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## RESEARCH PAPER PUBLICATIONS IN 2018-19

Number of research papers published per teacher in the Journals notified on UGC care list during the year 2018-19

S.No	Title of paper
1	A Feasibility Study On C-RAN
2	Micro-calcification Detection In Digital Mammogram
3	An improved classification system for brain tumors using wavelet transfer and neural network
4	Epilepsy detection based on EEG signals
5	A Critical analysis on the evolution in the E-payment system ,security risk threats and vulnerability
6	Metamaterial patch antenna with PBG structure to reduce surface wave
7	ELM Based Detection of Micro calcification in Mammogram using GLCM Features
8	A Hybridized ELM for Automatic Micro Calcification Detection in Mammogram Images Based on Multi-Scale Features
9	MICROGRIDS -A FUTURE SMART GRID DESIGN
10	A novel design for PV integrated buck converter using MPPT and sub MPPT
11	Brain tumor detection and segmentation using a wrapper based genetic algorithm for optimized feature set
12	Emerging Techniques and Trends in DNA Cryptography
13	Survey on Static and Dynamic Hand Gesture Recognition Techniques
14	ELM Based Detection of Micro calcification in Mammogram using GLCM Features
15	Experimental analysis and effects of Gasoline as an additive in Compression Ignition Engine





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18	Thermal Degradation On Biomass Briquettes Of Artocarpus Heterophyllus Leaf Powder
19	Grid frequency regulation by hybrid system using energy storage system
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21	Automatic diagnosis of diabetic retinopathy with the aid of adaptive average filtering with optimized deep convolutional neural network
22	Analysis of ph neutralization using ANFIS based queuing algorithm
23	Fractional order controller design for SEPIC converter using metaheuristic algorithm
24	Watermarking Schemes for High Security with Applications and Attacks: Research Challenges and Open Issues
25	Corrosion rate of Al-Si Alloy Reinforced with B4C Nanoparticle prepared by Powder Metallurgy Method using RSM
26	Development of an Adaptive PID Controller for a Nonlinear Process





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## A Feasibility Study On C-RAN

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### Abstract

Now a days the number of users of mobile phone are increasing exponentially, so it will cause jamming in the network and require large bandwidth. So among promising technology candidates to overcome this problem, cloud radio access network (C-RAN) is used. C-RAN, having one baseband unit (BBU) communicates with users through distributed Remote Radio Heads (RRHs). RRHs are connected to the BBU via high capability, low latency fronthaul links and performs soft relaying. The architecture of C-RAN imposes a shortage of fronthaul bandwidth because raw I/Q samples are exchanged between the RRHs and the BBU. In BBU different algorithms are used to improve the capacity, joint decompression and decoding (JDD) and Wyner-Ziv coding.

**Keywords:** Cloud radio access networks, joint decompression and decoding, BBU, RRH

### INTRODUCTION

Cloud radio access network (C-RAN) has been widely accepted as a new architecture for future mobile networks to sustain the ever increasing demand in data rate [2]. Simply speaking, C-RAN is a centralized, cloud computing-based architecture for radio access networks that supports 2G, 3G, 4G and future wireless communication standards. C-RAN consists of one centralized Baseband Unit (BBU) and a variety of distributed Remote Radio Heads (RRHs), it serves users in a geographical region. The advantage of C-RAN over Traditional cellular, or radio access networks (RAN) includes system throughput improvement, high power efficiency, and dynamic resource management, which eventually result in the cost-saving on capital expenditure and operating expenditure [5].

Traditional cellular or Radio Access Networks (RAN), it consists of many complete base stations. Each base station covers a tiny space, whereas a cluster of base stations provides coverage over a

continual space. Each base station processes and transmits its own signal to and from the mobile terminal, and forwards the data payload to and from the mobile terminal and out to the core network via the backhaul. Each base station has its own cooling, backhaul transportation, backup battery, monitoring system, and so on. Because of restricted spectral resources, network operators 'reuse' the frequency among different base stations, which will cause interference between neighbouring cells [6].

Cloud computing is the hot topic for all information technology investors. C-RAN is used for boosting of data services and applications, in wireless systems mainly used in voice, data e-mail, video. Now a days increasing demand of data services and users C-RAN is used, earlier traditional RAN was used. In traditional RAN each base station connects to a fixed number of antennas, the antenna covers a small area and capacity is limited by interference. The main challenges are requirement of large base station, base





2-2018-19

## Micro-calcification Detection In Digital Mammogram

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### Abstract

As reported by world health organization, breast cancer is the most common cancer in women and it caused large number of death in world. Early diagnosis is the only solution to increase the survival rate. There are two early screening plans for breast cancer: early detection and screening. Limited resources parameter with low health system is the main reason for diagnosing in the late stages and should organize early diagnosis programs based on knowledge of the first signs and symptoms. Many methods are used to test women to identify cancer before all symptoms appear. Mammography is one of the methods in which an X-ray of the breast used to detect and diagnose breast cancer tumors. The tiny deposit of calcium known as the micro-calcification can be detected by using screening mammogram and this calcification sometimes represents the cancer. This review aims to compare different method for detecting micro calcification in mammogram.

**Keywords:** Artificial neural network, Micro-calcification, Mammogram, Support vector machine, Wavelet Transform

### INTRODUCTION

A mammogram is an X-ray image of breast. Mammograms can be used to detect breast cancer in women who have no sign of the disease and are known as screening mammogram. Screening mammogram usually consist of two X-ray images or images of two breast. These images are used to detect the tumor which cannot be felt and it also detects micro-calcification which sometimes indicates the presence of cancer. Mammogram is also used to detect cancer which shows some sign or symptoms. This type of mammography is called a diagnostic mammography. In addition to one piece, signs of breast cancer may include breast pain, skin thickening of the breast, nipple discharge, or a change breast size or shape; however, these signs may also be signs of benign conditions.

A observed mammography can also be used to estimate changes in screening mammography or to visualize breast tissue when it is difficult to get a screening

mammogram due to conditions such as presence of breast implants Prosthetic. The same machines are used for both types of mammography. Radiation from the mammogram causes some health problem. The continuous mammography will cause other health problems. However, diagnostic mammography takes longer to perform mammography screening and the total radiation dose is greater because more X-ray images are needed for getting the sinus view from different angles. The technician may develop a distrustful area to produce a detailed picture that can help the doctor to make a specific diagnosis.



Fig: 1. an example of micro-calcification in mammogram

A woman born today has about one in eight chance of being diagnosed with



3(2018-19)

ORIGINAL ARTICLE

## An Improved Classification System for Brain Tumours Using Wavelet Transform and Neural Network

AS Dhas<sup>1</sup>, M Madheswaran<sup>2</sup>

### ABSTRACT

*This paper presents an improved classification system for brain tumours using wavelet transform and neural network. The anisotropic diffusion filter was used for image denoising, and the performance of the oriented rician noise reducing anisotropic diffusion (ORNRAD) filter was validated. The segmentation of the denoised image was carried out by fuzzy c-means clustering. The features were extracted using symlet and coiflet wavelet transforms, and the Levenberg-Marquardt algorithm based neural network was used to classify the magnetic resonance (MR) images. This classification technique of MR images was tested and analysed with existing methods, and its performance was found to be satisfactory with a classification accuracy of 93.24%. The developed system could assist physicians in classifying MR images for better decision-making.*

**Keywords:** Brain tumour, fuzzy c-means, Levenberg-Marquardt algorithm, magnetic resonance images, neural network, wavelet transform

## Un sistema de clasificación mejorado para los tumores cerebrales usando la transformada de ondeletas y la red neuronal

AS Dhas<sup>1</sup>, M Madheswaran<sup>2</sup>

### RESUMEN

*Este artículo presenta un sistema de clasificación mejorado para los tumores de cerebro usando la transformada de ondeletas (transformada wavelet) y la red neuronal. El filtro de difusión anisotrópica fue utilizado para la eliminación del ruido de la imagen, y se validó el funcionamiento del filtro de difusión anisotrópica orientado a reducir el ruido riciano (ORNRAD, siglas en inglés). La segmentación de la imagen 'desruidizada' (denoised) fue realizada mediante el agrupamiento difuso c-means fuzzy. Las características fueron extraídas usando las transformadas de ondeletas symlet y coiflet, y la red neuronal basada en el algoritmo de Levenberg-Marquardt fue utilizada para clasificar las imágenes de resonancia magnética (RM) imágenes. Esta técnica de clasificación de imágenes de RM fue probada y analizada con métodos existentes, y se halló que su rendimiento era satisfactorio con una precisión de clasi-*

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4-2018-19

## Epilepsy Detection Based on EEG Signals

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### Abstract

Epilepsy is a brain neurological disorder in which the brain activity becomes abnormal causing unusual behavior, uncontrollable jerking movements, sensation and sometimes loss of awareness, affecting 71 million people world-wide. Electroencephalogram (EEG) is used to measure the electro-neurological activity of the brain. When the Signal to Noise Ratio (SNR) of the noisy data is lower than 0dB the current seizure detection method can't maintain a strong performance. The SNR of the noise data is below 0dB or negative means that EEG data is corrupted with serious levels of noise.

**Index Terms:** Electroencephalogram (EEG), Neural Network, specificity, accuracy, sensitivity, Epileptic seizure, SNR

### INTRODUCTION

Epilepsy is a common brain disorder after migraine. In worldwide around 72 million people have epilepsy, it makes epilepsy the second common electro-neurological disorder after migraine [22]. It is a brain disorder that occurs in mammalian species, in both genders at all ages, especially in neonates and in aging population. In this case probably more frequently the brain become more complex, it can cause a variety of temporary changes in perception and behavior such as the brain activity becomes abnormal, causing unusual behavior, sensation, sometimes loss of awareness stare blankly, and uncontrollable jerking movements of the arms and legs. Epilepsy can be ordered into two, fractional/general Partial seizures: - they are delivered by and large from a restricted limited locale of the cerebrum, and some of the time it might radiate to other new regions. Based on the epilepsy patient's response during the seizure period, partial epileptic seizure is again divided into simple and complex [14]. Epilepsy detection plays a very

important role in improving the quality of life of epileptic patients. Electroencephalogram (EEG), the prime and more complex signal widely used for the diagnosis of epilepsy. It represents neuro-physiologic activity of the brain measured electrographically using electrode placed on the Scalp. Electroencephalographic records, is a relevant and most relevant tool/medium for the detection of neural disorders like head injury, tumor and epilepsy. Human EEG they are reflected by numerous ictal patterns, epileptic seizures can typically become evident as characteristic. Usually rhythmic brain signals frequently coinciding with or precedent the earliest observable changes in the behavior. Their diagnosis at the beginning of ictal patterns in the EEG can be used to begin detailed detection process during seizures and to discriminate epileptic seizures from other conditions with seizure-like symptoms [23]. Around 90% of the previous work has aim on developing sufficient and important feature extraction method that can find the most important EEG features



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## A Critical Analysis on the Evolution in the E-Payment System, Security Risk, Threats and Vulnerability

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### ABSTRACT

At present, payment system through the internet has been trending at the furious pace. There are different ways and varieties of e-payment systems are existing to facilitate ease of transaction at the most active security level. However, parallelly the cyber-attacks strategies are growing at the advanced level as security protocols. In this research study, have analyzing the evolution of e-payment system and its terminology followed by different conventional e-payment mechanisms. Also demonstrates lack of security provisions and solution strategies. The main contribution of the present survey study is providing the landscape of digital e-payment system and its opportunities for future e-commerce systems. In the last, have briefly discussing and analyzing the fraudulent transaction rates which will become the benchmark for the development of secure e-payment system.

### Keywords

Debit/Credit card, Electronic Payment System, E-Cash Transaction, Mobile-Payment, Security, Secure E-Transaction (SET), QR code.

### 1. INTRODUCTION

With the fast growth of the internet and information technology, most of the consumers, as well as a vendor, are depending upon electronic-commerce (i.e., E-commerce) system. It is a process of buying and selling the goods and services or financial transaction, over the internet [1]. For example, e-payment or online payment, which is also known as EDI (Electronic data interchange). In the current digital world, internet banking or e-banking system has become most rapidly adopting technology for multiple purposes especially for online shopping, money transaction, e-ticket booking, and many more applications. An e-payment or e-banking system provides a service to make a financial transaction for goods and services via an electronic system, without using any cash or check. The e-payment technology has to place a new era over the past decades owing to the popular online-based shopping and internet banking [2]. As rapid growth in the development of e-banking system can notice the increasing use of e-payment system has provided tremendous opportunities and services for the users. The services offered from the internet banking are becoming the prevalent medium of money transactions and can be taken as major requirements in current financial industry [3]. As of simplifying e-banking operations, these services offer any time access to banking services [4]. As per the research report of [5], ~29 percentage of online consumers accessed the e-banking sites in the year 2012, which is a very low access rate [6].

In the e-banking system, the essential aspect is that establishing the important technical infrastructure, for example; E-payment system. Generally, E-payment system can be grouped into

different categories; one is cash-based payment (i.e., E-cash, and pre-paid card) and second is account based payment system (i.e., credit card, debit card, and E-check). The E-payment process mainly depends upon time and location, and it happens with the help of the smart device that is named as M-payment (mobile payment) system. In this procedure, operators and network carriers have to communicate with banks or financial institutions, because, like example; cash-based payment system often managed over the accounts of citizens. In the state sector, there are multiple enterprises to offer E-payment for the citizens to protect the electronic payments is made by government organizations to pay for public services. With the tremendous growth in the information & communication technology (ICT), mobile services achieved broad coverage and extensive use, not only helping in the public sector but also in economic or business activities becoming essential service for improving business revenue. According to the report of ARCOTEL [7], mobile access surpasses 100%, with the coverage over 90% throughout the public region. In [8], Ecuador financial institution estimated that in the year 2014, less than 50% of the population was using e-banking, i.e. no alternative use of physical money payment.

The key factor of E-banking service is to understand the customer's satisfaction and requirements. To improve the E-payment system adoption rate, the factors which affect customer adoption must be better managed [6]. Despite the huge investment made on internet technology in the banking sector, the case study shows that few customers although following physical money transaction, are reluctant to utilize the system. This shows the research required to figure out the influencing factors for the adoption of e-payment system [9]. Multiple electronic banking methods have been explored to define the factors influencing the customer's adoption of E-payment. The major influencing factors are; flexibility during payment system, payment operations, data management, privacy and system security [10]. Always, customers of E-payment system fears about using the internet services for online money transactions. The major problem of trust occurs when high risk is involved. Therefore, security and trust can be considered as a primary factor influencing customer contentment in the use of E-payment.

The establishment of M-payment system began more than ten years ago. However, in real scenario adoption of M-payment is quite different. Till now, 70% of Indian customers are being aware of M-payment system, don't adopting the technologies. The primary reason for this less adoption rate is because of high fear of privacy and security incorporations provided by different services [11]. With the adoption of mobile phones and related services, various applications (M-Pesa) has been launched in our country which can be utilized for financial transactions, E-recharge, E-bill payments, and cash withdraw from ATM.





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## METAMATERIAL PATCH ANTENNA WITH PBG STRUCTURE TO REDUCE SURFACE WAVE

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**Abstract** - This paper presents a modified design of patch antenna using an artificial material called metamaterial. The resonating frequency of 7.6 GHz patch antenna with RT DUROID 5880 is the substrate. The proposed antenna has a size of 32mm\*28mm and thickness 31 mil. Microstrip patch antenna has high advantages like low profile, light weight, omni-directional and low-cost, but it also face some disadvantages like low gain, low VSWR and presence of surface wave leads to reduction of over all performance. To overcome these drawbacks use metamaterial patch antenna and Photonic band gap structures. That will improve overall performance as well as efficiency of the proposed patch antenna. Rectangular patch and microstrip line feeding is also present. On patch micro-triangular pattern is using, that make the patch to metamaterial. And on ground plane crossed strip lines are using, also on substrate PBG structure is using to reduce the presence of surface wave. Proposed antenna is simulating using HFSS software.

**Keywords**- Metamaterial, Microtriangles, PBG, VSWR, Surface wave.

### I. INTRODUCTION

Antenna design is the emerging field of research to change the future. Microstrip patch antenna is one of the interesting area in antenna design due to its wonderful advantages like low profile, light weight, easily compactable, and low-cost. Patch antennas also face some disadvantages in there parameters like low gain, low VSWR, and low efficiency due to some unwanted signals like surface waves, leaky waves etc. Researches take it as a challenge to overcome these drawbacks and getting new products every day. In this paper, the proposed patch antenna has a size of 32mm\*28mm and thickness of 31mil. RT Duroid 5880 is the substrate material. Due to the patterning of patch as microtriangles and ground plane with crossed strip lines make patch and ground plane to metamaterial.

Metamaterial is an artificial material. It can't be found naturally in earth. Repeated pattern make any metal or plastic to metamaterial. Metamaterials show negative refractive index too. Using these advantages of metamaterials the proposed antenna has negative refractive index as well as horizontal radiation when it place horizontally.

Applying photonic band gap structure on substrate near to patch area helps to reduce the presence of surface waves. And that makes a highly efficient patch antenna. This concept is also using in this proposed metamaterial patch antenna to reduce the presence of surface wave.

The resonating frequency of proposed antenna is 7.6GHz and it lies in X band. So it can be used for X band applications. HFSS software is using for simulation purpose.

### II. ANTENNA DESIGN

For designing a patch antenna, it is very important to find the operating frequency of proposed patch antenna. After the decision of resonating frequency, calculate the width and length of patch antenna by equation no [1].

$$\omega = \frac{c_0}{2f_r} \sqrt{\frac{2}{\epsilon_r + 1}} \quad (1)$$

The calculation of  $\epsilon_{r,eff}$  is given by the equation

$$\epsilon_{r,eff} = \frac{\epsilon_r + 1}{2} + \frac{\epsilon_r - 1}{2} \left[ 1 + 12 \frac{h}{\omega} \right]^{-2} \quad (2)$$

Substituting the values of  $\omega$ ,  $\epsilon_{r,eff}$  and  $h$ ,

$$\Delta L = 0.412h \frac{(\epsilon_{r,eff} - 0.3) \left( \frac{\omega}{h} + 0.264 \right)}{(\epsilon_{r,eff} - 0.258) \left( \frac{\omega}{h} + 0.8 \right)} \quad (3)$$

Substituting the values of  $\epsilon_{r,eff}$  and  $f_r$ ,

$$L_{eff} = \frac{c_0}{2f_r \sqrt{\epsilon_{r,eff} - 2\Delta L}} \quad (4)$$

The actual length of the antenna is given by,

$$L = L_{eff} - 2\Delta L \quad (5)$$

### III. ANTENNA STRUCTURE

A 32 mm\*28 mm RT Duroid with 2 side copper coating is taken with substrate thickness of 31 mil. The patch dimensions are 16mm\*12 mm rectangular patch. On patch microstrip line pattern is added to make the patch to metamaterial as shown in fig 1.





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Image & Signal Processing | [Published: 15 May 2019](#)

## A Hybridized ELM for Automatic Micro Calcification Detection in Mammogram Images Based on Multi-Scale Features

[Jayesh George Melekoodappattu](#)  & [Perumal Sankar Subbian](#)

[Journal of Medical Systems](#) **43**, Article number: 183 (2019) | [Cite this article](#)

**424** Accesses | **25** Citations | [Metrics](#)

### Abstract

Detection of masses and micro calcifications are a stimulating task for radiologists in digital mammogram images. Radiologists using Computer Aided Detection (CAD) frameworks to find the breast lesion. Micro calcification may be the early sign of breast cancer. There are different kinds of methods used to detect and recognize micro calcification from mammogram images. This paper presents an ELM (Extreme Learning Machine) algorithm for micro calcification detection in digital mammogram images. The interference of mammographic image is removed at the pre-processing stages. A multi-scale features are extracted by a feature generation model. The performance did not improve by all extracted feature, therefore feature selection is performed by nature-inspired optimization algorithm. At last, the hybridized ELM



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IMAGE & SIGNAL PROCESSING



## A Hybridized ELM for Automatic Micro Calcification Detection in Mammogram Images Based on Multi-Scale Features

Jayesh George Melekoodappattu<sup>1</sup> · Perumal Sankar Subbian<sup>2</sup>

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### Abstract

Detection of masses and micro calcifications are a stimulating task for radiologists in digital mammogram images. Radiologists using Computer Aided Detection (CAD) frameworks to find the breast lesion. Micro calcification may be the early sign of breast cancer. There are different kinds of methods used to detect and recognize micro calcification from mammogram images. This paper presents an ELM (Extreme Learning Machine) algorithm for micro calcification detection in digital mammogram images. The interference of mammographic image is removed at the pre-processing stages. A multi-scale features are extracted by a feature generation model. The performance did not improve by all extracted feature, therefore feature selection is performed by nature-inspired optimization algorithm. At last, the hybridized ELM classifier taken the selected optimal features to classify malignant from benign micro calcifications. The proposed work is compared with various classifiers and it shown better performance in training time, sensitivity, specificity and accuracy. The existing approaches considered here are SVM (Support Vector Machine) and NB (Naïve Bayes classifier). The proposed detection system provides 99.04% accuracy which is the better performance than the existing approaches. The optimal selection of feature vectors and the efficient classifier improves the performance of proposed system. Results illustrate the classification performance is better when compared with several other classification approaches.

**Keywords** Mammography · Micro calcification · Extreme Learning Machine · Feature selection · Classification · FOA

### Introduction

Mammography is an X-ray based imaging model which is

mammogram is considered to be the main method which can sense 85 to 90% of all breast cancers [5]. The milk gland is the main origin of growth of malicious cells [6, 7]. The



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 Open Access  Subscription Access

## MICROGRIDS -A FUTURE SMART GRID DESIGN

Ms. Thrishna Jayaraj, Prof. G Justin Sunil Dhas

### ABSTRACT

*Microgrid is the small scale power grid with a bunch of manifold distributed generators (DGs) that supply electrical energy to consumers. The main components include loads, DERs, master controller, smart switches, protective devices, as well as communication, control and automation systems [1]. Two main control techniques used in microgrids are hierarchical control and distributed control structures. Both controls structures empower consistent and resourceful operation for microgrids. Different measures have been developed to improve the negative effects of the voltage disturbance and to moderate the power quality complications. A microgrid can able to operate moreover in grid- connected or autonomous (islanded) modes. Islanding can have undesirable impacts on system operation as well as safety issues if not detected and configured on time. Within the smartgrid concept microgrids have been proposed as novel distribution network architecture.*

### FULL TEXT:

 PDF

### REFERENCES

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## Abstract

The future of renewable energy is so demand as it relates more with the scarcity of the bio-fuels and other petroleum products. The usage of such a part is aided for the conventional production of electric power. The generation of electricity cost a lot as it is highly used for the day to day needs. A reliable indigenous production of electric power is from the application or introduction of the photovoltaic system. The main region where the PV system leads behind is especially on the shaded conditions. The shading effect reduces the output efficiency of the solar cell and it leads to some fixed losses. This paper proposes a novel PV structure configuration that has the capacity to reduce the effect of partial shading by changing the MPPT control algorithm and an additional sub algorithm. This paper describes the lateral effect of the partial shading and the introduction of the step by step control topology which aids the MPP with the PID for obtaining the optimal output irrespective of optimal load current with a stable DC output. The practical problems of loop delay, feedback noise, feedback filtering and deadbeat controller parameters sensitivity are investigated by linear analysis simulation, experimental implementation and non linear model analysis. This paper presented the simulation, implementation and performance of dead beat control. © 2018, Institute of Advanced Scientific Research, Inc.. All rights reserved.



11(2018-19)

Published: 02 March 2018

## Brain tumor detection and segmentation using a wrapper based genetic algorithm for optimized feature set

S. U. Aswathy , G. Glan Devadhas & S. S. Kumar

*Cluster Computing* **22**, 13369–13380 (2019) | [Cite this article](#)

243 Accesses | 13 Citations | [Metrics](#)

### Abstract

The work here intends to develop an algorithm for optimizing the available feature set for identifying tumor from brain MRI images. A set of features are selected based on texture features. From the large set of features relevant features would be selected using wrapper approach. Further, an optimized subset of the relevant features is generated with the help of Genetic Algorithm. The machine learning with support vector machine algorithm is used for detection and segmentation of tumors in the brain MRI image acquired. The superiority of the algorithm is established by comparing it with the state of the art algorithms such as level set method and fuzzy based methods. The authors are using performance measurement tools including manual segmentation and volume based tools for validating the claim.



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12-2018-19

## Journal of Computer Technology & Applications

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Home > Vol 10, No 3 (2019) > **George**

Open Access Subscription Access

### Emerging Techniques and Trends in DNA Cryptography

*Shilpa George, Biji C.L., Achuthsankar S. Nair, Akhila Mathew*

#### Abstract

**Abstract:** This paper reviews recent research trends and methods in the field of DNA cryptography. An attempt is made to introduce biological background and the literature concerning the various DNA cryptography techniques mainly comes under Pseudo DNA cryptography and DNA steganography based on biomolecular operations. The paper explains some of the key algorithms in designing Pseudo DNA cryptographic scheme such as (i) DNA Insertion, (ii) DNA Substitution and (iii) DNA Complementary pair method. Later it comes with the approaches adapted in DNA steganography based on biomolecular operations like Polymerase chain reaction (PCR) based DNA steganography, DNA microdot technology, and DNA steganography using recombinant DNA technology. The paper further does a comparative analysis on these methods and argues the various challenges involved in biomolecular operations while designing the DNA ciphers.

**Keywords:** DNA cryptography, Pseudo DNA cryptography, DNA steganography, PCR, DNA Microdot, Recombinant DNA

**Cite this Article:** Shilpa George, Biji C.L, Achuthsankar S. Nair, Akhila Mathew. Emerging Techniques and Trends in DNA Cryptography. Journal of Computer Technology & Applications. 2019; 10(3): 29-41p.





13-2018-19

International Journal of Science and Research (IJSR)

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# Survey on Static and Dynamic Hand Gesture Recognition Techniques

Ophelia M<sup>1</sup>, Keerthijith P<sup>2</sup>

<sup>1,2</sup>Department of Computer Science and Engineering, Vimal Jyothi College of Engineering, Chempери, Kerala-670632, India

**Abstract:** *A hand gesture recognition system provides a natural way of non-verbal communication. Human Computer Inter-action mostly involves hand gestures. Vision-based hand gesture recognition techniques have many advantages over traditional devices, giving users a comfortable and more intuitive way of communication between a human and a computer. Hand gestures are of two types: Static hand gestures and Dynamic hand gestures. Hand gestures which can be either static or dynamic, for human computer interaction is an area of active research and with many numerous possible applications. This survey describes different systems used for gesture recognition. This paper presents a literature review on various gesture recognition methods.*

**Keywords:** Cyber-Glove, Dynamic gesture, Human-Computer Interaction, Gestures, Posture, Skin color detection, Static gestures

## 1. Introduction

“vocabulary” of actions is defined, that can easily be recognized based on the active contour shape and motion.



14-2018-19



## Elm Based Detection of Micro-Calcification in Mammogram using Glcm Features

Jayesh George Melekoodappattu, Perumal Sankar Subbian

**Abstract:** The breast is made up of many different types of tissue and cells. When the cells in the breast grow or change abnormally and it is called breast cancer. Most breast cancers occur in women who are over the age of fifty. Calcification is the main causes of breast cancer. The deposit of calcium in breast tissue is known as calcification. And it is two types, Micro-calcification and macro-calcification. Large calcium deposits represent the macro-calcification which may relate to non-cancerous. The tiny white dots on mammogram represent the micro-calcification which is the earliest stage of breast cancer and the calcification can be found in different shapes. Mammography is the one of the method to determine the breast cancer. In this paper we are determining the micro-calcification in mammogram using different steps which include preprocessing, enhancement, feature extraction, feature selection and the classification.

**Index Terms:** Extreme learning machine, Global Swarm Optimization, Gray level co-occurrence matrix, Mammography.

### I. INTRODUCTION

Each year in the world lots of women are learned that they have breast malignancy. The incidence of breast malignancy decreasing so as the death rate also decreases. The increased cure rate can be attributed to effective surgical and medical treatment also early find out of breast cancer plays an important role[1]. The size of the breast tumor is detected by annual mammogram is very small compared to the size of a

cancer is developed inside this milk channel. non-invasive and invasive are the two types of breast malignancy. In non-invasive cancers the ducts fill with the cancer cells but there is no evidence of the cancer outside of the ducts. The medical term for this is Ductal carcinoma insitu [5].

A surgical strategy to remove the cancer is highly likely to result in a cure with invasive breast cancer cells have broken down the wall of the duct and are found in the fatty part of the breast.

