



### 3.3.2 Number of research papers per teachers in the Journals notified on UGC website during the last five years

## INDEX SHEET

**2019-2020**

Sl. No.	Title of paper	Name of the author/s	Name of journal	Indexing	Page/ Journal No.
1	Impact of AlInN Back-Barrier Over AlGaIn/GaN MOS-HEMT With HfO <sub>2</sub> Dielectric Using Cubic Spline Interpolation Technique	Prajoon P	IEEE Transaction on Electron Devices	Web of Science	1
2	A Numerical Investigation of Heat Suppression in HEMT for Power Electronics Application	Prajoon P	Silicon	Web of Science	2
3	Optical Grating Techniques for MEMS based Spectrometer - A Review	Prajoon P	IEEE Sensors Council	Web of Science	3
4	Domestic Language Accent Detector Using MFCC and GMM	Roshni Rajan	International Journal of Applied Engineering Research	Scopus	4
5	Investigation on the performance of fiber reinforced concrete subjected to standard fire exposure	Alwyn Varghese	World Journal of Engineering	Web of Science	5
6	Analysis of combustion, emission and performance attributes of hemp biodiesel on a compression ignition engine	Cijil. B. John	World Review of Science, Technology and Sust. Development	Scopus	6
7	Estimation of fuel properties and characterization of hemp biodiesel using spectrometric techniques	Cijil B John, B. Deepanraj	Energy Sources, Part A: Recovery, Utilization, and Environmental Effects	Web of Science	7
8	Palm stearin biodiesel: preparation, characterization using spectrometric techniques and the assessment of fuel properties	Cijil B John, B. Deepanraj	Biomass Conversion and Biorefinery	Web of Science	8



9	Growth and investigations of 3rd order NLO properties of novel semi organic tartaric acid lithium sulfate single crystal for photonics application	B. Deepanraj, P. L. Biju	Optical and Quantum Electronics	Web of Science	9
10	Thematic issue: energy provision from organic by-products, residues, and wastes in Asia	B. Deepanraj	Biomass Conversion and Biorefinery	Web of Science	10
11	Super-Resolution Based Automatic Diagnosis of Retinal Disease Detection for Clinical Applicatio	Anoop V	Neural Processing Letters, Springer	Web of Science	11
12	CAD Systems for Automatic Detection and Classification of Covid-19 in Nano CT Lung Image by Using Machine Learning Technique	Jarin T	International Journal of Pharmaceutical Research	Scopus	12
13	Diabetic Reti- nopathy Detection using Neural Networking	Anil Antony	International Journal of Trend in Sci- entific Research and Development (IJTSRD)	Others	13
14	Automating the Drug Dosage of Tacrolimus for Liver, Renal Transplant Patients using Neural Network	Aswathy Wilson	International Journal of Innovative Technology and Exploring Engineering (IJITEE)	Scopus	14
15	Blind-Assist	Aswathy Wilson	International Journal of Scientific Research & Engineering Trends	Others	15
16	LBA using Blockchain	Bineesh M	International Journal of Trend in Scientific Research and Development	Others	16
17	Library Management System	Fepslin Athish Mon S	International Journal Of trend in Scientific research and Development	Others	17
18	Performance Analysis of different Classifiers for Earthquake prediction: PACE”	Ninu Francis	International Journal of Innovative Research in	Scopus	18



			Technology, IJIRT		
19	Review analysis of products and recommendation system	Sajitha I	International Journal of Trend in Scientific Research and Development	Others	19
20	KYC using Block Chain	Swapna B Sasi	International Journal of Trend in Scientific Research and Development	Others	20
21	Enhanced sparse representation classifier for text classification	Unnikrishnan P	Expert Systems with Applications	Web of Science	21
22	Segmentation by fractional order darwinian particle swarm optimization based multilevel thresholding and improved lossless prediction based compression algorithm for medical images	Jarin T	IEEE Access	Web of Science	22
23	Neural Proliferation using Brain stimulation Methods Intended for Pediatric Neuropsychiatric Population: A Hypothesis and Theoretical Investigation	Jarin T	Test Engineering and Management	Scopus	23
24	Intelligent Parking Management System using Dijkstra's Algorithm with Driver Preferences	Jarin T	Test Engineering and Management	Scopus	24
25	Atmospheric Water Absorption Kit	Jarin T	Journal of Advanced Engineering Research	Others	25
26	Simulation on the generation of electricity from running train wheels.	Jarin T	International Journal of Mechanical and Production Engineering Research and Development	Scopus	26
27	Investigation on novel bulk size single crystal of Glycine with metal ions grown by solution growth method for photonic applications	B. Deepanraj	Materials Letters	Web of Science	27



28	An Optimization Of Drilling Process Parameters In Machining Epoxy Based Carbon Fibre Composites	B. Deepanraj, Nice Menachery, O.P. Sukesh	International Journal of Mechanical and Production Engineering Research and Development	Scopus	28
29	An Experimental Analysis And Optimization Of Heat Treatment Parameters Of Al6061 Alloy For Improved Mechanical Properties	B. Deepanraj	International Journal of Mechanical and Production Engineering Research and Development	Scopus	29
30	Investigation and Optimization of Machining Parameters Influence on Surface Roughness in Turning AISI 4340 Steel	B. Deepanraj	FME Transactions	Web of Science	30
31	Growth and investigation of novel nonlinear optical single crystal of urea potassium dichromate by solution growth technique for photonic application	B. Deepanraj	Journal of Optics	Web of Science	31
32	Production, optimisation and engine characteristics of beef tallow biodiesel rendered from leather fleshing and slaughterhouse wastes	B. Deepanraj	Biomass Conversion and Biorefinery	Web of Science	32
33	Investigation on single crystal by tartaric acid-barium chloride: growth and characterization of novel NLO materials	B. Deepanraj	Bulletin of Materials Science	Web of Science	33
34	An Optimization Of Micro-Drilling Parameters In Carbon Fiber Reinforced Polymer Using Grey Relation Analysis	C. A. Lawrance	International Journal of Mechanical and Production Engineering Research and Development	Scopus	34
35	The Low Cost Adult Diaper Waste Management Method	Nice Menachery	International Journal of Mechanical and Production Engineering Research and Development	Scopus	35



36	An Optimisation Of Surface Area And Heat Transfer Study Of Rectangular Porous Structure	Nisha Sherief	International Journal of Mechanical and Production Engineering Research and Development	Scopus	36
37	Effect of solid concentration on biogas production through anaerobic digestion of rapeseed oil cake	B. Deepanraj	Energy Sources, Part A: Recovery, Utilization, and Environmental Effects	Web of Science	37
38	Biogas from food waste through anaerobic digestion: optimization with response surface methodology	B. Deepanraj	Biomass Conversion and Biorefinery	Web of Science	38
39	Influence of fatty acid composition on process optimization and characteristics assessment of biodiesel produced from waste animal fat	B. Deepanraj	Energy Sources, Part A: Recovery, Utilization, and Environmental Effects	Web of Science	39
40	Spectral feature and Optimization- based Actor-Critic Neural Network for arrhythmia classification using ECG signal	Anoop V	Journal of Experimental & theoretical Artificial Intelligence	Web of Science	40
41	CCGPA-MPPT: Cauchy preferential crossover-based global pollination algorithm for MPPT in photovoltaic system	Anoop V	Progress in Photovoltaics: Research and Applications	Web of Science	41
42	A comprehensive Study on Human Interaction with IoT systems	Drishya MK	International Research Journal of Engineering and Technology (IRJET)	Others	42
43	Different Sensors Used for Biochemical Detection	Ambily Francis	International Research Journal of Engineering and Technology (IRJET)	Others	43
44	Hybrid control of a multi-area multi-machine power system with FACTS devices using nonlinear modeling Journal - IET Generation, Transmission & Distribution	Jose P. Therattil	IET Generation Transmission & Distribution	Web of Science	44



NBA accredited B.Tech Programmes in Computer Science & Engineering, Electronics & Communication Engineering, Electrical & Electronics Engineering and Mechanical Engineering valid for the academic years 2016-2022. NBA accredited B.Tech Programme in Civil Engineering valid for the academic years 2019-2022.

45	A review of blue light emitting diodes for future solid state lighting and visible light communication applications, , Superlattices and Microstructures(J), Elsevier,	Prajoon P	Superlattices and Microstructures	Web of Science	45
46	Design and Implementation of Instantaneous Power Estimation Algorithm for Unified Power Conditioner	Sindhu S	Journal of Power Electronics	Web of Science	46
47	Asset Tracking Using Low Power Bluetooth	David Nettikadan	International Journal of Advanced Research Trends in Engineering and Technology	Others	47
48	Early detection of breast malignancy using wavelet features and optimized classifier	Anoop V	International Journal of Imaging Systems and Technology	Web of Science	48
49	Effect of Geometry on Driver Heart Rate	Jisha Akkara	Transportation Research Procedia	Scopus	49



# Impact of AlInN Back-Barrier Over AlGaIn/GaN MOS-HEMT With HfO<sub>2</sub> Dielectric Using Cubic Spline Interpolation Technique

V. Sandeep, Graduate Student Member, IEEE, J. Charles Pravin<sup>✉</sup>, Member, IEEE, A. Ramesh Babu, and P. Prajoun<sup>✉</sup>, Member, IEEE

**Abstract**—The dc characteristics of AlGaIn/gallium nitride (GaN) metal–oxide–semiconductor–high electron mobility transistor (MOS-HEMT) with an AlInN back-barrier layer has been studied here. An analytical model is proposed for evaluating the charge density ( $\sigma_{tot}$ ), carrier concentration ( $n_s$ ), drain current ( $I_D$ ), and transconductance ( $g_m$ ) of the device by incorporating Hafnium oxide (HfO<sub>2</sub>) as a high- $k$  dielectric layer. The charges created between the oxide and the AlGaIn barrier layer influence the enhancement of carrier concentration of up to  $6.2 \times 10^{13} \text{ cm}^{-2}$ , at the two-dimensional electron gas (2DEG). The AlInN back-barrier increases the conduction band (CB) level of the GaN buffer and eliminates the confinement problems near the channel. By deriving the mathematical dependence of these parameters, this device demonstrated a positive threshold shift and a high current drive of 880 mA/mm. Cubic spline interpolation (CSI) technique is employed here to model the parameters in a more precise manner. The outcomes are evidence that the device could be a potential solution for high power switching as well as microwave applications.

**Index Terms**—AlGaIn/gallium nitride (GaN), AlInN, back-barrier, cubic spline interpolation (CSI), HfO<sub>2</sub> dielectric, metal–oxide–semiconductor–high electron mobility transistor (MOS-HEMT).

## I. INTRODUCTION

SILICON is one of the most common and significant semiconductor materials used in the industry. A remarkable quantity of the research carried out in semiconductors constitute of silicon-based devices. There have been some analytical research carried out for low-dimension silicon-based

Manuscript received June 28, 2020; accepted July 16, 2020. Date of publication August 5, 2020; date of current version August 21, 2020. The review of this article was arranged by Editor K. Alam. (Corresponding author: J. Charles Pravin.)

V. Sandeep and J. Charles Pravin are with the Centre for VLSI Design, Department of Electronics and Communication Engineering, Kalasalingam Academy of Research and Education, Srivilliputhur 626128, India (e-mail: charles@klu.ac.in; pctchrispravin@gmail.com).

A. Ramesh Babu is with the Department of Mathematics, School of Engineering, Amrita Vishva Vidyapeetham, Coimbatore 641112, India.

P. Prajoun is with the Department of Electronics and Communication Engineering, Jyothi Engineering College, Thrissur 679531, India.

Color versions of one or more of the figures in this article are available online at <http://ieeexplore.ieee.org>.

Digital Object Identifier 10.1109/TED.2020.3010710

devices at nanoscales [1], [2]. However, silicon material poses a menace to the microelectronics revolution by keeping the device from performing at high frequencies while scaling down further. Low-dimensional devices find it a challenge to function at high frequencies. So, attention turns over to a more diverse group of materials that approaches the problem of group III–V semiconductors [3]. Significant research was carried out by evaluating the performance metrics of group III and V metal–oxide–semiconductor field effect transistors (MOSFETs) using materials for high electron mobility channels and gate oxides [4]. Gallium nitride (GaN)-based materials were used for building transistors with high mobility, such as high electron mobility transistor (HEMT), achieving large breakdown voltages and suitable for RF circuit simulation and high frequency applications [5], [6].

AlGaIn/GaN-based HEMTs have found intense popularity in the early years due to its capability to form polarization induced charge densities in the order of  $10^{13} \text{ cm}^{-2}$  inside the triangular potential well [7]. AlGaIn/GaN heterostructures also displayed excellent breakdown characteristics proving themselves a viable contender for switching power devices [8], [9]. AlInN material is used as a back-barrier since it could prevent the forming of parasitic electron channel in the buffer layer due to its negative polarization charge [10]. There was still an issue of large gate leakage currents occurring in HEMT devices. Metal–oxide–semiconductor-HEMT (MOS-HEMT) devices were used to overcome this issue by incorporating an oxide or dielectric layer near the metal region. Early research carried out in AlGaIn/GaN-based MOS-HEMTs incorporated Silicon dioxide (SiO<sub>2</sub>) as the dielectric [11], [12]. AlGaIn/GaN hetero-structures were later characterized with oxide layers having high dielectric constants like zinc oxide (ZnO) and aluminum oxide (Al<sub>2</sub>O<sub>3</sub>) and produced exceptional RF and dc performances than the HEMT [13], [14]. HfO<sub>2</sub> is one among such high- $k$  dielectric materials having a large dielectric constant and bandgap. Not only does it enhance the polarization charges and the oxide/GaN interface traps, it also creates a positive threshold shift and the oxide defect charge [15].

In this work, an AlInN material is employed as a back-barrier layer, which eliminates some of the parasitic



Check for updates

# A Numerical Investigation of Heat Suppression in HEMT for Power Electronics Application

L. Arivazhagan<sup>1</sup> · D. Nirmal<sup>1</sup> · P. Pavan Kumar Reddy<sup>1</sup> · J. Ajayan<sup>2</sup> · D. Godfrey<sup>1</sup> · P. Prajoun<sup>3</sup> · Ashok Ray<sup>4</sup>

Received: 2 June 2020 / Accepted: 10 August 2020

© Springer Nature B.V. 2020

## Abstract

In this paper, AlGaIn/GaN High Electron Mobility Transistor (HEMT) with stacked passivation (Diamond/SiN) is proposed and investigated. The implementation of stacked passivation in HEMT has been shown to be effective in suppressing self-heating effect. Under the gate-terminal, the peak channel temperature of HEMT with stacked passivation is 384 K, whereas it is 393 K for conventional HEMT. The reduction of channel temperature in the proposed device is attributed to good heat-spreading via diamond. The thermal resistance ( $R_{TH}$ ) is extracted and it is found that  $R_{TH}$  of proposed HEMT is 17% lower than that of the conventional HEMT. The transconductance of the proposed GaN-HEMT is also improved by 12%. Furthermore, the maximum drain current of 800 mA/mm at  $V_{GS} = 0$  V and  $V_{DS} = 5$  V is obtained for the proposed HEMT with a gate length of 0.25  $\mu$ m. The proposed device is considered as one of the most attractive candidates for future high frequency and high-power applications over a wide range of operating temperatures.

**Keywords** GaN · HEMT · Self-heating · Diamond · Thermal resistance

## 1 Introduction

In recent years, AlGaIn/GaN-on-SiC HEMT receives a great attention in power amplifier and power switches due to their capability of delivering high power at high-frequency [1–3]. Technology innovations such as field plate engineering, back-barrier under GaN buffer and gate-length reduction further enhances the RF and DC performance of GaN HEMT. The performance metrics are breakdown voltage [4–6], drain current [7–9], output-power [10–13], unity current-gain cut-off frequency ( $f_T$ ) [14], maximum oscillation frequency ( $f_{MAX}$ ) etc. However, the improvement in these performance metrics increase the acceleration/velocity of electron in the channel under gate edge of the device. This results in increase of thermal resistance, reduction of total safe operating area, and

increase of channel temperature in the device [15]. Thermal failure and threshold failure levels in semiconductor device also occurs due to increased channel temperature. The increase in channel temperature results in self-heating effects which is a serious concern in modern AlGaIn/GaN HEMT and an extensive investigation is required in this case. A continuous effort has been made to model and/or characterize the self-heating effect and thermal resistance [15, 16]. Very few efforts have been taken to reduce channel-temperature and thermal resistance in the device. Hence, there is a great space in optimising device layout and choice of epitaxial layers for AlGaIn/GaN HEMT towards the suppression of self-heating effects. In this paper, AlGaIn/GaN HEMT with optimized passivation dielectric is proposed to suppress the device heating and thermal resistance. In passivating the GaN HEMT by dielectric material, the Silicon Nitride (SiN) is the most popular choice over the other dielectric materials [17–27]. It is due to the fact that SiN establishes a good quality interface (less dangling bond or surface traps) with GaN or AlGaIn layer and thereby reduces the leakage current in the device [23, 28–30]. The SiN dielectric not only reduces the leakage current, but also helps to suppress the current collapse in GaN HEMTs. Thus, the complete elimination of SiN is not an effective technique in optimizing the passivation dielectric. As a compromise, the combination of Diamond and SiN

✉ D. Nirmal  
nirmal@karunya.edu

<sup>1</sup> Karunya Institute of Technology and Sciences, Coimbatore, India

<sup>2</sup> SNS College of Technology College in Coimbatore, Coimbatore, India

<sup>3</sup> Jyothi Engineering College, Cheruthuruthy, Thrissur, India

<sup>4</sup> Indian Institute of Technology, Guwahati, India



# Optical Grating Techniques for MEMS based Spectrometer - A Review

Ajith Ravindran, Senior Member, IEEE, D Nirmal, Senior Member, IEEE and Prajoon P and Gracia Nirmala Rani D

**Abstract**—This paper examined the innovations of the spectrometers for the measurement of consistency based parameters of the handheld Micro Electronic Mechanical System (MEMS) Spectrometer. Fast, highly sensitive, miniature spectroscopy techniques empowered quick, savvy and effective measures for various applications. In the light spectroscopy-based identification and quantification, advances in the field of wavelength discrimination are significant and essential. The identification of grid parameters and limiting conditions are necessary for the design and fabrication of diffraction gratings, for the spectrometer. This work evaluates the emerging trends in Micro-Spectrometer's Grating Techniques, focusing on the aspects of grating parameters and the recent developments of grating. The main parameters for evaluating the performance of a grating have been reviewed and found that grating efficiency, groove density, free spectral range and resolving power play a significant part in the grating performance. The fabrication technique employed as well as the materials used in the fabrication process, play a significant role in the efficiency of the grating. Silicon, Silicon dioxide ( $\text{SiO}_2$ ), Glass (Silica glass), Poly methyl methacrylate (PMMA), Chromium and Silicon nitride ( $\text{Si}_3\text{N}_4$ ) are the most used materials. The integration of new materials that are ideal for the state-of-the-art semiconductor industry techniques for MEMS fabrication along with a new blazing structure would increase the efficiency of the grating.

**Index Terms**—Diffraction, Optical Grating, Spectroscopy, System Resolution, MEMS, Spectral Range, Dispersion, Transmission gratings, Diffraction order, Groove density.

## I. INTRODUCTION

**S**PECTROSCOPY can be defined as the analysis of absorption, transmission and radiation emission, and the reliance on the radiation wavelength [1]. The spectrum of the material components are derived from a unique interaction of the material's components with specific electromagnetic wave frequencies (absorption, transmission or emission) [2]. The spectrum of the specific materials will be the graphical interpretation of the resulting interactions with frequency. Today, almost all the technical areas of science and engineering use spectroscopic techniques. The variations between the different materials used, may be observed by means of a comparative study of the electromagnetic spectra of various materials with properties comparable in equal size [3, 4].

The basic diagram of the block demonstrating the spectroscopy theory is displayed in Fig.1. The reactions between the elements in a substance and electromagnetic radiation classify the constituents of the material as radioactive, nu-

This paragraph of the first footnote will contain the date on which you submitted your paper for review.

Ajith Ravindran is with the Department of Electronics and Communication Engineering, Karunya Institute of Technology and Sciences, Coimbatore, India and Saintgits College of Engineering, Kottayam, India (e-mail: ravindran.ajith@yahoo.com).

D Nirmal is with the Department of Electronics and Communication Engineering, Karunya Institute of Technology and Sciences, Coimbatore, India (e-mail: dnirmalphd@gmail.com).

Prajoon P is with Department of Electronics and Communication Engineering, Jyothi Engineering College, Cheruthuruthy, Thrissur, India (e-mail: prajoon.p@gmail.com).

Gracia Nirmala Rani D is with Department of Electronics and Communication Engineering, Thiagarajar College of Engineering, Madurai, India (e-mail: gracia@tce.edu).

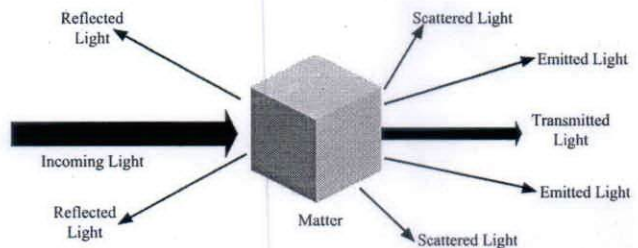


Fig. 1. Basic Spectroscopy Theory

clear, supermolecular and microbial. That is, information of the material such as its atoms, molecules, crystal, etc. can be easily obtained from the electromagnetic wave generation process and its source [5]–[7].

Absorption is electromagnetic energy transfer from the radiation to atoms or molecules in the sample used for the analysis. As a consequence of interaction of the radiation with a sample in solid, liquid or gas state, the electrons that are in the excited state relaxes and goes to an energy state which will be at a lower level by photon emission and the energy of the emitted photons will be similar to the gap in energy between states. Radiation may be emitted from the surface of the sample because of its physical specifications. If the matter is transparent, light will pass through it. When a photon strikes the external layers of an atom, the electron is only absorbed if the amount of energy it carries, kicks the electron from one energy level to higher levels. The photon energies that are not detected in the spectrum are the ones that have equal energy between two energy levels. Spectroscopic analyses are the only

## Domestic Language Accent Detector Using MFCC and GMM

Roshni Rajan.K

Department of Electronics and Communication Engineering,  
Jyothi Engineering College, Thrissur, Kerala, India.

