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## INTEGRATION OF MATERIALS USED IN ANCIENT STRUCTURES FOR PRESENT DAY CONSTRUCTION

Ramachander Damera et. al

### Abstract

*Materials used in ancient era for construction has been focused here to understand the advantages of heritage buildings life time comparison with present construction practices. Brick and mortar based constructions of ancient structures with quality assessment comparison of present day work need to be studied, as a part of it the present paper focuses on the advantages and draw backs of both present and past constructional materials. Earth based mortars were used in all over the world since ancient times in extensive range of building types. Plastering is one of the most common current applications in earth based mortars for contemporary architecture. Mortars characterization confirmed that clay mineralogy drives important plaster properties like vapour adsorption, drying shrinkage and also have significance in mechanical resistance, dry abrasion and thermal conductivity. Present work discusses on the brick based mortar addition to increase strengthening properties of walls in comparison with present methods. Lime mortars significance is also studied as a part of novel approaches with stone and mortar addition comparatives.*

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# STRENGTH PROPERTIES OF FRC USING GLASS FIBRE AND POLYPROPYLENE

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## Abstract:

Concrete is one of the primary materials in a variety of studies in the building industry. In order to increase its properties such as workability, strength, durability and other applications, as well as to reduce production costs, alternatives in concrete are also required in civil technology. Containing the fibrous content, fiber-reinforced concrete (FRC) increases the structural strength of this material. It comprises small, equal sized and randomly-oriented discrete fibres. Fibers include steel, glass fibres, synthetic and natural fibres, each with a range of properties. Furthermore, fiber-reinforced concrete change characteristics with various concretes, fibre materials, geometry, distribution, orientation and permeability. In shotcrete, fibre-reinforcement is used especially but can also be used in regular concrete. Normal fibre reinforced concrete is used mainly for ground floors and floors but can be used for a wide variety of construction sections.

**Key words:** natural fibres, fiber-reinforced concrete (FRC), polypropylene

## 1.0 INTRODUCTION

Concrete is the most commonly used construction material in the world. Beta processing includes materials such as cement, fine aggregates, rough aggregates, water and admixtures. The use of concrete grows more rapidly due to infrastructure growth and construction activities. However, the effects on concrete production are negative: continuous mining of aggregates from natural resources, ecological imbalances and deterioration of the environment are responsible. In the construction sector this environmental reason has caused much problem. Since ancient times, fibres have been used for concrete strengthening, although the technology has considerably advanced as is the case in other regions. Stroke and mortar were used in early age for manufacturing mud bricks and horsehair for strengthening them. With the advent of fibre technology, cement was improved in the early 20th siècle by asbestos fibres. In the mid-20th century substantial study has been underway into the use of concrete reinforcement composites.

## 2.0 LITERATURE REVIEW

Containing synthetic fibers, fiber-reinforced concrete (FRC) enhances structural integrity. It comprises small, unifotmly distributed and randomly oriented discrete fibres. The fibres include steel and glass fibres, synthetic and natural fibres, each of which has different characteristics.



## NDE Techniques for In-Situ Concrete Structures

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**Abstract.** In this paper an attempt was made to establish Non destructive Evaluation Technique(NDE)for assessment of compressive strength of in-situ concrete by conducting UPV and Rebound Hammer tests on Various concretes of mixes M15, M20, M25, M30.The various concretes like Plain concrete, Recycled Aggregate concrete, concrete with replacement of fly ash with10%,20%,30%.were designed as per Sp23.Concrete cubes of size 150x150x150mm were cast and tested for compressive strength at 7days,14 days,28 days,56 days and 90 days. Before conducting compression test, UPV test and Rebound Hammer tests were conducted on the same cubes for assessment of compressive strength .A comparative study was made among the compressive strength, Pulse velocity, and Rebound Number for all types of concrete of various mixes and curves were drawn. Regression analysis was also made for the tests being conducted and kept them ready for assessment of compressive strength of in-situ concrete structures .It is observed the Pulse velocity and Rebound Number increases with the age of concrete increases. it is concluded that the equations obtained from regression analysis for compressive strength of various concretes of different mixes can be incorporated in the IS codes for future reference.