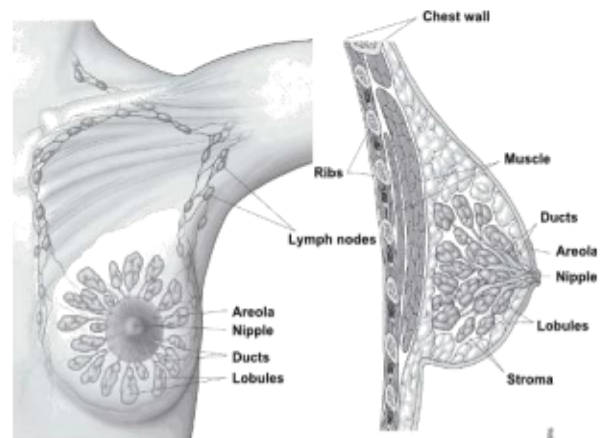


Fig. 1: Breast Tissue

cancer has access to the circulation of the lymph system





15-2018-19

International Journal of Innovative Technology and Exploring Engineering (IJITEE)  
ISSN: 2278-3075, Volume-8 Issue-10, August 2019

## Experimental Analysis and Effects of Gasoline as an Additive in Compression Ignition Engine

Appu Kurian, Rameshan K.P, Ryne P.M, Benphil C Mathew

*Abstract: A compression ignition engine is a sort of engine where the fuel utilized is diesel. In this current study, various influences on petrol-diesel mixture have been introduced in a mono cylinder vertical diesel engine and investigated factually for various stages. Denouement of 0%, 4%, 8% and 12 % of gasoline by volume is varied with diesel and the outcomes has been registered with the foundation of test perceptions at 1500(rpm). Out of various trial experimental outcomes, it is found out that, with the addition of gasoline fuel the real brake -power output rises at the rate of 4-9% and also the brake specific fuel consumption reduces by relatively 6%. Also, the study found out that increase in the volume fraction of gasoline decreases the fuel density, surface tension and kinematic viscosity. In addition the*

Under the classification of Internal Combustion Engines, a Diesel engine plays the role of one of the most dynamic liquid fuel combustion prime movers. However, on the other side, a diesel engine experiences various disadvantages. One of the disadvantages is their limited speed range, particularly for high terrain and heavy load vehicle applications. Because of ignition delay, the rotational speed (rpm) of CI engine is not applicable for higher levels [3]. Due to this reason and also the various accoutrements such as low equivalence ratios, tremendous pressure differences, etc., normally a diesel engine is much heavier than gasoline engine of equivalent power [4]. Meanwhile, the Ignition delay period shall be



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16-2018-19

## Modeling of a Gasifier Using Cycle-Tempo for SOFC Applications

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**Abstract.** Gasifier-SOFC system is an excellent choice for waste to energy conversion. Optimization of process parameter is an issue faced in such complex energy systems. CYCLE-TEMPO is the world leading software used for thermodynamic analysis of energy systems. In this paper a downdraft gasifier is modelled using CYCLE-TEMPO and process parameter like equivalence ratio are optimized for maximum yield. Three agricultural residues namely coconut shell, rubber wood and bamboo which are locally available were tested as a feed. Gasifier model is validated using a downdraft gasifier experimental setup. Gasifier is then integrated with a SOFC unit. From the simulation carried out it was found that the coconut shell will be the best biomass for quality syngas production at an equivalent ratio of 0.2. But the syngas contain other impurities so that gas cleaning is necessary and the purified syngas can be supplied to the solid oxide fuel cell (SOFC).

### INTRODUCTION

Biomass gasification is the thermochemical conversion of biomass feed stocks into combustible gas. It is the major contender for conversion of waste to energy apart from biomethanation. Unlike other renewable sources of energy, as wind and photovoltaic, the bio energy sector is characterized by a high level of complexity, due to the close interaction between industry and the agro-forestry field. The crucial problem is a lack of biomass markets, primarily because of a scarce demand, and a lack of conversion plants able to use this potentially available energy source. However, the use of biomass in the heat and power generation is becoming more and more common. Modeling of gasifier-SOFC systems are very much of importance for optimizing the parameters and experimenting such systems for a wide range are not possible due to cost and other practical limitations.

Fortunato et al. [1] modeled a downdraft gasifier in cycle tempo in which pyrolysis, oxidation and reduction





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Criterion: 3.3.1

17-2018-19

## BIOMASS DENSIFICATION OF AHL POWDER MECHANICAL PROPERTIES USING RSM

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### Abstract

The study of agricultural wastes into biomass is an approach on the way to the growth of alternative energy sources. Artocarpus Heterophyllus Leaves (AHL) powder can be utilized as an alternative energy source to coal. Densification of scum's depends upon its physical properties and process parameters. In this article





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ISSN: 0378-1844

2019 44(11)

## THERMAL DEGRADATION ON BIOMASS BRIQUETTES OF ARTOCARPUS HETEROPHYLLUS LEAF POWDER

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### ABSTRACT

Biomass briquettes replace fossil fuels such as coal or oil and have versatile relevance's in emergent countries. These briquettes are a renewable energy source and limit the carbon emission to the atmosphere. We use Artocarpus Heterophyllus leaves (AHL), a kind of waste collected from the Jack fruit tree mainly from village side. In order to make selection, the properties of the material taken and the cost of the binder





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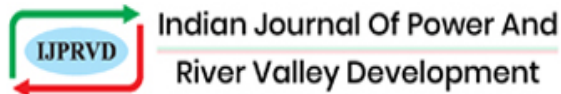
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19(2018-19)



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### Grid frequency regulation by hybrid system using energy storage system

Aug 2019 / by M Pradeep Kumar, S. Durairaj and P. Sridharan

Nowadays, wind and solar power are one of the greatest demand in the electricity market. Due to the inherent variability and uncertainty in grid frequency, a combination of the hybrid system of wind, solar, thermal and ESS brings numerous difficulties in power systems, particularly when generation is not equal to demand. Power systems possess a lot of difficulties like quality, stability, and reliability. In this paper, grid frequency is regulated by means of a hybrid system of wind and solar power with batteries (ESS). The use of energy storage system seems to be one of the best solutions in the power system network. The model of the power system studied in this paper is established on the MATLAB/SIMULINK platform.





20-2018-19

Image & Signal Processing | [Published: 15 May 2019](#)

## A Hybridized ELM for Automatic Micro Calcification Detection in Mammogram Images Based on Multi-Scale Features

[Jayesh George Melekoodappattu](#)  & [Perumal Sankar Subbian](#)

*Journal of Medical Systems* **43**, Article number: 183 (2019) | [Cite this article](#)

424 Accesses | 25 Citations | [Metrics](#)

### Abstract

Detection of masses and micro calcifications are a stimulating task for radiologists in digital mammogram images. Radiologists using Computer Aided Detection (CAD) frameworks to find the breast lesion. Micro calcification may be the early sign of breast cancer. There are different kinds of methods used to detect and recognize micro calcification from mammogram images. This paper presents an ELM (Extreme Learning Machine) algorithm for micro calcification detection in digital mammogram images. The interference of mammographic image is removed at the pre-processing stages. A multi-scale features are extracted by a feature generation model. The performance did not improve by all extracted feature, therefore feature selection is performed by nature-inspired optimization algorithm. At last, the hybridized ELM classifier taken the selected optimal features to classify malignant from benign micro calcifications. The proposed work is compared with various classifiers and it shown better performance in training time, sensitivity, specificity and accuracy. The existing approaches






21-2018-19

## Automatic diagnosis of diabetic retinopathy with the aid of adaptive average filtering with optimized deep convolutional neural network

TV Roshini ✉, Ranjith V Ravi, A Reema Mathew, Anoop Balakrishnan Kadan ✉, Perumal Sankar Subbian

First published: 03 April 2020 | <https://doi.org/10.1002/ima.22419> | Citations: 17

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### Abstract

The most effective treatment for diabetic retinopathy (DR) is the early detection through regular screening, which is critical for a better prognosis. Automatic screening of the images would assist the physicians in diagnosing the condition of patients easily and accurately. This condition searches out for special importance of image processing technology in the way of processing the retinal fundus images. Accordingly, this article plans to develop an automatic DR detection model with the aid of three main stages like (a) image preprocessing, (b) blood vessel segmentation, and (c) classification. The preprocessing phase includes two steps: conversion of RGB to Lab, and contrast enhancement. The Histogram equalization process is done using the contrast enhancement of an image. To the next of preprocessing, the segmentation phase starts with a valuable procedure. It includes (a), thresholding the contrast-enhanced and filtered images, (b) thresholding the keypoints of contrast-enhanced and filtered images, and (c) adding both thresholded binary images. Here, the filtering process is performed by proposed adaptive average filtering, where the filter coefficients are tuned or optimized by an improved meta-heuristic algorithm called fitness probability-based CSO (FP-CSO).



23-2018-19

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DOI:10.3233/JIFS-171892  
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6269

## Fractional order controller design for SEPIC converter using metaheuristic algorithm

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**Abstract.** Fractional order proportional, Integral and a derivative controller is a special kind of controller which is used to regulate the output voltage of a class of sepic converter to the desired level. Tuning of fractional Proportional, Integral and Derivative controller (FOPID) is achieved by different metaheuristic algorithm and the optimization performance target is chosen as minimizing the integral square error (ISE). This paper presents a performance analysis of Single Ended Primary Inductance Converter (SEPIC) by time response specifications such as rise time, settling time and steady-state error and further, the results are compared with the controllers designed by Genetic Algorithm (GA), Particle Swarm Optimization (PSO) and Queen Bee based Genetic Algorithm (QBGA). The design and implementation of fractional order controller for a closed loop control of converter is done by utilizing a MATLAB/SIMULINK environment. Results show that QBGA algorithm exhibit better performance as compared to other optimization technique for voltage mode controller in terms of disturbance rejection.

**Keywords:** SEPIC converter, fractional PID controller, GA, PSO, QBGA

### 1. Introduction

DC-DC converters have been widely used in industrial applications such as communication equipment, computer systems, electric vehicle charging and DC motor drives due to its buck-boost abilities. There are different types of DC converters such as boost, buck, and buck-boost converters are required for different applications. Buck-boost converter has an inverted output, high voltage stress and pulsating input current. These drawbacks can be overcome by SEPIC converter. The SEPIC converter is a type of DC-DC converter allowing the voltage at its output to be less than, greater than, or equal to that of its input with the ability to provide noninverting polarity with respect to the input voltage. This converter acts as a buck-boost converter due to its voltage gain flexibility. By varying the duty cycle of the converter from 0 to 1 the output voltage can be varied.

Generally, the sepic converters are inherently nonlinear characteristics due to the operation of switching devices and load variations. The response of the sepic converter is easily influenced by external disturbances. The SEPIC converter shown in Fig. 1 has two inductors, two capacitors and a power switch thus it is a fourth order nonlinear system and also exhibits nonminimum phase system. Due to these nonlinearities, the stability analysis, designing and evaluating the controllers are difficult. The converter is stable when operating under nominal operating conditions for small perturbation in linearized and small signal model [1]. Many controlling techniques like sliding mode, back stepping can be used for nonminimal phase systems while for minimal phase systems modal reference adaptive control technique is required [2]. The transfer function of the new inverter topology for the positive and negative cycle is derived and the control to output transfer function is analyzed using root locus [3]. The root locus method is studied for variation in components value to determine the shift of the poles and zeros of the

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## Watermarking Schemes for High Security with Applications and Attacks: Research Challenges and Open Issues



Rahul Ajithkumar, K. Satyanarayan Reddy, G.Glan Devadhas

*Abstract: Recently, the growth of the internet is increased day by day also the digital data such as videos, images and audio availability to the public get increased rapidly. The society required intellectual property protection. To protect the media from other attack intruders and avoid business loss is the requirement of digital media produced. Introducing watermarks can be useful to safeguard copyright. In this review an effort is made to explore various aspects of watermarking, algorithms used, and to carry out a comparative study of these techniques based on their classifications.*

**Keywords:** Watermarking, Capacity, Robust, DCT, DWT, PCA, Spread Spectrum

### I. INTRODUCTION

With the usage of any digital media, the useful information is hidden by watermarking process [40]. The user checks a digital media authentication by water marking process. The Steganography is interlinked with video. text. audio and

Therefore, the moving and non-moving fraction of the frames are the classification of Non-blind color video frame watermarking algorithm [4], [11]. The round causing errors are corrected with the help of Cat Swarm Optimization (CSO) [47] [48] [49]. The image transformation process of frequency domain to spatial domain image with the real number conversion into integer is to cause the errors [29]. When

compared to the DCT-based method, the performances of DWT-based watermarking method are optimal and produce better results

[36]. The barcodes is considered as a watermark for obtaining well secure and robust watermarking process [37].

The watermarking algorithms are inserted based on the nature of each algorithm and the approaches are distinct in nature [24]. Fig 1 represents the watermarking algorithm. The encryption of solution visual impacts and computational overheads are minimized as well as high efficiency video



25-2018-19



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## Corrosion rate of Al-Si Alloy Reinforced with B<sub>4</sub>C Nanoparticle prepared by Powder Metallurgy Method using RSM



Abraham Subaraj. M, Bensam Raj. J, Malkiya Rasalin Prince. R, Glan Devadhas.G, Christopher Ezhil Singh. S

**Abstract:** The current work aims to optimize the Al-Si alloy reinforced with B<sub>4</sub>C nanoparticles prepared through powder metallurgy technique. The sample was prepared with different weight percentage 0, 4 and 8; the size of the sample was 20 mm x 20mm and sintered in a furnace upto 500°C with argon gas and their by furnace cooled to room temperature. The samples were brushed to remove the slag present in it, and polished by emery paper. Then the samples were weighed in an electric balancing apparatus to measure the initial weight of the sample before dipping it into acid solution. The weight loss was measured to calibrate the corrosion rate of the samples for 9 days. Response surface methodology was designed for three factors at three levels with a response as corrosion rate. The Analysis of Variance (ANOVA) was used to identify the most influencing factor on corrosion rate. The normal probability plot, residual plot, and desirability plot demonstrates the influence of corrosion rate of the composites.

**Keywords:** Al-Si. Boron Carbide. ANOVA. Powder Metallurov

metals at present in trend, which are predominantly suitable for aircraft uses. If metal matrix materials have to agree maximum strength, they need maximum modulus strengthening. The strength-to-weight ratios of subsequent composites could be maximum than best alloys. In this general RSM design was utilized for the reason that this kind of design is appropriate for products and process design, process enhancement and industrial investigation. In accumulation, after confident high-order interactions are possibly insignificant, evidence on the key effects and low-order interactions might be achieved by consecutively only a RSM design [5- 7]. Hence, this current work is an effort made to scrutinize the effort of reinforcement, acid and time input factors and arithmetical model to forecast weight loss of Al-12Si-x B<sub>4</sub>C composites utilizing a Box-Behnken Design (BBD), analysis of variance, the probability and weight loss plot.



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## Development of an Adaptive PID Controller for a Nonlinear Process

Dhanoj Mohan<sup>1</sup>, Dr. Rathika Rani<sup>2</sup>, Dr. G.Glan Devadhas<sup>3</sup>, Dr. K.Gopakumar<sup>4</sup>, Sudharsana Vijayan<sup>5</sup>, Shalet K S<sup>6</sup>

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<sup>2</sup> Associate Professor, Department of EIE, Annamalai University, Chidambaram, Tamil Nadu, India.

<sup>4</sup> Professor, Department of EIE, TKM College of Engineering, Kollam, Kerala, India.

### Abstract

It is a crucial task to control the head of cone shaped tanks which is widely used in many industries like food manufacturing industries, petroleum industries and hydrometallurgical industries. The nonlinearity due to the tapered bottom area of the tank makes the level control in the conical tank the toughest task. The conventional controllers will not give a clear solution for this case. Obtaining the equilibrium conditioning by balancing the inflow rate and the out flow rate is the normal level control problem. Different shapes of the tanks implies different equilibrium and operating

regimes. The entire system can be divided in to low middle and high regimes in order to consider the system as piece wise linear and varying controller parameters are required at these points. This work deals with development of a suitable controller for such process. This work start with the development of conventional three mode controller and further it is enhanced with Internal Model Controller and the Adaptive technique. The controllers developed are simulated in SIMULINK environment.

**Keywords:** Adaptive Controller, ID Controller, Conical Tank, IMC Controller, Nonlinear System

### NOMENCLATURE

SLNO	SYMBOLS	SPECIFICATION
1	q	Flow rate(LPH)
2	A	Cross sectional area of conical tank(cm <sup>2</sup> )



## RESEARCH PAPER PUBLICATIONS IN 2019-20

**Number of research papers published per teacher in the Journals notified on UGC care list during the year 2019-20**

S.No	Title of paper
1	Emerging Techniques and Trends in DNA Cryptography
2	Survey on Static and Dynamic Hand Gesture Recognition Techniques
3	A Hybridized ELM for Automatic Micro Calcification Detection in Mammogram Images Based on Multi-Scale Features
4	Experimental analysis and effects of Gasoline as an additive in Compression Ignition Engine
5	Modeling of a Gasifier Using Cycle-Tempo for SOFC Applications
6	Biomass Densification of Ahl Powder Mechanical Properties Using RSM
7	Thermal Degradation On Biomass Briquettes Of Artocarpus Heterophyllus Leaf Powder
8	Grid frequency regulation by hybrid system using energy storage system
9	Elm Based Detection of Micro-Calcification in Mammogram using Glcm Features
10	Design of a novel controller to stabilize the dc level of photovoltaic system for low voltage standalone applications
11	Automatic diagnosis of diabetic retinopathy with the aid of adaptive average filtering with optimized deep convolutional neural network
12	Design of a Novel Controller to Maintain DC Level of PV System for Low Voltage Applications – a Review
13	Improved Least Mean Square Algorithm for 5G signals in Microwave –Photonic Link
14	Increasing the Coverage Area Using Microcells in Hybrid GFDM System based on RoF Technology

15	Enhanced Noise Curtailing In Long Haul Multi Service 5g Cellular Optical Hybrid Networks
16	Watermarking Schemes for High Security with Applications and Attacks: Research Challenges and Open Issues,
17	Corrosion rate of Al-Si Alloy Reinforced with B4C Nanoparticle prepared by Powder Metallurgy Method using RSM ,
18	Development of an Adaptive PID Controller for a Nonlinear Process
19	Non linearity mitigation and dispersion reduction using Buss gang theorem, modified MSE and improved MLE equalizers,
20	Moth-Flame Optimization Based Radiant Thermal Pattern Controller for Continuous Stirred Tank Heater
21	Design and development of new control technique for standalone PV System
22	Detection of pH Neutralization Technique in multiple tanks using ANFIS controller
23	Various Methods for Object Detection Based on Deep Learning
24	Optimization algorithms, an effective tool for the design of digital filters; a review
25	An improved brain tumor classification system using Wavelet transform and Neural network
26	A novel decision support system for malignant tumor using 3D reconstruction and volumetric analysis
27	Surface structural features and wear analysis of a multilayer Ti-6Al-4V-B 4 C thin film coated AISI 1040 steel
28	Radio Frequency Identification (RFID): A co-generation tool in Product Life cycle Management (PLM)
29	A Controllable Window Function for modelling nonlinearity of a HP Memristor model resultant from sigmoidal behaviour of Memristive method
30	Wear and Corrosion Behavior of Ti-based Coating on Biomedical Implants
31	Optimization Tool Wear on Hard Turning of AISI4140 Steel with Coated Carbide Tool Cutting Conditions

32	Machine Tool Vibration on dimensional accuracy and Surface Roughness during Milling Operation of Al6082 with Index able Carbide Inserts
33	TG/DTA studies on the oxidation and thermal behaviour of Ti-6Al-4V-B 4 C coatings obtained by magnetron sputtering
34	Optimization algorithms, an effective tool for the design of digital filters; a review
35	Individual customization strategy accomplished by developing prototype of a laparoscopic forceps handle using additive manufacturing
36	Improved Proportional Fair Algorithm for Transportation of 5G Signals in Internet of Medical Things

**Prof. Dr. Benny Joseph**



**(PRINCIPAL)**

# Journal of Computer Technology & Applications

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## Emerging Techniques and Trends in DNA Cryptography

*Shilpa George, Biji C.L., Achuthsankar S. Nair, Akhila Mathew*

### Abstract

**Abstract:** This paper reviews recent research trends and methods in the field of DNA cryptography. An attempt is made to introduce biological background and the literature concerning the various DNA cryptography techniques mainly comes under Pseudo DNA cryptography and DNA steganography based on biomolecular operations. The paper explains some of the key algorithms in designing Pseudo DNA cryptographic scheme such as (i) DNA Insertion, (ii) DNA Substitution and (iii) DNA Complementary pair method. Later it comes with the approaches adapted in DNA steganography based on biomolecular operations like Polymerase chain reaction (PCR) based DNA steganography, DNA microdot technology, and DNA steganography using recombinant DNA technology. The paper further does a comparative analysis on these methods and argues the various challenges involved in biomolecular operations while designing the DNA ciphers.

**Keywords:** DNA cryptography, Pseudo DNA cryptography, DNA steganography, PCR, DNA Microdot, Recombinant DNA

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## Survey on Static and Dynamic Hand Gesture Recognition Techniques

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**Abstract:** *A hand gesture recognition system provides a natural way of non-verbal communication. Human Computer Inter-action mostly involves hand gestures. Vision-based hand gesture recognition techniques have many advantages over traditional devices, giving users a comfortable and more intuitive way of communication between a human and a computer. Hand gestures are of two types: Static hand gestures and Dynamic hand gestures. Hand gestures which can be either static or dynamic, for human computer interaction is an area of active research and with many numerous possible applications. This survey describes different systems used for gesture recognition. This paper presents a literature review on various gesture recognition methods.*

**Keywords:** Cyber-Glove, Dynamic gesture, Human-Computer Interaction, Gestures, Posture, Skin color detection, Static gestures

### 1. Introduction

Gesture is a form of non-verbal communication using various body parts such as hands and fingers. Gesture is the oldest method of communication among humans. Primitive men used to communicate about the information of food/prey for hunting, information about their enemy, request for help etc. within themselves with the help of gestures. This mainly includes human-robot interaction, sign language recognition, interactive games, vision-based augmented reality etc. For communication by the people at a visible distance, but not audible distance and by the physically challenged people like the deaf and dumb gesture is the only method.

Hand gesture recognition system is built to create a natural interaction between human and computer. The target of this method is the proposition of a real time vision system for its application inside visual association situations through hand gesture recognition, utilizing broadly useful equipment and minimal effort sensors, similar to a straightforward PC and a USB Webcam, so any client could make utilization of it in his/her office or home. Posture is another word often confused with gesture. Posture refers to a single image corresponding to a single command (such as stop), whereas a sequence of postures is called gesture (such as move the screen to left or right). They are either static posture and dynamic posture. When compared to postures is simple and needs less computational power, but gesture mainly dynamic one is complex. Despite the fact that occasionally face and other part of the body is used along with single hand or double hands, hand gesture is most popular among all and is used in wide variety of applications.

Hand gesture recognition technology have a place in wide variety of applications such as virtual environments, smart surveillance, sign language translation, medical systems etc. Hand gestures are used for analyzing and annotating video sequences of technical talks. Such a system is presented in [1]. Gestures like pointing or writing are automatically tracked and recognized to provide a rich annotation of the sequence that can be used to access a condensed version of the talk. Given the constrained domain a simple

“vocabulary” of actions is defined, that can easily be recognized based on the active contour shape and motion. The recognized actions provide a rich annotation of the sequence that can be used to get a condensed version of the talk from a web page. Gesture recognition technique recognizes static or dynamic hand gestures or combinations of both. Static hand gesture restricts the movement of hands. In the case of dynamic hand gesture user can interact in a more comfortable manner.

There are various approaches used to recognize gestures like vision-based gesture recognition, glove-based gesture recognition, marker-based gesture recognition etc. Vision-based gesture recognition helps to create a more user-friendly interface restricting a user from wearing gloves and other external devices. Glove-based devices such as the most common CyberGlove have been used to capture human hand motions. However, the gloves and its attached wires are still quite cumbersome and awkward for users to wear those gloves during the interaction, and moreover, the cost of the glove is often too expensive for regular users. In the current state-of-the-art vision-based hand tracking and gesture classification methods, the research is more focused on tracking the bare hand without the help of any type of gloves and recognizing hand gestures. Whereas, the vision-based hand gesture recognition system also needs to meet the requirements including real-time performance and accuracy improving recognition rate.

### 2. Hand Gesture Recognition Techniques

Vision based hand gesture recognition creates a natural interface between human and computer. This approach mainly uses webcam as the camera. This approach do not require the user to wear anything i.e. bare hands are used in this approach. Video cameras are used to capture the images of hands, which are then processed and analyzed using computer vision techniques [2]. This type of hand gesture recognition is simple, natural and comfortable for users. These are the most popular methods for gesture recognition. However, there are several challenges to be addressed, for example, illumination change, background clutter, partial or full occlusion etc. Vision based hand gesture recognition can

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## A Hybridized ELM for Automatic Micro Calcification Detection in Mammogram Images Based on Multi-Scale Features

[Jayesh George Melekoodappattu](#)  & [Perumal Sankar Subbian](#)

*Journal of Medical Systems* **43**, Article number: 183 (2019) | [Cite this article](#)

**424** Accesses | **25** Citations | [Metrics](#)

### Abstract

Detection of masses and micro calcifications are a stimulating task for radiologists in digital mammogram images. Radiologists using Computer Aided Detection (CAD) frameworks to find the breast lesion. Micro calcification may be the early sign of breast cancer. There are different kinds of methods used to detect and recognize micro calcification from mammogram images. This paper presents an ELM (Extreme Learning Machine) algorithm for micro calcification detection in digital mammogram images. The interference of mammographic image is removed at the pre-processing stages. A multi-scale features are extracted by a feature generation model. The performance did not improve by all extracted feature, therefore feature selection is performed by nature-inspired optimization algorithm. At last, the hybridized ELM classifier taken the selected optimal features to classify malignant from benign micro calcifications. The proposed work is compared with various classifiers and it shown better performance in training time, sensitivity, specificity and accuracy. The existing approaches

# Experimental Analysis and Effects of Gasoline as an Additive in Compression Ignition Engine

Appu Kurian, Rameshan K.P., Ryne P.M, Benphil C Mathew



**Abstract:** A compression ignition engine is a sort of engine where the fuel utilized is diesel. In this current study, various influences on petrol-diesel mixture have been introduced in a mono cylinder vertical diesel engine and investigated factually for various stages. Denouement of 0%, 4%, 8% and 12 % of gasoline by volume is varied with diesel and the outcomes has been registered with the foundation of test perceptions at 1500(rpm). Out of various trial experimental outcomes, it is found out that, with the addition of gasoline fuel the real brake power output rises at the rate of 4-9% and also the brake specific fuel consumption reduces by relatively 6%. Also, the study found out that increase in the volume fraction of gasoline decreases the fuel density, surface tension and kinematic viscosity. In addition, the various blending of petrol fuel causes a decrease in the size of the droplet because the surface tension decreases with the inclusion of petrol, thereby generating an extension in the instability of droplet. Meanwhile, petrol blending resulted in the development of the ignition delay period and also the formation of a comparatively higher homogeneous mixture. These peculiarities in the combustion characteristics cause a drastic reduction of NOx. However, the Hydrocarbon and Carbon Monoxide emissions were slightly increased. The boosting of burden in engine curtails the effect of gasoline blending on combustion performance and exhaust fumes discharges.

**Keywords:** Brake horse power, Compression ignition engine, Gasoline volume, Blending of fuel, Emissions.

## I. INTRODUCTION

One of the main reasons behind this study of Gasoline-Diesel mixture is that, in high terrain areas, also in heavy load carrying trucks, there is a practice of blending certain quantity of petrol with diesel [1]. This was done because of the factual improvement of power of the diesel engine, thereby carrying the intended load. As this condition prevails, there require the need of a solid analysis of the above situation and figure out the results of proficiency as efficiency, emissions, power etc. on diesel-petrol combination at diverse fractions and different load in the unadulterated traditional diesel compression ignition engines [2]. The study find useful for giving an awareness to public,

which ultimately attests the advantages and disadvantages of blending diesel-petrol under above extents and conditions.

Under the classification of Internal Combustion Engines, a Diesel engine plays the role of one of the most dynamic liquid fuel combustion prime movers. However, on the other side, a diesel engine experiences various disadvantages. One of the disadvantages is their limited speed range, particularly for high terrain and heavy load vehicle applications. Because of ignition delay, the rotational speed (rpm) of CI engine is not applicable for higher levels [3]. Due to this reason and also the various accoutrements such as low equivalence ratios, tremendous pressure differences, etc., normally a diesel engine is much heavier than gasoline engine of equivalent power [4]. Meanwhile, the Ignition delay period shall be controlled and the engine speed could be expanded by presenting a specific technique for fuel infusion or in the design of burning frameworks in the combustion systems [5]. A design of Pre-combustion chamber and addition of piston bowls can be quoted as examples of these improvements in the systems. In this way, the mixture of air-fuel is accelerated by expanded gas movements, so the period of ignition delay can be reduced and the injection pressure of fuel at 7–14MPa levels are sufficient [6]. Along these lines, nozzles with mono hole and fuel systems which are cheaper can be utilized. By selecting relatively high speed ratio or rates of the engine and comparably higher proportionality equivalence proportion ratio, lighter design of engines structure can be created [7]. Yet, the use of pre combustion burning chamber expands the surface region of burning chamber and this causes an extra heat loss and relatively higher brake-specific fuel consumption (BSFC). On contrast, high injection pressures at the rate of 100–150 MPa levels are considered by using special injection methods, for example, common-rail direct injection (CRDI) system [8]. However, for this condition, necessities of trend setting innovations are required and are increasingly costly requirement. A diesel fuel burning-compression engine operating on the basis of self-ignition compression technique has advanced thermal efficiency and comparatively lower fuel utilization attributes than a petrol combustion spark ignition engine; thence the practice of diesel used engine vehicles are as of now across the board [9]. But, there prolongs the challenges of environmental effects in the form of pollution of NOx and soot. Low temperature combustion (LTC) is one method to allow the reduction of NOx and soot emissions simultaneously. Consequently, the LTC strategy is notified on the control of local air-fuel rich mixture regions and the drastic reduction of the temperature in cylinder where combustion takes place [10]. To understand this combustion concept, high exhaust gas recirculation (EGR) rate need to be applied to the conventional diesel engine.