Annie P Joseph

Department of Electronics and Communication Engineering,  
Jyothi Engineering College, Thrissur, Kerala, India.

### Abstract

In day today life, speech is commonly used for communication purpose. So that its recognition has an important role. There are already recognition systems for English and that has been used in different automation and assistance purposes. But in the case of local languages it seems to be difficult in recognition. In the case of Malayalam the usage of words, its pronunciation as well as the meaning vary with respect to the regions. So the same word has different meaning in different areas and hence it become complex. This paper aims to recognize different accents of Malayalam in accounts with the place of the user. Initially a set of training data is acquired from different areas and from the data Mel Frequency Cepstral Co-efficients are extracted as features. A Gaussian Mixture Model is made in accordance with the data which uses Energy Maximization Algorithm. It recognizes the spoken accents and can be used for various home automation and virtual assisting technologies.

**Keywords:** GMM, MFCC

### I. INTRODUCTION

In this paper speech features have been explored to recognize three major accent of Malayalam used in three different regions Ernakulam, Thrissur and Thiruvananthapuram. The dialect of a given language is a pattern of pronunciation of a language used by the community of native speakers and the speech samples are collected from the native speakers of the different accents for both training and testing. Using Mel Frequency Cepstral Coefficients the features of the each speech samples are extracted for both training and testing. Gaussian Mixture Model (GMM) is used for classification of the speech based on accent and the experiment is implemented in Raspberry Pi.

This paper consists of five sections: Literature review is discussed in Section II. Section III deals with Methodology for the proposed techniques. Section IV illustrates the implementation Section V discusses Results and discussions and conclusion in Section VI.

### II. LITERATURE REVIEW

Speech recognition has become a practical concept, which is now being implemented in different languages around the world. Speech recognition covers a wide range of real-world

human language applications which includes the information recovery also. Speech is considered as the common means of the communication as the information plays the basic role in conversation.

Speech recognition is the conversation of the speech that is captured by a microphone or a telephone is to a set of words. It can have either final output or it can synthesis to pronounce into sounds, which means speech-to-speech. In order to achieve speech understanding, Speech recognition can serves as the input to linguistic processing.

Speech recognition systems are characterized by speaking modes and speaking styles, environmental matters ,vocabulary, acoustic model, language model, Signal to Noise Ratio (SNR) etc. The basic model of speech recognition system includes preprocessing, feature extraction and classification as shown in Fig 1.1.



Figure 1.1: Basic model of speech recognition system

At the time of recording speech due to noise signals interference may occurs and it degrades the performance of the system. Before feeding the speech signal to feature extraction block these noise contained in speech signal must be removed. This task is done by pre-processing block. The main function of the feature extraction is to extract the feature from speech signal and to represent them using appropriate data model of the input speech signals.

### III. METHODOLOGY

MFCC-GMM based accent recognition system for Malayalam speech signals in MATLAB and Raspberry Pi is used for the implementation. Mel Frequency Cepstral Coefficients (MFCC)[1] are the features used for classification whereas GMM classifier is used for accent recognition.

The speech input to the system is given through a microphone which is connected to the USB port of the Raspberry Pi via a USB sound card. The USB sound card is used to connect

# Investigation on the performance of fiber reinforced concrete subjected to standard fire exposure

*Alwyn Varghese*

Jyothi Engineering College, Thrissur, India

*Anand N.*

Department of Civil Engineering, Karunya University, Coimbatore, India, and

*Diana Andrushia and Prince Arulraj*

Karunya University, Coimbatore, India

## Abstract

**Purpose** – Aim of this research work is to examine the stress–strain behavior and modulus of elasticity of fiber-reinforced concrete (FRC) exposed to elevated temperature. The purpose of this paper is to study the effect of standard fire exposure on the mechanical and microstructure characteristics of concrete specimens with different strength grade.

**Design/methodology/approach** – An electrical bogie hearth furnace was developed to simulate the ISO 834 standard fire curve. Specimens were exposed to high temperatures of 821°C, 925°C and 986°C for the duration of 30, 60 and 90 min, respectively, as per standard fire curve. Peak stress, peak strain, modulus of elasticity and damage level of heated concrete specimens were evaluated by experimental investigation. SEM-based microstructure investigation has been carried out to analyze the microstructure characteristics of heated concrete specimens.

**Findings** – The results revealed that carbon fiber reinforced concrete was found to be better than the FRC made with other fibers on improving the modulus of elasticity of concrete. An empirical relationship has been established to predict the modulus of elasticity of temperature exposed specimens with different type of fiber and grade of concrete. In comparison with low melting point fibers, high melting point fibers exhibited higher modulus of elasticity under all tested conditions. Surface damage and porosity level of concrete with carbon and basalt fibers were found to be lower than other FRC.

**Originality/value** – Empirical relationship was developed to determine the modulus of elasticity of concrete exposed to elevate temperature, and this will be useful for concrete design applications. This research work may be useful for finding the residual compressive strength of concrete exposed to elevate temperature. So that it will be helpful to identify the suitable repair/retrofitting technique for reinforced concrete elements.

**Keywords** Fiber reinforced concrete, Modulus of elasticity, Basalt fiber, Carbon fiber, Glass fiber, Polypropylene fiber

**Paper type** Research paper

## 1. Introduction

Concrete is a versatile building material used in the construction of buildings and structures compared to the other building materials. Concrete structures always provide a reasonably good life span with least maintenance and hence it is the most widely used material than other man-made materials (Lomborg, 2003). The excellent fire resistance property of concrete is because of its ingredients like aggregates and cement. The properties which enable the concrete to resist fire are mainly its low thermal conductivity and high specific heat capacity. Concrete protects itself from fire or elevated heat conditions by acting as a fire shield among its adjacent spaces (Kodur, 2014). In the case of exposure to higher temperatures for a longer period of time, concrete undergoes drastic chemical and physical changes which lead to weakening of concrete

(Heikal, 2000; Xu *et al.*, 2001). The type of aggregates and its properties have a significant role on the residual characteristics of concrete exposed to high temperature (Arioz, 2007). The degradations of concrete with different aggregates are not similar when exposed to elevated heat (Sakr and El-Hakim, 2005). Fibers have been widely used to improve the ductility of concrete. It is reported in literature that some fibers help to maintain the properties of concrete after exposure to elevated temperature. The addition of fiber was found to improve the behavior of concrete at elevated temperature and the fiber was found to enhance the peak strain of concrete (Poon *et al.*, 2004). Table 1 gives a brief summary of the research work carried out on modulus of fiber-reinforced concrete (FRC) exposed to elevated temperature.

Although few researchers have reported about the modulus of elasticity of different FRC (except for concrete with steel fiber, polypropylene fiber [PPF] and poly vinyl alcohol fiber

The current issue and full text archive of this journal is available on Emerald Insight at: <https://www.emerald.com/insight/1708-5284.htm>



World Journal of Engineering  
© Emerald Publishing Limited [ISSN 1708-5284]  
[DOI 10.1108/WJE-04-2020-0138]

True Copy Attested

Department of Science and Technology, Ministry of Science and Technology, Science and Engineering Research Board, YSS/2015/001196.

Received 28 April 2020

Revised 21 September 2020

Accepted 2 December 2020

*Prasad*  
SURYA JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)  
PRINCIPAL

Jyothi Engineering College  
Cheruthuruthy P.O.- 679 531

## Analysis of combustion, emission and performance attributes of hemp biodiesel on a compression ignition engine

Cijil B. John\* and S. Antony Raja

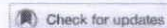
Department of Mechanical Engineering,  
Karunya Institute of Technology and Sciences  
(Deemed to be University),  
Coimbatore, 641114, Tamil Nadu, India  
Email: cijilbjohn@jecc.ac.in  
Email: santonyraja@karunya.edu  
\*Corresponding author

**Abstract:** The increasing pollution problems caused by conventional fuels and fuel scarcity are forcing the scientists all over the world to look for sustainable fuel alternatives. The suitability of hemp biodiesel derived from non-edible industrial grade hemp (*Cannabis sativa* L.) seed as a biofuel in C.I engines is discussed in this paper. The performance, emission and combustion attributes of different hemp biodiesel combinations are tested on a Kirloskar VCR engine at a standard compression ratio 17.5:1 and the outcomes are contrasted with those of standard diesel fuel. Hemp biodiesel blends exhibit an average increment of 7.35% in the mechanical efficiency in comparison to neat diesel. Hemp biofuel blends also results in a moderate decrement in CO and HC emissions by 20.83% and 24.5% accordingly at peak load. The experimental findings show the suitability of hemp biodiesel blends as a nature-friendly alternate fuel.




**Keywords:** biodiesel; alternative fuel; hemp oil; diesel engine; compression ratio; performance; combustion; emission.

**Reference** to this paper should be made as follows: John, C.B. and Antony Raja, S. (2020) 'Analysis of combustion, emission and performance attributes of hemp biodiesel on a compression ignition engine', *World Review of Science, Technology and Sustainable Development*, Vol. 16, No. 2, pp.169-183.

**Biographical notes:** Cijil B. John is a part time Research Scholar in the Department of Mechanical Engineering at Karunya Institute of Technology and Sciences (Deemed to be University), Coimbatore, Tamil Nadu, India. He holds a Master's degree in Internal Combustion Engineering from the Hindustan University, Chennai. His research interests include alternative fuels for IC engines, fuels and combustion, automobile engineering etc. He has over five years of teaching experience and presently working as an Assistant Professor in the Department of Mechanical Engineering at Jyothi Engineering College, Thrissur, Kerala, India.



## Estimation of fuel properties and characterization of hemp biodiesel using spectrometric techniques

Cijil Biju John <sup>a,b</sup>, Antony Raja Solamalai<sup>a</sup>, Ranjitha Jambulingam <sup>c</sup>, and Deepanraj Balakrishnan <sup>b</sup>

<sup>a</sup>Department of Mechanical Engineering, Karunya Institute of Technology and Sciences, Coimbatore, India;

<sup>b</sup>Department of Mechanical Engineering, Jyothi Engineering College, Thrissur, India; <sup>c</sup>CO2 Research and Green Technologies Centre, Vellore Institute of Technology, Vellore, India

### ABSTRACT

Reducing fossil fuel reliance is considered a great challenge for several progressive emerging economies. The development of alternative renewable fuels tends to improve energy security as well as diminish fuel supply vulnerability. This paper details an enhanced protocol intended for the manufacture of hemp biodiesel over two-stage base catalyzed transesterification from crude hemp oil (CHO). The estimation of fuel properties, along with the various spectrometric techniques like Gas Chromatography and Mass Spectrometry (GC-MS), Fourier Transform Infra-Red Spectrometry (FTIR), and Thermo Gravimetry-Differential Scanning Calorimetry/Derivative Thermogravimetry (TG-DSC/DTG) methodologies were used to properly assess the quality and quantity of hemp (*Cannabis Sativa L.*) biodiesel (HB). The density, kinematic viscosity, and cetane number of HB were found to be 876 kg/m<sup>3</sup>, 3.91 cSt, and 50, respectively. Since the estimated fuel properties fall well within the range of American Society for Testing and Materials (ASTM) standards, HB could be considered as a sustainable fuel alternative to conventional diesel. GC-MS results demonstrate that the HB contains unsaturated long-chain fatty acids like 9,15-Octadecadienoic acid methyl ester as dominant in the mixture. The FTIR spectrum of crude hemp oil and the synthesized biodiesel confirm the conversion of triglycerides in the CHO into methyl esters in the HB. The findings obtained from TG-DSC/DTG are in near agreement with the results of GC-MS and FTIR. It is therefore proven the hemp oil has abundant potential to be used as an inedible source for the manufacture of bio-diesel.

### ARTICLE HISTORY

Received 24 June 2020  
Revised 14 October 2020  
Accepted 16 October 2020

### KEYWORDS

Hemp biodiesel; fatty acid methyl ester; fuel properties; biodiesel characterization; spectrometric techniques

### Introduction

Reliable, affordable, safe, and eco-friendly energy supplies are essential for the economic development of a nation, as well as for the overall well-being of an individual. A major share of the global energy demand is being met by fossil fuels like coal, natural gas, and other petroleum products. Compression Ignition (C.I) engines fueled by petro-diesel, are widely used in industrial, agricultural, and transportation sectors due to their versatility in terms of greater fuel efficiency, reliability, lower fuel costs, and safer operation. Researchers have been successful in raising the thermal efficiency of C.I engines considerably in the past. At the same time, the pollutants generated by the combustion of fossil fuels are responsible for the rising environmental concerns like global warming, climatic change, acid rain, respiratory problems to individuals, etc. The ever-increasing population, the higher living standards caused by rapid urbanization and industrialization, dependence on foreign countries for crude oil, the rapid hike in petroleum prices, and the environmental pollution problems caused by the

**CONTACT** Deepanraj Balakrishnan  babudeepan@gmail.com  Department of Mechanical Engineering, Jyothi Engineering College, Thrissur, Kerala, India.

© 2020 Taylor & Francis Group, LLC

True Copy Attested

  
**Dr. SUNNY JOSEPH KALAYATHANKAL**  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)  
PRINCIPAL  
Jyothi Engineering College



# Palm stearin biodiesel: preparation, characterization using spectrometric techniques and the assessment of fuel properties

Cijil B. John<sup>1,2</sup> · S. Antony Raja<sup>1</sup> · B. Deepanraj<sup>2</sup> · H. C. Ong<sup>3</sup>

Received: 11 October 2020 / Revised: 16 December 2020 / Accepted: 29 December 2020  
© The Author(s), under exclusive licence to Springer-Verlag GmbH, DE part of Springer Nature 2021

## Abstract

In the contemporary era, our planet has been experiencing an unprecedented energy shortage and degradation of the environment. The exhaustion of crude oil reserves, fluctuation in fuel prices, and the escalating environmental pollution problems are driving the researchers worldwide to search for sustainable alternative fuels. This study discusses an enhanced protocol for the production of biodiesel using crude palm stearin (CPS), the nonedible solid portion of palm oil, through alkali-catalyzed transesterification. The significant physicochemical properties of CPS and palm stearin biodiesel (PSB) were analyzed by adopting American Society for Testing and Materials (ASTM) test procedures and contrasted with the commonly used biodiesels, petro-diesel, and ASTM biodiesel standards. The kinematic viscosity, density, gross calorific value, and cetane number of PSB were noticed to be 0.566 cSt, 0.882 kg/m<sup>3</sup>, 38,676.90 kJ/kg, and 47.5, respectively. The fatty acid composition and the functional groups present in CPS and PSB were determined by gas chromatography mass spectrometry (GCMS) and Fourier transform infrared spectrometry (FTIR) techniques. GCMS spectra for PSB demonstrated a composition consisting of myristic acid, palmitoleic acid, palmitic acid, elaidic acid, oleic acid, stearic acid, linoleic acid, and eicosapentaenoic acid in varying percentages. The conversion of triglycerides in the CPS into methyl esters in PSB was confirmed by the FTIR analysis. The results of thermogravimetric analyses were also in good agreement with GCMS and FTIR. The closeness of the estimated properties of PSB with petro-diesel and the conformance with ASTM standards indicate the prospective of PSB as an alternative fuel for compressed ignition engines.

**Keywords** Palm stearin biodiesel · Biodiesel characterization · Alternative fuel · Fatty acid composition · Spectrometric techniques · Thermogravimetric analysis

## 1 Introduction

The exhaustion of petroleum reserves has resulted in a collective attempt to explore ecofriendly and renewable alternate fuel resources. The continuous increase in crude oil prices and the diminishing fuel reserves have forced numerous scientists worldwide to study the feasibility of lipids obtained

from biomass as alternatives to conventional fuels. Many scientists and ecologists have proclaimed biodiesel as the most favorable and sustainable option to lower the dependence on crude oil and to reduce global CO<sub>2</sub> emissions [1]. In addition, the usage of biodiesel also supports the agricultural sector and positively impacts the nation's economy [2]. Biodiesels from vegetable oils have energy content close to petro-diesel and are regarded as an inexhaustible energy source. The biodiesel also offers the advantages of being toxic free and sulfur free and provides better lubricity compared with petro-diesel [3]. Since vegetable oils are produced from renewable sources, they have gained much attention recently as alternative fuels. However, the large molecular size and the higher viscosity associated with vegetable oils prevent their direct utilization in engines. These problems can be resolved, if the vegetable oils are converted to biodiesels [4]. Nevertheless, the use of cooking oils for fuel production cannot be justified as they create a food–fuel conflict, mostly in third world nations [5].

✉ B. Deepanraj  
babudeepan@gmail.com

<sup>1</sup> Department of Mechanical Engineering, Karunya Institute of Technology and Sciences, Coimbatore 641114, India

<sup>2</sup> Department of Mechanical Engineering, Jyothi Engineering College, Cheruthuruthy, Thrissur 679531, India

<sup>3</sup> School of Information, Systems and Modelling, Faculty of Engineering and Information Technology, University of Technology Sydney, Ultimo, NSW 2007, Australia



# Growth and investigations of 3rd order NLO properties of novel semi organic tartaric acid lithium sulfate single crystal for photonics application

S. Rajeswari<sup>1</sup> · Geetha Palani<sup>1</sup> · B. Deepanraj<sup>2</sup> · P. L. Biju<sup>2</sup> · V. Chithambaram<sup>1</sup>

Received: 17 March 2020 / Accepted: 15 July 2020  
© Springer Science+Business Media, LLC, part of Springer Nature 2020

## Abstract

Single crystals of tartaric acid lithium sulfate (TALS), a semi-organic nonlinear optical crystal has been successfully grown by slow evaporation solution growth technique. Single crystals were grown in a life span of 3 weeks. The grown crystals were characterized by single crystal X-ray diffraction to identify the lattice parameters. Fourier Transform Infra Red studies confirm the presence of various functional groups present in the crystal. Optical, mechanical, microscopic image and thermal stabilities of the title crystal was carried out to know the properties of the titled compound. Third order non-linear studies have also been studied by Z-scan techniques. Nonlinear absorption and nonlinear refractive index were found out and the third order bulk susceptibility of compound was also estimated. The negative sign in the refractive index indicates the self-defocusing nature of the crystal.

**Keywords** Semi organic crystal · Optical properties · DSC analysis · Mechanical properties · Z-scan technique

## 1 Outline

Recently, many young researchers are focusing their interest towards the development of third order semi organic nonlinear optical crystal. Because of its wide application in the field of LASER, photo detectors, computers, optical calculators, signal processing, etc. (Terkia-Derdra et al. 2000; Fuks-Janczarek et al. 2005; Zawadzka et al. 2013). The emerging materials must possess shorter UV cutoff wavelength, large optical transparency window and high nonlinearity. Among them the semi organic materials show prominent properties due to their fast and large nonlinear response over a broad frequency range and large optical damage threshold (Kulyk and Turko 2007; Chithambaram et al. 2011; Chithambaram and Krishnan 2014). The existence of strong nonlinear absorption, the optical limiting property is clearly visible in organic materials which

✉ V. Chithambaram  
chithambaramv@gmail.com

<sup>1</sup> Physics R&D, Dhanalakshmi College of Engineering, Manimangalam, Chennai, India

<sup>2</sup> Department of Mechanical Engineering, Jyothi Engineering College, Thrissur, India

Published online: 28 July 2020

Springer

True Copy Attested

*Sunny Joseph*  
Dr. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)  
PRINCIPAL  
Jyothi Engineering College



Check for updates

## Thematic issue: energy provision from organic by-products, residues, and wastes in Asia

B. Deepanraj<sup>1</sup> · M. Mubarak<sup>2</sup> · S. Jayaraj<sup>3</sup> · R. Thundil Karuppa Raj<sup>4</sup>

Published online: 30 July 2020

© Springer-Verlag GmbH Germany, part of Springer Nature 2020

Due to fast industrialization and increasing population, large quantities of organic wastes are being generated in different forms such as solids, liquids, sludge, and gases. These wastes include among others agricultural wastes and crop residues, excreta from animals, slaughterhouse waste, organic household waste, polluted waste water, wood processing residues, and waste from fruit markets. Each city produces tons of organic wastes daily from households, hospitals, industry offices, market centers, restaurants, etc. Every year in the world, several million tons of organic wastes are being disposed through different ways such as incineration, anaerobic digestion, land applications, and land filling.

This globally available and to be treated organic waste has a high potential to be used as a bio-renewable energy resource and to be turned into high-value by-products. This thematic issue titled "Energy provision from organic by-products, residues and wastes in Asia" within the *Biomass Conversion and Biorefinery* (Journal) highlights recent advances of our understanding on energy production from different waste streams in Asia.

The above thematic issue consists of state-of-the-art and original research works involving experimental and numerical studies, recent developments, and novel and emerging

technologies in the area of energy production from organic waste. This thematic issue covers the thermo-chemical and biochemical conversion systems including gasification of palm kernel shells, groundnut shell, and *Madhuca longifolia* biomass to bioenergy. Additionally, saccharification of lignocellulosic biomass for bioethanol production, utilization of waste coconut meal for biodiesel and bioethanol production, and usage of beef tallow for biodiesel are tackled. Beside this, anaerobic digestion of perennial grass, textile industries wastes, food waste, and water hyacinth for biogas (biomethane) production have been addressed. We believe that the readers will enjoy reading the scientific articles and will collect many new scientific impressions and insights from this thematic issue.

Finally, we would like to thank the authors of this thematic issue for their valuable contributions and all the reviewers for their helpful comments and suggestions greatly helping to enhance the quality of the papers.

