificing ease of use or application performance.

[0045] The GUI structure is split into three layers, first one is the authentications, second is the controls and overviews layer and last is the functioning layer. The GUI Starts from the home screen the user can either login or sign up as a new user to the UI. As the user logs in the UI will be driven to the overview page, where all the current status of the vehicle is displayed. From there the user can navigate through three different other pages which are the settings page, navigations and communication screen and the apps screen which comes under the controls and overview layer. The user stays in this layer form most of the time during driving the vehicle.

[0046] The last one is the functioning layer, by which the user can access all the features and functionalities of the system. All the pages in this layer are interconnected

to each other in specific manners and depending on the access levels. The GUI is most useful in the V2V communication where the user gets a clear idea about what's going in there.

[0047] Figures 4A and 4B discloses the architectures of the vehicle to vehicle communication in the host vehicle and the guest vehicle respectively. For the system implementation, this invention proposes two vehicles that will be referred to as the host vehicle and the guest vehicle. Both the vehicles are equipped with the wireless transmitting system. For the Host vehicle we have we developed the Graphical User interface (GUI) system and for the second car we are using a 16x2 LCD display for indications. Using the GUI the driver in the host car can select a driving mode, which in our case is the power saving mode, emergency mode, overloaded mode, or the help mode. When the driver starts to drive the system is activated and the car starts to send some information wirelessly to every vehicle which is within 100 meters range of the host vehicle. Together with this the host vehicle will also receive all the message form the vehicle which is in the 100 meters range of the host car. The driver can set what information has to be transferred through the wireless networks. This information may include, drivers destination points, heading, mode, emergency signal, etc. The vehicle which receives signals from or transmits single to the host vehicle is treated as the guest vehicle. The guest vehicle will receive some information from the host vehicle, and it will indicate to the guest driver about it.

[0048] The system uses nRF24L01 module for the wireless communication between vehicles. The nRF24L01+ transceiver module is designed to operate in 2.4 GHz worldwide ISM frequency band and uses GFSK modulation for data transmission.

The data transfer rate can be one of 250kbps, 1Mbps and 2Mbps. This module is able to communicate over a distance of 100 meters.

[0049] The v2v communication system will first access the vehicle location, speeding, heading using GPS, accelerometer and gyroscope respectively. For implantation purposes we have accessed the location of the building Global Positioning System of the Raspberry pi for the host car and for the guest vehicle we have used The GPS NEO M6 module for accessing the location. In the second step the host vehicle will receive this data from the guest vehicle and based on the assistance system algorithms the v2v system will analyse the direction of movement and position of both cars. In the third step the vehicle can transmit messages with each other. Some special cases are listed below.

[0050] Case 1: When the guest vehicle wants to over take; The driver of the guest vehicle can trigger a button and the vehicle will send a overtake request to the host vehicle. The host vehicle will receive the message instantly and a popup will appear in the GUI of the host can. The host driver can either give a go ahead message or slowdown message to the guest car wirelessly.

[0051] Case 2: The guest vehicle wants to overtake when there is a vehicle in front of the host car; the host vehicle has a collision warning system in it. When the host vehicle receives an overtake request, the host vehicle will first check whether there is any vehicle in front of the host vehicle so that the guest vehicle can overtake. If there is a vehicle present the host vehicle will send a message such as vehicle ahead. And hence the guest vehicle will receive an message that it is not safe to over take

[0052] Case 3: when the Emergency mode is enabled. In any of the vehicles, if the emergency mode is enabled the corresponding vehicle will broadcast an emergency message to the surrounding vehicle in its range and all the other vehicles which receive this message will get an alert message on the screen that an emergency vehicle is nearby
5 and give some space to pass by. The emergency vehicle can be an ambulance or a fire truck. Any vehicle with this advanced vehicle to vehicle communication system can use this feature and set the vehicle in emergency mode.

[0053] Case 4: when the vehicle is break downed. If a vehicle is broadened, the driver can set the vehicle to help mode. And the v2v system will transmit a help message
10 to every vehicle which comes in range of the host vehicle. The guest which receives the message can avoid the accident condition and can help the host vehicle's driver.

[0054] Case 5: when a vehicle in front applies a sudden break. If a vehicle in front applies a sudden break the host vehicle will set a flag and send a message to all the succeeding vehicles that the front in front of the host vehicle has applied break, go slow,
15 so as to avoid an accident.

[0055] It should be apparent to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except
20 in the scope of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms "comprises" and "comprising" should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present,

or utilized, or combined with other elements, components, or steps that are not expressly referenced. Where the specification claims refers to at least one of something selected from the group consisting of A, B, Cand N, the text should be interpreted as requiring only one element from the group, not A plus N, or B plus N, etc. The
5 foregoing description of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of
10 equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the scope of the appended claims.

15 **[0056]** All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0057] The invention is not restricted to the details of the foregoing embodiment(s).
20 The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

[0058] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions or examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge available to the person having ordinary skill in the art.

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#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

CLAIMS

We claim:

1. A system and method of efficient driving assistance and navigation for vehicles,
comprising
5 a plurality of sensing modules;
 at least one image capturing device;
 one or more processors; and
 a combination of mechanical and electromechanical components
 systematically operated.
- 10 2. The system as claimed in claim 1 wherein, the said sensors are preferably rotary
 encoders, ultrasonic sensors, radiofrequency transceivers and accelerometers.
3. The system as claimed in claims 1 and 2 wherein, the sensing devices are
 configured to collect information on the speed, distance, acceleration and the
 lane of the host and the guest vehicles.
- 15 4. The system as claimed in claim 1 wherein, the said processors are preferably a
 Raspberry Pi on the guest vehicle and an Intel i5 processor in the host vehicle.
5. The system as claimed in claims 1 and 4 wherein, the host vehicle further
 comprises an image-capturing module and the same is preferably a camera
 device configured to capture the data of the guest vehicle from distant locations.
- 20 6. The system as claimed in claims 1 and 4 wherein, the said processor is further
 operatively coupled to the said mechanical components of the vehicle and the
 components include the steering module to ensure the host vehicle is on the safe
 lane.

7. The system as claimed in claims 1 and 6 wherein, the said mechanical and electromechanical components further include an arrangement to reduce the intensity of light of the guest vehicle if the intensity of light exceeds the limit beyond which the vision of the host vehicle is disturbed.

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PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent On Behalf of the Applicants

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ABSTRACT

A SYSTEM AND METHOD OF EFFICIENT DRIVING ASSISTANCE AND NAVIGATION FOR VEHICLES

The present invention relates to driving systems in automobiles. More particularly, the
5 present disclosure pertains to an artificially intelligent driving assistance system
integrated with a navigation system and a method thereof. The v2v communication
system will first access the vehicle location, speeding, heading using GPS,
accelerometer and gyroscope respectively. For implantation purposes we have accessed
10 the location of the building Global Positioning System of the Raspberry pi for the host
car and for the guest vehicle we have used The GPS NEO M6 module for accessing the
location. In the second step the host vehicle will receive this data from the guest vehicle
and based on the assistance system algorithms the v2v system will analyse the direction
of movement and position of both cars. In the third step the vehicle can transmit
messages with each other.

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Patent Agent On Behalf of the Applicants

20

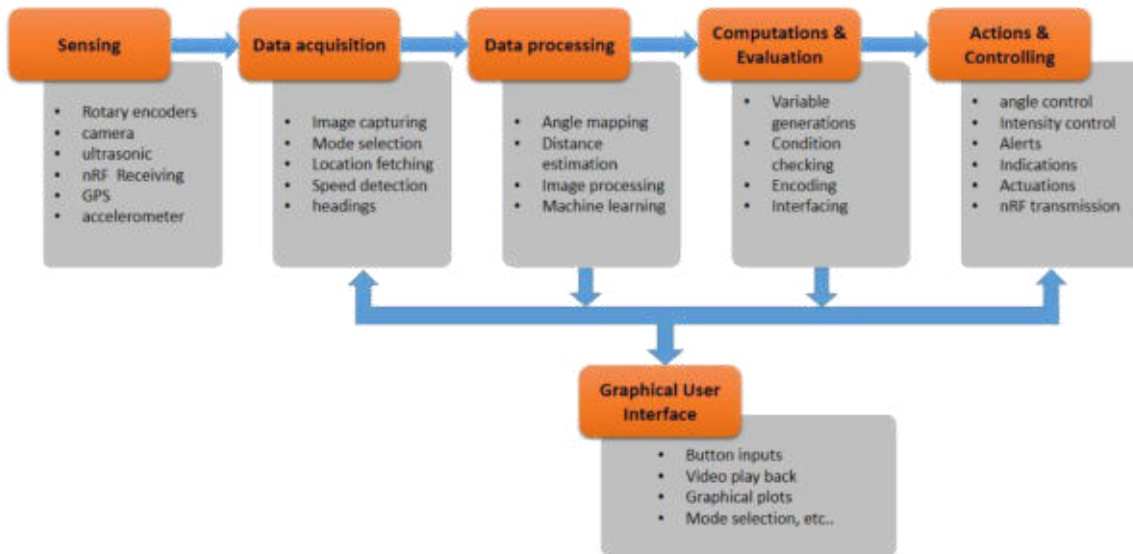


FIGURE 1

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

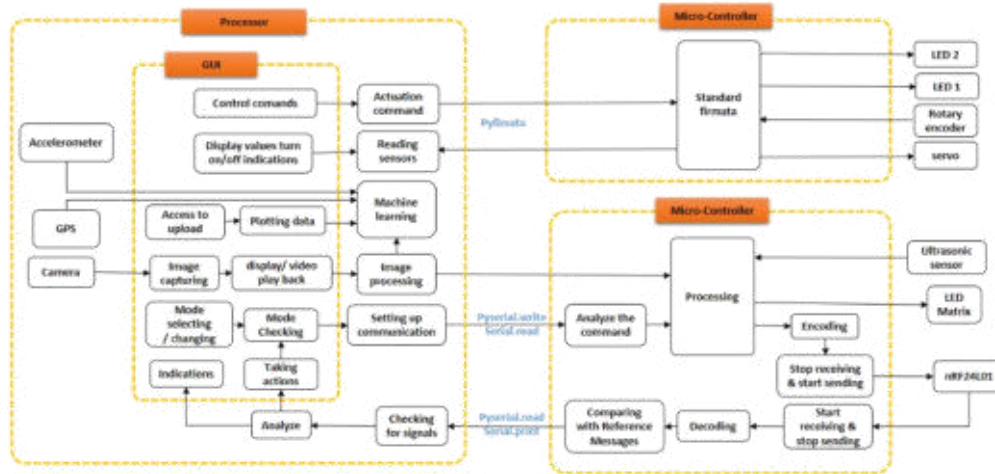


FIGURE 2A

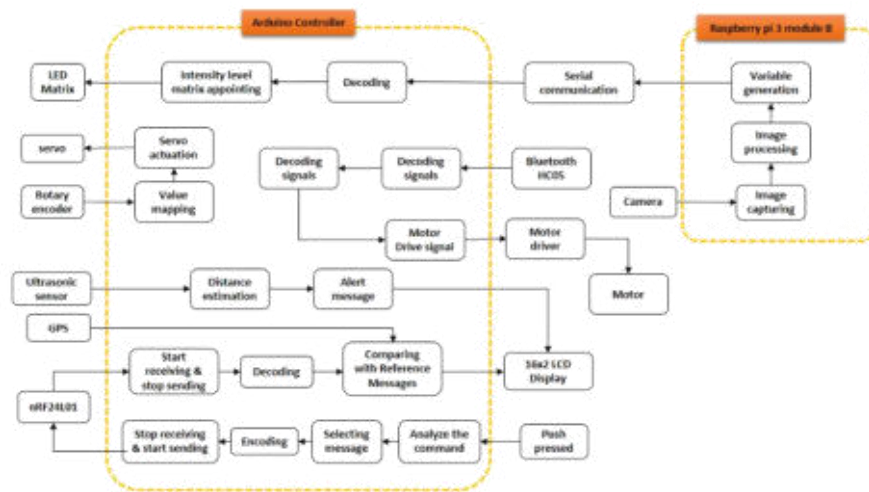


FIGURE 2B

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

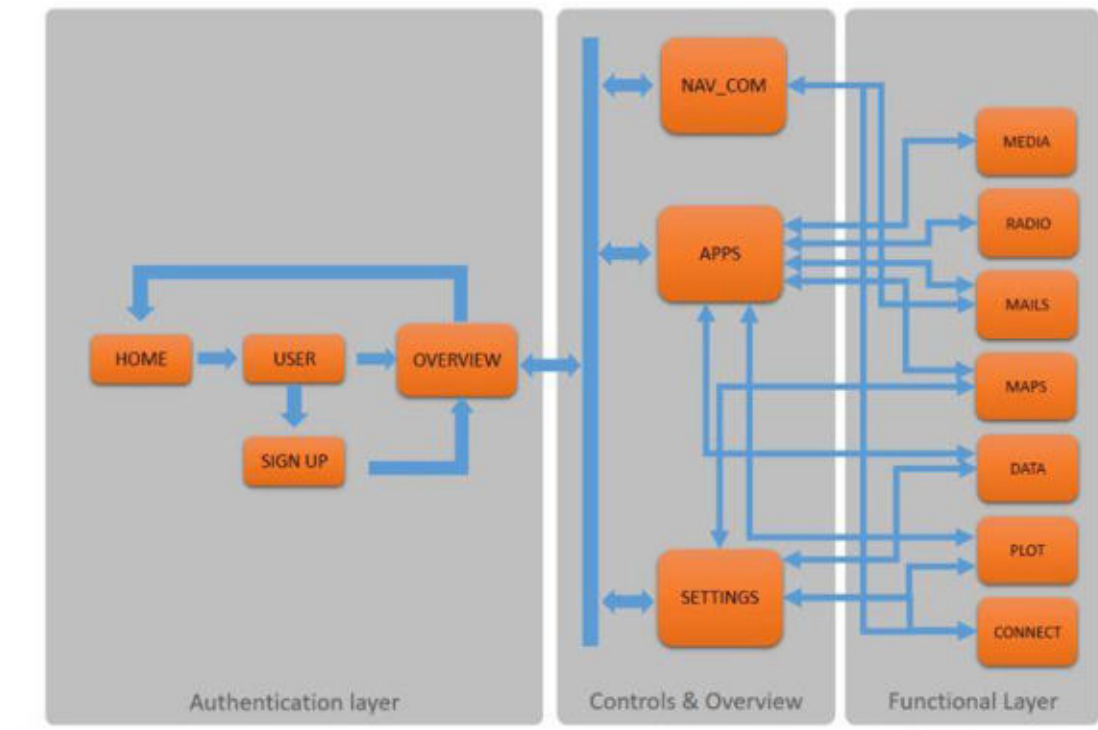


FIGURE 3

#####DIGITALLY SIGNED#####
PREM CHARLES I
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Patent Agent On Behalf of the Applicants

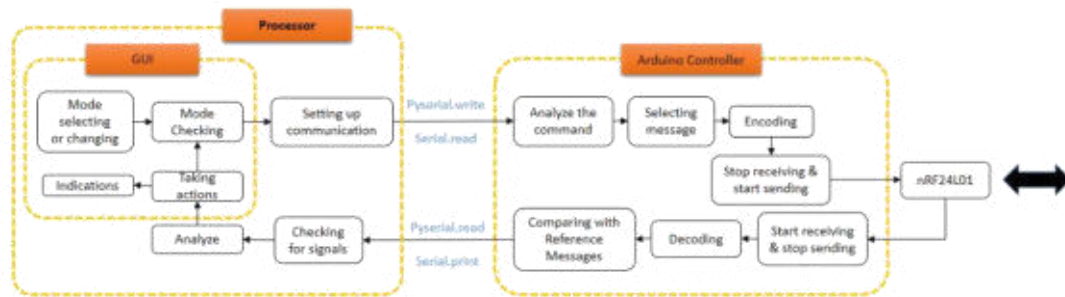


FIGURE 4A

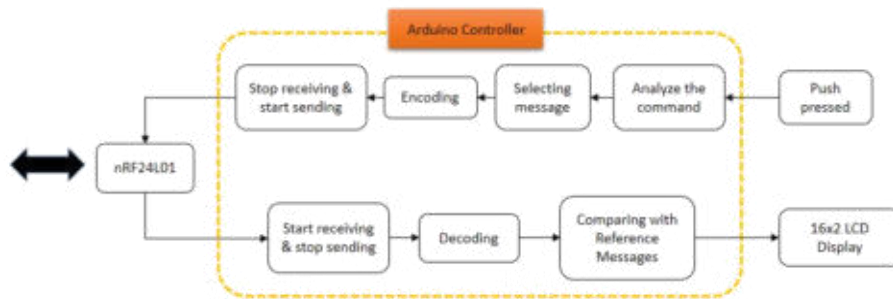


FIGURE 4B

#####DIGITALLY SIGNED#####
PREM CHARLES I
REGISTERED PATENT AGENT INPA-3311
Patent Agent On Behalf of the Applicants

FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241053317 dated 18-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:

NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 18th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241053317** Dated **18th day of Sep , 2022** are

INVENTOR (S):

1	a) Name: b) Nationality: c) Address:	Dr. Glan Devadhas G. Indian Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
2	a) Name: b) Nationality: c) Address:	Robin Jose Indian Student, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
3	a) Name: b) Nationality: c) Address:	Jis Mathew Indian Student, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
4	a) Name: b) Nationality: c) Address:	Shinu M. M. Indian Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
5	a) Name: b) Nationality: c) Address:	Shamya A. Indian Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
6	a) Name: b) Nationality: c) Address:	Jinsa Mathew Indian Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

Dated This 18thday ofSep,2022

Signature,



NAME: PREM CHARLES I(INPA 3311)

PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

To,

The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu- 600032

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/59434/2022-CHE

Dated **11/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

Name of the signatory

To,
The Controller of Patents,
The Patent Office,
At Chennai

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Controller General of Patents, Designs & Trade
Marks
G.S.T. Road, Guindy, Chennai-600032
Tel No. (091)(044) 22502081-84 Fax No. 044 22502066
E-mail: chennai-patent@nic.in
Web Site: www.ipindia.gov.in



सत्यमेव जयते
G.A.R.6
[See Rule 22(1)]
RECEIPT



Docket No 89679

Date/Time 2022/09/18 19:54:07

To
PREM CHARLES

UserId: prem1987

360E, SENTHUR MURUGAN KOVIL
STREET, OPPOSITE SM MAHAL,
OLDPET

CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	E-106/5540/2022/CHE	202241053315	0	----	FORM28	
2	E-106/5541/2022/CHE	202241053313	0	----	FORM28	----
3	E-106/5543/2022/CHE	202241053314	0	----	FORM28	----
4	E-106/5544/2022/CHE	202241053316	0	----	FORM28	----
5	E-106/5542/2022/CHE	202241053317	0	----	FORM28	----
6	E-12/7069/2022/CHE	202241053315	2500	37515	FORM 9	----
7	E-12/7073/2022/CHE	202241053313	2500	37515	FORM 9	----
8	E-12/7070/2022/CHE	202241053314	2500	37515	FORM 9	----
9	E-12/7071/2022/CHE	202241053316	2500	37515	FORM 9	----
10	E-12/7072/2022/CHE	202241053317	2500	37515	FORM 9	----
11	202241053315	TEMP/E-1/59430/2022-CHE	1600	37515	FORM 1	An Optical Fiber Based System and Method to Detect Adulteration in Fuels
12	202241053313	TEMP/E-1/59431/2022-CHE	1600	37515	FORM 1	A System for Transforming Finger Gestures into Other Communication Health Monitoring of Differently
13	202241053314	TEMP/E-1/59432/2022-CHE	1600	37515	FORM 1	A Device and System for Automobiles to Distinguish and Identify Authorized and Unauthorized Parking
14	202241053316	TEMP/E-1/59433/2022-CHE	1600	37515	FORM 1	An Image Processing Based Smart System for Reading and Communication of the Visually Challenged
15	202241053317	TEMP/E-1/59434/2022-CHE	1600	37515	FORM 1	A System and Method of Efficient Driving Assistance and Navigation for Vehicles

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001024387	Online Bank Transfer	1809220005196	20500.00	1475001020000001

Total Amount : ₹ 20500.00

Amount in Words: Rupees Twenty Thousand Five Hundred Only

Received from PREM CHARLES the sum of ₹ 20500.00 on account of Payment of fee for above mentioned Application/Forms.

* This is a computer generated receipt, hence no signature required.