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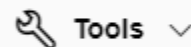
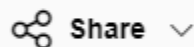
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RESEARCH ARTICLE | AUGUST 06 2019

## Modeling of a gasifier using cycle-tempo for SOFC applications

Sarath Pappinisseri ; Priyak Nellikka Kandiyan; Vasanth Parthasarathy; John Tharappel Devasya[+ Author & Article Information](#)*AIP Conf. Proc.* 2134, 030008 (2019)<https://doi.org/10.1063/1.5120206>

Gasifier-SOFC system is an excellent choice for waste to energy conversion. Optimization of process parameter is an issue faced in such complex energy systems. CYCLE-TEMPO is the world leading software used for thermodynamic analysis of energy systems. In this paper a downdraft gasifier is modelled using CYCLE-TEMPO and process parameter like equivalence ratio are optimized for maximum yield. Three agricultural residues namely coconut shell, rubber wood and bamboo which are locally available were tested as a feed. Gasifier model is validated using a downdraft gasifier experimental setup. Gasifier is then integrated with a SOFC unit. From the simulation carried out it

## BIOMASS DENSIFICATION OF AHL POWDER MECHANICAL PROPERTIES USING RSM

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### Abstract

The study of agricultural wastes into biomass is an approach on the way to the growth of alternative energy sources. Artocarpus Heterophyllus Leaves (AHL) powder can be utilized as an alternative energy source to coal. Densification of scum's depends upon its physical properties and process parameters. In this article the influence of Moisture Content (MC) and Die Pressure (DP) on Relaxed Density (RD) of AHL Powder were studied. The investigation was carried out to explore the properties of fuel briquettes manufactured from AHL. The investigation on scientific model for a synthesized assessment was reputable according to response surface methodology (RSM). Based on the RSM, a most favorable method was preferred for a completely operational AHL briquette utilizing central composite design. ANOVA is utilized to find out the significant factor that influencing the relaxed density was die pressure compared to that of moisture content. From the numerical optimization, the ramp graph exposed that samples are effectively compressed at the pressure of 30.18 MPa and the moisture content of 17 % with relaxed density 733.075 kg/m<sup>3</sup> and some useful conclusions were made.

**Keywords:** Artocarpus Heterophyllus Leaves; Moisture content; Die pressure; RSM; Relaxed density

### 1.0 INTRODUCTION

Briquettes is an aptitude for densification of farming scums/squanders to upgrade their Bulk Density (BD), subordinate their Moisture Contents (MC) and make briquettes of uniform sizes and shapes for simple utilization, transport and

## THERMAL DEGRADATION ON BIOMASS BRIQUETTES OF ARTOCARPUS HETEROPHYLLUS LEAF POWDER

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### ABSTRACT

Biomass briquettes replace fossil fuels such as coal or oil and have versatile relevance's in emergent countries. These briquettes are a renewable energy source and limit the carbon emission to the atmosphere. We use Artocarpus Heterophyllus leaves (AHL), a kind of waste collected from the Jack fruit tree mainly from village side. In order to make selection, the properties of the material taken and the cost of the binder addition play an important role. In this experiment cow dung (CD) and saw dust (SD) with water are taken as binder material considering their availability and cost effectiveness. Five samples were prepared by adding the binders to various weight percentages. The briquettes are obtained at high pressure and they undergo mechanical and thermal treatment. Thermal and mechanical investigations of the fuel were performed utilizing standard methods comprising compression bomb calorimetry, thermogravimetric analysis (TGA/DTA) and Scanning electron microscopy respectively.

**Key words:** Briquette, renewable, atmosphere, coal, binder, calorimetry

Grid frequency regulation by hybrid system using energy storage system.

MP KUMAR, S DURAIRAJ, P SRIDHARAN

Indian Journal of Power & River Valley Development, 2019 - search.ebscohost.com

**Abstract**

Nowadays, wind and solar power are one of the greatest demand in the electricity market. Due to the inherent variability and uncertainty in grid frequency, a combination of the hybrid system of wind, solar, thermal and ESS brings numerous difficulties in power systems, particularly when generation is not equal to demand. Power systems possess a lot of difficulties like quality, stability, and reliability. In this paper, grid frequency is regulated by means of a hybrid system of wind and solar power with batteries (ESS). The use of energy storage system seems to be one of the best solutions in the power system network. The model of the power system studied in this paper is established on the MATLAB/SIMULINK platform.

## A hybridized ELM for automatic micro calcification detection in mammogram images based on multi-scale features

[JG Melekoodappattu](#), PS Subbian

Journal of medical systems, 2019 - Springer

### Abstract

Detection of masses and micro calcifications are a stimulating task for radiologists in digital mammogram images. Radiologists using Computer Aided Detection (CAD) frameworks to find the breast lesion. Micro calcification may be the early sign of breast cancer. There are different kinds of methods used to detect and recognize micro calcification from mammogram images. This paper presents an ELM (Extreme Learning Machine) algorithm for micro calcification detection in digital mammogram images. The interference of mammographic image is removed at the pre-processing stages. A multi-scale features are extracted by a feature generation model. The performance did not improve by all extracted feature, therefore feature selection is performed by nature-inspired optimization algorithm. At last, the hybridized ELM classifier taken the selected optimal features to classify malignant from benign micro calcifications. The proposed work is compared with various classifiers and it shown better performance in training time, sensitivity, specificity and accuracy. The existing approaches considered here are SVM (Support Vector Machine) and NB (Naïve Bayes classifier). The proposed detection system provides 99.04% accuracy which is the better performance than the existing approaches. The optimal selection of feature vectors and the efficient classifier improves the performance of proposed system. Results illustrate the classification performance is better when compared with several other classification approaches.

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## Automatic diagnosis of diabetic retinopathy with the aid of adaptive average filtering with optimized deep convolutional neural network

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### Abstract

The most effective treatment for diabetic retinopathy (DR) is the early detection through regular screening, which is critical for a better prognosis. Automatic screening of the images would assist the physicians in diagnosing the condition of patients easily and accurately. This condition searches out for special importance of image processing technology in the way of processing the retinal fundus images. Accordingly, this article plans to develop an automatic DR detection model with the aid of three main stages like (a) image preprocessing, (b) blood vessel segmentation, and (c) classification. The preprocessing phase includes two steps: conversion of RGB to Lab, and contrast enhancement. The Histogram equalization process is done using the contrast enhancement of an image. To the next of preprocessing, the segmentation phase starts with a valuable procedure. It includes (a), thresholding the contrast-enhanced and filtered images, (b) thresholding the keypoints of contrast-enhanced and filtered images, and (c) adding both thresholded binary images. Here, the filtering process is performed by proposed adaptive average filtering, where the filter coefficients are tuned or optimized by an improved meta-heuristic algorithm called fitness probability-based CSO (FP-CSO). Finally, the classification part uses Deep CNN, where the improvement is exploited on the convolutional layer, which is optimized by the same improved FP-CSO. Since the conventional CSO depends on a fitness probability in the improved algorithm, the proposed algo-



# Design of a Novel Controller to Maintain DC Level of PV System for Low Voltage Applications

V.S. Bibin Raj, G. Glan Devadhas

**Abstract:** The human exercises add to the worldwide temperature alteration of the planet. Thus, every nation endeavors to diminish carbon discharges. The world is standing up to the weariness of non-sustainable power sources, just as it's increasing costs which cause the worldwide money related shakiness. By the grouping it is resolved that the new enthusiasm for power has been compensated by the execution of sun based electric and photovoltaic development. These embed some assistance for the up and coming requirements for the monetary development of the country and the speed developing force age innovation. The central expect is to make another framework which joins the working PV System to stack and the power equipment and the logic to pursue the sun based route by introducing the MPP following. By this, the proficiency can be expanded further and can enhance the use factor. At that point fundamental conspicuousness will be put on the photovoltaic system, the demonstrating and reenactment of photovoltaic cluster, the MPP control and the DC/DC converter. The PV Simulink model could be utilized later on for broadened contemplate with various DC/DC converter topology. Advancement of MPPT algorithm can be actualized with the current Photovoltaic and DC/DC converter. This topology is most reasonable for the low voltage applications, for example, Health Monitoring systems (HMS), Bed Side Monitors and for some low voltage applications.

**Keywords:** PV, MPPT, Dc-Dc Converter, Inverter, Renewable Energy Sources, Control Algorithm.

## I. INTRODUCTION

Manageable quality resources are beginning to play extra limit in two or three zones, for instance, building joined photovoltaic, notwithstanding common zones. With respect to displacing the mass quality amassing of oil subordinates, economical power has not but instead shown to be reasonable. In any case, power can surpass desires in neighborhood programs in which there is kept or no get admission to a quality system, or in which get admission to conventional quality is prohibitively costly. They are best in contiguous ventures in light of the way that the power delivering is at the equal area in light of the way that the end-use, therefore restricting the carport energy and transport.

Photovoltaic (PV) system used to deliver control for neighborhood or present day machines that requires regular power. This advancement makes a translation of daylight into power using semiconductor cells, called PV cells. The MPPT keeps up the working voltage of the show at a specific regard that grows the group yield and it can

energize DC stack. If the heap is AC, for instance, AC motors, utility framework, etc, inverters are used. Sun based PV is utilized in both matrix associated applications and independent applications. It will in general be used in a wide extent of employments from a microwatt Internet of Things framework to a megawatt-scale sun controlled PV plant [1], [2]. Sun fueled PV works in a wide extent of dc volt-ages, while electrical and electronic frameworks also have various components of dc voltage essentials [3]. Along these lines, it is essential to use control electronic interfaces for sun based PV applications.

Since the vitality from sun oriented PV is discontinuous in nature, it is vital to unite energy stockpiling systems and other sustainable power sources to keep up a strong action for independent PV frameworks. This can be practiced by many single-input/yield (twofold port) dc– dc converters in parallel or multiport dc– dc converters. The united designing of multiport converters uses less switches, reduced structure, a lower cost, and a higher efficiency, and maintains a strategic distance from the need to utilize communication systems when contrasted with numerous single-input/yield dc– dc converters [4]– [6].

Sun et al. [4] have proposed a three-port converter incorporating sun oriented PV and a battery as power sources bolstering dc loads with galvanic confinement. The control structure included a complex hybrid tweak system (beat width regulation (PWM) + beat recurrence balance) with delicate exchanging. Beam et al. genius represented a coordinated double yield dc– dc converter, which had both buck and lift yields utilizing PWM to control yield voltages [7]. Different conceivable topologies for multiport converters have been talked about in [8]. Regardless, using different inductors result in substantial converter size and cost. In order to overcome these issues, single-inductor various data/yield topologies have been proposed. Single-inductor different yield dc– dc converters subject to buck, buck– lift, and lift topologies have been proposed in different writing templates [9]– [13]. This declines the cost and circuit complexity and results in progressively important profitability. Nami et al. [14] have proposed single-input multi-yield support converters dependent on the diode-clasped topology for various arrangement and different parallel yields utilizing fell voltage and current control circles. Khaligh et al. [15] have professional represented a solitary inductor-based multi-input bidirectional dc– dc converter, which works in buck, help, and buck– support modes.

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# Improved Least Mean Square Algorithm for 5G signals in Microwave –Photonic Link

Asish B Mathews, G.GlanDevadhas

**Abstract:** For the use in 5G system, common public radio interface (CPRI) is implemented for increasing the transmission capacity of conventional MFN and it exceeds hundreds of Gpbs. In this work, we proposed an improved LMS and compared it with the existing equalizers. Due to the complex nature of nonlinear effects, the nonlinearity of a signal is designed by the second order Volterra model consisting of linear and nonlinear part. By using improved LMS and Blind equalizer, the bit-error rate (BER) of the nonlinear system is diminished to a great extent. The results shows that the proposed Least mean square (LMS) and blind equalizers with constraint can decrease the inter-symbol interference (ISI) that causes nonlinearity and also helps to improve performance characteristics .

**Keyword:** Least mean square equalizer and blind equalizer.

## I. INTRODUCTION

The expeditious enlargement of mobile head-end communications and wireless internet approach helped to produce a secure demand for inexpensive, portable, and high data rate wireless transceivers working in variety of environments. The resources like data and video power efficient transceivers should achieve reliable high speed transmissions even in high mobility scenarios. Most of these transmission systems experience degradations, such as attenuation, noise, multipath fading, interference, time variation, and non-linearity. Also it has to satisfy the constraints, such as finite transmit power and predominantly finite bandwidth requirements. In particular, multipath fading of wireless channels leads to inter-symbol interference (ISI) in single carrier systems and also limits the transmission rate. In conventional single carrier communication systems, the ISI is usually dealt with a time domain channel equalizer. The equalizer concept in single carrier communication is not feasible for high data rate communication. In high data rate transmission, the symbol duration is reduced, which makes the equalizer more complex and logically it become more complex. So it is obligatory to go for a novel technique to overcome multipath fading impairments in the most challenging wireless channel environments. Kushwah(2014) projected IEEE 802.16 as a normal standard suitable for Broadband Wireless Access (BWA) and its associated business syndicate, Worldwide Ability for Microwave Access (WiMAX) forum for supplying high rate over massive areas, wherever broadband is unobtainable.

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This paper analyzed totally different higher level modulations on Worldwide Ability for Microwave Access Multiple Input and Multiple Output (WiMAX-MIMO) systems with different code rates for Rayleigh channel. This abstraction diversity technique of MIMO systems combined with Wi-MAX is analyzed so as to realize higher data rates by lowering the Bit Error Rate of the system and to realize higher performance with Rayleigh channel.

Atul Singh Kushwah (2014) made an effort to exceed the cyclic prefix (CP) and designed the constraints of the filter. X. Liu, F. Effen Berger et al., (2015) used a bandwidth - efficient mobile front haul by a novel DSP system and it is based on aggregation and de-aggregation techniques. The dispersion and non-linearity is increased and has small coverage area.

### A. (Least Mean Square) LMS algorithm:

Among various equalizer systems, the LMS algorithm is very common; it is often used in practice because of its simplicity and relative ease of implementation. The LMS filter is one of the fundamental adaptive algorithms and its performance under certain conditions usually serves as a reference for the evaluation of other adaptive filters. The algorithm repeatedly iterates through three successive phases: signal filtering, error calculation, and filter coefficient update.

### B. Improved LMS Equalizer algorithm:

The improved LMS equalizer input signal  $a(x)$  is given as a vector containing present sample followed by  $X-1$  samples. The obtained output value for the Finite-Impulse Response (FIR) filter is a product between input and a transposed vector of  $X$  filter coefficients  $b(x)$ .

$$y(x) = b^T(x)a(x) \quad (1)$$

$$= \sum_{i=1}^N b_i(x)a(x - i + 1) \quad (2)$$

$$e(x) = d(x) - y(x) \quad (3)$$

$$b(x + 1) = b(x) + \mu e(x)a(x) \quad (4)$$

Following that, the coefficients of the filter are updated to minimize the output mean squared error  $E$ . Coefficient vector  $a(x + 1)$  for the next iteration is obtained from the sum of the current coefficient vector  $b(n)$  with the weighted input vector  $a(x)$  (equation 4). The input vector is scaled with the error value  $e(x)$  and the adaptation rate  $\mu$ .



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# Increasing the Coverage Area Using Microcells in Hybrid GFDM System based on RoF Technology

Asish B Mathews, G. Glan Devadhas

**Abstract**— Hybrid architecture based on Wavelength Division Multiplexing Passive Optical Networks (WDM-PON) and Radio-over-Fiber (RoF) technology to deploy Generalized Frequency Division Multiplexing (GFDM) signals in 5G Heterogeneous Networks (HetNet) is proposed in this paper. The proposed RoF technology is the combination of Optical and Wireless communications that is used to reduce the base stations and to provide feasibility in high capacity connections and flexibility over long distance. This paper mainly focuses on increasing the coverage area without much path loss in the densely populated areas. By using microcells in GFDM system, this technology significantly enhances the data capacity of the users and also provides wider coverage area. The performance of GFDM is analyzed by computing the throughput and various parameters that affect the capacity of the system. The obtained simulation results proved that the proposed technique performs much better than conventional techniques.

**Keywords**— GFDM, GFDM Improved Proportional Fair, Microcells, Coverage area, Pathloss.

## I. INTRODUCTION

Nowadays, there is a robust growth of data traffic due to the increasing number of users as well as the massive usage of wireless devices. This leads to growth of Fifth generation (5G). Recently, there are several emerging application consider using Fifth generation networks (5G) that provides higher data rates. The successful of 5G depends upon enhanced coverage, reducing non-linearity, low cost, quality in transmitting the data, reducing dispersion and so on. Presently, the demanding growth of services led to the massive developments in the field of Optical fiber communications. Optical access network is the robust connection between the backbone network and the end users that gives higher data capacity and higher reliability resources. The Radio over Fiber (RoF) technology has many attentions in the field of 5G wireless communication.

Microcells can used in 30 GHz OFDM wideband photo receivers to improve Signal to Noise Ratio (SNR) (Umezawa et al., 2017). It offered data rate of 14.5 GHz at a range of 10 m with  $1 \times 10^{-3}$  Bit Error Rate (BER) and also detected the highly reflected signals at the range of 5m. Macrocells and femtocells are deployed on Fractional Frequency Reuse (FFR)-OFDM based two tier HetNet to evaluate the throughput and downlink performance of the system (Garcia-Morales et al., 2016). MilliMeter Wave (MMW) small cells within the macrocells were employed in a novel multiband OFDMA Heterogeneous wireless Networks to increase the maximum data capacity during densification. The problem of Long Term Evolution (LTE)

was addressed and solved by applying Greedy algorithm at the time of resource allocation (Niknam S et al., 2016). A hybrid backhaul architecture based on Wavelength Division Multiplexing-Passive Optical Networks (WDM-PON) and MMW communications was used to transmit OFDM signals in HetNet (Ngo et al., 2018). It evaluated the downlink performance by investigating the BER under the influences of various noises like Photo Detector (PD) noise, clipping noise and amplifier noise.

Various novel waveforms are recently discovered for 5G networks. Filter Bank Multi Carrier (FBMC) is used to linearly filter every subcarriers and Offset Quadrature Amplitude Modulation (OQAM) is used to mitigate the Inter Carrier Interference (ICI). These achieved higher spectrum efficiency and lower Out of Band Emission (OoBE). Yet the long filter acts as a hindrance in the usage of these waveforms in the cases of Internet of Things (IoT) applications and MTC. Filtered OFDM (f-OFDM) localized the spectral waveforms thereby maintaining the interferences such as ISI and ICI within acceptable limits (Abdoli et al., 2015). This f-OFDM provided 46% of throughput over traditional OFDM. The advancement of f-OFDM helps in aggregating the seamless carrier subbands was described. It also achieved demonstrating gapless transmission of downlink and uplink signals over 6Gbps wireless and 20km fiber system. Universal Filtered Multi Carrier (UFMC) is otherwise known as Universal Filtered Orthogonal Frequency Multiplexing (UF-OFDM) is used for filtering the set of sub carriers that are placed orthogonal to each other within the subbands (Bi et al., 2017). UFMC does not make use of Cyclic Prefix (CP) for avoiding Inter Symbol Interference (ISI). It was very delicate to handle time misalignments, resulting in less performance. filtered-Orthogonal Frequency Division Multiplexing (f-OFDM) is one of the types of OFDM based waveforms that deployed subband filtering (Zhang et al., 2015). f-OFDM used CP to overcome ISI in multipath channels unlike UFMC thereby achieving lower OoBE and high performance. f-OFDM deployed one CP per symbol in order to reduce spectrum efficiency especially when there is a requirement of short symbols which is quite similar to OFDM. Generalized Frequency Division Multiplexing (GFDM) is a 5G waveform that relies on subband filtering to lower OoBE. GFDM has an ability to cover the 4G waveforms. GFDM has many pros in giving freedom to improve the performance of waveforms. Densification of users are in need of high speed data that led to the evolution of obtaining the maximum coverage area without losing the average data capacity.

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# Watermarking Schemes for High Security with Applications and Attacks: Research Challenges and Open Issues



Rahul Ajithkumar, K. Satyanarayan Reddy, G.Glan Devadhas

**Abstract:** Recently, the growth of the internet is increased day by day also the digital data such as videos, images and audio availability to the public get increased rapidly. The society required intellectual property protection. To protect the media from other attack intruders and avoid business loss is the requirement of digital media produced. Introducing watermarks can be useful to safeguard copyright. In this review an effort is made to explore various aspects of watermarking, algorithms used, and to carry out a comparative study of these techniques based on their classifications.

**Keywords:** Watermarking, Capacity, Robust, DCT, DWT, PCA, Spread Spectrum

## I. INTRODUCTION

With the usage of any digital media, the useful information is hidden by watermarking process [40]. The user checks a digital media authentication by water marking process. The Steganography is interlinked with video, text, audio and image of digital media. Since, the digital signal consists of both hide messages of Steganography and water marking respectively [40]. The basic difference between the two is: The actual content of the digital signal messages are converted by watermarking. Nevertheless, there is no other message contact by Steganography. There are two images are needed for the watermarking process, from this, the initial one is original and another one is watermark image. The Unauthorized author hides the valuable information of watermark image. The watermark image is useful for the sender level as well as for the receiving level. So it should be protected from the unauthorized access at the sending level as well as at the receiving level. Watermark is extractable or detectable to live helpful.

Therefore, the moving and non-moving fraction of the frames are the classification of Non-blind color video frame watermarking algorithm [4], [11]. The round causing errors are corrected with the help of Cat Swarm Optimization (CSO) [47] [48] [49]. The image transformation process of frequency domain to spatial domain image with the real number conversion into integer is to cause the errors [29]. When

compared to the DCT-based method, the performances of DWT-based watermarking method are optimal and produce better results

[36]. The barcodes is considered as a watermark for obtaining well secure and robust watermarking process [37].

The watermarking algorithms are inserted based on the nature of each algorithm and the approaches are distinct in nature [24]. Fig 1 represents the watermarking algorithm. The encryption of solution visual impacts and computational overheads are minimized as well as high efficiency video coding (HEVC) standards and Advanced Video coding (H.264/ AVC) watermarking compliant are designed correctly [41]. The Un-compressed Video Watermarking optimization depends upon DWT and SVD has proposed to improve the robustness [38]. Different Watermarking scheme based on spread spectrum, Blind extraction process, Non blind process, Path work, PCA extraction, MAP detector, DCT, DWT-SVD, DCT-DWT-SVD, SVD has been proposed to provide the security for data has been discussed below.

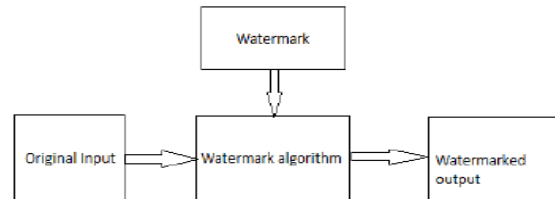


Fig 1.Process of Watermarking Algorithm

## II. DIGITAL WATERMARKING ASPECTS

Based on the technology usage and types with more number of digital watermarking applications are established. Based on the number of properties such as robustness, imperceptibility, security, verifiability, fidelity, transparency, capacity, false-positive rate, quality with the watermarking systems is categorized. These different aspects are discussed below.

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# Corrosion rate of Al-Si Alloy Reinforced with B<sub>4</sub>C Nanoparticle prepared by Powder Metallurgy Method using RSM



Abraham Subaraj. M, Bensam Raj. J, Malkiya Rasalin Prince. R, Glan Devadhas.G, Christopher Ezhil Singh. S

**Abstract:** The current work aims to optimize the Al-Si alloy reinforced with B<sub>4</sub>C nanoparticles prepared through powder metallurgy technique. The sample was prepared with different weight percentage 0, 4 and 8; the size of the sample was 20 mm x 20mm and sintered in a furnace upto 500°C with argon gas and their by furnace cooled to room temperature. The samples were brushed to remove the slag present in it, and polished by emery paper. Then the samples were weighed in an electric balancing apparatus to measure the initial weight of the sample before dipping it into acid solution. The weight loss was measured to calibrate the corrosion rate of the samples for 9 days. Response surface methodology was designed for three factors at three levels with a response as corrosion rate. The Analysis of Variance (ANOVA) was used to identify the most influencing factor on corrosion rate. The normal probability plot, residual plot, and desirability plot demonstrates the influence of corrosion rate of the composites.

**Keywords:** Al-Si, Boron Carbide, ANOVA, Powder Metallurgy

## I. INTRODUCTION

Aluminium Matrix Composites (AMCs) is wangled mixture of the metal alloys and hard ceramic to become tailored properties. Furthermost metals and alloys might be utilized as matrices and they necessitate strengthening materials which requirement to be steady above a variety of temperature and non-reactive too. Light metals form the matrix for temperature application and the strengthening in with the aforementioned causes are considered by maximum moduli. Aluminum and Magnesium are the common matrix

metals at present in trend, which are predominantly suitable for aircraft uses. If metal matrix materials have to agree maximum strength, they need maximum modulus strengthening. The strength-to-weight ratios of subsequent composites could be maximum than best alloys. In this general RSM design was utilized for the reason that this kind of design is appropriate for products and process design, process enhancement and industrial investigation. In accumulation, after confident high-order interactions are possibly insignificant, evidence on the key effects and low-order interactions might be achieved by consecutively only a RSM design [5-7]. Hence, this current work is an effort made to scrutinize the effort of reinforcement, acid and time input factors and arithmetical model to forecast weight loss of Al-12Si-x B<sub>4</sub>C composites utilizing a Box-Behnken Design (BBD), analysis of variance, the probability and weight loss plot.

## II. EXPERIMENTAL PROCEDURE

Aluminum and Silicon were purchased and the perfection of 99% and size minor than 20 and 40 μm from M/S. MEPCO metal powder company, thirumagal, tamilnadu, india. Boron carbide powder with perfection of 99.9% and size minor than 44 μm used as a secondary fortification material was purchased from Sigma Aldrich, Germany. Nano sized B<sub>4</sub>C particles were milled to a size of the elements was ≤100 nm, subsequently 60 h grinding. The SEM microstructures of the composites are shown in the following figures. Fig 1 (a) demonstrates the SEM microstructure of Al elements. It can be observed that aluminum has spherical structure. Fig 1 (b) demonstrates the SEM image of Si element and it is observed to have flattened and large flake like elements. Figure 1 (c) demonstrates that the B<sub>4</sub>C particles with rhombohedral shape. Rule of mixtures was used to calibrate the changing weight portions of Al-12Si-xB<sub>4</sub>C (x = 0, 4 & 8 wt.%). It was evidently confirmed in the SEM pictures exposed in Fig. 2(a-c). It was perceived that all the elements were disseminated consistently through the compositions. The alloyed powder is compacted in a compression testing machine to achieve 30 mm height and 10 mm diameter with applied pressure of 800 MPa. The compressed specimens are sintered using argon gas purging heating furnace for 120 min at 550°C and furnace cooled to surrounding temperature.

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## Development of an Adaptive PID Controller for a Nonlinear Process

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### Abstract

It is a crucial task to control the head of cone shaped tanks which is widely used in many industries like food manufacturing industries, petroleum industries and hydrometallurgical industries. The nonlinearity due to the tapered bottom area of the tank makes the level control in the conical tank the toughest task. The conventional controllers will not give a clear solution for this case. Obtaining the equilibrium conditioning by balancing the inflow rate and the out flow rate is the normal level control problem. Different shapes of the tanks implies different equilibrium and operating

regimes. The entire system can be divided in to low middle and high regimes in order to consider the system as piece wise linear and varying controller parameters are required at these points. This work deals with development of a suitable controller for such process. This work start with the development of conventional three mode controller and further it is enhanced with Internal Model Controller and the Adaptive technique. The controllers developed are simulated in SIMULINK environment.