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

True Copy Attested

✉ B. Deepanraj  
 babudeepan@gmail.com; deepanraj@jecc.ac.in

<sup>1</sup> Department of Mechanical Engineering, Jyothi Engineering College, Cheruthuruthy, Thrissur, India

<sup>2</sup> Department of Mechanical Engineering, MEA Engineering College, Perinthalmanna, India

<sup>3</sup> Department of Mechanical Engineering, National Institute of Technology Calicut, Kozhikode, India

<sup>4</sup> School of Mechanical Engineering, Vellore Institute of Technology, Vellore, India

  
 Dr. SUNNY JOSEPH KALAYATHANKAL  
 M.Tech, MCA, M.Sc, M.Phil, B.Ed  
 Ph.D (Computer Science), Ph.D (Maths)  
 PRINCIPAL  
 Jyothi Engineering College  
 Cheruthuruthy P.O.- 679 531





## Super-Resolution Based Automatic Diagnosis of Retinal Disease Detection for Clinical Applications

V. Anoop<sup>1</sup> · P. R. Bipin<sup>2</sup>

© Springer Science+Business Media, LLC, part of Springer Nature 2020

### Abstract

In medical image processing, the automatic analysis of pathology localization and the anatomical segmentation steps are more important. The Fundus images of Low resolution (LR) are not applicable to detect the retinal disease. The main aim of this paper is to enhance the resolution of the low-resolution retinal images obtained from the cheap imaging devices within less computational time and high accuracy. So, we proposed the fundus image with Super-Resolution and its performance via the Diagnostically Significant Area (DSA). This approach focuses only on the region of Interest (ROI) instead of concentrating on the entire image leading to less computational time by reducing the time complexity. Therefore, the Eigen MR inter-band feature, Energy MR intra-band feature, Shannon entropy and Sensitive Contrast Interest (SCI) are used to capture the clinical data from the selected region. Therefore, the DSA is determined by using Levenshtein based KNN classifier. Because of better classification outcomes, the Bicubic method is employed in the selected region to reduce the loss of reconstruction error. Experimentally, the implementation works are carried out in the platform of MATLAB with DRIVE and STARE database images are chosen. The super-resolution image performances are compared with different start of art techniques such as PSM, GR-SR, LLE, and SpC-SR. Finally, higher efficiency with low computational super-resolution fundus images is collected.

**Keywords** Retinal image · Super-resolution · ROI · Fundus · KNN

### 1 Introduction

The degeneration of age-related muscular, Diabetic Retinopathy (DR) disease and the retinal problem diagnosis are carried out by using Fluorescein Angiographic (FA). In the diabetic population, the main reason for the blindness and low vision is Diabetic Macular Edema (DME). When compared to Proliferative diabetic retinopathy, the DME contains more visual loss. For ophthalmologists, the diagnosis and prediction of various eye diseases from the muscular area is an important task [1]. Hence, progressive disease is

True Copy Attested

✉ V. Anoop  
anoopv.phd@gmail.com; vanoop@gmail.com

<sup>1</sup> Jyothi Engineering College, Cheruthuruthy, Thrissur, Kerala 679531, India

<sup>2</sup> Adi Shankara Institute of Engineering and Technology, Kalady, Ernakulam, Kerala 683574, India

*Anoop*

## Research Article

# CAD Systems for Automatic Detection and Classification of Covid-19 in Nano CT Lung Image by Using Machine Learning Technique

DR.S.U. ASWATHY<sup>1\*</sup>, DR.T. JARIN<sup>2</sup>, RIA MATHEWS<sup>3</sup>, LAKSHMI M NAIR<sup>4</sup>, M. RROAN<sup>5</sup><sup>1</sup>Professor, Department of Computer Science and Engineering, Mangalam College of Engineering, Kottayam.

E-mail:

<sup>2</sup>Professor, Department of Electrical and Electronics Engineering, Jyothi College of Engineering, Thrissur.

E-mail:

<sup>3</sup>Assistant Professor, Department of Computer Science and Engineering, Saingits College of Engineering, Kottayam.

E-mail:

<sup>4</sup>Assistant Professor, Department of EEE, Mohandas college of Engineering and Technology, Thiruvananthapuram.

E-mail:

<sup>5</sup>B. Tech Scholar, Department of Computer Science and Engineering, Mangalam College of Engineering, Kottayam.

\*Corresponding Author

Email ID: [aswathy.su@gmail.com](mailto:aswathy.su@gmail.com), [jeroever2000@gmail.com](mailto:jeroever2000@gmail.com), [riam308@gmail.com](mailto:riam308@gmail.com), [lakshmiimnair@yahoo.com](mailto:lakshmiimnair@yahoo.com), [rroanmoorthy1998@gmail.com](mailto:rroanmoorthy1998@gmail.com).

Received: 19.04.20, Revised: 19.05.20, Accepted: 19.06.20

## ABSTRACT

The WHO has declared Human Coronavirus (HCoV) ongoing outbreak to be a global public health emergency. Corona virus (HCoV) was reported two months ago in Wuhan, China. Health care systems over the world get into a chaotic mode due to limited capacity and a hectic increase of suspected coronavirus cases. The one thing that everybody is trying to do is to reduce the effect of cause created for a patient. This study will show how Machine Learning technique can be used for classifying the infected and healthy lung using the nano scaling imaging technique of computed tomography (CT) lung scans. Pre-processing is used to reduce the effect of intensity variations and for noise removal between CT slices. Then thresholding and other morphological operation is used to separately isolate the background of the CT lung scan. Each dataset that we take undergoes a texture-based feature extraction method in which it uses GLCM along with a wrapper method for optimization. The obtained features are classified using a Deep convolutional neural network, which will classify in several layers. By giving our input of scan images it will train in an efficient manner and gives us an accuracy of 99%.

**Keywords:** Nano Technique, GLCM, Deep Convolutional Neural Network, COVID-19, Pneumonia.

## INTRODUCTION

COVID-19 also known as coronavirus which already have the presence in December 2019 named SARS-2 but mainly create cause from 2020 in which it basically affects the respiratory system. WHO declared this virus as a pandemic nature due to its widespread [1]. The most common cause of this virus is cough, cold that

leads to infection [2]. Several characteristics can influence its severity: weak or impaired immune system, chronic diseases like asthma or bronchitis, elderly people and smoking. The treatment depends on the organism responsible for the infection, but usually requires antibiotics, cough medicine, fever reducer and pain reliever.

True Copy Attested

  
Dr. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)  
PRINCIPAL

# Diabetic Retinopathy Detection using Neural Networking

N Rahul<sup>1</sup>, Roy Eluvathingal<sup>1</sup>, Sanith Jayan K<sup>1</sup>, Mr. Anil Antony<sup>2</sup>

<sup>1</sup>Student, Department of Computer Science, <sup>2</sup>Assistant Professor, Department of CSE,  
<sup>1,2</sup>Jyothi Engineering College, Thiruvananthapuram, Thrissur, Kerala, India

## ABSTRACT

The clinical and laboratory studies states that diabetic retinopathy is the major cause of permanent blindness among the aged personalities. The problem with this disease is that there is no cure for it and the only thing we can do is to detect the disease as soon as possible in order to prevent further loss of vision. In this system we propose a CNN approach for diagnosing DR from retinal images and classifying the stages of the disease

The classification is done based on the haemorrhages, micro aneurysms present in the retinal image. We train this network using a high-end graphics processor unit (GPU) using kaggle data set and the disease classification is done, hence we can identify the the disease and prevent the further loss of vision.

**KEYWORDS:** component, formatting, style, styling, insert

**How to cite this paper:** N Rahul | Roy Eluvathingal | Sanith Jayan K | Mr. Anil Antony "Diabetic Retinopathy Detection using Neural Networking" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-4 | Issue-4, June 2020, pp.1358-1360, URL: www.ijtsrd.com/papers/ijtsrd31487.pdf



IJTSRD31487

Copyright © 2020 by author(s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



## I. INTRODUCTION

There are a large number of diseases seen around us. Some of them can cure and some of them are not. The only thing we can do with those incurable diseases is to prevent them. The clinical and laboratory study states that diabetic retinopathy is such a disease which cannot be cured completely. Health studies state that diabetic retinopathy is one of the major reasons for the permanent blindness for the aged people. Retinopathy means- damage of retina. Diabetic retinopathy is a complication that affects the eyes. DR is caused due to the damage to the blood vessels of the light sensitive tissues at the back of the eye that leads to the permanent blindness of the eye. Diabets remains a leading cause of legal blindness between the ages of 25-65 years in the western world and it is responsible for 1.8 million cases of blindness throughout the world [1]. Screening of DR is crucial for type1 (insulin dependent) and type2 (noninsulin dependent) diabetic patients as both types are at risk of Diabetic retinopathy. DR has two stages, namely non proliferative diabetic retinopathy (NPDR) and proliferative retinopathy (PDR). NPDR also known as background retinopathy. It is an early stage of diabetic retinopathy. In this early stage, tiny blood vessels within the retina leaks blood or fluid and this leakage causes damage to retina. Non-proliferative diabetic retinopathy (NPDR) is an early stage of diabetic retinopathy and it is categorized into three stages they are mild, moderate and sever NPDR [2]. The Proliferative Diabetic Retinopathy (PDR) is a stage of retinopathy where blood vessels proliferate i.e. grows. The magnification of incipient vessels represent the advanced stages of DR known as the proliferative diabetic retinopathy

(PDR), which poses the high risk of rigorous vision loss [3]. DR is an incurable disease so we can't recollect the lost vision So there is a need of a system that can detect the disease as soon as possible and hence prevent the further loss of vision. In our system we are proposing a CNN approach for diagnosing DR from retinal images and classifying the stages of the disease.

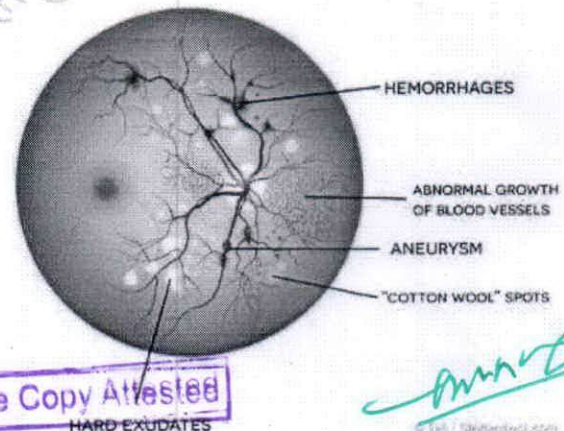


Fig.1. Signs and symptoms of diabetic retinopathy

## II. EXISTING SYSTEM

A. An automated early diabetic retinopathy detection through improved blood vessel and optic disc segmentation

An automated early diabetic retinopathy detection is the method of detecting the disease from the fundus image

DR. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)  
PRINCIPAL  
Jyothi Engineering College  
Cheruthuruthy P.O. - 679 531

# Automating the Drug Dosage of Tacrolimus for Liver, Renal Transplant Patients using Neural Network

Nijitha Thomas K., Aswathy Wilson

*Abstract: Nowadays in medical field the major concern lies in the field of liver, renal diseases. Liver is the largest organ in the body and it is the factory which processes all the foods we taken. We should keep liver in perfect condition. But today there were lot of Liver, renal damages occurred commonly. where sluggish lifestyle of humans and escalated alcohol abuse has become dangerously common, liver ,kidney health have regained focus. This can cause liver cirrhosis and liver dysfunction. The main solution for this is transplantation surgeries. In most of the cases, transplantation surgeries are successful. But after few days normal patients become die. its a very common news. This is because of the lack of ideal drug dosage prediction. Today all of the medical practitioners calculate manually using some patients responses towards the drug. So it is not a systematic approach. Only purely mathematical approach is available for calculating drug dosage.*

*To achieve an optimal drug dosage calculation, proposed model will automate this system based on some patients response data like cell viability, drug trough level, Creatine Test result, biopsy result, MELD score etc using some artificial intelligence techniques like neural networks. The human and monetary of both optimal and Sub-optimal drug dosage may be deduced from the action of various optimized neural networks. Neural networks provide sceptical help to doctors. Currently there is no system will automatize this dosage calculation. This calculation based on patients responses after transplantation surgery. Normally start with zero level dosage of medicines. After few days the ideal drug usage calculations occurred based on some observing patients different levels of data. Automate this system will help to doctors to calculate automatically the optimal usage of drugs makes precise calculations in the patients health.*

**Keywords – Artificial Intelligence, Artificial Neural Network, MELD score, Tacrolimus**

## I. INTRODUCTION

In medical field, there were lot of medical procedures implemented with the help of computer applications nowadays. Today it's necessary to keep all detailed patient's data using computer. Many of the techniques developed for medical imaging (CT scan , MRI scan) implemented using computer technologies. Robotic technologies (including surgical robots and rehabilitation robots) are widely used for many of the surgical procedures. The use of computer applications range in health care will be widely increased. Currently the application of computer technologies are widely used in drug therapy also. In this the major experiments will concentrate on optimal drug dosage calculation.

Because Inter variability and individual variability in requirements of dosage formally use guided by physicians quantified drug management, which gives in rampant variations from the objective dosage ranges.[12] Normally once a peculiar drug is chosen, the pharmacokinetics clinical principles are required to assure the pertinent management of drug is chosen for an administration appropriate route . On the basis of the patient's handling parameters of drug, which require a considerate of one basic pharmacokinetics metabolism and excretion, absorption, distribution, the regimen of dosage for the medicine in a appropriate patient can be developed. It is necessary to ensure that the appropriate regimen is prescribed to achieve optimal adequacy and nominal toxicity. Nowadays there were lot of liver and kidney diseases widely increased. The new lifestyle of the peoples were highly influenced these type of chronic diseases. Some of the diseases which will lead to the transplantation of liver or kidney.[1]

These are:

- viral hepatitis
- Alcoholic liver disease
- Autoimmune hepatitis
- Acute liver failure
- Autoimmune diseases, such as lupus and IgA nephropathy
- Nephrotic syndrome
- Urinary tract problems

In these liver, kidney failures, the only solution for this is liver, kidney transplantation. Here the major reason lies in the lifestyle change

and misconceptions about health in between people. where sluggish lifestyle of humans and escalated alcohol abuse has also the reasons for this kind of liver, kidney damages[2].

Transplantation is the procedure of the deportation of tissue from one part of the body or from one individual and its implantation or insertion in another . Most of the organs will be transplanted nowadays. Transplantation have vital role in survival of patients. In case of transplantation, tacrolimus is the main drug used for suppressing the immunity. For every person receives an organ or tissue from someone else during surgery of transplantation, that person's immunity system may observe that it is foreign. It is because of the person's immune system distinguish that the antigens on the cells of the organ are different. Mismatched organs, or tissues that are not matched intently enough, can generate a blood exchange reaction or transplant rejection.

True Copy Attested

Revised Manuscript Received on December 15, 2019.

Nijitha Thomas K., M.tech, Department of Computer Science, Jyothi Engineering College Cheruthuruthy, Thrissur, Kerala, India.

Aswathy Wilson, Assistant Professor, Department of Computer Science, Jyothi Engineering College Cheruthuruthy, Thrissur, Kerala, India.

Dr. SUNNY JOSE, KALAPATHANKAL  
M.Tech, M.S., IJITEE  
Ph.D (Computer Science), Ph.D (Maths)

## Blind-Assist

Parvathy Mohanakrishnan, Reshma P.G, Shabana Asmi K S, Assistant Professor Aswathy Wilson

Dept. of CSE, JECC, Thrissur, Kerala

parvathy.cs16@jecc.ac.in, reshma.cs16@jecc.ac.in, shabana.cs16@jecc.ac.in, aswathy@jecc.ac.in

**Abstract** – The recent survey on the issues faced by the visually impaired suggested self-reliant movement in urban areas as challenge. It also becomes difficult for them to stay a track of their routine environments. So, we proposed a completely unique way of assisting the visually impaired to acknowledge e various objects and to detect obstacles. The system detects obstacle before of the person and also recognize them to assist aid a visually impaired person. This paper proposes an efficient system for both obstacle detection and beholding. We employ image-based recognition supported the visual information obtained from a pi-cam to detect objects. Ultrasonic sensors are accustomed aid the obstacle detection. Ultrasonic waves are emitted by the ultrasonic sensors to detect the presence of an obstacle and therefore the distance thereto. Raspberry pi is common medium for obstacle detection and beholding. Raspberry is connected to ultrasonic sensor via a breadboard and pi-cam is direct connected to Raspberry pi. Raspberry Pi is employed to implement artificial vision using python language on the OpenCV platform, presence of third-party modules, open source, extensive support libraries like characteristics of python adds advantages to the processing part. This paper proposed a modified YOLO algorithm in OpenCV using Python language and COCO dataset which has an additional module for obstacle detection. The camera captures the image of the item and extract the item alone by clearing off the encompassing. The image is them compared with the predefined dataset to spot the item particularly. The output information regarding the item are provided via a headset or ear-bone. Experimental analyses also are provided to match various methods and draw some meaningful conclusions. In obstacle detection, the presence of an obstacle is known via buzzer sound. The system is especially introduced by keeping in mind the most aspects and therefore the difficulties faced by the visually impaired in their day-to-day life.

**Keywords** – COCO, Object Recognition, Obstacle Detection, Ultrasonic Sensor, YOLO.

### I. INTRODUCTION

Visually impaired people represent a significant population segment, currently the number being estimated to tens of millions around the globe. Their integration in the society is an important and constant objective. A great effort has been made to assure a health care system. Various guidance system techniques have been developed to assist the visually impaired people in living a normal life. Often, these systems are designed only for specific tasks. Nevertheless, these systems can greatly contribute to the mobility and safety of such people. The development of state-of-the-art guidance systems to assist visually impaired people is closely related to the advanced methods in image processing and computer vision as well as to the speed performance of the devices and unit processors. Regardless of the involved technology, the application needs to operate in real time with quick actions and decisions, as the speed might be critical for tacking actions. Basically, picking up the best solution is a trade-off between the performance of the software component and the hardware capabilities. Optimum parameters tuning is required. During the indoor or outdoor movement of a visually impaired person, one of the main objectives for the assisted system is to

automatically detect and recognize objects or obstacles followed by an acoustic alert. The integrated guidance system for visually impaired people developed includes two basic platforms:

- Raspberry Pi platform, with an ARM Advanced RISC Machine; and RISC - Reduced instruction set computing technology. Object detection and recognition is performed using a camera as source and the software is OpenCV based.
- Ultrasonic sensors are used for obstacle detection which uses ultrasonic signals to detect the presence of an obstacle and the distance to it.

The vision module for image processing proposed in the paper is an integrated part of the platform dedicated to guide visually impaired people. The vision-based guidance system proposed is designed, developed and validated throughout experiments and iteratively optimized. The module is compliant to the principle of developing a highly performance device but cost effective with practical usage. The module is using disruptive technology and allows for updating and inclusion of new functions.

#### Procedure for Paper Submission

- **Related Works**

Techniques for the obstacle detection and recognition victimization supersonic sensors and processing

*mm*  
**Dr. SUNNY JOSEPH KALAYATHANKAL**  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D. (Computer Science) Ph.D (Maths)  
PRINCIPAL

## LBA using Blockchain

Reshma Ramesan K<sup>1</sup>, Flower Mariya Varghese<sup>1</sup>, Sneja N Joshy<sup>1</sup>, Ano Joseph<sup>1</sup>, Bineesh M<sup>2</sup>

<sup>1</sup>Student, <sup>2</sup>Assistant Professor,

<sup>1,2</sup>Department of CSE, Jyothi Engineering College, Thrissur, Kerala, India

### ABSTRACT

As we all know about recent demolition happened in Kerala - The Marad flat case and also the Muthoot resort case. Buildings that are constructed by violating the conservation of paddy land and wetland act are demolished by controlled explosion. The residents of the building are unaware of this fact that those buildings are constructed by violating the rule. There is no means to find out the properties of the land whether it is legal or illegal. And also, there is a chance of getting cheated by the mediator. In order to avoid this scenario, we are going to introduce THE SECURE LANDBANK ANALYSIS using Blockchain. This website consists of information regarding land details like type of land, survey number, Ownership, etc. And also, provision for showing the property to sell. By using Blockchain we are securing the data regarding it because nowadays all this information is stored in pen and paper format so there is no assurance for the data, it can be edited by officials connected to the government bodies. So, in order to avoid this, we are keeping the data as separate blocks and placing each governing officials like Village Officer, Tahsildar, District Collector, Revenue Secretary, Minister and so on as separate nodes. If any updating or editing is made in the data it will be informed by all other nodes, and thereby we can cross-check whether it is legal or illegal. Thus, we can avoid corruption happening in various revenue offices to an extent.

**KEYWORDS:** Blockchain; Land registry; Smart Contract; Ethereum;

### 1. INTRODUCTION

Nowadays all the documents in the government offices are written in pen and paper format. It is the practice that has been following years ago. There is no validity for the data stored in it. Because there is no guarantee for the data stored there as it is written in the pen and paper format when it is damaged we can't restore it. And it can be edited by anyone. Many land mediators are cheating people by showing illegal properties or properties that are not ready to sell. Many people are losing their money just because of this fraud. The main problem is that as it is written in pen and paper format, it can be edited by anyone. The format of land can be changed by any person inside the office for any purpose. This may lead to big problems as we have seen in Maradu flat case. By knowingly or unknowingly many other people become a part of this. When any of the officials changed the data or information regarding it the other people don't know about it. No other can cross check or reverify whether any change has happened to it. It can't be found out by anyone. If we want to find any particular data it will consume much time to find out that particular information. The officials have to go through many register books to pick this particular one. In case it is lost we don't have any recovery mechanism. Nowadays we know that there is a great violation of the conservation paddy field and wetland act. As a part of this, huge buildings are constructed by filling the paddy fields, wetlands and water bodies. Many people are selling their property by converting the paddy fields wetlands all these kinds of places into a human habitable format. People unknowingly buy such property and may get

**How to cite this paper:** Reshma Ramesan K | Flower Mariya Varghese | Sneja N Joshy | Ano Joseph | Bineesh M "LBA using Blockchain"

Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-4 | Issue-4, June 2020, pp.1617-1620, URL: www.ijtsrd.com/papers/ijtsrd31535.pdf



Copyright © 2020 by author(s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



The manual system poses a number of challenges which include: 1. It wastes a lot of time 2. Loss of data 3. Nobody can't retrieve data 4. It is not easy to find the required data from the existing data set 5. A lot of paperwork is involved. 6. Common people can't easily access the information[6]. Here we are introducing THE SECURE LANDBANK ANALYZER using Blockchain. This is a website consisting of information regarding the land like the type of land, survey number, Ownership, etc. And also, a provision for showing the property to sell. By using Blockchain we are securing the data regarding the land. Because nowadays all this information is stored in a pen and paper format. So there is no assurance for the data, it can be edited by any officials connected to the government bodies. So in order to avoid this, we are keeping the data as separate blocks and placing each governing officials like Village Officer, Tahsildar, District Collector, Revenue Secretary, Minister and so on. If any updates or editing is made in the data it will be informed by all other nodes, and thereby we can cross-check whether it is legal or illegal. Thus, we can avoid corruption happening in various revenue offices to an extent. LBA helps to analyze the data set, it also helps the common people to access the required data on fingertips. It reduces corruption in the revenue sector. It provides a secure format of data, by storing it for future use. The Land Bank Analyzer has been developed with the aim of improving services delivered to its users.

