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NAAC Cycle 2

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RESEARCH PAPER PUBLICATIONS IN 2019-20

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Prof. Dr. Benny Joseph

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Criterion: 3.3.1

1(2019-20)

Journal of Computer Technology & Applications

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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.





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NAAC Cycle 2

Criterion: 3.3.1

2(2019-20)

International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2018): 7.426

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

Volume 8 Issue 4, April 2019

www.ijsr.net

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Paper ID: ART20196946

10.21275/ART20196946

1207





3(2019-20)

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



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NAAC Cycle 2

Criterion: 3.3.1

4(2019-20)





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 infusion 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.

Manuscript published on 30 August 2019.

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Retrieval Number: J96400881019/19@BEIESP
DOI: 10.35940/ijitee.J9640.0881019
Journal Website: www.ijitee.org

Published By:
Blue Eyes Intelligence Engineering
and Sciences Publication (BEIESP)
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3660



5(2019-20)





RESEARCH ARTICLE | AUGUST 06 2019

Modeling of a gasifier using cycle-tempo for SOFC applications

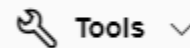
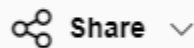
Sarath Pappinisseri ; Priyak Nellikka Kandiyar; Vasanth Parthasarathy; John Tharappel Devasya



+ 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

6(2019-20)





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/m³ 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

7(2019-20)





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NAAC Cycle 2

Criterion: 3.3.1

Interiencia Journal

2019 44(11)

ISSN: 0378-1844

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

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8(2019-20)





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Criterion: 3.3.1

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.

9(2019-20)





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.

Springer

10 (2019-20)





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NAAC Cycle 2

Criterion: 3.3.1

Design of A Novel Controller to Stabilize the Dc Level of Photovoltaic System for Low Voltage Stand Alone Applications

👤 V.S. Bibin Raj and Dr.G. Glan Devadhas

Abstract

The fate of sustainable power source is so request as it relates more with the shortage of the bio-powers and other oil based goods. The utilization of such a section is helped for the traditional generation of electric power. The age of power cost a great deal as it is profoundly utilized for the everyday needs. A dependable indigenous generation of electric power is from the application or presentation of the photovoltaic framework. The principle locale where the PV framework leads behind is particularly on the shaded conditions. The shading impact lessens the yield proficiency of the sunlight based cell and it prompts some settled misfortunes. This paper proposes a novel PV structure design that has the ability to decrease the impact of fractional shading by changing the MPPT control calculation and an extra sub calculation. This paper depicts the horizontal impact of the fractional shading and the presentation of the well-ordered control topology which helps the MPP with the PID for acquiring the ideal yield regardless of ideal load current with a steady DC yield. The down to earth issues of circle delay, criticism clamor, input separating and deadbeat controller parameters affectability are examined by direct investigation reproduction, test execution and non-straight model examination. This paper exhibited the recreation, usage and execution of dead beat control.

📖 Volume 11 | 06-Special Issue

📄 Pages: 1569-1577

11(2019-20)





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 consciousness 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/yard (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/yard 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/yard 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 contemplates [9]- [13]. This declines the cost and circuit complexity and results in progressively important profitability. Nami et al. [14] have proposed single-input multi-ward 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.

Manuscript received January 25, 2019.

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Retrieval Number: ES2023017519/19@BEIESP

155

Published By: Blue Eyes Intelligence Engineering & Sciences Publication



13(2019-20)





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.

Manuscript published on 30 April 2019.

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Retrieval Number D6314048419/19@BEIESP
Journal Website: www.ijeat.org

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 μ .





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 1×10^{-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-OFDMA) 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.

Manuscript received February 01, 2019

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Published By: ..