**Keywords:** Adaptive Controller, ID Controller, Conical Tank, IMC Controller, Nonlinear System

### NOMENCLATURE

SLNO	SYMBOLS	SPECIFICATION
1	q	Flow rate(LPH)
2	A	Cross sectional area of conical tank(cm <sup>2</sup> )
3	V	Volume of conical tank(cm <sup>3</sup> )
4	$\delta$	Density of water
5	$\tau$	Time constant
6	$t_d$	Delay time
7	$\tilde{d}(s) \& d(s)$	Disturbance & estimated disturbance
8	$q(s)$	Internal model controller
9	$g_p(s) \& \tilde{g}_p(s)$	Process & process model
10	$r(s) \& \tilde{r}(s)$	Set point & Modified set point
11	$u(s)$	Manipulated input
12	$y(s) \& \tilde{y}(s)$	Measured process output & Model output

### I. INTRODUCTION

Based on the mathematical equation characterized the system it can be classified under the category of Linear or Nonlinear [1-3]. There are many procedures are available to find the nonlinear model of the system and the nature of nonlinearity subjected to the system. The nonlinearity may influence ambiguities and constrains on the control and the input side of the system. So the people working on these process claims that designing the controller for such process is challenging [14].

The process variables need to be controlled in process industries are such as flow rate, level, pressure, temperature and

concentration. The control of liquid level is of great importance in chemical industries. If the level is raised to high then the reaction equilibrium cause damage to the equipment or spillage of valuable material. There will be adverse consequences if the level is down to low [14]. The nonlinearities present in the liquid flow line and the shape of the tank introduce the nonlinearities in the system is the basic crises in process industries [5]. The tanks in cylindrical or cubical shapes used in the laboratory are termed as linear, but they provides poor drainage due to their flat base. For the purpose where complete drainage is required like water treatment plants, Food and beverages plants, Metallurgical plants, Concrete mixing plants the conical bottom



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## Non linearity mitigation and dispersion reduction using Busgang theorem, modified MSE and improved MLE equalizers

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## ABSTRACT

Radio over fiber technology based backhaul technology based 5G system support the broad band services. Because of its low attenuation, large capacity and low operational cost Radio-over-fiber (ROF) technology is used. In this paper, generalized frequency division multiplexing based millimeter wave is used to deliver the optical signals in wireless networks. This paper mainly focuses on reducing dispersion and non-linearity effects. For reducing the non-linearity modified minimum mean square error equalizer is implemented and it minimizes the mean square error, for reducing the dispersion effect Improved Maximum Likelihood equalizer (MLE) technique is used. The performance of GFDM is analyzed by computing the throughput and various parameters that affect the capacity of the system. The obtained simulation results proved that the proposed technique performs much better than conventional techniques.

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## 1. Introduction

A new technology such as Radio Over fiber (ROF) attracted by significant attention and alternative transport technology for mobile back haul network (MBN) of the 5th generation (5G) wireless communication systems. It causes because of extremely large capacity is essential in the network. For the use in 5G system, the digital fiber optics such as common public radio interface (CPRI) is implemented for the transmission capacity of conventional MFN and it exceeds hundreds of Gps. The optical transceiver shaving

sion) and electro-optic (reception) conversions. The design link between BBUs and RRUs is called front haul have higher bandwidth and low latency.

OFDM/FBMC based radio access for the transmission of LTE-A [13,15,18]. It is easy and low cost frequency fiber system. Filter bank multi carrier (FBMC) [14] to exhibit full duplex asynchronous quasi gapless. Here fourteen broadband FBMC signals are aggregated by using 1subcarrier of 60 GHz MMW. It achieves higher efficiency with better error vector magnitude. Filtered orthogonal frequency division multiplexing (f-OFDM) [16,17] to exceed the cyclic

# Moth-Flame Optimization Based Radiant Thermal Pattern Controller For Continuous Stirred Tank Heater

V. Kabila, G. Glan Devadhas

**Abstract:** Managing a Continuous Stirred Tank Heater to maintain a uniform temperature within an automated system is complicated. Attaining a constant temperature and sustaining it all through the process is a key challenge inferred in this system. This kind of systems finds its usefulness in many of the automated manufacturing units and in some other chemical processing units too. The controller implemented is meant for regulating the stirring function in order to accomplish a constant actual temperature within the tank. Conventional tuning methodologies trailed to influence the controller experiences various shortcomings in realizing a feasible transient response within the stipulated time. Former Proportional Integral Differential controllers find too hard to organize the entire stirring compartment in a pre-defined manner. Integrating a fuzzy approach augments the delay in proposing a desired value. Those approaches escalated all those necessitated parameters that certainly assists in accomplishing a better performance. In order to overcome all shortcomings inferred, this proposes a Moth Flame Optimization based Radiant Thermal Pattern. Augmented moth-flame optimization methodology tends to initiate the stirring function with a feasible speed and hence, the temperature gets controlled without any delay. The devised approach diminishes the variations of overshoot value in the initial state itself and mitigates the settling time too. The comparative analysis carried out among the suggested mechanism with the traditional approaches like Zeigler-Nicholos, Genetic Algorithm, Particle Swarm Optimization and a hybrid GA-PSO based tuning evidently proves the proficiency in terms of peak overshoot, settling time, rise time and delay time.

**Index Terms:** CSTH, Moth-Flame, Optimization, Radiant Patterns, Stirred tank Heater, Continuous Stirred Tank Heater, Continuous Stirred Tank Heater

## 1 INTRODUCTION

Irrepressible need of the hour that typically longs for an automated control system in all sorts of industrial applications serves as a key idea in establishing an optimal controlling system. In order to endow with sufficient power insisted on machinery for a certain amount of time in an unvarying manner, a complete control is acquired through installation of a Proportional Integral Derivative (PID) controller that purposefully serves the industrial ambience without any negotiation. It comprises of prominent and productive features to a vast stretch. One among them is the feedback loops that contributed as a crucial mainstay for alleviating the erroneous inferences incorporated with the processes accomplished in a steady state (Sabir & Ali, 2016). It is literally explored through varied components involved within the deployed PID structure (Jatoth, Jain, & Phanindra, 2013; Rojjananil & Assawinchaichote, 2016) given as proportional gain for unwrapping the errors presently occurred, an integral gain is utilized for unveiling reactive action inferred as a totality of all errors. Finally, derivative gain that is supposed to discover the future samples framed on the basis of the rate assessed with fluctuating errors. This sort of resourceful PID finds its solicitations (Shi, He, Peng, Zhang, & Zhuge, 2016) in several industrious applications such as domestic boilers, solar thermal power generators, biological waste heaters, geothermal power generators, robot manipulators. The real impact of heat energy integrated within these systems are it should get sustained in an unceasing manner right from the beginning until the end of the procedure.

The electrical load assigned to a DC motor is altered into a mechanical energy to provide heat for the devised applications. The applications may infer to accomplish a constant stirring effect or maintain a standard heat or reiterate some sort of without any lag in it. At this juncture, an optimal PID controller is necessitated to manage the overall activities performed by the system in a controlled manner. Intricacies prevalent in all of this conventional PID controller is the accomplishment of tuning constants in accordance with the Proportional ( $K_p$ ), Integral ( $K_i$ ) and Derivative ( $K_d$ ) in order to obtain an ideal differential order to sustain the performance. On the occurrence of a high differential order, the computational cost incurred is high. These constants opt for selecting an initial value to fine-tune the metrics through which the controller stability is acquired. If the initial value is precise then the controller stability is accomplished on time without any sorts of additional delay or else the time span incurred for accomplishing controller stability constantly surges up. (Sahib & Ahmed, 2016) discussed several PID parameter tuning methodologies that serve to accomplish an ideal parameter within a precise time span. A conventional methodology trailed to fine tune the PID is given as, Ziegler-Nichols (Shah & Agashe, 2016) stating that the constants are designated on the basis of varied minimizing functionalities and sometimes the overall order of the entire system may get altered. Another PID parameter tuning methodology refers to the Iterative Feedback Tuning (IFT) (Heertjes, Van der Velden, & Oomen, 2016). Though there are many gains acquired owing to its optimized approach, the stability of the entire controlling system is not assured at the time of iterative procedures. The robustness of the whole procedure becomes questionable. Other than these methodologies, some categories of Artificial Intelligence (AI) based procedures are also utilized tune the parameters of PID such as evolutionary algorithm, Differential Evolution (DE) algorithm, Simulated Annealing (SA), multi-objective optimization, Tabu Search (TS), Artificial Bee Colony (ABC) algorithm, fuzzy systems, Particle Swarm Optimization (PSO) algorithm, Many Optimizing Liaisons (MOL) and Genetic Algorithm (GA) (Pi & Ye, 2015; Sharma, Verma, &

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## Design and development of new control technique for standalone PV system

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### ABSTRACT

A Sub-Maximum Power Point Tracking (S-MPPT) algorithm improves the performance of Photo Voltaic (PV) systems. This S-MPPT is used in single-phase PV system to test the tracking accuracy and its impact on the consistency of the whole system. Single phase PV Deadbeat Scheduler is proposed in this paper. The Deadbeat scheduler is a linear system. It initializes each initial state of the system to zero in shortest time possible. A single phase PV structure configuration is proposed to decrease the partial shading effect by changing the parameters of S-MPPT control algorithm. Thus, voltage sensor based S-MPPT algorithm through voltage reference control technique with the help of controller is developed for minimizing the tracking time and steady state oscillations. Selection of the objective function to mitigate the drawbacks associated with voltage sensor based algorithm for a decrease in solar irradiance are also demonstrated. The proposed MPPT algorithm with the designed controller is tested for a step change in irradiance from 270 to 480W/m<sup>2</sup> with a perturbation time of 20 ms and  $\Delta V = 0.5V$  (perturbation of voltage). From the simulation results, the proposed method with S-MPPT plus deadbeat control algorithm is compared with other existing algorithms.

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### 1. Introduction

Sustainable quality assets are starting to play additional capacity in a couple of zones, for example, building incorporated photovoltaic, in addition to provincial zones. With regards to supplanting the mass quality assembling of petroleum derivatives, sustainable power has not but rather exhibited to be sensible. However, electricity can exceed expectations in neighborhood programs in which there is confined or no get admission to a quality network, or in which get admission to traditional quality is restrictively expensive. They are most effective in adjacent projects in light of the fact that the power producing is at the equivalent region in light of the fact that the end-use, subsequently limiting the garage energy and conveyance.

Photovoltaic (PV) system used to produce power for local or modern machines that requires conventional power. This innovation makes an interpretation of sunlight into power utilizing semiconductor cells, called PV cells. The MPPT keeps up the working voltage of the exhibit at a particular esteem that expands the cluster yield and it can encourage DC load. In the event that the load

is AC, for example, AC engines, utility matrix, and so on, inverters are utilized. A critical part of the PV system is the capacity limit of vitality. Positive uprooting draws offer low volume with high lift capacities, though pivoting pumps are best for vast water necessities over any lift. Gliding and surface suction pumps offer a scope of volumes at low lift as it were. Submersible pumps are the most productive for use in a PV drawing system, as they dispense with the suction line. The engine can either be DC or AC and the choice ought to be founded on the value, unwavering quality, and the specialized help that is accessible. Lasting magnet DC engines can interface specifically to the PV cluster. They are solid, proficient, and work over an extensive variety of voltages. For the horticultural utilize, generally AC engines are utilized to direct water from the wells or profound bores. Air conditioning engines require the utilization of an inverter, yet are more affordable and all the more promptly accessible. Another application where sunlight based vitality is utilized is in the region of battery charging. Profound cycle batteries are most proper for PV application as they can withstand cycles of up to 80% release. There are numerous worries like support, visit substitution, and so on, while utilizing battery stockpiling. The water drawing system with PV is most usually utilized as a total PV system, both in created and creating regions. There are numerous focal points of utilizing a PV system for producing power for water pumping. The put away water can be utilized on

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**Detection of *pH* Neutralization Technique in multiple tanks using ANFIS controller**

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**Abstract:**

*pH* neutralization is commonly used in Industry. Limitation of *pH* has been recognized as an exciting trouble due to the changing in time and non-linear characteristics of the system. because of that, monitoring of *pH* in neutral region is an essential process. In this paper authors recommend layout method and alertness of Adaptive Neuro-Fuzzy Inference System (ANFIS) using hybrid studying set of rules to enhance the prediction based totally on fractional PI controller. Therefore, this paper deals with multiple tank size and its quantity. Using ANFIS method easy to reduce settling time, disturbance and errors going on in output. This technique produces an efficient output in minimal time. From this result offset and overshoot time is zero, the setting time is below 10 minutes. This is the best result while comparing other methods.

**Keywords:** *pH neutralization*, Fractional order PI controller (FOPI) and Adaptive Neuro Fuzzy Inference System (ANFIS).

**I. Introduction:**

The neutralization of acid and base is very important in chemical industry. The objective of neutralization procedure is to change the value of *pH* in the input by manipulating the influent by

# Various Methods for Object Detection Based on Deep Learning



Arlin Maria Scari, Neena V V

**Abstract:** The growing technology in the world made-up the deep learning method, which classifies different vehicles from a video. In deep learning technology use different strategies such as RCNN, Fast RCNN, RPN, faster RCNN, YOLO, SSD. All methods offer various accuracy of the identification of the vehicle. The convolutional natural network determining an object detection task exploitation in deep learning. Object detection is very important in AI as well as in videos using pc vision. Through this paper demystifies the important role of deep learning supported by CNN for object detection. And the methodology offers additional correct result. Deep learning techniques shows the development of object detection in various area and the different technics are assessed during this paper.

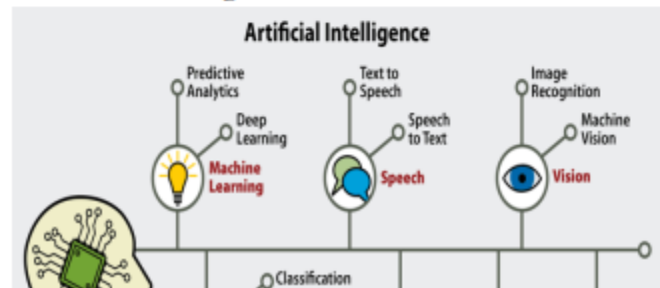
**Keywords:** Machine Learning, Deep learning, CNN, RCNN, Fast RCNN, Faster RCNN, YOLO, SSD.

## I. INTRODUCTION

Vehicle detection is incredibly necessary within the traffic scene to classify the vehicle supported its structure and different options by newest deep learning technology. Robot working is based on AI, which is the latest technology and same as human intelligence processes by machines, particularly laptop systems. These methods embrace automatically learn, recognize and self-orientation. The


labour for natural vision primarily based tasks which will be performed by a pc or an automatic system. The applications of pc vision systems have conjointly applied in numerous public areas like roads, airports and retail sectors. One such form of vision systems is within the task of watching and analysing scenes of road traffic, with a specific interest in watching highways and intersection. Such a system is needed for effective real-time traffic management systems, which will find changes in traffic characteristics in an exceedingly timely manner, permitting regulators and authorities the power to respond to traffic things [5] quickly. The core of any such system which will be used to effectively detect exact object and classifying the moving vehicles from the video [16].

## A. Artificial Intelligence



Original Research | [Published: 05 September 2019](#)

## Optimization algorithms, an effective tool for the design of digital filters; a review

[Renjith V. Ravi](#) , [Kamalraj Subramaniam](#), [T. V. Roshini](#), [Sundar Prakash Balaji Muthusamy](#) & [G. K. D. Prasanna Venkatesan](#)

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### Abstract

Nowadays, optimal and intelligent design approaches are vital in almost all areas of engineering. Scientists and engineers are attempting to make frameworks and models more proficient and intelligent. This paper deals with a detailed investigation on design of various digital filters using optimization algorithms. Generally digital filters are classified into two types which are FIR and IIR filters and are again classified into one dimensional, two dimensional and three dimensional filters for signal, image and video respectively. The design of a digital filter that satisfies all the required conditions perfectly is a challenging factor. So, apart from the conventional mathematical methods, optimization algorithms can be used to design optimal digital filters. IIR Filters are infinite impulse response filter; they have impulse response of infinite duration. FIR Filters are finite impulse response filters; they have impulse response of finite duration. In this paper we have discussed the design of various optimal digital filters based on various optimization algorithms, for processing of signal, image and

## An Improved Classification System for Brain Tumours Using Wavelet Transform and Neural Network

AS Dhas<sup>1</sup>, M Madheswaran<sup>2</sup>

### ABSTRACT

*This paper presents an improved classification system for brain tumours using wavelet transform and neural network. The anisotropic diffusion filter was used for image denoising, and the performance of the oriented rician noise reducing anisotropic diffusion (ORNRAD) filter was validated. The segmentation of the denoised image was carried out by fuzzy c-means clustering. The features were extracted using symlet and coiflet wavelet transforms, and the Levenberg-Marquardt algorithm based neural network was used to classify the magnetic resonance (MR) images. This classification technique of MR images was tested and analysed with existing methods, and its performance was found to be satisfactory with a classification accuracy of 93.24%. The developed system could assist physicians in classifying MR images for better decision-making.*

**Keywords:** Brain tumour, fuzzy c-means, Levenberg-Marquardt algorithm, magnetic resonance images, neural network, wavelet transform

## Un sistema de clasificación mejorado para los tumores cerebrales usando la transformada de ondeletas y la red neuronal

AS Dhas<sup>1</sup>, M Madheswaran<sup>2</sup>

### RESUMEN

*Este artículo presenta un sistema de clasificación mejorado para los tumores de cerebro usando la transformada de ondeletas (transformada wavelet) y la red neuronal. El filtro de difusión anisotrópica fue utilizado para la eliminación del ruido de la imagen, y se validó el funcionamiento del filtro de difusión anisotrópica orientado a reducir el ruido riciano (ORNRAD, siglas en inglés). La segmentación de la imagen 'desruidizada' (denoised) fue realizada mediante el agrupamiento difuso c-means fuzzy. Las características fueron extraídas usando las transformadas de ondeletas symlet y coiflet, y la red neuronal basada en el algoritmo de Levenberg-Marquardt fue utilizada para clasificar las imágenes de resonancia magnética (RM) imágenes. Esta técnica de clasificación de imágenes de RM fue probada y analizada con métodos existentes, y se halló que su rendimiento era satisfactorio con una precisión de clasific-*

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## A Novel Decision Support System for Malignant Tumor Using 3D Reconstruction and Volumetric Analysis

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👤 V. Vijikala and D. Anto Sahaya Dhas

### Abstract

Breast cancer is one of the deadly disease which leads to death in women now a days. The challenges in assessing malignant tumor heterogeneity force existing clinical evaluations to their limits and account for most targeted therapy failures and clinical outcome uncertainties in breast cancer patients. A novel decision support system for malignant tumor is proposed using 3D reconstruction and volumetric analysis. The tumor region is extracted using OTSU thres holding and the 3D reconstruction is done by adopting interpolation techniques. After the image reconstruction, the volumetric analysis is done by summing the quantity of voxels set apart as the object of interest within. The absolute mean curvature per unit area is determined by summing the absolute value of the mean curvature  $\gamma$  above the object of interest surface. A decision can be made on whether the patient has to undergo lumpectomy or quadrantectomy or mastectomy based on the volumetric analysis.

## Materials Research Express



## PAPER

Surface structural features and wear analysis of a multilayer Ti6Al4V-B<sub>4</sub>C thin film coated AISI 1040 steel

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**Keywords:** Ti-6Al-4V-4B<sub>4</sub>C films, surface roughness, nanoindentation, thermogravimetric analysis, wear and friction

## Abstract

The deprived wear resistance of AISI 1040 steel often results in higher wear rates. The best ways to upgrade their wear resistance are to introduce hard particle reinforcement to produce a metal matrix composite which can be used as a coating. In the present study Ti-6Al-4V-4B<sub>4</sub>C metal matrix composite coatings were coated on AISI 1040 steel using the magnetron sputtering process and their dry sliding wear behavior was studied at room temperature. The coating morphology was explored by SEM, XRD, FT-IR, and AFM. The constant coating thicknesses of 80 nm and 115 nm were achieved for 0.5 h and 1 h coating duration, respectively. The effects of introducing B<sub>4</sub>C on the hardness, thermal behavior, wear, and friction characteristics were studied. The nano hardness and elastic modulus were attained by AFM nanoindentation technique which showed a maximum of 21.7 GPa and 218.4 GPa, respectively. It was proven that the adding of B<sub>4</sub>C increases the thermal stability of Ti-6Al-4V-4B<sub>4</sub>C coatings as well as modifies the oxidation mechanism. It is expected that the addition of B<sub>4</sub>C will improve the thermal behavior of thin film coatings for their practical application. Wear tests were executed by ball-on-disc wear tester with E-52100 sphere as the counterface at a sliding velocity of 2 m s<sup>-1</sup> with 3 N load. Wear rate and coefficient of friction (CoF) reduced with an increase in load and sliding distances also composite coatings exhibited higher wear resistance within entire loading conditions, hereafter suggesting that it could be a favorable substitute to other hard coatings.

## 1. Introduction

Physical vapor deposition (PVD) was one of the oldest techniques used for the preparation of hard coatings [1]. Thin film coatings are the most common technique used for tribological purposes since no post-deposition processing is required [2]. According to the literature, it is mentioned that carbide and nitride coatings upgrade the wear resistance, high strength with a better hardness of products explained by Huiying *et al* [3]. In such a way that AlCrN coatings give better wear resistance, high abrasion resistance, good oxidation resistance and reasonable thermal stability [4]. Also, metal nitrides and carbides with high hardness play an important role in the surface engineering field as discussed by Robinson and Jackson [5]. Moreover, the hardest metal carbide coated stainless steel components show outstanding properties as described by Chicco *et al* [6]. However, the nanoindentation technique is an assessable method to appraise the mechanical properties of the coated thin films. The XRD, SEM, and AFM applied to characterize the surface morphology of thin-film coatings were explored in [7, 8]. The surface roughness of the thin film coating has been investigated by using AFM image analysis explained by Ozmetin and Sahin [9].

# Radio Frequency Identification (RFID): A co-generation tool in Product Life cycle Management (PLM)



V.Sampathkumar, P.Sridharan

**Abstract:** Product life cycle management (PLM) and Radio Frequency Identification (RFID) when properly amalgamated aids product development throughout the lifecycle of the product design and narrows the gap between OEM (design team) and customer by providing real-time information about product failures thereby increasing product lifecycle. Therefore, this paper enhances the pros and cons of RFID in PLM as a co-generation tool and the benefits of using RFID in assembling critical components are elucidated. The PLM-RFID solution embraces a demand-focused supply chain representation by integrating suppliers, manufacturers, distributors, and retailers to share product movement data and feeds valuable inputs for new product development. To illustrate the benefits of PLM-RFID amalgamation in enterprise application we have developed middleware to facilitate data communication between RFID readers and PLM databases.

**Keywords:** PLM, RFID, Middleware, J2EE, EPC

## I. INTRODUCTION

This paper provides a summary and practical applicability of RFID technology combined with PLM issues. The product lifecycle management consist of different phases such as initial design, manufacturing, marketing, after-sales or creating new versions. In this case, PLM signifies managing product information related to the corresponding product and the lifecycle of the same. By fixing the RFID tag on the product or files and it can be tracked with the help of reader then the data to be sent to the database through the middleware with a unique product code called as electronic product code (EPC)

## II. RADIO FREQUENCY IDENTIFICATION

RFID is an automatic data-capture technology that can be used to electronically identify, track, and store information about groups of products, individual items, or product components.

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There are three elements were employed in this technology: RFID Tags; RFID Readers; and a Data collection device, distribution system, and management system. RFID tags are of miniaturized computer chips programmed with information about the product or with a unique number that corresponds to information that is stored in a digital database. The tags can be located inside or on the surface of the product, file, item, or packing material to be tracked. RFID readers are interrogated with the tags or send signals to the tags and receive the responses as per backscattering technology. These responses can be stored with the reader for later transfer to a data collection system or instantaneously transferred to the data gathering structure (system). Finally, data collection systems consist of computers performing data processing software such as the J2EE platform, ORACLE 10g which typically are networked with a larger information management system. The RFID technology is the line of sight and faster response to the reader compared to the bar code technology. The following are problems with bar code technologies.

- Damaged or misprinted barcode labels
- Unacceptable date /life printed on manufactured goods label
- Erroneous pricing on product labels
- Erroneous 'special' pricing labels applied
- Wrong tray-end label applied (goods within tray incorrect)
- The human error leading to an incorrect number of trays dispatched

### 2.2 Active Tags

Active RFID tags, that have each an on-tag electricity source and an energetic transmitter, offer advanced overall performance. Because they're related to their personal battery, they maybe study at a much better variety – from numerous kilometers away. But they are larger and more high-priced. Active RFID tags are appropriate for manufacturing, including tracking components on a meeting line, or for logistics in most cases wherein the tag device could be reused.

### 2.3 Passive Tags




Passive tags are the maximum potential for the lowest cost, making them applicable for mass single-use packages. And it as no energy source and no on-tag transmitter, which offers them a variety of fewer than10-meters and makes them sensitive to regulatory and environmental constraints.

### 2.4 Read-only or Read -Write Tags

Chip tags may be read-only or read-write. A read-only memory chip has an identification code (Electronic Product Code) recorded at the time of manufacture or when allocated to an object. Read-only tags are much cheaper and are typically used in passive tags




# Wear and corrosion behaviour of Ti-based coat on biomedical implants

G. Godwin , S. Julyes Jaisingh, M. Shunmuga Priyan  & S. Christopher Ezhil Singh 

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 Full Article

 Figures & data

 References

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## ABSTRACT

Biomedical implants are immensely manoeuvred devices that fix various deformities and injuries on medical grounds. With an emergent exploration in this field by researchers, countless combinations of materials have been discovered that perks global mankind. The ultimate goal of this experimentation is to appraise the characteristics of wear and corrosion resistance of Ti-Co-Cr-coated 316L grade austenitic stainless steel (SS) in contrast with TiN-coated and uncoated 316L SS. A micro-abrasion test was conducted on every single sample at 3N, 5N and 7N loads and were characterized in accordance with weight loss, coefficient of friction, surface roughness, Scanning Electron Microscope (SEM) analysis, X-ray Diffraction pattern (XRD), Energy

# Optimization Tool Wear on Hard Turning of AISI4140 Steel with Coated Carbide Tool Cutting Conditions



D. Rajeev, S. Christopher Ezhil Singh, D.R. Anand Rejilin, G. Glan Devadhas, S. Ajitha Priyadarsini

**Abstract:** In recent year's traditional grinding process are being replaced by hard turning for the finishing operation of hardened steel. High rate of TW and the cost of CBN inserts associated with hard turning is a cause of concern. In order to minimize the TW, this work proposes the optimal cutting conditions for the hard turning of Hardened AISI 4140 steel (47 HRC) utilizing low affluent CVD coated Ti(C, N) + Al<sub>2</sub>O<sub>3</sub> carbide tool. All the trials are conceded out based on Design of Experiments. Response surface methodology based on BBD is followed for experimentation. The ANOVA is utilized to recognize the most impacting parameters on the TW. Results indicate that both the CS and the DoC influences the TW. Optimization results reveal lower CS results in minimal TW.

**Keywords:** Hard turning, RSM, coated carbide, ANOVA, TW.

## I. INTRODUCTION

Hard turning takes out the arrangement of operations essential for hardened material in machining by conventional processes, subsequently diminishing the process duration and refining the production. Fundamentally a finishing process with materials of choice 45-70 HRC to completed the HT [1]. Despite the fact that it is progressively profitable as far as cost, time, surroundings and production, its use is constrained in industries because of ambiguity in surface integrity, TW and life [5]. Consequently, a thorough assessment in machinability features in HT was directed. Ersan Aslan et al. [2] explored owing to their enhanced hardness and resistance to wear, AISI 4140 with Al<sub>2</sub>O<sub>3</sub> + TiCN blended ceramic tools are one of the greatest appropriate cutting tool materials. Influence of CS, Fr and DoC on responses of FW and SR on the orthogonal array and the ANOVA. Sudhansu Ranjan Das et al. [3] explored the agreements with hard turning of AISI

4140 steel utilizing PVD-TiN coated Al<sub>2</sub>O<sub>3</sub>+TiCN varied ceramic inserts. The joint influence of cutting variables (CS, feed and DoC) on enactment physiognomies such as SR and FW is experimented by FFD and ANOVA. The outcomes demonstrate that feed is the main cutting variable consequence SR, monitored by CS. Though, FW is disturbs by the CS and interaction of feed, DoC, though DoC has no significant effect, but FW is an enhanced function of DoC. Rohit Uppal et al. [4] examined the impacts of shapes of insert through machining of steel. The triangular insert was seen as better than square and round insert for minor SR. Aouici et al. [5], described the HT of steel, examined the impact of speed, feed, workpiece hardness and DoC on CF parts and SR utilizing CBN tools. RSM based regression models were created for the responses. Suresh et al. [6] examined the multilayer CVD coated TiN/TiCN/Al<sub>2</sub>O<sub>3</sub> solidified CI execution however machining of hardened steel. It was presumed that the blend of CS, less DoC and less Fr influence minor CF and SR. It is seen that best of the works are restricted to the costly CBN and certainly, there is a requirement for most affordable tool which could be execute HT. In such a setting the offered option is Coated CI which is less expensive than CBN or ceramic tools, only insufficient work is accounted for on the capacity of coated CI through hard turning of alloy steel in the hardness choice (46-48 HRC), for modern applications. In this work, an exhaustive trial examination of cutting parameters was conveyed dependent on RSM. AISI 4140 hardened steel was machined utilizing coated CI. The affecting parameters were discovered utilizing ANOVA. The ideal cutting condition for diminishing wear is likewise investigated.