## Library Management System

Joshua Shaji<sup>1</sup>, Antony David<sup>1</sup>, Divya Stephen<sup>1</sup>, Amitha Isac<sup>1</sup>, Fepslin Athish Mon S<sup>2</sup>

<sup>1</sup>Student, <sup>2</sup>Assistant Professor,

<sup>1,2</sup>Department of CSE, Jyothi Engineering College, Thrissur, Kerala, India

### ABSTRACT

The Library Management System using the Laravel framework is a web-based application that points in building up an automated Integrated library system to keep up all day by day work of the library. This undertaking has numerous highlights that are commonly not accessible in typical integrated library system, facilities like separate user interfaces for different users having different priorities. It also has a facility of admin login. Through this, the admin can monitor the whole system. In this system, users can see the list of books they have taken and its issue date, return date and also they can reserve the books online. The fine count is robotized with exactness. The application is intended to assist clients in maintaining and organizing the library. It is easy to use for both beginners and advanced users. It incorporates a recognizable, well-thoroughly considered, and appealing UI joined with solid searching, insertion and reporting capacities. Generally, this task of our own is being created to help students as well as the staff to keep up the library in the most ideal manner conceivable and decrease human endeavors.

**KEYWORDS:** *Laravel*

**How to cite this paper:** Joshua Shaji | Antony David | Divya Stephen | Amitha Isac | Fepslin Athish Mon S "Library Management System" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-4 | Issue-4, June 2020, pp.1625-1629, URL: [www.ijtsrd.com/papers/ijtsrd31538.pdf](http://www.ijtsrd.com/papers/ijtsrd31538.pdf)



IJTSRD31538

Copyright © 2020 by author(s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0/>)



True Copy Attested

Dr. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Management)  
PRINCIPAL  
Jyothi Engineering College  
Cheruthuruthy P.O. - 879 551

### 1. INTRODUCTION

The current system LMS is not fully automated. The librarian staff enters the information in the log register on the entry or exit of the user to the library, hence it requires a lot of time. It's difficult to manage a large number of books and transaction details. One cannot check the availability of a book without the help of library staff. If the system crashes or any faces an attack from outside then all information might get lost. The librarian notes the borrow date and due date on the book card. A fine is calculated on the return of the book. This fine is calculated manually. The manual system poses a number of challenges which include: 1. It wastes a lot of time. 2. It's difficult to process large volumes of information concerning books. 3. Fines are calculated manually hence accuracy is not guaranteed. 4. There is no backup for the records hence in case of any exposure to danger, all information gets lost. 5. A lot of paperwork is involved hence more room and staff to handle them which translates to more costs. 6. It's difficult to search for a book without the help of library staff. Using a fully automated library management system should provide better and efficient service. It also provides basic functions in a library like adding new members, new books, update information, searching books and the facility to borrow and return books. It should provide faster retrieval of information. It can also reduce the workload associated with the library staff as most of the works are automated. It should feature a familiar and well-thought-out attractive user interface, combined with strong searching, insertion and reporting capabilities. All details of the book should be available on a click, thus

with the aim of improving services delivered to its users. This is made possible by automating all the library services such as 1. To develop a system that ensures the privacy of its users. 2. To enable easy maintenance of members and book details. 3. To check the availability of books by simply searching in the system without the help of library staff. 4. To enable easy borrowing and returning of books. 5. To enable automated fine calculation and reports generation. 6. To enable a secure and portable database that eliminates redundant data.

Library Management System is a web-based application that was developed and designed with the sole objective of automating library services. The system was intended to address the current problems experienced. This system aims in automating the processes of cataloging, book transaction, fine calculation, member details maintenance, and reports generation. The system's performance meets user's requirements, hence providing the main benefit of concentrating all the library services and functions within the power of a mouse click and feeding of data into the system. In this system, Books and student modules are included in this which would keep track of the students using the library and also a detailed description of the books a library contains. In this computerized system, there will be no loss of book record or member record. The various modules will help the librarian to manage the library with

# Performance Analysis of different Classifiers for Earthquake prediction: PACE

Arya P Menon<sup>1</sup>, Abin Varghese<sup>2</sup>, Joel P Joseph<sup>3</sup>, Jofiya Sajan<sup>4</sup>, Ninu Francis<sup>5</sup>  
<sup>1,2,3,4</sup>Student, Jyothi Engineering College  
<sup>5</sup>Assistant Professor, Jyothi Engineering College

**Abstract**— Earthquakes are catastrophic geo-hazards that endanger human life. Predicting the occurrence of earthquakes is very helpful to reduce the harmful effects. Therefore, a system to predict the forthcoming earthquakes and issues warning promptly are very appealing. There have been researches going on in the machine learning area to predict the earthquakes by the statistical methods based on the previous events recorded. However, the prediction of earthquakes suffers from the class imbalance problem as these events occur very rarely. This system is built to analyze the performance of various machine learning algorithms. The class imbalance problem of the data set is reduced using the resampling method. The system is trained using different algorithms namely: Support Vector Machine, K-Nearest Neighbour, Decision Tree, Logistic Regression and Naive Bayes. The performance is evaluated based on the values of accuracy, precision, recall, and f-measure. To increase the performance, k-fold cross-validation is implemented and performance is again evaluated. This cross-validation is carried out for three different values of k such as 5, 10 and 15. The system is evaluated with both class imbalance problem prevailing dataset and class imbalance problem resolved dataset. The performance is plotted and the optimum value of k for k-fold cross validation is found out. It also identifies which classifier is best for the prediction of earthquake.

**Index Terms**— Decision Tree, Earthquake, K-fold cross-validation, K-Nearest Neighbour, Logistic Regression, Machine Learning, Naive Bayes, Support Vector Machine

## I. INTRODUCTION

Human faces many natural disasters like flood, earthquake, landslide and volcano in their life. These disasters cause great loss to human life. The main issue with these disasters is that they are unable to correctly predict. Investigations are going on in predicting these disasters based on the previously

occurred events. Earthquakes are one of the major catastrophic geohazards and their unpredictability causes severe destruction in human life. Earthquakes are results of the sudden release of energy in the Earth's crust. This results in the shaking of earth which is named as the earthquake. This also creates elastic energy waves known as seismic waves. PACE is based on the quantitative earthquake dataset and the use of machine learning algorithms for differentiating the hazardous and non-hazardous region. Supervised learning technique is employed as earthquake prediction is a classification problem. Algorithms used for the study are SVM, Naive Bayes, K-Nearest Neighbour, Logistic Regression and Decision Tree. Even though logistic regression is considered as a regression algorithm, its output will be either 0 or 1. Thus it can be used for classification problem. Each algorithm will classify the data into the hazardous region or nonhazardous region. The splitting of the dataset into the training set and the test is done using the sampling method and kfold cross validation. Firstly the system is trained with the imbalanced dataset and then with the balanced dataset. Finally, the performance is evaluated based on accuracy, precision, recall and f-measure and the best classifier for the earthquake prediction problem is identified

K-fold cross-validation is carried out for three different values of k such as 5, 10, and 15. All the performance results are plotted and the optimum value of k for k-fold cross validation is also identified.

## II. LITERATURE SURVEY

The literature review includes papers which covers almost all aspects of earthquake detection. The details of some papers are given here:

True Copy Attested

Dr. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science) Ph.D (Maths)



# Review Analysis of Products and Recommendation System

Maria Ann Toms<sup>1</sup>, Manu P S<sup>2</sup>, Mohammed Ashique<sup>3</sup>, Ms. Sajitha I<sup>4</sup>

<sup>4</sup>Assistant Professor

<sup>1,2,3,4</sup>Computer Science Department, Jyothi Engineering College, Thrissur, Kerala, India

## ABSTRACT

In this paper, we first classify the text reviews given by different users on different products. There will be a wide variety of reviews about different products in the market. Using the machine learning techniques, we can analyze this data and use the different classifiers on them to get the behavior of the reviews. Later we are performing a collaborative approach to find out the possible list of products a user tend to buy and also the potential customers who are more likely to buy a particular product. For more expertise knowledge about the product and for its clear understanding, the most discussed features and the specifications of the product is also highlighted.

**KEYWORDS:** Machine Learning; Data Analysis; Collaborative Filtering; Euclidean Distance; Pearson Score

**How to cite this paper:** Maria Ann Toms | Manu P S | Mohammed Ashique | Ms. Sajitha I "Review Analysis of Products and Recommendation System" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-4 | Issue-3, April 2020, pp.1164-1167, URL: www.ijtsrd.com/papers/ijtsrd30771.pdf



IJTSRD30771

Copyright © 2020 by author(s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



True Copy Attested

*amuro*  
Dr. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)  
PRINCIPAL  
Jyothi Engineering College  
Cheruthuruthy P.O.- 679 531

## 1. INTRODUCTION

In the current scenario of digitalization and development in the business fields, people appear to be more comfortable with the online shopping rather than the conventional one. There is a very large scale of online shopping happening which is widely accepted and has become a very popular trend in the present. It is also interesting to note that the customers who purchase products online post their reviews in the corresponding sites so that the other customers can view them and understand more from a customer point of view. The customers can give ratings also for the product on the scale for which the product could satisfy the requirements and expectations of the customer. Since a huge number of products are sold online and a very large number of people buy the products online and give the reviews and their opinion regarding the product, a huge amount of data is generated on a daily basis in this background. It is possible to get this vast amount of data in terms of the reviews and ratings given to different products by different customers from the online shopping sites. The famous shopping sites like amazon, flipkart etc produces a very big quantity of data in this regard.

Another interesting thing to be noticed is that there could be different frequent patterns occurring in the purchase of the products between different customers. This pattern or association found can be exploited and be used to recommend the products to the possible list of customers and in the same way around a list of potential products could be given to a customer. There are various Machine Learning techniques used for the analysis of data and classifying them and finally make predictions based on the same. This paper hence focuses on the following things: To classify the reviews of the different products using the different machine learning algorithms, Recommend a list of possible products that could be bought by the customer which is implemented using the Euclidean Distance, generating a list of potential products that the customer would tend to purchase and also identifying the most discussed features of the products. From this work it would help the customer to be smarter and make his or her choices of purchasing the products online wise and easier.

## 2. OVERVIEW OF BASICS

### 2.1. Data Analysis

In the present scenario there is data generated everywhere now and then. All of our daily routines pays way to loads of data being accumulated. This could be observed in many different realms of the day to day living. Data Analysis is the process of cleaning, transforming, modeling and interpreting data into useful forms. From the huge amount of data used

Now what can be done with this obtained data in the forms of reviews and ratings? There could be a very interesting answer to this question. It is understood that the new customers who wants to buy a new product studies the different reviews and ratings the other customers had given to this product before he or she gets it. In fact that is a very

## KYC using Blockchain

Sreelakshmi V G<sup>1</sup>, Meera P M<sup>1</sup>, Senna Mariya Pius<sup>1</sup>, Mathews Jose<sup>1</sup>, Swapna B Sasi<sup>2</sup>

<sup>1</sup>Student, <sup>2</sup>Assistant Professor,

<sup>1,2</sup>Department of CSE, Jyothi Engineering College, Thrissur, Kerala, India

### ABSTRACT

Nowadays everyone uses their personal identification documents on a regular basis, which gets shared with third-parties without their explicit consent and stored at an unknown location. Companies such as government institutions, banks, credit agencies and other financial organizations are considered to be the weakest point in the current identity management system as they are unfortified to theft and hacking of data. Although the financial services sector have been seeking solutions for identity problem for a long time, it is only now that a viable solution has arrived in form of blockchain. KYC (Know Your Customer) using Blockchain eliminates the repeated KYC checks that banks currently perform by maintaining a common secure database in a blockchain. The nature of a blockchain ensures that unauthorized changes to the data are automatically invalidated. The proof of reputation concept makes the verification process more robust and secure. Decentralized computing architecture, blockchain will allow for the accumulation of data from multiple authoritative service provider into a single immutable, cryptographically secured and validated database. Blockchain KYC solution take advantages of a secure, public digital ledger to give almost instantaneous and truly secure verification of identity. Due to the immutable and unalterable nature of the record kept in the blockchain, fraud could become a thing of the past.

**KEYWORDS:** Blockchain, KYC, Smart contract, Ethereum

### 1. INTRODUCTION

KYC is an abbreviation for "Know Your Customer" and is a significant term utilized by organizations and alludes to the procedure of check of the character of the customers either previously or during the beginning of working with them. The documents is put together by the client to an association so as to make trust between the two gatherings. At first, there was no real way to confirm the personality of the clients therefore KYC was proposed in the United States in 1990. Around then the reason for KYC was to stop fear monger financing and tax evasion through banks. The fundamental partner of KYC is bank. Banks request that their clients fill KYC record with the goal that they can check their personality. Bank crosschecks the data put together by customers to stop tax evasion, psychological oppressor financing, and budgetary fakes. In this way, at present banks don't permit any record holder without KYC documentation. KYC archive contains client data, ID confirmation, address verification, and photo. At first, the pen-paper approach was utilized for submitting KYC archive however the issue with support of records was noticeable. The errands got furious for the bank to check the personality each time through paper filled by the clients. The odds of the record being lost were more in such case. In this way, computerized KYC framework was proposed, which is called e-KYC. In that approach, the client fills the KYC archive through the web utilization of the association. Information submitted were put away in brought together databases. Anytime, the association can get to the client data through client id. This framework was paperless so by and large expense got decreased however since information is put away in the

**How to cite this paper:** Sreelakshmi V G | Meera P M | Senna Mariya Pius | Mathews Jose | Swapna B Sasi "KYC using Blockchain"

Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-4 | Issue-4, June 2020, pp.1600-1603, URL: www.ijtsrd.com/papers/ijtsrd31542.pdf



Copyright © 2020 by author(s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



brought together database along these lines, escape clauses of the incorporated framework like the single purpose of disappointment, information repetition and outsider inclusion in check despite everything exists. Likewise, information put away in the brought together server can be undermined or assaulted by the programmers in this way, odds of the hole of client private information is more in the current unified framework design. The objective of this paper is to propose a new approach to the KYC verification process. This process is very safer and faster than the other systems. Hence there is no need for further verification for other organisations. The system is Ethereum based decentralized solution. Only hash value and username is stored as data on the blockchain. In most of the KYC systems, there is an option to upload documents such as ID proof, passport, address proof, etc. Therefore the system has all the functionalities of a traditional KYC system including image data is stored in the decentralized database.

### 2. OVERVIEW OF BASICS

#### 2.1. Blockchain

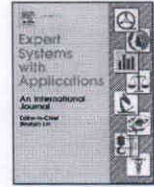
Blockchain is truly only a chain of blocks, however not in the conventional feeling of those words. At the point when we state the words "blocks" and "chain" right now, are really discussing about digital data stored in an open database. This tech network has been discovered for the innovation with the potential purposes. A blockchain is, in the least complex of terms, a period stepped arrangement of immutable records of information that is overseen by a cluster of computers not controlled by a single element.

DR. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc., M.Phil., B.Ed.  
Ph.D. (Computer Science), Ph.D. (Maths)  
PRINCIPAL  
Jyothi Engineering College



Contents lists available at ScienceDirect

## Expert Systems With Applications

journal homepage: [www.elsevier.com/locate/eswa](http://www.elsevier.com/locate/eswa)

## Enhanced sparse representation classifier for text classification

Unnikrishnan P.<sup>\*</sup>, V.K. Govindan, S.D. Madhu Kumar

Department of Computer Science and Engineering, National Institute of Technology Calicut, India

## ARTICLE INFO

## Article history:

Received 22 July 2018

Revised 2 April 2019

Accepted 2 April 2019

Available online 3 April 2019

## Keywords:

Text classification

Sparse representation

Orthogonal matching pursuit

Dictionary

## ABSTRACT

Classification of text based on its substance is an essential part of analysis to organize enormously large text data and to mine the salient information contained in it. It is gaining greater attention with the surge in the volume of on-line data available. Classical algorithms like  $k$ -NN ( $k$ -nearest neighbor), SVM (Support Vector Machine) and their variations have been observed to yield only reasonable results in addressing the problem, leaving enough room for further improvement. A class of algorithms commonly referred to as Sparse Methods has been emerged recently from compressive sensing and found numerous effective applications in many areas of data analysis and image processing. Sparse Methods as a tool for text analysis is an alley that is largely unexplored rigorously. This paper presents exploration of sparse representation-based methods for text classification. Based on the success of sparse representation based methods in different areas of data analysis, we intuitively hypothesized that it should work well on text classification problems as well. This paper empirically reinforces the hypothesis by testing the method on Reuters and WebKB data sets. The empirical results on Reuters and WebKB benchmark data show that it can outperform classical classification algorithms like SVM and  $k$ -NN. It has been observed that obtaining the basis of representation and sparse codes are computationally costly operations affecting the performance of the system. We also propose a class-wise dictionary refinement algorithm and dynamic dictionary selection algorithm to make sparse coding faster. The addition of dictionary refinement to the classification system not only reduces the time taken for sparse coding but also gives improved classification accuracy. The outcomes of the study are empirical verification of sparse representation classifier as a text classification tool and a computationally efficient solution for the bottleneck operation of sparse coding.

© 2019 Elsevier Ltd. All rights reserved.

## 1. Introduction

Text classification or categorization is the process of assigning structured or unstructured text documents to predefined categories or labels. The text can be off-line or on-line and of any size. It is an integral part of the analysis of the text data with wide-ranging applications like document retrieval, opinion mining, email classification, and spam filtering. Text classification process consists of many stages like data acquisition, data analysis and labelling, feature construction, feature weighting, feature selection, feature projection and classifier design. This paper proposes methods to apply the idea of sparse representation in designing the classifier for text classification. Empirical comparisons of our proposal with classical algorithms like  $k$ -NN ( $k$ -nearest neighbor), Naive Bayes and SVM (Support Vector Machine) indicate the potential of sparse methods as a powerful tool for text classification. Numerous works

have already been reported in literature, using most of the popular classifiers. Majority of the text classification techniques are based on Decision trees, Naive Bayes classifier,  $k$ -Nearest Neighbors ( $k$ -NN) classifier, Rocchio classifier, Support vector machines and Neural Networks.

Text classification is widely studied by machine learning community and most of the major classification techniques have been applied on this problem with varying levels of accuracy and effectiveness as we can see from the literature (Aggarwal & Zhai, 2012; Mirończuk & Protasiewicz, 2018). This paper proposes sparse representation based methods as an effective tool for text classification with results outperforming many of the existing approaches like  $k$ -NN ( $k$ -nearest neighbor), Naive Bayes and SVM (Support Vector Machine). Sparse representation has already found application in diverse areas of data and signal processing, achieving commendable performance. However, with the exception of a few works such as Sainath et al. (2010) and Sharma, Sharma, Thenkanidiyoor, and Dileep (2016), sparse methods are yet to find serious attention in the field of document classification.

<sup>\*</sup> Corresponding author.

E-mail addresses: [mail.unnikrishnanp@gmail.com](mailto:mail.unnikrishnanp@gmail.com) (U. P.), [vkg@nitc.ac.in](mailto:vkg@nitc.ac.in) (V.K. Govindan), [madhu@nitc.ac.in](mailto:madhu@nitc.ac.in) (S.D. Madhu Kumar).

Received November 30, 2018, accepted December 6, 2018, date of current version July 23, 2019.

Digital Object Identifier 10.1109/ACCESS.2019.2891632

# Segmentation by Fractional Order Darwinian Particle Swarm Optimization Based Multilevel Thresholding and Improved Lossless Prediction Based Compression Algorithm for Medical Images

A. AHILAN<sup>1</sup>, GUNASEKARAN MANOGARAN<sup>2</sup>, C. RAJA<sup>3</sup>, SEIFEDINE KADRY<sup>4</sup>,  
S. N. KUMAR<sup>5</sup>, C. AGEES KUMAR<sup>6</sup>, T. JARIN<sup>7</sup>, SUJATHA KRISHNAMOORTHY<sup>8</sup>,  
PRIYAN MALARVIZHI KUMAR<sup>1,2</sup>, GOKULNATH CHANDRA BABU<sup>2</sup>,  
N. SENTHIL MURUGAN<sup>2</sup>, AND PARTHASARATHY<sup>2</sup>

<sup>1</sup>Department of Electronics and Communications Engineering, Infant Jesus College of Engineering, Tuticorin 628851, India

<sup>2</sup>Vellore Institute of Technology University, Vellore 632014, India

<sup>3</sup>Department of Electronics and Communications Engineering, KL University, Vijayavada 522502, India

<sup>4</sup>Department of Mathematics and Computer Science, Faculty of Science, Beirut Arab University, Beirut 11-5020, Lebanon

<sup>5</sup>School of Electronics and Communications Engineering, Mar Ephraem College of Engineering and Technology, Elavuvilai 629171, India

<sup>6</sup>Department of Electronics and Electrical Engineering, Arunachala College of Engineering for Women, Nagercoil 629203, India

<sup>7</sup>Department of Electronics and Electrical Engineering, Jyothi Engineering College, Thrissur 679531, India

<sup>8</sup>Department of Computer Science and Engineering, Wenzhou-Kean University, Zhejiang Sheng 325060, China

Corresponding author: A. Ahilan (listentoahil@gmail.com)

**ABSTRACT** The image segmentation refers to the extraction of region of interest and it plays a vital role in medical image processing. This work proposes multilevel thresholding based on optimization technique for the extraction of region of interest and compression of DICOM images by an improved prediction lossless algorithm for telemedicine applications. The role of compression algorithm is inevitable in data storage and transfer. Compared to the conventional thresholding, multilevel thresholding technique plays an efficient role in image analysis. In this paper, the Particle Swarm Optimization (PSO), Darwinian Particle Swarm Optimization (DPSO), and Fractional Order Darwinian Particle Swarm Optimization (FODPSO) are employed in the estimation of the threshold value. The simulation results reveal that the FODPSO-based multilevel level thresholding generate superior results. The fractional coefficient in FODPSO algorithm makes it effective optimization with fast convergence rate. The classification and blending prediction-based lossless compression algorithm generates efficient results when compared with the JPEG lossy and JPEG lossless approaches. The algorithms are tested for various threshold values and higher value of PSNR indicates the proficiency of the proposed segmentation approach. The performance of the compression algorithms was validated by metrics and was found to be appropriate for data transfer in telemedicine. The algorithms are developed in Matlab2010a and tested on DICOM CT images.

