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## ACADEMIC YEAR 2021-22

S.No	NAME OF THE AUTHOR	TITLE OF THE BOOK/PAPER	NAME OF THE CONFERENCE/PUBLICATIONS
1.	Mrs. Z. Asmathunnisa	Problem Solving and Python Programming	Charulatha Publications (June, 2022) <a href="http://www.charulathapublications.com">http://www.charulathapublications.com</a> ISBN: 978-93-5577-036-3
2.	Sr. A. Punitha Jilt	Python Programming	JBR TRISEA Publications (2022) <a href="http://www.jbrtriseapublishers.com">http://www.jbrtriseapublishers.com</a> ISBN: 978-81-9526-987-7
3.	Mrs. D. Umamaheswari	Prognostication of Diabetic Retinopathy using Transfer Learning of Alex Net	International Conference on Emerging Trends in Engineering, Science and Management ISBN: 978-93-91535-09-4
4.	Dr. S. Anita		International Conference on Emerging Trends in Engineering, Science and Management. ISBN: 978-93-91535-09-4
5.	Dr. S. Anita	Cascade Attentive Refinement For Blood Vessels Segmentation of Diabetic Retinopathy	Computing Information Electronics and Electrical Engineering. ISBN: 978-93-91930-01-1
6.	Mrs. D. Umamaheswari		Computing Information Electronics and Electrical Engineering. ISBN: 978-93-91930-01-1
7.	Mr. P. Saravanabhava	Design of secured web application for E-Voting	Second National E-Conference on Research Trends in Computational Intelligence NCRTCI'2022 ISBN: 978-93-5627-353-5
8.	Mrs. Z. Asmathunnisa	User Choice based Alpha numerical random password generator for securing the data assets	National conference on Research and Development in Science, Engineering & Technology, 2022. ISBN: 978-93-5254-811-8
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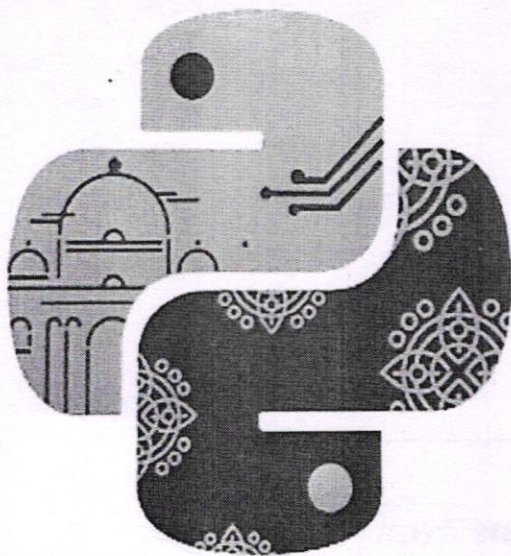
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# TABLE OF CONTENT

## UNIT - 1 ALGORITHMIC PROBLEM SOLVING

1.1.	Fundamentals of Computing	1.1
1.2	Identification of Computational Problems	1.8
1.3.	Algorithm	1.11
1.3.1	Basic Building Blocks of Algorithm	1.12
1.3.1.1	Sequence Structure	1.13
1.3.1.2	Selection Structure	1.14
1.3.1.3	Iteration Structure	1.16
1.4	Flowchart	1.17
1.4.1	Types	1.17
1.4.1.1	High-Level Flowchart	1.17
1.4.1.2	Detailed Flowchart	1.17
1.4.1.3	Deployment or Matrix Flowchart	1.21
1.5	Pseudocode	1.21
1.5.1	Three Basic Constructs for Flow of Control	1.21
1.5.1.1	Sequence	1.22
1.5.1.2	Selection	1.24
1.5.1.3	Repetition	1.27
1.5.2	Nested Constructs	1.29
1.6	Illustrative Problems	1.29
1.6.1	Algorithm to Check Whether a Number Entered By User is Prime or Not	1.29
1.6.2	Algorithm to Find Minimum and Maximum Elements in the List.	1.30
1.6.3	Algorithm to Print Numbers From 1 to 20.	1.30
1.6.4	Algorithm to Convert Temperature From Fahrenheit to Celsius	1.30
1.6.5	Algorithm to Determine and Output Whether Number n is Even or Odd	1.30
1.6.6	Algorithm to Determine Whether a Student Passed the Exam or Not	1.31
1.6.7	Flowchart to Print Numbers From 1 to 20	1.31
1.6.8	Flowchart to Convert Temperature From Fahrenheit to Celsius	1.31
1.6.9	Flowchart to Determine and Output Whether Number n is Even or Odd	1.32



1.6.10	Flowchart To Determine Whether A Student Passed The Exam or Not	1.32
1.6.11	Towers of Hanoi	1.32
1.6.12	Guessing Game	1.34
1.6.13	Flow Chart for Finding Minimum Number in a List.	1.36
1.6.14	Flowchart for Inserting a Card in a List of Sorted Cards	1.36
1.6.15	Pseudo Code to Find Minimum in a List	1.37
1.6.16	Pseudo Code to Insert a Card in a List of Sorted Cards	1.37
1.6.17	Pseudo Code to Guess an Integer Number in a Range	1.38
1.6.18	Pseudo Code for Towers of Hanoi	1.38
	Two Marks Question & Answer	1.39

## UNIT - 2 DATA, EXPRESSIONS, STATEMENTS

2.1.	Introduction: Python	2.1
2.1.1	Values And Types	2.3
2.1.1.1	Number Data Type	2.4
2.1.1.2	String Data Type	2.4
2.1.1.3	List Data Type	2.4
2.1.1.4	Tuple Data Type	2.5
2.1.1.5	Dictionary Data Type	2.6
2.1.1.6	Boolean Data Type	2.6
2.2	Variable	2.6
2.3	Expressions And Statements	2.7
2.4	Comments	2.7
2.5	Operators	2.8
2.5.1	Types of Operator	2.8
2.5.1.1	Arithmetic Operators	2.8
2.5.1.2	Comparison (Relational) Operators	2.9
2.5.1.3	Assignment Operators	2.10
2.5.1.4	Logical Operators	2.12
2.5.1.5	Bitwise Operators	2.13
2.5.1.6	Membership Operators	2.14
2.5.1.7	Identity Operators	2.15

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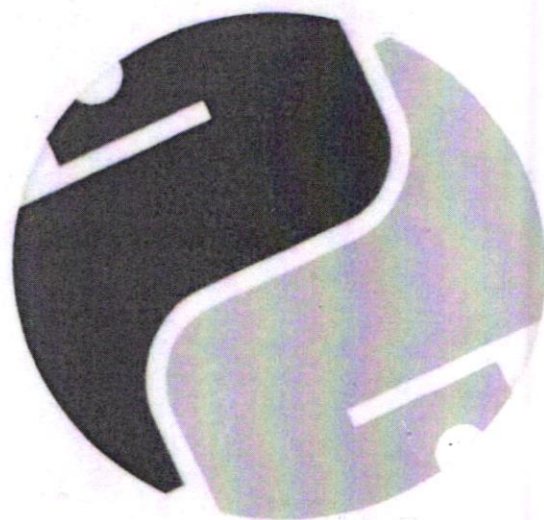
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# **PYTHON PROGRAMMING**

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# CONTENTS

## Chapter - 1 ALGORITHMIC PROBLEM SOLVING

1.1	Need for Logical Analysis and Thinking .....	1
1.2	Problem Solving Techniques .....	2
1.3	Algorithm .....	2
1.3.1	Properties of an Algorithm .....	3
1.3.2	Advantages of Algorithm .....	4
1.4	Building Blocks of Algorithms .....	4
1.4.1	Instruments/Statements .....	5
1.4.2	State .....	5
1.4.3	Control Flow .....	5
1.5	Notation .....	7
1.5.1	Pseudocode .....	7
1.5.2	Flow Chart .....	10
1.5.3	Programming Language .....	17
1.6	Algorithmic Problem Solving .....	19
1.7	Simple Strategies for Developing Algorithm .....	23
1.7.1	Iteration .....	23
1.7.2	Recursion .....	23
	Illustrative Problems .....	24
	Pseudocode Examples .....	36
	Flowchart Examples .....	39
	2 Marks Questions with Answers .....	48
	16 Marks Questions with Answers .....	51

## Chapter - 2 INTRODUCTION TO PYTHON

2.1	Introduction .....	57
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in

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## TABLE OF CONTENT

ARTICLE	AUTHOR	MANUSCRIPT DOWNLOAD
Prognostication of Diabetic Retinopathy using Transfer Learning of Alex Net	D. Umamaheswari, N. Nachammai, S. Anita,	<a href="#"><u>Download</u></a>
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# Prognostication of Diabetic Retinopathy using Transfer Learning of AlexNet

<sup>1</sup>D. Umamaheswari,<sup>2</sup>Dr. N. Nachammai,<sup>3</sup>Dr. S. Anita,

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**Abstract**—Diabetic Retinopathy (DR) is one of the complications which affects the retina and may lead to blindness in diabetes mellitus patients which can be avoided if diagnosed and detected early. Though it is often asymptotic if detected early is very much treatable. A computer vision-based algorithm can help the doctors and the patients for a faster and more precise diagnosis for treatment. Such algorithms can potentially have better accuracy in detecting different stages of the disease. However, developing such algorithms can be computationally expensive and to some extent complex in terms of extracting highly non-linear features. Applying deep learning in such scenarios increases the problem-solving capacity of the system significantly. Deep Learning algorithms have their own challenges often being dependent on corpus of labelled data. In the medical imaging field getting such large amount of labelled data can be expensive and time consuming but once completed and optimised would give a robust system for diagnosis. In this study a robust framework for the classification of DR and healthy images were implemented. This framework using the feature map of AlexNet gives us promising results in terms of Accuracy 80%.

**Index Terms** – AlexNet, Deep Learning, Diabetic Retinopathy.

## 1. INTRODUCTION

Diabetes being a chronic disease worldwide affects one out of eleven adults globally. Around 40-45% diabetes patients have a good chance of developing the diabetic retinopathy (DR) [1]. Diabetes Mellitus is a disorder which causes high chronic concentration of glucose in the blood [2]. In an estimate, more than 370 million people worldwide have a high possibility of being affected by this disease. The estimated indicate that this number can go as high as 600 million by the year 2040 [1]. If this condition is not detected in the early stages, the diabetic retinopathy could potentially cause blindness [2]. The consultation of an ophthalmologist or an optometrist is required within the 3-5 years in diabetes type 1 patients after its onset.

A blood sugar control, healthy diet and lifestyles are recommended precautionary measures to avoid DR developments [3]. DR at its early stages is usually asymptomatic and often goes undetected until patients feel vision related problems such as distortions, blurs, or floaters [3]. This makes the detection of DR in its early stages highly significant for the diagnosis as well as the treatment of the patients [3]. An automatic system with a deep learning algorithm for the detection of DR would help to reduce the burden on the medical professional to diagnose and on the other hand the efficiency would help them to treat more patients. The model aims to classify the DR into two classes in terms of Retina as shown in Fig1. There are 5 different classes onto which we could classify the DR severity. The 5 classes being: no DR, mild, moderate, severe, proliferative. To some extent this model can be made into a binary classification by fusing categories to get non-referable which is no to mild DR or (DR and no DR) versus referable which is moderate to worse DR [2].

In order to make the diagnosis process easier to machine learning techniques used. Conventional machine learning techniques require an expert to identify the features manually. Such conventional methods depend heavily on the expert's accuracy on the feature extraction [4]. Recent developments in deep learning have been widely appreciated and applied in the domain of medical image analysis [5]. The previously complex high-level features are increasingly more understandable in advancing deep learning algorithms [5].

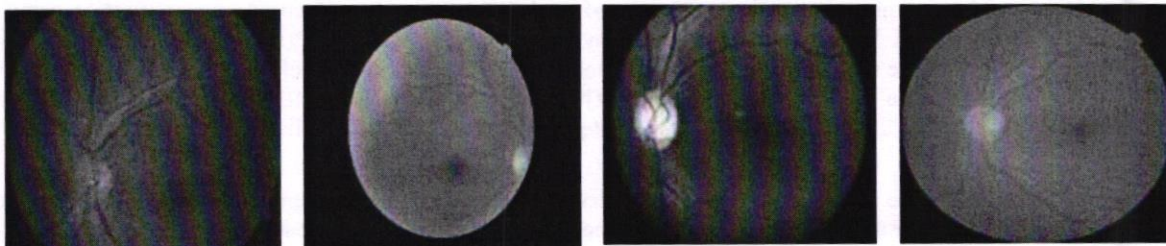
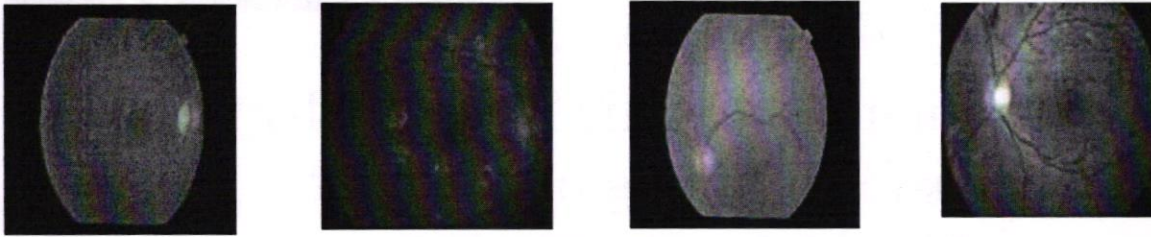


Fig1a. Sample Input Images taken for Healthy patients' Experimental Results





**Fig1b. Images Detected with Diabetic Retinopathy after Experimental Results**

The recent developments in deep learning have expanded the capacity of those algorithms beyond human capabilities [6]. A range of new application domains including retinal imaging analysis with not seen before specificity and sensitivity in detection and classification have been made possible with deep learning. The Convolution neural networks have proved to be a powerful tool and have been increasingly popular among researchers for DR grading [2]. Deep learning algorithms in various domains have shown to have an edge over the conventional techniques[1]. In retinal image analysis, several researchers and communities have developed algorithms to automate a computer aided analysis on retinal fundus images [1]. The detection of diabetic retinopathy is one of such conditions that can be detected with such algorithms[1].

AlexNet is one of the most powerful models in the object detection domain with high accuracies on challenging datasets. AlexNet has a huge potential in the domain of computer vision and artificial intelligence technology. The AlexNet by its architecture has been a leading model for object detection problems. The performance by AlexNet models has so appealing in recent times that it may replace the CNNs for image-based problems. The results from AlexNet could be record-breaking on highly challenging datasets. The highlight of each section of this article is summarised below. In this study we describe the development and validation of AlexNet for DR Screening, Related Works, Datasets, Proposed Architecture, Results, Conclusion and Future works

## 2. LITERATURE REVIEW

**Mohammad T. Al-Antary AND Yasmine Arafa et al** [7]. This article proposes MSA-Net or Multiscale attention network for the DR classification. The retinal image is embedded in the encoder network in a high-level representational space, the mid-level and high-level features are used to improve the representation. The retinal structure of different locality is incorporated by a multi-scale feature pyramid. A multi scale attention mechanism is used to enhance discriminative power in representing the features. The DR severity level classification done using a cross entropy loss method. The model is also trained using a weakly annotated data for healthy and non-healthy retina images. Outstanding results on experimenting this model were achieved in the public datasets of EyePACS and APTOS.

**Yehui Yang et al.**[8]The authors of this paper collaboratively used patch and image level annotations in the classification of DR severity grading. This paper presents an optimised robust framework bilaterally exchanging the information in terms of fine level lesion and image level grade. Such a framework offers to exploit more DR grading features discriminatively. The result from this article suggests outperforming the advanced modern technologies and 3 ophthalmologists practicing over 9 years. When tested on various distribution like labelled and camera data, the algorithms prove to be resilient in real world scenarios. The CLPI in this study on extensive experiments proves to have competing performance with SOTA algorithms and other senior ophthalmologists. The paper also shows its robustness of CLPI for classification of DR grading under real world scenarios [2].

**Pengxiao Zang et al.** [9]. This article proposed a DR classification framework based on Conventional Neural Network (CNNs) using OCT and OCTA. DcardNet (adaptive dropout rates) is used in this framework of continuously and densely connected neural network. To address overfitting this article also proposes a adaptive label smoothing. By the guidelines of International Clinical Diabetic Retinopathy Scale three different classifications are made. On a higher level this model classifies DR as referable (Category 1) and non-referable (Category 2). Further, on the 2nd level the model can classify the eye as non-DR, NPDR (non-proliferative DR), or PDR (proliferative DR). The final level classification is done as no DR, mild to moderate NPDR, severe NPDR and PDR. The adaptive label smoothing helps in network's convergence focused more on mispredicted data. The trained model following the mentioned has better chance of handling over fitting. Such CMA generations and 3 levels of DR improves diagnosis and treatment. 95.7%, 85.0%, and 71.0 were obtained as the classification accuracy at these 3 levels respectively [4].

**Zubair Khan et al**[10]To speed up training time and convergence of model the authors have focused on classification using the lowest possible learnable parameters. A VGG-NiN model is used by stacking VGG16 as a SPP (spatial pyramid pooling layer) with NiN (network in network) to achieve scale invariant and highly nonlinear Deep Learning model. By the virtue of SPP layer the DR image can be processed at any scale by the VGG-NiN model. The NiN stacking helps classify better by adding an extra non linearity to the model. The results from this study suggest having better accuracy and resource utilisation compared to state of the art of the art technologies.

**Shuqiang Wang et al.**[11]In this article the model uses a semi supervised multichannel-based generative adversarial network or MGAN for DR grading. A series of subfundus images with respect to the scattering DR features are generated using the multichannel generative model. The MGAN minimises the dependence of labelled data by using high-resolution fundus images without any compression. The MGAN could achieve that by identifying inconspicuous lesion features. Effective results are





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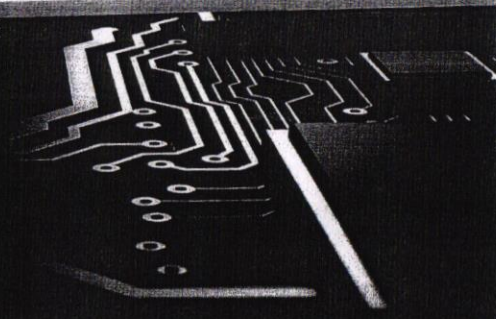
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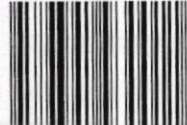


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Dr. A. Praveena  
Dr. S. Jayasundar  
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## SOLAR PANEL CRACK DETECTION USING CONVOLUTIONAL NEURAL NETWORK

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### ABSTRACT

Solar energy is gaining strong momentum as the future clean and renewable source among other sources of energy. In this paper we approached a new method of Deep learning Algorithm Convolutional Neural Network for the prediction of cracks in the solar panel. Solar power generation has attracted much attention but there are not enough specialists for condition monitoring of the solar panel. Safety and human cost is most valuable thing. Risking of human lives is not acceptable. So, it is a need to find a outcome for reducing the mortality of lives due to carcinogen present in solar panel. The feature extraction gives us a broad view about the image which is captured and help us to process the image for preprocessing. The given system has overcomes the errors and has higher efficiency than the current image processing methods. By the usage of multiple hidden layers such as conv2D, maxpoolD, Flatten and Dense the crack is detected and it can be viewed by the user in the shell of python. By the help of classified image the cracked solar panel is removed before it gets bursts. Cracked Solar Panels may emits high Carcinogen agents so it is necessary to remove it.

**Keywords:** *Deep learning, Convolutional Neural Network, Solar panel*

## CASCADE ATTENTIVE REFINE NET FOR BLOOD VESSELS SEGMENTATION OF DIABETIC RETINOPATHY

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### ABSTRACT

Diabetic retinopathy is that the leading reason for blindness in working population. vas segmentation from fundus images helps ophthalmologists accurately diagnose and early detection of diabetic retinopathy. However, the task of Blood vessels segmentation is crammed with challenges because of the complex structure, the numerous sizes and also the interclass similarity with other fundus tissues. to cope with the issue, this paper proposes a cascade attentive Refine Net (CARNet) for automatic and accurate vessel segmentation of diabetic retinopathy. It can fill use of the fine local details and coarse global information from the fundus image. CARNet consists of world image encoder, local image encoder and a spotlight refinement decoder. We take the total image and so the patch image because the twin input, and feed them to ResNet50 and ResNet101, respectively, for down sampling to extract vas features. The high-level refinement decoder uses dual attention mechanism to integrate the same-level features within the 2 encoders with the output of the low-level attention refinement module for Multiscale information fusion, which focus the model on the vessel area to induce accurate predictions. We evaluated the segmentation performance of the proposed Kaggle and DDR data sets. Extensive comparison experiments and ablation studies on various data sets show the proposed framework outperforms the state-of-the-art approaches and has better accuracy and robustness.