## II. MATERIALS AND METHODS

### A. Work piece and Machine tool



Fig. 1. The Machine tool and the work piece

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## Machining tool vibration on dimensional accuracy and surface roughness during milling operation of Al6082 with indexable carbide inserts

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**Abstract:** In this research paper, machining tool vibration occurs because of relative motion between the work piece and the cutting tool, which influences the surface finish of the machined part and the lifespan of the cutting tool. Some of the parameters that influence machining tool vibration include feed rate, depth of cut and spindle speed. In this study, experimentation is carried out on a conventional vertical milling machine to investigate the influence of machining tool vibration on surface roughness during face milling operation of Al6082 alloy with indexable carbide inserts. The eutectic phase for joint of Al6082 is  $\beta$ -Al<sub>5</sub>FeSi eutectic phase. The machining is done in dry condition under the different combinations of Machining parameters designed through Taguchi L9 orthogonal array. The machining tool vibrations are captured with the help of tri-axial accelerometer. Analysis of variance (ANOVA) technique used to formulate the experimental data to analyze the effect of each parameter and machining tool vibration on surface roughness.

**Keywords:** Machining, surface roughness, vibrations, Taguchi, ANOVA

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# TG/DTA studies on the oxidation and thermal behaviour of Ti-6Al-4V-B4C coatings obtained by magnetron sputtering

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<https://doi.org/10.22201/icat.24486736e.2020.18.3.1088>**Keywords:**

Thermogravimetric analysis, differential thermal analysis, oxidation kinetics, activation energy, nanohardness

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## Abstract

Thermogravimetric analysis (TG) is a rapid method for the determination of protecting the ability of thin film coatings in addition to oxidation kinetics. Boron carbide (B4C) reinforced Ti-6Al-4V thin films were deposited through the magnetron sputtering coating technique. The effect of 0, 2, 4, 6 and 8 Wt. % of B4C adding on microstructure, thermal behaviour and hardness of Ti-6Al-4V-B4C coatings were investigated. Thermal analysis of Ti-6Al-4V-B4C coatings with varying percentage of B4C resulted in the establishment of an exothermic peak, for the reason that reduction in the oxidation of coating. The thermal behaviour of coating was improved by B 4C addition; those coatings are recommended for practical application. It was proven that the addition of B 4C not only alters the thermal stability but also transforms the mechanism of oxidation. It was absolutely unconcealed that the Ti-6Al-4V-B4C film oxidization may be a multi-staged procedure subject on the

# Optimization algorithms, an effective tool for the design of digital filters; a review

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## Abstract

Nowadays, optimal and intelligent design approaches are vital in almost all areas of engineering. Scientists and engineers are attempting to make frameworks and models more proficient and intelligent. This paper deals with a detailed investigation on design of various digital filters using optimization algorithms. Generally digital filters are classified into two types which are FIR and IIR filters and are again classified into one dimensional, two dimensional and three dimensional filters for signal, image and video respectively. The design of a digital filter that satisfies all the required conditions perfectly is a challenging factor. So, apart from the conventional mathematical methods, optimization algorithms can be used to design optimal digital filters. IIR Filters are infinite impulse response filter; they have impulse response of infinite duration. FIR Filters are finite impulse response filters; they have impulse response of finite duration. In this paper we have discussed the design of various optimal digital filters based on various optimization algorithms, for processing of signal, image and video. The design of digital filters based on Evolutionary algorithms and swarm intelligence algorithms like Genetic Algorithm, Particle Swarm Optimization, Artificial Bee Colony

# Individual customization strategy accomplished by developing prototype of a laparoscopic forceps handle using additive manufacturing

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## Abstract

**Purpose** – Laparoscopic surgeons suffer because of discomfited body posture while performing surgery and experience discomfort owing to lack of customized surgical instruments. Accordingly, this paper aims to recommend an individual customization strategy by developing an ergonomically designed laparoscopic forceps handle and thereby increase the comfort of surgeons.

**Design/methodology/approach** – Hand anthropometric parameters of 282 south Indian male subjects are used to customize the handle. uPrint and Objet260 Connex, which works based on fused deposition modeling and PolyJet, respectively, are used to fabricate the prototype of the handle. Design modifications include a pistol-type grip, the increased contact area between the hand and handle, and neutral wrist posture.

**Findings** – Ergonomic evaluation parameters such as grip, functionality, comfort and wrist posture using subjective ratings from laparoscopic surgeons were recorded and obtained average values of 4.1, 3.6, 4.1 and 4.1, respectively, based on a five-point ordinal scale. Additionally, stress analysis also confirms the safety of the handle based on von Mises stress criteria.

**Research limitations/implications** – Anthropometric data are limited to 282 subjects and subjective evaluation is conducted using a prototype, not the end-use product.

**Originality/value** – Evaluation using subjective rating confirms the ascendancy of a modified handle over the existing handle in terms of assessed parameters. The proposed individual customization strategy can be applied for other industrial hand tools to enhance comfort.

**Keywords** Individual customization, Laparoscopic forceps handle, Comfort, Subjective rating, Additive manufacturing

**Paper type** Research paper

## 1. Introduction

Because of reduced hospital stay and decreased size of surgical wounds, the number of laparoscopic surgery or minimally invasive surgery has predominantly increased for the past two decades (Richardson *et al.*, 2000; Raymond *et al.*, 2008). When compared to open surgery, laparoscopic surgeons go through an uncomfortable body and hand posture by looking into a monitor without directly touching the internal organs even though patients benefit from the laparoscopic procedure (Berguer *et al.*, 1999; Nguyen *et al.*, 2001). Laparoscopic surgeons reported about discomfort and pain on hand, wrist, arm, neck and shoulder, which, in turn, leads to musculoskeletal disorders, in short MSD (Berguer *et al.*, 1999; Wauben *et al.*, 2006; Gofrit *et al.*, 2008; Szeto *et al.*, 2009; Stomberg *et al.*, 2010; Tjiam *et al.*, 2014; Dabholkar *et al.*, 2015).

Many researchers reported that these discomforts are because of lack of ergonomic principles in the instrument

design or poorly crafted laparoscopic instruments (Berguer, 1998; Veelen *et al.*, 2003; Supe *et al.*, 2010; Seagull, 2012; Xiao *et al.*, 2012). However, some of the other researchers thought that this problem persisted because of lack deficiency in size of handles and design reflecting hand size of the targeted population can be able to solve the issue (Veelen and Meijer, 1999; Berguer and Hreljac, 2004; DiMartino *et al.*, 2004; Adams *et al.*, 2008). Collecting different human body dimensions known as anthropometry, which is a branch of ergonomics, for various purposes such as customized instrument design is getting more and more importance (Zhang and Molenbroek, 2004; Krishan, 2007).

Additionally, Yang *et al.* (2004) believed that ergonomics is an integral part of customized development of products and some other researchers stressed the importance of additive manufacturing for developing customized medical products (García *et al.*, 2018; Culmone *et al.*, 2019). Shin *et al.* (2008) developed a customized and ergonomically designed clamping hand tool, which increase the clamping force by 21 per cent. Another research is reported about ergonomic design of a chisel type hand tool fabricated by fused deposition modeling (FDM), which increases comfort of the user (Cerny *et al.*, 2013). In

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# Improved Proportional Fair Algorithm for Transportation of 5G Signals in Internet of Medical Things



Asish B Mathews, G.GlanDevadhas

**Abstract:** The Internet of medical things (IoMT) is a hybrid network in which numerous technologies like Bluetooth, Wi-Fi, and Cellular technology are integrated on a single platform. The internet of things applied to the medical healthcare necessitates enormous data rate and tremendous bandwidth along with better battery life with reliable and versatile connectivity. The use of 5G network satisfies these prerequisite with its tremendous data rate capabilities and assists human health services diagnosis and treatment. In this paper, improved proportional fair algorithm is introduced and is compared with existing scheduling algorithm for developing revolutionary changes in the medical healthcare. 5G networks represent a contemporary approach which encounter a hybrid digital network for developing Internet of things. Performance metrics considered for simulation studies are throughput, path-loss and SNR.

**Keywords:** 5G network, greedy algorithm, round robin algorithm and improved proportional fair.

## I. INTRODUCTION

The medical healthcare indicates a set of medical standards which can incorporate much biomedical equipments such as sensing devices, diagnostic devices, real-time imaging, critical services and telemedicine technologies. The internet of medical things need enormous data rate and tremendous bandwidth for supporting 5g technology. The EO modulator, square-law detection, and fiber transmission have a nonlinearity property, so it distributes a nonlinear distortion in IM / DD systems. The performance of the system is wasted due to these properties, which overproduce the original signal on the receiving side. At present the communication systems has become necessary for various application of machine learning techniques. The 5G technology can aid to develop the medical infrastructure such as robotic surgeries with extra high reliability and very small latency.

Bandwidth, throughput and path loss are very important parameters in Internet of Medical things, without much compromise to connectivity and latency. Filter Bank Multi Carrier (FBMC) is used to linearly filter every subcarriers and Offset Quadrature Amplitude Modulation (OQAM) is used to mitigate the Inter Carrier Interference (ICI). This achieved higher spectrum efficiency and lower Out of Band Emission (OoBE).

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Yet the long filter acts as a hindrance in the usage of these waveforms in the cases of Internet of Things (IoT) applications and MTC. Filtered OFDM (f-OFDMA) localized the spectral waveforms thereby maintaining the interferences such as ISI and ICI within acceptable limits [1]. This f-OFDM provided 46% of throughput over traditional OFDM [22]. The advancement of f-OFDM helps in aggregating the seamless carrier sub-bands was described. It also achieved demonstrating gapless transmission of downlink and uplink signals over 6Gbps wireless and 20km fiber system.

Universal Filtered Multi Carrier (UFMC), also called Universal Filtered Orthogonal Frequency Multiplexing (UF-OFDM) is employed for filtering the set of sub carriers which are set orthogonal to each other within the allowed sub-bands [2]. UFMC may not use Cyclic Prefix (CP) for preventing Inter carrier and intersymbol Interference (ISI). Therefore it is intricate to handle misalignments in time domain, causing least performance [23-26]. Filtered-Orthogonal Frequency Division Multiplexing (f-OFDM) is one of the types of OFDM based waveforms that deployed sub-band filtering 3f-OFDM deployed one CP per symbol in order to reduce spectrum efficiency especially when there is a requirement of short symbols which is quite similar to OFDM.

The fiber dispersion and nonlinear effects are key details of the rate-limiting factors in the existing optical communication systems [16], the ANN applications, and are referred to as the universal function approximate [17], for channel equalization is the majority preference for prodigious research attention [8]. The CP has been exceeded in [19] and numerous filters have been installed. A novel DSP is based on a bandwidth-efficient mobile front haul aggregation and de-aggregation technique. GFDM is a 5G waveform that depends on sub-band filtering to lower OoBE [20]. GFDM which can cover the 4G waveforms and can enhance the performance of waveforms. Existing methods like OFDM, F-OFDM have few defects like reduced performance in covering the extreme distance in the area which are densely populated and does not eliminate the dispersion and nonlinear effects proficiently [21].

Generalized Frequency Division Multiplexing (GFDM) is a 5G signal that relies on sub-band filtering to lower OoBE. GFDM has an ability to cover the 4G waveforms. GFDM has many pros in giving freedom to improve the performance of waveforms. Densification of users is in need of high speed data that led to the evolution of obtaining the maximum coverage area without losing the average data capacity [27-31].

## RESEARCH PAPER PUBLICATIONS IN 2020-21

**Number of research papers published per teacher in the Journals notified on UGC care list during the year 2020-21**

S.No	Title of paper
1	Smart Stick for blinds with advanced face recognition and Vehicle detection using machine learning
2	Effect of Nano B 4 C on the Tribological behaviour of magnesium alloy prepared through powder metallurgy
3	Tensile and compression behaviour, microstructural characterization on Mg-3Zn-3Sn-0.7Mn alloy reinforced with SiCp prepared through powder metallurgy method
4	Dry Sliding Friction of Al-Si-B 4 C Composites Prepared Through Powder Metallurgy using Taguchi Design
5	Analysis of Sneak Path Issues in Memristor Based 4x4 And 8x8Crossbar Nonvolatile Random Access Memory Array
6	Prediction and performance emission characteristics of direct Ignition engine with biofuel using artificial neural networks
7	optimization on friction and wear behavior of Al-Si alloy reinforced with B4C particles by Powder Metallurgy using Taguchi design
8	Early detection and classification of breast tumor from mammogram images
9	A tumor segmentation approach from FLAIR MRI brain images using SVM and genetic algorithm
10	Detection and classification of breast cancer from digital mammograms using Hybrid Extreme Learning Machine Classifier
11	Driver Exhaustion Detection Systems
12	Approaching Bus Driver Collapse Exposure Entity Situated upon Rumbustious Observable Inquiry as Concerns Eye Eventuality
13	Kidney Transplantation System for Matching and Donor Recipient Verification using Block Chain
14	Script identification: A Review
15	Identification of Plant Disease: A Review



16	Machine Learning and Internet of Things based Fruit Quality Monitoring System: A Proof of Concept Implementation and Analysis
17	Automatic Form Filler
18	Weight Optimized Neural Network for Heart Disease Prediction using Hybrid Lion Plus Particle Swarm A l g o r i t h m
19	Bitcoin : An Overview of the Innovative Decentralized Digital Currency
20	Frame-Angle Controlled Wavelet Modulated Inverter and Self-Recurrent Wavelet Neural Network-Based Maximum Power Point Tracking for Wind Energy Conversion System
21	MODELING AND CONFIGURATIONS OF AN ELECTRIC VEHICLE
22	A Bibliometric Review of Stock Market Prediction: Perspective of Emerging Markets
23	Comparison Method of PSO and DE Optimization for MPPT in PV Systems under Partial Shading Conditions
24	A Unified Tensor Framework for Clustering and Simultaneous Reconstruction of Incomplete Imaging Data
25	A Two-Way Optimization Framework for Clustering of Images using Weighted Tensor Nuclear Norm Approximation
26	Automated breast cancer detection using hybrid extreme learning machine classifier

**Prof. Dr. Benny Joseph**  
**(PRINCIPAL)**



# Smart Stick for Blinds with advanced Face Recognition and Vehicle Detection using Machine Learning

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**Abstract:** *Some infrastructure can be provided for the blind people so that they can feel safe while travelling. A smart stick can be proposed as an additional aid for the blind to improve mobility. The stick helps to sense obstacles and provide assistance to return to home safely. The stick helps to detect the vehicle coming towards the user by means of strong sensors employed in it. This enables the blinds user to cross roads without assistance. The Assistor works based on the technology of object recognition, image processing and human recognition and a navigation system. This model implements a camera on the hand of the stick. It captures the images of person approaching the user. Using convolutional neural network algorithm(CNN), the stick recognize the image and it returns the identity of that person. Ultrasonic sensors are used for obstacle detection. Three of them together helps to detect the vehicles passing by. Atmega328 microcontroller controls the activities taking place in the system. Feedback is given to the user through an audio earpiece using Bluetooth technology. The system employs GPS module for location tracking and navigation. GSM module installed in the stick sends emergency messages to the stored mobile numbers (Usually the numbers of people closer to the user) along with his current location.*

**Index Terms:** *GPS, GSM, CNN, image recognition, vehicle de- tecton, ultrasonic sensors, bluetooth module, emergency button.*

## Effect of Nano B<sub>4</sub>C on the Tribological Behaviour of Magnesium Alloy Prepared Through Powder Metallurgy

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In this present study, the particle size of as received magnesium alloy (AZ91) and B<sub>4</sub>C powders was reduced through high energy ball mills. The combination of AZ91 (both 10 μm and 60 μm) reinforced with nano B<sub>4</sub>C particles were fabricated by powder metallurgy technique. The incorporation of nano B<sub>4</sub>C particles to the Mg matrix was done at various weight % such as 5, 10, 15 and 20. The AZ91 composites were fabricated in a suitable die set assembly and the green compacts were sintered in an electric muffle furnace at 500 °C with argon atmosphere for a dwell time of 1 h. The density of the composites was estimated using Archimedes principle. Micro hardness test was carried out for the prepared specimens and dry sliding wear test was conducted by using pin-on-disc apparatus at room temperature with varying loads and sliding velocities by keeping a constant Sliding Distance (SD). Among the various specimens, the composite with 10 μm size attained a higher Vickers hardness value as well as better wear resistant property. Worn surface analysis of the prepared composites was studied using Scanning Electron Microscope (SEM).

**Keywords:** AZ91, B<sub>4</sub>C, coefficient of friction, sliding wear, hardness.

### 1. INTRODUCTION

There is much attention in scientific research because of the increase in demand on lightweight materials for aerospace and automotive applications. Metal matrix composites are used as effective reinforcements to enhance the mechanical properties and also reduction in fuel consumption [1,2]. Many researchers found that magnesium alloys process good strengthening effects and are used in aerospace applications due to its low density. Magnesium composites result in better wear resistance and lower Coefficient of Friction (CoF) [3]. Recent works focused on AZ91 magnesium alloy, which has good mechanical properties, Specific Wear Rate (SWR) and hardness [4]. Powder metallurgy method utilizes reduced manufacturing temperature and gains uniform reinforcement distribution. So, metal matrix composites (MMC's) were prepared by this method which favours nucleation at the reinforcement-matrix interface [5].

Magnesium alone has reduced lifetime, poor corrosion resistance and wear property but it's lightweight and low density makes the material demand and applicable for automobile and aerospace.

It can be reinforced with matrix composites like aluminium, boron carbide, silicon carbide, titanium carbide, etc. [6]. Also, the mechanical properties of pure

magnesium and its alloys were improved by high strength and high modulus materials like titanium, zinc, copper and nickel etc., Researchers found compressive responses when Mg is incorporated with ZrO<sub>2</sub> and Cu led to enhanced hardness, compressive and tensile strength [7, 8]. Also, silicon carbide reinforced Mg composites processed by powder metallurgy technique enhances the compressive behaviour with reduced grain size and uniform reinforcement distribution [9]. The microstructures of Mg sample changes with average grain size and weight percentage of the reinforcements added [10]. The reinforcement of nanoparticles to the magnesium composites exhibits superior mechanical properties such as hardness, corrosion resistance and tribological behaviour [11].

In this research, AZ91 magnesium alloy is reinforced with Boron carbide in different weight percent to reduce the wear rate and CoF. B<sub>4</sub>C is a one of the carbide particles, which is used to increase the strength and tribological properties [12]. Specially, the interfacial microstructure was focused on many studies such as aluminium composites reinforced with boron carbide, which results in high strength, low density, high hardness and Young's modulus [13]. Ball milling was carried out for homogeneous mixing of nano B<sub>4</sub>C particles with AZ91 alloy for 1h before taken to compaction. The AZ91 alloy reinforced with B<sub>4</sub>C particles were prepared through powder metallurgy method [14]. The compacted specimen

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# Tensile and compression behaviour, microstructural characterization on Mg-3Zn-3Sn-0.7Mn alloy reinforced with SiC<sub>p</sub> prepared through powder metallurgy method

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**Keywords:** Mg-3Zn-3Sn-0.7Mn, silicon carbide, hardness, strength, SEM, powder metallurgy

## Abstract

In this research paper, Mg-3Zn-3Sn-0.7Mn/SiC composite is developed by reinforcing various weight fractions of SiC<sub>p</sub> in Mg-3Zn-3Sn-0.7Mn alloy through powder metallurgy route. The weight fraction of SiC<sub>p</sub> usage is varied from 3% to 15% in Mg-3Zn-3Sn-0.7Mn alloy (i.e., in Mg-3Zn-3Sn-0.7Mn/xSiC; the sample values are varies for x is 3, 6, 9, 12 and 15%). The effect of SiC<sub>p</sub> addition got tested against its tensile strength, compression behavior, hardness, microstructure, alloying nature and porosity. This study shows better grain refinement with improved properties while reinforcing Mg-3Zn-3Sn-0.7Mn alloy with 6 wt% SiC composites. It was observed that the grain refinement occurred while adding up to 6 wt% of SiC particles in the composite and thereafter increase in SiC caused little grain refinement effect. Hardness is getting increased with the increase of SiC weight fraction and reached maximum to 133 HV at 12SiC/ Mg-3Zn-3Sn-0.7Mn. Higher UTS of 293 MPa obtained from the sample prepared with 12%SiC for 0.0533 s<sup>-1</sup> strain rate. The highest UCS of 341 MPa is obtained from the sample made with 15%SiC inclusion for 0.0533 s<sup>-1</sup> strain rate. From the SEM fracture analysis, the Mg-3Zn-3Sn-0.7Mn alloy and Mg-3Zn-3Sn-0.7Mn/SiC composite exhibit the almost same type of fracture called quasi-cleavage regardless of the % addition of SiC reinforcement. It was observed that the increase of SiC weight fraction increases the UCS because of its increased load-bearing capacity and reduction in cleavage facets.

## 1. Introduction

Magnesium (Mg) alloys and composites have various applications in an automobile field and in making of human implants because of its high strength to weight ratio and biocompatibility of magnesium [1, 2]. The success of these applications depends on the superior mechanical and physical properties shown from the studies carried out by many researchers; it is evident that the addition of Zn, Sn and Mn is come to improve the mechanical properties of magnesium alloy. Reinforcing of SiC<sub>p</sub> also drastically influence the mechanical properties. Some researches were extended with various magnesium alloys with composite nature developed through different processing [3–12]. The Mg-1.0Mn alloy by casting followed by hot extrusion obtained superior mechanical properties [13]. The high strength TAZ1031 Mg alloy at a ram speed of 0.1 mm/s and an extrusion temperature of 250 °C the same values were used for this study too [14]. The addition of Sn to the Mg-6Zn-1Mn alloy improved mechanical properties [15]. The effect of SiC particle reinforcement in AZ91 alloy and attained improved tensile and yield strength in AZ91/3SiC composite. SiC<sub>p</sub> reinforced in AZ31B alloy improves the mechanical properties and refined the grain size of AZ31B/SiC<sub>p</sub> composite [16, 17]. Taguchi based grey analysis

# Dry Sliding Friction of Al-Si-B<sub>4</sub>C Composites Prepared Through Powder Metallurgy using Taguchi Design



Abraham Subaraj. M, Bensam Raj. J, Naveenchandran. P, Christopher Ezhil Singh. S, G.Glan Devadhas

**Abstract:** This research paper discuss about the friction behavior of Al-12Si-xB<sub>4</sub>C composites prepared through powder metallurgy method by varying the weight percentage of reinforcement (x = 2, 4, 6, 8, and 10) content. The samples were prepared by using die and punch assembly and the lubricant used to eject the sample from the die was molybdenum disulfide. The compaction was done by using compression testing machine by applying a pressure of 800MPa. The dry sliding friction behavior of the sample was conducted on Pin-on-Disc machine and the experimental values of friction were calibrated. Taguchi design experiment was done by applying L25 orthogonal array for 3 factors at 5 levels for the response parameter coefficient of friction. Analysis of Variance demonstrated by Mean and S/N ratio table for coefficient of friction was discussed and from the table it can be seen that the reinforcement plays a main role, when the compared with load and sliding distance. The normal probability plot shows that the residuals falls near to the red line, it indicate that the error values were less in the model.

**Keywords:** Al-Si-B<sub>4</sub>C, ANOVA, P/M, Taguchi design, CoF.

## I. INTRODUCTION

Aluminium based composites is commonly utilized in manufacturing to variety appropriates variations to improve the tribological in addition to mechanical properties. Al based composites is strengthened to afford extra strength to metal [1]. The light weight metal Al alloy is strengthened by some of carbide or oxide materials. Among Al alloy is the best utilized matrix metal for the planning of light weight commercial products [2]. The CoF have been conceded out in this effort. Taguchi technique is utilized for optimization of factors and ANOVA is conceded out [4]. The friction

behaviour on Al based composites utilizing Taguchi technique with load, reinforcement, sliding distance as input and output as CoF. ANOVA demonstrates the significant factors for controlling the friction. This research work the friction behavior of Al-12Si-xB<sub>4</sub>C composites prepared through powder metallurgy method by varying the weight percentage of reinforcement (x = 2, 4, 6, 8, and 10) content. Taguchi design experiment was done by applying L25 orthogonal array for 3 factors at 5 levels for the response parameter coefficient of friction. Analysis of Variance demonstrated by Mean and S/N ratio table for coefficient of friction was discussed and from the table it can be seen that the reinforcement plays a main role, when the compared with load and sliding distance. The normal probability plot shows that the residuals falls near to the red line, it indicate that the error values were less in the model.

## II. EXPERIMENTAL PROCEDURE

The aluminium and silicon powder was purchased from metal powder company, Thirumagalum, Madurai, Tamilnadu, India. The particle sizes of the two powders were 40µm with purity 99.5%. The powders were mixed in high energy ball mill for 30min for homogenous mixing. The mixed powder were compacted in die and punch assembly with a pressure of 800MPa in compression testing machine. The samples with 10mm diameter and 30mm height were used for the dry sliding friction and wear on pin-on-disc machine.

## III. TAGUCHI DESIGN

The influence of input parameters on the friction parameters was deliberate utilizing the Taguchi's method. Next leading the trial test, it was obvious to select the levels of experiments. For the current circumstance, process parameters deliberated are reinforcement, load, and SD changing at 5 levels. Friction trials were showed in agreement to say trial plan and response was measured as specified in Table 1. The input parameters such as reinforcement (A), load (B) and SD (C) at 5 levels were deliberated for this current work. With the design plan of L25 orthogonal array, the trial levels were obvious and revealed in Table 2.

Table 1 trials and levels

Factors	Levels				
	1	2	3	4	5
wt.% B <sub>4</sub> C	2	4	6	8	10

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## Analysis of Sneak Path Issues in Memristor Based 4x4 And 8x8 Crossbar Nonvolatile Random Access Memory Array

Dr. V. Saminathan, Dr. V. Sampathkumar, Dr. P. Sridharan

 PDF

### Abstract

Numerous memory vendors are pursuing different categories of memory cells that can deal with more density, nonvolatility, extreme performance and long endurance. There are a number of on-going determinations to architect main memory systems with these novel NVRAMs that can contest with traditional DRAM and SRAM systems. Every NVRAM has individualities that entail novel micro architectures and procedures for memory access. Resistive memories have commonly been premeditated as substitutes for level two and secondary level caches because of their low leakage energies. In this paper, we examine a memristor-CMOS based nonvolatile random access 4x4 and 8x8 memory array and also investigate the sneak path problem. It can be evaluated by introducing three types of array structure such as grounded array, floating array and gated array structure. Furthermore, the sneak current, noise margin and power consumption of the proposed array structures related to these solutions can be evaluated during different memory operations.

Issue

[Vol. 63 No. 5 \(2020\)](#)

Section

Articles

## ARCHIVE

Title	PREDICTION OF PERFORMANCE EMISSION CHARACTERISTICS OF DI ENGINE WITH BIOFUEL USING ARTIFICIAL NEURAL NETWORKS
Paper ID	hSPzt
Keywords	ANN, Alternate Fuel, BTE, Radial Basis Function Network, Treated Bio gas.
	<a href="#">Read More...</a>
	<p>Energy is one of the most significant products to power the global economy as stated by the World Trade Organization (WTO). The world's population is expected to upsurge from 7.1 billion in 2013 to 9 billion in 2040, with the growth-focused in Africa, India, Southeast Asia, and the Middle East. The massive growth of world population, advanced technical developments, and a higher standard of living in the industrially developed nations has led to a complicated situation in the field of energy supply and demand. The Scenario of New Policies include platforms to backing non-conventional</p>

## Optimization on friction and wear behaviour of Al-Si alloy reinforced with B<sub>4</sub>C particles by Powder Metallurgy using Taguchi design

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**Abstract.** This research paper discusses the friction and wear behaviour of Al-12Si alloy reinforced with B<sub>4</sub>C prepared through Powder Metallurgy (P/M) method by varying the weight percentage of reinforcement ( $x = 2, 4, 6, 8, \text{ and } 10$ ) content. The samples were prepared by using die and punch assembly and the lubricant used to eject the sample from the die was molybdenum disulfide. The compaction was done by using a compression testing machine by applying a pressure of 800 MPa. The dry sliding friction and wear behaviour of the sample was conducted on a Pin-on-Disc machine and the experimental values of friction and wear were calibrated. The Taguchi design experiment was done by applying an L25 orthogonal array for 3 factors at 5 levels for the response parameter Coefficient of Friction (CoF) and wear loss. The SEM images show the shape, size and EDX confirm the existence of Al, Si, B<sub>4</sub>C particles in the composites. Analysis of Variance (ANOVA) for CoF of S/N ratio, shows that the reinforcement having 34.92% influence towards the S/N ratio of CoF, ANOVA for wear loss of S/N ratio shows that the sliding distance having 46.76% influence towards the S/N ratio of wear loss, when compared to that of the other two input parameters. The interaction line plot and the 2D surface plot for CoF and wear loss show that the increase in B<sub>4</sub>C content decreases the wear loss and CoF. The worn surface shows that the B<sub>4</sub>C addition will increase the wear resistance.