**INDEX TERMS** Compression, Darwinian Particle Swarm Optimization, Fractional Order Darwinian Particle Swarm Optimization, Particle Swarm Optimization, segmentation, thresholding.

## I. INTRODUCTION

Image segmentation refers to the process of extraction of the desired region of interest. In medical images, the region of interest represents anomalies or anatomical organs. Image compression role is inevitable for data storage and transfer in telemedicine. The lossless compression algorithms are preferred for medical images since the reconstructed image quality is good for the validation by physicians. The thresholding

is a classical segmentation technique and many variants like iterative thresholding, bi-level thresholding, local thresholding based on specific features and thresholding based on optimization techniques are there in literature.

Moallem *et al.* [1] used Adaptive Particle Swarm Optimization (APSO) for optimal selection of threshold in benchmark images; fewer error rates were produced when compared with Otsu's and Genetic algorithm (GA).

# Neural Proliferation using Brain stimulation Methods Intended for Pediatric Neuropsychiatric Population: A Hypothesis and Theoretical Investigation

Milner Vithayathil<sup>1</sup>, Jarin T<sup>2</sup>, George Athappilly<sup>3</sup>, Dr. S. R. Boselin Prabhu<sup>4</sup>, Milan Paul<sup>5</sup>, Richard Ningthoujam<sup>1</sup>, Loitongbam Surajkumar Singh<sup>1</sup>

<sup>1</sup>Department of Electronics and Communication, National Institute of Technology, Manipur, India.

<sup>2</sup>Associate Professor, Department of Electrical and Electronics Engineering, Jyothi Engineering College, India.

<sup>3</sup>Professor, Department of Computer Science Engineering, Jyothi Engineering College, India.

<sup>4</sup>Associate Professor, Dept. of Electronics & Communication Engineering, Surya Engineering College, India.

<sup>5</sup>Radiation Oncologist, Tata Memorial Hospital, Mumbai, India.

## Article Info

Volume 82

Page Number: 9138 – 9151

Publication Issue:

January-February 2020

## Abstract:

It is estimated that 7 – 8 per cent of the total world population comprises of mentally disabled people further within 75 – 90 per cent are intellectually challenged. Apart from this, there is a considerable rate of children who are suffering from cognitive syndromes. Many people around the world are affected by neuropsychological disorders. Unfortunately, there are no adequate solutions for strengthening their capacity and all such methods are in the infancy stage and they are dealing with animal models. This paper will provide a bird's view of existing solutions and the recent trends that are commercially available. In addition, we are developing a unique method that will be a promising solution for treating neuropsychological disorders. There are commercially many tools available to assess the rodents' behaviour and all these systems are application specified and developed for Deep Brain Stimulation studies. A system that stimulates multiple neurons along with the reward center intended for treating intellectually challenged, neurological and psychiatric subjects and the patients with brain stroke is yet to be evolved. We are developing a system that will show a new horizon in these areas. The futuristic design of our product will lead the degraded society into light and nurture them with a life of equal standard with others. The main challenge is to verify the system in an animal model before introducing it in humans.

**Keywords:** Deep Brain Stimulation, Intracranial Self-Stimulation, Implant, Stimulations..

## Article History

Article Received: 18 May 2019

Revised: 14 July 2019

Accepted: 22 December 2019

Publication: 09 February 2020

## I. INTRODUCTION

In the study of the neural basis of behaviour, electrical stimulation of brain is an important tool. It is a fruitful technique to explore the brain-behaviour relationships. Studies show that there is a considerable response when we provide stimulations in specified regions. It is treated as one of the strongly remunerating conduct encounters; maybe it is more compelling than encouraging or sexual prizes. Self-incitement encounter which includes repetitive exercises of emphatically remunerating

circuits may result in critical changes in dendritic arborization of the neurons of limbic and neocortical districts.

Intracranial self-stimulation experience helps to increase the spine, dendritic arborization and synaptic concentration and fasten neuro transmission [1]. In any case, it was suspicious this was because of a remunerating feeling or because of direct electrical incitement. A study was conducted to answer this question by Dr. B. S. Shankaranaryana Rao, Dr. T. Desiraju and Dr. T. R. Dr. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc., M.Phil., B.Ed.

# Intelligent Parking Management System using Dijkstra's Algorithm with Driver Preferences

Sumini Mani\*, Department of Computer Science, Rajagiri School of Engineering & Technology, Kochi.  
Email: [suminimaniv@gmail.com](mailto:suminimaniv@gmail.com)

Jaison Mulerikkal, Department of Computer Science, Jyothi Engineering College, Thrissur Email:  
[jaisonmpaul@jecc.ac.in](mailto:jaisonmpaul@jecc.ac.in)

Ramkumar P B, Department of Basic Engineering, Rajagiri School of Engineering & Technology, Kochi.  
Email:  
[ramkumar\\_pg@rajagiritech.edu.in](mailto:ramkumar_pg@rajagiritech.edu.in)

Jarin T, Department of Electrical & Electronics Engineering, Jyothi Engineering College, Thrissur. Email:  
[jarint@jecc.ac.in](mailto:jarint@jecc.ac.in)

## Article Info

Volume 82

Page Number: 9186 – 9194

Publication Issue:

January-February 2020

## Abstract:

Abstract— Car Park is a dynamic system where cars are constantly entering and leaving the parking area. The aim of this work is to develop an algorithm, that assigns a parking slot based on the driver's criteria, especially in a mall/building Car Park. Here, the driver's preferences are considered while choosing a slot to park his/her car. Some of these preferences include driving distance, walking distance, environmental factors, and other factors. Here the driving distance is the shortest path between the entrance and the assigned parking slot. It is found out by using Dijkstra's Shortest Path algorithm. Walking distance is the Euclidean distance between the mall/building entrance and the parking slots. Environmental factors considered here are car occupancy at both sides of a slot and shape of the slot. Other factors include multiple entrances (two entrances are used in this study) and a slot assignment strategy (FIFO). The principles of fuzzy logic are being applied here for helping the driver to make a decision on which slot to choose by assigning fuzzy weights to the slots.

**Keywords:** Car parking mechanism; Dijkstra's Shortest Path algorithm; Euclidean distance; Fuzzy logic.

## Article History

Article Received: 18 May 2019

Revised: 14 July 2019

Accepted: 22 December 2019

Publication: 09 February 2020

## I. Introduction

The common method of finding a parking space in a mall/building Car Park is to find it manually which is time consuming and may lead to the worst case scenario of not finding a slot, especially if the driver is driving in high traffic conditions. The alternative is to choose a pre-defined parking space with high capacity. However, this is not an optimal solution as the car park could usually be far away from the user destination. The main motivation behind this study is the fact that not much research has been

done in the area of automating the selection of a parking slot based on the driver's preferences.

"Recently, research has used vehicle-to-vehicle and vehicle-to-infrastructure interaction with the support of various wireless network technologies such as Radio Frequency Identification (RFID), ZigBee, Wireless Mesh Networks and the Internet"[4]. This work initially targeted to conduct a study of providing information about nearby parking spaces for the driver and make a reservation prior to his/her arrival to the car park using supported devices such as Smartphones or Tablet PC's. Later the work has been extended to choose a convenient parking slot in a car park

## Atmospheric Water Absorption Kit

Jain Varghese<sup>1,\*</sup>, Stephy Akkara<sup>2</sup>, Jarin T<sup>1</sup>

<sup>1</sup>Department of Electrical and Electronics Engineering, Jyothi Engineering College, Cheruthuruthy, India.

<sup>2</sup>Department of Electronics and Instrumentation Engineering, Karpagam College of Engineering, Coimbatore, India

\*Corresponding author email: jainvarghese2018@gmail.com, Tel.: +917994039969

### ABSTRACT

As the water scarcity is becoming a serious problem, it's our duty to use each drop of water with care. Everyone knows that the atmosphere is rich in humidity. Thus the humidity rise, it will cause a dangerous problem of rise in temperature of that particular place. Both the problems can be avoided by the water absorption from atmosphere. For this we are using biomimicing with desert beetle, cactus, and lotus for effective water absorption without electricity. Usually in railway stations, we can see lots of people are using water filters for drinking waters. The water coming out from these electrical filters are chilled water. This chillness is not required for the people as its making tough to drink. Besides such chillness of water is not good for human health .in such a case we are wasting some amount of energy on chilling water. While considering a water filter unit in in public place like railway station the wastage of energy will be really high as people are using it more for getting drinking water.in this paper we are explaining the possibility of using this waste energy to collect atmospheric water by using a particular container which is a result of biomimicing. This method will help to reduce the over humidity present in the surrounding atmosphere. The prime important factor of this method is that we are collecting atmospheric water as energy input.

**Keywords**-biomimicing, chilling water, electrical filters, humidity, water absorption

### 1. INTRODUCTION

Water filtration is the procedure of eradicating unwanted chemical components, suspended solids in addition to form toxic gases from water. The aim is to create a novel water filter for a definite utility for the human being. Mostly water is sterilized for human intake (drinking water), but water wastage may also be considered for a diversity of other resolves, indulging the necessities of medical, pharmacological, chemical as well as industrial applications. Reusing of water could diminish the wastage of water as well as reducing the electricity usage used for filtering [1-3].

Rendering to a 2007 World Health Organization (WHO) report, 1.1 billion people want safe drinking water for their existence; 88% of the 4 billion yearly issues of diarrheal disease are endorsed to insecure water also insufficient hygiene, whereas 1.8 million people pass away due to diarrheal sickness every year [4, 5]. There are several methods vibrantly used for the water filtering purpose i.e., from homely approach to industrial level. Nature is the best way to learn things hence we are approached the technique of biomimicing. Nature handle things very beautiful manner so that it will benefit for everyone.so by using the technique of biomimicing this proposed method is eco-friendly.

This proposed method is a new design to existing filter unit, so it can collect water from atmosphere without using any other energy by biomimicing principle and also try to reduce room temperature by putting an attempt of absorbing the atmospheric water (thus reducing the humidity). For this we are introducing the proposed method Atmospheric Water Absorption Kit (AWAK).

### 2. LITERATURE REVIEW

In order to create an effective design, the actual need of the customer is of absolute importance. If these needs are not taken into consideration, it is possible to create a design that has no use for the people it is intended to help. With this in mind, when creating a design, the focus was placed on creating a purification system capable of reusing water with the limited resources that are available in India. That is, we were tasked with making a filtration setup that accepted the polluted water as an input and yielded clean water as the output. It was essential to create a re-filtration system that solved the water problems India faces in a way that it would also be feasible for those living there to utilize, purchase, and maintain. The problem that was solved in India was how to reuse the water which had very specific and unique problems, i.e., as well as

## SIMULATION ON THE GENERATION OF ELECTRICITY FROM RUNNING TRAIN WHEELS

EZHIL VIGNESH. K<sup>1</sup>, STEPHY AKKARA<sup>2</sup> & JARIN. T<sup>3</sup>

<sup>1</sup>Department of Electrical Engineering,

Malla Reddy Engineering College, Hyderabad, Telangana, India

<sup>2,3</sup>Department of Electrical Engineering,

Jyothi Engineering College, Thrissur, Kerala, India

### ABSTRACT

*The existence of industrial actions and our communal construction depends on low cost and continuous supply of electrical energy. Even the advancement of a country is self-possessed in positions of per capita intake of electrical energy. The same is in the case of trains, the major network of transport in India. This paper emphasis on the design of electrical energy in the supreme advanced technique. In this paper rotational energy is used for the assembly of electricity. When associated to other procedures of energy like solar, fuel cell etc., the rotational energy has extraordinary efficient ways and means for producing electricity. This paper purposes of setting up miniature power stations at the foul points of the railway rail wherever the fuel supply is limited. The prevailing structure of train wheels are operated in the making of electricity over other minor rollers close-fitting to the rail. These minor rollers rotate and this rotational energy can be amplified and transformed. This obtained electrical energy supply that can be used as unrestricted power supply for railway utilities such as water streaming, charging electrical gadgets, LCD display supply for traveler list, train time scheduling, lighting the podium bulbs, fan, signal lights etc. Most crowded cities like Mumbai, Chennai and Delhi etc. in India such scheme can be definitely implemented. The proposal of the corresponding scheme equally at the entrance and departure path in the railway station or when mounted at intersections nearby rural area, can afford electricity free of cost for minor scale actions.*

**KEYWORDS:** Rotational Energy, Traction, Train Wheel, Roller, Podium, Regenerative Braking, Conversion, Rotational Speed, Tensile Strength & Fouling Mark

Original Article

### INTRODUCTION

An electric power commencing has an additional source of prime energy in the electricity generation and its development. While considering the electrical efficacy, this is the major method that used in the commutation of clients using electricity [1][3]. Thus in further developments transmission, distribution, in addition electrical power storage and its recovery by means of pumped storage methods are approved by electric power industry. Electrical energy is an utmost produced at power station mainly driven by heat engines fuelled by combustion or nuclear fission by using electromechanical generators. This similar action occurs by an extra means which is comparable to kinetic energy of flowing water and wind [2]. Mainly the energy sources comprise of geothermal power as well as solar photovoltaic.

The main factor of generation of electricity has followed by several methods but depend on the demand and utility it deserves. The region where the generation of the system implemented also has an importance. There

True Copy Attested

Dr. SUNNY JOSEPH KALANATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)  
PRINCIPAL





# Investigation on novel bulk size single crystal of Glycine with metal ions grown by solution growth method for photonic applications

R. Vivekanandhan<sup>a</sup>, S. Santhanakrishnan<sup>b</sup>, B. Deepanraj<sup>c</sup>, Geetha Palani<sup>d</sup>, V. Chithambaram<sup>d,\*</sup>

<sup>a</sup> Research and Development Centre, Bharathiyar University, Coimbatore, India

<sup>b</sup> Mechanical Department, Meenakshmi Sundararajan Engineering College, Chennai, India

<sup>c</sup> Department of Mechanical Engineering, Jyothi Engineering College, Thrissur, India

<sup>d</sup> R & D Physics, Dhanalakshmi College of Engineering, Chennai, India

## ARTICLE INFO

### Article history:

Received 25 April 2019

Received in revised form 13 September 2019

2019

Accepted 14 September 2019

Available online 21 September 2019

### Keywords:

Crystal growth

Optical studies

Hardness

## ABSTRACT

Single crystals of Glycine Potassium dichromate (GPDC) were successfully grown by slow evaporation method at an ambient temperature. Single crystal X-Ray diffractometer was utilized to measure the lattice parameters and to confirm the crystal system. The functional groups present in the grown GPDC crystal have been identified by the FTIR spectral analysis. The optical absorption studies were carried out so as to confirm the lower cut off wavelength of the grown crystal which has been analyzed by making use of UV-Vis spectrum. The mechanical hardness of the sample has been studied. The existence of second harmonic generation signals was observed using Nd:YAG laser with fundamental wavelength of 1064 nm possessing SHG efficiency of 1.3 times greater than that of KDP and hence it can be a potential material for the frequency- doubling process.

© 2019 Elsevier B.V. All rights reserved.

## 1. Introduction

For the past few years, the search of high quality nonlinear optical (NLO) crystals continue to occupy the centre stage research surging all the way with unprecedented progress due to their potential multi level applications in the field of photonic and optoelectronic technologies. Extensive studies have been made on the synthesis and crystal growth of new NLO frequency conversion materials because of their predominant presence in frequency shifting; optical modulation, optical switching and optical memory for the emerging technologies in areas such as telecommunications, signal processing and optical inter connections [1–7]. In this investigation, a successful attempt has been made to grow a novel single crystal of Glycine Potassium dichromate by slow evaporation method and to study their optical and mechanical properties [8–14].

## 2. Crystal growth

The starting material was synthesized by taking Glycine and Potassium Dichromate in the equal molar ratio. The calculated amount of Glycine and Potassium Dichromate was dissolved in distilled water at room temperature. The prepared saturated solution was allowed to evaporate at room temperature. During the slow

evaporation, the nucleation starts paving the way for the seed crystals to be formed. After a few recrystallization processes, a good quality single seed crystal was chosen for the growth of bulk crystal. The seed crystal tied with a thread was placed again at the immersed position of the saturated solution so as to allow the bulk crystal to be grown as slow evaporation continued throughout the growth process and the growth set up is shown in Fig. 1a. GPDC crystal having the dimensions of  $10 \times 9 \times 7 \text{ mm}^3$  has been grown within 27 days as shown in Fig. 1b.

## 3. Results and discussion

### 3.1. Single X-ray diffraction analysis

The single crystal XRD instrument ENRAF NONIUS CAD4 X-ray diffractometer is used to collect lattice parameters and space group. It was observed that the crystal belongs to Triclinic system with the following cell dimensions  $a = 7.412 \text{ \AA}$ ,  $b = 8.501 \text{ \AA}$ ,  $c = 12.471 \text{ \AA}$ ,  $\alpha = 96^\circ$ ,  $\beta = 97^\circ$ ,  $\gamma = 90^\circ$ , and volume  $785 \text{ \AA}^3$  with Non - Centro symmetric space group P.

### 3.2. UV-VIS-NIR analysis

The optical absorption spectrum for the grown GPDC single crystal of 3 mm thickness was recorded in the range 200–800 nm using Varian Cary – 5E Spectrophotometer and is shown in Fig. 2

\* Corresponding author.

E-mail address: chithambaram.v@dce.edu.in (V. Chithambaram).

*nonius*  
Dr. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)  
PRINCIPAL



## AN OPTIMIZATION OF MICRO-DRILLING PARAMETERS IN CARBON FIBER REINFORCED POLYMER USING GREY RELATION ANALYSIS

SHUNMUGESH K<sup>1\*</sup>, LAKSHMIKANTH G<sup>2</sup>, LAWRENCE C.A<sup>3</sup> & ANANTHA RAMAN L<sup>4</sup>

<sup>1</sup>Department of Mechanical Engineering, Viswajyothi College of Engineering and Technology, Vazhakulam, Kerala, India

<sup>2</sup>Department of Mechanical Engineering, Wolaita Sodo University, Wolaita Sodo, Ethiopia

<sup>3</sup>Department of Mechanical Engineering, Jyothi Engineering College, Cheruthuruthy, Thrissur, Kerala, India

<sup>4</sup>Department of Mechanical Engineering, S.A. Engineering College, Chennai, Tamil Nadu, India

### ABSTRACT

*In the present investigation, the influence of drilling parameters such as feed rate, spindle speed, drill diameters in drilling is studied. Drilling experiments have been conducted with three sets of input process parameters such as cutting speed of 1800, 3800 and 5800 rpm, feed varied from 15, 25 and 35 mm/min in three steps using conventional twist drills of three different diameters of 0.6, 0.7 and 0.8mm respectively. A rectangular cross section of Carbon Fiber Reinforced Polymer (CFRP) of having dimensions 150mm x150 mm x 3mm is selected for performing drilling. For optimizing multiple responses, Grey Relational Analysis and Desirability Function are used in this study to optimize the machining process parameter. Multiple response characteristics of delamination factor and material removal rate can be converted into unique response using these methods.*

**KEYWORDS:** CFRP, Grey Relation Analysis, & Delamination Factor

### 1. INTRODUCTION

Machining is the process by which a material is cut to the desired form (shape and size). The machining can be applied to different types of materials such as plastic, composite materials, wood and ceramics. A controlled material removal process is used to process a raw material of the desired shape and size. All products manufactured in the world have been processed directly or indirectly. Carbon fibre is drilled with various drills with a diameter of 0.7, 0.8, and 0.9 mm. Parameters such as spindle speed, feed and diameter vary for the study. The rate of material removal and the delamination factor are also discovered. The tool microscope is used to determine the delamination factor. The optimization is performed according to the Grey method. This method also allows determining the optimal process parameters to obtain a low surface roughness.

Bhojan et al., [1] studied the influence of tool rotation in friction stir welding of Metal Matrix Composites (MMCs). They concluded the experimental study in such a way that higher the tool rotation speed, higher is the hardness of the weld joint of the material. Bosco et al. [2] carried out the drilling exercises on glass fibre reinforced plastic sandwich composites. They optimized the drilling process parameters on delamination of sandwich composites. The test results indicate that the rate of feed is said to be the major influential factor that affects the delamination factor. The research contribution of Venkatesan et al., [3] investigates the machinability properties of hybrid metal matrix composite. The influence of input parameters were optimized through Response Surface Methodology (RSM). The results of experimental study conclude that surface roughness improved with feed rate variation. Experiments were conducted on AISI 304 steel by Nayak et al.

True Copy Attested



## AN EXPERIMENTAL ANALYSIS AND OPTIMIZATION OF HEAT TREATMENT PARAMETERS OF AL6061 ALLOY FOR IMPROVED MECHANICAL PROPERTIES

V. MONICA<sup>1</sup>, G. LAKSHMIKANTH<sup>2</sup>, S. LATHICASHREE<sup>3</sup>, N. SENTHILKUMAR<sup>4</sup>,  
A. MUNIAPPAN<sup>5</sup> & B. DEEPANRAJ<sup>6</sup>

<sup>1,3</sup>Madras Institute of Technology, Anna University, Chennai, Tamil Nadu, India

<sup>2</sup>Wolaita Sodo University, Wolaita Sodo, Ethiopia

<sup>4</sup>Adhiparasakthi Engineering College, Melmaruvathur, Tamil Nadu, India

<sup>5</sup>Saveetha Institute of Medical and Technical Sciences, Chennai, Tamil Nadu, India

<sup>6</sup>Jyothi Engineering College, Thrissur, Kerala, India

### ABSTRACT

*This present work, investigate the heat treatment behaviour of Al6061 aluminium alloy experimentally and optimizing the results of tensile, impact strength and resistance over the identified input variables viz., aging temperature, medium of cooling and time period of heat treatment using The Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS). Taguchi's Design of Experiments, a suitable L<sub>9</sub> orthogonal array is opted for performing the experiments. Analysis of Variance (ANOVA), an analytical tool has been used to study the most important parameters. The optimized conditions achieved were: aging temperature of 450°C, oil as quenching medium and aging time period of 30 min. ANOVA result shows that the aging temperature was the most influential parameter, which influences the output responses with an error percentage of 4.15%. At the outset it is noted that the performance of the thermal process can be improved by identifying the most critical parameters using TOPSIS.*

**KEYWORDS:** Taguchi's Technique, ANOVA, TOPSIS & Aging Temperature

### INTRODUCTION

Heat treatment in broad manner, is a process of the heating and cooling tasks that are done to change the mechanical properties and the metallurgical structure of a metal item (Elagin & Zakharov, 1994). In aluminum composites, heat treatment is every now and again limited to the specific tasks utilized for the cast and hardened combinations for improving the hardness and quality (Vasilevskii & Postnikov, 1979), which are generally alluded as the "heat-treatable" compounds to recognize them from those amalgams in which no noteworthy fortifying can be accomplished by heating and cooling. The last mentioned, "non-heat-treatable" combinations, depend basically on work to expand quality. Heating to diminish quality and increment of ductile is utilized with compounds of the two sorts; metallurgical responses may change with kind of composite and with level of softening wanted. Aside from the low-temperature adjustment treatment in some cases given for series of 5xxx alloys, total or fractional heating are the main ones utilized for non-heat-treatable alloys (ASM, 1991). One fundamental trait of a precipitation-type of alloy hardening framework is a temperature-subordinate balance strong solvency described by expanding dissolvability with expanding temperature (Sverdlin et al. 1996; Cheng et al. 2012; Chernyak et al. 1978). In spite of the fact that this condition is met by a large portion of the binary system for aluminum alloy, and normally they are not viewed as heat treatable. Alloys of the aluminum-silicon (Kutsova et al. 1992) and aluminum-manganese, display moderately immaterial changes in mechanical properties with increase of warmth.