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Welcome PREM CHARLES

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Tel No. (091)(044) 22502081-84 Fax No. 044 22502066
E-mail: chennai-patent@nic.in
Web Site: www.ipindia.gov.in



सत्यमेव जयते



Docket No 89681

Date/Time 18/09/2022

To
PREM CHARLES

User Id: prem1987

360E, SENTHUR MURUGAN KOVIL
STREET, OPPOSITE SM MAHAL,
OLDPET

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241053317	E-3/29318/2022/CHE	0	----	FORM 3	
2	202241053317	E-5/3768/2022/CHE	0	----	FORM 5	
3	202241053316	E-3/29319/2022/CHE	0	----	FORM 3	
4	202241053316	E-5/3769/2022/CHE	0	----	FORM 5	
5	202241053315	E-3/29320/2022/CHE	0	----	FORM 3	
6	202241053315	E-5/3770/2022/CHE	0	----	FORM 5	
7	202241053314	E-3/29321/2022/CHE	0	----	FORM 3	
8	202241053314	E-5/3771/2022/CHE	0	----	FORM 5	
9	202241053313	E-5/3772/2022/CHE	0	----	FORM 5	
10	202241053313	E-3/29322/2022/CHE	0	----	FORM 3	

Total Amount : ₹ 0

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पेटेंट कार्यालय
शासकीय जर्नल

**OFFICIAL JOURNAL
OF
THE PATENT OFFICE**

निर्गमन सं. 41/2022
ISSUE NO. 41/2022

शुक्रवार
FRIDAY

दिनांक: 14/10/2022
DATE: 14/10/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

**(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS**

14nd OCTOBER, 2022

(54) Title of the invention : A System for Indoor Navigation of the Visually Impaired

(51) International classification :G01C0021200000, G09B0021000000, H04W0064000000, G01S0005020000, H04W0004330000

(86) International Application No Filing Date :PCT// :01/01/1900

(87) International Publication No : NA

(61) Patent of Addition to Application Number Filing Date :NA :NA

(62) Divisional to Application Number Filing Date :NA :NA

(71)**Name of Applicant :**
1)VIMAL JYOTHI ENGINEERING COLLEGE
 Address of Applicant :Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. Chemperi -----

Name of Applicant : NA
Address of Applicant : NA

(72)**Name of Inventor :**
1)Jeethu V. Devasia
 Address of Applicant :Professor and Head, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

2)Ashly K. P.
 Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

--

3)Devika K.
 Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

--

4)Nivedya Susil
 Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

--

(57) Abstract :
 The present invention relates to the field of biomedical engineering and particularly it discloses an intelligent navigation system for the visually impaired people to commute within the indoor spaces without any collisions. The present system is designed to help visually impaired to meet people and provide a safer and independent navigation in the indoor space. The system uses Wi-Fi and NodeMCU in the indoor environments to allocate and track the user’s location and fingerprinting algorithm is used to estimate the position. Wi-Fi fingerprinting is found to have high accuracy and precision compared to other positioning algorithm.

No. of Pages : 28 No. of Claims : 5



Application Filing Receipt

**Government of India
Patent Office**
Intellectual Property Office Building,
G.S.T. Road, Guindy,
Chennai -600032
Phone- 044-22502081-84
Fax: 044-22502066
e-mail: chennai-patent@nic.in

CBR Number : 37516

CBR date: 18-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
VIMAL JYOTHI ENGINEERING COLLEGE
Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting to be an application for patent numbered 202241053319 dated 18-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to A System for Indoor Navigation of the Visually Impaired together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority of date of filing, whichever is earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority of date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

(For Controller of Patents)



Office of the Controller General of Patents, Designs & Trade Marks
Department of Industrial Policy & Promotion,
Ministry of Commerce & Industry,
Government of India

(<http://ipindia.nic.in/index.htm>)



(<http://ipindia.nic.in/index.htm>)

Application Details

APPLICATION NUMBER	202241053319
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	18/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	A System for Indoor Navigation of the Visually Impaired
FIELD OF INVENTION	PHYSICS
E-MAIL (As Per Record)	patents@allinnov.org
ADDITIONAL-EMAIL (As Per Record)	allinnovrnd@gmail.com
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	14/10/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:

Filing Date:

Amount of Fee Paid:

CBR No.:

Signature:

1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	VIMAL JYOTHI ENGINEERING COLLEGE	India	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

2. INVENTOR(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	Jeethu V. Devasia	India	Professor and Head, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
			Student, Department of Computer Science and Engineering, Vimal Jyothi				

2	Ashly K. P.	India	Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
3	Devika K.	India	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
4	Nivedya Susil	India	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

3. TITLE OF THE INVENTION: A System for Indoor Navigation of the Visually Impaired

**4. ADDRESS FOR CORRESPONDENCE OF APPLICANT /
AUTHORISED PATENT AGENT IN INDIA:**
Allinnov Innovation and Intellectual Property Services, #360E,
First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri -
635001, Tamil Nadu, India.

Telephone No.:

Fax No.:

Mobile No: 9790586194

E-mail: patents@allinnov.org

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Title of the Invention
--------	---------	--------------------	-------------	-----------------------	------------------------

6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application
-------------------------------------	--

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application
-----------------------------------	------------------------------------

9. DECLARATIONS:

(i) Declaration by the inventor(s)

I/We ,Jeethu V. Devasia,Ashly K. P.,Devika K.,Nivedya Susil, is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Jeethu V. Devasia,Ashly K. P.,Devika K.,Nivedya Susil

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the singnatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- **The Complete specification relating to the invention is filed with this application.**
- **I am/We are, in the possession of the above mentioned invention.**
- **There is no lawful ground of objection to the grant of the Patent to me/us.**
- **I am/We are, the assignee or legal representative to true first inventors.**

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Collission Free Navigation (14).pdf
2	DRAWINGS	Drawings - Collission Free Navigation (14).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hering are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

To The Controller of Patents

The Patent office at CHENNAI

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

A System for Indoor Navigation of the Visually Impaired

2. APPLICANT(S)

NAME(S)

NATIONALITY

ADDRESS

VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

A SYSTEM FOR INDOOR NAVIGATION OF THE VISUALLY IMPAIRED

FIELD OF INVENTION

[001] The present invention relates to the field of biomedical engineering and particularly
5 it discloses an intelligent navigation system for the visually impaired people to
commute within the indoor spaces without any collisions.

BACKGROUND OF INVENTION

[002] Background description includes information that may be useful in understanding
the present invention. It is not an admission that any of the information provided
10 herein is prior art or relevant to the presently claimed invention, or that any
publication specifically or implicitly referenced is prior art.

[003] Blind people do lead a normal life with their own style of doing things. But, they
definitely face troubles due to inaccessible infrastructure and social challenges.
According to the World Health Organization (WHO), 285 million people are
15 estimated to be visually impaired worldwide, 39 million are blind and 246 have low
vision. Whether it happened accidentally or by a disease, this physical impairment
has major impacts on daily life activities. As a matter of fact, motion is noticeably
refrained. Moreover, visually impaired people may lose orientation and have a
higher risk of falling. But, people need to move, whether at home, at work or leisure.

[004] We have built a world around us that serves the majority. Any individual different than the average, has to face many difficulties because they are not considered to be the average. Indoor navigation in a complex environment is very essential for the blind people to move independently and securely. Among activities affected by visual impairment, navigation plays a fundamental role, as it enables person to move independently and safely. A challenging task for VIP (Visually Impaired Person) is independent navigation in new environments, where chances of getting lost is very high. In contrast to outdoors, traveling inside public spaces is a different story, as many environmental cues cannot be used and have their own set of difficulties. When traveling indoors, most of the outdoor challenges are not present, but head-level and trip accidents and even movable objects are still taken into consideration. To promote the tracking, navigation and create better use of technologies for visually impaired people, it is essential to understand the facts, and actual problems that they experience, and what behaviors and strategies they use to overcome any problems.

[005] One of the most famous localization technologies is Global Positioning System (GPS) which works very well in the outdoor environment and supports different types of applications such as in mobile phones, car navigation, ships, planes and so on. However, it failed to work in the indoor environment, due to the fact it required a line of sight between the transmitter and receiver, which is considered the main challenge for this technology in the indoor environment (non-line of sight).

[006] Indoor location technology is used in different types of commercial, military and public safety applications. The existing systems still suffers from challenges in term of accuracy, real-time, low cost and reliability. The challenge, inaccuracy is due to the indoor environment elements like obstacles which including the people, walls and furniture which have a huge impact on the signal strength. This necessitates need of a sys-tem that would provide peer tracking and navigation with obstacle detection. The present system, will turn out to be a promising one, helping visually impaired to enjoy a sense of independence.

[007] The present system aims to implement an android application that will help blind people in peer tracking and enabling them to navigate in the indoor space with voice assistance to reach the desired destination. The system includes a provision to detect and warn in case of any obstacles found in the desired path.

[008] A prior art disclosed a smart navigational system that delivers a brand-new way of indoor environment perception using low cost passive radio frequency identification (RFID) tags that are strategically located on selected areas, a detachable voice controlled portable unit that serves as the brain of the whole system, a conversational voice output that tells the user the correct directions and an adjustable customized light-weight cane that detects the tags deployed on the area. The sys-tem runs autonomously which empowers the blind and visually impaired people in navigating independently inside the facilities.

[009] Another prior art disclosed a system that works to identify the individuals and track their location in a smart building. It was developed to recognize the identity of

individuals by using a combination of methods which are facial recognition with the MAC (Media Access Control) address of the portable device. After the system recognizes the individuals it then allocate and track the individual's position based on Wi-Fi technology.

[0010] 5 Yet another prior art disclosed a system in which existing popular machine learning algorithms are first trained with the RSSI (Received Signal Strength Indicator) samples at various radio mapping points. Once the system is trained, then the machine estimates the position of a mobile based on the given RSSI input.

[0011] System uses the popular state-of-the-art machine-learning technique for the
10 fingerprinting as well as location estimation. The system demonstrates how machine learning algorithm and Bluetooth low energy (BLE) can be used together to accurately estimate the location of a mobile device. The state-of-art machine-learning algorithm is used to estimate the probability of being at each radio map and used the probability to estimate the location of a mobile device. The existing
15 popular machine learning algorithms are first trained with the RSSI samples at various radio mapping points. Once the system is trained, then the machine estimates the position of a mobile based on the given RSSI input.

[0012] Yet another prior art stated that navigating through an indoor environment where there is an absence of GPS technology for accessing location is a real struggle for
20 VIP. It is a global network helping to merge physical and virtual things, comprising of objects embedded with sensors, actuators, Radio Frequency Identification (RFID) tags, and beacons will bring revolutionary change in life of VIP. Orthogonal

Jump point search (OJPS) is an efficient path finding approach on rectangular grids. It is an optimal search algorithm for speeding up the search by selectively expanding only certain nodes on a grid map known as Jump points. This algorithm defines jump points (way-points) that can be reached in straight lines. Unlike OJPS, OrthoPATH is a step-ahead that has pre-calculated jump points rather than searching the jump points at run time on the grid map. The objective of the algorithm is to reduce computation time and remove symmetry by recursively jumping over the nodes which can be reached optimally by a path that does not visit the current node.

[0013]0 Yet another prior art disclosed a method that aims to develop an easily implementable indoor navigation system by using a path finding algorithm and a wearable cap installed with IR receivers and ultrasonic sensor. This system will reduce the need of designing complex infrastructure and holding of any extra assistive device. The need of an extra assist device has been removed by using ultrasonic sensor and Arduino Nano mounted on a cap, which will always warn the user about any obstacle along his/her pathway. Moreover, this system does not require GPS or any telecommunication network connectivity. The components used for designing the wearable are easily available in the market, they are cheaper and smaller in size and the whole system is said to be very easy to design.

[0014]0 However, there is a pressing need for a better and efficient system to further improvise the overall requirement and hence we come up with the present invention.

[0015] Further limitations and disadvantages of conventional and traditional approaches will become apparent to one of skill in the art through comparison of described systems with some aspects of the present disclosure, as set forth in the remainder of the present application and with reference to the drawings.

[0016] 5 In some embodiments, the numbers expressing quantities or dimensions of items, and so forth, used to describe and claim certain embodiments of the invention are to be understood as being modified in some instances by the term “about.” Accordingly, in some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending
10 upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical
15 values set forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiments of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0017] As used in the description herein and throughout the claims that follow, the meaning
20 of “a,” “an,” and “the” includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

[0018] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein
5 can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g. “such as”) provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the
10 specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0019] Groupings of alternative elements or embodiments of the invention disclosed herein are not to be construed as limitations. Each group member can be referred to and claimed individually or in any or a combination with other members of the group
15 or other elements found herein. One or more members of a group can be included in, or deleted from, a group for reasons of convenience and/or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all groups used in the appended claims.

20 **OBJECTS OF THE INVENTION:**

[0020] The objects of the invention are to implement a system to help blind people track their peer’s location in indoor environment, to provide a safer navigation to the

peer's location in the indoor space using the system application and to overcome the drawbacks of the existing systems.

[0021] These features and advantages of the present disclosure may be appreciated by reviewing the following description of the present disclosure, along with the
5 accompanying figures wherein like reference numerals refer to like parts.

[0022] Various objects, features, aspects and advantages of the inventive subject matter will become more apparent from the following detailed description of the preferred embodiments, along with the accompanying drawing figures in which the numerals represent the like components.

[0023]0 Within the scope of this application it is expressly envisaged that the various aspects, embodiments, examples, alternatives set out in the preceding paragraphs, in the claims and/or the following description and drawings, and in particular the individual features thereof, may be taken independently or in any or a combination. Features described in connection with one embodiment are applicable to all
15 embodiments, unless such features are incompatible.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] The accompanying drawings are included to provide a further understanding of the present disclosure and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and,
20 together with the description, serve to explain the principles of the present disclosure.

[0025] A complete understanding of the system and method of the present invention may be obtained by reference to the following drawings:

FIG. 1 illustrates a representation of the use case diagram for the present system.

FIG. 2A and 2B illustrates representations of the data flow diagrams for the present
5 system at levels 0 and 1 respectively.

FIG. 3 discloses an exemplary architecture of the system in the present disclosure.

DETAILED DESCRIPTION

[0026] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to clearly
10 communicate the disclosure. However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0027] In the following description, numerous specific details are set forth in order to
15 provide a thorough understanding of embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0028] Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be
20 embodied in machine-executable instructions, which may be used to cause a general-purpose or special purpose processor programmed with the instructions to

perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0029] Various methods described herein may be practiced by combining one or more machine-readable storage media containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a single computer) and storage systems containing or having network access to computer program(s) coded in accordance with various methods described herein, and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

[0030] The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0031] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For example, circuits, systems, networks, processes, and other

components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

[0032] 5 Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those of ordinary skill in the art. The invention disclosed
10 may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein.

[0033] Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Moreover,
15 all statements herein reciting embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure). Also,
20 the terminology and phraseology used is for the purpose of describing exemplary embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives,

modifications and equivalents consistent with the principles and features disclosed. For purpose of clarity, details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not to unnecessarily obscure the present invention.

[0034] 5 Thus, for example, it will be appreciated by those of ordinary skill in the art that the diagrams, schematics, illustrations, and the like represent conceptual views or processes illustrating systems and methods embodying this invention. The functions of the various elements shown in the figures may be provided through the use of dedicated hardware as well as hardware capable of executing associated
10 software. Similarly, any switches shown in the figures are conceptual only. Their function may be carried out through the operation of program logic, through dedicated logic, through the interaction of program control and dedicated logic, or even manually, the particular technique being selectable by the entity implementing this invention. Those of ordinary skill in the art further understand that the
15 exemplary hardware, software, processes, methods, and/or operating systems described herein are for illustrative purposes and, thus, are not intended to be limited to any particular named element.

[0035] Embodiments of the present invention may be provided as a computer program product, which may include a machine-readable storage medium tangible
20 embodying thereon instructions, which may be used to program a computer (or other electronic devices) to perform a process. The term “machine-readable storage medium” or “computer-readable storage medium” includes, but is not limited to,

fixed (hard) drives, magnetic tape, floppy diskettes, optical disks, compact disc read-only memories (CD-ROMs), and magneto-optical disks, semiconductor memories, such as ROMs, PROMs, random access memories (RAMs), programmable read-only memories (PROMs), erasable PROMs (EPROMs),
5 electrically erasable PROMs (EEPROMs), flash memory, magnetic or optical cards, or other type of media/machine-readable medium suitable for storing electronic instructions (e.g., computer programming code, such as software or firmware). A machine-readable medium may include a non-transitory medium in which data may be stored and that does not include carrier waves and/or transitory
10 electronic signals propagating wirelessly or over wired connections.

[0036] Examples of a non-transitory medium may include, but are not limited to, a magnetic disk or tape, optical storage media such as compact disk (CD) or digital versatile disk (DVD), flash memory, memory or memory devices. A computer-program product may include code and/or machine-executable instructions that
15 may represent a procedure, a function, a subprogram, a program, a routine, a subroutine, a module, a software package, a class, or any combination of instructions, data structures, or program statements. A code segment may be coupled to another code segment or a hardware circuit by passing and/or receiving information, data, arguments, parameters, or memory contents. Information,
20 arguments, parameters, data, etc. may be passed, forwarded, or transmitted via any suitable means including memory sharing, message passing, token passing, network transmission, etc.

[0037] Furthermore, embodiments may be implemented by hardware, software, firmware, middleware, microcode, hardware description languages, or any combination thereof. When implemented in software, firmware, middleware or microcode, the program code or code segments to perform the necessary tasks (e.g., a computer-
5 program product) may be stored in a machine-readable medium. A processor(s) may perform the necessary tasks.

[0038] Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the pertinent art have given that term as reflected in printed publications and issued
10 patents at the time of filing.

[0039] The present invention will now be described more fully hereinafter. This invention may, however, be embodied in many different forms and should not be construed as being limited to the embodiment set forth herein. Rather, the embodiment is provided so that this disclosure will be thorough, and will fully convey the scope of
15 the invention to those skilled in the art.

[0040] The present disclosure is best understood with reference to the detailed figures and description set forth herein. Various embodiments have been discussed with reference to the figures. However, those skilled in the art will readily appreciate that the detailed descriptions provided herein with respect to the figures are merely
20 for explanatory purposes, as the methods and systems may extend beyond the described embodiments. For instance, the teachings presented and the needs of a particular application may yield multiple alternative and suitable approaches to

implement the functionality of any detail described herein. Therefore, any approach may extend beyond certain implementation choices in the following embodiments.

[0041] References to “one embodiment,” “at least one embodiment,” “an embodiment,” “one example,” “an example,” “for example,” and so on indicate that the embodiment(s) or example(s) may include a particular feature, structure, characteristic, property, element, or limitation but that not every embodiment or example necessarily includes that particular feature, structure, characteristic, property, element, or limitation. Further, repeated use of the phrase “in an embodiment” does not necessarily refer to the same embodiment.

[0042] Methods of the present invention may be implemented by performing or completing manually, automatically, or a combination thereof, selected steps or tasks. The term “method” refers to manners, means, techniques and procedures for accomplishing a given task including, but not limited to, those manners, means, techniques, and procedures either known to, or readily developed from known manners, means, techniques and procedures by practitioners of the art to which the invention belongs. The descriptions, examples, methods, and materials presented in the claims and the specification are not to be construed as limiting but rather as illustrative only. Those skilled in the art will envision many other possible variations within the scope of the technology described herein.

[0043] FIG. 1 illustrates a representation of the use case diagram for the present system and FIGs. 2A and 2B illustrates representations of the data flow diagrams for the present system at levels 0 and 1 respectively. The use case diagram is used to

describe the actor and their roles in the application. There are two actors in the system, the blind user and his / her peer. The blind user input peer's name as voice command. Data acquisition involves collection of required data from user. Navigation assistance is given to reach peer's location with obstacle detection. User
5 is acknowledged once he reaches the destination.

[0044] FIG. 3 discloses an exemplary architecture of the system in the present disclosure. The present system consists of data acquisition, indoor positioning, and navigation with obstacle detection. Since smartphones are commonly equipped with Wi-Fi sensors and its user friendliness, makes them adequate devices to implement such
10 an indoor positioning system. Most of the actual techniques, especially those requiring satellite coverage, are not suitable for indoor positioning. As nearly all modern buildings are equipped with Wi-Fi access points, indoor positioning using IEEE 802.11 standard has become a realistic alternative

[0045] The present system has two phases: Offline phase and Online phase. Offline phase
15 comprises of data collection (RSSI) from the indoor space and backend working whereas online phase includes Wi-Fi scanning, and location tracking.

[0046] In the offline phase, signal strength of Wi-Fi is recorded at different reference points in the indoor environment. Corresponding to each signal strength a location value or id is assigned and are stored in database for future use.

[0047] In the online phase, when the user enters inside the building, user's device
20 automatically connects to the Wi-Fi in the building. User gives peer's name as voice command, and voice input is converted to text using Speech-To-Text python

module. NodeMCU, which is serially connected to the raspberry Pi 3b+, scans the nearby Wi-Fi devices and records the signal strength from the user and peer devices and send the data to the database.

[0048] Indoor localization is performed using Wi-Fi fingerprinting algorithm. The Wi-Fi
5 fingerprints collected in the offline phase is compared with the signal strength recorded during the online phase. Based on the comparison, the id or tag corresponding to the matching fingerprint is taken as the location of the user and/or peer.

[0049] Based on the location estimated and the video frames captured, safer navigation
10 guidance is provided to the user. During navigation, presence of obstacles are detected using the SSD MobileNet V2 object classifier model. The predictions regarding the obstacles detected, can be viewed on the application. Communication between the raspberry Pi 3b+ processor and the application is done using MQTT (Message Queuing Telemetry Transport) protocol.