**Key words:** Al-Si, B<sub>4</sub>C, ANOVA, Taguchi design, CoF and wear loss.

### 1. INTRODUCTION

Aluminium based composites are commonly utilized in manufacturing to change variations in the improvement of the tribological in addition to mechanical properties. The Al based composites are strengthened to afford extra strength to metal [1–3]. The lightweight metal Al alloy is strengthened by some of the carbide or oxide materials. Among Al alloy is the best utilized matrix metal for the planning of light weight commercial products [4–5]. Optimization of process parameters analysed by performing the milling machining of hardened steel by varying each parameter for L16 orthogonal array and output Parameter as surface finish. The result shows that radial cutting depth and the interaction between the radial and axial depth of cut are the most relevant parameters [6–7]. The face milling operation on Al6061 material according to Taguchi Orthogonal Array (OA) and Artificial Neural Network (ANN) model for various combinations of control parameter, concluded that both the experimental approaches got almost the

same for surface roughness value [8–10]. The effect of cutting parameters on machine tool vibration and surface roughness was carried out in high precision CNC milling machines. Comparing the ANOVA results for full factorial and Taguchi design of experiments techniques it was found that Taguchi design of experiments is better and reliable to obtain optimal number of experiments [11–13]. Optimization of cutting process parameters increases the efficiency and improves the quality of the component [14]. The second order equation developed, and it has shown good correlation between the predicted and experimental values [15]. The Taguchi method has been successfully employed for optimizing the process parameter of milling of mild steel; it provides a systematic and efficient methodology for optimal milling parameters [16]. The CoF have been conceded out in this effort. Taguchi technique is utilized for optimization of factors and ANOVA is conceded out [17]. The friction behaviour on Al based composites utilizing Taguchi technique with load, reinforcement, sliding distance as input and output as CoF. ANOVA demonstrates the significant factors for controlling the friction.

In this research work, we discuss the Taguchi technique on dry sliding wear and friction behaviour of Al-12Si alloy reinforced with B<sub>4</sub>C particles prepared through P/M method by varying the weight percentage of reinforcement ( $x = 2, 4, 6, 8,$

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# EARLY DETECTION AND CLASSIFICATION OF BREAST TUMOR FROM MAMMOGRAM IMAGES

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**ABSTRACT** – A low dose X-ray technique of the breast known as mammography is popular due to its advantages over other imaging techniques. Even though only 2 percentage chance of being malignant radiologist usually recommend for a biopsy test. The unwanted biopsy test not only increase the anxiety among patient but also enhance the health care cost. The existing CAD system may misinterpret the suspicious lesion as false positive or false negative. To avoid such misinterpretation it is necessary to improve the existing CAD system such that it will accurately **predict** the suspicious lesion. This paper presents a novel approach which compares several hybrid image processing techniques to enhance the accuracy. Hybrid technique is defined as the technique which combine two or more techniques together. The accuracy of the proposed system is obtained as 95 percentages.

**Key words-** CAD; Mammogram; Median filter; Preprocessing; FCM; PSO; GLCM; Genetic Algorithm

## I. INTRODUCTION

Breast Tumor is considered as a main cause of mortality in women. According to national cancer institute,

9(2020-21)



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**[A tumour segmentation approach from FLAIR MRI brain images using SVM and genetic algorithm](#)**

by S.U. Aswathy; G. Glan Devadhas; S.S. Kumar

*International Journal of Biomedical Engineering and Technology (IJET), Vol. 33, No. 4, 2020*

**Abstract:** This paper puts forth a framework of a medical image analysis system for brain tumour segmentation. Image segmentation helps to segregate objects right from the background, thus proving to be a powerful tool in medical image processing. This paper presents an improved segmentation algorithm rooted in support vector machine and genetic algorithm. SVM is the basis technique used for segmentation and classification of medical images. The MRI database used consists of FLAIR images. The proposed system consists of two stages. The first stage performs preprocessing the MRI image, followed by block division. The second stage includes - feature extraction, feature selection and finally, the SVM-based training and testing. The feature extraction is done by first order histogram and co-occurrence matrix and GA using KNN is used to select subset features. The performance of the proposed system is evaluated in terms of specificity, sensitivity, accuracy, time elapsed and figure of merit.

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## RESEARCH ARTICLE

WILEY

# Detection and classification of breast cancer from digital mammograms using hybrid extreme learning machine classifier

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**Abstract**

Breast imaging technique called mammography has gained bigger attention among the researchers for the diagnosis of breast malignancy in the woman. Mammogram screening is the most effective procedure to visualize various potential problems in the breast. The two most common features connected with breast tumors are mass lesions and microcalcification. The collection of suitable image preprocessing, segmentation, feature extraction, selection and prediction algorithms play an essential role in the accurate detection and classification of cancer on mammograms. Classification techniques estimate unlabeled datasets class labeling depending on its similarity to the pattern learned. The Glowworm Swarm Optimization(GSO) algorithm is ideal for finding several solutions, and dissimilar or equivalent objective function values at the same time. This feature of GSO is useful for optimizing the feature set obtained from multiscale feature extraction procedures. Poor performance in generalization is the issue that arises due to the unconditioned output matrix

11(2020-21)

# Driver Exhaustion Detection Systems

6 Pages • Posted: 7 Apr 2020

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Vimal Jyothi Engineering College

Date Written: March 12, 2020

## **Abstract**

Driver exhaustion throughout travel square measure comic main causes for expressive pathway mishap. Accordingly, exhaustion correspondent transportation mishap possess a better dumps furthermore beginning additional harm toward effective climate in comparison among collision wherever farcical automobilist square measure measure vigilant. A system which will facilitate to extend observance of the motorist and build him alert from fatigue state by supply timely warning may facilitate to forestall several collision, as well as therefore emancipate coinage as well as scale back secluded misfortune. During this paper, various method to notice

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# Approaching Bus Driver Collapse Exposure Entity Situated upon Rumbustious Observable Inquiry as Concerns Eye Eventuality

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**Abstract:** Drivers exhaustion is one in ensemble effective ultimate considerable causation away from service collision, decidedly considering operator based on immense transport. Recommend a perceiving situated exhaustion exposure entity considering indigene monitoring, whatever endure straightforward including versatile considering organization trendy integrate including enormous automobile. Effective entity repose based on section containing head-shoulder exposure, face exposure, eye pair exposure, eye observance appraisal, indolence frequency percent based on eyelift desistance appraisal, mouth exposure, as a consequence exhaustion level apportionment. A study measure of Eye Closure's Percentage on effective continual surface of eye observance endure specify, and therefore the operator states are classified on that. In venture, complete evaluations moreover investigation connected with contemplated algorithms, similarly as measuring with ground truth on Eye Closure's Percentage computation endure achieve. Impressive experimental repercussion show effective benefits of the entity on accuracy along with stableness as long as expressive investigate latitude immediately upon a camera of an sloping observe angle to



# Kidney Transplantation System for Matching and Donor Recipient Verification using BlockChain

Abhinav C<sup>1</sup>, Arjun Govindan<sup>2</sup>, Ajay Joy<sup>3</sup>, Midhun Devasia<sup>4</sup>, Akhila Mathew<sup>5</sup>

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**Abstract:** *Kidney failure or end-stage renal disease (ESRD) is the last stage of chronic kidney disease. Kidney transplantation is the only one solution for this problem. Individuals suffering from kidney failure today face significant challenges in order to obtain a Donor. The use of Blockchain promises to provide an avenue of decentralized system for kidney transplantation. In kidney transplantation, time is a critical factor so by using the Kidney transplantation system with BlockChain can give a transparent and time effective Kidney match. Originally devised for the digital currency, Bitcoin, but there are other potential uses for the technology such as security and transparency. Hence we propose a system using Blockchain that can verify and validate which matches a potential donor and recipient. Our system is based on Blockchain that can match a recipient with a potential donor. Various parameters are evaluated and a suitable match for the recipient is found. The involvement of third parties will not be there in the transplantation procedure. The patient gets the kidney in a time effective manner. And we have more reliable and secure procedures for kidney matching. The willing donor can easily register in the system and make transparent transplantation.*

**Keywords:** *Kidney; Transplantation; BlockChain; Donor; Recipient; Doctor;*



## SCRIPT IDENTIFICATION: A REVIEW

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**Abstract:** In a multilingual, robust learning environment, identifying a script in the field is very important. Textual identification is an important task, especially in India, where there are 13 different texts for 22 languages. Text filtering, automatic translation, OCR (Optical Character Recognition) and text location identification are the main applications for script identification. In recent years, with the widespread use of the Internet and automated text processing around the world, scripting techniques have become increasingly important in the field of pattern recognition. Script Identification refers to techniques for distinguishing different texts into multilingual and graphic texts.

### I.INTRODUCTION

Every human core of the population has a collection of languages which belong to that country and are considered to be its inherent characteristic. The root of human languages has been the topic of intellectual discussion for many decades. Even after so much study, there was no agreement on definite origin. Similarly, no agreement was reached at the age of the human language. This problem is made more complex by the fact that there is a deficit in direct undeviating facts. As a result, researchers seeking to discover and investigate the origin and genesis of languages must draw inferences from other forms of data and information such as archaeological evidence, language learning hypotheses, fossil records, current linguistic diversity, and by similarities and analogies between the human communication system and the communication systems used by animals. For communication of messages in a language, a writing method is popularly defined as a systematic, structured, and routine process for storing and transmitting text. This is achieved by using a series of symbols widely referred to

as characters, for visual encoding (writing) and decoding (reading). Collectively, the list of these characters is referred to a script. Collections of these characters typically contain numbers and letters. The attributes of writing systems can be broadly categorized into:

1. Alphabets: includes a standard set of letters consisting of vowels and consonants which encode, on the basis of the general law, that the letters reflect simple, significant sounds which are the phonemes of the spoken language.
2. Syllabaries: Generally, the syllabaries here correlate a syllable to a sign (these are usually a pair or group of phonemes and these are used as units for building words).
3. Logography: Here the character represents each unit of sentences, phrase or morpheme. They can be in groups or two groups of characters.

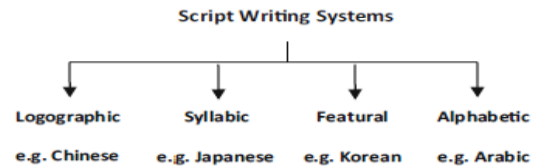


Fig. 1 Common script writing systems

Script Identification is intended to predict the script of a given text, which has a very important role in multilingual programming. Under several areas, it is necessary to determine which language model should be used for further identification or textual recognition. Pre-paper work, handwriting and video overlay, in which texts have a clear layout and clear context, have achieved great efficiency. But in the case of identifying Scene Text Script, which extends the application to many fields such as image Comprehension, other problems arise, such as complex content, different text types and different sounds, and so on. Our work focuses



## IDENTIFICATION OF PLANT DISEASE: A REVIEW

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**Abstract—** Agriculture has become something quite just a way of feeding ever-increasing populations. It's necessary to believe agriculture wherever there's a further 70th population of an Asian country. meaning it feeds an honest sort of people. Less crop quality thanks to disease is taken into account to be the foremost necessary. By the identification of disease we can avoid loss of production. Disease detection is that the step of inputting a picture preprocessing, segmenting, feature extracting and classify the images. The images of the leaves are given to identify plant diseases. It's also useful to classify illnesses of plants for farmers.

### I. INTRODUCTION

In the world, invariably been within the field of agriculture. The number of damaged plants is increased very fast. If the leaf of the plant is plagued by the unwellness, it'll cause a decline in crop production. If the detection and classification of leaf disease as early as possible is vital for farmers. Leaves of the plant are accustomed acknowledge and classify the leaf disease by early detection victimisation the image process system. Some diseases that have the potential to have an effect on plants will cause overwhelming money, social and ecological losses. Digital image process early detection of unwellness is extremely vital in accuracy.

This will facilitate farmers assess and create early choices concerning the kind of unwellness. This analysis addresses many varieties of image process techniques for the identification of diseases within the plant. Unit one provides associate degree introduction to the identification of plant disease. Unit 2 describes

the process steps of pictures followed by Unit 3, a literature survey is given. In fourth section, table offers fast details on the strategies and techniques of varied articles by each writers and ends with section five, paper offers conclusions.

In the field of agriculture, watching the well-being and illness of crops is very imperative for the roaring production of crops within the cultivation sector. This wants glorious time interval and employment package. The image handling technique are often used at the location of leaf disease. within the field of agriculture, watching the well-being and illness of crops is very imperative for the roaring production of crops within the cultivation sector. This wants glorious time interval and employment package. The image handling technique are often used at the location of leaf disease. image preprocessing will update the standard of the image. Image process analytics will manufacture fantastic results. It integrates shift of color area, improvement of pictures, and segmentation of pictures. The infection facet effects on the leaves, stem, and fruits will largely be seen. associate sign of infection could seem on the leaf of the plant. Image process is that the improvement of the image that an image manages to form some uses. After taking a picture involves sharp a picture from the center, light edges, differentiating image progression, or brightening a picture, evacuating noise. The preparation of the image has the potential to tell apart a number of varieties of leaf diseases, like to detect the sides of the unhealthy leaf and stem (ii) to search out the shape of the diseased space (iii) to make a decision the colour of the diseased space (iv) to differentiate the image parts (v) to section the picture.





# Machine Learning and Internet of Things based Fruit Quality Monitoring System: A Proof of Concept Implementation and Analysis

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**Abstract:** Food safety is imperative to avoid food borne diseases and to ensure the public health. Monitoring of perishable food products and early detection of degradation will avoid loss due to food wastage and ensures the freshness of food. In this scenario, remote monitoring of fruits during transportation from field to shelf can ensure the quality of fruit. Recent technological advancements like Internet of Things and Machine Learning (ML) has significant methodologies which can improve the fruit quality monitoring process's cost and time efficiency. This paper describes the concepts, architecture, proof of concept implementation and results analysis of such a Fruit Quality Monitoring System (FQMS).

**Keywords:** Fruit quality, Bioinformatics, Internet of Things, Machine Learning, Deep Learning

## I. INTRODUCTION

Food is the main energy source for the living being, intrinsically food quality and safety has been within the highest demand throughout the human history. The standard of food must be monitored, and it must be prevented from rotting and decaying because of atmospheric factors like temperature, humidity, and darkness. Therefore, it is necessary to put quality monitoring devices at food

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## Automatic Form Filler

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**Abstract:** *In the present world, the elderly and illiterate people find it difficult to fill a deposit or withdrawal form in a bank. They often require the help of literate people to fill the form. To solve this problem, we introduce an automatic for filler that would take the customer speech in Malayalam as input and produces the required form. The system is implemented using python modules that involves text-to-speech conversion, language translation, speech-to-text conversion, pdf generation, etc. The system uses googletrans module for translating Malayalam to English and vice-versa. It also uses gTTS module for text-to-speech conversion. The system uses speech-recognition module for converting speech to text format and reportlab module for producing the required form in PDF format. The input speech is converted to text using Speech-recognition module and the generated text is then used for language translation by googletrans module. The questions to be asked is converted from text to speech gTTS module. The system takes both account number and amount from the customer and generate the form with correct entries in PDF format. The generated form is sent to the counter for further processes.*

**Keyword:** *Speech recognition, Speech-to-Text, Text-to-Speech, Translation, Malayalam.*



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## Weight optimized neural network for heart disease prediction using hybrid lion plus particle swarm algorithm

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### ARTICLE INFO

#### Keywords:

Heart disease  
Feature extraction  
Neural network  
PSO merged LA update

### ABSTRACT

Heart disease remains one of the significant causes of mortality and morbidity amongst the world's population. Predicting heart disease is considered as one of the vital issues in clinical data analysis. Since the number of data is rising gradually, it is much complicated for analyzing and processing, and especially, it becomes difficult to maintain the e-healthcare data. Moreover, the prediction model under machine learning seems to be essential facet in this research area. In this scenario, this paper aims to propose a new heart disease prediction model with the inclusion of specific processes like Feature Extraction, Record, Attribute minimization, and Classification. Initially, both statistical and higher-order statistical features are extracted under feature extraction. Subsequently, the record and attribute minimization carried out, where Component Analysis PCA plays its major role in solving the "curse of dimensionality." Finally, the prediction process takes place by the Neural Network (NN) model that intake the dimensionally reduced features. Moreover, the major intention of this paper deals with the accurate prediction. Hence, it is planned to influence the utility of meta-heuristic algorithms for the weight optimization of NN. This paper introduces a new hybrid algorithm termed Particle Swarm Optimization (PSO) merged LA update (PM-LU) algorithm that solves the above-mentioned optimization crisis, which hybrids the concept of Lion Algorithm (LA) and PSO algorithm. Finally, the efficiency of proposed work is compared over other conventional approaches and its superiority is proven with respect to certain performance measures. From the analysis, the presented PM-LU-NN scheme with regards to accuracy is 3.85%, 12.5%, 12.5%, 3.85%, and 7.41% better than LM-NN, WOA-NN, FF-NN, PSO-NN and LA-NN algorithms.

### 1. Introduction

Disease prediction systems have been playing a significant role in the life of people, and it has been considered as an important topic, as a prediction of the diseases is essential for people to lead a well-settled life [1–3]. Disease prediction [4–6] thus remains much important for health care groups for arranging better medical care for patients. The recent development of data mining techniques has caused numerous disease

LR, NN approaches, and it also deploys more clustering techniques [14,15,40,44] for effective prediction.

Heart failure, also known as congestive heart malfunction, it happens when the heart could not be able to pump sufficient blood to meet with the needs of the body [16]. The threat factors for heart disease comprises heart attack, high blood pressure, obesity, a smoking, alcohol addict, vitamin deficit, heavy metal toxicity, sleep apnea, being inactive, and an improper diet (together with salt and animal fats) [17,18,47]. Therefore, the medical specialists recognize the damages that had occurred in a patient's heart and test out how well the blood is pumped in the heart of

## ***Bitcoin: An Overview of the Innovative Decentralised Digital Currency***

***Namitha P<sup>1</sup>, Keerthijith P<sup>2</sup>***

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### ***Abstract***

*The Internet has become so popular that most of the activities like communication, exchange of messages and commercial and non-commercial*

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Digital Object Identifier 10.1109/ACCESS.2020.3025309

# Frame-Angle Controlled Wavelet Modulated Inverter and Self-Recurrent Wavelet Neural Network-Based Maximum Power Point Tracking for Wind Energy Conversion System

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**ABSTRACT** In this work, a new control methodology is proposed for Type -IV wind energy conversion system (WECS) using a self-recurrent wavelet neural network (SRWNN) control with a Vienna rectifier as the machine side converter (MSC). A SRWNN combines excellent dynamic properties of recurrent neural networks and the fast convergence speed of wavelet neural network. Hidden neurons of SRWNN contains local self-feedback loops, which provide the memory feature and the necessary information of past values of the signals, allowing it to track maximum power from WECS under varying wind speeds. The Vienna rectifier allows unity power factor operation to increase electrical efficiency. Frame angle-controlled wavelet modulation is proposed for the grid side converter (GSC). Wavelet modulated inverter produces output voltage fundamental components with higher magnitudes than those obtained from the pulse width modulated inverters. The non-linear load compensation and power quality enhancement are achieved by



# MODELING AND CONFIGURATIONS OF AN ELECTRIC VEHICLE

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## ABSTRACT

*The vehicle modelling and configurations of an EV power-train is analyzed here. Electric Vehicle means, the propulsion power is solely produced by electrical means. Electric Vehicle are enjoying more widespread customer acceptance as personal vehicle because of their performance and economy in running cost. All electric vehicles use a battery pack to store electrical energy that powers the motor. Electric Vehicles are also known as battery electric vehicle. The charging of the battery of an EV can be done by plugging it. Since there is no tail pipe emission, EV's are considered as the zero emissions vehicles. The modeling of a vehicle and various configurations of EV based on the power train and power source is presented here.*

**Key words:** EV-Electric Vehicle, HEV-Hybrid Electric Vehicle, BLDC-Brushless DC, LMV-Light Motor Vehicle, FG- Fixed Gear, D- Differentials, EM – Electrical

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# A Bibliometric Review of Stock Market Prediction: Perspective of Emerging Markets

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**Abstract** – The objective of the paper is to identify predictive models in stock market prediction focusing on a scenario of the emerging markets. An exploratory analysis and conceptual modelling based on the extant literature during 1933 to 2020 have been used in the study. The databases of Web of Science, Scopus, and JSTOR ensure the reliability of the literature. Bibliometrics and scientometric techniques have been applied to the retrieved articles to create a conceptual framework by mapping interlinks and limitations in past studies. Focus of research is hybrid models that integrate big data, social media, and real-time streaming data. Key finding is that actual phenomena affecting stock market sectors are diverse and, hence, limited in generalization. The future research must focus on models empirically validated within the emerging markets. Such an approach will offer an insight to analysts and researchers, policymakers or regulators.

**Keywords** – Bibliometrics, emerging markets, stock market prediction, systematic review.

## I. INTRODUCTION

Research in the field of stock market goes back to the early 1930s. Apart from concrete theories, most studies have contributed to merging and sub-diverging of academic disciplines and varied findings. The earliest real stock market recorded in human history was Amsterdam stock exchange in 1602. Securities or shares/stocks that are comprised of different companies or firms can be grouped and tracked under a common notion called a stock index. Before the turn of the 21st century, this very definition has paved the way to different notions with the rise of electronic financial markets [1]. It is human psychology that investors and other stakeholders in this market wish to get profit regardless of actual economics involved in the transaction environment. From the perspective of academic disciplines of Statistics and Finance, researchers started looking into how the stock market behaves or prices can be predicted [2]. Three key theories have been developed from the earliest studies: random walk hypothesis (RWH), efficient market hypothesis (EMH), and noisy market hypothesis. In the current study, some major contributions are as follows.

1. The research growth of stock market prediction models documented from 1933 to 2020 are extracted from Web of Science and Scopus.

2. The authors analyse the major factors, such as most productive and influential researchers, highly cited journals.
3. Detailed synthesis of top papers on the basis of the total citations received till date from both databases.
4. The visualization of the highly influential works and inter-referencing in this field are displayed using citation data.
5. In addition to bibliometric methods, theoretical implications are discussed from the influential papers on the practice of emerging markets to provide the areas for future studies.

Bibliometrics or scientometric analysis is the research field to analyse current trends in the literature of a specific research field and delivers procedures and impetuses for future research. Earlier, [3] have provided precise explanation of a bibliometric study. Similarly, one study by [4] has given the motivation to work in this area. Rest of the paper is organised as follows. Section 2 provides a review of literature. Section 3 introduces the research methodology. The framework is proposed in Section 4. Finally, conclusions are drawn in Section 5.

## II. LITERATURE REVIEW

In the current study, two research questions are addressed. Research Question 1: Which are major predictive models for stock market prediction in emerging markets? This leads to the investigative question IQ1: Why is there a dearth of research in stock market forecasting models focused on sector/industrial categories in emerging markets? Research Question 2: What are emerging research themes of stock index forecasting in this scenario? The investigative question is IQ2: How can different theoretical frameworks of prediction models be validated in the Indian context?

In effort to answer these questions, a systematic but not exhaustive review is first carried out. Only scientific manuscripts are considered in the literature review. Any tertiary sources or industry reports etc. are not considered. Then Indian context works are compared on the basis of methodological variations, findings and contributions towards an overall research theme, and field of interest. Beginning with the theoretical perspectives, a random walk hypothesis (RWH) proposes that changes in stock prices have the same distribution

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## Comparison Method of PSO and DE Optimization for MPPT in PV Systems under Partial Shading Conditions

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**Abstract** – Solar power is the conversion of energy from sunlight into electricity by using photovoltaic cell. The output power of the PV array decreases due to partial shading conditions such as clouds, trees, buildings, etc. There are a variety of traditional methods are available for tracking maximum power point. But these all techniques perform well only in uniform irradiation conditions, however during partial shaded conditions; these are not capable to search the global maximum power point. Therefore, there is a proper optimization technique is essential for maximum power point tracking in PV system under partial shading condition. In this paper we will evaluate the performance of PSO and DE algorithms for maximum power point tracking in partially shaded condition with a PV panel connected to load via CUK converter is verified on MATLAB/Simulink environment. The simulation results shows that the two techniques defeat the partial shading problems extremely well with a maximum output power and the DE method has advantages compare to PSO method. From this comparison it is observed that faster convergence is achieved in DE algorithm when compared to PSO algorithm.

**Keywords** – differential evolution algorithm, maximum power point tracking, partial shading condition, particle swarm optimization, photovoltaic.

### 1. INTRODUCTION

The need for non-conventional and clean sources of energy is increasing throughout the world. With increasing popularity of solar systems, there is always an eminent need in making an efficient the PV system. The efficiency of the energy conversion in the solar energy system will be high only at certain voltage and current conditions at which the power will be maximum. Hence the operating point is called maximum power point. It is found non-linear for power-voltage curve of a PV panel and thereby it also depends sunlight irradiance and temperature of the atmosphere. The variation in voltage and power due to temperature is less significant when compared to sunlight irradiance [1]. Since the sunlight irradiance is not constant throughout the day, the power output of a PV panel will also not constant. Besides, the MPP will also shift with change in sunlight irradiance and atmospheric temperature [2]. MPPT technique is to be used for achieve maximum power under different temperature and irradiance [3].

Another major problem associated with solar power generation is handling partial shading condition (PSC) due to passing clouds. During partial shading conditions the sunlight irradiance will not be uniform over the entire panel [4]. In a photovoltaic system, for obtaining a required power rating the PV panels are arranged in series and parallel connections. Under partial shading condition, the PV panels are subjected to

non-uniform irradiance and in this situation the power-voltage characteristics exhibits multiple power peaks. The maximum of this power peak is called global power peak (GPP). The power output of a PV system under partial shading condition will be a maximum only when it is operated at GPP has been presented in [5]. Therefore, under partial shading condition the operating point should be maintained at GPP in order to take out maximum amount of power from partially shaded PV system [6]. In order to solve the stated problems is not practical; since they create the case of LMPP, hence partial shading algorithm is stated. Hence we use artificial intelligence method instead of traditional methods like perturb and observe, incremental conductance method *etc*. Thus from this work, we have simulated of PSO and DE (differential evolution) to determine the DC-DC converter switching process specially CUK converter [7].

### 2. PROPOSED SYSTEM

The block diagram of the partially shaded PV system selected for analysis of particle swarm optimization (PSO) technique is shown in Figure 1. The proposed PV system consists of four PV panels in series under shading condition, CUK boost converter, MPPT controller and load. In this project PSO and DE technique is used to determine the best PWM duty for the CUK converter to track MPP under PSC [8]. The PSO and DE algorithms are simulated using MATLAB / SIMULINK and the obtained results are presented in next section partially shaded condition (PSC) PV panel connected to load via CUK converter. PSO and DE algorithm is utilized to decide the optimum PWM duty for CUK boost converter to accomplish most extreme power from the PV panel under PSC. Searching the best

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# A Unified Tensor Framework for Clustering and Simultaneous Reconstruction of Incomplete Imaging Data

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Incomplete observations in the data are always troublesome to data clustering algorithms. In fact, most of the well-received techniques are not designed to encounter such imperative scenarios. Hence, clustering of images under incomplete samples is an inquisitive yet unaddressed area of research. Therefore, the aim of this article is to design a single-stage optimization procedure for clustering as well as simultaneous reconstruction of images without breaking the intrinsic spatial structure. The method employs the self-expressiveness property of submodules, and images are stacked as the lateral slices of a three-dimensional tensor. The proposed optimization method is designed to extract a sparse  $t$ -linear combination tensor with low multirank constraint, consisting of a unique set of linear coefficients in the form of mode-3 fibers and the spectral clustering is performed on these fibers. Simultaneously, the recovery of lost samples is accomplished by twisting the entire lateral slices of the data tensor and applying a low-rank approximation on each slice. The prominence of the proposed method lies in the simultaneous execution of data clustering and reconstruction of incomplete observations in a single step. Experimental results reveal the excellence of the proposed method over state-of-the-art clustering algorithms in the context of incomplete imaging data.

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CCS Concepts: • Computing methodologies → Optimization algorithms; Unsupervised learning; Cluster analysis; Reconstruction;

Additional Key Words and Phrases: Image clustering, subspace clustering, union of free submodules, low-rank approximation, image completion

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## 1 INTRODUCTION

In recent decades, there have been a massive volume of high-dimensional data generated from multiple sources all around the world. This high-dimensional data have actually originated from a wide variety sources such as images or videos from millions of cameras, surveillance systems, satellites,

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# A Two-Way Optimization Framework for Clustering of Images using Weighted Tensor Nuclear Norm Approximation

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**Abstract**—Clustering of multidimensional data has found applications in different fields. Among the existing methods, spectral clustering techniques have gained great attention due to its superior performance and low computational complexity. The clustering accuracy in spectral clustering methods depends on the affinity matrix learned from the data. Traditional clustering techniques fail to capture the spatial aspects of the images since they vectorize the images. In the proposed approach, the images are stacked as lateral slices of a three-way tensor. Further, a two-way optimization problem is formulated to extract a sparse t-linear combination tensor. Weighted Tensor Nuclear Norm (WTNN) is introduced in the optimization problem for enhancing tensor sparsity, and thereby improving the clustering accuracy. The performance of the proposed method is evaluated on three popular datasets. The evaluation shows that the proposed method has superior performance over the state-of-the-art methods.