True Copy Attested

www.tjprc.org

SCOPUS Indexed Journal

Dr. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)  
PRINCIPAL  
editor@tjprc.org

Original Article



## RESEARCH ARTICLE

# Growth and investigation of novel nonlinear optical single crystal of urea potassium dichromate by solution growth technique for photonic application

V. Chithambaram<sup>1</sup> · T. S. Franklin Rajesh<sup>2</sup> · Geetha Palani<sup>1</sup> · E. Ilango<sup>1</sup> · B. Deepanraj<sup>3</sup> · S. Santhanakrishnan<sup>4</sup>

Received: 29 January 2019 / Accepted: 25 February 2020  
© The Optical Society of India 2020

**Abstract** Single crystals of urea potassium dichromate (UPDC) were successfully grown by slow evaporation method at normal room temperature. Single-crystal X-ray diffractometer was utilized to measure the lattice parameters and to confirm the crystal system. The functional groups present in the grown UPDC crystal have been identified by the FTIR spectral analysis. The optical absorption studies were carried out so as to confirm the lower cutoff wavelength of the grown crystal which has been analyzed by making use of UV-Vis spectrum. The dielectric response and the mechanical hardness of the sample have been studied. The surface morphology of the sample was identified using scanning electron microscope. The existence of second-harmonic generation signals was observed using Nd: YAG laser with fundamental wavelength of 1064 nm possessing SHG efficiency of 2.5 times greater than that of KDP, and hence it can be a potential material for the frequency-doubling process.

**Keywords** Crystal growth · Optical studies · Hardness · Dielectric

✉ V. Chithambaram  
chithambaramv@gmail.com

<sup>1</sup> Research Center Physics, Dhanalakshmi College of Engineering, Chennai, India

<sup>2</sup> Department of Chemistry, V.V. College of Engineering, Tisaiyanvilai, Tamilnadu, India

<sup>3</sup> Department of Mechanical Engineering, Jyothi Engineering College, Thrissur, India

<sup>4</sup> Department of Mechanical Engineering, Meenakshi Sundararajan Engineering College, Chennai, India

## Introduction

For the past few years, the search of high-quality nonlinear optical (NLO) crystals continues to occupy the center stage research surging all the way with unprecedented progress due to their potential multi-level applications in the field of photonic and optoelectronic technologies. Extensive studies have been made on the synthesis and crystal growth of new NLO frequency conversion materials because of their predominant presence in frequency shifting, optical modulation, optical switching and optical memory for the emerging technologies in areas such as telecommunications, signal processing and optical interconnections [1–7]. The consistent work on finding new and efficient NLO materials has resulted in the development of new class of materials called semi-organics, which have the potential for combining high optical nonlinearity and chemical flexibility of organic materials with the thermal stability and mechanical robustness of inorganic materials. In this new class of materials, high-efficiency optical quality organic-based NLO materials form compounds on which polarizable molecule is stoichiometrically bonded to an inorganic host. In this investigation, a successful attempt has been made to grow novel single crystals of urea potassium dichromate by slow evaporation method and to study their optical, mechanical and biological properties [8–12].

## Experimental procedure

### Material synthesis

The following materials were used for the crystal growth experiments such as urea-(CO (NH<sub>2</sub>)<sub>2</sub>), SD-fine AR grade



# Production, optimisation and engine characteristics of beef tallow biodiesel rendered from leather fleshing and slaughterhouse wastes

J. Ranjitha<sup>1</sup> · S. Gokul Raghavendra<sup>1,2</sup> · S. Vijayalakshmi<sup>1</sup> · B. Deepanraj<sup>3</sup>

Received: 22 April 2019 / Revised: 10 August 2019 / Accepted: 14 August 2019 / Published online: 8 September 2019  
© Springer-Verlag GmbH Germany, part of Springer Nature 2019

## Abstract

Presently, biodiesel is considered as an effective alternate fuel owing to its high sustainability and robustness. This paper concentrates on the biodiesel production from waste beef tallow rendered from subcutaneous and intramuscular wastes discarded from leather tanneries and slaughterhouses. The maximum fat content was estimated to be 92.5% and 3.05%, whereas maximum rendering efficiency was determined to be 92% and 75% for subcutaneous and intramuscular wastes, respectively. The rendered waste tallow was converted into biodiesel using ethanol as a solvent and L-valine amido ethyl methyl imidazolium bromide ([L-Vaemim]Br) as a novel ionic liquid catalyst. The most optimised reaction parameters are as follows: molar ratio of 1:7.5, catalyst concentration of 20 wt% of tallow, reaction temperature of 75 °C and reaction time of 160 min. Properties of the produced biodiesel have been tested in accordance with ASTM Standards, where the results were found to be within the permissible range. The engine characteristics of biodiesel exhibited increased heat release rate and maximum cylinder pressure, reduced emission levels than compared to ordinary diesel; in addition, its performance characteristics were similar to diesel, thereby making it a suitable replacement for existing fossil fuel.

**Keywords** Leather tanneries · Animal slaughterhouses · Subcutaneous and intramuscular wastes · Fatty acid esters · [L-Vaemim]Br

## 1 Introduction

Global modernisation and expanding population growth have resulted in larger energy demand, leading to depletion of fossil fuel reserve and increased pollution level caused by these non-renewable energy resources. In addition to that, modernisation has paved a path to waste generation at large-scale level and is usually categorised based on its source of origin and its nature; and are predominantly discarded without proper disposal techniques. These wastes have been the root cause for various anthropogenic activities like soil contamination, water and air pollution, and environmental infection which has an adverse effect on every living thing on this planet [4]. Numerous

studies have been carried out to manage these wastes effectively, convert them into a useful product, or dispose it properly through suitable disposal techniques. One such study proposes the effective conversion of these wastes into energy sources, which has the ability to satisfy the growing global demand for energy [22].

Accordingly, leather fleshing and slaughterhouse wastes are such wastes discarded from tanneries and slaughterhouses with good energy potential but cannot be directly used for power generation owing to numerous constraints associated with its nature, availability and its properties (thermal and physicochemical) [5]. However, fat rendered from these wastes can be used for power production using proper treatment and conversion techniques. One such technique is chemical conversion of rendered fat into biodiesel (fatty acid chain linked with alkyl chain through ester group) which reduces its viscosity and makes it suitable for CI engines. Biodiesel is highly regarded for its renewability and self-sustainability, lower toxicity, and higher biodegradability with enhanced combustion rate and reduced emission characteristics. In addition, this non-volatile biofuel has improvised solvent properties along with high oxygen content, zero sulphur and aromatics content [34].

✉ B. Deepanraj  
babudeepan@gmail.com; deepanrajb@jecc.ac.in

<sup>1</sup> CO2 Research and Green Technologies Centre, Vellore Institute of Technology, Vellore, India

<sup>2</sup> Department of Mechanical Engineering, Bharath Institute of Higher Education and Research, Chennai, India

<sup>3</sup> Department of Mechanical Engineering, Jyothi Engineering College, Cheruthuruthy, Thrissur, India

True Copy Attest@d

Dr. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)



# Investigation on single crystal by tartaric acid–barium chloride: growth and characterization of novel NLO materials

S SHANMUGAN<sup>1</sup>, N SARAVANAN<sup>2</sup>, V CHITHAMBARAM<sup>3,\*</sup>, B DEEPANRAJ<sup>4</sup> and GEETHA PALANI<sup>3</sup>

<sup>1</sup>Research Center for Solar Energy, Department of Physics, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram 522502, India

<sup>2</sup>Physics Department, Adhiparasakthi College of Engineering, Kalavai 632506, India

<sup>3</sup>Research Centre Physics, Dhanalakshmi College of Engineering, Chennai 601301, India

<sup>4</sup>Department of Mechanical Engineering, Jyothi Engineering College, Thrissur 679531, India

\*Author for correspondence (chithambaramv@gmail.com)

MS received 5 March 2020; accepted 20 May 2020

**Abstract.** The progress of single crystal followed by C<sub>4</sub>H<sub>6</sub>O<sub>6</sub> (tartaric acid) and BaCl<sub>2</sub> (barium chloride) (TABC; third-order nonlinear optics semi-organic) was synthesized with slow evaporation method using distilled water at room temperature. TABC single crystal was introduced into various characterizations like X-ray diffraction to determine inter atomic cell parameter values. The samples are crystalline structure of monoclinic, which have space group of P<sub>2</sub>. The functional groups of the current material are identified using FT-IR spectrum. Optical parameters like transparency, energy bandgap and Urbach energy have been determined using UV–vis–NIR spectrum. The thermal stability of the material was investigated by differential scanning calorimeter analysis. The mechanical property was studied using Vickers microhardness test. The surface morphology of the material was determined by scanning electron microscope technique. The change in dielectric behaviour of TABC with respect to the function of frequency at various temperatures has been keenly absorbed and discussed. The third-order nonlinear optical parameters were measured using Z-scan analyses.

**Keywords.** Optical material; XRD; microhardness; thermal study; Z-scan analyses.

## 1. Introduction

Third-order nonlinear optical materials have wide applications like optical communication, sensing, signal processing, data storages, optical logic gates, laser radiation protection and THz-wave generation [1–5]. In recent years, a broad investigation was performed to develop the nonlinear optical materials with high extensive applications in photonic and optoelectronic fields. Various studies dealing with organic, inorganic and semiorganic crystals for nonlinear optics have been reported. Semiorganic nonlinear optical materials play an important role in technological industry. In literature many of these materials has been reported. The organic materials possess poor mechanical, thermal properties with high nonlinear optical coefficient. The development of bulky single crystal is very tough for device fabrications. An inorganic material has admirable thermal, optical and mechanical properties of rather nonlinearity owing to the absence of electron– $\pi$  conjugation [6–10]. Nowadays, interest has been made to grow the semiorganic crystals with less delinquency, high laser damage threshold, exceptional mechanical and thermal properties, low angular sensitivity, wide optical transparency, which makes

the material comfortable for device fabrications [11–13]. Lakshmi *et al* [14] studied nonlinear optical materials of *N,N*-diphenylbenzamide (NNDPB) and 4-fluoro-*N,N*-diphenylbenzamide (FNNDPB). The NNDPB and FNNDPB crystals studied using UV–vis–near IR spectra showed results of 100% in the visible area. It is thermally stable up to 483 and 503 K. Second-harmonic generation (SHG) productivity was calculated by the Kurtz–Perry powder method, which is 1.55 and 1.7 times as that of potassium dihydrogen phosphate. Prabukanthan *et al* [15] have analysed *N*-methyl-4-nitrobenzamide, *N*-methyl-*N*-(4-nitrophenyl)benzamide, 4-fluoro-*N*-methyl-*N*-(4-nitrophenyl)benzamide and 4-methoxy-*N*-methyl-*N*-(4-nitrophenyl)benzamide single crystals through the slow evaporation solution progress. In these crystal structures, thermal analysis was 570 K and the efficiency of SHG was 2.25 times higher than the potassium dihydrogen phosphate (KDP) crystal.

L-tartaric acid is a prominent organic nonlinear optical material. In this study, we report tartaric acid barium chloride (TABC), a third-order nonlinear optical, samples studied by solution growth technique. TABC single crystal was introduced into various characterizations like X-ray



## AN OPTIMIZATION OF MICRO-DRILLING PARAMETERS IN CARBON FIBER REINFORCED POLYMER USING GREY RELATION ANALYSIS

SHUNMUGESH K<sup>1\*</sup>, LAKSHMIKANTH G<sup>2</sup>, LAWRENCE C.A<sup>3</sup> & ANANTHA RAMAN L<sup>4</sup>

<sup>1</sup>Department of Mechanical Engineering, Viswajyothi College of Engineering and Technology, Vazhakulam, Kerala, India

<sup>2</sup>Department of Mechanical Engineering, Wolaita Sodo University, Wolaita Sodo, Ethiopia

<sup>3</sup>Department of Mechanical Engineering, Jyothi Engineering College, Cheruthuruthy, Thrissur, Kerala, India

<sup>4</sup>Department of Mechanical Engineering, S.A. Engineering College, Chennai, Tamil Nadu, India

### ABSTRACT

*In the present investigation, the influence of drilling parameters such as feed rate, spindle speed, drill diameters in drilling is studied. Drilling experiments have been conducted with three sets of input process parameters such as cutting speed of 1800, 3800 and 5800 rpm, feed varied from 15, 25 and 35 mm/min in three steps using conventional twist drills of three different diameters of 0.6, 0.7 and 0.8mm respectively. A rectangular cross section of Carbon Fiber Reinforced Polymer (CFRP) of having dimensions 150mm x150 mm x 3mm is selected for performing drilling. For optimizing multiple responses, Grey Relational Analysis and Desirability Function are used in this study to optimize the machining process parameter. Multiple response characteristics of delamination factor and material removal rate can be converted into unique response using these methods.*

**KEYWORDS:** CFRP, Grey Relation Analysis, & Delamination Factor

### 1. INTRODUCTION

Machining is the process by which a material is cut to the desired form (shape and size). The machining can be applied to different types of materials such as plastic, composite materials, wood and ceramics. A controlled material removal process is used to process a raw material of the desired shape and size. All products manufactured in the world have been processed directly or indirectly. Carbon fibre is drilled with various drills with a diameter of 0.7, 0.8, and 0.9 mm. Parameters such as spindle speed, feed and diameter vary for the study. The rate of material removal and the delamination factor are also discovered. The tool microscope is used to determine the delamination factor. The optimization is performed according to the Grey method. This method also allows determining the optimal process parameters to obtain a low surface roughness.

Bhojan et al., [1] studied the influence of tool rotation in friction stir welding of Metal Matrix Composites (MMCs). They concluded the experimental study in such a way that higher the tool rotation speed, higher is the hardness of the weld joint of the material. Bosco et al. [2] carried out the drilling exercises on glass fibre reinforced plastic sandwich composites. They optimized the drilling process parameters on delamination of sandwich composites. The test results indicate that the rate of feed is said to be the major influential factor that affects the delamination factor. The research contribution of Venkatesan et al., [3] investigates the machinability properties of hybrid metal matrix composite. The influence of input parameters were optimized through Response Surface Methodology (RSM). The results of experimental study conclude that surface roughness improved with feed rate variation. Experiments were conducted on AISI 304 steel by Nayak et al., [4] to

Original Article



## THE LOW COST ADULT DIAPER WASTE MANAGEMENT METHOD

NICE MENACHERY, SREERAG V NAMBIAR, SANGEETH S, VISHNU THILAK A,  
NIGIL SEBASTIAN & SHABIN K JOBY

*Department of Mechanical Engineering, Jyothi Engineering College, Thrissur Kerala, India*

### ABSTRACT

*The current situation of waste disposals constantly embraces a potential danger in environmental degradation. Due to disregard of authorized, fast filling landfills is becoming a troublemaker. Diaper is creating a hefty involvement towards solid wastes without making an allowance for inadequate landfill space. The government is taking keen interest in building up proper sanitation facilities which essentially intend for a hygienic environment but dumped diapers still remain a menace. Traditional method of diaper disposal is unhygienic. In urban areas, most of them are sealed in a plastic bag and moved to landfills, while in rural areas, the major prospect is to burn them. This paper proposes an economic and sanitized way of adult diaper disposal, this can be an assist to many houses, hospitals, old age homes, charity trusts etc.*

**KEYWORDS:** *Adult Diaper, Solid Wastes, Disposal, Hygienic & Diaper Waste Management*

Original Article

### INTRODUCTION

In this 21<sup>st</sup> century one of the major issues we are facing is the disposal of sanitary wastes. As we all know that this is due to the plastics which are employed in disposable sanitary napkins are non-biodegradable and leads to environment and health threats. The recent study states that a single woman uses nearly 100 kilograms of non biodegradable waste during her menstrual years. A paralyzed person nearly uses six to seven adult diapers per day, this results usage of approximately two hundred adult diapers per month. The life cycle of a single adult diapers is 450 to 500 years. This context is more conspicuous because of the way in which how municipal solid waste is managed and their collection, disposal and transportation network. Moreover, the main problem of sanitary waste has ever been their categorization, i. e, whether it is a bio-medical or plastic waste. Diapers, soiled napkins, tampons, condoms, and blood-soaked cotton are being disposed of after separation into non-biodegradable and biodegradable segments. However, the Bio-Medical Waste Management Rules, 2016 show that objects tainted with body fluids and blood, including cotton, soiled plaster casts, dressings, lines and bedding, are bio-medical waste and must be incinerated, micro-waved or autoclaved to remove pathogens. The need of interest for sanitary waste management in our nation is shown in the evidence that there is no credible statistics on the problem. Due to the need of separation of waste, there is little documentation in this section, so through guidance for treatment and management of sanitary waste are necessary. As per the studies conducted in 2011, titled 'Sanitary Protection', Every woman's health right' estimated that only about 12% of the 335 million menstruating women can able to dispose of their sanitary napkins. Environment portal Down to Earth estimated that 432 million pads are disposed of per month.

*Handwritten signature*

**Dr. SUNNY JOSEPH KALAYATHANKAL**  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)

True Copy Attested

## AN OPTIMISATION OF SURFACE AREA AND HEAT TRANSFER STUDY OF RECTANGULAR POROUS STRUCTURE

NISHASHERIEF, SAINTSON. P. A, RICHARD JACOB. E,  
SANJAI BABU. S & MANISH. P

*Department of Mechanical Engineering, Jyothi Engineering College, Cheruthuruthy, Thrissur, India*

### ABSTRACT

*Heat transfer can be maximized by increasing the surface area which is exposed to convection. Structures which have high surface area compared with volume are called porous structures. In order to increase the surface area of a porous structure to maximum, the fiber width of the structure can be varied. We can maximize the surface area by varying fiber width for the given porosity. Increasing the porosity below a particular point increases the surface area after the limit increasing porosity decreases the heat transfer by decreasing the conductional heat transfer. For the study a cube shaped unit cell model of rubik's cube is chosen.*

**KEYWORDS:** Heat Transfer, Surface Area, Cube & Porous

Original Article

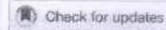
### INTRODUCTION

In order to improve the durability of an electronic equipment, heat removal can be used as an effective tool. The heat removal rate depends on the area of surface that is exposed to the convection. Depending upon the purpose different size structures is used for increasing the heat transfer rate. According to law of convection, the heat transfer rate can be increased using porous body in thermal system. The usage of porous body will also help reduce weight and space requirement. Porosity can be defined as the measure of the void spaces in a material. It is a ratio of the volume of voids to the total volume. The porosity is expressed between 0 and 1, or as a percentage between 0% and 100%. Materials that contain pores are called a porous material. Matrix is the skeletal portion and the pores are usually occupied by a fluid. By using concept of porous media we can analyze structures like foams, although the skeletal material is normally a solid. This work presents a fresh technique that boosts the heat transfer from the surface by using fins with porosity. The thermal performance of fins with porosity is assessed and paralleled with that of normal solid fins. If we use porous fins in the place of normal fins it will increase the performance of the equal sized normal solid fin and, it will save fin material. The operating parameters, thermal performance of porous fin and the effect of different design is investigated. Ra number, Da number, and thermal conductivity ratio are the examples of these parameters. Increasing the Ra number improves the performance of porous fin. It is found that there is no further improvement in the fin performance after an optimum limit of porosity.

### LITERATURE REVIEW

Jian Yang et al. "Forced Convection Heat Transfer Enhancement by Porous Pin Fins in Rectangular Channels". This paper studies the heat transfer the of forced convective nature three-dimensional porous pin fin channels numerically. In the study, air and water both, are being used as cold fluids. The study prudently examines effect of pore density, Renoylds number and pin fin forms. Also, heat transfer and the flow performances in these porous

True Copy Attested



## Effect of solid concentration on biogas production through anaerobic digestion of rapeseed oil cake

B. Deepanraj<sup>a</sup>, N. Senthilkumar<sup>a,b</sup>, and J. Ranjitha<sup>c</sup>

<sup>a</sup>Department of Mechanical Engineering, Jyothi Engineering College, Thrissur, India; <sup>b</sup>Department of Mechanical Engineering, Adhiparasakthi Engineering College, Melmaruvathur, India; <sup>c</sup>CO2 Research and Green Technologies Centre, Vellore Institute of Technology, Vellore, India

### ABSTRACT

Solid concentration is considered as one of the most important parameters governing the anaerobic digestion process. In this present study, four solid concentration levels (10%, 15%, 20% and 25% of total solids), were tested to evaluate the effect on biogas production from rapeseed oil cake. Four laboratory scale batch reactors with 2 L volume were used for this study with a retention period of 30 days. The performance of reactors was assessed by quantifying the daily biogas production, cumulative biogas production and the degradation of total solids, volatile solids and COD. Biogas production was found to be maximum at a solid concentration of 20%, followed by 25%, 15% and 10%. The results obtained from the study were evaluated using Gompertz, modified Gompertz and Logistic models to determine the kinetic constants of the process. There were smaller differences between measured and predicted biogas production for rapeseed oil cake when using a modified Gompertz model compared with the other two models.