[0050]15 Our present system uses SSD-MobileNet V2 architecture on real time frames for object detection and classification. This architecture uses proven depth-wise separable convolutions to build lightweight deep neural networks. SSD has two components: SSD head and a backbone model. Backbone model basically is a trained image classification network as a feature extractor. The SSD head is just
20 one or more convolutional layers added to this backbone and the outputs are interpreted as the bounding boxes and classes of objects in the spatial location of the final layers activations. SSD is trained with COCO (Common Objects in

Context) dataset containing more than 200,000 images and 250,000 person instances labeled with key points.

[0051] Raspberry Pi 3b+ controller does the processing. Input sources are Wi-Fi interface (for voice commands), camera interface, and Node MCU interface. The system
5 processes the inputs and generates directional text messages for indoor navigation using navigational and localization algorithm. The direction command as well as the obstacle command is produced. The user should be acknowledged on reaching destination. Text-converted voice commands and navigational data are interchanged on the same Wi-Fi interface.

[0052]10 The system tracks the mobile devices in the indoor environment based on the Wi-Fi radiation of the mobile device, so there is no need for an additional software to be installed on the device. Once the device is connected to the Wi-Fi hotspot, the system will estimate its location.

[0053] An Android application is designed to help the blind user to detect the obstacles
15 and to input/output voice commands to and from the system. This application is developed using Android Studio which is the official Integrated Development Environment (IDE) for Android app development. Tensorflow API displays a screen with upper part showing the obstacle detection result and the lower part showing the layout information. The system is set up in such a way where an
20 android application will capture real-time frames and will send it to a laptop based networked server where all the computations take place. After passing the model name, camera widget, and set recognition (which contains a dynamic list for store

results with image height and width) to the Camera class and the permission is granted, it will use these data to run the live feed frame-by-frame to detect objects presented in the feed.

[0054] In the present system there is no need of any extra hardware or software set up,
5 since Wi-Fi technology is used for localization. Accurate indoor location estimation is also provided. Using fingerprinting algorithm continuous positioning is obtained and environmental effects are also considered in the calibration phase. The system is small, smart and cheaper as Raspberry Pi and NodeMCU are used for processing and data collection. SSD MobileNet V2 used for obstacle detection is considered
10 as the fastest and most accurate object detection architecture. Thus system provides independent and safer navigation for visually impaired in the indoor space. It is considered user friendly since audio input / output is provided and smartphone is used for localization purpose.

[0055] The present system is designed to help visually impaired to meet people and provide
15 a safer and independent navigation in the indoor space. The system uses Wi-Fi and NodeMCU in the indoor environments to allocate and track the user's location and fingerprinting algorithm is used to estimate the position. Wi-Fi fingerprinting is found to have high accuracy and precision compared to other positioning algorithm.

[0056] Single Shot Detector (SSD) used for obstacle detection achieves a good balance
20 between speed and accuracy. SSD with MobileNet V2 as the base network provides a very efficient mobile-oriented model that can be used as a base for many visual recognition tasks. The biggest advantage of using SSD is, it is extremely fast and

can process 59 frames per second. The present system generates paths which suit the need of a VIP in terms of accuracy, computation time and user friendliness. This system will enable the blind people to overcome various physical, social and accessibility barriers.

[0057] 5 While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions, or examples, which are included to enable a person having ordinary skill in the art to
10 make and use the invention when combined with information and knowledge available to the person.

15

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Patent Agent On Behalf of the Applicants

CLAIMS

We claim,

1. A system for indoor navigation of the visually impaired, comprising:
 - at least an image capturing module;
 - 5 one or more processors;
 - a plurality of output modules.
2. The system as claimed in claim 1 wherein, the said image capturing module is preferably a camera configured to detect objects in the indoor region, track and pass a record of the various obstacles in a pathway.
- 10 3. The system as claimed in claims 1 and 2 wherein, the said processor is preferably a Raspberry Pi configured in it is an artificial intelligence algorithm capable of receiving the data from the image capturing module on the nature of the obstacles and classify them accordingly based on the images captured.
- 15 4. The system as claimed in claims 2 and 3 wherein, the said algorithm is further configured to also identify the objects by classification according to the images stored in the database so as to enable the person locating the objects within the household as and when required.

5. The system as claimed in claim 1 wherein, the said output device is preferably a speaker configured with it is a microphone to receive the inputs of the person and to pass instructions to the person about the distance, size and height of the object in the visual region and also on the classification of the object as identified by the image processing algorithm.

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Patent Agent On Behalf of the Applicants

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ABSTRACT

A SYSTEM FOR INDOOR NAVIGATION OF THE VISUALLY IMPAIRED

The present invention relates to the field of biomedical engineering and particularly
5 it discloses an intelligent navigation system for the visually impaired people to
commute within the indoor spaces without any collisions. The present system is
designed to help visually impaired to meet people and provide a safer and
independent navigation in the indoor space. The system uses Wi-Fi and NodeMCU
in the indoor environments to allocate and track the user's location and
10 fingerprinting algorithm is used to estimate the position. Wi-Fi fingerprinting is
found to have high accuracy and precision compared to other positioning algorithm.

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15



FIGURE 1

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FIGURE 2A

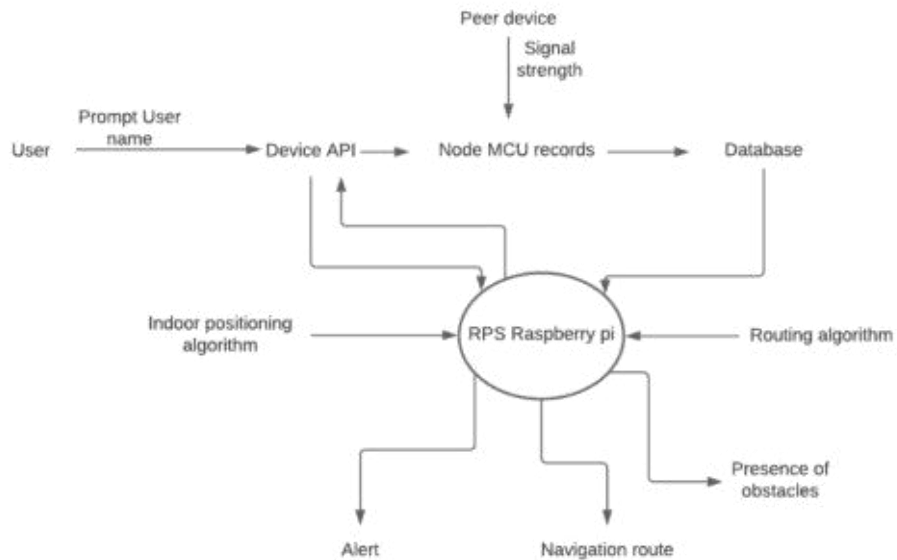


FIGURE 2B

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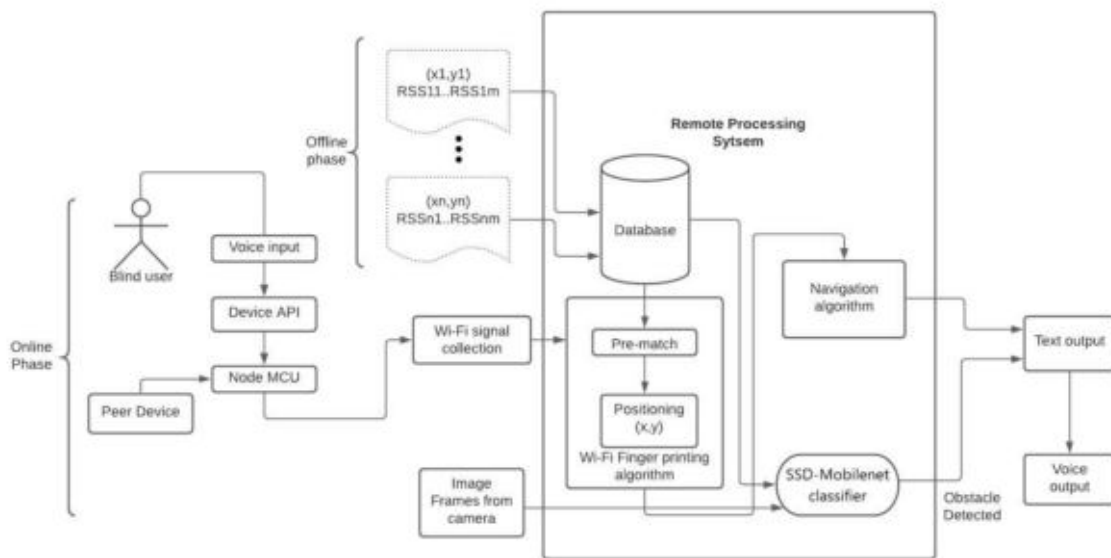


FIGURE 3

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FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241053319 dated 18-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:

NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 18th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
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Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241053319** Dated **18th day of Sep , 2022** are

INVENTOR (S):

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Dated This 18th day of Sep, 2022

Signature,



NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-
-N.A-

To,
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Theni Hwy, Guindy, Chennai, Tamil Nadu- 600032

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/58790/2022-CHE

Dated **08/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

Name of the signatory

To,
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G.A.R.6
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CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241053320	TEMP/E-1/59428/2022-CHE	1600	37516	FORM 1	A Helmet Operated Smart Control System for Two Wheeled Automotive
2	202241053321	TEMP/E-1/59429/2022-CHE	1600	37516	FORM 1	A Trackable and Communicative Helmet Device for Miners
3	E-12/7075/2022/CHE	202241053319	2500	37516	FORM 9	----
4	E-12/7074/2022/CHE	202241053320	2500	37516	FORM 9	----
5	E-12/7076/2022/CHE	202241053321	2500	37516	FORM 9	----
6	202241053319	TEMP/E-1/58790/2022-CHE	1600	37516	FORM 1	A System for Indoor Navigation of the Visually Impaired
7	E-106/5545/2022/CHE	202241053319	0	----	FORM28	----
8	E-106/5547/2022/CHE	202241053320	0	----	FORM28	----
9	E-106/5546/2022/CHE	202241053321	0	----	FORM28	----

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001024390	Online Bank Transfer	1809220005469	12300.00	1475001020000001

Total Amount : ₹ 12300.00

Amount in Words: Rupees Twelve Thousand Three Hundred Only

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Docket No 89688

Date/Time 18/09/2022

**To
PREM CHARLES**

User Id: prem1987

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Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241053321	E-3/29324/2022/CHE	0	----	FORM 3	
2	202241053321	E-5/3773/2022/CHE	0	----	FORM 5	
3	202241053320	E-5/3774/2022/CHE	0	----	FORM 5	
4	202241053320	E-3/29325/2022/CHE	0	----	FORM 3	
5	202241053319	E-5/3775/2022/CHE	0	----	FORM 5	
6	202241053319	E-3/29326/2022/CHE	0	----	FORM 3	

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**OFFICIAL JOURNAL
OF
THE PATENT OFFICE**

निर्गमन सं. 38/2022
ISSUE NO. 38/2022

शुक्रवार
FRIDAY

दिनांक: 23/09/2022
DATE: 23/09/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

**(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS**

23rd SEPTEMBER, 2022

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202241053320 A

(19) INDIA

(22) Date of filing of Application :18/09/2022

(43) Publication Date : 23/09/2022

(54) Title of the invention : A Helmet Operated Smart Control System for Two Wheeled Automotive

(51) International classification :A42B0003300000, G08C0017020000, G08C0023040000, G08B0021020000, E03C0001050000

(86) International Application No :PCT//
Filing Date :01/01/1900

(87) International Publication No : NA

(61) Patent of Addition to Application Number :NA
Filing Date :NA

(62) Divisional to Application Number :NA
Filing Date :NA

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(57) Abstract :

The present invention relates to the field of mechatronics and more particularly it refers to a smart helmet device configured to control a two wheeled automotive through interdependent communication modules. The system consists of two modules, transmitter side contains two sensors- alcohol sensor and IR sensor and a transmitter circuitry. Alcohol sensor put close to the mouth of the rider. The Zigbee module transmits information from the helmet side to the recipient on the vehicle side. The receiver side works with wireless communication. The receiver side Zigbee receives information from the transmitter side and sends it to the Arduino Uno for further handling.

No. of Pages : 26 No. of Claims : 6



Application Filing Receipt

**Government of India
Patent Office**
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CBR Number : 37516

CBR date: 18-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
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Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting to be an application for patent numbered 202241053320 dated 18-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to A Helmet Operated Smart Control System for Two Wheeled Automotive together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority or date of filing, whichever is earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority or date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

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Government of India

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Application Details

APPLICATION NUMBER	202241053320
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	18/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	A Helmet Operated Smart Control System for Two Wheeled Automotive
FIELD OF INVENTION	TEXTILE
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E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	23/09/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)

&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:
Filing Date:
Amount of Fee Paid:
CBR No.:
Signature:

1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
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2. INVENTOR(S):

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5	Jinita Elisa Augustine	India	Student, Department of Electronics and Communication Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

3. TITLE OF THE INVENTION: A Helmet Operated Smart Control System for Two Wheeled Automotive

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5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Title of the Invention
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6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application
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8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application
--	---

9. DECLARATIONS:

(i) Declaration by the inventor(s)

I/We ,Dr. Reema Mathew A.,Manoj K.C.,Anjitha Satheesan T. K.,Jesna k.,Jinita Elisa Augustine, is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Dr. Reema Mathew A.,Manoj K.C.,Anjitha Satheesan T. K.,Jesna k.,Jinita Elisa Augustine

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the singnatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- **The Complete specification relationg to the invention is filed with this application.**
- **I am/We are, in the possession of the above mentioned invention.**
- **There is no lawful ground of objection to the grant of the Patent to me/us.**
- **I am/We are, the assignee or legal representative to true first inventors.**

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
------------	-----------------------------	-----------------

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hering are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

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The Patent office at CHENNAI

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

A Helmet Operated Smart Control System for Two Wheeled Automotive

2. APPLICANT(S)

NAME(S)

NATIONALITY

ADDRESS

VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

**A HELMET OPERATED SMART CONTROL SYSTEM FOR TWO
WHEELED AUTOMOTIVE**

FIELD OF INVENTION

[001] The present invention relates to the field of mechatronics and more particularly it
5 refers to a smart helmet device configured to control a two wheeled automotive
through interdependent communication modules.

BACKGROUND OF INVENTION

[002] Background description includes information that may be useful in understanding
the present invention. It is not an admission that any of the information provided
10 herein is prior art or relevant to the presently claimed invention, or that any
publication specifically or implicitly referenced is prior art.

[003] According to available statistical data, over 1.3 million people die each year on the
road and 20 to 50 million people suffer non-fatal injuries due to road accidents.
There are total of 154.3 million two wheelers are there in India, considering only
15 the registered and renewed vehicle in to consideration, as the density of the two
wheelers increases, there the main risk factor is to provide the safety to the riders.

[004] A driver who is drunken or sleepy while driving loses control of the vehicle, an
action which often results in a crash with either another vehicle or stationary
objects. In order to prevent these devastating accidents, it has to be verified that the
20 person has not consumed alcohol and the state of drowsiness of the driver should

be monitored as well. Smart helmet, which comprises of two units, motor unit and helmet unit, Helmet unit consists of the alcohol and Eye blink sensor, Alcohol Sensor will not allow rider to take on bike after drinking alcohol and eye blink sensor raises the alarm in sleeping conditions. The bike is forced to stop then.

[005] 5 A researcher proposed a mechanism that it can detect if one is wearing the helmet, detect accidents, and detect whether the person has over-consumed alcohol. For this purpose, here uses onboard sensors – flex sensor, impact sensor, accelerometer (ADXL355) and breath-analyzer (MQ3).The accelerometer measures the change in tilt, in X, Y and Z axes respectively, and sends the data to a server via an online
10 application programming interface (API). The breath analyzer senses the amount of alcohol present in the breath of a person wearing the helmet and reports if it is beyond the legal limit. The server also uses the data gathered from the accelerometer and the pressure sensors, to train a support vector machine (SVM).This can help optimize accident detection in the future when enough data is
15 gathered to provide reliable accuracy. The helmet can connect to any smartphone via Bluetooth, to communicate with the online API, using the internet connection of the smartphone. This will ensure the holistic safety of the rider at all times. The comparison of the parameters for accident detection, with and without the use of the alarm, shows how important the use of an alarm is, to report false accident
20 detection. However, repeated unwanted need to respond to the alarm while driving can cause discomfort and distraction. Therefore, this is not safe either.

[006] Another researcher proposed a system to reduce head injuries from road accidents and from bike theft. The system has mainly focused on helmet use as mandatory by providing two solutions in the helmet itself, which are security lock system and safety engine system these two application are operated when user uses the helmet
5 in a proper manner. Here the engine will be on if and only if he or she wears the helmet. For sensing that an FSR is used it is nothing but a pressure sensor. This sensor detect the pressure applied by the user while the user wears his helmet and hooks it properly. A limitation to this system is that the engine remains off even
10 though he or she wears the helmet, this is because sometimes he may not hook it properly or the pressure applied by him does not reach the threshold value.

[007] Yet another researcher stated that there are various reasons for accident such as not having adequate ability to drive, defective two wheelers drink and drive etc. It is important that there should be a facility to minimize the after effect of these accidents. The main goal of this invention is to make it mandatory for a rider to
15 wear a helmet during ride. This system detects whether the rider is wearing helmet with the help of a magnetic chip connected to the helmet. Also uses an alcohol sensor to detect the presence. Accident detection circuit is made up of an accelerometer, and some resistors. The accelerometer check the tilt of the helmet to determine the occurrence of an accident. Even though this system determines that
20 an accident had occurred there is no such medium that can inform about the accident, in that case the system can be improved by providing GPS and GSM module.

[008] Yet another researcher proposed a smart helmet system is divided into two modules which both of the modules are mounted on the side of the helmet and mounted on the motorcycle dashboard. Each module is controlled by the Arduino and the communication between the module use nRF24L01+.The initialization connection
5 between the helmet module and the bike module is started. If the connection is failed, then the reconnection process will be started. If the connection is success, then the light will light up constant but if failed the light will blink. The helmet module sends a helmet usage status and helmet strap lock status to the bike module. The buzzer and the helmet light notification will light up when one of the status
10 condition is not fulfilled. The speed of the motorcycle is calculated by converting the wheel rotation into linear speed. If the speed is above the speed limit, then the speed light notification and the buzzer will light up. The shock detection is done when the motorcycle passes through the road obstacle. If the shock above the safe shock limit, then the shocking indicator light will light up. This study succeeded
15 designed a smart helmet that has several features which are functioned properly. The warning notification is generated to notify the rider when meets the unsafe condition such as the rider does not wear the helmet, the helmet strap is not locked correctly and the motorcycle is over the safe speed limit. This study also introduces a new feature to warn the rider when passing through the obstacle at an unsafe speed
20 that caused strong shocks and compromised the stability of the motorcycle.

[009] Yet another researcher proposed a system in which the whole work is partitioned into four different verticals: Accident identification and alert module, navigation system, Voice call service through Bluetooth device and a solar panel for external

power source. In Accident Identification and Intimation part, pressure sensors are used to sense when the pressure exceeds the present value. ARDUINO board is used for sending an alert which is interfaced with a GSM module. The alerts can be sent to ambulance and guardians. In Navigation, the helmet is interfaced with our
5 mobile so once the navigating places are fixed then the route to the destination location is intimated using voice intimation. We can interface this with INRSS in future thereby promote in gournations navigation application. In voice call, as the helmet is interfaced with the phone whenever a phone call is received the user can attend his call by the use of voice recognition system. As the phone is interfaced
10 the probability of charge attached to the helmet. This can also be used as a power bank. The features of the present system can be further extended to place a call to an ambulance when an accident occurs and offers to pick up calls from the dialers using the concept of voice recognition system and the automatic text reader to read out the text sent to the driver, which ensures reduced accidents.

[0010]15 However, there is a pressing need for a better and efficient system to further improvise the overall requirement and hence we come up with the present invention.

[0011] Further limitations and disadvantages of conventional and traditional approaches will become apparent to one of skill in the art through comparison of described
20 systems with some aspects of the present disclosure, as set forth in the remainder of the present application and with reference to the drawings.

[0012] In some embodiments, the numbers expressing quantities or dimensions of items, and so forth, used to describe and claim certain embodiments of the invention are to be understood as being modified in some instances by the term “about.” Accordingly, in some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiments of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0013]5 As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

[0014] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or

otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g. “such as”) provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0015] Groupings of alternative elements or embodiments of the invention disclosed herein are not to be construed as limitations. Each group member can be referred to and claimed individually or in any or a combination with other members of the group or other elements found herein. One or more members of a group can be included in, or deleted from, a group for reasons of convenience and/or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all groups used in the appended claims.

15 **OBJECTS OF THE INVENTION:**

[0016] A general object of the present invention is to design an intelligent or smart helmet, which act as a security system and also contain a monitoring system for the two wheeler and its rider, to design a low-cost intelligent helmet and to identify alcohol consumption and preventing road accidents.