**Keywords:** Non destructive evaluation, in-situ concrete, UPV test, Rebound Hammer test, Regression curves

### I. INTRODUCTION

Nondestructive testing (NDT) has been defined as comprising those test methods used to examine an object, material or system without impairing its future usefulness. The term is generally applied to non medical investigations of material integrity. Nondestructive tests in great variety are in worldwide use to detect variations in structure, minute changes in surface finish, the presence of cracks or other physical discontinuities, to measure the thickness of materials and coatings and to determine other characteristics of industrial products. The demands on integrity assessment and life management of ageing infrastructure such as old buildings bridges and Dams are providing continuous impetus for development of reliable testing methods. These methods not only provide information on the necessity for repairs, but also frequency of future inspections/repairs as they sense damages at micro level. However, while assessing the capabilities and limitations of various non-destructive testing (NDT) and evaluation (NDE) techniques that can be applied to concrete structures, it has been found that, in many cases, the data obtained are qualitative rather than quantitative and hence efforts are being made to overcome this limitation.

### II. NDE TECHNIQUES FOR ASSESSMENT OF CONCRETE STRUCTURES

The following Table: 1 gives the capabilities of some of the NDT & NDE techniques for assessment of concrete structures. It is clear that ultrasonic methods are superior methods in the sense that they are capable of providing more information on concrete parameters as compared to the other methods.

Techniques	Strength	Elastic Modulus	Thickness	Crack depth	Crack width	Crack distribution	Crack Development	Honeycombing & voids	Laminations	Bar location	Bar size	Bar Corrosion
Ultrasonic	♦	♦	♦	♦				♦	♦	♦		
Pull out	♦											
Rebound Hammer	♦											
Penetration resistance	♦											
Radar			♦					♦	♦	♦		



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# Comparative Study Of Partial Replacment Of Cement With Ceramic Powder For M30 Concrete

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**Abstract:** The cost of construction material is rising mainly due to high demand of concrete and scarcity of raw material affecting the economy of the structure. With increasing demand and consumption of cement, researchers and civil engineers are in search of developing alternate binders that are eco-friendly and contribute towards waste management. In such case, the use of industrial and agricultural waste produced by industrial processes has been the focus of waste reduction research for economic and environmental. In ceramic industry, about 15%-30% production goes as waste. These wastes create a problem in present-day society, requiring a suitable form of management in order to achieve sustainable development. The use of the waste materials in cement, concrete and other construction materials has numerous indirect benefits such as reducing the cost of concrete manufacturing, protecting environment from possible pollution effect. It may also result in foreign exchange earnings. In this study, the properties of concrete enhanced with partially replacement of Ceramic powder in the ratio of 0%, 5%, 10% and 15% by weight of cement in concrete were studied for M 30 grade. The properties for fresh concrete are tested like slump cone test and for hardened concrete compressive strength and split-tensile strength at the age of 7, 28 and 56 days curing period and durability properties are also considered. The aim behind the use of Ceramic Powder as partial replacement in the concrete is to reduce the cost of material and as an eco-friendly structure.

**Keywords:** cement, M 30 grade, waste reduction

## Introduction:

In ancient period, the structures are made from naturally occurring gaps formed between mountains and hills generally known as caves. As the time passes, with increasing population the number of caves occupied is increased. So as to protect the nature, construction of structures has been started. Initially buildings are constructed with the available local materials such as the stones, mud and lime. Later, as the technology improved stones were used in the foundation and the superstructure was constructed with the bricks made of lime and concrete

## Ceramics:

Ceramics are special materials with many applications in almost all the engineering disciplines. But their importance has often been underestimated due to the fact that many people believe that ceramics are all about pottery and tiles. Today's ceramics industry is one of most rapidly advancing concerns in many parts of the world. Ceramic industry began to expand as a modern industry with the attribution of new techniques and knowledge gained in the 1970s. Since then it has also been one of most competitive industries in the market.

## Uses of Ceramic Powder

Ceramic powder improves durability against freeze-thaw action due to possibility of much better controlled porosity. Ceramic powder also improves durability against chemical (chloride, sulphate) attacks. It has high elastic stiffness, compressive strength, split-tensile strength and modulus of rupture. Ceramic powder has highdimensional stability in certain glass ceramics, resulting in reduction in thermal cracking related to temperature cycling. Ceramic powder also possesses higher temperature resistance, which may be useful to prevent heat balls, such as due to hot jet exhaust on airfields pavements from vertical take-off / landingaircrafts.

## Aim of the Study:

The present study deals with the partial replacement of ceramic powder for M 30 grade of concrete.