### ARTICLE HISTORY

Received 31 January 2019  
Revised 21 May 2019  
Accepted 12 June 2019

### KEYWORDS

Anaerobic digestion; Biogas; Solid concentration; Kinetic study; Rapeseed oil cake

### Introduction

In the 21<sup>st</sup> century, developing new and alternative energy resources and technologies is a major goal for achieving global sustainable socio-economic advancement as petroleum fuel has been exhausted to an alarming level. Globally, engineers and researchers are researching the potential of cultivated biomass resources as alternatives to fossil fuel energy. In this scenario, developing commercially viable and sustainable technologies for biogas, biodiesel, producer gas, and alcohol production are excellent examples. The economic viability of bioenergy technology ultimately depends on the utilization level of cultivated resources and the energy consumption quantity for producing useful fuel (Chandra et al. 2012; Ghatak and Mahanta 2014).

Biogas production has earned growing interest globally because it is an alternative fuel that can be produced from renewable feedstock. Anaerobic digestion is the most common way to produce biogas, which is broadly practised as the major treatment choice for municipal solid waste (MSW) disposal similar to composting technologies (Ugwua and Enweremadua 2019; Li et al., 2011). It has the advantages of energy recovery, greenhouse gas mitigation, and stable end product generation, and the end products can be composted for land use applications (Alghoul et al. 2019; Zeshan, Karthikeyan, and Visvanathan 2012).

Anaerobic digestion occurs in four distinct stages, namely hydrolysis, acidogenesis, acetogenesis, and methanogenesis (Chynoweth, Owens, and Legand 2008; Tambone et al. 2013). These stages occur through the effects of syntrophy by microbial consortia. In the first stage, monocarbonates and

**CONTACT** N. Senthilkumar ✉ [nskumar\\_1998@yahoo.co](mailto:nskumar_1998@yahoo.co) Department of Mechanical Engineering, Adhiparasakthi Engineering College, Melmaruvathur 603319, India

Color versions of one or more of the figures in the article can be found online at [www.tandfonline.com/UE50](http://www.tandfonline.com/UE50).

© 2019 Taylor & Francis Group, LLC

True Copy Attested

  
Dr. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)



# Biogas from food waste through anaerobic digestion: optimization with response surface methodology

B. Deepanraj<sup>1</sup> · N. Senthilkumar<sup>2</sup> · J. Ranjitha<sup>3</sup> · S. Jayaraj<sup>4</sup> · Hwai Chyuan Ong<sup>5</sup>

Received: 3 December 2019 / Revised: 5 February 2020 / Accepted: 16 February 2020  
© Springer-Verlag GmbH Germany, part of Springer Nature 2020

## Abstract

In the current study, anaerobic digestion method efficiency on biogas production and chemical oxygen demand (COD) degradation was assessed through a sequence of laboratory-scale batch experimentations to compute the role of chosen process parameters, viz., solid concentration (5–15%), pH (5–9), temperature (30–60 °C), and co-digestion (0–40% of poultry manure). Biogas production and COD degradation were significantly dependent on the selected process parameters with independent conditions to accomplish active performance of the process. Central composite design (CCD)-based response surface methodology (RSM) was adopted for evaluation and optimizing of the combined performance of system considering two responses. Among various combinations, it was observed that solid concentration of 7.38%, pH value as 7, temperature at 48.43 °C, and co-digestion as 29% produce biogas of 6344 ml and COD degradation as 38%. Confirmation experiment performed shows a deviation of 4.93% maximum between the predicted and experimental results.

**Keywords** Anaerobic digestion · Biogas production · Multi-objective optimization · Alternative energy · Food waste · Soft computing

## 1 Introduction

Energy and resource shortage is one of the most significant problems faced by the world nowadays. The rising price of petroleum products and increasing attention regarding environmental impacts together with the fossil fuel depletion have prompted considerable research to identify renewable and alternative fuel sources [1, 2]. Therefore, researchers concentrate on finding alternative energy sources and employing

them to reduce adverse effects. Most of the studies shown in the literature on renewable energy sources have focused on different waste energy sources. These wastes include used tires, trees, plastics, municipal solid wastes, etc. These wastes have several adverse impacts on environment and living organisms including human beings. These impacts can be reduced when they are transformed into fuel. Out of all the available wastes, food waste contains a considerably large quantity of organic matter, which can be fermented anaerobically to produce biogas [3, 4].

The food waste comprises un-consumed food items and leftovers during the preparation of foods from houses, hotels, institutional sources like college/school cafeterias, and industrial sources like factory lunchrooms [5]. In 2011, a report published on global food waste by UN Agriculture Organization stated that nearly one-third of the total food prepared for human consumption goes as waste that accounts for 1.3 billion tons annually [6]. Usually, food waste contains 69–93% of moisture, 85–96% of volatile solids (VS), and C/N ratio of 14.6–18.3 [5]. Because of the higher moisture content in food waste, biochemical processes like anaerobic digestion are more suitable when compared to thermochemical processes like gasification and combustion [7, 8]. Anaerobic digestion process involves the disintegration and stabilization of

✉ N. Senthilkumar  
nsk@adhiparasakthi.in

<sup>1</sup> Department of Mechanical Engineering, Jyothi Engineering College, Cheruthuruthy, Thrissur, India

<sup>2</sup> Department of Mechanical Engineering, Adhiparasakthi Engineering College, Melmaruvathur, India

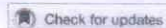
<sup>3</sup> CO2 Research and Green Technologies Centre, Vellore Institute of Technology, Vellore, India

<sup>4</sup> Department of Mechanical Engineering, National Institute of Technology Calicut, Kozhikode, India

<sup>5</sup> School of Information, Systems and Modelling, Faculty of Engineering and Information Technology, University of Technology, Sydney, Australia

*Ronald*  
**DR. JONAS JOSEPH KALAYATHANKAL**  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)  
PRINCIPAL

Springer



## Influence of fatty acid composition on process optimization and characteristics assessment of biodiesel produced from waste animal fat

Gokul Raghavendra Srinivasan<sup>a,b</sup>, Vijayalakshmi Shankar<sup>b,a</sup>, Sreekanth Chandra Sekharan<sup>c</sup>, Mamoon Munir<sup>d</sup>, Deepanraj Balakrishnan<sup>e</sup>, Anand Mohanam<sup>f</sup>, and Ranjitha Jambulingam<sup>b</sup>

<sup>a</sup>CO<sub>2</sub> Research and Green Technologies Centre, Vellore Institute of Technology, Vellore, India; <sup>b</sup>Department of Mechanical Engineering, Bharath Institute of Higher Education and Research, Chennai, India; <sup>c</sup>Department of Electrical and Electronics Engineering, College of Engineering, Vadakara, Calicut, India; <sup>d</sup>Biodiesel Lab, Department of Plant Sciences, Quaid-i-Azam University, Islamabad, Pakistan; <sup>e</sup>Department of Mechanical Engineering, Jyothi Engineering College, Cheruthuruthy, Thrissur, India; <sup>f</sup>Department of Chemistry, Science and Humanities, Kingston Engineering College, Vellore, India

### ABSTRACT

This present study focus on the process optimization and characteristic assessment of waste animal fat (WAF) biodiesel based on the influence of fatty acids characterized in it. WAFs were rendered from leather fleshing (subcutaneous fat, 85.64%) and slaughterhouse (intramuscular fat, 8.46%) wastes using dry rendering technique, wherein the maximum renderable fat content was found to be 75.77% and 5.89%, respectively. Ethyl esters of oleic acid, palmitic acid, and stearic acid were characterized as dominant fatty acid esters (FAEs) in WAF biodiesel. Optimized transesterification on waste fats using ethanol and synthesized D-valine amido ethyl methyl imidazolium chloride ([D-Vaemim] Cl) as novel ionic liquid (IL) catalyst yielded 97.36% of biodiesel. High molar ratio (WAF to ethanol:6) and reaction temperature (75°C) were accounted by the long-chain fatty acids in triglyceride molecules and their higher degree of saturation, respectively, meanwhile, [D-Vaemim]Cl exhibited high conversion yield beyond 10% and was effective up to 10 cycles. Similarly, biodiesel properties were evaluated as per ASTM D6751 standards, were found to be in acceptable range, and were deeply influenced by carbon chain length and degree of unsaturation in FAE molecules. Also, the presence of long-chain saturated FAEs along with fuel bound oxygen induced superior combustion characteristics and controlled emission concentrations. However, slight reduction in engine performance was due to high viscosity and reduced calorific value of biodiesel which was reflected from its FAE molecules.

### ARTICLE HISTORY

Received 23 March 2019  
Revised 13 May 2020  
Accepted 14 May 2020

### KEYWORDS

Waste animal fat (WAF); fatty acid esters; carbon chain length; degree of unsaturation; cetane number; fuel bound oxygen

### Introduction

Challenges in addressing the global energy demand due to modern technological advancements and oversize population growth has nearly depleted our planet's fossil fuel reserves. Apart from over-consumption, increased pollution levels associated with their handling and processing have redefined the global climate and atmospheric scenarios putting the entire planet at risk. These potential threats have forced many researchers from various fields to rely on renewable energy resources for addressing this energy demand; and also serve as a replacement for fossil fuel along with reduced or zero emissions into the atmosphere. One such promising renewable energy resource is biodiesel, which

**CONTACT** Jambulingam Ranjitha  ranjitha.j@vit.ac.in  CO<sub>2</sub> Research and Green Technologies Centre, Vellore Institute of Technology, Vellore Campus, Tiruvalam Rd, Katpadi, Vellore, Tamil Nadu 632014, India


This article has been republished with minor changes. These changes do not impact the academic content of the article.

© 2020 Taylor & Francis Group, LLC

True Copy Attested

  
Dr. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)  
PRINCIPAL

ARTICLE

 Check for updates

## Spectral feature and optimization- based actor-critic neural network for arrhythmia classification using ECG signal

Anoop Vylala<sup>a</sup> and Bipin Plakkottu Radhakrishnan<sup>b</sup>

<sup>a</sup>ECE Department, Jyothi Engineering College, Cheruthuruthy, India; <sup>b</sup>ECE Department, Ilaahiya College of Engineering and Technology, Muvattupuzha, India

### ABSTRACT

Arrhythmia classification is an interesting research field that serves as the solution for most of the cardiac-related diseases. The patients with cardiac diseases are experiencing the greatest risk rate of death, and hence, there is a need to identify the presence of arrhythmia in patients to reduce the fatality rate. This paper proposes an arrhythmia classification method, which offers better classification accuracy and releases the time spend for classifying the patients. The proposed method of arrhythmia classification uses the Electrocardiography (ECG) signal to classify the patients with and without arrhythmia. Initially, the wave components are identified from the ECG signal and are subjected to the feature extraction. The spectral and statistical features are extracted from the wave components that yield the texture and the geometric nature of ECG such that classification of ECG becomes effective. The classification is carried out using the Actor-Critic (AC) Neural Network that is trained using the Proposed Taylor-Sine Cosine Algorithm (Taylor-SCA). The Proposed Taylor-SCA algorithm is the integration of Taylor series and SCA. The experimentation is performed using the MIT-BIH Arrhythmia Database, and the experimental results show that the proposed algorithm exhibits the maximum accuracy, sensitivity, and specificity of 0.9545, 0.77, and 0.9375, respectively.

### ARTICLE HISTORY



Received 4 October 2018  
Accepted 27 July 2019

### KEYWORDS

Electrocardiography signal; arrhythmia classification; actor-critic neural network; sine cosine algorithm; Taylor series


### Introduction

For the past few decades, Electrocardiography (ECG) plays a significant role in diagnosing the heart diseases such that the ECG signals are analyzed for offering a better diagnosis step by the cardiologists (Raj, Ray, & Shankar, 2016). ECG defines the electrical activity of the heart, and the cardiac health is detected based on the shape of the ECG waveform such that the peak points in the waveform exhibit the diseases of the heart. The bio-signals are non-stationary, and hence, the peak pointers appear random on the time scale. Thus, an effective study is required that enables effective diagnosis of heart diseases using the patterns in the ECG signal. In certain circumstances, the detection of heart disorder based on the symptoms is impossible. This makes it clear that time has to be spent with the ECG signals for several hours to extract the data. The tedious and the time-consuming processes make the diagnosis of heart disease a risky and hectic challenge (Kumar & Inbarani, 2016; Sathishkumar, Thangavel, & Nishama, 2014). At present, half of the population suffers from Cardio Vascular Disease (CVD), and a large percentage of the people are with Arrhythmia (Yang et al., 2017). ECG signals require continuous monitoring (Dipalishende, 2018) irrespective to the time and physical state of the patients (Ali, Haldar, Khan, & Ullah, 2015). Even though some arrhythmia is rare and less harmful, it may sometimes end up with serious cardiac issues (Haldar, Khan, Ali, & Abbas, 2017).

**CONTACT** Anoop Vylala  vanoop@gmail.com  ECE Department, Jyothi Engineering College, Cheruthuruthy, India

© 2019 Informa UK Limited, trading as Taylor & Francis Group

True Copy Attested

  
Dr. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)  
PRINCIPAL  
Jyothi Engineering College  
Cheruthuruthy P.O.- 679 531



# CCGPA-MPPT: Cauchy preferential crossover-based global pollination algorithm for MPPT in photovoltaic system

Vinu Sundararaj<sup>1</sup> | V. Anoop<sup>2</sup> | Priyanka Dixit<sup>3</sup> | Arundhati Arjaria<sup>4</sup> |  
Uday Chourasia<sup>5</sup> | Pankaj Bhambri<sup>6</sup> | MR Rejeesh<sup>1</sup> | Regu Sundararaj<sup>7</sup>

<sup>1</sup>Department of Electronics and Communications, Anna University, Chennai, India

<sup>2</sup>Department of ECE, Jyothi Engineering College, Thrissur, Kerala, India

<sup>3</sup>Department of CSE, Rajiv Gandhi Proudयोगiki Vishwavidyalaya, Bhopal, Madhya Pradesh, India

<sup>4</sup>Department of CSE, Digital Institute of Science and Technology (DIST), Chhatarpur, India

<sup>5</sup>Department of CSE, University Institute of Technology RGPV, Bhopal, India

<sup>6</sup>Department of Information Technology, Guru Nanak Dev Engineering College, Ludhiana, Punjab, India

<sup>7</sup>Department of Civil Engineering, Anna University, Chennai, India

## Correspondence

Vinu Sundararaj, Rejeesh MR and Regu Sundararaj, Anna University, Chennai, India.  
Email: vinovinu2020@gmail.com; rejeeshmr@gmail.com; regu2020@gmail.com

## Abstract

In general, the photovoltaic (PV) is considered as the best selection among renewable energy resources due to its nonpolluted operation and good flexibility condition. The PV system is affected because of the partial shading conditions (PSCs), which reduce the generated power. During steady-state operating conditions, there occurs a time delay in tracking the Global maximum power point (GMPP) and Local maximum power point (LMPP) under PSCs using the perturb and observe (P&O) method. In order to overcome such shortcomings, this paper proposed a hybrid algorithm with a P&O technique to improve the maximum power point tracking (MPPT) for the PV system under PSC. In addition to this, the P&O technique is utilized to achieve the LMPP in the first section, and the hybrid algorithm is utilized to achieve the GMPP in the second section. Here, the hybrid technique is the integration of Cauchy preferential crossover (CC) with the flower pollination algorithm (FPA). Furthermore, the exploitation ability of the FPA is enhanced by the CC, and the combined hybrid algorithm has the ability to produce the optimal duty cycle for the DC-DC boost converter for MPPT. Then the proposed method will be executed in MATLAB/Simulink model, and it is contrasted with the existing methods such as CC, current sensorless (CS), and FPA, respectively. The experimental results and analysis reveal that the proposed approach provides better performances when compared with several other metaheuristic algorithms.

## KEYWORDS

crossover, DC to DC boost converter, global maximum power point, global pollination, local maximum power point, photovoltaic, PSC

## 1 | INTRODUCTION

Due to the rapid growth and expansion in business as well as the consistently increasing refinement of existing ways of living, the world supply energy is exposed to a huge strain. This wonder creates uncertainties over energy security as well as environmental sustainability.<sup>1,2</sup> Besides, the problem of climatic changes and it is necessary to reduce carbon impressions has added to the solid force for organizations and countries to put resources into elective

energy sources, especially renewable energy (RE). Solar energy is a standout among the most vital RE sources, rather than regular unrennewable assets, for example, fuel and coal.<sup>3</sup> Solar energy is spotless, limitless, and free. The primary utilization of photovoltaic (PV) frameworks is said to be a stand-alone (military, street and residential lighting, electric vehicles space applications, and water pumping). Despite these focal points, PV control frameworks, all in all, still could not accomplish the grid parity because of the high initial investment cost.<sup>4</sup>

*Handwritten signature*  
DE. SUNNY, JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc., M.Phil., B.Ed.,  
Ph.D. (Computer Science), Ph.D. (Maths)  
PRINCIPAL  
Jyothi Engineering College  
Cheruthuruthy P.O. - 679 521

# A Comprehensive Study on Human Interaction with IoT Systems

Mubashira KM<sup>1</sup>, Drisya MK<sup>2</sup>

<sup>1</sup>Student, Dept. of ECE, Jyothi Engineering College Cheruthuruthy, Kerala, India

<sup>2</sup>Asst. Professor, Dept. of ECE, Jyothi Engineering College Cheruthuruthy, Kerala, India

\*\*\*

**Abstract** - Internet of Things (IoT) is one among the trending technology in this digital era. Developments in network infrastructure and automated devices boosted the reach of IoT. The IoT can be defined as a network of internet-connected things (e.g., computers, vehicles, and sensors). These interconnected things exchange data between themselves and help people to access internet-connected devices, applications, and services anytime and at anywhere. The technological advancements mainly focused on how to make huge profit by enabling faster machine to machine communication. Still there is a challenge exists to provide an efficient and better interaction between human beings and IoT systems.

User could either monitor or configure internet connected things at home, offices and any other places for control of various functions like temperature, humidity, lighting and other energy efficiency. Users can be of different types. Depending on them, dissemination of IoT became a great issue. Because, the users like children, elderly people and various kinds of disabled persons will be the intended customers of specific IoT devices. To make them comfortable with the products, their interaction with IoT devices should be smooth and easier. Here, in this paper we tried to evaluate some of the early published interacting systems developed by others. This will enable you to understand the working principles used by them and will help you to integrate various methods to develop a better interacting system devoid of limitations experienced by them.

**Key Words:** IoT, Man and IoT, Human interaction with IoT, IoT device controls, Human to machine communication, Smart Wearables, Gesture recognition, Speech recognition....

## 1. INTRODUCTION

Internet of Things (IoT) has been emerging as a new phenomenon that will change the world. IoT will make an impact on different aspects of human life such as the economy, welfare, security, safety, etc. There are a lot of applications for IoT like smart homes, smart cities, healthcare, etc. IoT establishes interrelated computing devices, where each one has a unique identifier and can communicate with each other with minimum human intervention [1]. The number of internet-connected devices is now dramatically growing. According to a recent study on the prediction of IoT market share, the number of IoT devices will approach 100 billion and the total amount of

data generated by the users and devices will reach 35 ZB by 2020 [2].

However, the current technologies mainly focus on improving the machine-to-machine communication/interaction, rather than the interaction between users and machines. For example, some IoT platforms designed for smart home automation provide a web-based UI and a mobile application to register, manage, and control the smart home appliances connected to them. Users must first open the website or the mobile application, explore a page to select a menu, find a room or location, and finally select the device to be manipulated from a list. After selecting the device, the users can check the status or control it by touching or clicking the buttons on the webpage or mobile page. However, this UI and procedure will become tedious and time-consuming to the users with the current rapid increase in the number of IoT ready devices. Additionally, users who are not familiar with smart devices, such as children and seniors, or those with limitations in accessing them, such as severely ill patients or the disabled, will encounter difficulties in using the IoT applications and services. This inconvenience will be a major obstacle to the dissemination of the IoT [3].

Typically, 'interaction' in the context of IoT means interfaces which allow people to either monitor or configure IoT devices. Some examples include mobile applications and embedded touchscreens for control of various functions (e.g., heating, lights, and energy efficiency) in environments such as homes and offices. Additionally, users who are not familiar with smart devices, such as children and seniors, or those with limitations in accessing them, such as severely ill patients or the disabled, will encounter difficulties in using the IoT applications and services. This inconvenience will be a major obstacle to the dissemination of the IoT. Thus, there is a need to investigate what kinds of interaction techniques could provide IoT to be more human oriented, what is the role of automation and interaction, and how human originated data can be used in IoT [4].

In this paper we tried to study some human-machine interacting systems. It includes a complete description on methodology and schemes of each system along with its limitations. This paper will make us aware about various interaction methods in detail.

*Sunny*  
DR. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)  
PRINCIPAL



## Different Sensors Used for Biochemical Detection

Thasneem V A<sup>1</sup>, Ambily Francis<sup>2</sup>

<sup>2</sup>Assistant Professor, Dept. of Electronics and Communication Engineering, Jyothi Engineering College, Thrissur, Kerala, India

\*\*\*

**Abstract** - Biochemical process measurement shows great importance in our daily life. Mainly this paper describes to realize an efficient and proper working sensor to detect the biochemical process. Here we discuss about the design and working process of different types of sensors. First type is microfluidic chip sensor which is an integration of antimony (Sb)-bismuth (Bi) thin-film thermopile heat detection element. It is highly sensitive, inexpensive and easy fabrication. The device measures the dynamic temperature changes which occur at mixing of glycerol and water. Another sensor is a polysilicon wire based biosensor for the detection of glucose and matrix metalloproteinase (MMP) extracted from cancer cells. These are only for the specific sample testing. The current flows through the poly-Si wire by applying some material. Third detector is Biochemically sensitive field-effect sensors. Sensor works based on metal gate complementary metal-oxide semiconductor technology. They measure the current flowing through it by applying some biochemical materials. In this paper, we compare these sensors and study about the design and working. At last we choose one of the sensor with high sensitive, inexpensive, easy to use.