[0017] These features and advantages of the present disclosure may be appreciated by reviewing the following description of the present disclosure, along with the accompanying figures wherein like reference numerals refer to like parts.

[0018] Various objects, features, aspects and advantages of the inventive subject matter will become more apparent from the following detailed description of the preferred embodiments, along with the accompanying drawing figures in which the numerals represent the like components.

[0019]5 Within the scope of this application it is expressly envisaged that the various aspects, embodiments, examples, alternatives set out in the preceding paragraphs, in the claims and/or the following description and drawings, and in particular the individual features thereof, may be taken independently or in any or a combination. Features described in connection with one embodiment are applicable to all
10 embodiments, unless such features are incompatible.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The accompanying drawings are included to provide a further understanding of the present disclosure and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and,
15 together with the description, serve to explain the principles of the present disclosure.

[0021] A complete understanding of the system and method of the present invention may be obtained by reference to the following drawings:

FIG. 1 illustrates an exemplary block diagram of the present system on the helmet
20 part.

FIG. 2 represents another exemplary block diagram of the present system on the vehicle part.

FIG. 3A and 3B represents a circuit diagram of the system on the helmet and the vehicle parts respectively.

5 **DETAILED DESCRIPTION**

[0022] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to clearly communicate the disclosure. However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0023] In the following description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0024] Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be embodied in machine-executable instructions, which may be used to cause a general-purpose or special purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0025] Various methods described herein may be practiced by combining one or more machine-readable storage media containing the code according to the present invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a
5 single computer) and storage systems containing or having network access to computer program(s) coded in accordance with various methods described herein, and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

[0026]10 The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and
15 arrangement of elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0027] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these
20 specific details. For example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known

circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

[0028] Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those of ordinary skill in the art. The invention disclosed may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein.

[0029] Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives, modifications and equivalents consistent with the principles and features disclosed. For purpose of clarity, details relating to technical material that is known in the

technical fields related to the invention have not been described in detail so as not to unnecessarily obscure the present invention.

[0030] Thus, for example, it will be appreciated by those of ordinary skill in the art that the diagrams, schematics, illustrations, and the like represent conceptual views or
5 processes illustrating systems and methods embodying this invention. The functions of the various elements shown in the figures may be provided through the use of dedicated hardware as well as hardware capable of executing associated software. Similarly, any switches shown in the figures are conceptual only. Their function may be carried out through the operation of program logic, through
10 dedicated logic, through the interaction of program control and dedicated logic, or even manually, the particular technique being selectable by the entity implementing this invention. Those of ordinary skill in the art further understand that the exemplary hardware, software, processes, methods, and/or operating systems described herein are for illustrative purposes and, thus, are not intended to be
15 limited to any particular named element.

[0031] Embodiments of the present invention may be provided as a computer program product, which may include a machine-readable storage medium tangible embodying thereon instructions, which may be used to program a computer (or other electronic devices) to perform a process. The term “machine-readable storage
20 medium” or “computer-readable storage medium” includes, but is not limited to, fixed (hard) drives, magnetic tape, floppy diskettes, optical disks, compact disc read-only memories (CD-ROMs), and magneto-optical disks, semiconductor

memories, such as ROMs, PROMs, random access memories (RAMs), programmable read-only memories (PROMs), erasable PROMs (EPROMs), electrically erasable PROMs (EEPROMs), flash memory, magnetic or optical cards, or other type of media/machine-readable medium suitable for storing
5 electronic instructions (e.g., computer programming code, such as software or firmware). A machine-readable medium may include a non-transitory medium in which data may be stored and that does not include carrier waves and/or transitory electronic signals propagating wirelessly or over wired connections.

[0032] Examples of a non-transitory medium may include, but are not limited to, a
10 magnetic disk or tape, optical storage media such as compact disk (CD) or digital versatile disk (DVD), flash memory, memory or memory devices. A computer-program product may include code and/or machine-executable instructions that may represent a procedure, a function, a subprogram, a program, a routine, a subroutine, a module, a software package, a class, or any combination of
15 instructions, data structures, or program statements. A code segment may be coupled to another code segment or a hardware circuit by passing and/or receiving information, data, arguments, parameters, or memory contents. Information, arguments, parameters, data, etc. may be passed, forwarded, or transmitted via any suitable means including memory sharing, message passing, token passing, network
20 transmission, etc.

[0033] Furthermore, embodiments may be implemented by hardware, software, firmware, middleware, microcode, hardware description languages, or any combination

thereof. When implemented in software, firmware, middleware or microcode, the program code or code segments to perform the necessary tasks (e.g., a computer-program product) may be stored in a machine-readable medium. A processor(s) may perform the necessary tasks.

[0034] 5 Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the pertinent art have given that term as reflected in printed publications and issued patents at the time of filing.

[0035] The present invention will now be described more fully hereinafter. This invention
10 may, however, be embodied in many different forms and should not be construed as being limited to the embodiment set forth herein. Rather, the embodiment is provided so that this disclosure will be thorough, and will fully convey the scope of the invention to those skilled in the art.

[0036] The present disclosure is best understood with reference to the detailed figures and
15 description set forth herein. Various embodiments have been discussed with reference to the figures. However, those skilled in the art will readily appreciate that the detailed descriptions provided herein with respect to the figures are merely for explanatory purposes, as the methods and systems may extend beyond the described embodiments. For instance, the teachings presented and the needs of a
20 particular application may yield multiple alternative and suitable approaches to implement the functionality of any detail described herein. Therefore, any approach may extend beyond certain implementation choices in the following embodiments.

[0037] References to “one embodiment,” “at least one embodiment,” “an embodiment,” “one example,” “an example,” “for example,” and so on indicate that the embodiment(s) or example(s) may include a particular feature, structure, characteristic, property, element, or limitation but that not every embodiment or
5 example necessarily includes that particular feature, structure, characteristic, property, element, or limitation. Further, repeated use of the phrase “in an embodiment” does not necessarily refer to the same embodiment.

[0038] Methods of the present invention may be implemented by performing or completing manually, automatically, or a combination thereof, selected steps or tasks. The term
10 “method” refers to manners, means, techniques and procedures for accomplishing a given task including, but not limited to, those manners, means, techniques, and procedures either known to, or readily developed from known manners, means, techniques and procedures by practitioners of the art to which the invention belongs. The descriptions, examples, methods, and materials presented in the claims and the
15 specification are not to be construed as limiting but rather as illustrative only. Those skilled in the art will envision many other possible variations within the scope of the technology described herein.

[0039] We are developing a smart helmet using the internet of things (IoT) technology, in which we ensure the safety of the bike rider. The system detects whether the rider
20 is wearing a helmet or not if he wears then only the vehicle will start. It detects the amount of alcohol consumed by the rider, if the rider has over drunk, the bike engine

will not start. When the bike rider meets with an accident it detects it and gives the notification to the registered contact with a location.

[0040] For the safety of the bike rider, we are using the latest technology IoT, this technology provides the advance techniques for alerting the rider and ensures that
5 rider follows the rules and regulations. For two-wheeler rider, Helmet is the most basic protection device and it is necessary for every bicycle or motorbike riders. But it does not ensure the safety of the rider and the rider won't follow the traffic rules. Most of the people use ordinary helmet just to avoid giving challan to the traffic police, these helmets do not ensure the safety of the driver. So, to overcome
10 these problems we need to use the smart helmet.

[0041] FIG. 1 illustrates an exemplary block diagram of the present system on the helmet part. An alcohol sensor is placed near to mouth of the driver in the helmet to detect the presence of alcohol. The engine of the vehicle will be on and off if and only if he wears the helmet. A node MCU, sensor and a button are used. If the button is
15 pressed and sensor senses it, Zigbee a communication module is used which transmit the information to Arduino UNO which controls the engine. To show the ON/OFF condition of engine a motor is used. Also, accident detection is done buy using an accelerometer, and an android device. When accident is detected, message will be sent to the number saved in the device. The location is also identified from
20 the message. Since the android device contain both GPS and GSM.

[0042] It consists of two modules. Transmitter Side (Helmet)-Contains two sensors- alcohol sensor and IR sensor and a transmitter circuitry. Alcohol sensor put close

to the mouth of the rider. The Zigbee module transmits information from the helmet side to the recipient on the vehicle side.

[0043] FIG. 2 represents another exemplary block diagram of the present system on the vehicle part. Receiver Side (Vehicle)-Works with wireless communication. The receiver side Zigbee receives information from the transmitter side and sends it to the Arduino Uno for further handling.

[0044] FIG. 3A and 3B represents a circuit diagram of the system on the helmet and the vehicle parts respectively. This invention discusses and reviews the various Smart helmet and functions of some of the smart helmet features that exist in the world based on many references from journals and books. How Smart helmets work, problems before and after Smart helmets are made, and what will be in the future. We also can't deny that the internet has the most impact on the systems in this review invention, while IoT is the main reason why these discussions were born. The Internet of Things or IoT in the Health care section aims to draw beads on the urgent person for a healthy life, to make people live more carefully, and to make them more aware of their safety during the journey. Smart Helmet is built with a lot of well-equipped systems and features, so they can still wear Smart Helmet like they wear the usual ones. Therefore, the material chosen for this invention is well chosen in order to create a Smart Helmet review with nice features but still worth it in every aspect. Various technologies have been applied and analyzed in this invention, which each technology reminds to raise the awareness of the riders. This

invention has the substance of IoT features, in which each feature is created with consideration and exploration.

[0045] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions, or examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge available to the person.

10

#####DIGITALLY SIGNED#####
PREM CHARLES I
Registered Patent Agent INPA-3311
Patent Agent On Behalf of the Applicants

15

CLAIMS

We claim,

1. A helmet operated smart control system for two wheeled automotive,
comprising:
 - 5 a plurality of sensors;
 - at least one communication module;
 - one or more processors; and
 - a GPS module .
2. The system as claimed in claim 1 wherein, the said plurality of sensors are
10 preferably an alcohol sensor and an accelerometer.
3. The system as claimed in claims 1 and 2 wherein, the said sensors are
configured to sense the rider's alcohol consumption and the speed of the
vehicle.
4. The system as claimed in claim 1 wherein, the said communication module
15 is preferably a zigbee configured and characterized in it is a GSM
communication module operatively coupled to a sim card to process
communication to mobile phone devices.

5. The system as claimed in claims 1, 2 and 4 wherein, the said processor is preferably an Arduino configured to receive data from the said plurality of sensors, process and communicate through the said communication module.

6. The system as claimed in claims 1 and 5 wherein, the said GPS module is configured and operatively coupled to the said processor thereby characterized to send a message through commands received from the processor the exact location upon cases of accidents.

10

#####DIGITALLY SIGNED#####
PREM CHARLES I
Registered Patent Agent INPA-3311
Patent Agent On Behalf of the Applicants

15

20

ABSTRACT

A HELMET OPERATED SMART CONTROL SYSTEM FOR TWO WHEELED AUTOMOTIVE

The present invention relates to the field of mechatronics and more particularly it
5 refers to a smart helmet device configured to control a two wheeled automotive
through interdependent communication modules. The system consists of two
modules, transmitter side contains two sensors- alcohol sensor and IR sensor and a
transmitter circuitry. Alcohol sensor put close to the mouth of the rider. The Zigbee
10 module transmits information from the helmet side to the recipient on the vehicle
side. The receiver side works with wireless communication. The receiver side
Zigbee receives information from the transmitter side and sends it to the Arduino
Uno for further handling.

#####**DIGITALLY SIGNED**#####
PREM CHARLES I
15 **Registered Patent Agent INPA-3311**
Patent Agent On Behalf of the Applicants

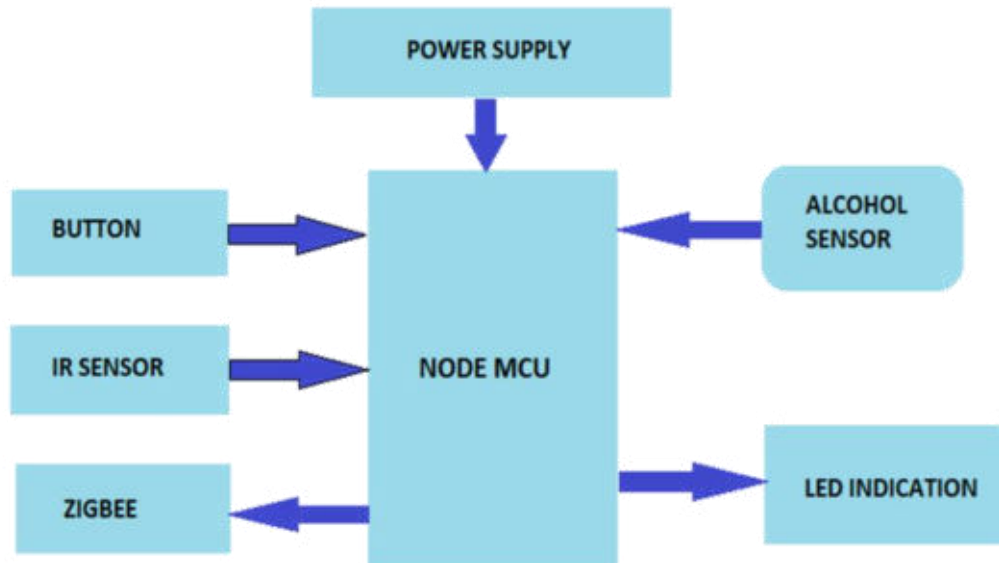


FIGURE 1

#####DIGITALLY SIGNED#####
PREM CHARLES I
Registered Patent Agent INPA-3311
Agent on Behalf of the Applicants

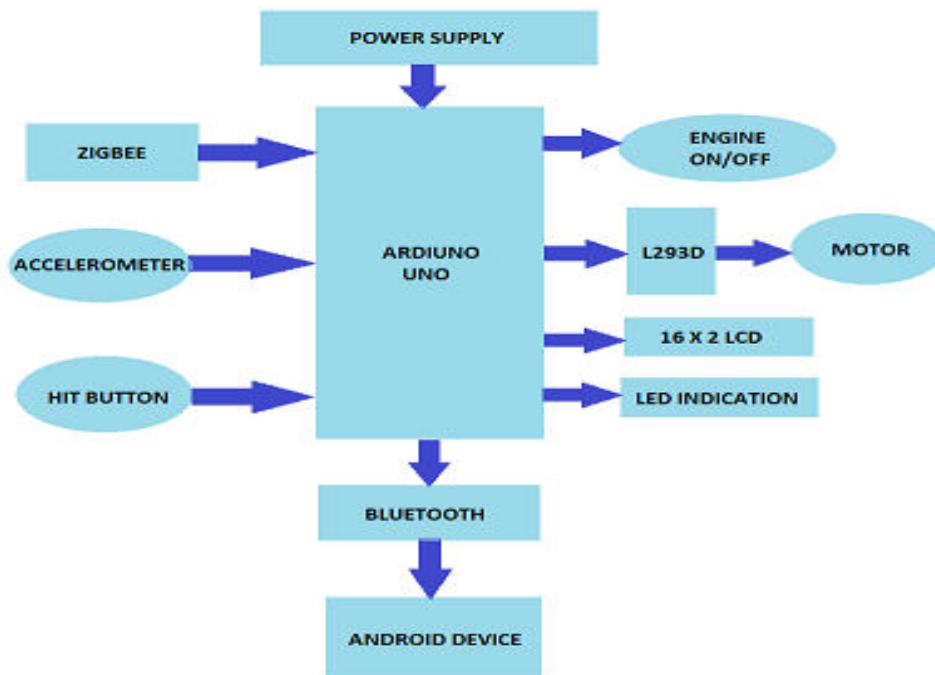


FIGURE 2

#####DIGITALLY SIGNED#####
PREM CHARLES I
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Agent on Behalf of the Applicants

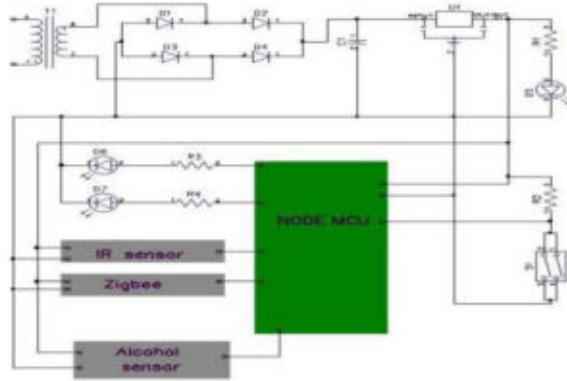


FIGURE 3A

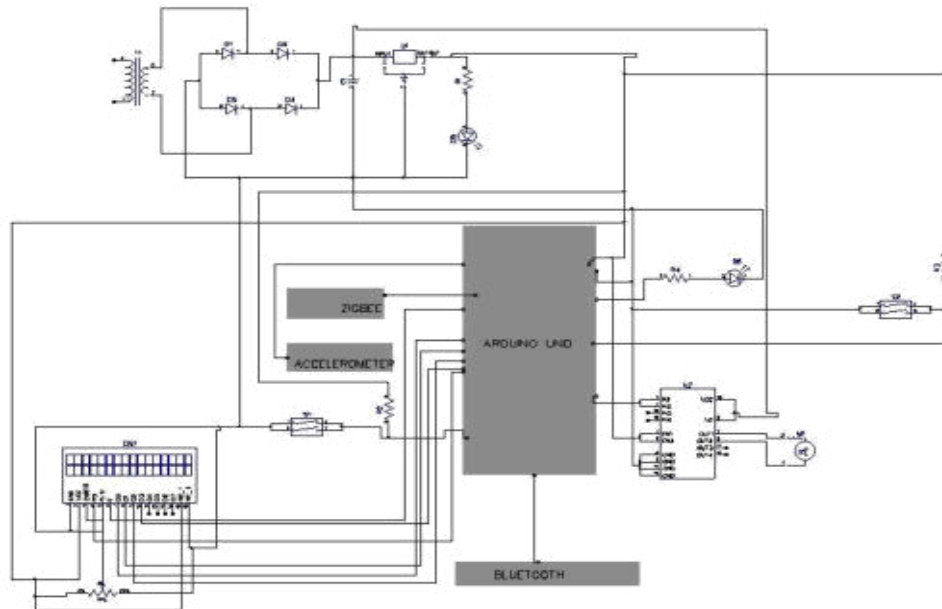


FIGURE 3B

#####DIGITALLY SIGNED#####
PREM CHARLES I
Registered Patent Agent INPA-3311
Agent on Behalf of the Applicants

FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241053320 dated 18-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:

NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 18th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241053320** Dated **18th day of Sep , 2022** are

INVENTOR (S):

- | | | |
|---|---|--|
| 1 | a) Name:
b) Nationality:
c) Address: | Dr. Reema Mathew A.
Indian
Associate Professor, Department of Electronics and Communication Engineering,
Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. |
| 2 | a) Name:
b) Nationality:
c) Address: | Manoj K. C.
Indian
Associate Professor, Department of Electronics and Communication Engineering,
Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. |
| 3 | a) Name:
b) Nationality:
c) Address: | Anjitha Satheesan T. K.
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Student, Department of Electronics and Communication Engineering, Vimal Jyothi
Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. |
| 4 | a) Name:
b) Nationality:
c) Address: | Jesna k.
Indian
Student, Department of Electronics and Communication Engineering, Vimal Jyothi
Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. |
| 5 | a) Name:
b) Nationality:
c) Address: | Jinita Elisa Augustine
Indian
Student, Department of Electronics and Communication Engineering, Vimal Jyothi
Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. |

Dated This 18thday ofSep,2022

Signature,



NAME: PREM CHARLES I(INPA 3311)

PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

To,

The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu- 600032

FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our [Patent Application No.] TEMP/E-1/59428/2022-CHE

Dated **11/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):------

Signature

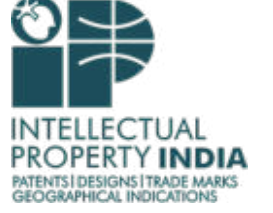
Name of the signatory

To,
The Controller of Patents,
The Patent Office,
At Chennai

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सत्यमेव जयते

G.A.R.6
[See Rule 22(1)]
RECEIPTController General of Patents, Designs & Trade
Marks

Docket No 89682

Date/Time 2022/09/18 20:42:05

To
PREM CHARLES

UserId: prem1987

360E, SENTHUR MURUGAN KOVIL
STREET, OPPOSITE SM MAHAL,
OLDPET

CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241053320	TEMP/E-1/59428/2022-CHE	1600	37516	FORM 1	A Helmet Operated Smart Control System for Two Wheeled Automotive
2	202241053321	TEMP/E-1/59429/2022-CHE	1600	37516	FORM 1	A Trackable and Communicative Helmet Device for Miners
3	E-12/7075/2022/CHE	202241053319	2500	37516	FORM 9	----
4	E-12/7074/2022/CHE	202241053320	2500	37516	FORM 9	----
5	E-12/7076/2022/CHE	202241053321	2500	37516	FORM 9	----
6	202241053319	TEMP/E-1/58790/2022-CHE	1600	37516	FORM 1	A System for Indoor Navigation of the Visually Impaired
7	E-106/5545/2022/CHE	202241053319	0	----	FORM28	----
8	E-106/5547/2022/CHE	202241053320	0	----	FORM28	----
9	E-106/5546/2022/CHE	202241053321	0	----	FORM28	----

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001024390	Online Bank Transfer	1809220005469	12300.00	1475001020000001

Total Amount : ₹ 12300.00

Amount in Words: Rupees Twelve Thousand Three Hundred Only

Received from PREM CHARLES the sum of ₹ 12300.00 on account of Payment of fee for above mentioned Application/Forms.