The aims of the study are:

- To understand the utilization of Ceramic powder and its effect in concrete.

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# A Multivariate Regression Model for Identifying, Analyzing and Predicting Crimes

Siddharth Shukla, Praphula Kumar Jain , Ch. Ramesh Babu & Rajendra Pamula

*Wireless Personal Communications* **113**, 2447–2461 (2020)

**326** Accesses | **3** Citations | [Metrics](#)

## Abstract

Crime is canonically “capricious”. It is not necessarily hap-hazardous, but neither does it occur consistently. A better theoretical perception is needed to facilitate practical crime prevention solutions that correspond to specific places and times. Crime analysis and prevention is a systematic approach for identifying and analyzing patterns and trends in crime. Crime data analysts helps in law enforcement officers to speed up the process of solving crimes, owing to increase in the advent of computerized systems. This research is an attempt to forecast the occurrences of crimes, and predicts the frequency (count) of crimes at beat-day level in the city of Chicago. Forecasting crimes helps in taking care of crime prevention



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# Assessment of Plant Disease Identification using GLCM and KNN Algorithms

Ch Ramesh Babu, Dammavalam Srinivasa Rao, V. Sravan Kiran, N. Rajasekhar

**Abstract:** *One of the significant segments of Indian Economy is Cultivation. Occupation to almost 50% of the nation's labor force is delivered by Indian cultivation segment. India is recognized to be the world's biggest manufacturer of pulses, rice, wheat, spices and spice harvests. Agronomist's financial progress is contingent on the excellence of the goods that they yield, which depend on on the plant's progress and the harvest they get. Consequently, in ground of cultivation, recognition of disease in plants shows an involved part. Plants are exceedingly disposed to to infections that disturb the progress of the plant which in chance distresses the natural balance of the agronomist. In order to distinguish a plant disease at right preliminary period, usage of automatic disease detection procedure is beneficial. The indications of plant diseases are noticeable in various portions of a plant such as leaves, etc. Physical recognition of plant disease by means of leaf descriptions is a wearisome job. The k-mean clustering procedure is utilized for the segmentation of input images. The GLCM (gray-level co-occurrence matrices) procedure is utilized which excerpts textural features from the input image and implementation of KNN (k-nearest neighbors) algorithm for image classification and produced classification accuracy from 70 to 75% for different inputs. Hence, it is required to develop machine learning based computational methods which will make the process of disease detection and classification using leaf images automatic. .. To advance concert of standing methods machine learning and deep learning algorithms will be utilized for more accurate classification.*

**Keywords :** *GLCM, K-Means, KNN algorithm, bacterial, fungal, viral, machine learning, deep learning, neural networks, support vector machines, genetic algorithm, convolution neural networks.*

## I. INTRODUCTION

The cultivation land-living mass is added than just actuality a nurturing sourcing in today's realm. Indian economy is extremely reliant on of cultivated production. Consequently in ground of agriculture, recognition of infection in plants shows an imperative part. To perceive a plant infection in very preliminary phase, usage of instinctive disease recognition procedure is advantageous. The newest group of convolutional neural networks (CNNs) has accomplished exciting outcomes in the arena of image cataloguing. This work alarmed with a different method to the growth of plant disease recognition classic, centred on leaf image classification, by the use of deep convolutional networks. Innovative way of training and the procedure utilized enable a rapid and relaxed system enactment in exercise. The