**Index Terms**—Image Clustering, Low Rank Approximation, Subspace Clustering, Spectral Clustering

## I. INTRODUCTION

Aggregation of unorganised data has enormous applications in different domains such as engineering, medical science, market research and many more [1], [5]. Classification and clustering are the methods to characterize any object into groups. The term classification is used in the context of unsupervised learning technique where the class labels are already available [1]- [2]. The term clustering is used in the context of unsupervised learning where unlabelled datapoints are grouped based on the inherent similarity [1].

Clustering has attained remarkable attention in recent years due to massive data generation and to date, several clustering techniques has been proposed in various fields [7]. Clustering techniques can be broadly classified as Hierarchical Clustering, Partitioning Clustering, Mixture Resolve Clustering and Fuzzy Clustering techniques [2]. The main objective of a clustering problem is to obtain high accurate clustering with minimum execution time. All the conventional techniques mentioned above do not give satisfactory results when dealing with high dimensional data due to the curse of dimensionality [3]. As the number of dimension increases, the data becomes more sparse and the performance can be affected by the noise [7]. Hence, all the techniques need dimensionality reduction beforehand. But, most of the times dimensionality reduction techniques fail to give satisfactory results for high dimensional data [8]- [9]. Hence, subspace clustering is adopted for high dimensional data [5].

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Even if the data is high dimensional, they can be well represented in low dimensional space [6]. In practical scenario, the high dimensional data will be lying in multiple subspaces. The goal of subspace clustering is to find these subspaces and segment the data according to the dissimilarity between the subspaces [3]. Subspace clustering techniques are generally divided into algebraic methods, matrix factorization methods, statistical methods and spectral clustering methods [5].

Algebraic methods perform better on intrinsic data, but are sensitive to noise and outliers [11]. Statistical methods assumes that the datapoints are fetched from a Gaussian distribution and the clustering problem is equivalent to find out the suitable parameters of the probability distribution model. However, these methods need the prior information about the number of subspaces.

Spectral clustering methods achieve the segmentation by spectral decomposition of the affinity matrix learned from the data. Spectral clustering is the most popular one in the literature since it is easy to implement and can outperform many of the existing traditional methods [12]. Different spectral clustering algorithms are available based on the type of affinity matrices learned. Andrew *et al.* proposed another method using Laplacian matrix with additional row normalization [13]. Elhamifar *et al.* proposed Sparse Subspace Clustering (SSC) [14] where each data point is expressed as a linear combination of other data points. This is called self expressiveness property. The SSC algorithm tries to obtain the sparsest solution which corresponds to find out the points belonging to the same subspace. The SSC is more robust to noise compared to the previously mentioned methods [14]. But, the method is proved more appropriate for disjoint and independent subspaces [5]. Liu *et al.* [15] proposed a method similar to SSC except that instead of sparsest solution, it aims to find out the low rank representation. However, this method works well only for noiseless data samples drawn from independent subspaces.

All the aforementioned methods vectorize each image prior to the clustering. Hence, these methods do not take the spatial aspects of the image into consideration. To overcome this issue, instead of vectorizing the imaging data, another method was proposed which conserves its matrix structure and this approach is called Union of Free Submodule (UoFS) model [16]. Using this concept and extending the idea of self expressiveness property in SSC algorithm, Kernfeld *et al.* proposed



# Automated breast cancer detection using hybrid extreme learning machine classifier

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## Abstract

Breast cancer has been identified as one of the major diseases that have led to the death of women in recent decades. Mammograms are extensively used by physicians to diagnose breast cancer. The selection of appropriate image enhancement, segmentation, feature extraction, feature selection and prediction algorithm plays an essential role in precise cancer diagnosis on mammograms and remains as a major task in the research field. Classification methods predict the class label for unlabeled dataset based on its proximity to the learnt pattern. The selected features obtained after feature selection are classified using an extreme learning machines (ELM) to three classes with the classes being normal, benign and malignant. Low generalisation performance is the problem which happens due to the ill-conditioned output matrix of the hidden layer of the classifier. The optimisation algorithms would resolve these issues because of their global searching ability. This paper proposes ELM with Fruitfly Optimisation Algorithm (ELM-FOA) to tune the input weight to obtain optimum output at the ELM's hidden node to obtain the solution analytically. The testing sensitivity and precision of ELM-FOA are 97.5% and 100% respectively. The developed method can detect the calcifications and tumours with 99.04% accuracy. The optimal selection of preprocessing and segmentation algorithms, features from multiple feature filters and the efficient classifier algorithm meliorate the performance of the approach.

**Keywords** Mammogram · Classification · ELM · Fruit fly · Optimization · Accuracy · CAD

## 1 Introduction

Over the last few years, signal and image processing algorithms hold key position in the field of research. These algorithms have been used to analyze various images which are useful in the field of remote sensing, medicine, aerospace, control system etc. (Tavakoli et al. 2019). In the area of medical imaging, breast imaging technique called mammography has gained bigger attention among the researchers for the diagnosis of breast malignancy in woman. Mammography is popular as it utilises low energy X-rays to imaging the breast of women (Bray et al. 2018; Melekoodappattu and

Subbian 2019). It is safe and painless procedure to diagnose the breast. Mammography is used for the early identification of breast malignancy, commonly through the identification of masses and small scale calcifications (Akselrod-Ballin et al. 2019).

In the image processing application, enhancement of the image is vital to procure the features and make classification steps easier (Sankar and Melekoodappattu, 2019; Adam Kelder et al. 2018). Hence, perfect pre-processing approaches are an essential requirement in biomedical image processing application. To attain high performance, a suitable denoising filter is absolutely necessary (Ahmed et al. 2020). The abnormal areas in the mammogram images can be obtained by proper segmentation approaches (Melekoodappattu and Subbian 2019). Feature extraction is the very next stage after preprocessing and area of interest extraction which is trailed by feature selection. Features are selected based on some predetermined criteria (Eltroukhy et al. 2018). Once feature selection is completed, these features are subjected to the classification process. A hybrid classification system has been designed to enhance classification

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## **RESEARCH PAPER PUBLICATIONS IN 2021-22**

**Number of research papers published per teacher in the Journals notified on UGC care list during the year 2021-22**

<b>S.No</b>	<b>Title of paper</b>
1	Maximum Power Tracking and Power Sharing in Grid Connected WECS Using Modified PFC Rectifier and PR Controlled Inverter
2	ZrC-Impregnated Titanium-Based Coating as an Effective Lubricating Barrier for Artificial Hip Prosthesis
3	Early detection of breast malignancy using wavelet features and optimized classifier
4	Malignancy detection on mammograms by integrating modified convolutional neural network classifier and texture features
5	Automated Papaya Farm Monitoring system using Unmanned Aerial Vehicle (UAV)
6	Deep learning based robust medical image watermarking exploiting DCT & Harris hawks optimization
7	Computational system for medical image authentication using watermarking
8	Prediction of fatigue crack initiation life in SA312 type 304LN austenitic stainless steel straight pipe with nodes
9	Influence of AZ91 Alloy Reinforced with Nano B4C particles on Microstructural Characterization, Mechanical and Tribological Properties prepared Through Powder Metallurgy
10	Performance Characterization of a Solar Cavity Collector Using Artificial Neural Network
11	Sports Utility Vehicle Prediction based on Machine Learning Approach
12	Flexural Behaviour of RC Beams with a Circular Opening at the Flexural Zone and Shear Zone Strengthened Using Steel Plates
13	Investigation on mechanical properties for PolyJet-printed parts involving material reduction strategy
14	Preliminary prototype and analysis of a customized handle for winding machine using fused filament fabrication

**Prof. Dr. Benny Joseph**

**(PRINCIPAL)**

# Maximum Power Tracking and Power Sharing in Grid Connected WECS Using Modified PFC Rectifier and PR Controlled Inverter

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  5. Proportional Resonant Controlled GSC for WECS
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**Abstract**—This article presents an improved maximum power tracking and power sharing technique by using a self-recurrent wavelet neural network (SRWNN) controller. A power factor correction (PFC) rectifier as machine-side converter and proportional resonant (PR) controlled three-phase inverter as grid-side converter for wind energy conversion system (WECS) is presented. The modified PFC rectifier ensures the machine to work at maximum power coefficient, by using a sensor less SRWNN controller. Hence, it extracts maximum power at various wind speeds and provides unity power factor operation at generator side so as to increase the efficiency. The PR controlled inverter ensures proper real and reactive power sharing with the grid, which also acts as a distribution static compensator (DSTATCOM), by casting off harmonics at the grid side for nonlinear loads. The wind turbine, generator, converter and controller are modeled in MATLAB/Simulink platform and performance is analyzed for maximum power tracking and power sharing for a 40kVA, 400 V WECS. An extensive analysis of the proposed system is carried out in a developed experimental setup and the results validate the theoretical claims.

## 1. INTRODUCTION

Existing power generation schemes are creating a high amount of environmental issues and are facing problems due to insufficient fossil fuels, which is to be replaced with robust, sustainable, and environmentally friendly power generating schemes, utilizing renewable energy resources. The variable-speed wind energy conversion systems



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R. Mercy Russelin Prabha,<sup>6</sup> J. Aldrin Raj,<sup>7</sup> and R. B. Jeen Robert<sup>8</sup>

## ZrC-Impregnated Titanium-Based Coating as an Effective Lubricating Barrier for Artificial Hip Prosthesis

### Reference

R. Malkiya Rasalin Prince, N. Selvakumar, D. Arulkirubakaran, S. Christopher Ezhil Singh, M. Chrispin Das, P. K. Bannaravuri, R. Mercy Russelin Prabha, J. Aldrin Raj, and R. B. Jeen Robert, "ZrC-Impregnated Titanium-Based Coating as an Effective Lubricating Barrier for Artificial Hip Prosthesis," *Materials Performance and Characterization* 10, no. 1 (2021): 1-17. <https://doi.org/10.1520/MPC20200075>

### ABSTRACT

The important properties of implant materials are extended component life, wear resistance, and biocompatibility. The wear characteristics depend, for implant materials, on the nature of the implant, movement of joints, and usage of the part. Hard ceramic Ti-6Al-4V-2ZrC (Titanium (Ti), Aluminium (Al), Vanadium (V), Zirconium Carbide (ZrC)) was coated over stainless steel (SS) 316L for analyzing the wear and mechanical properties against E-52100 steel balls sliding for artificial hip joints. The coating crystallography was examined by X-ray diffraction analysis and the topography was inspected by an Atomic Force Microscope (AFM). The coating thickness has been measured as 5–6  $\mu\text{m}$  using a scanning electron microscope (SEM), and the smooth surface roughness of 0.03  $\mu\text{m}$  was measured using AFM. The Ti-6Al-4V-2ZrC coated surface nano-hardness has been enhanced three times higher than uncoated. The ball-on-disk wear was investigated with a load of 2–3 N, sliding distance 110 m, and sliding velocity 0.25–0.95 m/s. The investigated wear rates are mostly higher than  $10^{-5} \text{ mm}^3/\text{Nm}$ , and the frictional coefficient reduces from 0.8 to 0.35. The morphology of worn surfaces was analyzed using SEM. Based on the improvement in nano-hardness, it is concluded that the Ti-6Al-4V-2ZrC coated SS 316L is a good replacement for an artificial hip joint because of its better wear resistance and coefficient of friction.

### Keywords

Ti-6Al-4V-2ZrC films, artificial hip joint, wear and coefficient of friction (CoF), adhesion, nanoindentation




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# Early detection of breast malignancy using wavelet features and optimized classifier

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## Abstract

Breast cancer considered to be a significant health issue among women. Early detection will ensure the treatment is easier and more successful. Recently, numerous methodologies have developed using medical imaging to investigate breast cancer. This research seeks to build a computer-aided diagnostic (CAD) system to interpret mammograms. The first stage of CAD includes preprocessing, Fuzzy c means based segmentation applied to a localized area. In the second stage of the CAD method, the extraction of the feature is carried out using three distinct wavelet families with decomposition level at 4 and 6. The ANN, SVM, and ELM classifiers are used in the final stage to enable accurate classification. This article proposes ELM with the Grasshopper Optimization Algorithm (ELM-GOA) to adjust the weight between the input and hidden layer to obtain maximum performance at the middle layer. This method adopts mammogram enhancement, optimum image segmentation, wavelet-based feature extraction, and grasshopper optimization algorithm based ELM to ameliorating the accuracy and reducing the computational cost. The result shows that ELM-GOA has precision and sensitivity of 100% and 98% respectively. The CAD system can identify tumors with 99.33 % accuracy.

**RESEARCH ARTICLE**

# Malignancy detection on mammograms by integrating modified convolutional neural network classifier and texture features

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**Abstract**

Breast cancer is detected by identifying malignancy on breast tissue. Emerging technologies in medical image processing are used to interpret histopathology images. For analyzing medical imaging and pathological data, modified deep neural networks are being used. Automatic detection of malignancy is usually achieved in deep learning by capturing features from a convolutional neural network (CNN) and then categorizing them using a fully connected network. A framework to automatically diagnose malignancy using an ensemble approach, including CNN and extraction of image texture features, is implemented in this research. In the CNN phase, the nine-layer modified CNN is used to classify images. Texture features are derived and their dimension is minimized using maximum variance unfolding to enhance the efficiency of classification in the extraction-based phase. The results of each phase were then merged to obtain the final decision. The testing specificity and accuracy of our ensemble method on MIAS repository are 98.9% and 99%, respectively.



## Automated Papaya Farm Monitoring system using Unmanned Aerial Vehicle (UAV)

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**ABSTRACT** Papaya Farm monitoring plays a key role in taking the required early-stage steps to increase the efficiency of harvesting. Using Unmanned aerial vehicles (UAVs) we can increase the efficiency of fanning and get maximum yield. Improving performance Unmanned aerial vehicles (UAVs) offer a quick and reliable means of collecting data from difficult to reach large farms. Awareness of the latest usability and technologies used in UAVs and the techniques of programming used to process images taken from UAVs. The approaches used to evaluate the stage of development with available algorithms. To plants, local binary patterns, distance transformation, and watershed segmentation methods are applied to pictures. Using YOLOv4 architecture trine the system to program to detect the plats and find the deficiency in it. this will help to monitor the large farm very easy. Papaya is one of the plants that have the we can find the deficiency of the tree by using monitoring the arial leaf images. at proper care of the plant yielding is can be improved. here with the help of ML (machine learning) the program can be done. using python, we are going to trine the system and gest the result from the program. making the use of available algorithms to modify the performance the get the best result up to loss parentage of 3. The available free were coding yolo is used to performing the task. Here we are using the lasted vision of YOLOv4. that improve the accuracy up to 97%. the increasing the iterations making the result best, here we use 3600 iterations for this project.

### 1 INTRODUCTION

As technology is rapidly increasing, the equipment available is also progressing. We should gain the economical way to apply the available theologies to gain full output in order to increase

agriculture yielding and to improve with large scale to accomplish this. Able to monitor the sector consistently is the biggest concern of agriculture. As a first step, we can obtain the result by using UAV to gain efficiency. To increase performance, understand the present theology The control of development is limited. In order to achieve a high yield, large farms need continuous observation beginning from the early days of planting until harvesting times. The growth of planted trees has been impaired by insect pests, water drains and wild animals. If such issues are observed in the first stages of planting plants, they can be resolved, like stopping the final yield from decreasing. Early estimations with continuous control of the final yield. In particular, taking into account the scale and geography of the plantation farms, routine monitoring activities are difficult. Equipped with cameras and sensors, unmanned aerial vehicles (UAVs) offer a more effective solution to manual inspection of broad field plantations. Using aerial photos taken from UAV to suggest techniques for counting plants. Using photogrammetric point clouds generated from UAV images, several applications are demonstrated to recognise or characterise trees in 3D The research focuses on automatic picture analysis from a UAV flying over large plantation regions. The device effectively blends cutting-edge UAV, GIS, stereophotogrammetry, and image processing technologies to help the plantation farm operator achieve the following objectives.

We arrived after a long journey from the hunters and gatherers of the past. Nowadays, people use the period to create a new way of living. People nowadays utilise this period to improve their day-to-day tasks. Harvesting vegetables and fruits on farms is an example. Human beings' major source of income is agriculture. Plants were discovered to be useful in the past by human ancestors. Agriculture has been practised by modern

RESEARCH ARTICLE

# Deep learning-based robust medical image watermarking exploiting DCT and Harris hawks optimization

Anusha Chacko ✉, Shanty Chacko

First published: 22 November 2021 | <https://doi.org/10.1002/int.22742> | Citations: 1

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## Abstract

Image watermarking is an effective way to secure the ownership of digital photographs. This paper proposes a new methodology for integrating a watermark on the basis of various integrative strengths. The image is separated as  $8 \times 8$  pixels blocks that do not overlap. The pixel size for each image block has been determined. For the embedding areas, picture blocks with the highest value have been chosen. Therefore, discrete cosine



[Proceedings of the Computational Methods in Systems and Software](#)

↳ CoMeSySo 2021: **[Software Engineering Application in Informatics](#)** pp 954–965 | [Cite as](#)

# CSMI-AW: Computational System for Medical Image Authentication Using Watermarking

[Anusha Chacko](#)  & [Shanty Chacko](#)

Conference paper | [First Online: 17 November 2021](#)

**598** Accesses

Part of the [Lecture Notes in Networks and Systems](#) book series (LNNS, volume 232)

## Abstract



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Nuclear Engineering and Technology

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Original Article

## Prediction of fatigue crack initiation life in SA312 Type 304LN austenitic stainless steel straight pipes with notch

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### ABSTRACT

In the nuclear power plants, stainless steel is widely used for fabrication of various components such as piping and pipe fittings. These piping components are subjected to cyclic loading due to start up and shut down of the nuclear power plants. The application of cyclic loading may lead to initiation of crack at stress raiser locations such as nozzle to piping connection, crown of piping bends etc. of the piping system. Crack initiation can also take place from the flaws which have gone unnoticed during manufacturing. Therefore, prediction of crack initiation life would help in decision making with respect to plant operational life. The primary objective of the present study is to compile various analytical models to predict the crack initiation life of the pipes with notch. Here notch simulates the stress raisers in the piping system. As a part of the study, Coffin-Manson equations have been benchmarked to predict the crack initiation life of pipe with notch. Analytical models proposed by Zheng et al. [1], Singh et al. [2], Yang Dong et al. [25], Masayuki et al. [33] and Liu et al. [3] were compiled to predict the crack initiation life of SA312 Type 304LN stainless steel pipe with notch under fatigue loading. Tensile and low cycle fatigue properties were evaluated for the same lot of SA312 Type 304LN stainless steel as that of pipe test. The predicted crack initiation lives by different models were compared with the experimental results of three pipes under different frequencies and loading conditions. It was observed that the predicted crack initiation life is in very good agreement with experimental results with maximum difference of  $\pm 10.0\%$ . © 2021 Korean Nuclear Society, Published by Elsevier Korea LLC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

### 1. Introduction

Fatigue is degradation mechanism that involves processes of crack initiation, its growth and fracture of components under repetitive stresses. This mechanism depends on the microstructural features of the material, loading amplitude and distribution of localized plastic deformation. The fatigue life of components/structures has broadly two phases, namely, crack initiation and crack growth periods as shown in Fig. 1. Crack initiation is mostly associated with cyclic plastic deformation which in turn is a function of stress raisers, sub-surface inclusion, gradient stress/strain field and environmental attack. Subsurface crack initiation has been observed primarily in many materials at very low stresses and very long lives, leading to the failure surface with the appearance of a fish-eye. Transition from surface-dominated fatigue processes to

subsurface failure initiation is observed in the metals with primary inclusions. The difference in fatigue lives is significant between surface and sub-surface initiated modes of failure. Hence, the separation of experimental/analytical fatigue life data between surface and internal initiation failure modes is very important for several purposes, namely, tailored microstructural improvement at sensitive locations, repair, retrofitting and structural integrity assessment. The engineering fatigue crack initiation phase consists of three stages: crack nucleation, microstructurally and mechanically/physically short crack propagation [4,34]. Fig. 1 explains crack initiation period and the crack growth period until failure [5].

It is well known fact that the pipelines contain some defects during the manufacturing, installation and in-service. The significance of defects in the pipelines under various loading conditions is to be addressed properly for the design and safety assessment purposes. The pipelines are generally subjected to flexural fatigue loading due to which crack formation and growth will occur at defect/sensitive locations. The fatigue life of a pipe has two phases, namely, crack initiation and growth. Generally, crack spends about

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E-mail address: [murthyarc@serc.res.in](mailto:murthyarc@serc.res.in) (A. Ramachandra Murthy).<https://doi.org/10.1016/j.net.2021.11.011>1738-5733/© 2021 Korean Nuclear Society, Published by Elsevier Korea LLC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

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# **Influence of AZ91 Alloy Reinforced with Nano B<sub>4</sub>C particles on Microstructural Characterization, Hardness and Tribological Properties prepared Through Powder Metallurgy**

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## **Abstract**

In this present work, a milled B<sub>4</sub>C nanoparticle was reinforced into the AZ91 alloy with different weight percentages (5, 10, 15, and 20 %) by powder metallurgy. XRD and SEM for the crystalline behavior and morphology of the AZ91-xB<sub>4</sub>C composite. The wear resistance on the load and Sliding Distance (SD) of the specimen has been experimented with the pin-on-disc apparatus and Vickers hardness machine to measure hardness. Wear loss decreased gradually with the addition of milled B<sub>4</sub>C nanoparticles is identified for AZ91-xB<sub>4</sub>C nanocomposites. Coefficients of friction (COF) increased with an increase in load for AZ91-xB<sub>4</sub>C nanocomposites. Microhardness was linear with the increase in the wt. % of milled B<sub>4</sub>C nanoparticles. The worn surface micrograph was also studied using a scanning electron microscope.

Keywords: AZ91, milled B<sub>4</sub>C nanoparticles, wear loss, Coefficient of friction, powder metallurgy.

## **1.0 Introduction**

Over the past few years, the research on particulate reinforced metal matrix composite (PRMMC) owing to potential applications in the automobile, aerospace, electrical, and electronics industries. PRMMC can control grain size, increase load transfer effect, and has nucleation effect due to the thermal mismatch [1]. According to the earlier reporters [2], AZ91 is

## Research Article

# Performance Characterization of a Solar Cavity Collector Using Artificial Neural Network

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It is mandatory to improve the design of the flat plate collector (FPC) used for solar thermal applications to perform well. One way to improve the performance characteristics of FPC is to retain the heat energy available inside the collector. That is, a collector should be capable to give more heat energy to working fluid for a longer duration. It has been implemented in such a way in an entertained and improved model which is known as solar cavity collector (SCC). It consists of 5 numbers of cavities equipped with inlet and outlet tubes. The same having with an enclosure has been constructed and investigated to find the optimal performance. In general, the physical dimensions of the collector influence more the functioning behaviors of SCC. The performance variables that are considered for the present study are the comparison between 5 and 7 numbers of cavities and the effect of aperture entry. Collector angle of tilt, two types of flow mode, and water mass flow rates are the other performance variables that are also considered. The data from the experimentations are trained, tested, and validated with the help of the artificial neural network (ANN). The accuracy of the model is 96%, and the end results revealed the same trend followed by both experimental and ANN simulation results. Also, the variations that occur between ANN and experimented results are  $\pm 4\%$ .

## 1. Introduction

For general home and industrial heating utilization, the heat energy needed is more to fulfill the requirements. If the desired temperature has achieving means, the heat is transferred to any kind of heat transfer fluid (HTF). The heating can be achieved by any kind of collection method that is available with specific requirements. Flesch et al. [1] have numerically analyzed the effect of angle of tilt at  $0^\circ$  to  $90^\circ$  cavity position and heat losses with the wind blowing on the cavity applied for cavity receivers. Also, they explain the effects of wind with these positions and how the huge impact on heat losses occurs in the particular environment. The cavity receivers designed with aperture transparent covering and reduction methods of convection losses have been analyzed and compared by Uhlig et al. [2]. Also, they ana-

lyzed the methods for enhancing collector efficiency. They conclude that the convection and radiation losses are decided by receiver tilt angle, the area of the aperture which is visible to the sun, and the temperature of the cavity receiver. The central receiver technology with low cost and high-performance scenarios has been reviewed by Zhu and Libby [3]. They discuss the thermal storage combined with the central receiver and its design considerations. It operates at higher temperatures and also delivers higher efficiency power generation and a cost-effective approach.

Samanes and Garcia-Barberena [4] have developed a transient simulation model numerically. The developed model was used to simulate the solar cavity receivers. They analyzed the performance-influencing parameters considering all major heat loss mechanisms in the cavity. For finding the thermal behavior, heat transfer fluid was utilized in

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Original

## Sport-utility vehicle prediction based on machine learning approach

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**Abstract:** Data mining and machine learning analytics in manufacturing field is one of the major research fields in Information Technology with a lot of challenges. The goal of this research is to design a categorical solution to decide whether a customer is eligible and interested to purchase a sport-utility vehicle (SUV) based on the available data from the previous records collected from the banks. The data from different customers across various ages who have purchased the sport-utility vehicle earlier are collected and used in building a solution for this logistic model. A range of age and an estimated salary across different ages are the dependent factors in building this model. In addition, this model will predict the binary logistic outcome to show whether a customer can purchase a sport-utility vehicle or not. By enhanced cloud platform with larger volume of data keeping the algorithm remains the same using machine learning deployment for predicting the customer mindset in purchasing a sport-utility vehicle.

**Keywords:** Data mining, machine learning, prediction, classification, logistic regression, scikit-learn








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## Research Article

# Flexural Behaviour of RC Beams with a Circular Opening at the Flexural Zone and Shear Zone Strengthened Using Steel Plates

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In this paper, an investigation on the behaviour of RC beams with circular openings in the flexural zone and shear zone strengthened using steel plates is presented. Totally seven beams were cast: a control beam, one beam with a circular opening of size of one-third the depth of the beam (100 mm $\phi$ ) in the flexural zone, one beam with opening strengthened using the steel plate, one beam with a circular opening of size of 100 mm $\phi$  in the shear zone, one beam with an opening in the shear zone strengthened using the steel plate, one beam with two circular openings of size of 100 mm $\phi$  in the shear zone, and another beam with two openings in the shear zone strengthened using the steel plate. The experiments were conducted in a loading frame of 400 kN capacity. The beams were subjected to two-point loading. The ultimate load carrying capacity reduced marginally by 1.78% and 2.8% compared to that of the control beam when a circular opening of 100 mm $\phi$  was provided in the flexural zone and shear zone, respectively, and when the opening was strengthened with steel plates, it reduced by 3.04% and 25%, respectively, but the ductility increased when steel plates were provided. Beams with an opening of size of one-third the depth of the beam (100 mm $\phi$ ) in the flexural zone strengthened with the steel plate can be provided, as the load carrying capacity is only marginally reduced compared to the control beam, and the ductility is more when compared with beams with unstrengthened openings.

## 1. Introduction

In high-rise framed structures, providing service ducts is necessary for various purposes. If the ducts placed under the beams are covered by a false ceiling, the height of each floor increases, resulting in a considerable increase of the total height. The service ducts are provided through openings in RC beams. As a result, the stiffness decreases, which reduces the load carrying capacity and causes excessive deflection under the service load. Many researchers have studied the strengthening of RC beam with openings which increased the load capacity effectively. In order to enhance the shear capacity and regain the strength of the beams with openings, numerous strengthening techniques were suggested. FRP

can play a key part in reinforcing and strengthening the structures. The reinforced concrete beams with openings can be strengthened by CFRP sheets, GFRP sheets, laminates, rods, fabrics, and so forth with different strengthening schemes. The load carrying capacity of the reinforced concrete beams with openings increases when strengthened externally with CFRP sheets in RC T-section deep beams [1], fibre reinforced polymer sheets in RC beams [2], unidirectional CFRP fabrics in RC T-beams [3], and NSM (near surface mounted) GFRP rods saturated with epoxy in RC self-compacting concrete deep beams [4]. CFRP laminates fully wrapped around the openings in RC beams with large openings [5], CFRP and GFRP sheets both around and inside the opening [6], CFRP strips with different



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## Investigation on mechanical properties for PolyJet-printed parts involving material reduction strategy

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**Abstract:** Additive manufacturing (AM), a tool less manufacturing process has the advantage of saving material; however, this is not a wastage free manufacturing technology. In PolyJet technology, material wastage is more due to material replacement. This study concentrates on finding a solution to reduce the wastage of material and compare the mechanical properties of PolyJet-printed specimens in single-material (SM) mode and digital-material (DM) mode. In order to reduce the wastage, modified mixed tray strategy is proposed and it is validated by case example. Six different combinations of test specimens are derived from available three printing modes and two finish types of Objet260 Connex PolyJet. This research identified that the proposed technique is capable of saving material. Findings indicate that specimens printed by DM mode explicate low mechanical strength than SM mode. This study provides the awareness of the material replacement and increase the fidelity of the PolyJet-printed parts.