* This is a computer generated receipt, hence no signature required.

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Welcome PREM CHARLES

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Controller General of Patents, Designs & Trade
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G.S.T. Road, Guindy, Chennai-600032
Tel No. (091)(044) 22502081-84 Fax No. 044 22502066
E-mail: chennai-patent@nic.in
Web Site: www.ipindia.gov.in



Docket No 89688

Date/Time 18/09/2022

To
PREM CHARLES

User Id: prem1987

360E, SENTHUR MURUGAN
KOVIL STREET, OPPOSITE SM
MAHAL, OLDPET

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241053321	E-3/29324/2022/CHE	0	----	FORM 3	
2	202241053321	E-5/3773/2022/CHE	0	----	FORM 5	
3	202241053320	E-5/3774/2022/CHE	0	----	FORM 5	
4	202241053320	E-3/29325/2022/CHE	0	----	FORM 3	
5	202241053319	E-5/3775/2022/CHE	0	----	FORM 5	
6	202241053319	E-3/29326/2022/CHE	0	----	FORM 3	

Total Amount : ₹ 0

Amount in Words: Rupees Only

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**OFFICIAL JOURNAL
OF
THE PATENT OFFICE**

निर्गमन सं. 38/2022
ISSUE NO. 38/2022

शुक्रवार
FRIDAY

दिनांक: 23/09/2022
DATE: 23/09/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

**(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS**

23rd SEPTEMBER, 2022

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202241053321 A

(19) INDIA

(22) Date of filing of Application :18/09/2022

(43) Publication Date : 23/09/2022

(54) Title of the invention : A Trackable and Communicative Helmet Device for Miners

(51) International classification :A42B0003040000, H04L0029080000, G08B0021020000, G01N0027120000, A42B0001100000
(86) International Application No :PCT//
Filing Date :01/01/1900
(87) International Publication No : NA
(61) Patent of Addition to Application Number :NA
Filing Date :NA
(62) Divisional to Application Number :NA
Filing Date :NA

(71)Name of Applicant :

1)VIMAL JYOTHI ENGINEERING COLLEGE

Address of Applicant :Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. Chemperi -----

Name of Applicant : NA

Address of Applicant : NA

(72)Name of Inventor :

1)Namitha P.

Address of Applicant :Assistant Professor, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

2)Abin Babu

Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

3)Ashique Prem

Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

4)Deekshith C

Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

5)Sonu Paul

Address of Applicant :Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India. Chemperi -----

(57) Abstract :

The present invention relates to the field of IoT based wearables and more particularly it refers to a smart helmet device integrated with a communicative arrangement and a tracking system for the safety of miners. The system uses sensor to detect whether the miner has worn his/her helmet, detect certain gases and provide any alertness to the team. So in this system we has designed sensor like MQ-7(for detecting carbon monoxide), MQ-4(for gases like methane, hydrogen etc.), humidity and temperature sensor etc., Using these sensor we can provide the details to the supervisor and then to the base station. If there is any problem in the mine the supervisor has a switch to alert the miners and the base station has a switch to alert the external rescue unit.

No. of Pages : 28 No. of Claims : 4



Application Filing Receipt

**Government of India
Patent Office**
Intellectual Property Office Building,
G.S.T. Road, Guindy,
Chennai -600032
Phone- 044-22502081-84
Fax: 044-22502066
e-mail: chennai-patent@nic.in

CBR Number : 37516

CBR date: 18-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
VIMAL JYOTHI ENGINEERING COLLEGE
Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting be to an application for patent numbered 202241053321 dated 18-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to A Trackable and Communicative Helmet Device for Miners together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority of date of filing, whichever is earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority of date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

(For Controller of Patents)



Office of the Controller General of Patents, Designs & Trade Marks
Department of Industrial Policy & Promotion,
Ministry of Commerce & Industry,
Government of India

<http://ipindia.nic.in/index.htm>



<http://ipindia.nic.in/index.htm>

Application Details

APPLICATION NUMBER	202241053321
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	18/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	A Trackable and Communicative Helmet Device for Miners
FIELD OF INVENTION	TEXTILE
E-MAIL (As Per Record)	patents@allinnov.org
ADDITIONAL-EMAIL (As Per Record)	allinnovrnd@gmail.com
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	23/09/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:
Filing Date:
Amount of Fee Paid:
CBR No.:
Signature:

1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	VIMAL JYOTHI ENGINEERING COLLEGE	India	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

2. INVENTOR(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	Namitha P.	India	Assistant Professor, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
2	Abin Babu	India	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
3	Ashique Prem	India	Student,	India	Kerala	Kannur	Chemperi

			Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.				
4	Deekshith C	India	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
5	Sonu Paul	India	Student, Department of Computer Science and Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

3. TITLE OF THE INVENTION: A Trackable and Communicative Helmet Device for Miners

4. ADDRESS FOR CORRESPONDENCE OF APPLICANT / AUTHORISED PATENT AGENT IN INDIA:

Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Telephone No.:

Fax No.:

Mobile No: 9790586194

E-mail: patents@allinnov.org

5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Titile of the Invention
--------	---------	--------------------	-------------	-----------------------	-------------------------

6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application

9. DECLARATIONS:

(i) Declaration by the inventor(s)

I/We ,Namitha P.,Abin Babu,Ashique Prem,Deekshith C,Sonu Paul, is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Namitha P.,Abin Babu,Ashique Prem,Deekshith C,Sonu Paul

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the singnatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- The Complete specification relating to the invention is filed with this application.
- I am/We are, in the possession of the above mentioned invention.
- There is no lawful ground of objection to the grant of the Patent to me/us.
- I am/We are, the assignee or legal representative to true first inventors.

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - Miners' Helmet (7).pdf
2	DRAWINGS	Drawings - Miners' Helmet (7).pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hereing are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

To The Controller of Patents

The Patent office at CHENNAI

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

A Trackable and Communicative Helmet Device for Miners

2. APPLICANT(S)

NAME(S)	NATIONALITY	ADDRESS
---------	-------------	---------

VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

A TRACKABLE AND COMMUNICATIVE HELMET DEVICE FOR MINERS

FIELD OF INVENTION

[001] The present invention relates to the field of IoT based wearables and more
5 particularly it refers to a smart helmet device integrated with a communicative
arrangement and a tracking system for the safety of miners.

BACKGROUND OF INVENTION

[002] Background description includes information that may be useful in understanding
the present invention. It is not an admission that any of the information provided
10 herein is prior art or relevant to the presently claimed invention, or that any
publication specifically or implicitly referenced is prior art.

[003] The mining industry exists with the well-recognized fact of having the most arduous
working environment, in which the safety and health of the worker are always a
prime concern. Mining safety has always drawn the attention of researchers
15 working in the field of health and safety. The metal and mining industry of India
has recorded a strong expansion in the recent past, with the expectation that India
is to become the second-largest steel producer from 2015. Production volumes have
also grown steadily during the period 2007-2015. Therefore, sudden enhancement
in production levels of manganese has generated an increase in concern regarding
20 safety scenario of these mines.

[004] The major cause of incidents between 2004 and 2008 was skill-based errors performed by the operators, indicating the need to analyze mining accidents from a human-factor perspective in the Indian environment also. The accident analysis in the present work is performed using the modified human factors analysis and classification system (HFACS) framework. The HFACS is a general human error framework, originally developed and tested within the United States military as a tool for investigating and analyzing the human causes of aviation accidents

[005] An accident predictive fuzzy reasoning approach (FRA)-based system was developed to predict the likelihood of accidents for manganese mines in India, using analysis of factors such as age, experience of worker, shift of work, etc. The outcome of the analysis indicated that skill-based errors are most critical and require immediate attention for mitigation. The FRA-based accident prediction system developed gives an outcome as an indicative risk score associated with the identified accident-prone situation, based upon which a suitable plan for mitigation can be developed.

[006] The safety protocol used by the mining industry till this date, hasn't proved to be an effective one, the loss of life and severe casualties point towards the same. Through IoT, the safety risk analysis and early warning management of the underground mining can effectively reduce the frequency of accidents and failures, to save the loss of personnel and property.

[007] In underground mining, miners have to carry out high-risk work under extreme conditions, and many people die every year because of mining accidents. Therefore,

safety warnings in underground mining are of great significance, and IoT technology is a good choice. In the existing system mining helmet ensures to protect the miners head from several injuries. Being aware of the environmental condition becomes a challenging part of the existing system. Oxygen supply is not provided
5 for the miners in case of poisonous gas leakage. Establishing a hurdle free communication environment is the biggest challenge the mining organizations face.

[008] Alerting authorities about the accidents on site, so as to avoid the condition get more critical. A smart helmet has been able to detect all dangerous events with the help of sensors. Gas sensor will detect poisonous gases like CO and natural gases. The
10 system can used in wide variety of applications. The scope of the system has a wide range.

[009] It could be used in military application to survey and supervise soldiers data and mobility. It could also be used in mechanical work sites like construction workers and so on. Thus a smart helmet for hazardous event detection, monitoring the
15 surrounding environmental conditions and updating information like GPS location and sensor data to the central console for easy tracking. The system can also be further developed with the implementation of Internet of Things (IoT).The database can be created that monitors the sensor modules continuously.

[0010] A researcher proposed Internet of Things (IoT) is a key enabler for many industrial
20 applications. Through the IoT, the safety risk analysis and early warning management of the underground mining can effectively reducee the frequency of accidents and failures, to save the loss of personnel and property. Therefore, the

safety warning of underground mining based on IoT is of great significance. However, underground industrial IoT requires the deployment of a large number of energy-constrained sensors and sensing units, and the wireless signals they send are lost due to data collisions, consuming node energy and reducing energy efficiency.

5 Therefore, real-time reliable transmission of sensing data under energy-constrained conditions is critical for construction safety warnings in harsh industrial monitoring environments. WSN is an essential element of IoT as it helps in combining heterogeneous data, systems, and applications. The WSNs carry the immense potential for becoming a part of IoT.

[0011]0 Another researcher proposed that the emerging Internet of Things(IoT) framework allows us to design small devices that are capable of sensing, processing and communicating, allowing sensors, embedding devices and other ' things ' to be created which will help to understand the surround-ings. In this paper, the IoT assisted electrocardiogram (ECG) monitoring framework with secure data
15 transmission has been proposed for continuous cardiovascular health monitoring. The development and implementation of a lightweight ECG Signal Strength Analysis has been proposed for automatic classification and realtime implementation, using ECG sensors, Arduino, Android phones, Bluetooth and cloud servers with the proposed IoT-assisted ECG monitoring system. For secure
20 data transmission, the Lightweight Secure IoT (LS-IoT) and Lightweight Access Control (LAC) has been proposed. The ECG signals taken from the MIT-BIH and Physio Net Challenges databases and ECG signals for various physical activities are analyzed and checked in real-time.

[0012] Yet another researcher proposed that there has been an increasing prevalence of ad-hoc networks for various purposes and applications. These include Low Power Wide Area Networks (LPWAN) and Wireless Body Area Networks (WBAN) which have emerging applications in health monitoring as well as user location tracking in emergency settings. Further applications can include real-time actuation of IoT equipment, and activation of emergency alarms through the inference of a user's situation using sensors and personal devices through a LPWAN. Due to the wireless nature of ad-hoc network devices, it is crucial to conserve battery power for sensors and equipment which transmit data to a central server. An inference system can be applied to devices to reduce data size for transfer and subsequently reduce battery consumption.

[0013] Yet another researcher proposed that underground mining is an industry that preserves the miners' safety and efficiency in their work using wireless communication systems as a tool. In addition to communication links characterized by radio frequency signals, optical links in the visible light spectrum are under intense research for underground mining applications due to their high transmission rates and immunity to electromagnetic interference. Features such as an arbitrary positioning and orientation of the optical transmitter and receiver, tunnels with irregular walls, shadowing by large machinery, and scattering by dust clouds are considered. These factors are integrated into a single modeling framework that lends itself for the derivation of compact mathematical expressions for the overall DC gain, the impulse response, the root mean square delay spread, and the received power of the proposed VLC channel model.

[0014] Yet another researcher proposed that safety is of great importance in mining regions. An IoT based wearable device inculcating the safety features for mine workers is developed. It consists of helmet module and the base station module. Wearable devices are the electronic accessories which can be worn for different purposes. Ubiquitous computing and wearable computers have contributed hugely to the evolution of wearable devices. The wearable devices get to share their data or retrieve the data through other source by making use of internet of things. A region in which mining is a significant economic activity needs to have safety measures taken. The wearable device designed in this paper aims to provide safety to miners by alerting them.

[0015] Yet another researcher proposed that Internet of Things (IoT) development brings new opportunities in many applications, including smart cities and smart healthcare. Currently, the primary usage of the IoT in healthcare can be categorized as remote monitoring and real-time health systems. Controlling and managing dire situations, such as the one in 2020 when the coronavirus disease (COVID-19) took over the world, can be achieved with the help of IoT systems, without imposing severe restrictions on people and industries. COVID-19 causes respiratory symptoms and appears to be more contagious in comparison to SARS in 2003.

[0016] However, there is a pressing need for a better and efficient system to further improvise the overall requirement and hence we come up with the present invention.

[0017] Further limitations and disadvantages of conventional and traditional approaches will become apparent to one of skill in the art through comparison of described systems with some aspects of the present disclosure, as set forth in the remainder of the present application and with reference to the drawings.

[0018] 5 In some embodiments, the numbers expressing quantities or dimensions of items, and so forth, used to describe and claim certain embodiments of the invention are to be understood as being modified in some instances by the term “about.” Accordingly, in some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending
10 upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical
15 values set forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiments of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0019] As used in the description herein and throughout the claims that follow, the meaning
20 of “a,” “an,” and “the” includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

[0020] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein
5 can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g. “such as”) provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the
10 specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0021] Groupings of alternative elements or embodiments of the invention disclosed herein are not to be construed as limitations. Each group member can be referred to and claimed individually or in any or a combination with other members of the group
15 or other elements found herein. One or more members of a group can be included in, or deleted from, a group for reasons of convenience and/or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all groups used in the appended claims.

20 **OBJECTS OF THE INVENTION:**

[0022] Mining is a multifaceted industry which includes complicated operations carried within the tunnels, underground etc. This involves various risk factors which affects

the health of miners. Miners may not be aware of the external conditions such as rise or fall of temperature, pressure etc. Factor that affects the miners is the inhalation of hazardous gases that provokes them in danger.

[0023] In this situation miners are not able to communicate with the outside world. In this
5 case, the smart helmet system becomes an essential and helpful measure to protect the miners from various accidents. This invention aims at designing a smart helmet for hazardous event detection, monitoring the surrounding environmental conditions and updating information like GPS location and sensor data to the central console for easy tracking and providing oxygen supplements to avoid the inhalation
10 of poisonous gases. This secures the life of miners in mining industries.

[0024] The objects of the invention are to help the coal miners inside the mines to communicate with the outside world, to monitor the conditions inside the mines and intimate the miners in case of emergency and detection of the poisonous gases.

[0025] These features and advantages of the present disclosure may be appreciated by
15 reviewing the following description of the present disclosure, along with the accompanying figures wherein like reference numerals refer to like parts.

[0026] Various objects, features, aspects and advantages of the inventive subject matter will become more apparent from the following detailed description of the preferred embodiments, along with the accompanying drawing figures in which the numerals
20 represent the like components.

[0027] Within the scope of this application it is expressly envisaged that the various aspects, embodiments, examples, alternatives set out in the preceding paragraphs, in the claims and/or the following description and drawings, and in particular the individual features thereof, may be taken independently or in any or a combination.

5 Features described in connection with one embodiment are applicable to all embodiments, unless such features are incompatible.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] The accompanying drawings are included to provide a further understanding of the present disclosure and are incorporated in and constitute a part of this specification.

10 The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0029] A complete understanding of the system and method of the present invention may be obtained by reference to the following drawings:

15 FIG. 1 illustrates an exemplary block diagram of the present system.

FIG. 2 represents a use case diagram of the present invention.

FIG. 3 represents a data flow diagram of the present invention at level 0.

FIG. 4 represents another data flow diagram of the present invention at level 1.

DETAILED DESCRIPTION

[0030] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to clearly communicate the disclosure. However, the amount of detail offered is not intended
5 to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0031] In the following description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present invention. It will
10 be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0032] Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be embodied in machine-executable instructions, which may be used to cause a
15 general-purpose or special purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0033] Various methods described herein may be practiced by combining one or more machine-readable storage media containing the code according to the present
20 invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a

single computer) and storage systems containing or having network access to computer program(s) coded in accordance with various methods described herein, and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

[0034] 5 The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and
10 arrangement of elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0035] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these
15 specific details. For example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

[0036] 20 Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes

and so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those of ordinary skill in the art. The invention disclosed may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein.

[0037] 5 Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional
10 equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary embodiments and should not be considered limiting. Thus, the present invention is
15 to be accorded the widest scope encompassing numerous alternatives, modifications and equivalents consistent with the principles and features disclosed. For purpose of clarity, details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not to unnecessarily obscure the present invention.

[0038] 20 Thus, for example, it will be appreciated by those of ordinary skill in the art that the diagrams, schematics, illustrations, and the like represent conceptual views or processes illustrating systems and methods embodying this invention. The

functions of the various elements shown in the figures may be provided through the use of dedicated hardware as well as hardware capable of executing associated software. Similarly, any switches shown in the figures are conceptual only. Their function may be carried out through the operation of program logic, through
5 dedicated logic, through the interaction of program control and dedicated logic, or even manually, the particular technique being selectable by the entity implementing this invention. Those of ordinary skill in the art further understand that the exemplary hardware, software, processes, methods, and/or operating systems described herein are for illustrative purposes and, thus, are not intended to be
10 limited to any particular named element.

[0039] Embodiments of the present invention may be provided as a computer program product, which may include a machine-readable storage medium tangible embodying thereon instructions, which may be used to program a computer (or other electronic devices) to perform a process. The term “machine-readable storage
15 medium” or “computer-readable storage medium” includes, but is not limited to, fixed (hard) drives, magnetic tape, floppy diskettes, optical disks, compact disc read-only memories (CD-ROMs), and magneto-optical disks, semiconductor memories, such as ROMs, PROMs, random access memories (RAMs), programmable read-only memories (PROMs), erasable PROMs (EPROMs),
20 electrically erasable PROMs (EEPROMs), flash memory, magnetic or optical cards, or other type of media/machine-readable medium suitable for storing electronic instructions (e.g., computer programming code, such as software or firmware). A machine-readable medium may include a non-transitory medium in

which data may be stored and that does not include carrier waves and/or transitory electronic signals propagating wirelessly or over wired connections.

[0040] Examples of a non-transitory medium may include, but are not limited to, a magnetic disk or tape, optical storage media such as compact disk (CD) or digital versatile disk (DVD), flash memory, memory or memory devices. A computer-program product may include code and/or machine-executable instructions that may represent a procedure, a function, a subprogram, a program, a routine, a subroutine, a module, a software package, a class, or any combination of instructions, data structures, or program statements. A code segment may be coupled to another code segment or a hardware circuit by passing and/or receiving information, data, arguments, parameters, or memory contents. Information, arguments, parameters, data, etc. may be passed, forwarded, or transmitted via any suitable means including memory sharing, message passing, token passing, network transmission, etc.

[0041] Furthermore, embodiments may be implemented by hardware, software, firmware, middleware, microcode, hardware description languages, or any combination thereof. When implemented in software, firmware, middleware or microcode, the program code or code segments to perform the necessary tasks (e.g., a computer-program product) may be stored in a machine-readable medium. A processor(s) may perform the necessary tasks.

[0042] Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the

pertinent art have given that term as reflected in printed publications and issued patents at the time of filing.

[0043] The present invention will now be described more fully hereinafter. This invention may, however, be embodied in many different forms and should not be construed
5 as being limited to the embodiment set forth herein. Rather, the embodiment is provided so that this disclosure will be thorough, and will fully convey the scope of the invention to those skilled in the art.

[0044] The present disclosure is best understood with reference to the detailed figures and description set forth herein. Various embodiments have been discussed with
10 reference to the figures. However, those skilled in the art will readily appreciate that the detailed descriptions provided herein with respect to the figures are merely for explanatory purposes, as the methods and systems may extend beyond the described embodiments. For instance, the teachings presented and the needs of a particular application may yield multiple alternative and suitable approaches to
15 implement the functionality of any detail described herein. Therefore, any approach may extend beyond certain implementation choices in the following embodiments.