advanced prototypical is able to identify 13 various sorts of plant diseases out of in good physical shape verdures, with the capability to discriminate plant leaves from their backgrounds. Rendering to our information plant disease appreciation has been planned. Entire important stages essential for realizing disease gratitude typical are wholly defined opening from collecting images so as to make a record [1]. An innovative attitude to the expansion of plant disease acknowledgment classical, grounded on leaf image categorization from deep convolution neural networks (DCNN). Developments in computer visualization existing an opening to increase and upsurge the exercise of detailed plant fortification and encompass the fair of computer vision solicitations in the ground of exactness cultivation. It is an original attitude in perceiving plant infections expending the DCNN accomplished and acceptable to fit truthfully to the record of a plant's verdures that was assembled individually for various plant maladies. The improvement and an originality of the advanced prototypical lie in its effortlessness strong verdures and related descriptions are in route with added modules, empowering the prototypical to extricate concerning non-healthy leaves and fit ones or from the setting by using deep CNN [2]. DCNN has realized excessive achievement in the cataloguing of numerous plant infections. Though, a inadequate number of revisions have clarified the procedure of implication, parting it by way of an unattainable obscure case. Tightfitting the CNN to excerpt the cultured property as an understoode form not only guarantees its consistency but also allows the authentication of the prototypical genuineness and the training dataset by human involvement. In the proposed work neural networks can imprisonment the colors and grains of scratches explicit to particular sicknesses upon finding, which is similar to human supervisory.. The outcomes afford energy for the CNN handlers in the ground of plant discipline to restored recognise the judgement development and lead to auxiliary resourceful use of DCNN for plant disease identification [3]. Modern progressive progresses in Deep Learning have permitted investigators to enormously advance the concert and correctness of object finding and acknowledgement schemes. A deep-learning method to perceive foil illnesses in numerous plants using images of plant leaves. Aim is to detect and improve the further appropriate deep learning procedures to the context. In the propped work modern approaches are utilized for the determination of exertion and

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# Medical Image Fusion Using Transform Based Fusion Techniques

D. Srinivasa Rao, Ch. Ramesh Babu, Nagendra Kumar, N. Rajasekhar, T. Ravi,

**Abstract:** The principal resolution of the image fusion is to merging indication from different images; CT (Computed Tomography) scan and an MRI (Magnetic Resonance Imaging) and to obtain more informative image. In this paper various transform based fusion methods like; discrete wavelet transform (DWT) and two specialisms of discrete cosine transform (DCT); DCT variance and DCT variance with consistency verification (DCT variance with CV) and stationary wavelet transform (SWT) image fusion procedures are instigated and associated in terms of image evidence. Fused outcomes attained from these fusion techniques are evaluated through distinctive evaluation metrics. A fused result accomplished from DCT variance with CV followed by DCT variance out performs DWT and SWT based image fusion methodologies. The potentiality of DCT features creates value-added evidence in the output fused image trailed by fused results proficient from DWT and SWT based image fusion methods. The discrete cosine transforms (DCT) stranded methods of image fusion are auxiliary accurate and concert leaning in real time solicitations by energy forte of DCT originated ideologies of stationary images. In this effort, a glowing systematic practice for fusion of multi-focus images based on DCT and its flavors are obtainable and demonstrated that DCT grounded fused outcomes exceed other fusion methodologies.

**Index Terms:** fusion, DCT, DWT, MRI, CT.

## I. INTRODUCTION

Highlight a section that you want to designate with a Recommends a new medical image fusion centered on the united effect of Discrete Wavelet Transform (DWT) and Discrete Ripplet Transform (DRT). The source images are originally converted into multiresolution image by means of DWT. The estimate images are additionally converted by utilizing DRT. The ripplet constants are useful to Pulse Coupled Neural Network (PCNN) and sacking maps are created. Relating the supreme fusion instruction and inverse DRT, the bonded factors of the estimate image are attained. The aspect images of the DWT are now fused expending outright supreme fusion instruction. The output image is acquired by relating inverse DWT to the united factors. The enactment of the output image is assessed by using parameters; entropy, standard deviation and average gradient and it overtakes the further standing approaches [1]. Endorsed a redundant discrete wavelet transform (RDWT) grounded image fusion approach for multimodal medical

images. The shift invariance nature of RDWT shows its effectiveness for image fusion. The projected technique customs maximum arrangement for fusion of medical images. Proposed method explored with numerous groups of medical images and exposed outcomes for three groups of medical images. The success of fusion outcomes has remained exposed expending edge strength, and mutual information fusion assessment parameters. The subjective and objective evaluation of the projected technique with dimensional province fusion methods (Linear, Sharp, and principal component analysis (PCA)) and wavelet province image fusion approaches (discrete wavelet transform (DWT), lifting wavelet transform (LWT), and multiwavelet transform (MWT)) demonstrates the preeminence of the projected image fusion technique [2]. Multimodal medical image fusion procedures and instruments have exposed distinguished accomplishments in enlightening clinical correctness of determinations constructed on medical images. The province where image fusion is willingly utilized currently is in medical diagnostics to fuse medical images. Proposed a new procedure to advance the excellence of multimodality medical image fusion expending Discrete Wavelet Transform (DWT) method. DWT approach has been engaged by utilizing various image fusion methods for medical image fusion. Concert of image fusion is intended on the foundation of PSNR, MSE and the total handling time and the outcomes illustrates the efficiency of fusion organization founded on DWT [3]. A new weight map structure procedure founded on visual saliency is established. Weight maps of this procedure are proficient of perceiving and recognizing attentive and defocused sections of the input images. Method is competent to assimilate only attentive and refined sections into the output image. Concert of the projected technique is associated with that of the advanced multi-focus image fusion procedures. Projected technique outpaces them in positions of visual quality and image fusion evaluation parameters [4]. MRI and PET images are preprocessed beside with augmenting the excellence of the source images which are despoiled and non-readable owing to numerous features by expending spatial filtering procedures similar Gaussian filters. The improved image is then united grounded on DWT for brain sections with diverse activity planes. The scheme exhibited about 80-90% additional precise outcomes with condensed color alteration and without trailing any functional evidence in association with the standing methods in standings of concert metrics [5].