**Keywords:** • *Diabetic retinopathy • Blood vessels segmentation RefineNet • Attention fusion*





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19.	Integrated multi-purpose field surveillance robot for military use	84
20.	Smart tracking security device for women safety using raspberry pie hardware	94
21.	Systematic survey on innovations of IOT in Covid	99
22.	Wearable Safety and Emergency Device	105
23.	Weighted Supervised Non-Negative Matrix Factorization and General Regression Neural Network based Gender Detection Model for Authentication	111
24.	Speech Authentication System with Multi layered Feed Forward Network having Gradient Descent Technique and Backward Error Propagation	126
25.	IOT in Smart Health Care	121
26.	Automated attendance system using face recognition.	123
27.	Creating bot for send email with converting voice message into text	126
28.	Smart bus pass system using android	129
29.	Online crime reporting department of local government using php	132
30.	Design of secured web application for e-voting	137
31.	Managing the Information of Logistics System Using the Techniques of Searchable encryption and data query algorithm.	143
32.	Smart stress analysis in social media with text matching and classification	146
33.	Early wheat leaf disease detection using CNN	152
34.	Live action and Sign Language Recognition using Neural Network	157
35.	Effect of web based learning on instructive efficiency for auxillary school under studies	165



# Design of Secured Web Application for E-Voting

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**Abstract**— The higher use of information technology seems to have enhanced the technologies of governmental department services. Electronic voting machine is the example for modernized democracy. Electronic voting machine should be combined with legal procedures. Data's acquired from Voting machine after the voting process determines who will run the country. Finding the peoples choice of leader is the main aim of Voting machine. In many of the countries voting is trouble. Some of the issues in EVM are incorrect voting during elections, experience less persons involved in election process, difficulty in accessing polling stations, and deficiency in voting equipment. The proposed new internet-based voting system solves the problem in EVM. This method proposes a small learning curve, citizens will have to be trained on how to exercise their right to vote online.

**Keywords**- voting, E-voting, electronic voting system.

## I. INTRODUCTION

E-voting plays a very high role in forming a democratic society. The existing voting technique makes voters to vote by visiting their polling stations. Polling stations are installed in some public places. The proposed E-voting technology would save a lot of time for both voters and the election commission.

A Perfect Voting application should allow fully functional online voting using general household devices [1]. Vote counting can be done secretly in an automated manner. E-voting system has some issues like threats and challenges as it depends on the internet. However, it is simultaneously solving the problems faced while

using current voting systems. Different sets of procedures need to be followed for the E-voting system. To get rid of threats, different types rules related to eligibility, ballot-privacy, singular verifiability, completeness, fairness, universal verifiability, and robustness need to be established.

The proposed Voting Application is an Online voting method. In this system, citizens who are over the age of 18 and all sexes should be able to cast their ballot without visiting polling stations. There is a database managed by the Indian Electoral Commission that stores all voters' names with complete information.

In this proposed method voters can easily use their voting rights online. People must be registered first in order to vote. For security reasons the system administrator need to register everyone. System administrator registers voters on a special registration form.

Citizens those who wish to register should contact the system administrator to submit their contact details. The verification of each citizen is done using existing informations such as AADHAR, PAN-Card, Passport, etc., by the registration authority, the individual is therefore registered as a voter by the Indian Electoral Commission.

After registration process, the voter will receive a Voter\_Id number and a password and using these

credentials the citizen can log in to the system and use the services of the system, e.g. Voting, reviewing results, etc. If invalid details are submitted by the user, the citizen will not be registered and he will not be able to vote.

## II. ISSUES WITH EXISTING SYSTEMS

### A. Current Scenario

In the past days, the voting was done using paper ballot. Due to advancement in technology, Electronic Voting Machines were developed and like any technology, it also has its advantages and disadvantages.

### B. Election Commission of INDIA

The duties of the Election Commission of India (ECI) as established by Article 324 of the Constitution are to ensure that the election process is being





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This is to certify that Mr/Ms/Dr P.SARAVANABHAVA  
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NCRDSET-1056	<b>Secure Message Communication Protocol For Warship Establishment</b> <i>Arivumathi.V, Jothika.S, Keerthana.S, Ramalingam.S</i>	51
NCRDSET-1059	<b>User Choice-Based Alpha Numerical Random Password Generator For Securing the Data Assets</b> <i>M.Saleth Reena, Z.Asmathunnisa</i>	52
NCRDSET-1061	<b>Blind Assistance System with Voice Enabled and Real time Object Detection</b> <i>S. Sri Ram, S. Syed Thameem, P.A.Yokesh, E.Indhuma</i>	57
NCRDSET-1063	<b>Video Compression</b> <i>Z. Asmathunnisa, B.Dhivagar, K.Rajesh, P.A.Vasanth</i>	63
NCRDSET-1079	<b>Automation using IoT in Greenhouse Environment</b> <i>Jasmine Medona .A</i>	69
NCRDSET-1086	<b>Drowsiness Detection of Driver by Using Transfer Learning of Deep Learning</b> <i>N.Kanishya, B. Ranjani, A.Reshma, V.Sindhu, P.M.Kamatchi</i>	77
NCRDSET-1053	<b>Hybrid key splitting scheme for data sharing and prevention of cyber security</b> <i>A.Nandhini, D. sowmiya., S. Subalakshmi , S. T. Preethi</i>	81
NCRDSET-1057	<b>AI Based transport system in real time traffic monitoring with machine learning</b> <i>B.Harine, E.Premalatha, S.Sivaranjani, S.Sneha, R.Vijayabharathi</i>	82

### **Electronics and Communication Engineering**

NCRDSET-1006	<b>Green energy harvesting from Radio frequency to direct current</b> <i>Elakiya, Heera, Pavithra, Sathyamoorthy.S</i>	86
NCRDSET-1008	<b>IOT Approach to vehicle accident detection and live location tracking</b> <i>K.Mohanapriya, G.Indumathi</i>	92
NCRDSET-1015	<b>Smart and secure voting machine using biometric authentication</b> <i>S.Abinandhini, R.Iyshwarya, R.Sivapratha</i>	97
NCRDSET-1018	<b>Implementation Of Speed Assistance In Vehicle By Using IoT</b> <i>Mohanraj. R,Sanjay. T,Yogeshraja. R Prithviraj.K</i>	104
NCRDSET-1019	<b>Abandoned Bore Well Rescue System For Toddlers Using Apl Device</b> <i>R.Aasha, M.Shylaja, S.Nivetha , T.Karthiga</i>	111



## INDEX

### Computer Science and Engineering

NCRDSET-1027	<b>Smart Ration card using Face recognition</b> <i>R.Ranjithkumar, M.Labilan, G.Ravindiran, P.Saravanabhava</i>	1
NCRDSET-1034	<b>Implementation Of Dna Cryptography In Cloud Computing And Using Socket Programming</b> <i>S. Nithya, R. Sharmila, N. Thanigaivel</i>	5
NCRDSET-1035	<b>Online product price and comparison using web mining and machine learning</b> <i>Sandhiya.R, Senthamizhselvi.P, AnnaiTherasammal.A, Brittadevi.v</i>	9
NCRDSET-1036	<b>Heart attack prediction for stroke patients using machine learning</b> <i>S.Manavalan, A.Bckiya priy, A.Ezakia selvam, R.Kamatchi</i>	14
NCRDSET-1039	<b>KBot: Approach for Understanding NL Over Linked Data</b> <i>D.Sakthi Sankar, T.Sivasubramanian, R.Sridharan, T.Periyasamy</i>	19
NCRDSET-1041	<b>Massive MIMO Transmission for LEO Satellite Communication</b> <i>Gayathiri.T, Reshma Taaj .M, Sangeetha .S, T. Periyasamy</i>	20
NCRDSET-1045	<b>Cyberbullying Detection on Social Networks Using Neural Networks</b> <i>P.Nivetha, A. Archana, R.Vimala Roshini</i>	21
NCRDSET-1046	<b>Classification of video metadata</b> <i>K. Bakkiyalakshmi, R. Kowsalya, R. Krishnaveni</i>	27
NCRDSET-1050	<b>Towards Achieving Keyword Search over Dynamic Encrypted Cloud Data with Symmetric-Key Based Verification</b> <i>S.Ramalingam, Abinash S, Prem S, Karthikeyan S</i>	31
NCRDSET-1051	<b>DL- CNN based hardware state enable using hand gesture</b> <i>E.Indhuma, N.Subasri, M.Jayaveena</i>	36
NCRDSET-1052	<b>Optimizing Spectrum Sensing for Energy Efficient Cognitive Radio Sensor Network</b> <i>Abirami.S, Priyadarshini.P, Ragulya.S, Gayathiri.N, ST.Preethi,</i>	41
NCRDSET-1054	<b>Smart Ration System Using Face Recognition.</b> <i>A.Ammeerunnish, R. Elavarasi, V. Lakshmi, T.Hemalatha</i>	42
NCRDSET-1055	<b>Modified Secure Multi Clouds Mobile Computing for the Data Computing in Cloud</b> <i>A. Akilan, R.Aadhithyan, S.Dinesh, S.Karthikeyan</i>	46



NCRDSET-1022	<b>IOT Based Implementation Of River Water Flow And Water Quality Monitoring For Pico Hydro Power Plant</b> <i>V.Heera, P.Paruthi Ilam Vazhuthi</i>	118
NCRDSET-1024	<b>Form Monitoring By Augmented Reality Using Under Ground Sensor Network</b> <i>Abinaya.S, Bavadharini.R, Kalki.V, Ramapriya.S</i>	124
NCRDSET-1032	<b>Military Robot For Surveillance And Protection System</b> <i>Ajay.K, Gokul Raj.R, Santhosh Kumar.S, Venkatesan.G</i>	130
NCRDSET-1033	<b>Bus Tracking System For Visually Impaired Person</b> <i>K.Santhini. G.Gayathri V.Thiyagarajan/ASP, G.Sadiq Basha</i>	133
NCRDSET-1037	<b>Audio Data Transmission On Light Using Li-Fi Technology</b> <i>Bhuvanitha K, Anupriya K, Deivanai E, Raju S</i>	139
NCRDSET-1049	<b>Design And Fabrication Of Optimized Rail gate Control And Obstacle Detection Using Wireless Protocol</b> <i>Jeevanandam.V, Manikandan.R, Mohamed Akshith.M, Thivagar.T</i>	142
NCRDSET-1065	<b>Cascade attentive refinenet for blood vessels Segmentation of diabetic retinopathy</b> <i>Abinesh.M, Ravichandran.P, D. Uma maheswari</i>	145
NCRDSET-1066	<b>IoT- Based Intelligent Aquaculture Monitoring System For Fish Farming</b> <i>R.Radhakrishnan/AP, S.Balabaker</i>	153
NCRDSET-1072	<b>Design And Implementation Of Microcontroller Based Vehicular Smart Helmet For Safe Journey Using Sensors</b> <i>B. Arunkumar/AP, S. Durai Ra/ AP, V.Venkatesan</i>	161
NCRDSET-1073	<b>Microfluidic Syringe Pump</b> <i>R. Sineka, Dr. S. Anita</i>	167
NCRDSET-1078	<b>Design And Analysis Of Multi-Patient Monitoring System Using Cloud Computing</b> <i>V. Ramya, G. Seetha Lakshmi, R.Radhakrishnan</i>	173
NCRDSET-1080	<b>Design of GaAs Based Low Noise Amplifier For 5G Frond-End System</b> <i>K.Kaveri, P.Sivasakthi, M.Sahinipiriya</i>	179
NCRDSET-1081	<b>Remote Health Monitoring System For Visually Impaired</b> <i>Kavitha.K, Delisya.D, B. Arunkumar</i>	184
NCRDSET-1082	<b>Saline Level Monitoring System Using Lora Technology</b> <i>G.Parameswari, R.Preethi, S.Krishna Dharshini, S.Balabaker</i>	189



NCRDSET-1083	<b>Design Of Fast Full By Exploring New Xor/X Nor Gates</b> <i>R.Manju, K.Vijayalakshmi , V.venkatesan</i>	193
NCRDSET-1093	<b>High Speed Gate Level Synchronous Full Adder Designs</b> <i>V.Venkatesan B.Arunkumar M.sahinipriya</i>	199
NCRDSET-1098	<b>Design of Rectangular Patch 4×4 Array For Satellite Communication</b> <i>S.Selvapraveena, R.Sandhiya S.Durai Raj</i>	205

### ***Electrical and Electronics Engineering***

NCRDSET-1062	<b>Optimal Placement and Sizing of Distributed Generator Based on Multi objective Particle Swarm Optimization</b> <i>A. Richard Pravin, J. Aarthiroja, M. Eswari, S. Sivapriya</i>	210
NCRDSET-1067	<b>Cost Saving on Micro Grid Operation using Grey Wolf Optimization Algorithm</b> <i>K. Sriram, B. Anbumani, S. KalaiPriyan, C. Naveenkumar</i>	215
NCRDSET-1069	<b>A 129-level Asymmetrical Cascaded H-Bridge Multilevel Inverter with Reduced Switches and Low THD</b> <i>A. Annai Theresa, P. Vivethitha, K. Srilekha, M. Nivetha</i>	221
NCRDSET-1071	<b>Monitoring the Microgrid using IoT</b> <i>J. Ramesh, C. Boobathi, K. Mohanraj, R. Rasu</i>	227
NCRDSET-1074	<b>Power Loss Reduction and Voltage Profile Improvement using Optimal Placement of FACTS Devices</b> <i>M. Prema Latha, S. Kannan, G. Sampathkumar, K. Surendhar</i>	233
NCRDSET -1075	<b>A Novel Circuit for Battery Charging and Motor Control of Electric Vehicle</b> <i>V. Balaji, K. Bhuvaneshwaran, M. Muralikrishnan, V. Vijay</i>	240
NCRDSET-1076	<b>Wireless Power Transmission System</b> <i>J. Arul Martinal, A. Pieorex, A. Arockiaraj, I. Kavnilavan, D. Vijaykumar</i>	245
NCRDSET-1077	<b>Solution to Combine Economic and Emission Dispatch Problem using Adaptive Particle Swarm Optimization Algorithm</b> <i>M. Gnanaprakash, S. P. Mangaiyarkarasi, R. Vijayakumar, S. Sathishkumar</i>	250
NCRDSET-1099	<b>Design of Efficient Electric Motorcycle Using Brushless DC Motor</b> <i>A. Sundarapandiyan</i>	256
NCRDSET-1100	<b>Electrical Motor Topologies for Aircraft Propulsion</b> <i>V. C. Eugin Martin Raj</i>	261



## **Mechanical Engineering**

NCRDSET-1038	<b>Performance Enhancement Study for Single Slope Solar Desalination Plant</b> <i>M.Kavitha, K. Anandavelu, K. Thiruvvasagamoorthy</i>	267
NCRDSET -1088	<b>1 A Brief Review On The Influence Of Nanofillers On Composite Efficiency</b> <i>A.Abinesh, Jayakrishnan, Robin Paul, A.Shanmugarajan</i>	273
NCRDSET-1089	<b>Experimental Analysis Of Diesel Engine Using Bio Fuel Blended With Aluminium Oxide</b> <i>R.Sasikumar , Krishanakumar.S, D.Manivel, B.Karunakaran</i>	282
NCRDSET-1090	<b>Electrical Discharge Coating Of Aluminium Alloy Using Ws2/Cu Green Compact Electrode</b> <i>K.Shanmuga Elango(S), J.Arockiatony Play , A. Vigneshkumar, R. Arun Prakash</i>	285
NCRDSET-1091	<b>Analysis Of Mechanical Properties Of Tic Reinforced Aluminium Alloy Composites</b> <i>D.Ommurugadhasan, M. Arulselvam, K. Dhinakaran, A. Krishnaraj, V. Senthamilselvan, Dr.</i>	294
NCRDSET -1094	<b>Taguchi optimization of end milling parameters on 316L stainless steel</b> <i>R.Arokiadass, S.Daniel, R.Devendiran, T.Anbhazhagan, S.Fralick</i>	301
NCRDSET-1095	<b>Optimization Of Machining Parameter On Ss316l Material Using Orthogonal Array Method</b> <i>K.Saravanan ,M.Sivamanikandan, R.Jayakumar</i>	306
NCRDSET -1096	<b>An Over View Of Biomass Dryer For Cashew Product</b> <i>P.Murugan, Dhanushkodi</i>	309
NCRDSET-1097	<b>A Review on Recent Development In Design and Energy Enhancement of Flat Plate Hybrid Photovoltaic Thermal (PV/T) Air Collector.</b> <i>K.Sakthivel , P.Murugan , S.Dhanushkodi</i>	318

## **Science and Humanities**

NCRDSET-1013	<b>Analysis of MAP/PH/1 Queueing model subject to Two-stage vacations policy with imperfect service, Setup time, Breakdown, Delayed Phase type repair and Reneging customer</b> <i>G. Ayyappan, N. Arulmozhi</i>	322
NCRDSET-1020	<b>Analysis of MAP/PH/1 Queueing Model with Degrading Service Rate, Phase-type Vacation, Repairs, Starting failure and Closedown</b> <i>G. Ayyappan, S. Meena</i>	323



**th Differentiated  
Policy, Optional  
Discouragement of** 324

**with Priority Services,  
Semi-Vacation,** 325

**server, multiple  
and repairs** 326

**Organic Light-Emitting** 327



## User Choice-Based Alpha Numerical Random Password Generator For Securing the Data Assets

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### Abstract

The users of computer technology and internet are increasing day by day. As the users are growing, the need for security is also felt very much. The data assets and other valuable facts are stored in the computer systems. One of the ways to safely guard the data assets is to have a proper authorization method to access the data. This is achieved by user identification and password mechanism. The selection of password is important, since the entire authorization is dependent on the password. There is a wide range of password generator available through internet. However, they are not secure being generic in nature. Many users face problem in remembering complex passwords thereby increasing the probability of using older passwords. In this paper, a new technique is presented in which random complex passwords are generated from the choice of alphabets and numbers given by user. User can also decide the number of unique complex passwords required from the combination entered, thus making it more reliable and easy to remember as the passwords are generated from the choice of alphabets and numbers given by user as input. The password needs to be strong enough to avoid brute force attack and other attacks. Here we discuss a method of generating random passwords, which is strong enough to combat the attacks.

### 1 Introduction

Password is a sequence of character string used to authenticate personal identity of user and to provide or refuse the access to system resources. The password is not only denying any access to the system from unauthorized persons but also prevent users who are previously logged in from doing unauthorized process in system. Security risk from unauthorized entry involves more than the risk to a single user via their system account[1]. User ID and password combination is the one of the simplest forms of user authentication. Password is a secret word, which is used to authorize the user to particular system or particular application. The identity of the user is tested using the password. If passwords are not strong or easily guessable, the intruders can attack the system and attack the data assets.

Password is indispensable and inevitable one in numbers, and special characters, prohibited elements such as own name, D.O.B., address, telephone number. The aim of this paper is to provide an Automated Password Generator Module by specifying an algorithm to generate passwords for the protection of computer resources, which provides basic security criteria for the design, implementation, and use of passwords. The algorithm uses random numbers to select the characters that form the random passwords. The generated password is protected through encryption and decryption mechanism.

The length and diversity contribute to the size of the domain set containing all possible, that increases the difficulty of brute force detection [1]. They are minimum length, required categories such as upper and lower case, numbers, and special characters, prohibited elements such as own name, D.O.B., address, telephone number. The most difficult task is to remember the complex passwords thereby increasing the probability of user using older passwords. In this paper, a new technique is presented in which random complex passwords are generated from the choice of alphabets and numbers given by user. User can also decide the number of unique complex passwords required from the combination entered, thus making it more reliable and easy to remember as the passwords are generated from the choice of alphabets and numbers given by user as input. It is always easier to remember passwords resulting from the combinations given by user.

Users of High-Tech Devices such as tablets, smartphones always face a problem of unauthorized access. If there is illegitimate access leads to loss of user's important data and access to his/her private information. The effect of password leakage in access is worse in case the private data includes bank account details resulting in monetary loss. "Brute Force" attack is used by most of the attackers to guess users' password. Commonly used and simple passwords are easier to crack facilitating the invader to have control and access of users' device. A complex password is difficult to guess and is less susceptible to hackers' attack. Passwords are users' way of proving their authorization for the use of computing device. In case of multiple users operating a single computing device, each user has their own unique password to prove their authenticity. The generated password is protected through encryption and decryption mechanism.



## SMART RATION SYSTEM USING FACE RECOGNITION

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### Abstract

Ration card plays a vital role for the household details such as to get gas connection, family member details. Technique and IOT to thwart the derelictions and corruption in the current ration distribution system. In this system conventional quota card will be replaced by a Face Recognition system. This Faces will be verified with family members for authentication of the user. If user is found to be authentic then monthly quota of the ration available for the user is displayed. After successful transaction the database will be updated stating the ration content delivered to the user. This system will require very less human efforts for operation and is also very secure. By implementing this system government can keep track of all the delivered ration content very easily.