[0045] References to “one embodiment,” “at least one embodiment,” “an embodiment,” “one example,” “an example,” “for example,” and so on indicate that the embodiment(s) or example(s) may include a particular feature, structure,
20 characteristic, property, element, or limitation but that not every embodiment or example necessarily includes that particular feature, structure, characteristic,

property, element, or limitation. Further, repeated use of the phrase “in an embodiment” does not necessarily refer to the same embodiment.

[0046] Methods of the present invention may be implemented by performing or completing manually, automatically, or a combination thereof, selected steps or tasks. The term “method” refers to manners, means, techniques and procedures for accomplishing a given task including, but not limited to, those manners, means, techniques, and procedures either known to, or readily developed from known manners, means, techniques and procedures by practitioners of the art to which the invention belongs. The descriptions, examples, methods, and materials presented in the claims and the specification are not to be construed as limiting but rather as illustrative only. Those skilled in the art will envision many other possible variations within the scope of the technology described herein.

[0047] FIG. 1 illustrates an exemplary block diagram of the present system. The present system all it does is to use sensor to detect whether the miner has worn his/her helmet, detect certain gases and does not provide any alertness to the team. So in this system we has designed sensor like MQ-7(for detecting carbon monoxide), MQ-4(for gases like methane, hydrogen etc.), humidity and temperature sensor etc., Using these sensor we can provide the details to the supervisor and then to the base station. If there is any problem in the mine the supervisor has a switch to alert the miners and the base station has a switch to alert the external rescue unit.

[0048] FIG. 2 represents a use case diagram of the present invention. There are four actors Miner, Supervisor, Base station and Rescue Team. The miner health data and

Location is collected so that in case of some emergency aid is provided immediately. If there is some issue with the miners an alert is provided to him as well as the rescue team. The information is also provided to the Rescue Team in order to avoid the need to search for the person to provide aid.

[0049] 5 The supervisor mainly monitor the miners but it is also not safe for the supervisor inside the mining industry so the miners data is collected so that in case of some emergency aid is provided immediately. If there is any issue with the miner it is the duty of the supervisor to alert the other users. The supervisor also keeps a report of the miner in order to keep track of miner health data. The supervisor has access to
10 all the elements.

[0050] In the base station, the Manager has access to the Report Generation unit. The data is provided to the Manager so that the Manager can alert the rescue team in the mining industry if there is any problem.

[0051] The Rescue Team has access to the alert system so that they can provide immediate
15 aid to the miners who needs help.

[0052] FIG. 3 represents a data flow diagram of the present invention at level 0. A connection between the miner, miner monitoring unit and medical team (Rescue team) is depicted. The data collected from the miner is provided to the miner monitoring system(supervisor and base station).from there an alert signal is sent to
20 both the miner and medical team if there is an issue with the miner.

[0053] FIG. 4 represents another data flow diagram of the present invention at level 1. Here the data collected from the miner is given to the Arduino and then the data is transmitted. The transmitter data is received at the supervisor. The data that is received by the supervisor is processed and report is created and further transmitted
5 to the base station. At the base there is a user interface to show the data and provide an alert if necessary.

[0054] In the present system, the sensor module is only for workers. Sensor module consists of Heart beat sensor, humidity, temperature and Gas sensor. These sensors collect necessary data from the person wearing helmet and send it to the processing unit.

[0055] Miners hat consists of Arduino board and Emergency button. Since no computation is needed, Arduino is used so that cost for the system can be reduced. Emergency button is placed to alert the co-workers in case of any danger. The supervisor needs to generate report based on the sensor data collected from miners and supervisor. Raspberry pi is used to process the sensor data and generate report based on the
15 available data. The communication module consists of NRF module, which is used to send and receive data by using radio waves. It is a single chip transceiver module. It uses SPI protocol for transmitting data. Alarming system is used to alert the worker in case of any danger.

[0056] Safety has always been of great concern in mines. In this invention we are going
20 to provide a helmet for the miners for their safety. Miners may not be aware of the external conditions such as rise or fall of temperature, pressure etc. In this situation miners are not able to communicate with the outside world. In this case, the smart

helmet system becomes an essential and helpful measure to protect the miners from various accidents. Thus a smart helmet for hazardous event detection, monitoring the surrounding environmental conditions.

[0057] While the foregoing describes various embodiments of the invention, other and
5 further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions, or examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge
10 available to the person.

#####DIGITALLY SIGNED#####
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Registered Patent Agent INPA-3311
Patent Agent On Behalf of the Applicants

15

CLAIMS

We claim,

1. A trackable and communicative helmet device for miners, comprising:

a plurality of sensors;

5 at least one communication module; and

one or more processors.

2. The system as claimed in claim 1 wherein, the said plurality of sensors are preferably MQ-7 (for detecting carbon monoxide), MQ-4 (for gases like methane, hydrogen etc.), humidity and temperature sensors.

10 3. The system as claimed in claim 1 wherein, the said communication module is a NRF module configured to send and receive data by using radio waves.

4. The system as claimed in claims 1, 2 and 3 wherein, the said processor is an Arduino operatively coupled with the said sensors and the communication module to receive and process the health and other aspects of the miners and
15 communicate to the base station and the rescue team while also collecting the data if the miner is wearing the helmet or not.

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20 **Patent Agent On Behalf of the Applicants**

ABSTRACT

A TRACKABLE AND COMMUNICATIVE HELMET DEVICE FOR MINERS

The present invention relates to the field of IoT based wearables and more
5 particularly it refers to a smart helmet device integrated with a communicative
arrangement and a tracking system for the safety of miners. The system uses sensor
to detect whether the miner has worn his/her helmet, detect certain gases and
provide any alertness to the team. So in this system we has designed sensor like
MQ-7(for detecting carbon monoxide), MQ-4(for gases like methane, hydrogen
10 etc.), humidity and temperature sensor etc., Using these sensor we can provide the
details to the supervisor and then to the base station. If there is any problem in the
mine the supervisor has a switch to alert the miners and the base station has a switch
to alert the external rescue unit.

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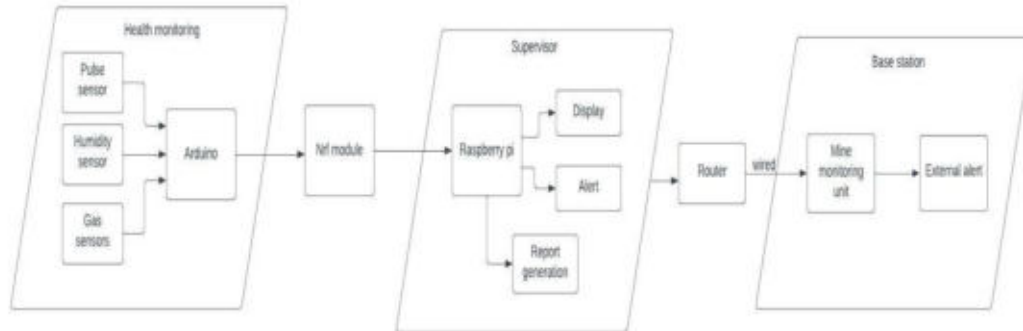


FIGURE 1

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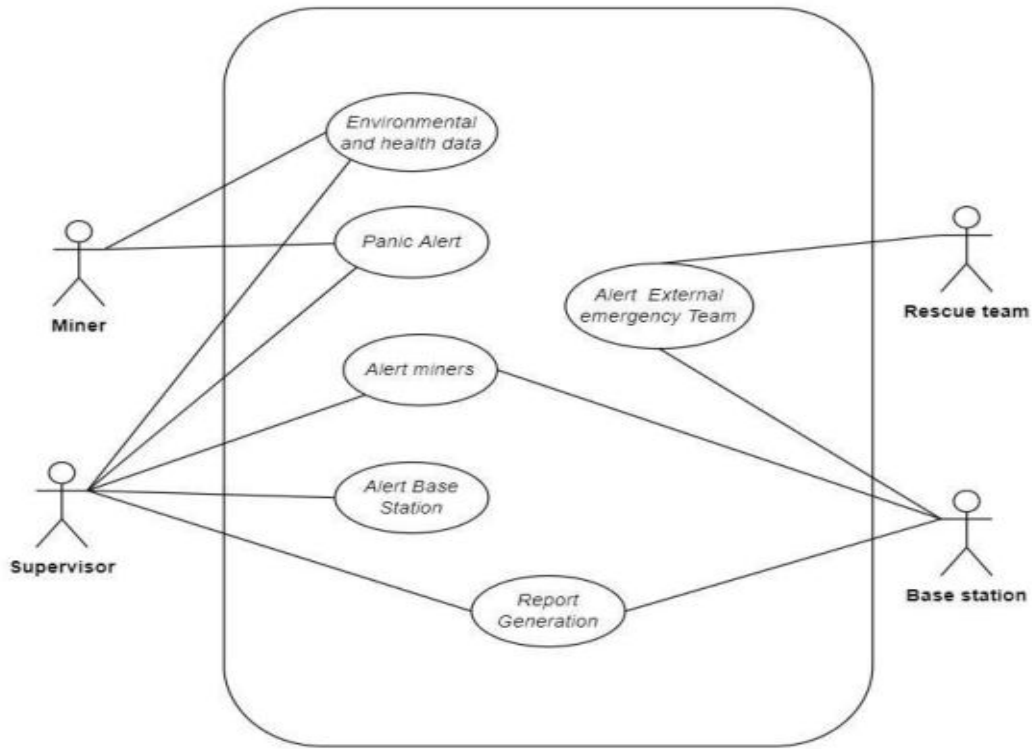


FIGURE 2

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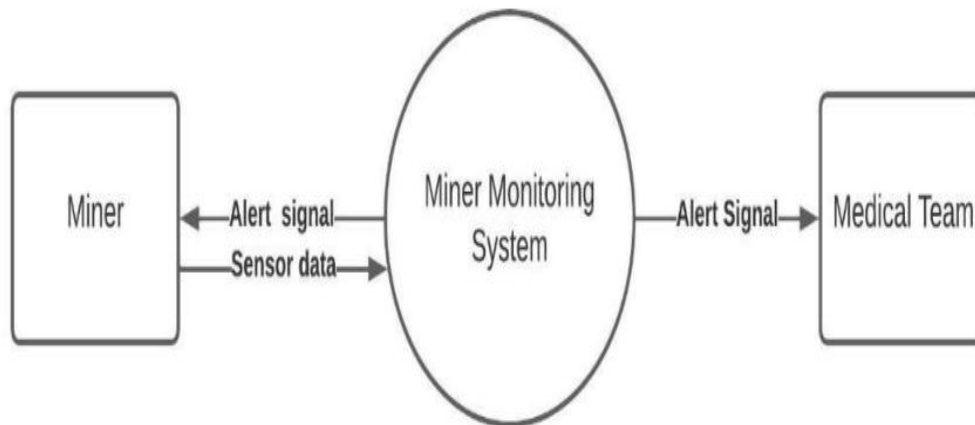


FIGURE 3

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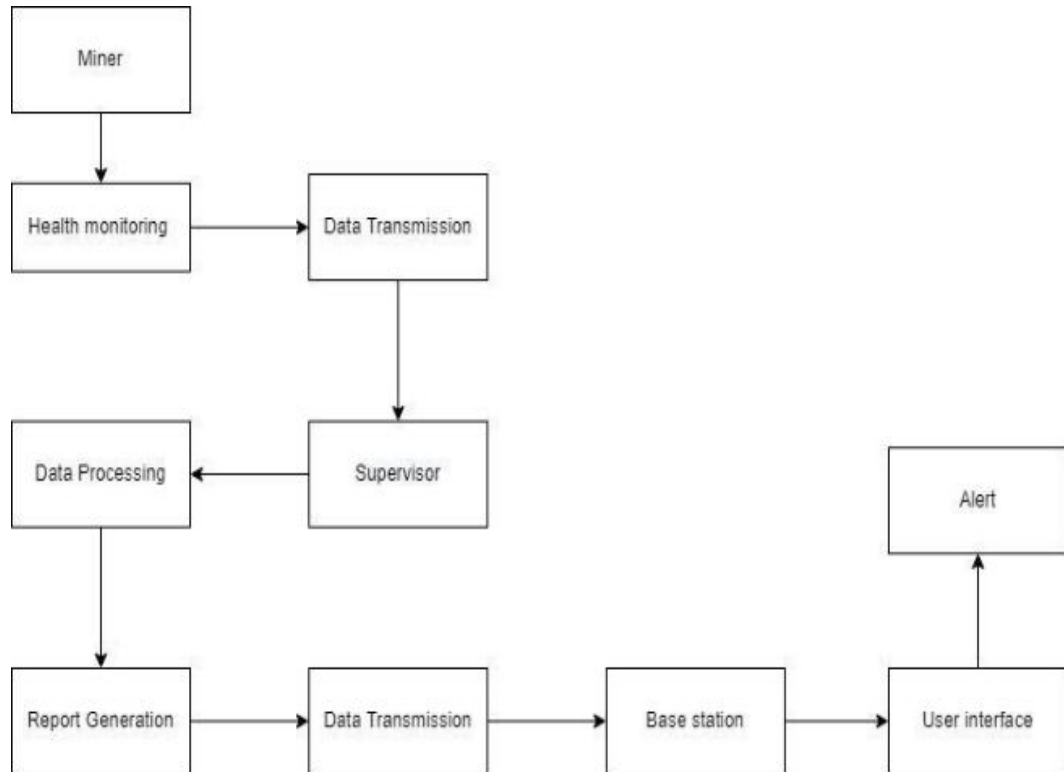


FIGURE 4

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FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241053321 dated 18-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:

NAME OF THE COUNTRY	DATE OF APPLICATION	APPLICATION NO.	STATUS OF THE APPLICATION	DATE OF PUBLICATION	DATE OF GRANT
—	—	—	—	—	—

(ii) that the rights in the application(s) has/have been assigned to

“NONE” and the rights are held with applicants only;

that I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated This 18th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
Building, Boudhik Sampada Bhawan, Chennai -
Theni Hwy, Guindy, Chennai, Tamil Nadu - 600032

FORM 5
THE PATENTS ACT, 1970
(39 of 1970)
and
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241053321** Dated **18th day of Sep , 2022** are

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Dated This 18thday ofSep,2022

Signature,



NAME: PREM CHARLES I(INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

To,

**The Controller of Patents, Intellectual Property
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FORM 9

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/59429/2022-CHE

Dated **11/09/2022 00:00:00** under section 11A(2) of the Act.

Dated this(Final Payment Date):-----

Signature

Name of the signatory

To,
The Controller of Patents,
The Patent Office,
At Chennai

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G.A.R.6
[See Rule 22(1)]
RECEIPTController General of Patents, Designs & Trade
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Docket No 89682

Date/Time 2022/09/18 20:42:05

To
PREM CHARLES

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360E, SENTHUR MURUGAN KOVIL
STREET, OPPOSITE SM MAHAL,
OLDPET

CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241053320	TEMP/E-1/59428/2022-CHE	1600	37516	FORM 1	A Helmet Operated Smart Control System for Two Wheeled Automotive
2	202241053321	TEMP/E-1/59429/2022-CHE	1600	37516	FORM 1	A Trackable and Communicative Helmet Device for Miners
3	E-12/7075/2022/CHE	202241053319	2500	37516	FORM 9	----
4	E-12/7074/2022/CHE	202241053320	2500	37516	FORM 9	----
5	E-12/7076/2022/CHE	202241053321	2500	37516	FORM 9	----
6	202241053319	TEMP/E-1/58790/2022-CHE	1600	37516	FORM 1	A System for Indoor Navigation of the Visually Impaired
7	E-106/5545/2022/CHE	202241053319	0	----	FORM28	----
8	E-106/5547/2022/CHE	202241053320	0	----	FORM28	----
9	E-106/5546/2022/CHE	202241053321	0	----	FORM28	----

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001024390	Online Bank Transfer	1809220005469	12300.00	1475001020000001

Total Amount : ₹ 12300.00

Amount in Words: Rupees Twelve Thousand Three Hundred Only

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E-mail: chennai-patent@nic.in
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सत्यमेव जयते



Docket No 89688

Date/Time 18/09/2022

To
PREM CHARLES

User Id: prem1987

360E, SENTHUR MURUGAN KOVIL
STREET, OPPOSITE SM MAHAL,
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Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202241053321	E-3/29324/2022/CHE	0	----	FORM 3	
2	202241053321	E-5/3773/2022/CHE	0	----	FORM 5	
3	202241053320	E-5/3774/2022/CHE	0	----	FORM 5	
4	202241053320	E-3/29325/2022/CHE	0	----	FORM 3	
5	202241053319	E-5/3775/2022/CHE	0	----	FORM 5	
6	202241053319	E-3/29326/2022/CHE	0	----	FORM 3	

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**OFFICIAL JOURNAL
OF
THE PATENT OFFICE**

निर्गमन सं. 38/2022
ISSUE NO. 38/2022

शुक्रवार
FRIDAY

दिनांक: 23/09/2022
DATE: 23/09/2022

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

INTRODUCTION

In view of the recent amendment made in the Patents Act, 1970 by the Patents (Amendment) Act, 2005 effective from 01st January 2005, the Official Journal of The Patent Office is required to be published under the Statute. This Journal is being published on weekly basis on every Friday covering the various proceedings on Patents as required according to the provision of Section 145 of the Patents Act 1970. All the enquiries on this Official Journal and other information as required by the public should be addressed to the Controller General of Patents, Designs & Trade Marks. Suggestions and comments are requested from all quarters so that the content can be enriched.

(PROF. (DR) UNNAT P. PANDIT)
CONTROLLER GENERAL OF PATENTS, DESIGNS & TRADE MARKS

23rd SEPTEMBER, 2022

(54) Title of the invention : A System for Automated Cleaning and Sanitization of Toilets

(51) International classification :E03D0009000000, A47K0013300000, B25J0011000000, A01J0007020000, A61M0003020000

(86) International Application No :PCT//
Filing Date :01/01/1900

(87) International Publication No : NA

(61) Patent of Addition to Application Number :NA
Filing Date :NA

(62) Divisional to Application Number :NA
Filing Date :NA

(71)Name of Applicant :
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Name of Applicant : NA
Address of Applicant : NA

(72)Name of Inventor :
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(57) Abstract :

The present invention relates to the field of automatic cleaning systems and more particularly it discloses an automated and smart system for cleansing and sanitizing the wash bowls and floor of toilets. The existing methods involve manual cleaning done by a human which is not at all an easy task and may not even exist in all areas. Placing a sensor-controlled water flusher attached to the toilet will perform the cleaning task and meanwhile, the number of cycles used is recorded to activate the automated cleaning process. We aim to ease the brushing technology using a robotic arm mechanism in which 3 servomotors are used. Pressure pump along with proper designing of pipes are also incorporated. Hence, on adopting this methodology, we will be able to increase the standard of public and community toilets and facilitate people to use these effectively.

No. of Pages : 29 No. of Claims : 5



Application Filing Receipt

**Government of India
Patent Office**
Intellectual Property Office Building,
G.S.T. Road, Guindy,
Chennai - 600032
Phone- 044-22502081-84
Fax: 044-22502066
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CBR Number : 37613

CBR date: 19-09-2022

Application Type: ORDINARY APPLICATION
Priority Number:
Priority Date:
Priority Country: Not Selected

To,
VIMAL JYOTHI ENGINEERING COLLEGE
Allinnov Innovation and Intellectual Property Services, #360E, First Floor, Senthur Murugan Kovil Street, Oldpet, Krishnagiri - 635001, Tamil Nadu, India.

Received documents purporting to be an application for patent numbered 202241053378 dated 19-09-2022 by VIMAL JYOTHI ENGINEERING COLLEGE of Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India. relating to A System for Automated Cleaning and Sanitization of Toilets together with the Complete and fee(s) of ₹1600 (One Thousand Six Hundred only).

Note:

1. In case of Patent Application accompanied by a Provisional Specification, a complete Specification should be filed within 12 months from the date of filing of the Provisional Specification, failing which the application will be deemed to be abandoned under Section 9(1) of the Patent Act, 1970.
2. You may withdraw the application at any time before the grant of patent, if you wish so. If, in addition to withdrawal, you also wish to prevent the publication of application in the Patent Office Journal, the application should be withdrawn within fifteen months from the date of priority or date of filing, whichever is earlier.
3. If not withdrawn, your application will be published in the Patent Office Journal after eighteen months from the date of priority or date of filing, whichever is earlier.
4. If you wish to get your application examined, you should file a request for examination in Form-18 within 48 months from the date of priority or date of filing, whichever is earlier, failing which the application will be treated as withdrawn by the applicant under Section 11(B)(4) of the Patent Act, 1970.