**Keywords:** additive manufacturing; PolyJet; Objet260 connex; material reduction; material replacement; flushing; modified mixed tray.

**Reference to this paper should be made as follows:** Pugalendhi, A., Ranganathan, R., Sreekanth, M.P. and Ganesan, S. (2021) 'Investigation on mechanical properties for PolyJet-printed parts involving material reduction strategy', *Int. J. Rapid Manufacturing*, Vol. 10, No. 1, pp.52–68.

**Biographical notes:** Arivazhagan Pugalendhi is currently working as Project Manager in Centre of Excellence in Manufacturing Sciences (funded by MHRD, Government of India) functioning at Coimbatore Institute of Technology. He completed his under graduation in Mechanical Engineering and received his Masters in Production Engineering. Currently, he is pursuing his PhD program under Anna University, Chennai. Apart from academic, he holds an industrial experience in the areas of mechanical design field like pattern and die making, special purpose machine. His research interests include additive manufacturing, new product development, product customisation, digital product manufacturing and healthcare innovations.



## Preliminary Prototype and Analysis of a Customized Handle for Winding Machine using Fused Filament Fabrication

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**Abstract** - Additive manufacturing transformed the prospect of product development. Customized and individualized product development never be so effortless. In this context, aim here is to develop a preliminary prototype of customized handle for winding machine using in handloom industry. Design of the handle is completed according to the hand anthropometric data of workers. CATIA V5R20 is used for 3D modeling and Analysis. Polylactic Acid (PLA) used as material and FlashForge Dreamer Additive Manufacturing (AM) machine, which works based Fused Filament Fabrication (FFF) is employed for prototyping. Analysis confirms that the design using PLA material is safe as maximum von Moses stress obtained ( $6.57 \times 10^4 \text{ N/m}^2$ ) is less than the yield strength of PLA material ( $4.9 \times 10^7 \text{ N/m}^2$ ).

**Keywords** - Prototype; Customization; Fused Filament Fabrication, Handle, Hand Anthropometry, Additive Manufacturing.

### INTRODUCTION

By eliminating tool and reducing wastage of material, Additive Manufacturing (AM) or 3D Printing (3DP) can be considered as one of the most noteworthy development in manufacturing in recent years, which directly prints from Computer Aided Design (CAD) data layer - by - layer [1]. It helps the technology to be a potential player in Industry 4.0 [2]. Fused Filament Fabrication (FFF) or Fused Deposition Modeling (FDM) is an AM technology which usually fabricate the objects layer-by-layer by extruding material through a nozzle [3, 4]. FFF parts can be used in wide variety of applications from unarmed aerial vehicles to 3D Printers [5].

Parry et al. developed a customized crutch grip using 3D scanner, Autodesk Fusion 360, and Stereolithography (SLA) additive manufacturing and recommended that AM is a worthwhile method for fabricating customized Daily Living Aids (DLA) [6]. Additionally, using reverse engineering and FDM additive

manufacturing technology, a customized helmet is developed with enhanced comfort. The researchers concluded from the study that the method is suitable for rapid product development and to address the needs of the customer individually [7].

A customized hand orthosis is developed using 3D Scanner and FDM AM machine with a printing time of about 11 hours and lead time of about 1 day, which will be useful for patients [8]. In addition to this, individually customized wrist orthosis was designed using the 3D scanned data of a patient and fabricated by employing FDM technology with upper layer of the orthosis was made of ABS and inner layer was made using TPU (Thermoplastic Polyurethane) [9]. TPU has considerable elasticity and research proved that the flexible inner layer increases the comfort of user [9].

Furthermore, customized orthosis is fabricated using Autodesk Inventor 3D modeling software, 3D scanner, MeshLab software for creating an automated algorithm of 3D scan data, and Raise 3D Pro FDM AM machine [10]. The study concluded that Polylactic Acid (PLA) is strong when compared to other materials used such as Acrylonitrile Butadiene Styrene (ABS), High impact Polystyrene (HIPS), and Polyamide 12 (PA12 - nylon) [10]. Fabrication of customized prosthetic sockets for upper limbs using 3D scanner and FDM process proved the feasibility of fully functional products [11].

Textile industries facing a challenge to deliver more customized products and amalgamation of product, process, and supply chain designs is the feasible to achieve customization in textile industry [12, 13]. At the same time, Chatterjee and Ghosh believed that textile industry can utilize 3DP by exploring its unique capability of manufacturing customized products [14].

From above it can be understood that the research explored the possibility of customized products in various areas including textile

## RESEARCH PAPER PUBLICATIONS IN 2022-23

**Number of research papers published per teacher in the Journals notified on UGC care list during the year 2022-23**

S.No	Title of paper
1	Breast cancer detection in mammogram: combining modified CNN and texture feature based approach
2	Flame dynamics of premixed CH <sub>4</sub> /H <sub>2</sub> /air flames in a microchannel with a wall temperature gradient
3	Effect of hydrogen addition on the dynamics of premixed C <sub>1</sub> eC <sub>4</sub> alkane-air flames in a microchannel with a wall temperature gradient
4	A Review on Power Generation Enhancements in a Pumped Storage Powerhouse by Using Appropriate Guide Vane Sealing Material
5	Effectiveness of Feature Extraction by PCA-Based Detection and Naive Bayes Classifier for Glaucoma Images
6	Compression behaviour Mg-Zn-xSr-HA hybrid nanocomposites through powder metallurgy method
7	Tribological and mechanical properties Mg-Zn-xSr-HA hybrid nanocomposites prepared by powder metallurgy technique
8	Wind energy conversion system-based PMSG for maximum power tracking and grid synchronization using adaptive fuzzy logic control
9	Weapon detection using ML for PPA
10	Effect of hydrogen addition on the dynamics of premixed c <sub>1</sub> -c <sub>4</sub> alkaline air flames in a microchannel with a well temperature gradient
11	Sustainable Green Connected Systems Through Integrated Organic Waste Management Eco-model for the Green Clean Campus
12	PRODUCTIVITY ASSESSMENT MODEL USING FUZZY LOGIC APPROACH
13	ANALYSIS OF CONCRETE FILLED DOUBLE SKIN STEEL COLUMN WITH FRP WRAPPING

14	NUMERICAL INVESTIGATION AND COMPARISON STUDY OF COLD FORMED STEEL CASTELLATED I-SECTION
15	5G-Telecommunication Allocation Network Using IoT Enabled Improved Machine Learning Technique

**Prof. Dr. Benny Joseph**

**(PRINCIPAL)**



# Breast cancer detection in mammogram: combining modified CNN and texture feature based approach

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## Abstract

Customized deep neural networks are being used to assess medical imaging and pathology data. The proper assessment of malignancy using digital mammography images is a challenging task. This study implements a system for autonomously diagnosing cancer using an integration method, which includes CNN and image texture attribute extraction. The nine-layer customized convolutional neural network is used to categorize data in the CNN stage. To improve the effectiveness of categorization in the extraction-based phase, texture features are defined and their dimension is reduced using Uniform Manifold Approximation and Projection (UMAP). The findings of each phase were combined by an ensemble algorithm to arrive at the ultimate conclusion. The final categorization is presumed to be malignant if any of the stage's output is malignant. On the MIAS repository, our ensemble method's testing specificity and accuracy are 97.8% and 98%, respectively, while on the DDSM repository, they are 98.3% and 97.9%. The combination method improves measurement metrics across each phase independently, as per the experimental findings.

**Keywords** CNN · Texture feature · Local binary patterns · Integration method · UMAP



## 1 Introduction

Mammographic screening technologies are currently an essential technique for the early detection of breast cancer. Despite this, a radiologist cannot properly categorize mam-


radiologists in improving diagnosis by lowering the number of missed tumors and biopsy specimens (false positives). Several feature extraction methods and classification algorithms have previously been used to detect and classify key points in medical images in general, and breast tumors in

2(2022-23)


# Flame dynamics of premixed CH<sub>4</sub>/H<sub>2</sub>/air flames in a microchannel with a wall temperature gradient

Satender Singh, Jithin Edacheri Veetil, Neeraj Kumbhakarna, Ratna Kishore Velamati  & Sudarshan Kumar  

Pages 989-1013 | Received 06 Oct 2021, Accepted 19 Jun 2022, Published online: 13 Jul 2022

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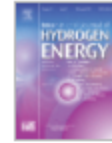
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## Abstract



The effect of hydrogen (H<sub>2</sub>) addition on the flame dynamics of premixed methane/air mixtures in a microchannel was investigated through two-dimensional numerical computations using a detailed chemistry model. Detailed numerical simulations were

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# Effect of hydrogen addition on the dynamics of premixed C<sub>1</sub>–C<sub>4</sub> alkane-air flames in a microchannel with a wall temperature gradient

Jithin Edacheri Veetil<sup>a</sup>  , Neeraj Kumbhakarna<sup>b</sup>, Satender Singh<sup>c</sup>, Ratna Kishore Velamati<sup>d</sup>, Sudarshan Kumar<sup>e</sup>

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## Abstract

The effect of hydrogen (H<sub>2</sub>) addition on the flame dynamics of premixed C<sub>1</sub>–C<sub>4</sub> alkane/air mixtures in a microchannel is investigated using a detailed-chemistry model through two-dimensional numerical computations. A detailed computational study have been performed in a 2 mm diameter tube with 120mm length and a wall temperature gradient

## A Review on Power Generation Enhancements in a Pumped Storage Powerhouse by Using Appropriate Guide Vane Sealing Material

*V. Sampathkumar, P. Sridharan, Parthiban K.P*






### Abstract

One of the essential needs of the growth of a country is generating and utilizing electricity. India has made a powerful contribution to electricity generation. India is a naturally wealthy country with mountains and water resources. There are strategies to shape new hydroelectric power plants in the upcoming years. It is particularly important to establish Pumped Storage Hydroelectric Power Plants. This research describes that the water leakage occurring in guide vane end sealing rubber material due to damage, does not enter the turbine runner resulting in the reduction of water flow through the turbine runner, so the required amount of electricity is not generated in a Pumped Storage Powerhouse. This water leakage problem also affects the pumping mode operations, which reduces plant efficiency. Hence Pumped Storage Powerhouse generates less targeted electricity generation, and more power is also required for pumping mode operations. This research is carried out with the use of four new guide vane end sealing rubber materials such as Hydrogenated Nitrile Butadiene Rubber, Ethylene Propylene Diene Monomer, Polyurethane and Filled Polytetrafluoroethylene to assess their life and to find out the best one which improves the power generation and reduces power consumption in pumping mode operation



## Research Article

# Effectiveness of Feature Extraction by PCA-Based Detection and Naive Bayes Classifier for Glaucoma Images

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After cataract, glaucoma is one of the second leading retinal diseases in the world. This paper presents the methodology to detect the glaucoma using principal component analysis. The images are involved in dilation as a preprocessing, enhancement using the contrast limited adaptive histogram equalization method, and followed by the extraction of features using principal component analysis. The extracted features are classified using support vector machine, Naive Bayes, and K-nearest neighbor classifiers. Comparing with other classifiers, the Naive Bayes provides high accuracy of 95% which demonstrates the effectiveness of the feature extraction and the classifier.

## 1. Introduction



Glaucoma is the second-leading cause of blindness in the U.S. The prevalence of glaucoma in the world is 60.5 million in 2015, and by 2030, it is expected to increase up to 10 percentages of world population [1]. The high prevalence of undetected glaucoma in the society contributes to the high rate of blindness among the Indian people [2]. A physical eye examination technique can occasionally result in incorrect diagnosis. Automated and accurate diagnosis of retinal disease helps to prevent the loss of vision. A thorough eye examination for the detection of glaucoma involves tonometry, ophthalmoscopy, perimetry, gonioscopy, and pachymetry. Utilizing the right automated decision tools while imaging the retina improves the early detection of glaucoma and prevents visual loss. The brightest section within retinal fundus image is where the optic nerve exits the retina and to the brain, which is called the optic disc. To prevent vision loss, the optic disc region must be examined for the existence of glaucoma at an early stage. The nerve that transmits data

from the eye to the nerve is called the optic nerve. When the optic nerve gets damaged, glaucoma occurs. Early on, there are no symptoms, but if a proper diagnosis is not made, vision loss sets in. The greater than usual pressure in the eye, which occasionally accompanies glaucoma, is referred to as ocular hypertension.




Initial enhancements are made to the input retinal images to improve their quality. The feature extraction technique has an impact on analyses on the detection and classification of glaucoma utilizing retinal images. Glaucoma progression is identified using morphological and nonmorphological elements. Glaucoma detection using CDR feature was performed by Xu et al. [3], Muramatsu et al. [4], Joshi et al. [5], and Yin et al. [6]. On the other hand, the categorization of the retina structures is not a characteristic of the nonmorphological features. The published investigations have demonstrated that morphological parameters like colour, pixel intensity, histogram, and texture are not used to detect glaucoma. A system based on hybrid feature extraction from fundus images using higher order spectra, trace

6(2022-23)

# Compression behaviour Mg-Zn-xSr-HA hybrid nanocomposites through powder metallurgy method

[George Recklin](#)<sup>a</sup>, [P.V. Pranav](#)<sup>a</sup>, [S. Christopher Ezhil Singh](#)<sup>a</sup>  , [Rajkumar S. Rai](#)<sup>b</sup>, [T. Mary Little Flower](#)<sup>c</sup>, [P. Sridharan](#)<sup>a</sup>

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## Abstract




In the present work, biocompatible materials such as zinc (Zn), Strontium (Sr) and Hydroxyapatite (HA) have been mixed with magnesium (Mg) to fabricate a biomaterial with enhance strength by powder metallurgy technique. The

7(2022-23)

# Tribological and mechanical properties Mg-Zn-xSr-HA hybrid nanocomposites prepared by powder metallurgy technique


[Rosh George](#)<sup>a</sup>, [Cris Benny](#)<sup>a</sup>, [Thomaskutty Mathew](#)<sup>a</sup>, [M. Shyamlal](#)<sup>a</sup>,  
[S. Christopher Ezhil Singh](#)<sup>a</sup>, [T. Mary Little Flower](#)<sup>b</sup>, [R. Malkiya Rasalin Prince](#)<sup>c</sup>

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## Abstract

In this work, biocompatible minerals such as zinc (Zn), strontium (Sr), and hydroxyapatite (HA) were combined with magnesium (Mg) to create a biomaterial



## Wind energy conversion system-based PMSG for maximum power tracking and grid synchronization using adaptive fuzzy logic control

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**Abstract:** This paper proposes an adaptive fuzzy logic-based Maximum Power Point Tracking (MPPT) for a Permanent Magnet Synchronous Generator (PMSG)-based variable speed Wind Energy Conversion System (WECS). The control algorithm, online updates the scaling factors of the Fuzzy Logic Controllers (FLCs) at a high convergence speed. The adaptive FLC is in cooperated along with field-oriented control of PMSG to track the maximum power. The WECS is connected to the grid through a back-to-back converter. The grid side inverter is controlled by voltage-oriented control along with FLC, so that power quality standards of the grid are maintained. The performance of the system is verified using MATLAB Simulink and it is validated that power coefficient of WECS abide at its optimum value with dynamic conditions in wind speed. The WECS provides full reactive power support for the system with a unity power factor operation at the grid. The active power sharing of WECS to the grid/load changes with the availability of wind power.

**Keywords:** Wind energy conversion system (WECS), permanent magnet synchronous generator (PMSG), maximum power point tracking (MPPT), fuzzy logic control (FLC)

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# Weapon Detection Using ML for PPA

[Nabeel Hashim](#), [D. Anto Sahaya Dhas](#) & [M. Jayesh George](#)

Conference paper | [First Online: 15 March 2022](#)

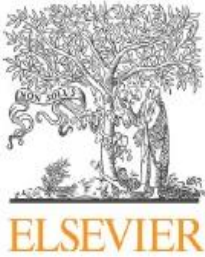
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## Abstract

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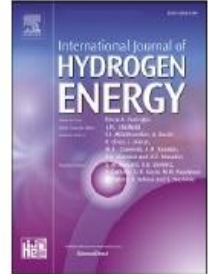
Security is always a top issue in every domain. Computer vision is used extensively in abnormal detection and monitoring to solve a variety of problems in physical protection applications (PPA). Old technology like pixel-based video analytics has a loophole in identifying the object, and the object identified with old technologies is less accurate. Weapon identification using cutting-edge technology like machine learning (ML), artificial intelligence, and deep learning can be used to identify weapons in the security area, as the world is constantly threatened by conflict or terror attacks. Using a convolution neural network (CNN), this paper shows an implementation of an automatic gun (or) weapon detection using (CNN). It focuses on detecting, classifying, and locating guns with pinpoint accuracy. This research proposes a groundbreaking real-time automatic weapon identification system for both surveillance purposes. Weapon detection in images/videos is accomplished by determining whether the



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## Effect of hydrogen addition on the dynamics of premixed $C_1$ – $C_4$ alkane-air flames in a microchannel with a wall temperature gradient

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**Sustainable Green Connected Systems Through Integrated Organic Waste Management Eco-model for the Green Clean Campus**

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**Abstract**

The sustainable green connected systems are considered as the engine room for fostering the Green-Clean Campuses. Biomass management with organic cycles is a crucial factor in tropical sustainable campuses as it tends to produce a huge amount of biomass with multiple organic cycles. This proposed biorefinery model at Chemperi, Kerala which is in a tropical region can connect Agri farming, pisciculture, piggery farming, and livestock farming for waste management with a centralized aerobic-anaerobic sewage recycling system. The model has proven benefits of cost optimization, reduced fuel conception, enhancing biodiversity with a sustainable ecosystem, and fostering sustainability. The output of these multiple farming provides fresh raw materials for the kitchen with economic and health benefits. This model established at Vimal Jyothi Campus was found to reduce biomass waste production, biorefinery waste management with energy-saving, inculcating sustainability practices in campus and establishment of Green Clean Campus. The model can be integrated with intelligent monitoring systems and automation.

**Keywords:** Integrated Organic Waste Management Eco-model, Green Clean Campus, Sustainable Green Connected Systems, 7Rs, Integrated LCA, CBE



## PRODUCTIVITY ASSESSMENT MODEL USING FUZZY LOGIC APPROACH

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**Abstract:** Productivity, more often defined as a ratio between an output value and an input value used to produce the output. Cement is one of the key essential materials in the construction industry. For the Indian cement industry, many challenges lie ahead. Increase in productivity is imperative in order to raise the standards of living and also to make the Indian exports globally competitive. Enhancement in productivity cannot be achieved without identifying and analyzing factors that adversely affect productivity. Measuring and quantifying the impact of factors influencing productivity of cement industries is a complex problem. Productivity barriers in cement industries are hampering its growth. Productivity problems can be minimized or avoided when their causes are clearly identified. Hence, exploring productivity determinants and their relationship with productivity of cement industries are important. A set of 49 productivity factors were extracted based on the related literature. The frequency of questionnaire data was obtained from SPSS software & then RII is calculated. Then Structural Equation Modeling is used to show the relationship between the most and least contributing factors. Finally productivity assessment models were then developed using fuzzy logic toolbox. So the study concludes that the power of fuzzy logic techniques can be very useful in the productivity problem environment and has future application.

**KEYWORDS:** Productivity, Productivity determinants, Cement industry, Influencing factor, Modeling

### 1. INTRODUCTION

Cement is one of the key essential materials in the construction industry. It is classified into various categories based on its composition and specific end uses. Cement is classified as either Portland, blended, or specialty cement. Portland cements are mostly used around the whole world. The key constituents used to manufacture cement include limestone, shells, and chalk or marl combined with shale, clay, slate, blast furnace slag, silica sand, and iron ore. To manufacture cement, limestone, sand, and other additives are combined in rotating kilns at temperatures of up to 1450°C. This process yields a granular intermediate known as clinker, which is then ground in mills to produce cement powder. The final cement mix will include around 5% gypsum and may also include other non-clinker mineral by product like limestone, slag, and ash from coal fired power plants. The cement industry presents one of the most energy-intensive sectors within the Indian economy and is therefore of exacting interest in the context of both local and global environmental discussions. Increases in productivity through the adoption of more efficient and cleaner technologies in the manufacturing sector will be effective in merging economic, environmental, and social development objectives. A historical examination of productivity growth in India's industries embedded into a broader analysis of structural composition and policy changes will help identify potential future development strategies that lead towards a more sustainable development path. Production in the cement sector has been increasing over the last years. Despite its fluctuating pattern it shows a relatively stable trend over time. There are many reasons for this expected increase in coming years in cement production. Among them one is economic growth in developing countries. This inevitably leads to increased demand for building materials, including cement. Though many of the largest and fastest growing cement industries are now in the developing world, still for many developing countries, self reliance in cement production is a major industrial target as it reduces the dependence on imports and reduces the cost of construction. It also enables further development of the economy through improved infrastructure. These studies identifies the factors affecting productivity of Indian cement production industries and determine the weightage of each productivity factors using Relative Importance Index (RII) technique. It also aims to figure out the relationship between most contributing factor and least contributing factor that affect the productivity and thereby develop the productivity assessment model using Fuzzy Logic approach as well as a model combination of factors that improve the productivity.





# ANALYSIS OF CONCRETE FILLED DOUBLE SKIN COLUMN WITH FRP WRAPPING

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*Abstract:* In this study modelling and analysis of Concrete filled double skin steel tube column is presented. CFDST consists of two steel layers embedding a concrete layer in between. CFDST have many advantages such as high strength, high bending stiffness, good seismic and fire performance. But the columns were proven to have certain shortcomings such as ageing of structures, corrosion of steel tubes. Therefore, the implementation of strengthening techniques with the new material is essential to eliminate this problem. In order to strengthen the CFDST column FRP wrapping is introduced in this study. The study and comparison of confinement effect under eccentric loading on varying different parameters of FRP was carried out. CFDST columns wrapped with FRP are modelled and analyzed using Finite element software ANSYS Workbench 16.1. From the analysis results it is found that the load capacity can be increased with the introduction of FRP confinement.

**Keywords:** CFDST, FRP, ANSYS

## 1. INTRODUCTION

CFDST column is a composite member, which consists of inner and outer steel skins with the annulus between the skins filled with concrete. From structural point of view, this form of column has higher strength (uni-axial, flexural and torsion). By replacing the central concrete with a steel tube of much smaller cross section area, the strength-to-weight ratio of the columns is improved significantly. Furthermore, the inner tube expands laterally during compression and hence increases the confining pressure provided to the concrete. Thus, the initial confining pressure builds up more rapidly than that in CFST columns that enhances the elastic strength and stiffness. From environmental point of view, CFDST column uses less concrete, which creates a more sustainable environment by reducing the embodied energy levels of the column. From cost effectiveness point of view, the tubes act as both the longitudinal reinforcement and formwork that save the construction cost and cycle. There are different possibilities to build CFDST columns combining tubes with different shapes (circular, square, rectangular). However, in general, those formed by circular columns have proved to be the most efficient in bearing the same ultimate load that column with the same steel cross-section area of other types. The cavity inside the inner tube provides a dry atmosphere for possible catering of facilities or utilities like power cables, telecommunication lines and drainage pipes. This form of construction is particularly useful for maritime structures, in which the subsea facilities can be accommodated in the dry atmosphere. In recent years, many steel and CFDST structures have been found to be suffering from a variety of deteriorations, including cracking, yielding and large deformation. These deteriorations are caused by a variety of factors, including fire, ageing, environmental degradation and corrosion. There are several strengthening or rehabilitation techniques that can be applied to enhance performance, including section enlargement, external bonding using steel plates and fibers, among others. Fiber Reinforced Polymer (FRP) composites can be used for rehabilitation. One of the main forces driving the development of external strengthening methods that uses the FRP composite is that they enable deteriorated members to be upgraded without significantly altering the appearance of the member. In addition, FRP composites are light weight, durable, and resistant to corrosion, and have high tensile strength, stiffness



# NUMERICAL INVESTIGATION AND COMPARISON STUDY OF COLD FORMED STEEL CASTELLATED I-SECTION

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**Abstract:** In this study modeling and analysis of Cold Formed Steel Castellated I-Section is presented. A castellated steel beam is per definition a wide flange (WF) or I shaped steel profile with openings, to reduce self-weight and improve the effectiveness in terms of material use. Recently, extensive study on these castellated steel beams has been conducted, involving different shapes in web openings. The main goal of these research works was to evaluate and analyze its optimum opening sizes and shapes configuration. More in-depth research work to the behavior and the influence of holes to WF beams need to be conducted. In this paper, cold formed 5 number of I-beam with constant dimension and varying load studies conducted. Additional castellated beam with circular and hexagonal shaped web opening is chosen as alternate. The study involves a modification in the variation of circular and hexagonal web openings both in the horizontally direction with single and 5 number of holes. A numerical study based on the finite element method conducted with the Abaqus /CAE 6.12 software is used to analyze the elastic and buckling behavior of the beam. The obtained results are compared from the finite element analysis to optimize the section element.

**KEYWORDS:** Cold-formed steel, castellated i- beam, circular, hexagonal, Abaqus





## INTRODUCTION

Cold-formed steel (CFS) section is the term used for products which are made by rolling or pressing thin gauges of steel sheets into goods. CFS goods are created by the working of thin steel sheets using stamping, rolling or presses to deform the steel sheets into a proper product at significantly cooler temperatures, often at even room temperature. The advantages of using cold-formed steel over hot rolled sections include high strength to weight ratio, precision in dimensions obtained (close tolerances), easier to produce any desired shape, use of all conventional jointing methods, easier to transport and erect. A castellated steel beam is an I-shaped beam section with a variety in shape opening in the web. The opening can be hexagonal, rectangular, circular, diamond or oval in shape. The origin of the name "castellated" is derived from the pattern of holes in the web, because castellated means "built like a castle or regular holes in the walls, like a castle". The castellated steel beam is made by expanding a standard rolled shape in a manner which creates a regular pattern of holes in the web. At first, the chosen pattern is made along the web on a path that will be cut. The cut half beams are separated and then welded together based on the chosen opening shape. The use of castellated steel beams nowadays has been rapidly catching attention due to its advantages. A castellated steel-beam in a structure gives the advantage of its lighter weight. Castellated steel beams can also utilize the placement of installations. Basically, steel sections that satisfy strength requirement have difficulty in satisfying serviceability requirements. Castellated steel beams can be the way to overcome that problem by providing a greater depth, and thus a greater moment of inertia. Furthermore, the modification of web openings affects the failure modes and stability of castellated steel beams itself. Numerous researchers have been dedicating their work to studying the effect of modification of web shaped opening. In this paper, a deep research on the behavior of castellated steel beams with circular and hexagonal shaped opening was conducted.

The aim of this study is to compared to the hot rolled sections, the use of cold rolled sections is very limited in the construction industry owing to the fact that not much research has been done in predicting the performance of cold form steel sections used as a beam at higher loads.

## Research Article

# 5G-Telecommunication Allocation Network Using IoT Enabled Improved Machine Learning Technique

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Recent improvements in communication technology have undergone a significant shift over the last two decades, with state-of-the-art communication equipment, standards, and protocols simplifying the lives of consumers everywhere. For more than a decade, advancements in communication technology have mostly focused on increasing the speed with which information can be delivered and retrieved from anywhere in the globe at any time of day or night, regardless of location. Four-generation (4G) communication technologies, which have already been developed and implemented, are used to offer users with seamless access to multimedia content at transmission rates of 100 megabits per second (Mbps). It is becoming more vital to create new technologies in order to meet the growing need for faster speed as well as a variety of other advanced features. 5G networks have just recently been built as a result of extensive research and development. This has resulted in the gradual replacement of existing 4G services with new 5G networks, which are capable of transmitting multimedia content such as audio-video and high definition images, among other things, at data transmission rates in the gigabyte range or higher (up to several gigabits per second). Further recent development, in addition to the Internet of Things (IoT), which was made possible by future communication technology, is the Internet of Things-based social network. Aspects of this include the ability to connect and expanding Internet connectivity to all physical devices that consumers use to access common commercial and industrial services available on the Internet. In spite of this, with the advancement of existing high-speed communication networks, the effective interaction of devices with their inputs and responses via the Internet may be made possible through 5G Internet of Things networks. This new generation of automation and communication systems has emerged as innovative platforms for the next generation of automation and communication systems to be developed further in the future. M2M data may be utilised to more efficiently distribute resources if machine learning (ML) and optimum cell clustering are applied to the situation. It is because of this heterogeneity that the ML is able to make the best use of the remaining resources of the M2M network in order to optimise efficiency. Over the last several years, the shortage of radio frequency spectrum has proven to be the most challenging hindrance to wireless communication. This has occurred from the large number of high-frequency devices that need significant amounts of bandwidth allowance. Cognitive radio networks have been designed to meet this higher demand as a result of this increased demand.