**Keywords:** *Face Detection, Face Recognition, Capture Face.*

## 1 INTRODUCTION

Distribution of ration in a country like India is not an easy task. India is second largest populated country in the world. Public distribution system is a major public sector which manages and distributes the essential commodities to all the citizens of the India below the poverty line and some reserved categories such as police and military persons. In ration shop, materials such as rice, wheat, sugar, dales, kerosene, and oil are provided.

## 2 EXISTING SYSTEM

In our current ration distribution system of India there are many limitations and malpractice at various levels, which needs to be improved. Furthermost of the helping shopkeepers keep fake allotment greetings card with them. Due en route for fake ration cards, the dealer receives the extra helping from higher govt.

## 3 DISADVANTAGES OF EXISTING SYSTEM

Due to fake ration cards, the dealer receives the extra ration from higher govt. authority and he sales it into the open market at higher price to earn some extra profit. The quantity of ration that is being allocated might differ significantly from the actual allocated ration quota.

## 4 PROPOSED SYSTEM

The Smart ration card system uses Face Recognition. This system successfully eliminates the errors due to manual monitoring of ration data as all the data is automatically updated in the cloud based database. To access the database and authentication of user requires internet connectivity which can be a problem in remote locations.



# Online Product Price and Comparison Using Web Mining and Machine Learning

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## Abstract

Web mining is an application data-mining technique used to extract information from web services. E-commerce websites nowadays have become one of the most important sources for buying all kinds of products. Many strategies have been developed by analyzing customer's behavior so as to attract more business and participation of people. As there are many e-commerce websites available it becomes difficult for users to choose best deal for desired product amongst these websites. Comparison of E-commerce products using web mining enables users to analyze prices and get desired product at minimum price. Users can also select multiple products that belong to same category for comparing its features. In order to make our system dynamic and to keep pace with real-time changes occurring on the sites, our database is automatically updated in every 12 hours. Our system displays the result with 93.06% accuracy according to the user's query. To obtain best deals from e-commerce websites web crawlers and web scrapping techniques are used to fetch detailed information. This way, project aims to provide solution for online customers to buy products at good deal and save their valuable time, effort and money.

*Keywords: Price Comparison, Web Crawling, Web Scapping, MangoDB, Django.*

## 1 Introduction

Nowadays, e-commerce websites have been prevalent and growing up in an unprecedented manner. In the current era of online business, ecommerce have become a huge market for the people to buy goods online. E-commerce website holders are deliberately putting prices on their websites derailed from actual rates leveraging on people's demand. Increasing use of smart devices and other mediums has paved the way for users to buy products almost from anywhere. Thus people are being deceived, paying more money than necessary to buy a product. Synthesizing the fact above, the importance of the price comparison tool is beyond gainsaying. This has increased involvement of online buyers evolving e-commerce business.

Our Solution aims for a collaborative platform for allowing a consumer to evaluate the price and make the purchase decision more manageable according to their budget. These large numbers of ecommerce websites put users in turmoil to search and choose to buy a single product from multiple ecommerce websites . They designed a tool for price comparison which uses scrapping scripts written with a python library and improvise the storage for scrapped data. formulated a pattern analysis recommender system by analyzing buying patterns using data mining technique. established a website with Django framework and Mongo DB for comparing price using web crawling and also used request and BeautifulSoup4 library for web scrapped.

We have designed User Interface for a user-friendly interaction while searching for query and for showing results appertaining to correspondent query. This paper is organized as follows: In section , we describe the proposed system and step by step explanations of our work and algorithm. The paper illustrates the experimental result and performance analysis in section , while section encompasses the paper with limitation of our system and plan for future work. .The proposed solution helps online users to grab best deal for their product from multiple ecommerce websites on single web interface

## 2 Proposed System

To obtain best deals from e-commerce websites web crawlers and web scrapping techniques are used to fetch detailed information. This way, paper aims to provide solution for online customers to buy products at good deal and save their valuable time, effort and money. The proposed system is as follows: The backend system consists of two important techniques web crawling and web scrapping. Web scrapping is a technique that is used to extract information in the human readable format and display it on destination terminal. In this section, we have demonstrated different aspects and the procedure of implementation of our price comparison tool. Algorithm 1 demonstrates the pseudo code for the creation of the database where Algorithm 2 represents the nseudo code for the language processing and comparison methods.



## Heart Attack Prediction For Stroke Patients Using Machine Learning

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### Abstract

Early predicting heart attack out of stroke patients in a view of data analysis is an approach to reduce a high mortality rate. Stroke-patient data in Intensive Care Unit are imbalanced due to that stroke patients with heart attack are in the minority of stroke patients. How to predict heart attack in the stroke-patient data becomes a challenge. For processing the imbalanced data, this paper designs an algorithm by leveraging Linear regression. Linear Regression is a machine learning algorithm based on supervised learning. It performs a regression task. Regression models a target prediction value based on independent variables. Our results show that classifier achieves the best Predicting performance with accuracy of 80.30%, precision of 80.05%. It could be well-predicted using Linear regression that whether a stroke patient will have heart attack or not.

Keywords: stroke, heart attack, Linear regression, imbalanced data, variable

## 1 Introduction

Stroke, also known as "ischemic stroke", refers to ischemic necrosis or softening of localized brain tissue caused by cerebral blood supply, ischemia and hypoxia. The main clinical manifestations are sudden collapse, mental coma, unclear speech, and hemiplegia. Heart attack is a myocardial necrosis caused by acute and persistent ischemia and hypoxia of coronary artery which manifestations are arrhythmia, shock or heart failure, which can be fatal. Stroke complicated with heart attack is cerebral infarction accompanied by heart attack. As we know, the stroke complicated by heart attack was 30%, and the mortality rate was as high as 54%. The main causes of death are ventricular arrhythmia, acute left heart failure and cardiogenic shock. On the other side, the onset of heart attack is rapid, and sudden deaths easily happen on the heart attack patients. This paper attempts to predict heart attack for the stroke patients based on analyzing medical indication. Such a prediction is to gain more treatment time for the stroke patients with heart attack.

### 1.1 Factors Of Stroke

- High blood pressure
- Cigarette smoking or second hand smoke exposure
- High cholesterol
- Diabetes
- Obstructive sleep apnea
- Cardiovascular disease, including heart failure, heart defects, heart infection or irregular heart rhythm, such as atrial fibrillation.
- Personal or family history of stroke, heart attack or transient ischemic attack
- COVID-19 infection

### 1.2 Symptoms



## CYBERBULLYING DETECTION ON SOCIAL NETWORKS USING NEURAL NETWORKS.

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### Abstract

Online users now share their information with each other easily using by communication, collaboration, knowledge and ideas. However, this has led to the growth of cyber criminal acts, for example, cyberbullying which has become a worldwide epidemic. Cyberbullying is the use of electronic communication to bully a person by sending harmful messages using social media, instant messaging, or digital messages. It has emerged as a platform for insulting and humiliating a person which can affect the person either physically or emotionally and sometimes lead to suicidal attempts in the worst case. The main issue in preventing cyberbullying is detecting its occurrence so that appropriate action can be taken at the initial stages. These social technologies have created a revolution in user-generated information, online human networks, and rich human behaviour-related data. However, the misuse of social technologies such as social media platforms has introduced a new form of aggression and violence that occurs in online. To overcome this problem, many methods and techniques had been worked upon till now to control this problem. Cyberbullying is the use of electronic communication to bully a person by sending harmful messages using social media, instant messaging, or digital messages. It has emerged as a platform for insulting and humiliating a person which can affect the person either physically or emotionally and sometimes lead to suicidal attempts in the worst case. The main issue in preventing cyberbullying is detecting its occurrence so that appropriate action can be taken at the initial stages. To overcome this problem, many methods and techniques had been worked upon till now to control this problem.

**INDEX TERMS:** Cyberbullying, Cybercriminals Online users and communicators.

### 1 Introduction

Online communication is how people communicate, connect, transact to send, retrieve, or receive information of any kind via the internet using digital media. All the communication that is carried out via the internet is known as Online communication. Because of our increasing presence online, this type of communication is becoming equally important as offline communication. More and more information is being churned out online ever than before. There is a lot of information for the reader to read online. People have started doing everything online, including but not limited to banking, reserving tickets, booking travel, planning travel, purchasing any and every kind of thing, teaching, conducting meetings and seminars, one on one or group discussions, dating, sending information. Every other activity which is possible is being done online. While basic tech literacy is essential for online activities, many can perform activities even with very little knowledge. The growth of online communication is fast and rapidly replacing traditional communication methods. Paper-based communication has reduced a lot since the evolution of online communication. It is convenient, easy, and does not cause any harm to nature. It is also fast and can be communicated anywhere in the world.

#### 1.1 Cybers talking:

Cybers talking is a form of online harassment in which the perpetrator uses electronic communications to stalk a victim. This is considered more dangerous than other forms of cyberbullying because it generally involves a credible threat to the victim's safety. Cybers talkers may send repeated messages intended to threaten or harass, and they may encourage others to do the same, either explicitly or by impersonating their victim and asking others to contact them..

#### 1.1.1 Trolling:

Internet trolls intentionally try to provoke or offend others in order to elicit a reaction. Trolls and cyberbullies do not always have the same goals: while some trolls engage in cyberbullying, others may be engaged in comparatively harmless mischief. A troll may be disruptive either for their own amusement or because they are genuinely a combative person.



## ARE STATE ENABLED USING HAND GESTURE

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### Abstract

coming increasingly relevant, given the recent growth and popularity of Virtual and aspect to HCI, allowing for two-way interaction in virtual spaces. However, many ed to specialized uses or more expensive devices such as the Kinect and the Oculus Rift. gesture recognition using a more common device the mobile Hand camera. Specifically, nenting the hand, and document the pros and cons of each method. We will also cover

IoT devices, anomaly detection: UAV videos; deep Learning.

for a computer to understand human body language. It plays a pivotal role in tion (HCI) applications such as smart mobile and TV control, video games. s of hand gesture recognition. The hand gestures involved in sign language are / convey important human communication information and feelings the time cult to directly compare the primitives in Euclidean space. Most of the existing al configuration of the hand. These systems either receive a segmented hand atation preprocessing step using skin color models or colored gloves. However, res involving simple alphabets and numbers, which slightly rely on the global uage gestures. Traditionally, dynamic hand gesture recognition systems use l features followed by a sequence modeling technique such as a hidden Markov ss of deep learning techniques in image classification, object recognition, speech ition has encouraged many researchers to exploit them for hand gesture neural networks (CNN) have been widely used for learning visual features in acteristic of 3DCNN is its ability to directly create hierarchical representations es more parameters than 2DCNN, which is one of its disadvantages. Moreover, on, which makes it harder to train. Hence, instead of training a 3DCNN from ained instances is preferred.

a paper on the survey of the current research trends in the field of SL recognition research aspects of the area. Paper also critically analyzed the current research zes faced by the researchers. This identification is aimed at providing guideline . Waldron and S. Kim [2] presented a paper on design and evaluation of a two- e isolated ASL signs is given. The input to this network is the hand shape and ounted with a Polhemus sensor. The first level consists of four backpropagation he sign language phonology, namely, the 36 hand shapes, 10 locations, 11



## Blind Assistance System with Voice Enabled and Real-Time Object Detection

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### Abstract

Real-time object detection is a difficult operation since it requires more computing power to recognize the object in real time. However, the data created by any real-time system is unlabeled, and effective training frequently necessitates a huge quantity of labelled data. Single Shot Multi-Box Detection is a quicker detection approach for real-time object detection, based on a convolution neural network model proposed in this paper (SSD). The feature resampling stage was eliminated in this work, and all calculated results were merged into a single component. Still, a light-weight network model is required for places with limited processing capability, such as mobile devices (eg: laptop, mobile phones, etc). In this suggested study, a light-weight network model called MobileNet is adopted, which uses depth-wise separable convolution. The usage of MobileNet in conjunction with the SSD model increases the accuracy level in detecting real-time household objects, according to the results of the experiments.

*Keywords: Object Detection, TensorFlow object detection API, SSD with MobileNet.*

### 1.Introduction

In today's advanced hi-tech environment, the need for self-sufficiency is recognised in the situation of visually impaired people who are socially restricted [3]. Visually impaired people encounter challenges and are at a disadvantage as a result of a lack of critical information in the surrounding environment, as visual information is what they lack the most [1]. The visually handicapped can be helped with the use of innovative technologies. The system can recognise items in the environment using voice commands and do text analysis to recognise text in a hard copy document. It may be an effective approach for blind persons to interact with others and may aid with their independence. Those who are wholly or partially blind are considered visually impaired. According to the World Health Organization (WHO), 285 million people worldwide suffer from vision impairment, 39 people are blind, and around 3% of the population of all ages is visually impaired [1][4]. Visually impaired people go through a lot and encounter a lot of difficulties in their daily lives, such as finding their way and directions, as well as going to places they don't go very often. In existing system (Fig.1.), system take surrounding information with help of webcam and then store the captured images. These images under goes reprocessing step and then identify the objects from the captured image and after that system will give output in text format [1][3].



## VIDEO COMPRESSION

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### Abstract

Data Compression is a technique of reducing the amount of space data occupies, to ease the process of storage and communication. The fundamental process of compression involves using a well drafted technique to convert the actual data into the compressed data (smaller size). Depending upon how well a compression technique works and how much data can be regenerated from the compressed data given by a certain technique, the technique is classified as either as a lossy data compression technique or lossless data compression technique. Compression is the process of modifying, encoding or converting the bits structure of data in such a way that it consumes less space on storage disk. It enhances reducing the storage size of one or more data instances or elements. The technique of data compression can save storage capacity, speed up file transfer, and decrease costs for storage hardware and network bandwidth. The Compression techniques enables sending a data object or file quickly over a network or the Internet and in optimizing physical storage resources. Different methodologies have been defined for this purpose. There is a complete range of different data compression techniques available both online and offline working such that it becomes really difficult to choose which technique serves the best. A data compression algorithm developed in this article consumes less time while provides more compression ratio as compared to existing techniques. In this paper we represent a MPEG compression algorithm to compress the video files.

**Keywords:** *lossless compression, lossy compression, storage, MPEG.*

### 1 Introduction

The video data compression has wide implementation in computing services and solutions, specifically data communications. The video data compression works through several compressing techniques and software solutions that utilize data compression algorithms to reduce the data size. Data compression technique, also called compaction, the process of reducing the amount of data needed for the storage or transmission of a given piece of information, typically by the use of encoding techniques. Today, data compression is important in storing information digitally on computer disks and in transmitting it over communications networks.

Also compressed files are much more easily exchanged over the internet since they upload and download much faster. We require the ability to reconstitute the original file from the compressed version at any time. Data compression is a method of encoding rules that allows substantial reduction in the total number of bits to store or transmit a file.

Compression technologies have been an enabler for the broadcast industry starting with the analogue television. Ever-increasing data from image and video capture require methods and techniques to reduce the amount of data to be transported or stored. Nearly over the last four decades MPEG Motion Pictures Expert Group - developed MPEG-1, MPEG-2, MPEG-4 and MPEG-H video compression standards. A given codec standard is developed with contribution from many researchers over a considerable time. ISO/MPEG and ITU have harmonised and standardised them. The following sections discuss briefly the process, advancements, trends and challenges.

For video coding standards, the core problem has remained the same over the years: reduce the size of stored or transmitted video data as much as possible while keeping the visual quality as close as possible to the original video. The convention when it comes to video coding standards has been to only define the bitstream format (syntax) and the decoder but not the encoder. This allows for cross-industry compatibility of the most critical component i.e. the decoder and at the same time. It allows for innovation and flexibility in the design of the encoding process, for example, meeting requirements of latency and availability of computational resources.

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## Microfluidic Syringe Pump

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### Abstract

Syringe pumps are widely used in microfluidics research since they are easy to use and enable fast setup of microfluidic experiments. A syringe pump is a small positive displacement pump used to gradually dose precise amounts of fluid for use in chemical and biomedical research. The key issue is how to make the flow of the syringe pump with very high accuracy and precision. The syringe pump has a stepper motor that drives the lead screw, which in turn moves the pusher block where the syringe plunger is fixed. The stepper motor drives the piston with a desired flow rate, it is controlled by the micro controller and the user interface collects the input data such as volume of drug and infusing time, depending on that flow rate is calculated. The microcontroller ESP32 that interfaces input and output components which controls the syringe pump.

**Keywords:** syringe pump, microfluidics, micro controller, and stepper motor

## 1 Introduction

In several international studies it was verified that the infusion techniques are a technology with underestimated risks due to several influence factors, namely the use of very small flow (300 ml/min) in premature babies, multi pump administration with the use of several administration lines and the individual variables of the different drugs. At present, microfluidic syringe pump system are needed in the medical, sensor industries and in research purpose. The microfluidic syringe pump will be used in the area where accuracy and precision are very important. Traceability and conformity of measurements are needed to improve the measuring instrument so that it meets the specifications and supports the quality system in the industry or other fields related to the tool [1]. Error and uncertainty associated with the measurement of flow-rate depending on the conditions of the infusion pump and the type of components used. The gravimetric method commonly used for standard calibration in laboratories [2].

Based on the design that has been made, to reduce errors and uncertainties of the components, Lead screw with spring coupler is used for the mechanical efficiency. The spring coupler creates a smooth gliding surface for the screw, thereby reducing friction and lead screw that transform rotary or turning movements into linear movements. The motor that used this microfluidic syringe pump system has been designed and made using a stepper motor as an actuator to drive the lead screw. Because the linear thread used to move the needle has a width pitch, the clock must be divided so that the speed is appropriate. Motor speed adjustment is done by dividing the hours that will be sent to the motor. Therefore, the DRV8825 micro stepping motor driver is used. It is designed to operate bipolar stepper motors in full-, half-, quarter-, eighth-, sixteenth- and thirty second-step modes, with an output drive capacity of up to 45 V and  $\pm 2.2$  A [3].

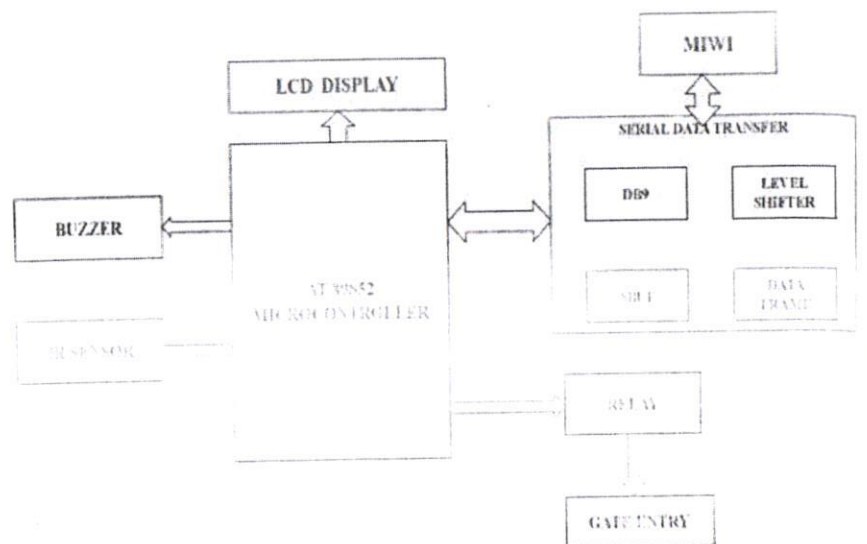
## 2 Requirements and Specification

The syringe pump should be programmable, user friendly, safe use and should have battery backup and comprehensive alarm system. Self-test the device when it is powered on. This power-on self-test includes tests of all critical processors, circuit circuitry, indicators, displays and alarm functionality, the simple monitoring of current through light-emitting diodes (LEDs) as they are turned on and off. If currents fall outside the acceptable range, a fault is indicated. The rate of injection depends on the syringe diameter and the adjusted flow rate of the pump. High or even low injection dosages of a specific drug can be dangerous for living cells. Plastic syringes manufactured by different companies are not identical; therefore, pumps are adjustable to work with different syringe models. Universal clamp is used for all types of syringe models to fit. The DRV8825 Stepper motor driver makes interfacing with a microcontroller super easy as you only need two pins to control both the speed and the direction of the stepper motor.



#### 4 Gate Section

The gate section has IR sensor and gate motor connected with microcontroller. If any person crosses the gate, the buzzer will be turned on. The information of arrival time is transmitted and received using MIWI.



#### 5 Conclusion

An automatic railgate control system and the real time monitoring is done using parallel monitoring architecture. This project will save many human lives in the rail crossing gates across cities and towns. This will help to reduce such accidents across the gates and will alert the humans by the alarm.