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Department of Industrial Policy & Promotion,
Ministry of Commerce & Industry,
Government of India

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Application Details

APPLICATION NUMBER	202241053378
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	19/09/2022
APPLICANT NAME	VIMAL JYOTHI ENGINEERING COLLEGE
TITLE OF INVENTION	A System for Automated Cleaning and Sanitization of Toilets
FIELD OF INVENTION	CIVIL
E-MAIL (As Per Record)	patents@allinnov.org
ADDITIONAL-EMAIL (As Per Record)	allinnovrnd@gmail.com
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	23/09/2022

FORM 1
THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

(FOR OFFICE USE ONLY)

Application No.:
Filing Date:
Amount of Fee Paid:
CBR No.:
Signature:

1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
1	VIMAL JYOTHI ENGINEERING COLLEGE	India	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

2. INVENTOR(S):

Sr.No.	Name	Nationality	Address	Country	State	Distict	City
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2	Dr. Glan Devadhas G.	India	Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur - 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
3	Sreehari	India	Student, Department of Electronics and Instrumentation Engineering,	India	Kerala	Kannur	Chemperi

			Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.				
4	Akshay P.	India	Student, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
5	Amal Raj P.	India	Student, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi
6	Anandhu Prakash	India	Student, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.	India	Kerala	Kannur	Chemperi

3. TITLE OF THE INVENTION: A System for Automated Cleaning and Sanitization of Toilets

4. ADDRESS FOR CORRESPONDENCE OF APPLICANT / AUTHORISED PATENT AGENT IN INDIA:
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5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application	Filing Date	Name of the Applicant	Title of the Invention
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Number

6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT//	

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

Original (first) Application Number	Date of Filing of Original (first) Application
-------------------------------------	--

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application
-----------------------------------	------------------------------------

9. DECLARATIONS:

(i) Declaration by the inventor(s)

I/We ,Shinu M. M. ,Dr. Glan Devadhas G.,Sreehari,Akshay P.,Amal Raj P. ,Anandhu Prakash, is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) of the inventor(s):

(c) Name(s): Shinu M. M. ,Dr. Glan Devadhas G.,Sreehari,Akshay P.,Amal Raj P. ,Anandhu Prakash

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) :

(c) Name(s) of the singnatory: VIMAL JYOTHI ENGINEERING COLLEGE

(iii) Declaration by the applicant(s)

- The Complete specification relating to the invention is filed with this application.
- I am/We are, in the possession of the above mentioned invention.
- There is no lawful ground of objection to the grant of the Patent to me/us.
- I am/We are, the assignee or legal representative to true first inventors.

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
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1	COMPLETE SPECIFICATION	Specification, Claims and Abstract - 12. Washroom Sanitizing.pdf
2	DRAWINGS	Drawings - 12. Washroom Sanitizing.pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hering are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): -----

Signature:

Name: PREM CHARLES

To The Controller of Patents

The Patent office at CHENNAI

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FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

A System for Automated Cleaning and Sanitization of Toilets

2. APPLICANT(S)

NAME(S)

NATIONALITY

ADDRESS

VIMAL JYOTHI ENGINEERING COLLEGE

An Indian Educational institution

Approved by the AICTE, India.

Affiliated to APJ Abdul Kalam Technological University (KTU), Kerala.

addressed at

Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

A SYSTEM FOR AUTOMATED CLEANING AND SANITIZATION OF TOILETS

FIELD OF INVENTION

[001] The present invention relates to the field of automatic cleaning systems and more
5 particularly it discloses an automated and smart system for cleansing and sanitizing
the wash bowls and floor of toilets.

BACKGROUND OF INVENTION

[002] Background description includes information that may be useful in understanding
the present invention. It is not an admission that any of the information provided
10 herein is prior art or relevant to the presently claimed invention, or that any
publication specifically or implicitly referenced is prior art.

[003] According to the UN (United Nation) Water report as per the study done by the
WHO (World Health Organization), nearly 4.2 billion people are living in this
world without safely managed sanitation. Nearly 4, 23,000 people are estimated to
15 lose their lives on suffering from diarrhoea every year simply due to the lack of
sanitation. This may be one of the major problems in developing countries like
India. As per the UN's latest reports, India has the largest number of people
following open defecation. The analysis of the reason behind the non-usage of
toilets in India includes sanitation issues also There are about 700 million people
20 that haven't any access to toilets at home. Slum areas don't have toilets. People are
thus forced to defecate within the open, which causes numerous diseases like

diarrhoea, cholera, dehydration, etc. Though 12 million toilets claim to possess been built under Swachh Bharat Abhiyan within the last five years, as per a UN report, 44% of the population continues to defecate within the open. Sanitation and hygiene still pose challenges in India. Inadequate sanitation means the shortage of enhanced facilities, and hygienic practices that exposes people to human excreta and harmful pathogens through different transmission pathways.

[004] The people must be given proper awareness and knowledge about the necessity and the procedures to maintain and use the toilets neatly. The users control their urge to observing the pathetic condition of the toilets, which harms their kidney health and cause illness due to the spread of harmful germs, toilet lice, and bacteria.

[005] The manual cleaning done by janitors, which may not be even present in most of the public and community toilets of India, does not seem reliable. They find it extremely difficult to clean the washrooms due to several reasons including leaving closets used without flushing, dirty floors on frequent usage, inappropriate usage of toilet seats, etc. Their condition turns even more pathetic on considering the harmful diseases on coming in contact with the germs while cleaning. Hence, it is necessary to ensure that public washrooms are maintained well. Innovations towards improving the route to reach complete proper sanitation are to be encouraged and seem to be a need for boosting several economic factors which include tourism, health, etc.

[006] Maintaining a public toilet as a janitor or a cleaner is considered a job that is degrading and not up to dignity. It is assumed that these jobs are to be handled by

people of low caste. Dalits are generally entrusted with the responsibility of public or community toilet maintenance. In most of the cases, it is observed that the janitors or cleaners are not paid adequately. They may not be even provided the safety equipment for doing the cleaning job properly. The cleaning tools may not
5 be functioning properly.

[007] All these imply the worsened condition of the public toilets. The health of the janitors is also one of the major concerns while cleaning the washrooms, especially the toilet closet bowls. The cost for proper operation of the restrooms as well as the capital re-investment that involves proper staffing, access to the utilities, and proper
10 drainage sewage system are inadequately planned or never thought through at a huge depth.

[008] A prior art disclosed a robot for the purpose of sanitation can be drawn many parallels to present day technologies such as fire-fighting, dishwashing and search and rescue missions. At present, the cleaning process is entirely operated with the
15 hands rather than by a robot and not very high-yielding. The Autonomous Lavatory Cleaning Robot proposed can greatly eliminate the extent of manual labour involved in the process of maintaining sanitary standards. As municipalities moving towards solutions which can ameliorate the existing problems while being cost effective, this system focuses on the actual concerns and provides the best solution.
20 It can be used to clean household toilets, toilets and toilets in mall, stadiums, and supermarkets.

[009] Another prior art disclosed a convenient and a hassle-free means of cleaning public toilets whilst maintaining hygienic and sanitary standards. By using a counter to record the number of times of usage, a line follower mechanism to guide the robot and an RFID module to initiate the auto-flushing, the cleaning operation is fully automated and requires low operational power. Furthermore, a robotic arm is part of the module, so as to thoroughly clean the toilet bowl. Such a provision will curtail the role of manpower in maintenance of public toilets to a great degree, and thus, serves as a win-win situation; a revolting objective is accomplished with considerable ease.

[0010] Yet another prior art disclosed that fecal-oral transmission of enteric and other pathogens due to poor sanitation is a major cause of morbidity and mortality, especially in low- or middle-income settings. Few studies have investigated the impact of sanitation on indicators of transmission, a prerequisite to achieving health gains. This review attempts to summarize the literature to date leading databases to identify studies that address the effect of sanitation on various transmission pathways including fecal pathogens or indicator bacteria in drinking water, hand contamination, sentinel toys, food, household and latrine surfaces and soil, as well as flies and observations of human feces. This also included studies that assessed the impact of fecal contamination of water supplies based on distance from sanitation facilities. We identified 29 studies that met the review's eligibility criteria.

[0011] Yet another prior art investigated one possible way to reduce the wastage of clean water used in a public toilet. The study focuses on saving clean water from the use of an automatic urinal flushing system in a toilet. The automatic urinal flushing is set with different water flushing duration parameter. This is to find the most satisfied parameter for users while spending clean water as less as possible.

5

[0012] In order to adjust the parameter, an automatic smart urinal flusher system is developed. The system uses MQTT as an underlying communication protocol. The protocol is used in collecting, controlling, commanding and debugging the system. The results in the testing environment show that using a flushing duration for 2.5 seconds is enough to satisfy most users while wasting clean water as less as possible.

10

[0013] Yet another prior art disclosed a system with gas sensor and turbidity sensor are used to detect any dirt particles or any foul smells and send a message to the organization alerting them to clean it. This is done by using a Wi-Fi module and GSM. This project takes a step towards promoting proper toilet maintenance. In this paper, numerous sensors are used to detect improper conditions of the toilet and a water monitoring system is used to check the amount of water used. This is connected to a water pump which provides water when the message is delivered.

15

[0014] Yet another prior art disclosed a system wherein cleaning of the washroom is being done automatically so that human involvement can be reduced. The cleaning process is aimed to be automated and simple. Such a provision will ease the job of regular janitors as well as the users. Placing a sensor-controlled water flusher

20

attached to the toilet will perform the cleaning task and meanwhile, the number of cycles used is recorded to activate the automated cleaning process. On selecting Arduino Uno as a suitable interface, we aim to provide an easily compatible facility at an economically feasible rate.

[0015]5 However, there is a pressing need for a better and efficient system to further improvise the overall requirement and hence we come up with the present invention.

[0016] Further limitations and disadvantages of conventional and traditional approaches will become apparent to one of skill in the art through comparison of described
10 systems with some aspects of the present disclosure, as set forth in the remainder of the present application and with reference to the drawings.

[0017] In some embodiments, the numbers expressing quantities or dimensions of items, and so forth, used to describe and claim certain embodiments of the invention are to be understood as being modified in some instances by the term “about.”

15 Accordingly, in some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the number of reported significant digits and by applying ordinary rounding techniques.

20 Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable.

The numerical values presented in some embodiments of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0018] As used in the description herein and throughout the claims that follow, the meaning
5 of “a,” “an,” and “the” includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

[0019] The recitation of ranges of values herein is merely intended to serve as a shorthand
method of referring individually to each separate value falling within the range.
10 Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g. “such as”) provided with respect to certain embodiments
15 herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0020] Groupings of alternative elements or embodiments of the invention disclosed herein
20 are not to be construed as limitations. Each group member can be referred to and claimed individually or in any or a combination with other members of the group or other elements found herein. One or more members of a group can be included in, or deleted from, a group for reasons of convenience and/or patentability. When

any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all groups used in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]5 The accompanying drawings are included to provide a further understanding of the present disclosure and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0022]10 A complete understanding of the system and method of the present invention may be obtained by reference to the following drawings:

FIG. 1 illustrates an exemplary block diagram of the system for flushing and bowl cleaning system.

FIG. 2 discloses a process flow of the system for flushing and bowl cleaning system.

15 FIG. 3 illustrates an exemplary block diagram of the floor cleaning module in the present system.

FIG. 4 discloses a process flow of the system for floor cleaning.

FIGs. 5A and 5B discloses the circuitries of the automated flushing and bowl cleaning system and floor cleaning system respectively.

DETAILED DESCRIPTION

[0023] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to clearly communicate the disclosure. However, the amount of detail offered is not intended
5 to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0024] In the following description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present invention. It will
10 be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details.

[0025] Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be embodied in machine-executable instructions, which may be used to cause a
15 general-purpose or special purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0026] Various methods described herein may be practiced by combining one or more machine-readable storage media containing the code according to the present
20 invention with appropriate standard computer hardware to execute the code contained therein. An apparatus for practicing various embodiments of the present invention may involve one or more computers (or one or more processors within a

single computer) and storage systems containing or having network access to computer program(s) coded in accordance with various methods described herein, and the method steps of the invention could be accomplished by modules, routines, subroutines, or subparts of a computer program product.

[0027] 5 The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and
10 arrangement of elements without departing from the spirit and scope of the disclosure as set forth in the appended claims.

[0028] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these
15 specific details. For example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

[0029] 20 Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes

and so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those of ordinary skill in the art. The invention disclosed may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein.

[0030] 5 Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional
10 equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary embodiments and should not be considered limiting. Thus, the present invention is
15 to be accorded the widest scope encompassing numerous alternatives, modifications and equivalents consistent with the principles and features disclosed. For purpose of clarity, details relating to technical material that is known in the technical fields related to the invention have not been described in detail so as not to unnecessarily obscure the present invention.

[0031] 20 Thus, for example, it will be appreciated by those of ordinary skill in the art that the diagrams, schematics, illustrations, and the like represent conceptual views or processes illustrating systems and methods embodying this invention. The

functions of the various elements shown in the figures may be provided through the use of dedicated hardware as well as hardware capable of executing associated software. Similarly, any switches shown in the figures are conceptual only. Their function may be carried out through the operation of program logic, through
5 dedicated logic, through the interaction of program control and dedicated logic, or even manually, the particular technique being selectable by the entity implementing this invention. Those of ordinary skill in the art further understand that the exemplary hardware, software, processes, methods, and/or operating systems described herein are for illustrative purposes and, thus, are not intended to be
10 limited to any particular named element.

[0032] Embodiments of the present invention may be provided as a computer program product, which may include a machine-readable storage medium tangible embodying thereon instructions, which may be used to program a computer (or other electronic devices) to perform a process. The term “machine-readable storage
15 medium” or “computer-readable storage medium” includes, but is not limited to, fixed (hard) drives, magnetic tape, floppy diskettes, optical disks, compact disc read-only memories (CD-ROMs), and magneto-optical disks, semiconductor memories, such as ROMs, PROMs, random access memories (RAMs), programmable read-only memories (PROMs), erasable PROMs (EPROMs),
20 electrically erasable PROMs (EEPROMs), flash memory, magnetic or optical cards, or other type of media/machine-readable medium suitable for storing electronic instructions (e.g., computer programming code, such as software or firmware). A machine-readable medium may include a non-transitory medium in

which data may be stored and that does not include carrier waves and/or transitory electronic signals propagating wirelessly or over wired connections.

[0033] Examples of a non-transitory medium may include, but are not limited to, a magnetic disk or tape, optical storage media such as compact disk (CD) or digital versatile disk (DVD), flash memory, memory or memory devices. A computer-program product may include code and/or machine-executable instructions that may represent a procedure, a function, a subprogram, a program, a routine, a subroutine, a module, a software package, a class, or any combination of instructions, data structures, or program statements. A code segment may be coupled to another code segment or a hardware circuit by passing and/or receiving information, data, arguments, parameters, or memory contents. Information, arguments, parameters, data, etc. may be passed, forwarded, or transmitted via any suitable means including memory sharing, message passing, token passing, network transmission, etc.

[0034] Furthermore, embodiments may be implemented by hardware, software, firmware, middleware, microcode, hardware description languages, or any combination thereof. When implemented in software, firmware, middleware or microcode, the program code or code segments to perform the necessary tasks (e.g., a computer-program product) may be stored in a machine-readable medium. A processor(s) may perform the necessary tasks.

[0035] Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the

pertinent art have given that term as reflected in printed publications and issued patents at the time of filing.

[0036] The present invention will now be described more fully hereinafter. This invention may, however, be embodied in many different forms and should not be construed
5 as being limited to the embodiment set forth herein. Rather, the embodiment is provided so that this disclosure will be thorough, and will fully convey the scope of the invention to those skilled in the art.

[0037] FIG. 1 illustrates an exemplary block diagram of the system for flushing and bowl cleaning system. Arduino Uno works as the interface to control the components and
10 to act as an output and input detector. Ultrasonic sensor is used to detect the presence of the human in the toilet. It is placed top to the seat so it can easily detect the presence. This sensor will be sensing the presence for a certain amount of time to generate a value, the generated value is sent to the controller. Meanwhile, the LED is also working as an input device.

[0038]15 There are 2 coloured LED one is red and other is green. Before the ultrasonic sensor sent the value to microcontroller the red LED will be glowing, which means person has not entered the toilet but when ultrasonic sensor detects the presence of person the green LED lights. Water level sensor detects the level of water inside the flush tank, when water level senses low which means that the person had used the flush
20 switch. When water level senses high, the person had not used the flush switch which activates the pump connected to microcontroller through MOSFET.

[0039] Meanwhile enable robotic arm to clean the toilet. The robotic arm consists of 3 servomotors.

[0040] FIG. 2 discloses a process flow of the system for flushing and bowl cleaning system. When the start button is pressed it initializes ultrasonic sensor and water level
5 sensor. First of all, ultrasonic sensor is detecting the presence of human inside the toilet. After few seconds it sends signal to the microcontroller which act as interface.

[0041] This microcontroller will be activated only when the signal from the ultrasonic sensor which is kept near to the seat. After few seconds water level sensor sends
10 status of water inside the tank and thus the microcontroller is activated.

[0042] After receiving message from ultrasonic sensor, water level sensor which is high microcontroller trigger the pump until the water level status is shown low. It turned on only when the person has not used the flush switch. Meanwhile the servomotor is triggered to clean the bowl.

[0043]5 FIG. 3 illustrates an exemplary block diagram of the floor cleaning module in the present system. Floor cleaning system consist of 2 ultrasonic sensors, 5LED, microcontroller, servomotor, MOSFET and pumps that carries soap and water separately.

[0044] Let the person trying to enter the washroom, 1st moves across the ultrasonic sensor
20 1 then moves across ultrasonic sensor 2. After using the toilet, the person moves out of the toilet then he passes ultrasonic sensor 2 and again passes through

ultrasonic sensor 1. At this moment the 1st count is taken and 1st LED is glowed. Similarly, after 5th LED lights, which turn on the servomotor and restrict the entry of 6th person that pump 1 gets turned on in which soap solution is present. Which is sprayed over the floor for some minutes. After few minutes pump 1 gets turned
5 off. Then pump 2 contains water turned on and clean the floor for few minutes. After cleaning the servomotor comes back to normal positions. And the process repeats.

[0045] FIG. 4 discloses a process flow of the system for floor cleaning. The system consists of 2 ultrasonic sensor 5 LEDs. When the start button is pressed it initializes
10 ultrasonic sensors and after entry and exit of a person one LED lights up similarly when 5th LED lights up the servomotor gets triggered to restrict the entry of 6th person and which turn on the pump containing the soap solution after few second it turns on the pump containing water solution. This process repeats after next 5 person had entered the toilet.

[0046]15 FIGs. 5A and 5B discloses the circuitries of the automated flushing and bowl cleaning system and floor cleaning system respectively. The ultrasonic sensor is used in this for detecting the presence of person in the toilet, for that sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic/level sensor measure the distance to target by measuring the time
20 between the emission and reception.

[0047] Another sensor used is water level sensor which is kept at the flush cap, it is used to measure the distance of water from cap to water level. It sends the data to the

microcontroller. The controller used in this is Arduino uno which act as an interface. The micro controller (Arduino) is implemented only when the 2 condition is satisfied.

[0048] The 2 conditions are: 1.Detect the presence of human inside the washroom and 2.
5 Identify whether the person has used the flush switch. These two conditions are observed by the 2 sensors. After these analyses, pump operates until the water level status is made low, it is operated only when the person had not used the flush switch.

[0049] The next purpose is to clean the bowl will is done by robotic arm which is made by
3 servomotors which is attached near to the toilet seat, rotates in xyz directions.
10 After the cleaning purpose 3 servomotor comes back to normal position. Ultrasonic sensor consists of trigger and echo pin which is connected to microcontroller and other 2 pin are connected to 5v supply and ground. Ultrasonic sensor act as an input and provide signal to the microcontroller. 2 LEDs (green, red) are connected to Arduino which is to indicate the presence and absence of person inside the
15 washroom.

[0050] Water level sensor is connected to pin number 3,4 of Arduino which also acts as input. A crystal oscillator circuit to Arduino so that microcontroller works properly. A flush switch is connected so that entered person can operate the flush water manually. 3 servomotors are connected directly to the microcontroller, which is
20 used for bowl cleaning purpose. A pump is connected to microcontroller through MOSFET which is used as water supply for rough cleaning of the toilet bowl.

[0051] The floor cleaning system consists of 2 ultrasonic sensors, 5 LEDs, servomotor, 2 pumps and microcontroller. Trigger, echo pin of both the ultrasonic sensor are connected to 14-17 pins of microcontroller.

[0052] LEDs are connected to microcontroller through resistors so the LEDs can be prevented from over load. crystal oscillator is connected same as above circuit diagram. A servomotor is used for restrict the entry of 6th person. It gets activated when the 5 LEDs are turned on then the pump 1 which is connected to the microcontroller through MOSFET containing soap solution will be turned on for few seconds for spreading the soap solution on to the floor then it is turned off.

10 After few minutes the pump 2 gets turned on for removing the dust and soap solution from the floor. After the pump 2 gets turned off the servomotor comes back to normal position and entry to the toilet is allowed. this process repeats after next 5th person had entered. After every entry of the person ultrasonic detects the presence on the output get reflected in LEDs.