15 (2019-20)



Enhanced Noise Curtailing In Long Haul Multi Service 5g Cellular Optical Hybrid Networks

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Abstract--- The desideratum for multi service 5G operations over optical medium led to the development of cellular optical network. The burgeoning of cellular services propound interesting alternative for communication requirements. Cellular optical link is a contrasting network developed by cellular and optical links. The network maintains competent technology for the simultaneous transmission of multiple services with salient mobility for handling the fixed and mobile customers in a secure platform. Cellular optical system collectively holds the advantage of enormous bandwidth of provided by the optical communication network and maneuverability granted by the cellular systems. There arises negative impact due to the nonlinear demeanor of cellular optical link. As a consequence, it is obligatory to curtail the noise under a precise brink. This paper examines the minimization of nonlinear noises using the improved shaping filters in optical laser source and enhanced noise curtailting technique in subsequent amplifier section.

Keywords--- Cellular Optical Network Enhanced Noise Curtailing Technique, Harmonics.

I. Introduction

The everlasting desideratum for a flexible multi service 5G network over wireless accessibility has been detonating for last few years. Furthermore the wireless head end have procured prodigious desideratum in the new era. The burgeoning of cellular services propound interesting alternative for communication requisite because of operational flexibility, network support and implied potential. In order to pacify the bandwidth obligation on cellular services, optical carriers are utilized, thereby ensuing in uninterrupted manipulation of high frequency bands. This eventually leads to plenty of cost- effective base station base stations. Radio over fiber technology has been suggested since it proffers simple operative base stations which are attached to a central station using optical fiber. Microwave Photonic link is a trailblazing technology that culminates the use of photonic links to administer cellular signals from a central station to base station. In the contemporary communication scheme, all the data handling functions are performed at the base stations and handed over to the antenna in a flash. Microwave Photonic link make it possible to centralize all the data handling functions under one shared location locus and afterwards the optical fiber is employed to assign the cellular signals to the base stations Microwave Photonic link incorporate both cellular link and optical link

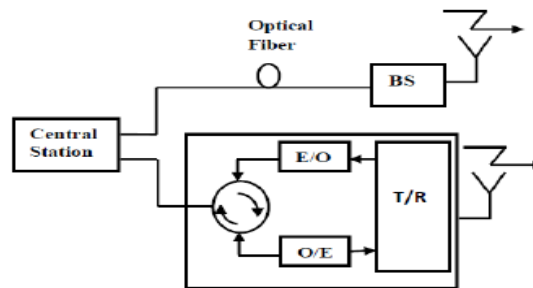


Fig: 1: Cellular Optical System

16(2019-20)



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.

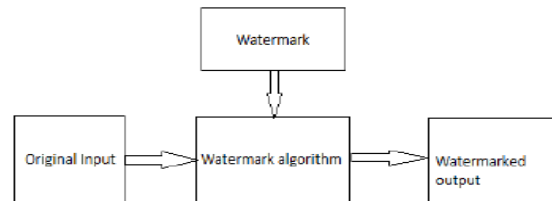


Fig 1.Process of Watermarking Algorithm

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.

Manuscript published on November 30, 2019.

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Retrieval Number: D7161118419/2019@BEIESP
DOI:10.35940/ijrte.D7161.118419
Journal Website: www.ijrte.org

4163

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Blue Eyes Intelligence Engineering
and Sciences Publication (BEIESP)
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Corrosion rate of Al-Si Alloy Reinforced with B₄C 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 B₄C 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 B₄C 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 B₄C 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 B₄C particles with rhombohedral shape. Rule of mixtures was used to calibrate the changing weight portions of Al-12Si-xB₄C (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.

Revised Manuscript Received on November 30, 2019.

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Retrieval Number: A4650119119/2019@BEIESP

DOI: 10.35940/ijitee.A4650.119119

Journal Website: www.ijitee.org

4677

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication



18(2019-20)





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NAAC Cycle 2

Criterion: 3.3.1

International Journal of Applied Engineering Research ISSN 0973-4562 Volume 14, Number 4 (2019) pp. 977-983
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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 ²)
3	V	Volume of conical tank(cm ³)
4	δ	Density of water
5	τ	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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NAAC Cycle 2