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### CASCADE ATTENTIVE REFINENET FOR BLOOD VESSELS SEGMENTATION OF DIABETIC RETINOPATHY

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#### Abstract

Diabetic retinopathy is the leading cause of blindness in working population. Blood vessel segmentation from fundus images helps ophthalmologists accurately diagnose and early detection of diabetic retinopathy. However, the task of Blood vessels segmentation is full of challenges due to the complex structure, the various sizes and the interclass similarity with other fundus tissues. To address the issue, this paper proposes a cascade attentive RefineNet (CARNet) for automatic and accurate Blood vessel segmentation of diabetic retinopathy. It can make full use of the fine local details and coarse global information from the whole image and the patch image as the dual input, and feed them to ResNet50 and ResNet101, respectively, for down sampling features in the two encoders with the output of the low-level attention refinement module for Multiscale information fusion, which focus the model on the Blood vessel area to generate accurate predictions. We evaluated the segmentation performance of the proposed Kaggle and DDR data sets. Extensive comparison experiments and ablation studies on various data sets demonstrate the proposed framework outperforms the state-of-the-art approaches and has better accuracy and robustness.

Keywords - Diabetic retinopathy - Blood vessels segmentation RefineNet - Attention fusion

#### 1. INTRODUCTION

Early diagnosis is crucial in many sight-threatening diseases like glaucoma, hypertension and diabetic retinopathy which cause blindness among working age people [1], [2]. Therefore retinal image analysis has become one major diagnosis method in modern ophthalmology. Retinal image analysis typically involves in blood vessel segmentation, optical disc segmentation and fovea segmentation for detecting and analyzing any abnormalities [3], [4]. The contrast enhancement is one mandatory step in any of the related image analysis approaches [1]–[6]. The main challenge of any contrast enhancement algorithm is finding a method to regulate the amplification according to the illumination variations over the image [7]. A typical solution is applying a homomorphism filter to normalize the illumination. However, some contrast enhancement techniques such as contrast limited adaptive histogram equalization (CLAHE) [8] and local normalization (LN)[9] have the capability of analyzing the local illumination and regulate the amplification to bring the final outcome up to an acceptable level of quality. CLAHE is able to handle the illumination variation by doing local histogram equalization and also can regulate the amplification of the details. However, it introduces a box-shaped artifact which may cause to suppress some details and also it amplifies some undesirable details.

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## Design and Analysis of Multi-Patient Monitoring System Using Cloud Computing

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### Abstract

This paper presents the design and implementation of a health monitoring system using the Internet of things (IoT). In present days, with the expansion of innovations, specialists are always looking for innovative electronic devices for easier identification of irregularities within the body. IoT-enabled technologies enable the possibility of developing novel and non-invasive clinical support systems. this paper presents ahealth care monitoring system. In particular, COVID-19 patients, high blood pressure patients, diabetic patients, etc., in a rural area in adeveloping country, such as Bangiadesh, do not have instant access to health or emergency clinics for testing. Buying individual instruments or continuous visitation to hospitals is also expensive for the regular population. (e system we developed will measure a patient's body temperature, heartbeat, and oxygen saturation (SpO<sub>2</sub>) levels in the blood and send the data to a mobile application using Bluetooth. (e mobile application was created via the Massachusetts Institute of Technology (MIT) inventor app and will receive the data from the device over Bluetooth. (e physical, logical, and application layers are the three layers that make up the system. (e logical layer processes the data collected by the sensors in the physical layer. A 95 percent confidence interval with a 5 percent maximum relative error is applied to all measurements related to determining the patient's health parameters. (e use of these devices as support tools by the general public in a certain situation could have a big impact on their own lives.

**Keywords:** SpO<sub>2</sub>, Pulse Sensor, LM35 Sensor, Arduino IDE

### Introduction

IoT devices are profoundly utilized in the clinical area. In this paper, the research is about an IoT-based health monitoring system. In particular, for COVID-19 patients, high blood pressure patients, hypertension patients, diabetic patients, etc., in a country territory, in rural areas, the number of doctors is not exactly the same as in urban areas. Medical equipment is not readily available in rural areas, except for government medical canters. The percentage of patients in these clinics is greater than that in government medical facilities. Similarly, the equipment has, for the most part, ended. As a result, if an emergency situation arises, this hardware component will send a report to the physicians or medical professionals as soon as possible. IoT devices are widely used in the medical sector. And the technology we are talking about is a patient health monitoring system that uses the IoT. A sensor in this health monitoring system will collect information about the patient's health condition. It is smaller in size, faster, and more affordable. This system can be used to measure the oxygen saturation level, heart rate, and temperature of the human body and display the results on a web-based platform. The physical, logical, and application layers are the three layers of the system. It is a multiparameter monitoring system that will monitor oxygen saturation level, heart rate, and temperature simultaneously. The term "IoT" was first referenced by Kevin Ashtor in 1998.

### 2 Literature Survey

#### Existing System:

The system used for health monitoring is the fixed monitoring system, which can be detected only when the patient is in hospital or in bed. In existing system, patient needs to get hospitalized for regular monitoring of the patient. The existing systems are measuring the health parameters of the patient and send it through zig bee, Bluetooth protocol etc., These are used for only short-range communication to transfer the data. Not all the time the doctor can fetch these details.



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## IoT- Based intelligent aquaculture monitoring system for fish farming

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### ABSTRACT

As current human Population is 7.7 billion and growing day by day hence food demand is also increasing accordingly. Fish is a rich source of vitamins, minerals, protein, nutrients and micronutrients. It is an important part of consumer's diet especially in poor and underdeveloped countries. It is a big challenge for farmer to fulfill market demand with healthy sea food. Aquaculture is a tool to fill gap between of sea food supply and demand. Use of controlled environment production of aquaculture has been increased to a significant level but losses huge due to manual equipment and management failure. Farmers need real time and accurate information to monitor and maximize production potential. Farmers are using traditional techniques and procedures for the aquaculture. By following traditional approach, farmer measure and monitors the water quality, water level, oxygen level and stress level of the aquaculture manually. In this study, we proposed an Internet of Things (IoT) based smart aquaculture model that will measure water quality (pH, water level, temperature, turbidity and motion detection of fish) for aquaculture. In this work uses low cost and short range wireless sensors network module to monitor and control aquaculture in real-time. Water recycling mechanism also proposed to reduce the amount of aquatic waste materials. By using this system parameters of water are monitored continuously using a serial port which reduces internet consumption, transmitted data regularly with small latency with error free and ensures survival of aquatic life also ensures the quality of growth and increases the economic benefits of aquaculture. The system also detects the movements of fish in the pond.

**Keywords:** Aquaculture, Internet of things (IoT), PH, Turbidity, Water quality Monitoring.

### 1.INTRODUCTION

Aquaculture also called aqua-farming, breeding, raising, harvesting of fish, seaweed, algae and many other organisms. It is also defined as breeding species which develop in the aquatic environment under controlled conditions. Aquaculture is one of most reliable and low environment impact process producing high quality protein for humans. This process is more efficient than other forms of agriculture because of higher food convergence. Aquaculture has become famous all over the world. Farmer faces a lot of problems like water rescues, manual testing of water, sudden climate change, no government interest etc. Unlike daily monitoring of aquaculture behavior and health of thousand individual manually testing is very difficult. Some other problems like inappropriate management technique, water quality, improper record keeping, poor site selection. Traditional water quality monitoring cannot change the dynamic of aquaculture water quality monitoring and also achieved a fixed point monitoring. The aqua farmer presently in depend on manual testing for water parameters. This leads in increase the death rate of fish, decrease the growth rate of the fish, and one of major drawback is more time consumption. Fish pond operators face the challenge of constant monitoring of the water and water changing in such a way that quality is compromised. The model proposed in this work will assist the fish farmers in monitoring fish ponds using IoT. Integrating sensor and internet technology in combination with a user-

## REMOTE HEALTH MONITORING SYSTEM FOR VISUALLY IMPAIRED

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### Abstract

There are some visually impaired people throughout the world. Some of them may be around us. The Visually impaired people find difficulty while performing day-to-day life tasks. The main challenge faced by blind people is they need immediate help from other people when they are unhealthy or in panic condition. Mostly the blind people rely on their family doctor whom they cannot accommodate them all the time. Hence there is a need to develop a system that enables the person to automatically inform the care taker and the family doctor if he/she is in danger or in unhealthy condition. The already existing system is expensive and no cost-effective approach is available to automatically inform the person to the information known to the blind person caretaker and the family doctor during panic condition. The proposed system consists of a suitable device with a Virtual assistant system for the visually impaired person. The proposed system consists of a heart rate sensor, temperature sensor, GSM modem, GPS module interfaced to the Arduino controller.

### 1. INTRODUCTION

In this fast-growing world, the number of people affected by vision loss is increasing [1]. According to a recent report by the World Health Organization (WHO) on blindness and visual impairment, globally, over 2.2 billion people are affected by vision impairment or blindness. The total inability to see while impaired visually or with low vision, significantly reduces a person's ability to perform certain or all tasks. As per the data collected and observations made in [3], approximately 10% of the visually impaired travel five or more times a week, which is an unexpected result (shown in Fig.1). Most of the people belong to the working class of society. The frequency of head level accidents who are blind and partially blind people who have vision 20/200 or less) as shown in Fig.2. The main challenge faced by blind people is that they feel very difficult to get immediate help from their caretaker or family doctor when they are in a panic condition. In the existing system the alert is given only to the blind person. This information is not provided to the blind person caretaker and the family doctor in different locations as there is no provision in the existing system to monitor the health condition of blind people continuously and send the report to their caretaker and family doctor when they are unhealthy or in the panic condition in real-time. The proposed idea is to provide a suitable device with a real-time health monitoring system for the visually impaired.

The proposed system consists of a heart rate sensor, temperature sensor, pulse sensor GSM modem, and GPS module interfaced with the Arduino controller. The Arduino controller continuously monitors the blind person. If the person is panicking, or abnormal the system will automatically detect the condition using a heart rate sensor, pulse sensor, and temperature sensor and send the alert message to the caretaker of the blind person and his family doctor using a GSM modem. The blind person could also get help manually from his caretaker in an emergency situation by pressing the panic button interfaced with the system. If the person presses the panic button the system will send an alert message to the caretaker's mobile phone. The location of a blind person can be tracked using a GPS module.

### 2. LITERATURE SURVEY

There have been work and research in order to design smart wearable devices to help blind people techniques. In the paper titled "IOT Enable Real-Time Remote Health Monitoring System (IEEE Journal on 2020)" by IOT F. S. Sainadh, Jeevan Sarwat Mohanty, Sushir Ratan, bop, Gudauta Vishnu Tea, Rose PreetKaurBhopal" Node MCU and cloud computing technique were used to send message which is costly and complex. In this Various techniques in Remote health Monitoring system have been explained. In the paper titled "Mobile Health in Remote patient Monitoring for chronic Diseases: Principle, Trends, and Challenges (IEEE Journal on 2021) by Rashid, shakarE1-sappah, S.M.Riazul Islam, Hazen M.E1-bakry and SamirAbdulrazak" Zigbee module, cloud

server mobile Applications is used to send and receive message. In this Challenges in Health Monitoring system is done. These methods have two main flaws. Firstly, given that carrying a stick is already a liability, adding sensors and IoT devices to it increases its weight and hinders its balance. The goal here should be to make the visually impaired independent of these sticks. Secondly, interpreting the actuator signals on a stick can be a difficult task.

### 3. PROPOSED METHODOLOGY

The proposed idea is to provide a suitable device with a real-time health monitoring system for the visually impaired person. The proposed system consists of a heart rate sensor, temperature sensor, pulse sensor GSM modem, and GPS module interfaced with the Arduino controller. The Arduino controller continuously monitors the blind person. If the blind person is panicking, or abnormal the system will automatically detect the condition using a heart rate sensor, pulse sensor, and temperature sensor and send the alert message to the caretaker of the blind person and his family doctor's mobile using a GSM modem. The blind person could also get help manually from his caretaker in an emergency situation by pressing the panic button interfaced with the system. If the person presses the panic button the system will send an alert message to the caretaker's mobile phone. The location of a blind person can be tracked using a GPS module.

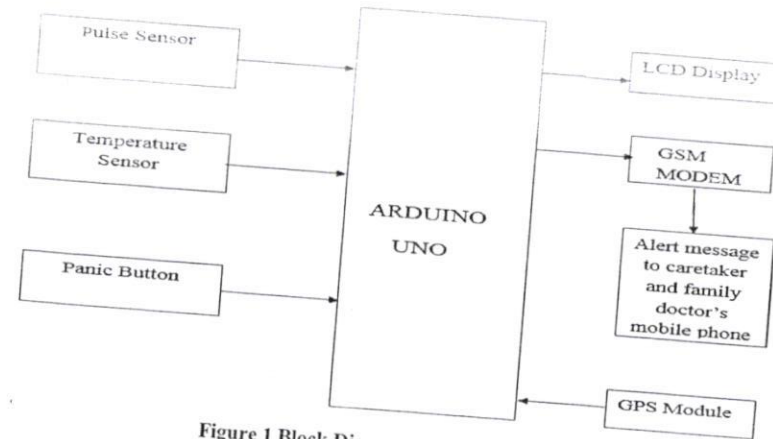


Figure 1. Block Diagram of Proposed System

### WORK FLOW

Interfacing Temperature sensor, Pulse sensor, Heart rate sensor with Arduino UNO.  
Programming Arduino UNO to read the sensor values and to check for the threshold condition.  
Interfacing GSM modem and Programming Arduino UNO to send the emergency information to caretaker's mobile and family doctor's mobile.  
Interfacing GPS module and Programming Arduino UNO to track the blind person location.



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## High Speed Gate Level Synchronous Full Adder Designs

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### Abstract

Addition forms the basis of digital computer systems. Three novel gate level full adder designs, based on the elements of a standard cell library are presented in this work: one design involving XNOR and multiplexer gates (XNM), another design utilizing XNOR, AND, Inverter, multiplexer and complex gates (XNAIMC) and the third design incorporating XOR, AND and complex gates (XAC). Comparisons have been performed with many other existing gate level full adder realizations. Based on extensive simulations with a 32-bit carry-ripple adder implementation; targeting three process, voltage and temperature (PVT) corners of the high speed (low V<sub>t</sub>) 65nm STMicroelectronics CMOS process, it was found that the XAC based full adder is found to be delay efficient compared to all its gate level counterparts, even in comparison with the full adder cell available in the library. The XNM based full adder is found to be area efficient, while the XNAIMC based full adder offers a slight compromise with respect to speed and area over the other two proposed adders. Key-Words: - Combinational logic, Full adder, High performance, Standard cells, and Deep submicron design.

### 1. Introduction

A binary full adder is often found in the critical path of microprocessor and digital signal processor data paths, as they are fundamental to almost all arithmetic operations. It is the core module used for many essential operations like multiplication, division and addresses computation for cache or memory accesses and is usually present in the arithmetic logic unit and floating point units. Hence, their speed optimization carries significant potential for high performance applications. A 1-bit full adder module basically comprises of three input bits (say, a, b and cin) and produces two outputs (say, sum and cout), where 'sum' refers to the summation of the two input bits, 'a' and 'b', and cin is the carry input to this stage from a preceding stage. The overflow carry output from this stage is labeled as 'cout'. Many efficient full custom transistor level solutions for full adder functionality have been proposed in the literature [1] – [10], optimizing any or all of the design metrics viz. speed, power and area. In this paper, our primary focus is on realizing high performance full adder functionality using readily available off-the-shelf components of a standard cell library [11]. Hence, our approach is semi-custom rather than being full custom.

This article primarily focuses on the novel design of full adders at the logic level and also highlights a comparison with many other existing gate level solutions, from performance and area perspectives. The inferences from this work may be used for further improvement of full adder designs at the transistor level. Apart from this, this article is also intended to provide pedagogical value addition. The remaining part of this paper is organized as follows. Section 2 describes the various existing gate level realizations of a 1-bit binary full adder. The three newly proposed full adder designs are mentioned in section 3. Section 4 gives details about the simulation mechanism and results obtained. Finally, we conclude in the next section.

### 2. Library's full adder cell

The internal details of the full adder cell, which forms a part of the commercial library [11], could not be commented upon in this article and so only the block schematic of the same is given below in fig. 9. The inputs and outputs are listed therein.

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## Design and Implementation of Microcontroller Based vehicular Smart Helmet for Safe Journey using sensors

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### Abstract

A smart helmet is a special idea which makes motorcycle driving safer than before. This is implemented using GSM and GPS technology. Many times we hear the cases of bikes getting stolen from parking area or sometimes we forgot to remove the keys from bike by mistake. In these cases it is really difficult to get the bike back. This project is designed to solve this purpose. Main concept behind this project is of a bike security system using a password entered through keypad. This system turns on the Buzzer when wrong password is entered for 3 times. User can change this password anytime he/she wish using a keypad. If the rider wears the helmet then only the bike will be turn on. The working of this smart helmet is very simple, vibration sensors are placed in different places of helmet where the probability of hitting is more which are connected to microcontroller board. So when the rider crashes and the helmet hit the ground, these sensors sense and gives to the microcontroller board, then controller extract GPS data using the GPS[8] module that is interfaced to it. When the data exceeds minimum stress limit then GSM module automatically sends message to ambulance or family member. The RF is used for start the two wheeler firstly it checks whether the driver is drunk end or not if drunken it will not allow to start two wheelers. Here a circuit which detects when a call is incoming in a mobile phone by means of a flashing LED. It can detect even when the calling mobile phone and the engine is automatically turn off.

Keywords: Alcohol Sensor, GSM, GPS, Microcontroller, Pressure Sensor, Smart helmet, Vibration Sensor

### 1. Introduction

The thought of developing this project comes to do some good things towards the society. Day by day the two wheeler accidents are increasing and leads to loss of many lives[6]. Accord to a survey of India there are around 698 accidents occurring due to bike crashes per year. The reasons may be many such as no proper driving knowledge, no fitness of the bike, fast riding of bike, drunken and drive etc[14]. Sometime the person injured, the accident may not be directly re possible for the accident, it may be fault of rider, but end of the day it's both the drivers involved in the accidents who is going to suffer[12]. If accidents are one issue, lack of treatment in proper time is another reason for deaths. According to the survey India 698 accidents occur per year, nearly half the injured people die due to lack of treatment in proper time. The many reasons for this such as late arrival of ambulance, no persons at place where the accident occur to give information to the ambulance or parents. This is a situation we observe our day to day life, a thought of finding some solution to resolve this problem come up with this idea of giving the information about accident as soon as possible and in TIME...!!!! Because after all time matter is a lot, if everything is done in time, at least we can save half the lives that are lost due to bike accidents. Considering three major factors for avoiding the accident causes such as I. Make wearing the helmet compulsory. II. Avoid drunk and drive. III. If person met with an accident, no one is there to help him. Simply leaving or ignoring the person he may die. In such situation, informing to ambulance or family members through mobile to rescue him for an extent. The idea of this work is to give information about the rider wearing the helmet or not, whether the rider drunken or not and also, he met with an accident it gives an information about location where he is met with an accident through GSM module to mobile numbers family members, so I have chosen GSM technology to give the information by sending SMS, using GSM module which has SIM card slot to place the SIM and send SMS[8]. Sending SMS alone can't help the driver, if we send an SMS saying that accident had occurred where the ambulance will come without knowing the location of the accident. So to trace out the location where exactly accident occur using GPS module, and gives to microcontroller, then it sends the SMS which contains the latitude and longitude of an area to family members mobile numbers For this we use GPS module to extract the location of the accident, the GPS data will contain the latitude and longitude values using which we can find the accurate position of the accident place[16].



## 6. RESULT

The temperature sensor monitors blind person continuously if the value is beyond the threshold level the information is send to blind person caretaker and family doctor the location of the blind person sends along with the information.

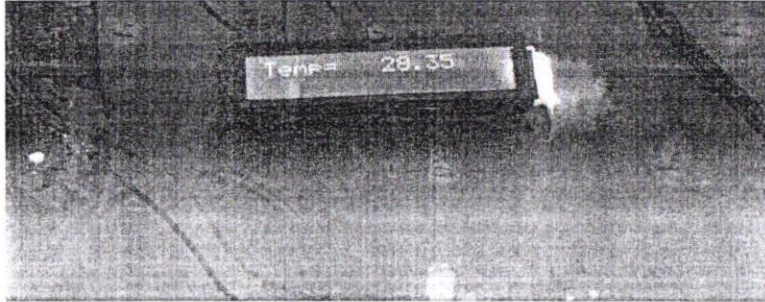


Figure 1 Temperature Output diagram

## 7. CONCLUSIONS AND FUTURE WORK

The proposed system assures the safety of the visually impaired person. The caretaker of a blind person can do their own work without any worry about the blind person under their care. The proposed system is a low-cost module that could be offered by most blind people. The Arduino controller used here is very faster and they produce reliable output.

This project can be extended using IoT technology in which the real time data. Can be collected from blind person and it can be maintained in cloud storage that can be used for future issues if arises.