[0053]15 Most of the people are not using public toilets because of the unhygienic conditions. The main purpose of our invention was to improve the hygienic conditions of public toilets. The Autonomous Cleaning System proposed can greatly eliminate the extent of manual labour involved in the process of maintaining sanitary standards. With municipalities moving towards solutions which can reduce the existing

20 problems while being cost effective, this system directly addresses actual concerns and seeks to provide an optimal solution. It can be deployed for cleaning toilets in households, public restrooms and restrooms in malls, stadiums, and supermarkets.

Furthermore, it can be used for upholding standards of hygiene in trains and airplanes, where it provides prime importance.

[0054] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions, or examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge available to the person.

10

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CLAIMS

We claim,

1. A system for automated cleaning and sanitization of toilets, comprising:
 - a plurality of sensors;
 - 5 at least one electronic switch;
 - one or more pumps;
 - at least one robotic arm; and
 - one or more processors
2. The system as claimed in claim 1 wherein, the said sensors are preferably
10 ultrasonic sensors configured to detect the presence of humans inside the toilet.
3. The system as claimed in claims 1 and 2 wherein, the said plurality of sensors also include a water level sensor configured to detect the water level in the flush.
- 15 4. The system as claimed in claim 1 wherein, the said electronic switch is a relay configured to autonomously actuate and deactivate a plurality of pump and motor devices to clean the bowl as well as the flooring of the toilet.

5. The system as claimed in claim 1 wherein, the said processor is preferably an Arduino configured to operate with the said plurality of sensors, the pump and the motors, wherein the motors are further configured to operate with a robotic arm characterized to clean the floor and the toilet seat automatically when there is not human inside.

5

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ABSTRACT

A SYSTEM FOR AUTOMATED CLEANING AND SANITIZATION OF TOILETS

The present invention relates to the field of automatic cleaning systems and more
5 particularly it discloses an automated and smart system for cleansing and sanitizing
the wash bowls and floor of toilets. The existing methods involve manual cleaning
done by a human which is not at all an easy task and may not even exist in all areas.
Placing a sensor-controlled water flusher attached to the toilet will perform the
cleaning task and meanwhile, the number of cycles used is recorded to activate the
10 automated cleaning process. We aim to ease the brushing technology using a robotic
arm mechanism in which 3 servomotors are used. Pressure pump along with proper
designing of pipes are also incorporated. Hence, on adopting this methodology, we
will be able to increase the standard of public and community toilets and facilitate
people to use these effectively.

15

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20 Patent Agent On Behalf of the Applicants

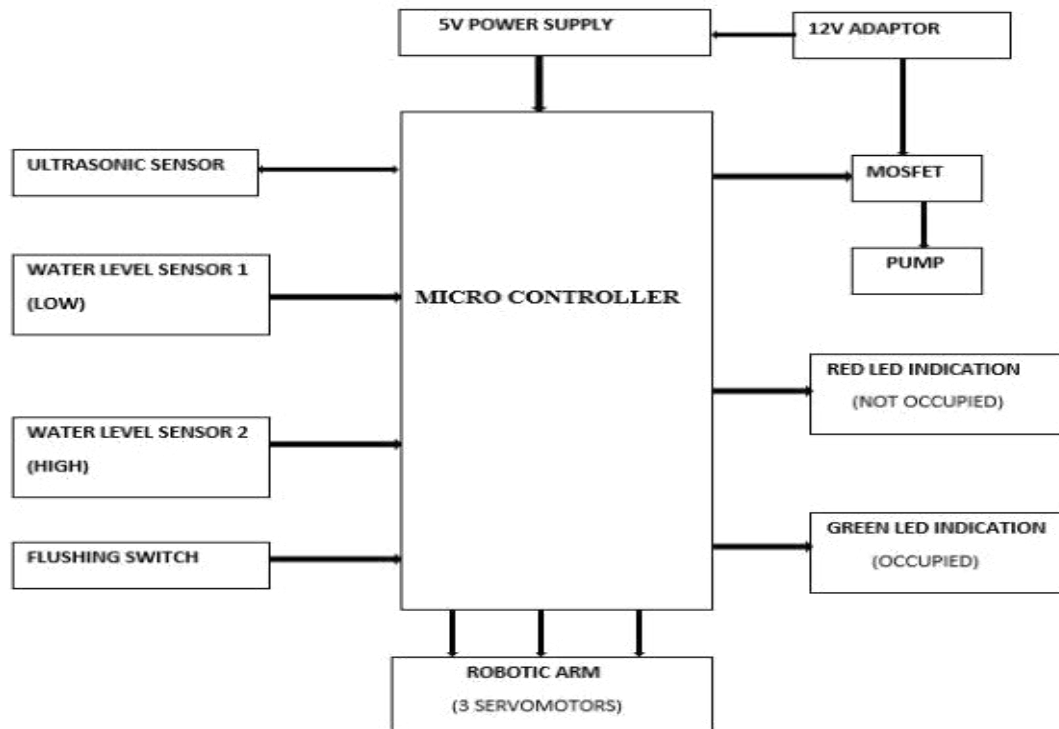


FIGURE 1

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FIGURE 2

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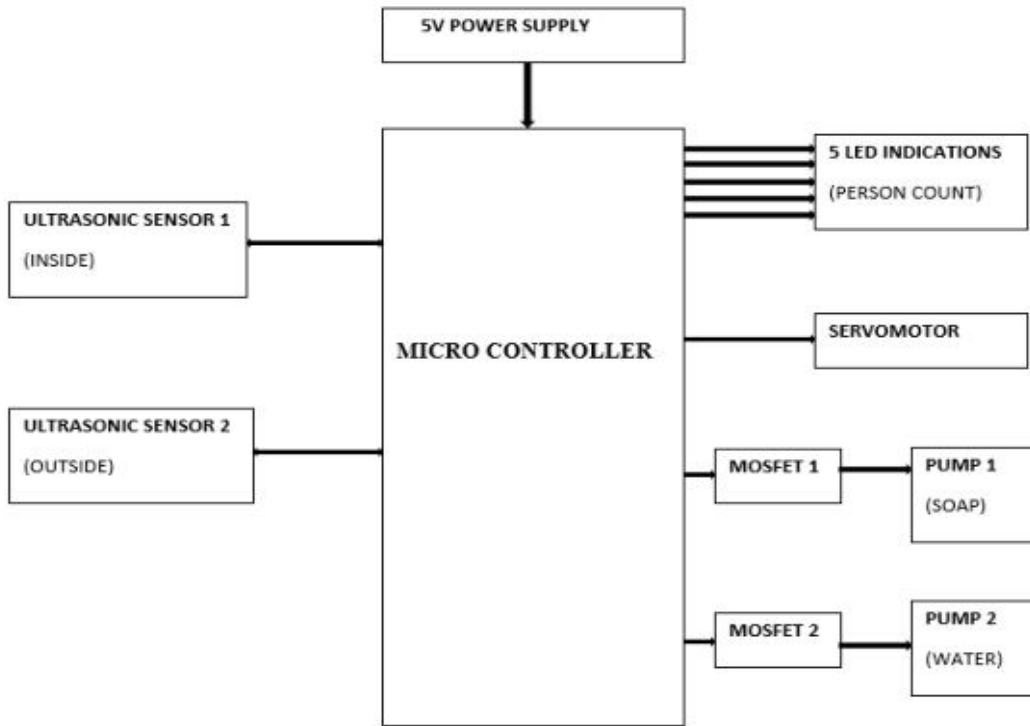


FIGURE 3

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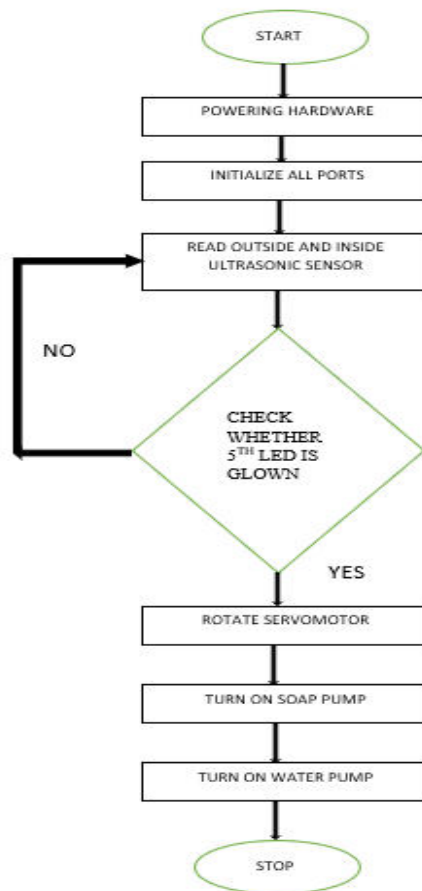


FIGURE 4

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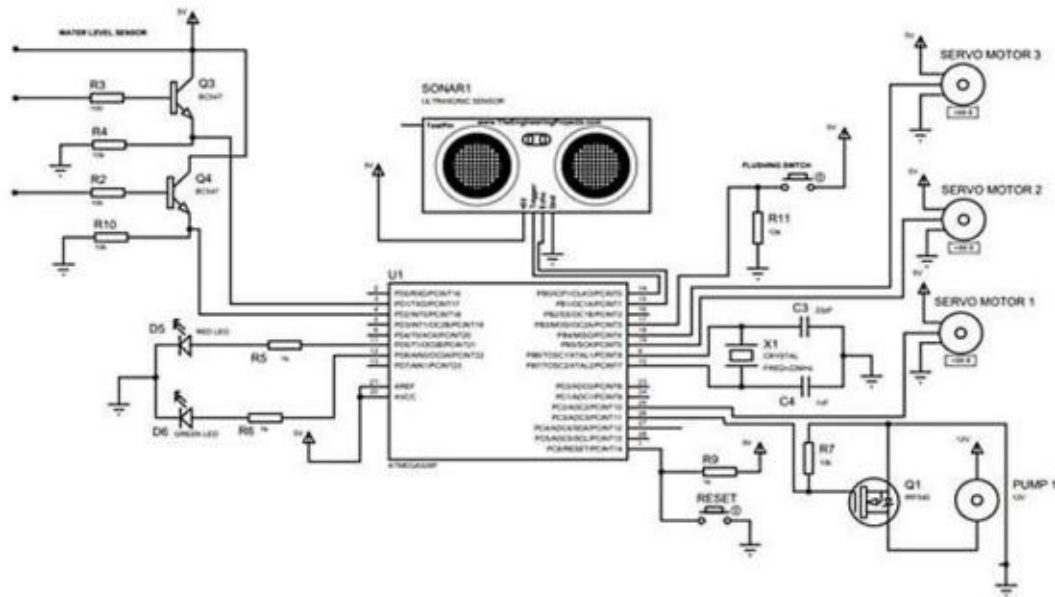


FIGURE 5A

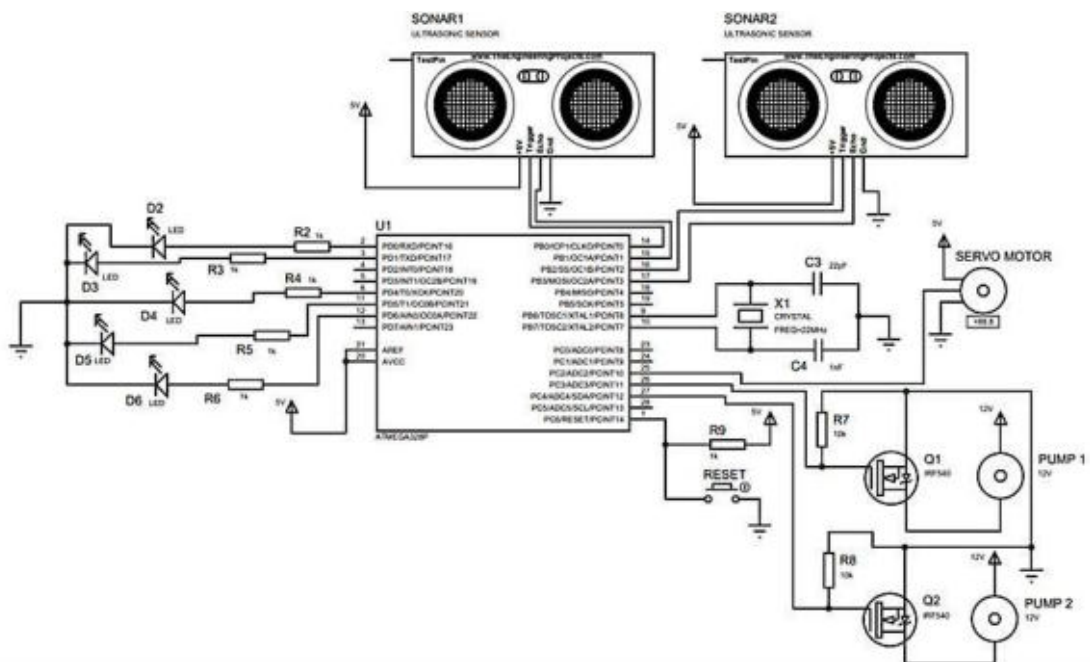


FIGURE 5B

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THE PATENTS ACT, 1970
(39 of 1970)
and

THE PATENTS RULES, 2003

STATEMENT AND UNDERTAKING UNDER SECTION 8

(See section 8; Rule 12)

I / We,

Name Of Applicants	Nationality	Address
VIMAL JYOTHI ENGINEERING COLLEGE	INDIAN	Jyothi Nagar, Chemperi (P.O.), Kannur - 670632, Kerala, India.

hereby declares:-

(i) that I/We who have made this application No.: 202241053378 dated 19-09-2022; alone/jointly has made for the same / substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:


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(ii) that the rights in the application(s) has/have been assigned to

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Dated This 19th day of Sep, 2022



Signature,

NAME: PREM CHARLES I (INPA 3311)
PATENT AGENT ON BEHALF OF THE APPLICANT(S)

To,
The Controller of Patents, Intellectual Property
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DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME OF APPLICANT (S)

VIMAL JYOTHI ENGINEERING COLLEGE

hereby declare that the true and first inventor(s) of the invention disclosed in the complete specification filed in pursuance of my/our application numbered **202241053378** Dated **19th day of Sep , 2022** are

INVENTOR (S):

1	a) Name: b) Nationality: c) Address:	Shinu M. M. Indian Assistant Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
2	a) Name: b) Nationality: c) Address:	Dr. Glan Devadhas G. Indian Professor, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
3	a) Name: b) Nationality: c) Address:	Sreehari Indian Student, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
4	a) Name: b) Nationality: c) Address:	Akshay P. Indian Student, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
5	a) Name: b) Nationality: c) Address:	Amal Raj P. Indian Student, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.
6	a) Name: b) Nationality: c) Address:	Anandhu Prakash Indian Student, Department of Electronics and Instrumentation Engineering, Vimal Jyothi Engineering College, Chemperi (PO), Kannur – 670632, Kerala, India.

Dated This 19thday ofSep,2022

Signature,



NAME: PREM CHARLES I(INPA 3311)

PATENT AGENT ON BEHALF OF THE APPLICANT(S)

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT(S) IN THE CONVENTION COUNTRY:-

-N.A-

To,

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FORM 9

THE PATENT ACT, 1970
(39 of 1970)
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REQUEST FOR PUBLICATION

[See section 11A (2) rule 24A]

I/We **VIMAL JYOTHI ENGINEERING COLLEGE** hereby request for early publication of my/our
[Patent Application No.] TEMP/E-1/61216/2022-CHE

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1	202241053378	TEMP/E-1/61216/2022-CHE	1600	37613	FORM 1	A System for Automated Cleaning and Sanitization of Toilets
2	E-106/5557/2022/CHE	202241053378	0	----	FORM28	----
3	E-12/7095/2022/CHE	202241053378	2500	37613	FORM 9	----

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N-0001024599	Online Bank Transfer	1909220014849	4100.00	1475001020000001

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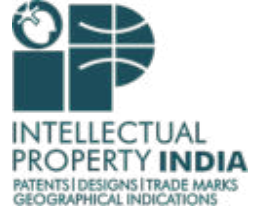
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To
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1	202241053378	E-5/3782/2022/CHE	0	----	FORM 5	
2	202241053378	E-3/29353/2022/CHE	0	----	FORM 3	

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November	Workshop on Intellectual Property Rights (IPRs) and IP management for start up
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Workshop	null
Program Theme:	Other:
IPR	NA
Date & Duration (Days):	External Participants, If any:
06/28/2022-06/28/2022-0	0

Student Participants:	Faculty Participants:
30	10
Expenditure Amount, If any:	Remark:
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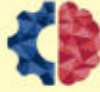
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Video:	https://drive.google.com/file/d/1RX2qbfT8Rn2KrVXFJsJoxZsBJpyVv7767/view?usp=sharing
Photograph1:	
Photograph2:	NA
Session plan, If any:	https://api.mic.gov.in/uploads/institutes/monthlyReport/report/6226-IC201810350.pdf

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(Prof. (Dr) Unnat P. Pandit)
CONTROLLER GENERAL OF
PATENTS, DESIGNS & TRADE MARKS



Ministry of Commerce
and Industry
Government of India

CERTIFICATE

This is to certify that, **DR.G.GLAN DEVADHAS** of **VIMAL JYOTHI ENGINEERING COLLEGE** co-ordinated in conducting the Intellectual Property Awareness program under

NATIONAL INTELLECTUAL PROPERTY AWARENESS MISSION

on April 29, 2022

Jointly Organized by

Intellectual Property Office and MoE's Innovation Cell, India

(Dr. Abhay Jere)

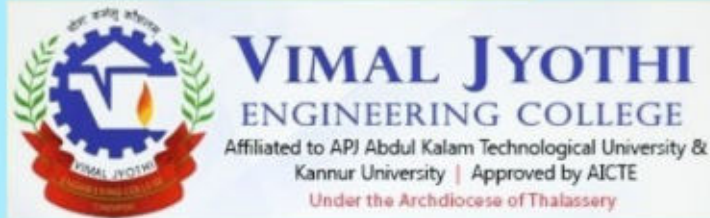
CHIEF INNOVATION OFFICER
MINISTRY OF EDUCATION'S INNOVATION CELL (MIC)
GOVERNMENT OF INDIA



(Prof. (Dr) Unnat P. Pandit)

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National IP Literacy Week Celebration
Online National IP Awareness Mission Event
conducted by



&

Kalam Program for IP Literacy and Awareness (KAPILA)

in collaboration with

National Intellectual Property Awareness Mission (NIPAM)

on 29/04/2022 @ 2.30 PM

SPOC

Dr.G.Glan Devadhas,
Professor & Head, Dept. of EIE
President, IIC-VJEC,
989+896257
hodaiei@vjec.ac.in.

Video call link: <https://meet.google.com/jee-vexf-wcs>

Resource Person:

Smt. Anjana Haridas,

Examiner of Patents and Designs, Indian Patent Office, Chennai

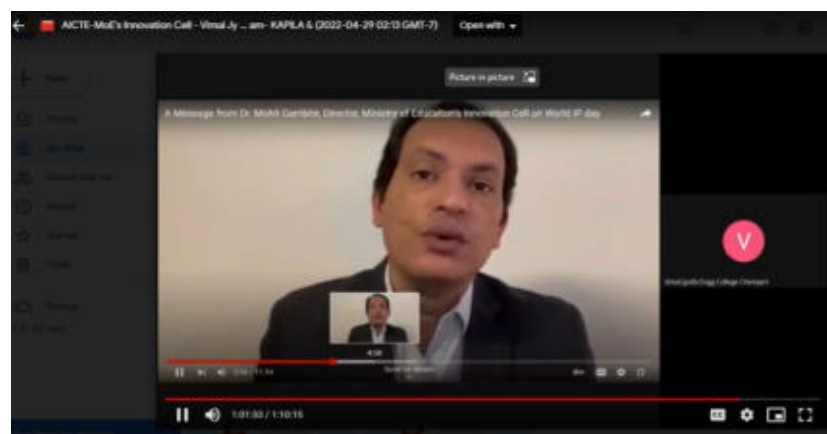




Principal Dr.Benny Joseph Addressed the gathering



Technical session handled by Ms.Anjana Haridas



Director MIC's talk is streamed



VIMAL JYOTHI
ENGINEERING COLLEGE
Affiliated to APJ Abdul Kalam Technological University &
Kannur University | Approved by AICTE
Under the Archdiocese of Thalassery



NATIONAL IP WEEK LITERACY CELEBRATIONS

Online National IP Awareness Mission Event

Organised by

Vimal Jyothi Engineering College, Kannur, Kerala

In Association with

NIAPM & KAPILA

On 29/04/2022 at 2.30 Am

Participants :Students and Staff members

On google Meet: <https://meet.google.com/jee-vexf-wcs?pli=1&authuser=8>

Program Schedule

Welcome Address	Dr.G.Glan Devadhas, President IIC VJEC
Presidential Address	Dr.Benny Joseph, Principal VJEC
IP Awareness Address Technical Session	Ms.Anjana Haridas, Examiner of patents and Designs, Indian Patent office,Chennai
Funding Opportunities for patent through KAPILA Scheme (through video) (https://youtu.be/LGkxNBE93Mg)	Dr. Mohit Gambhir Director, MIC
Vote of Thanks	Nashala K P, Student S6 EIE

IIC - VJEC