Criterion: 3.3.1

Microprocessors and Microsystems 69 (2019) 35–42



ELSEVIER

Contents lists available at ScienceDirect

Microprocessors and Microsystems

journal homepage: www.elsevier.com/locate/micpro



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



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ARTICLE INFO

Article history:

Received 18 March 2019

Revised 27 May 2019

Accepted 30 May 2019

Available online 31 May 2019

Keywords:

Generalized Frequency Division Multiplexing (GFDM)
Minimum Mean Square Error (MMSE)
Maximum Likelihood Equalizer (MLE)
Pulse shaping filters
Standard Single Mode Fiber (SSMF) and MZM

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

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

20(2019-20)





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 Ziegler-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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21(2019-20)





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NAAC Cycle 2

Criterion: 3.3.1

Microprocessors and Microsystems 72 (2020) 102888



Contents lists available at ScienceDirect

Microprocessors and Microsystems

journal homepage: www.elsevier.com/locate/micpro



Design and development of new control technique for standalone PV system

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ARTICLE INFO

Article history:

Received 18 March 2019

Revised 28 August 2019

Accepted 5 September 2019

Available online 7 September 2019

Keywords:

Sub-Maximum Power Point Tracking (S-MPPT)

Deadbeat controller

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/m² 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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<https://doi.org/10.1016/j.micpro.2019.102888>

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22(2019-20)





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).

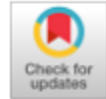
I. Introduction:

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

23(2019-20)



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.

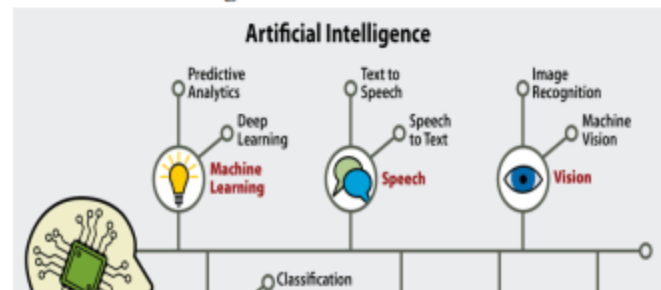
Keywords: Machine Learning, Deep learning, CNN, RCNN, Fast RCNN, Faster RCNN, YOLO, SSD.

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. Robert 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



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[Home](#) > [Journal of Ambient Intelligence and Humanized Computing](#) > [Article](#)

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](#)

[Journal of Ambient Intelligence and Humanized Computing](#) (2019) | [Cite this article](#)

631 Accesses | **16** Citations | [Metrics](#)

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

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NAAC Cycle 2

Criterion: 3.3.1

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

AS Dhas¹, M Madheswaran²

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 Dhas¹, M Madheswaran²

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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West Indian Med J 2018; 67 (3): 243

DOI: 10.7727/wimj.2015.169

26(2019-20)





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NAAC Cycle 2

Criterion: 3.3.1

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

👤 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 γ 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.

27(2019-20)





Materials Research Express



PAPER

Surface structural features and wear analysis of a multilayer Ti6Al4V-B₄C thin film coated AISI 1040 steel

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Keywords: Ti-6Al-4V-B₄C films, surface roughness, nanoindentation, thermogravimetric analysis, wear and friction

RECEIVED

2 October 2019

REVISED

9 January 2020

ACCEPTED FOR PUBLICATION

15 January 2020

PUBLISHED

27 January 2020

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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-4B₄C 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 B₄C 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 B₄C increases the thermal stability of Ti-6Al-4V-4B₄C coatings as well as modifies the oxidation mechanism. It is expected that the addition of B₄C 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⁻¹ 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 Chiccoa *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.

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 to 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
- RFID tags are basically classified into three

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 than 10-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

Revised Manuscript Received on January 30, 2020.