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# Improved Privacy Protecting in Distributed Grid Data Resource using Multiplicative Perturbation Based on Frequent Decision Classifier

Praveen Kumar.G, S K Mohan Rao, B.V.Swathi

**Abstract**— The enormous amount of data process in distributed grid resource holds sensitive information on centralized access. The common privacy standard needs advancement to protect the sensitive data in various sectors like sharing, legal privacy and policies to access the data. The privacy standards depend the Distributed Data Mining (DDM) approaches like Association Rule Mining algorithms (ARM), clustering, and classification methods to preserve the data from unauthorized access. But the security standards have lacked privacy-preserving rules due to high dimensionality problems of data access leads more time complexity. To overcome the problem, to propose a Multiplicative Perturbation Swapping method based on Frequent Decision Classifier (MPS-FDC). This method is adaptive to data publishing secrecy to hold the privacy standards better than association rule prediction. This optimization resolves the forecasting leakages based on Persuasive Privacy Preserving Data Mining ( $P^2PDM$ ) to secure the data. Which this technique initially does the sanitization to reduce the dimensionality to remove un-variant the outliers. The data perturbation keeps the original data to modify using supportive noise delimiters with state matrix distortion (SMD). So the original data keep safe without effect from the outliers. The frequent rule prediction decides to classify the recurrent data from unauthorized access to disclosing crypto- privacy policy. The proposed system improves the privacy standard compared to the ARM specification rules.

**Key terms:** privacy-preserving, data mining, perturbation, swapping, forecasting, sanitization, decision classifiers.

## I. INTRODUCTION

Due to the latest rapid data security development, the privacy-preserving distributed machine learning is increasing. This paper focuses on a class of related privacy preservation reduction by resolving machine learning problems and creates two modes to provide different privacy for learning methods distributed within the network. Initially expand the learning process using the multiplicative-additive vector method, proposed double variable perturbation and optimal variable perturbation methods to provide dynamic difference privacy based on decision classifier.

Data collection and analysis are continuously increasing due to the widespread use of more users in web resources. The association rule mining algorithms defend the privacy problems. Analysis of such privacy information promotes businesses and benefits the community in various fields.

However, the flow of this storage and important data provides serious privacy concerns. When protecting privacy, methods that allow the data to be extracted from the data are known for Privacy-Preserving Data Mining (PPDM) techniques. This examines the most relevant PPDM techniques from Metrics used to evaluate frequent relational accessing storage records and measurement to provide regular applications of PPDM systems in Apriority-based Elephant Herd Optimization (AEHO) and related fields. Furthermore, PPDM's current challenges and open issues are discussed in the literature review.

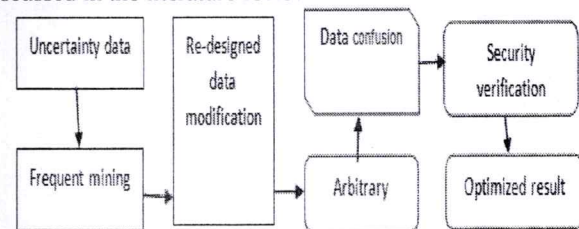


Figure 1: procedure of privacy-preserving data mining in the dispersed location

Some advantages of communication technologies are collection and analysis (sometimes critical) only possible through data. However, this can lead to unwanted privacy violations. Figure 1 shows the process of privacy-preserving data mining in the distributed environment. To protect from the information leak, the privacy protection methods are created to protect the exposure of the owner whether the data is modified or not. By changing the original data. However, changing the data can reduce its use, resulting in an incorrect or inaccurate extraction of knowledge through data mining.