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## SALINE LEVEL MONITORING SYSTEM USING LORA TECHNOLOGY

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### Abstract

Beyond Multiple treatments available in the hospital, saline therapy is one of the hospital's essential treatments. When saline is catered to the patients, it has to be monitored by a doctor, a caretaker, or a nurse. But due to the busy schedule, negligence, and inattentiveness of doctors and nurses in monitoring the saline level lead to critical conditions like the reverse flow of patients' blood into the saline tube. This acute condition harms patients highly and even leads to death in many hospitals. Hence, the system is designed to remotely control and monitor the saline level using LoRa (long-range) technology. The proposed system continuously monitors the weight of the saline bottle with the help of the load sensor, and it is converted into the saline level. This is the first time the LoRa technology has been deployed in the medical sector.

### Keywords:

Arduino uno Board, LCD Display, RA02 LoRa module (433Mhz), Load cell with HX711 Amplifier module, solenoid valve

## 1 INTRODUCTION

Every human life has infinite value. Therefore, their lives must be protected in all the ways possible and it should not be taken for granted. The active living of human life is threatened by various factors due to the amplified death rate. It is mandatory to protect the lives of the people. In recent years, there is a rapid growth in the medical sector due to the technological advancements which assures speedy recovery of patients in the hospitals. Beyond multiple treatments available in hospitals, Saline Therapy is one of the most important treatments that many patients receive. So, when saline is catered to the patients, it has to be monitored by a doctor, a caretaker, or a nurse. But due to the busy schedule, negligence and inattentiveness of the doctor and nurse in monitoring the saline level leads to critical conditions like reverse flow of patients' blood into the saline tube. This critical condition harms a patient too highly and even leads to death in many hospitals. Hence, the system is designed to control and monitor the saline level remotely by using Lora (Long Range) Technology. It is a low power wide area network where the saline level is observed up to 10km range. The proposed system continuously monitors the weight of the saline bottle with the help of a load sensor and it is converted into saline level. The saline level reaches a threshold limit (10% of saline) it automatically switches off the flow with the help of the solenoid valve connected to the saline bottle. The notification is also sent to the person in charge with the help of the Lora Module (Ra-02). The system utilizes the wide area with low power and offers high accuracy even in the remote area where the internet is not available. This is the first time the Lora technology is deployed in the medical sector.

## 2 EXISTING SYSTEM

The system eliminates nurses' continuous visual monitoring of the patient from distinct places. The entire project works on the principle of Beer-Lambert's law. The amount of transmitted light from the LED to the photodiode depends on the saline bottle's electrolyte. The voltage across the photodiode is monitored every millisecond. Threshold levels of voltage are calibrated on Arduino Uno by programming. Blynk application receives and sends data through mobile. The change in threshold level activates the alarm at the nurse station at the 100 ml mark. However, at the 50 ml mark, a message will be sent to the nurse station as well as a saline tube is clamped through a solenoid plunger to prevent it from air embolism. Table Below is the briefing of the actions taken.

Figure6.1

### Arduino UNO module

The arduino uno board is a microcontroller based on the ATmega328. It has 14 digital input/output pins in which 6 can be used as PWM outputs, 6 analog inputs, a power jack and reset button.

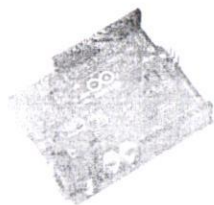


Figure6.2

## 8. CONCLUSION

In conclusion, the saline monitoring system was successfully deployed this system is able to indicate the current saline volume in the bottle. When the level of saline reaches the pre defined critical volume, the medical staffs or caretakers will be notified by the alarm from the buzzer and alert message will be sent to the medical staff via the application on the mobile phone using LoRa technology. This developed system can provide advantages on low power consumption and without internet. It can be reused for the next saline bottle.

## 9. FUTURE SCOPE

The saline level is controlled and monitored using LoRa Technology to protect the active living of human lives. The proposed work could be extended with more features using LoRa Technology. The wireless messages can send to doctors and nurses about the saline droplet rate. Smart health systems using LoRa technology can be implemented, which gives information about body temperature, blood pressure, heart rate and also the pulse rate.

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## DESIGN OF FAST FULL ADDER BY EXPLORING XOR AND XNOR GATES

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### Abstract

In this paper, circuits for fast full adder and simultaneous full adder functions are proposed. The proposed circuits are highly optimized in terms of the power consumption and delay, which are due to low output capacitance and low short-circuit power dissipation. The power consumed by the full adder is not therefore reduced by optimizing the design NOR gates. Simulation results are performed in tanner tool. These circuits are designed to have high speed and less power consumption compared to existing circuits. This is possible due to low output capacitance. Each one of the proposed full adder circuit has its own advantages of speed, power consumption and driving ability. From results, proposed circuits are found to be better than existing circuits. The novel structures of XNOR gate are proposed for the design of fast full adders with low power, high speed and less PDP. The proposed hybrid full adder has superior speed against other full adder circuits with less number of transistors.

Keywords: 2T (2 Transistors), 3T, ST, XNOR and PDP

### 1. INTRODUCTION

The need for small chip circuits, power consumption and speed vital factors should be taken into consideration while choosing the VLSI design with high performance. A basic arithmetic operation heavily demanded in VLSI design such as multiplier and accumulator, microprocessor, digital signal processing applications, so the system performance will be affected by the performance of full adder. A full adder is essential in arithmetic operation such as division, subtraction, addition and multiplication. The main block of the full adder circuit is the XOR/XNOR gate, as the XOR/XNOR gate consumes more power. The power consumed by the full adder is therefore reduced by optimizing the design of the XOR / XNOR gates. These can be used in a variety of multipliers, such as Vedic, Wallace, Array, etc. Simulation results are performed in Cadence Virtuoso tool 45-nm CMOS technology with 0.45V supply voltage.

The novel structures of XOR / XNOR gate are proposed for the design of hybrid full adders with low power, high speed and less PDP. The proposed HFA-14T has superior speed against other full adder cells with less number of transistors. Present day ever increasing number of compact applications requires low power. Power is one of the superior assets a designer tries to rescue when designing a system. Each full adder circuit has its own excellence regarding speed, power consumption, PDP (power delay product). PDP exhibited by full adder would affect the system's overall performance. The main block of the full adder circuit is XOR/ XNOR gate, because XOR/ XNOR gate consumes more power. So, the power consumed by the full adder is reduced by optimum design of XOR/ XNOR gates.

### 2. VLSI DESIGN CYCLE

The invention of the transistors by William B. Shockley, Walter H. Brattain and John Bardeen of Bell Telephone Laboratories drastically changed the electronics industry and paved the way for the development of the Integrated Circuit (IC) technology. VLSI circuit are present everywhere, our computer, our car, our brand new state-of-the-art digital camera, the cell-phones, and what we have all this involves a lot of expertise on many fronts within the same field. All modern digital designs start with a designer writing a hardware description of the IC in the Verilog / VHDL. RTL description is done using HDLs. This RTL description is simulated to test functionality. From here onwards we need the help of EDA tools. RTL description is then converted to a gate-level netlist using logic synthesis tools. The design process of producing a package VLSI chip physically follows various steps which are popularly known as VLSI design cycle. This design cycle normally represented by a flowchart below. The various step involved in the design cycle.



Experimental results corresponding to a nominal case PVT corner for 32-bit addition  
(V<sub>dd</sub> = 1.10V, T<sub>Junction</sub> = 25°C)

Design style	Critical path delay (ns)
Minimized SOP based full adder design [12]	5.41 (82.77%)
Half adders based full adder design [13]	4.28 (44.59%)
Full adder design embodying logic sharing [14]	5.78 (95.27%)
MUXes based full adder design [4]	3.73 (26.01%)
XNOR-XNOR based full adder design [7] - [9]	3.46 (16.89%)
XOR-XOR based full adder design [7] - [9]	3.50 (18.24%)
Centralized full adder [8] [9]	3.75 (26.69%)
Shannon's theorem based full adder [10]	5.17 (74.66%)
Commercial library's full adder [11]	4.11 (38.85%)
Proposed design – XNM based full adder	3.59 (21.28%)
Proposed design – XNAIMC based full adder	3.12 (5.41%)
Proposed design – XAC based full adder	2.96

## 6. Conclusions

Three novel gate level full adder designs have been presented in this work: XNM, XNAIMC and XAC based full adders. Amongst these, the XAC based full adder achieves the highest speed, while the XNM based full adder occupies the least area. The XNAIMC based adder is somewhat closer to the XAC based adder with respect to delay. It is worth noting that the proposed XAC based full adder is faster than even the full adder cell present in a commercial standard cell library. Apart from advancing fundamental research in data path element designs, this research article encompasses considerable pedagogical value. It is anticipated that the inferences from this work are likely to facilitate better transistor level solutions for full adder functionality compared to those which currently exist.

## Design of Rectangular Patch 4×4 Array For Satellite Communication

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### Abstract

This work presents the design and implementation of a micro strip patch array antenna with 4x4 element operates on a frequency of 12 GHz for satellite communication .The main element of this arrangement is a rectangular patch antenna design on the RT/Duroid 5880 substrate.Rogers duroid, in which  $\epsilon_r$  is 2.2 and height is 1 mm. The RT/duroid 5880 has a long industry presence of providing high reliability materials with superior performance.Based on the design results the micro strip patch array antenna with 4x4 element with achieve high efficiency, gain, VSWR and Return loss (S11) by which is simulate and optimize using High Frequency simulation structure software (HFSS 15.0 version).

**Keywords:** Microstrip Patch Array Antenna (MPAA), Satellite Communication, Bandwidth, HFSS.

### 1 Introduction

In any wireless communication field, the antenna is a primary need. The antennas are equipments used for connecting two or more devices by means of wireless medium connection. It is used for radiating or receiving radio waves by using air. Microstrip antennas have attracted a lot of attention due to rapid growth in wireless communication area. A microstrip antenna in its simplest configuration is shown in fig 1[5]. Figure 1: Microstrip Patch Antenna There are a lot of shapes of micro strip patch antenna that are usually square, rectangular, circle, triangle etc. For mobile communication, it requires small antennas dimensions at low cost and low profile. Microstrip patch antennas full fill all those requirements and they have been designed for use in wireless communication systems and satellite communication as well. The most significant advantage of antenna arrays is that the direction of maximum radiation can be changed and thus they can be used in beam scanning capabilities. The proposed antenna may find applications in wireless local area network. Today patch microstrip array antennas are probably the most widely used type of antennas due to their low volume, low cost, light weight. In satellite communication, there are a lot of types of antennas, the most common of which is Microstrip patch array antenna.

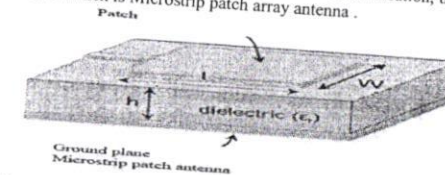


Figure 1: Microstrip Patch Antenna [5]

### 2 Antenna Design Methodology

Following are the parameters used to design the antenna.

W : The width of patch antenna

L : The length of the patch antenna

$\lambda_0$  : The Wavelength

f<sub>0</sub> : The operating frequency

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## Design of GaAs Based Low Noise Amplifier For 5G Frond-End System

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### Abstract

In radio receivers amplification is most important functionality. The low noise amplifier is the chief design in the radio receiver architecture. The CMOS technology has drawback of highest noise figure, small gain and less linearity and it cannot be applied for long range communication. In this paper the amplifier is designed in a GaAs Pseudomorphic High Electron Mobility Transistor (pHEMT) technology which has larger bandgap differences. The design is GaAs pHEMT process at 50nm technology. The simulation are done using ADS Software and parameters like noise figure and gain are measured and compared.

**Keywords:** LNA, ADS software, pHEMT, Noise figure, Forward gain

## 1 Introduction

Recent years the 5G communications systems are popular because of huge data rate, economical, high reliable small size. These all parameters are possible by chosen technology and selected band frequency. The preferable band frequencies for 5G IS SUB- 6 GHz and mm wave frequencies. Usually the mm wave frequencies are suitable for military applications. For 5G systems required many process steps for design and implementation to increase data rate, high reliable, increase the coverage area the transceiver required better sensitivity and more dynamic range.

The most important block in any receiver is LNA. The LNA can play an important role in the entire performance of receiver. The most important parameter in any LNA design and its performance forward gain  $S_{21}$ , input and output matching network Noise Figure, linearity, IIP3, OIP3 and 1dB compression point. The CMOS technology has drawback of highest Noise Figure, Small gain and less linearity. But low cost and better system integration [1] – [2]. The GaAs, pHEMT process of technology of compound semiconductor (III –IV group periodic table components) process has Low Noise, high linearity advantages. This is widely used in industry as well as academic fields [3]. In order to meet requirements the all existing published work papers authors suggested that different topologies and technology processes. In reference [4] the authors suggested the current reuse technology with cascaded inter stage resonance is demonstrated for the design of LNA, but design is restricted for 5.2 GHz frequency with minimum substrate resistance. Similarly in gm boosting with current reuse technique is implemented. Similarly in reference [6] a 5.7 GHz differential mode LNA is designed. In this proposed LNA a wideband low noise, high linearity GaAs pHEMT technology with two stage common source transistor cascaded current reused technique with enhanced matching network at inter stage.

### Low Noise Amplifier

A low-noise amplifier (LNA) is an electronic amplifier that is used to amplify signals of very low strength, usually from an antenna where signals are barely recognizable and should be amplified without adding any noise, otherwise important information might be lost. LNAs are one of the most important circuit components present in radio and other signal receivers. Analog Devices low noise amplifiers cover the frequency range from DC (IF) to RF Microwave and W-Band (95 GHz). These MMIC-based designs cover various gains and bandwidths with noise figures as low as 0.7 dB. Our low noise amplifiers offer some of the lowest noise and highest linearity available in the industry. Many of the designs offer a self-biased topology, and are internally matched to 50 ohms. They are used in a wide range of applications including telecom, instrumentation, and military/aerospace. All Analog Devices low noise amplifiers are fully specified over frequency, temperature, and supply voltage.



## EXPERIMENTAL ANALYSIS OF DIESEL ENGINE USING BIO-FUEL BLENDED WITH ALUMINIUM OXIDE

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### ABSTRACT

Petroleum products such as petrol and diesels are being used as a fuel to the running of Internal Combustion Engines. Day by day demands for the petroleum products is increasing since its rate of consumption is increasing

### INTRODUCTION

Petroleum based fuels plays a conventional energy sources along with increasing demand and also major contributors of air pollutants. The petroleum fuels fulfil energy needs in industrial development, transportation, agriculture sector and other basic requirements. Need alternative fuel for the shortage of fossil fuel The biofuel from the biomass available in large quantity and can be replaced for fossil fuels. The micro algae oil is used as the bio fuel in the direct injection (DI) diesel engine, when the oil extracted by pyrolysis process. An experimental investigation is carried out to analyze the effect of biofuel, the blended fuels to be improving diesel engine performance, emission and properties, where compared to diesel.

### OBJECTIVES

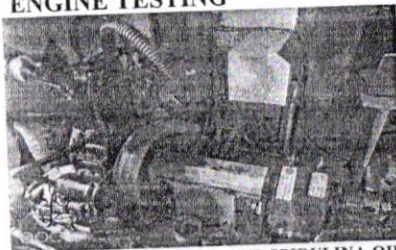
The main objective of our project is, To increase the performance and reduce the emission of diesel engine by using bio fuel, blended with aluminium oxide nano particle where compared to diesel.

### ALTERNATIVE FUEL

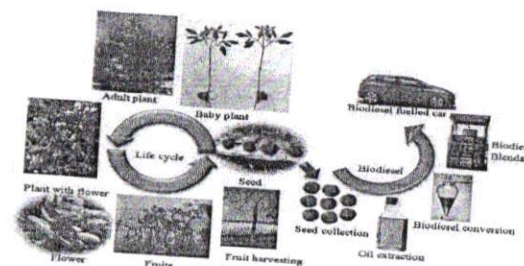
Alternative fuels known as "Non-conventional" or "Advanced fuels", are any materials or substances that can be used as fuels, other than conventional fuels like fossil fuels (petroleum oil, coal and natural gas) as well as nuclear materials such as uranium and thorium, as well as artificial radioisotope fuels that are made in nuclear reactors.

Example  
Biodiesel, bioalcohol (methanol, ethanol, butanol), hydrogen, non-fossil methane, non-fossil natural gas, vegetable oil, propane, and other biomass sources.

### ENGINE TESTING



BLENDING WITH DIESEL AND SPIRULINA OIL & ALUMINIUM OXIDE NANOPARTICLES



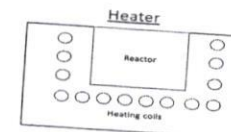
### CONSTRUCTION

The pyrolysis setup consists the following parts

#### 1.1 Heater, Reactor, Condenser, Oil collector, Nitrogen cylinder

##### HEATER

The heater is a U shaped heating element and is made of nicrome wire. Only one heater has 3Kw heating capacity and 240V supply. The heater is inserted outside of reactor in the shape of U.



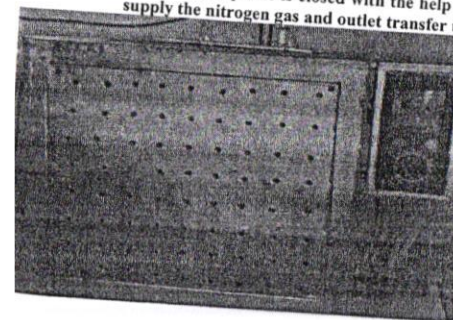
##### Specification

**Heater**  
Length (l) = 500 mm  
Breath (b) = 500 mm  
Depth (h) = 580 mm

**Reactor**  
Length (l) = 190 mm  
Breath (b) = 190 mm  
Depth (h) = 300 mm

#### 1.2 REACTOR

The reactor is made of stainless steel material, in the shape of rectangle and the thickness is 10mm. The top side is closed with the help of nuts. The one inlet and outlet are made. Inlet used supply the nitrogen gas and outlet transfer the volatile gases.



## Analysis of Mechanical Properties of TiC Reinforced Aluminium Alloy Composites

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### Abstract

In the present paper, the aluminium alloy i.e. AA 6061-T6 based composites reinforced with different weight fraction of TiC (2-3µm) particles (0%, 10%, 15% and 20%) was produced by stir cast technique and the effect of reinforced ratios on the mechanical properties and Tribological behaviour was examined. The test results shows that the increment in weight fraction of reinforcement particles in the matrix metal produced better mechanical properties like hardness, Tensile strength, Impact strength. SEM metallographic images and EDAX analysis evidences the homogenous dispersion of reinforcement in the matrix. The dry sliding wear behaviour shows that wear rate of the casted samples has decreased with the amount of reinforcement added. For the same working conditions wear rate increases with increasing load and with increasing speed.

**Keywords:** Metal Matrix Composites, AA 6061-T6-TiC, Mechanical properties, Tribological behaviour, Reinforcement

### 1. INTRODUCTION

Metal matrix composite (MMC) is engineered combination of the metal (Matrix) and hard [particle/ceramic (Reinforcement) to get tailored properties. MMC's are either in use or prototyping for the space shuttle, commercial airliners, electronic substrates, bicycles, automobiles, golf clubs, and a variety of other applications. The composite formed out of aluminium alloys are of wide interest owing to their high strength, fracture toughness, wear resistant and stiffness. Metal matrix composites (MMC's) are increasingly becoming attractive materials for advanced aerospace applications because their properties can be tailored through the addition of selected reinforcements [1-2]. In particular, particulate reinforced MMC's have recently found special interest because of their specific strength and specific stiffness at room or elevated temperatures [3]. It is well known that the elastic properties of metal matrix composites are strongly influenced by micro structural parameters of the reinforcement such as shape, size, orientation, distribution and volume fraction [4]. A typical chemical composition of Al 6061 is presented in Table I

Table I CHEMICAL COMPOSITION OF AA 6061-T6

Element	Mg	Fe	Si	Cu	Mn	Ti	V	Al
Weight %	1.08	0.17	0.63	0.32	0.52	0.01	0.02	Remainder

In recent years, the aluminium alloy based MMCs have offered designers many added benefits as they are particularly suited for applications requiring good strength at high temperatures, good structural rigidity, dimensional stability, light weight and low thermal expansion [5-10]. The major advantages of Aluminium Matrix composites (AMCs) include greater strength, improved stiffness, reduced density, improved high temperature properties, controlled thermal expansion coefficient, thermal / heat management, enhanced and tailored electrical performance, improved abrasion and wear resistance and improved damping capabilities [11, 12]. Various types and sizes of reinforcements are used in matrix of Aluminium like SiC, TiC, Al<sub>2</sub>O<sub>3</sub>, B<sub>4</sub>C, TiB<sub>2</sub>, TiN, etc. Among these, TiC is a relatively new reinforcement in metal matrix composites and has good properties such as wettability, thermal stability and distribution in Aluminium metal matrix [13-15]. The Al-TiC MMC samples for microscopic examinations were prepared by adopting standard metallographic procedure.