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Retrieval Number: B6612129219/2020@BEIESP
DOI: 10.35940/ijitee.B6612.019320
Journal Website: www.ijitee.org

2879

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication (BEIESP)
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29 (2019-20)





A Controllable Window Function for modeling nonlinearity of a HP memristor model resultant from sigmoidal behavior of memristive method

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Abstract: In order for the future memory technology and computing methods, the storage element is used as a memristor and its resistance is altered by exciting electrical signals and shows nonvolatile memory characteristics. Window functions are a particular method that falls into the classification of macroscopic models, which is commonly applied in the field of memristors to model the nonlinearity of the device. A mathematical model for the titanium oxide (TiO₂) memristive devices found by Hewlett Packard labs is recommended in this brief. In this paper, a nonlinearity of HP memristor is modeled by the proposed controllable window function and it is derived from new sigmoidal equations which are the combination of logistic sigmoidal and Richard's equation that resolves terminal state issues. The proposed controllable window function satisfies the two boundary conditions enforcing zero drift on the bi-layer edges. The additional controllable parameters can be used to control the horizontal scaling and skewness (both right skew and left skew) of the window function to model the different categories of memristors. A contrast with some existing window functions is given. The controllable window function combines all the features from the previously recommended functions and adds an extra degree of flexibility which permits better fitting of data.

Keywords: Memristor, sigmoidal function, Controllable window function, Richard equation. boundary state issues.

1. INTRODUCTION


In electronics world, the fourth fundamental missing circuit device called as memristor which is categorized by L. Chua in 1971 [1]. The memory resistances gives the relation between charge q and flux ϕ is given by $d\phi = Mdq$ where M is the memristor resistance [2]. The Physical device of memristor was invented by Hewlett Packard lab by using two terminal titanium-dioxide (TiO₂) in 2008 [5]. The memristor window function with added features are verified for write and read method [2] and also loop filter design for phased locked loop[3].

A sigmoidal function is applied to model growth processes where the results are partially or completely unknown [8]. Modeling the memristor is very important to design memristor based circuits and explores their performance. The two section of a memristor TiO₂ and TiO_{2-x} attached between two platinum contacts as presented in Figure 1. The change in oxygen vacancies gives the resistance variation and it is a non-volatile, henceforth it behaves as storage element.



Research Articles


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

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

Pages 32-41 | Received 05 Feb 2019, Accepted 05 Feb 2020, Published online: 25 Feb 2020


 Cite this article  <https://doi.org/10.1080/02670844.2020.1730058>



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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

31(2019-20)





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) + Al₂O₃ 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 Al₂O₃ + 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 Al₂O₃+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/Al₂O₃ 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

Revised Manuscript Received on March 30, 2020.

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Retrieval Number: E3213039520/2020©BEIESP
DOI: 10.35940/ijitee.E3213.039520
Journal Website: www.ijitee.org

2051

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication



32(2019-20)





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NAAC Cycle 2

Criterion: 3.3.1



Journal of Applied Research and Technology

www.jart.icat.unam.mx



Journal of Applied Research and Technology 18 (2020) 69-76

Original

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

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Received 10 13 2019; accepted 02 10 2020
Available online 04 30 2020

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 β -Al₅FeSi 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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Peer Review under the responsibility of Universidad Nacional Autónoma de México.

33(2019-20)





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

PDF

Published: Jun 26, 2020

DOI:

<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

34(2019-20)





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](#)

Journal of Ambient Intelligence and Humanized Computing (2019) | [Cite this article](#)

631 Accesses | 16 Citations | [Metrics](#)

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

35(2019-20)





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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Rapid Prototyping Journal
26/4 (2020) 689–697
© Emerald Publishing Limited [ISSN 1355-2546]
[DOI 10.1108/RPJ-06-2019-0157]

Received 12 June 2019
Revised 7 November 2019
Accepted 1 January 2020

36(2019-20)





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NAAC Cycle 2

Criterion: 3.3.1



International Journal of Innovative Technology and Exploring Engineering (IJITEE)
ISSN: 2278-3075 (Online), Volume-9 Issue-2, December 2019

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).

Revised Manuscript Received on December 30, 2019.

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Retrieval Number: B7471129219/2019@BEIESP
DOI: 10.35940/ijitee.B7471.129219
Journal Website: www.ijitee.org

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].

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