**Key Words:** Thermoelectric, thermopile, FIB, CAFM.

### 1. INTRODUCTION

Biochemical analysis techniques consists a set of methods, assays, and procedures. These techniques are useful to analyse the substances found in living organisms and the chemical reactions involved in their life processes. The most of these techniques are reserved for specialty research and diagnostic laboratories. Although simplified sets of these techniques are used in some other areas such as common events as testing for illegal drug abuse in competitive athletic events and monitoring of blood sugar by diabetic patients

To perform an analysis of a biomolecule in a system, we needs to design a strategy to detect that biomolecule, isolate it in pure form from among thousands of molecules from a biological sample, characterize it, and analyses its function. The first

biomolecules are the small building blocks of larger and more complex macromolecules, the amino acids of proteins, the bases of nucleic acids and sugar monomers of complex carbohydrates

Biochemical detection - is the science and technology of detecting biochemicals and their concentration. Biochemicals involves chemical processes within and relating to living organisms. Chemical reaction is the process of changing one or more chemicals. In our surrounding living organisms such as animals, plants, fungi, protists, bacteria etc. From these organisms we collect some cells, and which are then tested by this detection process. From the result analysis we can observe some fluctuations or some disorder in the output if the cell is damaged. That means the reactions are not proper. This way we can detect early, about the tested samples misbehavior

Various sensing techniques used for detection of bio chemicals are discussed here. The main purpose of biochemical detection is to provide early detection of prostate cancer, Plant Disease Detection, to Detect Early Alzheimer's Disease, Early detection of breast cancer, animals influenza etc.

### 2. LITERATURE SURVEY

Biochemical markers are used to mark potential targets so that they can be detected by special detectors.


#### 2.1 Device for Biosensing

Shradhya Singh et.al presented review on advances in FET, which is relying on the accumulation of charges at the gate/dielectric and dielectric/semiconductor interfaces [1]. The detection principle was based on threshold voltage shift induced by the biological recognition between probe and target molecules. The electrolyte, which replaces the classical dielectric in FET, fits well with biological processes. Concerning

True Copy Attested

# Hybrid control of a multi-area multi-machine power system with FACTS devices using non-linear modelling

ISSN 1751-8687  
 Received on 31st July 2019  
 Revised 26th October 2019  
 Accepted on 10th February 2020  
 E-First on 15th April 2020  
 doi: 10.1049/iet-gtd.2019.1165  
 www.ietdl.org

Jose P. Therattil<sup>1</sup>, Jenson Jose<sup>2</sup>, Praveen Raveendran Nair Prasannakumari<sup>3</sup> , Ahmed G. Abo-khalil<sup>3</sup>, Ali S. Alghamdi<sup>3</sup>, Bindu Gopakumar Rajalekshmi<sup>4</sup>, Khairy Sayed<sup>5</sup>

<sup>1</sup>Department of Electronics and Communication Engineering, Jyothi Engineering College, Trichur, Kerala, India

<sup>2</sup>Department of Electrical and Electronics Engineering, Jyothi Engineering College, Trichur, Kerala, India

<sup>3</sup>Department of Electrical Engineering, Faculty of Engineering, Majmaah University, Majmaah 11952, Saudi Arabia

<sup>4</sup>Department of Electrical and Electronics Engineering, College of Engineering Trivandrum, Kerala Technological University, Kerala, India

<sup>5</sup>Electrical Engineering Department, Faculty of Engineering, Sohag University, Sohag, Egypt

✉ E-mail: praveen.r@mu.edu.sa

**Abstract:** Generally, the mathematical formulation of the dynamics governing multi-area power systems with Unified Power Flow Controller (UPFC) is a challenging task owing to the presence of both differential and algebraic sub-systems. The proposed research work attempts to integrate the two subsystems by replacing the algebraic subsystem with a differential approximant that leads to a non-linear system of differential equations. Solution of the proposed model with a properly chosen Lyapunov function produce a nonlinear control signal which damps inter-area oscillations effectively. The non-linear control signal is realised using the backstepping method. Moreover, the new formulation enables utilisation of the law for uncertain parameters using the standard parametric feedback form, such that the advantage of such a controller is unaffected by these parameters. In addition to this major contribution, full utilisation of UPFC, by using a lone multi-variable PI controller which eliminates negative interaction between the controllers, is also achieved. Empirical verification of the proposed approach is done by simulating various scenarios with varying degrees of complexity – from dual area power networks to 39 buses New England system. The results of the experiments indicate the efficacy of the method.

## Nomenclature

$\omega_j, \delta_j$	angular speed and rotor angle of $j$ th generator
$\omega_o, \delta_o$	initial values of speed and rotor angle
$m$	count of generators
$M$	count of no generator buses
$P_{mj}$	input mechanical power of $j$ th generator
$P_{ej}$	synchronous output power of $j$ th generator
$D_j$	coefficient damping of $j$ th generator
$M_j$	moment of inertia of $j$ th generator
$H$	inertia constant
$V_j, \phi_j$	voltage and phase angle of $j$ th bus
$B_{jk}$	reactance elements of admittance matrix
$E_{gj}$	internal voltage of the $j$ th machine
$\varphi_{SR}$	phase angle of Series VSC
$\varphi_{SH}$	phase angle of shunt VSC
$m_{SR}$	amplitude modulation ratio of series VSC
$m_{SH}$	amplitude modulation ratio of Shunt VSC
$V_{dc}$	DC-link capacitor voltage
$Q_{Lj}, P_{Lj}$	reactive and active loads of $j$ th bus

## 1 Introduction

Electrical networks are operated on the verge of their stability limit owing to environmental and financial constraints. Utilisation of the available transmission corridor capacity is hampered by stability considerations of various sorts like small signal, transient and voltage stability [1, 2]. Excitation control design approach has received tremendous attention as a practical and convenient way to stabilisation of power systems [3, 4] but with incidental negative damping which needs to be addressed [1]. Power system stabiliser (PSS) which can reconcile the contrary exciter performance with stability is a potential solution for the problem [5–7]. However, PSS is far from being a settling solution, as it is marred by

insufficient damping in inter-area modes [8], necessitating more efficient solutions.

With high voltage power electronic techniques becoming competitive and having broad area of operation; flexible AC transmission system (FACTS) devices are earning growing acceptance. Hingorani and Gyugyi [9] initiated the basics of FACTS. Static Synchronous Compensator performs well in bus bar voltage management while Static Synchronous Series Compensators can manage power flow effectively. When the two are combined in a single device, we get the unified power flow controller (UPFC). An explanation of the elementary ideas is shown in [10, 11]. The modelling and control of the UPFC were tried out with various approaches. Power injection model in [12, 13] utilises the UPFC real and reactive power into the power network as the control input, ignoring the dynamics of UPFC. The better method for governing the UPFC is to use Proportional-Integral technique if the dynamics of UPFC is considered [14, 15]. In damping oscillations which include multiple modes, PI control is less productive. In such cases, a number of lead-lag blocks have to be employed [16]. This, in turn, makes the simulation more complex. Operating several controllers typically introduce mutual dynamic interactions with closed-loop system instability as their impairing consequence. A smart PID controller was suggested in [17] as a workaround which can achieve stability. It did improve the system in terms of transient stability and voltage stability, but the enhancement was limited. Another drawback was poor performance outcomes when operating point changed from the designed value.

Pradhan *et al.* [18] proposes a strategy that uses the pair non-local and local feedback means in FACTS based damping controller. However, it does not consider the non-linearity nature of the power system. Although designs using back-stepping technique [19] is popular, it is not suitable for control, the method assumes infinite bus, which is not valid for large systems. Transient energy function based model prediction method proposed in [20], is prone



ELSEVIER

Contents lists available at ScienceDirect

## Superlattices and Microstructures

journal homepage: [www.elsevier.com/locate/superlattices](http://www.elsevier.com/locate/superlattices)

## A review of blue light emitting diodes for future solid state lighting and visible light communication applications

M. Manikandan<sup>a</sup>, D. Nirmal<sup>b,\*</sup>, J. Ajayan<sup>c</sup>, P. Mohankumar<sup>c</sup>, P. Prajoon<sup>d</sup>, L. Arivazhagan<sup>b</sup><sup>a</sup> Department of Electronics and Communication Engineering, KPR Institute of Engineering and Technology, Coimbatore, Tamilnadu, India<sup>b</sup> Karunya Institute of Technology and Sciences, Coimbatore, Tamilnadu, India<sup>c</sup> SNS College of Technology, Coimbatore, Tamilnadu, India<sup>d</sup> Jyothi Engineering College, Thrissur, Kerala, India

## ARTICLE INFO

## Keywords:

Buried air void photonic crystal (BAVPC)  
Electroluminescence (EL)  
External quantum efficiency (EQE)  
Multiple quantum well (MQW)  
Super lattice (SL)

## ABSTRACT

This paper reviews the rapid progress being made in the developments of organic/inorganic blue light emitting diodes (LEDs). Blue LEDs exhibits outstanding electrical and optical properties such as low forward driving voltage, high light output power, high brightness and high internal quantum efficiency (IQE). This article highlights the rapid advancements being made in the developments of organic/inorganic blue LEDs over the last five decades, efficiency enhancement techniques, efficiency droop in blue LEDs and the techniques to alleviate efficiency droop, recent developments in flexible blue LEDs, degradation mechanisms and reliability issues in blue LEDs, challenges in fabrication and packaging of blue LEDs and it also throw light on the applications of blue LEDs. Their uniqueness in terms of low forward driving voltage, high light output power and brightness and large modulation bandwidth has fuelled the incorporation of blue LEDs in a wide variety of applications such as visible light communication (VLC), solid state lighting (SSL), cellular phone displays, liquid crystal display backlights, flexible flat panel displays, outdoor full colour displays, indicators, smart TVs, projection displays and implantable biomedical devices.

## 1. Introduction

The light emitting diodes (LEDs) have been considered as the most promising light sources for the future due to their unique features like environmental friendliness, high efficiency, low voltage operation and low power consumption, high brightness, small size and excellent reliability [1–5]. The world's first semiconductor p-n junction based red LED is invented by Nick Holonyak and S. F. Bevacqua [6]. Logan et al. then developed the first green LED based on nitrogen doped GaP semiconductor p-n junction [7]. The colour and energy emitted by the LEDs depends on the energy band gap ( $E_g$ ) of the semiconductor that is used to fabricate the LEDs. Semiconductor materials with an  $E_g$  of 2.6 eV or larger is essential to develop blue LEDs that can emit a wavelength range from 455 nm to 485 nm [8]. The wide band gap semiconductors that are used to develop blue LEDs should be of direct-transition type. High quality single crystal semiconductors with an  $E_g$  of above 2.6 eV are required to develop high brightness blue LEDs. The rapid improvement in the crystal quality of single crystal GaN semiconductor results in the development of high brightness blue LEDs. Zinc Selenide (ZnSe) with an  $E_g$  of 2.7 eV, Silicon Carbide (6H-SiC) with an  $E_g$  of 3 eV and GaN with an  $E_g$  of 3.4 eV have been considered as the most

\* Corresponding author.

E-mail address: [dnirmalphd@gmail.com](mailto:dnirmalphd@gmail.com) (D. Nirmal).<https://doi.org/10.1016/j.spmi.2019.106294>

Received 6 August 2019; Received in revised form 4 October 2019; Accepted 11 October 2019

Available online 19 October 2019

0749-6036/© 2019 Elsevier Ltd. All rights reserved.

True Copy Attested

*SUNNY*  
Dr. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)  
PRINCIPAL  
Jyothi Engineering College  
Cheruthuruthy P.O.- 679 531

# Design and Implementation of Instantaneous Power Estimation Algorithm for Unified Power Conditioner

Sindhu S.<sup>†</sup>, Sindhu M. R.<sup>\*</sup>, and T. N. P. Nambiar<sup>\*</sup>

<sup>†,\*</sup>Department of Electrical and Electronics Engineering, Amrita School of Engineering, Amrita Vishwa Vidyapeetham, Coimbatore, India

## Abstract

This paper discusses a simple control approach for a Unified Power Conditioner (UPC) system to achieve power quality compensation at the point of common coupling in distribution systems. The proposed Instantaneous Power Estimation Algorithm (IPEA) for shunt and series active power filters uses a simple mathematical concept that reduces the complexity in the design of the controller. The performance of a UPC is verified with a system subjected to voltage distortions, sags/swells and unbalanced loads using MATLAB/SIMULINK. The simulation study shows that a UPC with the proposed control algorithm can effectively compensate for voltage and current harmonics, unbalance and reactive power. The control algorithm is experimentally implemented using dSPACE DS1104 and its effectiveness has been verified.

**Key words:** Harmonics, Point of common coupling, Power conditioner, Power quality, Series active power filter, Shunt active power filter

## I. INTRODUCTION

Recently, there has been a surge in the current and voltage based power quality problems due to the wide use of power electronic controllers and sensitive equipment in the commercial and industrial areas. The alarming rate of growth in controller using power electronic devices in such industries has resulted in power quality disturbances in distribution networks. High precision process industries and critical loads such as computers, microprocessors and medical equipment require an uninterrupted and regulated power supply of a rated magnitude and frequency. Power quality problems have an adverse effect on industries in terms of equipment failure, data loss, commercial loss and so on [1]. Therefore, standards such as IEEE 519-1992, 2014 have been developed to keep power quality within acceptable limits [2]. A number of

mitigation techniques have evolved over time to meet these standards.

These mitigation techniques include passive filters, active filters, hybrid filters and custom power devices [3], [4]. Traditional passive filters using passive components provide only fixed compensation [5]. Active power filters [6]-[8] provide compensation for harmonics and introduce reactive components into systems so that power at a unity power factor can be drawn from the grid. Hybrid power filters [9] are a combination of more than one active filter or passive filter to solve the problems of reactive power and harmonics. Active power filters and hybrid power filters are capable of suppressing either voltage or current related power quality issues. The custom power park [10] concept was developed to provide high quality power to customers with critical loads that cannot tolerate variations in power quality levels. Custom power park with compensating custom power devices such as DVRs, static shunt compensators and unified power quality conditioners overcome power quality disturbances such as voltage sag, voltage swell, transients, voltage and current harmonics. It can also provide a solution to the reactive power burden. DVR injects voltage through a series transformer to

Manuscript received Jul. 13, 2018; accepted Feb. 23, 2019

Recommended for publication by Associate Editor Seon-Ju Ahn.

<sup>†</sup>Corresponding Author: [sindhus2478@gmail.com](mailto:sindhus2478@gmail.com)

Tel: 91-4662246100, Amrita Vishwa Vidyapeetham

<sup>\*</sup>Department of Electrical and Electronics Engineering, Amrita School of Engineering, Amrita Vishwa Vidyapeetham, Coimbatore, India

True Copy Attested

© 2019 KJPE

Dr. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)  
PRINCIPAL

Jyothi Engineering College



# Asset Tracking Using Low Power Bluetooth

Ann Sebi<sup>1</sup>, Jinesh K. J.<sup>2</sup>, David Nettikadan<sup>3</sup>

PG Scholar, Dept. of ECE, Jyothi Engineering College, Thrissur, Kerala, India<sup>1</sup>

Assistant Professor, Dept. of ECE, Jyothi Engineering College, Thrissur, Kerala, India<sup>2</sup>

Assistant Professor, Dept. of ECE, Jyothi Engineering College, Thrissur, Kerala, India<sup>3</sup>

**Abstract:** Asset Tracking is important for data management in organizations. The high value assets of individual/organization may get stolen. Companies and individuals can take advantage of asset tracking to protect their investments. These devices can let them know how often an asset is being used, when it's being used, if it has left a predetermined area and help to locate it if it's stolen. The System comprised of software integrated with hardware for preventing internal pilfering of assets. The system consists of i). nRF52 Beacon ii). ESP12E WiFi Module/Node MCU iii) central server. nRF Beacon will send BLE data serially to the receiver equipped with ESP12E WiFi Module and Bluebee Board to establish WiFi Connection at the Receiver and thus connected to the Central Server. This system helps tracking and monitoring of assets in real time and personal/organizational database is updated by the information stored in the Central server.

**Keywords:** Asset Tracking, Bluetooth Low Energy, Bluebee Board

## I. INTRODUCTION

Asset is a resource own by an individual/organization that has an economic value. Both companies and individuals can take advantage of asset tracking to protect their investments.. In RFID journal Ashton wrote that." If all objects in existence were equipped with identifiers and wireless property, these objects can be communicating with one another and be managed by computers". There are two types of assets:

- Tangible Assets
- Intangible Assets

Tangible assets are assets that have a physical form. This includes both fixed assets, such as machinery, buildings, land, and current assets, such as inventory whereas intangible assets are not physical in nature. If company is not investing money there is lose in time and money. The ultimate goal of asset tracking is to save time and money. Tracking company plus provides priceless info regarding asset usage (who is mistreatment what, where and when), maintenance and calibration schedules, and need for new equipment. Asset Tracking is a method of tracking physical assets either by scanning labels attached to assets or by using tags like GPS, BLE, Barcode, NFC or RFID which broadcasts tag location without manual tracking. Asset tracking mainly performs 3 functions:

- (i) Documenting asset attributes
- (ii) Location identification
- (iii) Tracking movement

In my system, Asset Tracking is done possible using Near Field communication (BLE Low Energy is used) to avoid distant transmission interferences.

## II. LITERATURE SURVEY

According to research commissioned by Cisco, there will be 50 billion devices connected to the internet by 2020. The problem of asset localization and tracking is not new. A large number of research works faced it in different scenarios and under various constraints: Some of related approaches are given below.

### A. On Device Mapping of WiFi Hotspots via Direct Connection of WiFi Enabled and GPS Enabled Mobile Devices

This paper [1] uses a WiFi enabled and GPS enabled user devices. It executes a hotspot location utility, which enables the device to detect WiFi hotspots and update a locally stored hotspot location database (LHLD) containing geographically mapped hotspots. When a hotspot is detected, the device accesses the hotspot, retrieves identification information and usage terms from the hotspot, and measures performance metrics of the hotspot. The utility stores the identified hotspot with the current GPS coordinate as an entry within the LHLD. When a user later desires to locate hotspots within a particular geographic location, the user enters the physical address of the location, and hotspots with matching (or proximate) GPS coordinates of the entered address are presented to the user. The user may specify

True Copy Attested

All Rights Reserved © 2019 IJARTET

*smans*  
 Dr. SUNNY JOSEPH KALAYATHANKAL  
 M.Tech, MCA, M.Sc, M.Phil, B.Ed  
 Ph.D (Computer Science), Ph.D (Maths)  
 PRINCIPAL  
 Jyothi Engineering College

## RESEARCH ARTICLE

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

Jayesh George Melekoodappattu<sup>1</sup> | Anoop Balakrishnan Kadan<sup>1</sup> | V Anoop<sup>2</sup>

<sup>1</sup>Department of Electronics and Communication Engineering, Vimal Jyothi Engineering College, Kannur, Kerala, India

<sup>2</sup>Department of Electronics and Communication Engineering, Jyothi Engineering College, Thrissur, Kerala, India

## Correspondence

Jayesh George Melekoodappattu, Department of Electronics and Communication Engineering, Vimal Jyothi Engineering College, Kannur, Kerala, India.

Email: jayeshg1988@gmail.com and drjayeshgeorge@gmail.com

## Abstract

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

## KEYWORDS

CAD, classification, GOA, mammogram, wavelets

## 1 | INTRODUCTION

Signal and image processing algorithms have played a pivotal role in the area of science over the last few years.<sup>1</sup> The use of image processing methods in biomedical science is more important. Digital image processing nowadays performs an integral part of healthcare. Image processing is generally split into four main fields: image acquisition, image enhancement, image analysis and image management.<sup>2</sup> The integration of a medical image directly into automated image processing algorithms is difficult as there is a disparity between the physician's elucidation of a diagnostic image and the structure of discrete pixels which form an image in computer

algorithms.<sup>3</sup> Hundreds of mammogram tests are reported in diagnosis facilities with the growing onset of awareness of breast cancer. Even in developed countries, there is a disparity between the availability of experts and the number of experts required for mammogram examination. Furthermore, manual classification is tedious and vulnerable to error. It might lead to poor critical results.<sup>4</sup> Computer-assisted diagnostic systems are necessary for diagnosis because of these limitations. These above-mentioned challenges led to the research and design of a high-precision, computer-assisted detection system for breast malignancy diagnosis.

Mammogram images are taken by exposing the human breast area to X-rays. Mammography is a



World Conference on Transport Research – WCTR 2019, Mumbai, 26-30 May 2019

## Effect of geometry on driver heart rate

Anitha Jacob<sup>a</sup>, Jisha Akkara<sup>a</sup>, Vineetha N<sup>a\*</sup>

<sup>a</sup>Jyothi Engineering College, Cheruthuruthy, Thrissur, Kerala, India -679531

### Abstract

Driving is a complex task incorporating most of the body organs and sensory system. Coordinated performance of eyes, ears, hands and legs are required in harmony with mental or cerebral actuations. Depending upon the stimulus the cardio vascular performance of a driver varies. The objective of this paper is to model the heart rate kinetics of drivers in response to variation in highway curve geometry. The study was done on 114 horizontal curves of two lane rural highways of Kerala. Heart rates of 30 drivers were collected during their drive along the study stretches. Cross sectional details of curve like radius of curve, length of curve, deflection angle, superelevation, width of road, width of shoulder and available sight distance were measured. Similarly the length of preceding tangent to the curve was also considered. Findings of the study revealed the correlation of sight distance and shoulder width with average heart rate. A nonlinear regression model was proposed based on analysis.

© 2020 The Authors. Published by Elsevier B.V.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Peer-review under responsibility of the scientific committee of the World Conference on Transport Research – WCTR 2019

*Keywords:* Heart rate; two-lane rural highway; geometry; driver workload

### 1. Introduction

#### Nomenclature

R	radius of horizontal curve in metre
CL	length of horizontal curve in metre
DA	deflection angle of horizontal curve in degrees
WR	width of road in metre
SE	superelevation of horizontal curve
PTL	length of preceding tangent in metre

\* Corresponding author. Tel.: +91-9447092923

E-mail address: [anithajacob\\_in@yahoo.com](mailto:anithajacob_in@yahoo.com)

2352-1465 © 2020 The Authors. Published by Elsevier B.V.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Peer-review under responsibility of the scientific committee of the World Conference on Transport Research – WCTR 2019

10.1016/j.trpro.2020.08.163

True Copy Attested

*Sunny*

Dr. SUNNY JOSEPH KALAYATHANKAL  
M.Tech, MCA, M.Sc, M.Phil, B.Ed  
Ph.D (Computer Science), Ph.D (Maths)  
PRINCIPAL