Samples were polished using different size of TiC grit papers of 120, 220, 400, 600, 800, 1000, and 1200, followed by velvet cloth with aluminium paste. The Keller's reagent was used for etching with mixture of 0.5 ml HF, 0.75 ml HCl, 2.5 ml HNO<sub>3</sub> and balance amount of distilled water. The microstructures of the etched sample were examined using Scanning Electron Microscope (SEM) and Compositional test of the sample were carried out using Energy-Dispersive X-ray spectroscopy (EDX)

## EXPERIMENTAL PROCEDURE

### A. Fabrication Process

Batch of 1250 g of aluminium alloy was melted at 660°C using an electrical furnace shown in Fig.1 and reinforcement is preheated at separate muffle furnace in order to make the surface oxidized

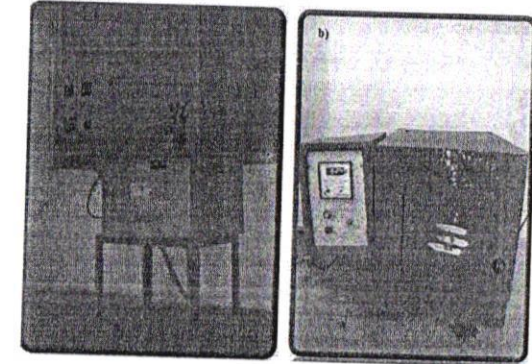


Fig.1 a) Electrical resistance furnace b) Muffle furnace

The melt was agitated with the help of a mechanical stirrer to form a fine vortex. The mixtures of preheated TiC particles with an equivalent amount of K<sub>2</sub>TiF<sub>6</sub> flux (with 0.1Ti/TiC ratio) were added at a constant feed rate into the vortex. The process parameters employed are given in Table II

TABLE II PROCESS PARAMETERS OF MODIFIED STIR CASTING

Parameters	Units	value
Spindle speed	RPM	300
Stirring time	min	5
Temperature of melt	°c	920
Preheated temperature of SiC particles	°c	700
Preheated temperature of mould	°c	250
Powder feed rate	g/s	0.8-1.2

Argon gas was supplied into the melt during the operation to provide an inert atmosphere. After stirring the molten mixture, it was poured down into the preheated permanent mould. The AMCs having different weight percentages (0, 10, 15 and 20) of TiC were fabricated by the same procedure. The manufactured procedure of Al AMCs are shown in Fig. 2



## OPTIMIZATION OF MACHINING PARAMETER ON SS316L MATERIAL USING ORTHOGONAL ARRAY METHOD

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R.Jayakumar, Department of Mechanical Engineering, St.Anne's College of Engineering, Panruti.

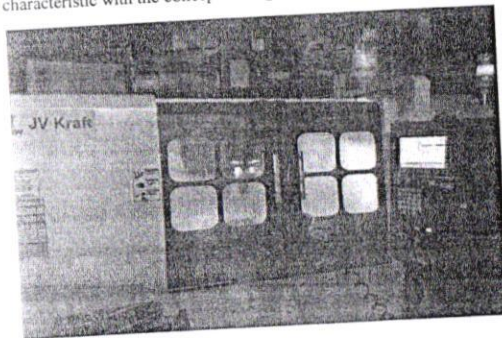
### ABSTRACT

In this paper, Taguchi techniques are applied to find out the surface roughness, metal removal rate, machinability in milling operation of SS316L. L9 orthogonal array, S/N ratios and ANOVA are used to study the performance characteristics of cutting speed, feed rate and depth of cut as milling parameters with tool flank wear width as response variable. The result of the analysis show that the selected machining parameters affect significantly the tool flank wear width of Tungsten Carbide cutting tool while machining SS316L. And also indicate that the cutting speed is the most influencing parameter out of the three parameters under study. Finally, the results are further confirmed by validation experiments or confirmation run.

**Keywords:** Taguchi Method, Optimization, Tool flank wear width, S/N ratio.

### Introduction

Taguchi method stresses the importance of studying the response variation using the resulting in minimization of quality characteristic variation due to uncontrollable parameter. The metal removal rate was considered as the quality characteristic with the concept of larger better.



The EN8 steel of is mounted on the JV KRAFT vertical milling machine tool and specimens of 10mmx50mmx100mm size are cut.

## 2 Experimentation

The 12 mm tool was fixed with the help of jaw block in machine. The program was made for cutting operation of the work piece and a profile of 12 mm x 100mm horizontal cut. Each set of experiments was performed at room temperature in a narrow temperature range

### Machining parameters

Machining parameters	unit	notation	level		
			-1	0	+1
Spindle speed	rpm	N	800	1000	1200
Feed rate	mm/re v	f	0.2	0.3	0.4
Depth of cut	mm	d	0.5	1	1.5

### SN Ratio

Level	speed	feed	doc
1	39.07	38.85	41.54
2	40.87	40.97	40.64
3	42.35	42.47	40.11
Delta	3.28	3.61	1.43
Rank	2	1	3

### Response Table for Signal to Noise Ratios

Smaller is better

Level	speed	feed	doc
1	-8.147	-2.906	-7.148
2	-5.449	-6.447	-5.726
3	-4.510	-8.753	-5.232
Delta	3.638	5.847	1.917
Rank	2	1	3

## RESULTS AND DISCUSSION

3 Table : Optimization of MRR

S.NO	SPINDLE SPEED(N)	FEED MM/REV	DEPTH OF CUT MM	MRR IN m3/min
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## Taguchi optimization of end milling parameters on 316L stainless steel

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### Abstract

Meeting predefined quality requirements, enhancing production efficiency with specialised equipment, and sticking to time and cost restrictions are all part of the overall manufacturing problem. Unfortunately, meeting these requirements for certain of a product's quality qualities is difficult. Surface finish is a significant quality attribute. This research examines the direct impacts of three processing parameters on surface roughness (Ra) in 316L stainless steel end milling. Three parameters were used in the experiments: spindle speed, feed rate, and cut depth. The experimental study was conducted using a Taguchi L9 orthogonal design. The Taguchi analysis was utilised to identify the sensitive parameters that have an impact on surface quality.

**Keywords:** AISI 316L stainless steel, Surface roughness, Main effect plot, SN ratio plot, Optimization

### 1. Introduction

In industrial processes, end milling is one of the most popular metal removal operations. It is widely utilised in a range of manufacturing industries, including aerospace and automotive, where the creation of slots, pockets, precision moulds, and dies requires high quality. The surface quality has a considerable impact on milling performance, since a high-quality milled surface enhances fatigue strength, corrosion resistance, and creep life [1].

Because of its high mechanical qualities, increased stability and withstand resistance to corrosion, and cost-effective manufacture, AISI 316L is most widely used in biomedical applications, aerospace, and marine [2-4]. Furthermore, as compared to other stainless steels, machining AISI 316L is quite difficult. Because it allows for less intensive martensite formation during metal cutting, making traditional techniques of processing easier [5]. The main advantage of these materials is that traditional machining can be done fast and cheaply. AISI 316L is commonly used to make bioimplants. Because the machined component of a bioimplant could attain very fine surface quality. Surface roughness will cause fatigue cracks, which will lead to corrosion [6].

Researchers have developed a number of techniques to reduce surface roughness and increase metal removal rate. Yang et al [7] focussed on improving the surface finish in face milling operation by the concept of Taguchi. The results predicted the best cutting combination for surface roughness and signal-to-noise ratio. Ghani et al [8] described a procedure for optimising the end milling parameters using Taguchi while execute the machining of steel grade AISI H13 and the outcomes confirm that higher level cutting speed and lower-level feed rate, and depth of cut were the best combinations for obtaining lower resultant cutting force and attain the excellent surface finish.

Gurbuz et al [9] focused on the surface condition of SS316L and the impact of machining parameters during machining. The results show that when increase the feed and the cutting depth, the surface condition deteriorated; but, when cutting speed was increased, the surface integrity improved. Kadi et al [10] observed the dry turning process of AISI 316L for obtaining low surface roughness. The findings show that major impact registered on surface finish was feed rate.



1	800	0.2	0.5	1.44
2	800	0.3	1	3.94
3	800	0.4	1.5	7.53
4	1000	0.2	1	3.60
5	1000	0.3	1.5	7.46
6	1000	0.4	0.5	3.46
7	1200	0.2	1.5	6.23
8	1200	0.3	0.5	2.70
9	1200	0.4	1	7.36

Taguchi method stresses the importance of studying the response variation using the resulting in minimization of quality characteristic variation due to uncontrollable parameter. The metal removal rate was considered as the quality characteristic with the concept of larger better.

### 5. Conclusions

In the earlier chapters, the effects of process variables on response characteristics (material removal rate and surface roughness) of the computer numerical control (CNC) machining process have been discussed. An optimal set of process variables that yields the optimum quality features to machined parts produced by CNC process has also been obtained.

In this work, an attempt was made to determine the important machining parameters of steel material for the performance measures like MRR and SR separately in CNC process.

Factors like the depth of cut and the feed rate have been found to play a significant role in rough cutting operations for the maximization of metal removal rate and minimization of surface roughness. Taguchi experimental design (L9 orthogonal array) is used to obtain the optimum machining parameters for the maximization of metal removal rate and minimization of surface roughness.

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## AN OVER VIEW OF BIOMASS DRYER FOR CASHEW PRODUCT

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### ABSTRACT

Biomass hybrid dryer is one of the simplest methods used in food and agriculture industries for extracting the moisture contents from the products in less time with good quality of product with and maintain uniform colour. Psychrometrically the psychrometric is important in drying technology as it refers to the properties of water particle mixture which controls drying rate. The temperature and rate at which the liquid vaporization occurs will depend on the concentration of evaporation in the surrounding atmosphere. Biomass drying refers to drying energy methods. A biomass dryer is an enclosed unit structure to keep the food protected from harm and to preserve product quality. Different types of biomass dryers are available and are generally known as forced convection and natural convection. Biomass dryer more cost efficient than other dryer types. Through this paper we looked at the development of the biomass dryer's architecture and efficiency review

**Keywords**— Biomass dryer, natural draft, forced draft, drying time, moisture.

### 1. Introduction.

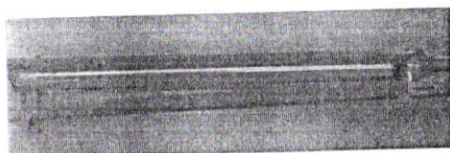
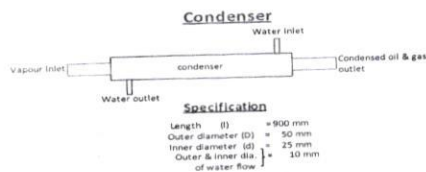
Biomass is one of the main renewable energy sources which are readily available. The energy source supplies are not limited that why it is called as renewable energy and it has much demand in various parts of the world. It is eagerly focusing for the cost effective method of dryers either forced or natural circulation method commonly used for drying. Dryers are utilizing to dry various agricultural products like crop drying, space heating and product maintaining good quality even studies a few biomass projects in different parts of the world and discusses future. Biomass techniques are available for drying different food products and which has some advantages and disadvantages. This technique is necessary to preserve the food products. The biomass hybrid dryer is one of the most effective methods which have been implemented. There is a lot of awareness growing in the world that the renewable energy is playing a vital role with extending technology. The developing countries are in need to improve their productivity hence biomass is much acceptable category as an energy saving method in agricultural applications. It is preferred as one of the best among other alternative energy sources and the technology is very good. The biomass hybrid dryers have various applications. Biomass has some benefits in sustainable terms over fossil fuels such as coal, petroleum and gas. It does not produce the pollutants but while burning biomass can release carbon dioxide but it is needed to grow plants that why it is balanced. In this review paper, we have reviewed the design modifications applied and development of different types of hybrid biomass dryers. Biomass dryer is not only environmentally friendly but also benefited to utilize both in urban and rural areas for commercial purpose and much more simple compared to other types of dryers. It provides higher drying temperatures as drying takes place in an enclosed cabinet. EERE information center [1] Biomass is one of the most important sources of renewable energy for transport. Biomass is any biological material that has stored sunlight in the form of chemical energy, such as plants, farm crops or residues, urban waste and algae

Tkemaladze et al [2] Economic and political value 'Biomass Action Plan and Multi-Year Plan,' established by the Energy Department of the European Commission. Chum et al [3] the former paper also reviewed the need to reduce emissions of carbon dioxide and focused on raising awareness by increasing the issue of global warming. Biomass renewable energy resource emitted CO<sub>2</sub> during processes of combustion and consumption occurs and results in an rise in atmospheric carbon dioxide in origin. Vegetables use CO<sub>2</sub> and Consecution of other plant degradation processes.

### 1.1 Comparative Study of various types of dryers with different parameters

There are various types of dryers based on the fuel are available in general it can be classified as follow

- Biomass dryer: use wood or waste of agricultural product
- Solar dryer: sun heat only use
- Electric dryer: based on power avail



### 1.3 CONDENSER

1.4 The condenser is made up of stainless steel and is connected to the gas liquid separator. The outlet of the reactor is directly connected to the condenser using a stainless steel tube which can withstand high temperature. Another one inlet is connected to the reactor from the nitrogen cylinder. The condenser is firmly connected with help of alloy gasket. Counter flow condenser here selected. The flow of water is directed against the direction of pyrolysis gases. The condensate drips into the gas liquid separator.

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## Electrical Discharge Coating of Aluminum Alloy Using WS<sub>2</sub>/Cu Green Compact Electrode

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### ABSTRACT

Aluminium (Al) alloys have been one of the most employed materials in defence applications like torpedoes, manufacture of Missile bodies and parts of automobile such as engine cylinders and pistons, due to their lightweight, high mechanical resistance, good corrosion properties and low cost. Poor wear resistance of the alloys is major constraint for their use particularly when aluminum is in contact with other parts. Keeping in view, improving the antifriction properties of Al-7075 alloy, electrical discharge coating (EDC) was attempted to modify the surface of Al alloy with solid lubricant tungsten disulfide (WS<sub>2</sub>). Tungsten disulfide (WS<sub>2</sub>) and copper (Cu) powder powders were mixed in the ratio of 60:40 and compacted in the hydraulic press to obtain green compact electrodes. Further it has been used as electrode for EDC technique. In the present work, Response surface methodology (RSM) is used to perform the experiment with different parameter combinations such as discharge current, pulse-on time and pulse-off time on the alloyed characteristics of deposition rate (DR) and electrode wear rate (EWR) were studied. It was found that current has significant parameter on DR and pulse on time was found to be predominant in obtaining higher EWR. Micro structural changes during EDC and composition of materials present on the surface were analyzed through SEM and EDS.

Keywords EDC; Powder metallurgy; DR, EWR.

### INTRODUCTION

Electro discharge coating (EDC) is an unconventional coating method developed in recent years. It uses an electrical discharge media to build a hard layer on a metallic work piece. EDC can be used to improve the hardness, wear resistance, corrosion resistance and without causing major changes to the bulk workpiece material. Due to its unique properties, such as light weight and high specific strength, aluminum alloy has rapidly increased its acceptance in industrial applications. It has led to the rapid substitution of ferrous metal materials, mainly in the aviation and automotive fields, with improvements in weight, fuel consumption and performance and efficiency. However, the wear resistance of aluminum alloy is very low [1]. Therefore, surface modification has become very important for improving wear resistance and improving the acceptability of aluminum alloys in industrial environments. In the process of EDM, a spark is activated at the point of the smallest gap between the poles through the high voltage of the positive polarity, which exceeds the dielectric breakdown resistance of the small gap. The insulating effect of the dielectric is important to avoid electrolysis of the electrode during the EDM process melting and vaporisation of the workpiece surface is followed by quick cooling/quenching by the dielectric fluid. Mohanty et al. (2018) used electrical discharge machining to examine the surface alloying of Ti6Al4V using tungsten disulphide powder mixed with dielectric. Surface roughness, material removal rate, and micro-hardness were the responses studied, with voltage, duty factor, and powder particle concentration being the processes. The most important factor affecting the decomposition was the powder concentration. The deposition rate, surface roughness, and recast layer thickness were all influenced by powder concentration [2]. Elaiyaran et al. (2020) examined the ZE41A magnesium alloy, which was deposited using an electrical discharge coating process with a WC-Cu powder metallurgy semi-sintered and sintered electrode. At low compaction loaded partial sintered electrodes, it was revealed that the maximum material migration rate and micro hardness increased as the current and pulse on time increased [3]. Senthil Kumar and Ganesan (2015) used a WC-5



- Gear on motor;  $Z_1 = 33$  T and  $D_1 = 10$  cm
- Gear on wheels;  $Z_2 = 45$  T and  $D_2 = 14$  cm
- D wheels = 56 cm
- $N_1 = 400$  rpm

From the data above, then on each round can be done calculation as follows:

$$\frac{N_2}{N_1} = \frac{D_1}{D_2}$$

$$N_2 = \frac{N_1 D_1}{D_2} = \frac{400 \cdot 10}{14} = 285,71 \text{ rpm.}$$

From the results of testing and discussion of data obtained, it can be concluded that funds needed to assemble an electric is quite low. The total weight of electric motorcycles is 1.338 N consisting of weight of rider 637 N and weight of electric motorcycle 701 N.

Energy consumption spent on a 10 km trip is 0.499 kWh. The cost for a journey as far as 10 km spends money of Rp.516 or equal to only Rp 5.160 per 100 km. It is more efficient than the usual petrol vehicle that cost Rp 8.000 per 10-15 km (a liter), or 15 times more efficient.

#### 4 Conclusion

In this study, we were succeeded in designing an efficient electrical motorcycle prototype with a scale of the laboratory, which can be accelerated up to 40 km/h and operational cost 15 times less than the usual petrol vehicle with more efficiency. This result is quite promising to be implemented on an industrial scale to support reducing fossil energy use.

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## Electrical Motor Topologies for Aircraft Propulsion

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#### Abstract

This paper provides the state-of-the art in aircraft electrical propulsion (AEP). Initially, the limitations of on-board energy storage devices are highlighted and contextualised. The definitions of useful measures for determining the suitability of motor design, namely specific power and motor torque per unit rotor volume (TRV), are discussed and relevant examples are provided. The classifications of motors used for terrestrial vehicle applications are reviewed and their limitations highlighted regarding their suitability to AEP applications. A discussion on motor configurations for aerospace applications is provided which includes: synchronous motor stator winding configurations; axial flux motor configurations and the causes of energy losses. Additionally, the topologies and performance characteristics of existing aerospace motor technologies are examined. It was concluded that electrical motors provide an ideal means for achieving aircraft propulsion and that higher motor speeds are likely to be required for future commercial aircraft motor designs.

**Keywords:** aircraft electrical propulsion, BLDC, unmanned aircraft, rim driven fan, RDF, specific power, TRV, slotless windings

## 1 Introduction

The comparatively low energy storage capacity of electrical aircraft is the only serious obstacle to the development of successful zero-emission flight. Although it is not the aim of this paper to discuss on-board electrical energy storage; it is first considered important to offer a contextual reference to the present feasibility of electrical propulsion for aircraft.

Various methods of electrical energy supply already exist to provide on-board power for propulsion. Fig. 1 provides an indication of power and energy densities of state-of-the-art electrical storage technologies. In [1] existing battery, solar cell, ultra-capacitor and fuel cell technologies are described alongside operational hybrid aircraft and future High-Temperature Superconducting (HTS) systems. HTS technology is becoming increasingly feasible with recent advances in material sciences [2],[3]. Likewise, high-powered metal-air battery technologies, such as lithiumair, offer the potential to equal and surpass the energy release capabilities of hydro-carbon fuels.

Fig. 1 provides an overview of theoretical specific energies of batteries compared with gasoline. Fig. 2. Shows Ragone chart comparing specific energy and power values for electrical storage technologies. At the time of writing, the energy density of practical Lithium-Ion batteries is about 200 Wh/kg whereas Jet-A1 (AvTur) kerosene has an energy density of 11.95 kWh/kg [2]. This is some sixty times greater than is achievable for electrical flight. Thus, it is restricting present aircraft applications to light weight, low speed and short duration flights such as light aircraft, paragliders, unmanned (autonomous) aircraft and model aircraft. Regardless of the means of on-board electrical energy supply, Aircraft Electrical Propulsion (AEP) is likely to bring about the most significant change to the topology of the electric motor for over a century. This paper presents a review of existing motor technologies for aircraft propulsion.

Two useful measures for determining the suitability of a motor design for a particular application are its Specific

Power (kW/kg) and its Torque per unit Rotor Volume (TRV: kNm/m<sup>3</sup>). The former provides an indication of performance regarding power to weight and allows a comparison to be made between electric motor performance and that of Internal Combustion Engines (ICE). Table I provides an approximate comparison of Specific Power

values for traditional forms of vehicle engines. The latter, TRV (refer to Table II), is a useful guide for designers in sizing an electrical machine as it provides an indication of the effectiveness of the electromechanical energy conversion of motor design. It can be calculated as follows [4]:

$$TRV = \frac{T}{V_{rotor}} = \frac{\pi}{\sqrt{2}} \times k_{st} \times A \times B = 2\sigma_{max}$$

$$T = \frac{\pi^3}{4\sqrt{2}} \times k_{st} \times A \times B \times D^3 \times L_{st}$$

$$V_{rotor} = \frac{\pi D^3 L_{st}}{4}$$

$$\sigma_{max} = \frac{F_{max}}{Area} = B \times A$$

## Optimal Placement and Sizing of Distributed Generator Based on Multi Objective Particle Swarm Optimization

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### Abstract

To solve the problems of environmental pollution and energy consumption, the development of renewable energy sources becomes the top priority of current energy transformation. Therefore, distributed power generation has received extensive attention from engineers and researchers. However, the output of distributed generation (DG) is generally random and intermittent, which will cause various degrees of impact on the safe and stable operation of power system when connected to different locations, different capacities, and different types of power grids. Thus, the impact of size, type, and location needs to be carefully considered when choosing the optimal DG connection scheme to ensure the overall operation safety, stability, reliability, and efficiency of power grid. This work proposes a distinctive objective function that comprehensively considers power loss, voltage profile, pollution emissions, and DG costs, which is then solved by the multi objective particle swarm optimization (MOPSO). Finally, the effectiveness and feasibility of the proposed algorithm are verified based on the IEEE 33 bus and 69-bus distribution network.

## 1 Introduction

With the rapid development of the world's electric power industry, the total amount of social electricity consumption has risen sharply over the last decade (Yang et al., 2016; Yang et al., 2017; Zhang et al., 2021). The traditional grid framework, the power sector mainly builds large centralized power sources such as nuclear stations, large hydropower stations, and coal-fired power stations and then expands into a large-scale power (Yang et al., 2019a; Yang et al., 2019b; Yan, 2020). However, its disadvantages are also increasingly prominent (Yang et al., 2020; Xi et al., 2020), in particular, highly centralized power supply is gradually difficult to meet the requirements of power grid operation, and the failure of important power supply nodes seriously affects the reliability of power grid's power supply. Moreover, long-distance transmission is also under serious power security problems (Mehleri et al., 2012; Wang et al., 2014; Yang et al., 2018).

To overcome the negative impact of the aforementioned problems, the concept of distributed generation was put forward in the 1980s (Gopiya Naik et al., 2013; Yang et al., 2015). DG has an extremely important impact on the planning and operation of the distribution network (Sara et al., 2020; Yang et al., 2020; Ali and Mohd, 2021). Also, proper access of DG in distribution network can effectively enhance the power quality, reduce the power loss, improve the voltage distribution, and boost the overall economy and flexibility of the power operation (Abdurrahman et al., 2020; Bikash et al., 2020; Suresh and Edward, 2020). As the end of power network, the stability and efficiency of distribution network directly affect its overall efficiency (Surajit and Parima Bikash et al., 2019). Therefore, the location and sizing of distributed power generation have become an important research content of power grid planning.

The problem of location and sizing of DG is to optimize its installation point and sizing to maximize the output under the constraints of satisfying the given investment and system operation (Kumar et al., 2019; Nagaballi et al., 2020). With the increasing requirements for power system reliable operation, the problem of DG location and sizing has developed from a single-objective problem that only considers the minimum network loss to a multi-objective optimization problem that comprehensively considers voltage quality, current quality, and environmental impact. Quadratic programming method, genetic algorithm, and other methods have been applied to solve such multi-objective location and constant volume problem. These methods all need to set weights to transform the multi-objective problem into a single-objective problem for proper solutions (Murty and Kumar, 2015); however, these weights are difficult to determine in actual operation.

Besides, the solution of a large number of planning models is relatively complicated, while the proposed algorithm directly affects the choice of planning schemes (Aman et al., 2014; Nezhad Pashaki et al.,

Shu, 2020). At present, the solving algorithms mainly include mathematical optimization and metaheuristic algorithm (Doagou - Mojarrad et al., 2013; Satish et al., 2013; Sultana et al., 2016).

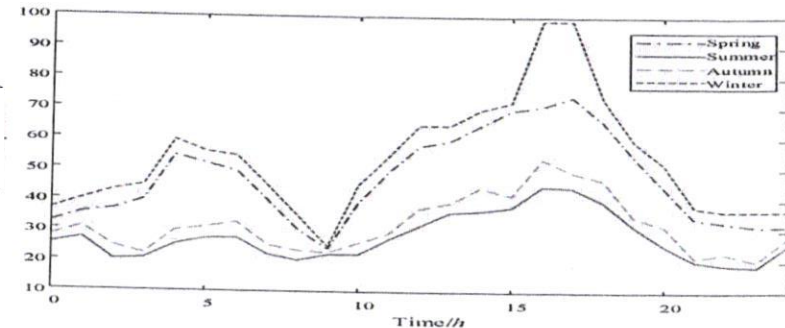


Figure 1| Annual output curve of wind turbine

Mathematical optimization algorithm owns relatively low computational efficiency and is only suitable for small-scale distribution networks. Thus, metaheuristic algorithm has received much attention and application in recent years (Aman et al., 2012; Pabu and Singh, 2016; Iqbal et al., 2018). Literature (Chandrasekhar and Sydulu, 2012) adopts genetic algorithm (GA) to optimize the new load nodes for expansion plan of distribution network, and then simulated annealing algorithm is utilized to optimize the generated single plan, which considerably reduces the load size of DG connected to the distribution network and the influence of power flow of the distribution network. Literature (Aman et al., 2013) proposes an improved particle swarm optimization algorithm based on hybrid simulated annealing method to optimize the location and sizing of distributed power sources. However, the convergence speed of the mentioned algorithms is relatively slow, and the result is prone to local optimal solutions.

Therefore, an objective function comprehensively considering power losses, voltage profile, pollution emission, and cost is proposed in this work, and MOPSO is utilized to solve it. Finally, the proposed method is validated via an IEEE 33-bus and 69-bus distribution network to verify its effectiveness. Then, the Pareto front result is given.

The remaining of this paper is organized as follows: Mathematical Optimization Model of DG Planning develops the objective function. In Multi objective Particle Swarm Optimization Algorithm, multi objective particle swarm optimization (MOPSO) is described. Comprehensive case studies are undertaken in Case Studies. At last, Conclusion summarizes the main contributions of the paper.

## Mathematical Optimization Model of DG Planning

### 1.1 Load and DG Power Output Timing Model

#### 1.1.1 Wind Turbine Output Timing Model

The output power of wind turbine mainly depends on wind speed, which can be expressed by the following piecewise function (Velasquez et al., 2016):

$$P(v) = \begin{cases} 0, & (v \leq v_{cl} \text{ or } v \geq v_{co}) \\ P_r \frac{v - v_{cl}}{v_R - v_{cl}}, & (v_{cl} \leq v \leq v_R) \\ P_r, & (v_R \leq v \leq v_{co}) \end{cases}, \quad (1)$$

where  $P(v)$  is the power output of the wind turbine;  $v_{cl}$  denotes the entry wind speed;  $v_{co}$  is the cut-out wind speed;  $v_R$  means rated wind speed;  $P_r$  represents the rated output power. The wind turbine output curve is modeled according to the mean seasonal wind speed, and the output curve is shown in Figure 1 (Sara et al., 2020).



## 4 Case Studies

As shown in Figure 5 and Figure 6, DG planning research on an IEEE 33-bus and 69-bus distribution network is carried out to verify the effectiveness of the proposed method, including PV system (two nodes installed), wind turbine (two nodes installed), fuel cell (one node installed), and microturbine (one node installed). It is worth noting that fuel cell and micro-gas turbine can carry out power output stably. When PV system and wind turbine are used together, the defect of fluctuating output power can be well compensated. In addition, in four typical days, the total active power loss of the network is 4061.87 kW, while the total voltage deviation is 66.1991 p.u. and the proposed method was coded in MATLAB 2017b.

## 5 Conclusion

In this work, MOPSO is used to optimize the location and sizing of DG, which contributions are outlined as follows:

1. The objective function with four indexes of distribution network losses reduction index, voltage profile index, environmental emission reduction index, and economic indicators is established to comprehensively optimize the distribution network.
2. Based on an IEEE 33-bus and 69-bus distribution network, it is effectively verified that MOPSO has strong global searching efficiency and high convergence speed. Also, it can effectively avoid falling into local optimum under complex objective function.
3. Four types of DG, PV station, wind turbine, fuel cell, and microturbine are installed, and the connection of microturbine and fuel cell can stabilize the instability of PV station and wind turbine. The experimental results show that the power losses of the distribution network optimized by MOPSO decrease by 51.91%, and the voltage profile is also significantly improved. In future studies, more advanced solution algorithms and multiobjective decision-making method will be devised to solve this problem.

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## Cost Saving on Micro Grid Operation using Grey Wolf Optimization Algorithm

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### Abstract

As a result of today's rapid socioeconomic growth and environmental concerns, higher service reliability, better power quality, increased energy efficiency and energy independency, exploring alternative energy resources, especially the renewable ones, has become the fields of interest for many modern societies. In this regard, MG (Micro-Grid) which is comprised of various alternative energy sources can serve as a basic tool to reach the desired objectives while distributing electricity more effectively, economically and securely. In this paper an expert multi-objective AMPSO (Adaptive Modified Particle Swarm Optimization algorithm) is presented for optimal operation of a typical MG with RESs (renewable energy sources) accompanied by a back-up Micro-Turbine/Fuel Cell/Battery hybrid power source to level the power mismatch or to store the surplus of energy when it's needed. The problem is formulated as a nonlinear constraint multi-objective optimization problem to minimize the total operating cost and the net emission simultaneously. To improve the optimization process, a hybrid PSO algorithm based on a CLS (Chaotic Local Search) mechanism and a FSA (Fuzzy Self Adaptive) structure is utilized. The proposed algorithm is tested on a typical MG and its superior performance is compared to those from other evolutionary algorithms such as GA (Genetic Algorithm) and PSO (Particle Swarm Optimization).

## 1 Introduction

In recent years, the application of alternative energy sources such as wind, biomass, solar, hydro and etc. has become more widespread mainly due to needs for better reliability, higher power quality, more flexibility, less cost and smaller environmental footprints. On the other hand, DGs (Distributed Generations) such as PV (photovoltaics), micro-turbines, fuel cells and storage devices are expected to play an important role in future electricity supply and low carbon economy [1,2]. However, high penetration of DGs into the grid environment will bring new challenges for the safe and efficient power system operation. These challenges can be partially addressed by MG (Micro-Grid) which is defined as an aggregation of DGs, electrical loads and generation interconnected among themselves and with distribution network as well [2e5]. In this regard, the methodologies applied to manage and control the operation of MGs are going through continuous changing in order

MG, in its whole vision, is an exemplar of a macro-grid in which local energy potentials are mutually connected with each other as well as with the L.V utility and make a small-scaled power grid. In such a network, DGs are exploited extensively both in forms of renewable (e.g., wind and solar) and non-conventional (MT (microturbine), fuel cell, diesel generator) resources because these emerging prime movers have lower emission and the potential to have lower cost negating traditional economies of scale [42]. In addition to DGs, storage options are also used widely to offset expensive energy purchases from utility or to store energy during off-peak hours for an anticipated price spike. In a typical MG, DERs generally have different owners handle the autonomous operation of the grid with the help of Local Controllers (mc or MGLC) which are joined with each DER and mcc or MGCC (Micro-Grid Central Controller). Moreover, the CCU (Central Control Unit), which is a part of the MGCC, does the optimization process to achieve a robust and optimal plan of action for the smart operation of the MG. The raw input data to this unit includes the amount of load inside the grid and the powers generated by the nonscheduled DGs typically based on RESs (Renewable Energy Sources) and the output information involves the optimal set points for DGs in terms of suitable ON/OFF states and required active and reactive powers for supplying the load while keeping the node voltages within the range specified by Norm EN 50160 [43].

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## A 129-level Asymmetrical Cascaded H-Bridge Multilevel Inverter with Reduced Switches and Low THD

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### Abstract

The multilevel inverter is a power conversion device which is used multiple dc sources to provide required alternating current level. It is used for medium to high power applications. This paper presents a 129 level asymmetrical cascaded H bridge multilevel inverter with reduced switching components and higher THD. The proposed inverter uses multiple dc sources with voltage ratio 1:1:2:4:8:16:32. The proposed inverter uses voltage reference technique to control the switching components of the topology. The comparative analysis of 129 level ASCHBMLI and conventional inverter topologies have been presented. The main advantages of the proposed topology is lower switching components, lower losses, and lower THD without the need of filter. MATLAB/SIMULINK software is used to perform simulation and analyse the performance of the proposed topology.

**Keywords:** Multilevel Inverter (MLI), Asymmetrical Cascaded H Bridge Multilevel Inverter (ASCHBMLI), Cascaded H Bridge (CHB), MATLAB, Total Harmonic Distortion (THD).

## 1 Introduction

The basic function of Inverters is to convert DC electricity to AC electricity, for uses in either stand-alone systems or to connect dc source to AC grid. The Multilevel inverters are power electronic method to generate multiple level AC voltages from multiple medium voltage, dc sources. The multilevel inverters were first invented in 1979, as a three level MLI. It gained popularity due its high-power capability and lower THD, lower electromagnetic interference. Due its vast applications, including FACTS drives, VAR control, HVDC, renewable systems etc., MLIs are popular. today more commercial products are based on MLIs. Thus, there is increased efforts in developing multilevel inverters by changing its topology to obtain superior performance, decreased switching losses, lower THD, lower components requirement etc. There are several topologies having distinctive features. Fig.1 shows different multilevel topologies.

The Multilevel inverters are classified into 3 basic types:

- A. Diode clamped multilevel inverter
- B. Flying capacitor multilevel inverter
- C. Cascaded multilevel inverter

The diode-clamped multilevel inverter consists of clamping diode to generate multiple voltage levels through different phases to the capacitors which are connected in series. It requires (n-1) main dc link capacitors and (n-1)(n-2) diodes, where 'n' is number of levels required. Some of the advantages of Diode clamped multilevel inverter are that it has high efficiency for fundamental frequency, it can be used for high voltage back-to-back inter-connection or an adjustable speed drive. However, diode clamped MLI suffers from various limitations.

The maximum output voltage obtained is limited to one half of input DC voltage. The number of diodes required is quadratically equal to number of levels, thus it requires a large number of diodes to generate high number of levels, disturbed charge balance for more than three levels etc.

The Flying capacitor (FC) topology uses a large number of capacitors of equal value. The topology requires a total number of (n-1)(n-1)/2 capacitors per phase and (n-1) main bus capacitors. The main advantage of the Flying capacitor topology is that the phase redundancy is achievable for balancing voltage levels of capacitors. The flying capacitor topology suffers from high switching losses, limited output voltage, requirement of large number of capacitors, complex start-up etc.

The advantages of this topology is modular design which makes the manufacturing of inverter, quicker and cheaper than other alternatives. The Cascaded H-Bridge inverters (CHB) are further classified into two categories. Symmetrical CHBMLI uses dc sources of equal magnitude (1:1:1:1:1:1). Hence it requires more dc sources to get higher levels. Asymmetrical CHBMLI uses dc sources of unequal magnitude in the order of (1:1:2:4:8:16:32).



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## Monitoring the Microgrid using IoT

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### Abstract

The current microgrid power management system is undergoing a significant and drastic overhaul. The integration of existing electrical infrastructure with an information and communication network is an inherent and significant need for microgrid classification and operation in this case. Microgrid technology's most important features: 1) Full duplex communication; 2) Advanced metering infrastructure; 3) Renewable and energy resource integration; 4) Distribution automation and complete monitoring, as well as overall power system control. A microgrid's communication infrastructure is made up of several hierarchical communication networks. Microgrid applications can frequently be found in numerous aspects of energy consumption. Because it provides a spontaneous communicational network, the Internet of Things plays a fundamental and crucial role in Microgrid infrastructure. This paper covers the deployment of a comprehensive energy management system for microgrid communication infrastructure based on the Internet of Things (IoT). This paper discusses microgrid operations and controls using the Internet of Things (IoT) architecture. Microgrids make use of IoT-enabled technologies, in conjunction with power grid equipment, which are enabling local networks to provide additional services on top of the essential supply of electricity to local networks that operate in parallel with or independently of the regional grid. Local balancing, internal blockage management, and request for support marketplace or grid operator activities are examples of auxiliary services provided by the microgrid that can add value to each end-user and other true stakeholders. Different technologies, architectures, and applications that use IoT as a key element with the main purpose of preserving and regulating innovative smart microgrids in accordance with modern optimization features and regulations are designed to update and improve efficiency, resiliency, and economics.

## 1 Introduction

For the US Department of Energy, the Microgrid Exchange Collection, an ad hoc collection of research and deployment specialists, created the following widely recognized definition: "A microgrid is a collection of interconnected loads and distributed energy resources that operate as a single controllable entity in relation to the grid and are contained within well-defined electrical boundaries. A microgrid may connect to the grid and disconnect from it, allowing it to function in grid-connected and island modes [1] Three prerequisites are included in this description: 1) The microgrid's neighborhood can be separated from the rest of the distribution system; 2) The resources linked to a microgrid are managed by one another rather than by remote resources; 3) The microgrid can operate whether or not it is connected to the larger grid. There is no mention of the scale of distributed energy resources or the technologies that will or should be implemented in the definition [2].

For balancing local loads and achieving economic advantages, microgrids have specific control needs and techniques. According to the agreement, microgrid controllers must have the following functional characteristics: Present the micro grid to the utility grid as a single self-contained entity capable of providing frequency control (similar to a synchronous generator system); avoiding power flow exceeding line ratings; regulating voltage and frequency within acceptable bounds during islanding; dispatching resources to ensure energy balance; islanding smoothly; safely reconnecting and resyncing [3].

Microgrids can be regulated in the same way as the main grid, that is, using a three-level hierarchical control system. Primary and secondary frequency and voltage regulation are typically performed by a Microgrid Central Controller (MGCC) that sends explicit instructions to distributed energy resources, or in a decentralized manner, such as CERTS, where each resource responds to local conditions [4].

Furthermore, microgrids typically include a tertiary control layer to enable economic and optimization operations for the microgrids, which is primarily focused on managing battery storage, distributed generation scheduling and dispatch, and managing electricity import and export between the microgrid and thus the utility grid. In two European microgrids, one on the Greek island of Kythnos and the other in the German "Am Steinweg" project, hierarchical control systems that regulate electricity inside a microgrid and mediate exchanges with the main grid are installed using a "multi-agent system" method. Increasingly, microgrid research and development is that concentrates on adding intelligence to optimize operational controls and market participation [5]

## A Novel Circuit for Battery Charging and Motor Control of Electric Vehicle

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### Abstract

A new method of battery charging and motor controlling of an electric vehicle (EV) is disclosed in this paper. The entire system consists of two major divisions, those are, EV charger and motor controller, which determine the arrangement of the battery, acting as load or source, and the motor that comes into action during the driving mode. Both the charging and motor control can be performed by two separate highly efficient DC-DC converters named as TA converter which is a Buck-Boost by its nature. While charging a battery it is necessary to make the charging process effective. Microcontroller employs to control all parameter of EV in all conditions. When the motor draws over current, the invented circuit will be tripped through the microcontroller. The supply for the charger will be either from the renewable source or rectified output from the grid.

**Keywords :** Electric Vehicle, DC-DC Converter, PI & Hysteresis Controller

## 1 Introduction

In the current world the technologies and equipment's are improving in a fast-accelerating speed. However, the wasteful emission from these equipment's is a humongous problem towards the society and Environment. Also, nowadays fuel consumption is at its peak. Time will come when the natural resources will be exhausted. Many vehicle manufacturing companies have already started working on hybrid electric vehicles to avoid the foreseeable future to some extent. An EV is a gift to the nature observing the rate of increase in pollution caused due to various human activities. Several new topologies were designed with different gain and variation in voltage range. LUO converter provides complex model with a high gain converter [8]. Some other non-isolated converters such as CUK, SEPIC can provide multiple drawbacks to buck-boost converters and can't provide positive output voltage as well [9, 4]. Maksimovik and Cuk suggested a converter having a gain of  $\frac{D^2}{(1-D)^2}$ , which is able to operate only in buck mode because of the clamping diodes D1 and D2 [9]. P. N. Ekemezie suggested that Compared to conventional dc-dc converters, two-switch buck-boost converter is more efficient because of low voltage stress across the switches [5]. A transformer less buck-boost converter with a voltage gain square time of conventional Buck-boost converter has been proposed by Shan Miao which has a drawback that it carries negative inductor current [7]. Markel and Simpson addressed with various operational approaches the battery capacity and energy needs for grid powered parallel Hybrid Electric Vehicles (HEVs) [10]. Bauml and Simic developed a sequence of hybrid simulations of electric vehicles using the language of simulation Modelica [11]. Divya and Jacob proposed a possible potential scenario in the sense of power device systems for the battery developments and the electric hybrid vehicles [12]. A two switch non isolated Buck-Boost converter which has a better performance than the conventional Buck-Boost Converter also known as TA converter has been proposed by Tapas Kumar Mohapatra and Asim Kumar Dey [2, 3]

Here the authors are attempting to use an efficient Buck-Boost Converter (BBC) i.e. the TA converter which is a new topology of BBC, for the purpose of charging the batteries and controlling the motor current of an EV, which has a gain  $\frac{D^2}{(1-D)^2}$  [1, 2 and 3]. This BBC also provides a positive output voltage and positive inductor current that is not generated by other BBCs. This converter can provide the required output voltage for any range of input voltage variation. As most of the EVs are designed using 12 volt rated batteries and the voltage rating of available

Solar plates fluctuating between 6 to 30 volts, a Buck-boost converter is suitable to use as a charger for the EV batteries. As TA converter overcomes almost all the drawbacks of other buck boost converters and charging the batteries of EV with motor current controller to control the output current to PMDC motor. Hysteresis current control technique is one of the robust control techniques and also provides several benefits as suggested by [6]. So, hysteresis current control is implemented as current control technique. Hardware testing of both the

EV charger and motor controller circuit has been performed with proper control techniques using DSP board. The article is organized as following. Section-II contains brief discussion of TA converter along with its circuit diagram. Section-III contains how TA converter can be operated as Battery charger. Section-IV contains how TA converter can be operated as motor current controller. In section-V & VI the simulation and hardware results are Discussed.

## 2 Dc-Dc Buck-Boost (TA) Converter

A DC-DC converter is an electrical power converter that changes the output level of a DC source voltage to another. Applications vary from very low (small batteries) to very high (high-voltage transmission) power.

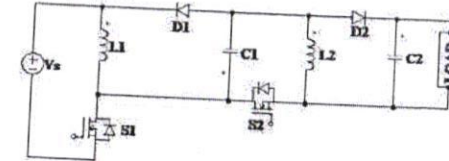


Fig 2.1: Schematic diagram of new Buck-Boost (TA) Converter

When both the switches are ON (act as short circuit), the diodes are reverse biased (act as open circuit) and current will flow through the path 'VS → L1 → S1 → VS' and 'C1 → S2 → L2 → C1'.

$$V_{L1} = V_s \Rightarrow L_1 \frac{dI_1}{dt} = V_s \Rightarrow \frac{dI_1}{dt} = \frac{V_s}{L_1} \quad [1]$$

$$V_{L2} = V_{C1} \Rightarrow L_2 \frac{dI_2}{dt} = V_{C1} \Rightarrow \frac{dI_2}{dt} = \frac{V_{C1}}{L_2} \quad [2]$$

$$V_0 = V_{C1} \quad [3]$$

When both the switches are OFF (act as open circuit), the diodes are forward biased (act as short circuit) and current will flow through the path 'L1 → C1 → D1 → L1' and 'L2 → D2 → C2 & Load → L2'.

$$V_{L1} = -V_{C1} \Rightarrow L_1 \frac{dI_1}{dt} = -V_{C1} \Rightarrow \frac{dI_1}{dt} = \frac{-V_{C1}}{L_1} \quad [4]$$

$$V_{L2} = -V_{C2} \Rightarrow L_2 \frac{dI_2}{dt} = -V_{C2} \Rightarrow \frac{dI_2}{dt} = \frac{-V_{C2}}{L_2} \quad [5]$$

$$V_0 = V_{C2} \quad [6]$$

By equating the average inductor voltage to Zero, we get

$$V_0 = \frac{D^2}{(1-D)^2} \times V_s$$

## 3 Battery Charger

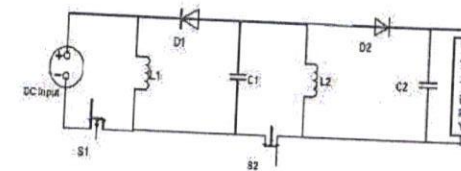


Fig.3.1 Battery Charger using DC-DC converter

The above charger circuit with the control technique is applicable for solar charger as the solar panel output is obtained as DC voltage. If solar supply is not available then can go for AC supply. However, in case of



## Design of Efficient Electric Motorcycle Using Brushless DC Motor

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### Abstract

Transportation is a tool that human needs from the past until now; it is an essential device in human life. Along with the development of transportation in this world, more and more energy used to come from fossil energy, which is limited, and the number of its availability decreases over time. Therefore, we must preserve the environment and limit the use of fossil energy. The solution to overcome the use of fossil energy is to replace the consumption of energy, mainly used by vehicles, by consuming electrical energy in the means of transportation. Electric vehicles do an excellent solution to keep the environment, aside from reducing the use of fossil energy. Electric vehicles do not produce waste substances or, in other words, emissions that are not produced so that the surrounding air is not contaminated with pollution like waste substances generated by vehicles using fossil energy. Also, electric vehicles can be categorized as energy-saving vehicles. It is our purpose in this study to design an efficient electrical motorcycle prototype, which can be accelerated up to 40 km/h and operational cost ten times less than the usual petrol vehicle with more efficiency.

Keywords — Electric Motorcycle, BLDC, Controller PWM

### 1 Introduction

At this time humans rely heavily on fossil fuels that provide at least three severe threats: (1) depletion of known petroleum reserves, (2) instability/price increases due to higher demand rate of production the oil itself, and (3) greenhouse gas (mainly CO<sub>2</sub>) pollution caused by the burning of fossil fuels. The development of an environmentally friendly renewable fuel implementation needs to get serious attention worldwide. One way to reduce the use of fossil fuels is to use electricity stored in batteries for vehicles including electric motorcycles [1]. This way, a motorcycle can be enhanced for security [2,3] and automation like IoT [4].

Here in this study, electrical energy in the battery is used as a source of electrical energy in electric motors. The purpose of this study is to design an electric motorbike with 5 kW BLDC motor (7 HP) is expected to drive up 130 km/h with cruises up to 230 km and then use Li-ion batteries or Sodium Silicate. We studied the amount of the cost needed in one trip and also to analyze the battery power that can be stored and how long the motor can work.

### 2 Material and Methods

#### A. Electric Current Direction

An electric current is a flow of electricity that flows through a conductor or conductor in a closed circuit. The electric current flows from the positive pole to the negative pole within a closed circuit. The direction of the electric current is opposite to the electron current from the negative pole to the positive pole on a closed circuit. When an electric current flows in a particular direction; at the same time, the electron flows in the opposite direction.

#### B. Ohm's Law

Ohm law is used because the electric current flowing through a conductor always directly proportional to the potential difference applied. A conductor follows the ohms law said that if the resistance value is not depending on the magnitude and polarity of the potential difference applied to it.

#### C. Definition of System

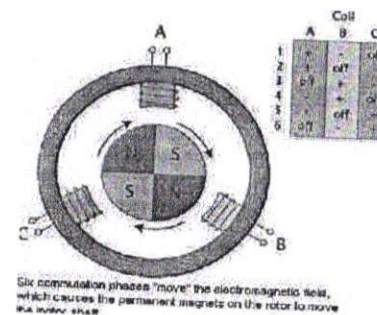
A system built is a comprehensive system to design an efficient motorcycle. A whole system is a collection of all the components in which each component interacts with each other, where each component to another component has a reciprocal interaction [5]. The power used in electric motorcycles is the electric motor, which is reduced to the roller chain through the gears. This reduction is made to transfer the power that is on the electric motor to the gears to roller chain that can drive the motorcycle.

#### D. Basic Forms Electric Motorcycles

The shape of the electric motorcycle will be designed and built using the basic framework of CB100 Motorcycle. It is because spare parts that are used are not too many that it reduces the weight of the motorcycle and make it more efficient in use. It is also accessible to a raft and secure release of electronic devices in pairs. At the time of the assembly process of the electric motorcycle, there is not too much change required to keep the authenticity of the components and maintain the motorcycle model CB100.

#### E. Brushless DC Motor (BLDC)

BLDC motor is the most commonly used electric vehicle of medium speed grade. This motor is no longer using Brush since motor coil acts as a rotor, on a permanent magnet BLDC. As a transfer point, when the BLDC phase motor execution requires the Hall sensor to help to know the location of the magnetic position. BLDC motor is required to use the controller to rotate because it requires the data processor provided by the hall sensor, as seen in Figure 1.



Six commutation phases "move" the electromagnetic field, which causes the permanent magnets on the rotor to move the motor shaft.

Fig. 1. BLDC Motor Scheme

The advantages of BLDC motor are excellent torque, considered to be high efficiency, have excellent durability in the longer usability, can work optimally on all ranges of rpm rotation, and also BLDC motor is the best in low-rotation work [6]. At the other hand, BLDC motor weakness includes the required controller, which must be controlled by Pulse Wide Modulation and degree of phase hall sensor; Top speed is limited, the power-to-weight ratio is low, not ideal in high power, max 30KW power and also not ideal in high voltage (V max equals to 200V).

Examples of the use of BLDC Motor are on middleclass electric vehicles, such as electric motorcycles and electric bicycles, as seen in figure 2. Also, fan computers and electric helicopter motor toys use BLDC motors. The motors have several loops on the dynamo to provide a more uniform torque, and the magnetic field is generated by an electromagnetic arrangement called a field coil. In understanding a motor, it is essential to analyze what the motor load is, which refers to the output of torque at the required speed.

#### F. Research methods

The design of the tool was done in the Energy Conversion laboratory, and retrieval was implemented on Jenai-Street Lapangan Merdeka. The research flow diagram is shown in figure 3 below. To perform the test, the following tools are required: electric motorcycles, BLDC motor, PWM, Voltmeter, Ampere meter, 48-volt source battery, charger 48 volts, and potentiometer.



Fig 2. BLDC motor hub

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## Power Loss Reduction and Voltage Profile Improvement Using Optimal Placement of FACTS Devices

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### Abstract

The crucial role of an electric power system is to generate sufficient electricity to meet customer demands with an acceptable level of reliability in an economic manner. In recent years, Flexible AC Transmission Systems (FACTS) devices have been widely used to increase power system operation flexibility and controllability to meet this need. This paper presents an application of Differential Evolution (DE) to optimise the allocation of a Thyristor Controlled Series Capacitor (TCSC), a Static Var Compensator (SVC), and Unified Power Flow Controller (UPFC), as example FACTS devices. The objective of the research was to reduce power losses and improve the voltage profile in an IEEE 30-bus test system. The system performance was assessed with and without each FACTS device under different scenarios of load increase at up to 150% of the base case. The results obtained are encouraging in terms of reassessing electrical restructuring.

## 1 Introduction

Electric power production and distribution companies are constantly looking for new industrial technologies to contribute to improving energy supplies to consumers that can overcome the problems of increased demand for electric power and the disruption of recent fuel price increases. In recent years, many of these companies have increased their interest in the use of FACTS device technologies, which offer an effective way to improve the stability, reliability and capability of electric power transmission systems in traditional networks without the need to establish new transmission lines [1]. FACTS devices make power flow in transmission systems more flexible by controlling the active and reactive power flows in the transmission lines. The flow of electrical energy in AC transmission lines depends on the size of the wire, the line's intrinsic resistance, and the phase angle between the transmitting and receiving ends of the transmission line [2]. However, although the addition of FACTS devices generally improves the performance of electric power transmission networks, it also adds several technological and economic complications in terms of control, maintenance, and costs [3]. Identifying the optimal location and sizing of FACTS devices may, however, help address these issues, and thus a significant amount of research has been conducted to identify the best use of FACTS devices.

In [4], modelling of the best location for the installation of FACTS devices in an electric power transmission network was discussed, while in [5], FACTS devices were added to power systems suffering from congestion due to overloads; in that case, the locations and sizing of the FACTS devices were determined based on those factors considered to be most sensitive based on the nature of the load. In [6], an adaptive genetic algorithm was used to determine the best allocation of various types of FACTS devices, with the aim of that study being to reduce costs by reducing system losses. Researchers in [7] addressed increasing power transmission capacity by applying PSO technology to reducing system losses and improving line voltage, while in [8], the researchers sought to reduce system losses by adding various types of FACTS devices to power transmission systems. It was thus deduced that the economic cost of adding these devices was offset by a reasonable percentage reduction in total energy losses. In [9], the performance of a power transmission system without the use of FACTS devices and with several types of such device was compared. An artificial intelligence technique was used to determine the best location and size for the relevant FACTS devices, which reduced losses and improved the voltage profile; in addition, the economic costs were calculated in each case and compared with those for the system without FACTS devices.

The current work is divided into several parts as follows: in section 2, a brief overview of FACTS technologies and types is presented, while in section 3, the basic principles of the DE improvement method are reviewed. The methodology used in this study is presented in section 4 and the results of the study are reported in section 5. Finally, these results are discussed in section 6.





Fig.6.2.a: Hardware setup for Motor Current Controller

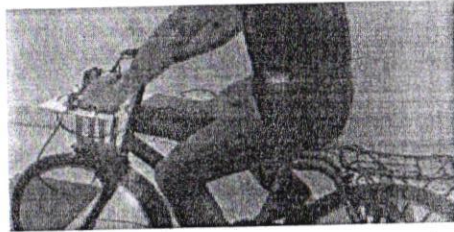


Fig.6.2.b: Setup when the cycle is in running condition

The targeted speed of the designed EV is 30 km/hour as the motor current controller is designed for maximum current of 12 ampere. The targeted speed can be improved by increasing the motor current controller rating.

## 6 Conclusion

From the hardware implementation for battery charger it is observed and it can be concluded that the designed circuit can provide the desired output i.e. 14V DC for an input variation from 30V to 40V AC. From the simulations and hardware operations for motor current controller, observe and conclude that designed circuit is able to operate in the entire three conditions i.e. Normal load, under load and Over load perfectly. When the motor current is less than 12.5 ampere, the vehicle is in running condition and when the motor current just exceeds 12.5 ampere the circuit become automatically trip by DSP microcontroller. All the performances of both battery charger and Motor current controller can be extended by changing the parameters if possible.

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## Wireless Power Transmission System

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### Abstract

This wireless power transfer (WPT) system with repeater coils for multiple loads. Every two repeater coils form a repeater unit where one is used to receive power from its preceding unit and other transmits power to subsequent unit. Each load is connected to a repeater unit and multiple loads can be powered with several repeater units. The two coils in the same repeater unit and both bipolar ones, which are placed perpendicularly so that the magnetic coupling between them can be eliminated. In order to obtain independent power control of all the loads, the series-parallel-series (SPS) compensation method is adopted for each repeater unit. With a proper resonant condition proposed in this paper, the constant load current can be obtained for all the loads when neglecting the parasitic resistances. Also we utilize the solar power in our project. An experimental setup has been constructed and the effectiveness of the proposed multiload WPT system is validated by the experimental.

**Keywords:** wireless power transmission; resonance; efficient power transmission; high frequency; design of winding; coupling factor.

## 1 Introduction

In the early 20th century, the great scientist Nikola Tesla dedicated to transport the power without wire. On the other hand, specific embodiments implicated unfortunately large electric fields [1]. Subsequently the wireless power transmission concept has become the most trending topic throughout the world. There are many applications using the wireless power technology. Many sensor networks and cellular networks also use the same principle as of wireless transmission. There are many approaches to adopt this. On the application of wireless power transmission some issues and initiatives are noticed in Japan although specific forum limited in this field like to concentrate achievements in the new business area [2]. The overview of recent development in this field like Electrodynamic induction, Electrostatic induction and Evanescent wave coupling clearly discussed [3]-[6]. At the same time the review highlighted the merits, demerits and cost. The performance of induction resonance principle compared with inductive coupling principle for wireless transmission systems. After noticing the problems with old techniques a few more new methodologies are invented [7].

In the wireless power transfer system coupled magnetic resonance plays a vital role because it has lot of advantages compared other methods. But its efficiency drastically decreases in the point of distance. To overcome this problem frequency tracking methods introduced [8]. Every method has its own advantages and disadvantages, after analyzing the all approaches one of the researchers introducing the wireless power transfer system based on inductive coupling technology for electric car battery charger. From the experiment they observed that to transfer wireless power resonant inductive coupling method is more efficient as compared to other methods [9]. Author T.Imura introducing maximizing air gap technique with help of electromagnetic induction principle to improve the efficiency. Here they are introducing Neumann formula with equivalent circuits and performance are found to be good [10]-[13].

In this paper, a new high frequency resonant inductive coupling method is proposed. Design of the HFWPT system is to be operated at resonance frequency of 50 kHz. It can be expected that the high frequency resonance coupling will improve the efficiency of transmission allowing one to transmit at lesser frequency which is nearly in a range of few kHz range. The performance of HFWPT is observed satisfactory to maintain the output voltage as required by changing the coupling coefficient.

## 2 Design of Wireless Power Transmission System

### 2.1 Designing

This design includes two sections

- Sending end

## MAP/PH(1),PH(2)/2 queue with backup server, multiple vacations, optional Service, breakdowns and repairs

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### Abstract

This paper looks at two sorts of services: classic server and main server, both of which offer both regular and optional services. Customers arrive using the Markovian Arrival Process (MAP), and service time is allocated based on phase type distribution. When the classic server fails due to a technical fault or goes on vacation, the backup server takes over at a gradual pace. This system has been modelled as a QBD Process that uses matrix analytic techniques to analyse steady state using finite-dimensional block matrices. During peak periods, the waiting time distribution of our model was investigated in greater depth. The system's performance metrics are assessed, and a few numerical and graphical representations are created.

**Keywords:** Markovian Arrival Process-Phase type service-Vacation-Optional service Interruptions.

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## Enhanced Internal Quantum Efficiency of Organic Light-Emitting Diodes: A Synergistic Effect

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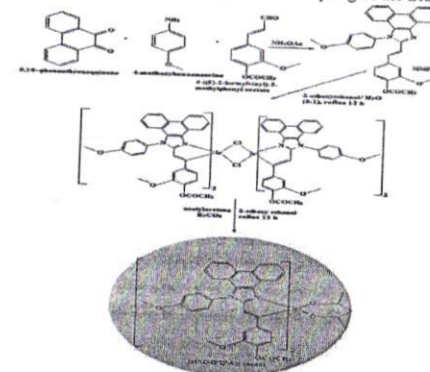
### Abstract

The size effect of copper, gold and silver nanoparticles on green OLEDs with MNP-PEDOT: PSS as hole injection layer (HIL) and 4,4'-bis(9-carbazolyl)-biphenyl(CBP): Ir (MMPIPA)<sub>2</sub> (acac) as emissive material were analysed. The OLEDs performance was enhanced by copper, gold and silver NPs with 21, 20 and 55 nm, respectively. The external quantum efficiency ( $\eta_{ex}$ ) of green OLEDs with Au (20 nm: III) and Ag (55 nm: IV) has been enhanced by 60% and 64%; power efficiency ( $\eta_p$ ) enhanced by 46.9% and 38.7% and current efficiency ( $\eta_c$ ) enhanced by 50.0% and 72.2%, when compared with control device (I) respectively. In addition higher efficiencies was harvested from OLEDs with co-doped NPs [Au (20nm) -Ag (55nm), L - 51262 cd/m<sup>2</sup>;  $\eta_{ex}$  - 9.8%;  $\eta_c$  - 35.3 cd A<sup>-1</sup> and  $\eta_p$  - 8.2 lm W<sup>-1</sup> and Cu (21nm) - Ag (55nm), L - 49856 cd/m<sup>2</sup>;  $\eta_{ex}$  - 8.3 %;  $\eta_c$  - 32.1 cd A<sup>-1</sup> and  $\eta_p$  - 7.5 lm W<sup>-1</sup>]. The  $\eta_{ex}$ ,  $\eta_p$  and  $\eta_c$  of co-doped green OLEDs with Au-Ag NPs was improved by 96.0, 67.3 and 96.1 %, respectively, compared to control device. The size-controlled NPs can synergistically enhanced OLEDs performances by improving the internal quantum efficiency.

**Keywords:** Phosphorescence spectrum, plasmon resonance, external quantum efficiency ( $\eta_{ex}$ ), MLCT transitions.

### 1. Characterization of green emissive material [Ir(MMPIPA)<sub>2</sub>(acac)]

For the heteroleptic iridium complex [Ir(MMPIPA)<sub>2</sub>(acac)] in (scheme 1) the absorption band at 248 nm is assigned to spin-allowed ligand-centered transition of imidazole fragment and absorptions at 304 and 345 nm attributed to MLCT transitions to singlet excited state [<sup>1</sup>MLCT ← S<sub>0</sub>] and triplet excited state [<sup>3</sup>MLCT ← S<sub>0</sub>], respectively (Fig.1), both originated from ligand interaction with iridium center of Ir(MMPIPA)<sub>2</sub>(acac))i.e., effective mixing of these transitions caused by strong spin-orbit coupling of the iridium ion.<sup>1-8</sup>



**Scheme 1:** Synthesis of iridium (III)bis-2-methoxy-4-((E)-2-(1-(4-methoxyphenyl)-1H-phenanthro[9,10-d]-imidazolato-N,C2) (acetylacetonate) [Ir(MMPIPA)<sub>2</sub>(acac)]