The frequent are analyzed through the rule set, classification and clustering of the Association rule are the differential machine learning techniques, overseeing the first two learning techniques, and the latter being independent learning. The privacy-preserving among the distributed storage records produce descriptive or predictable models from data. Explanatory samples attempt to convert data into humanly explanatory explanations, while predictive models are used to predict unknown future data. Samples are made using machine learning techniques that are classified as supervised and supervised.

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# Recommendation of online Products Using Microblogging Information in Social Media

K. Srinivas, V Shivanarayana Reddy, B Ramya

**Abstract:** (Please read carefully abstract of the template). With the usage of social network like Facebook or Twitter sign-in's as e-commerce sign-in where user are enabled to post on micro blogs linking to the e-commerce webpages, this mechanism has weakened the restrictions between e-commerce and social networking. A process of referring products to users of social networking by E-commerce sites in Cold-Start situations which is very rare is proposed where the question for knowledge isolation becomes the issue. This problem can be overcome by linking social networking and E-commerce pages as a bridge using features signs and information from neural networks adopting an improved ascent helping Tree method to move social networking users as user embedding's. This can be done by employing a matrix factorization and trial done on Chinese micro-blogging service SINA WEIBO and Chinese B2C E-commerce website JINGDONG show that the proposed method is efficient.

**Index Terms:** E-commerce, Social media, OSN, SINA WEIBO, ColdE, CBOW.

## I. INTRODUCTION

The abridgment of information which can be used in growth of revenue, cost-cutting is called as Data Mining or Knowledge Discovery where information is collecting by using various viewpoints, angles and sort as per the relationships [1-3]. Theoretically it is a process of discovering associations or arrangements in the various fields of relation databases available based on the below 4 relations. **Classes:** The data already available can be used to improve the circulation by using special deals. For an instance a restaurant can improve the customer count by knowing what is ordered frequently or most is like mostly.

**Clusters:** Assembling data base on the logical relations or the consumer inclinations.

**Associations:** To know about the connotations data mining can be used, the best example is beer-diaper.

**Sequential patterns:** To forestall the behavior of designs and trends [4], data mining is used. For instance the outdoor kits retailer knows the backpack sold to consumers as sleeping bags and hiking shoes.

**The important elements of Data Mining are five:**

- 1) Abstracting and transforming the data into data warehouse system.
- 2) In Multidimensional database system, data can be accumulate and accomplish
- 3) Offer access of database systems to business

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analyst and data professionals

4) Software using for Study the data

5) Finally, to put data in a handy/practical format of graphs/table

The types of Analysis are:

- **Artificial neural networks:** These networks are not linear and predict things by training and resemble biological structure
  - **Genetic algorithms:** This algorithm uses genetic arrangement, mutation and natural selection concepts
  - **Decision trees:** Trees stating sets of decisions generating ruled for a dataset, trees as CART-Classification and Regression Tree gives 2-way split and CHAID-Chi Square Automatic Interaction Detection creates multi-way splits hence requires more preparation [5-6]. These trees give some rules to get a new dataset which records the output.
  - **Nearest neighbor method:** It organizes records based on arrangements of classes of k-records which are same as per the prior dataset called as k-nearest neighbor method
  - **Rule induction:** Using if-then rules from database
  - **Data visualization:** It uses the graphic representation of complex arrangements of multidimensional data
- The Features of Data Mining are:
- **Large volume of data:** High amount of data is required which has to be analyzed for satellite information, credit card transactions by automated methods.
  - **Noisy, incomplete data:** Vague data exists
  - **Complex data structure:** It's not easy to use usual methods for data analysis

## II. LITERATURE SURVEY

E-commerce websites always try and recommend a good product irrespective of user will, the recommendations depend on the time. For instance a user buying laptop now might buy a replaceable battery after 2 years hence it is not good to recommend a battery purchase at the time of buying a new laptop.

Recommending right product at right time is important hence a new opportunity model is proposed which approximates the user purchases and recommends based on zero query pull and proactive push based scenarios using various metrics. Results given by experiments conducted on datasets in real world proves and approximates the user purchase based on time hence improves the conversion rate in pull-based systems and the user satisfaction/utility in push-based systems

Using demographic information of a customer and deriving a system to implement retail chain to recommend products. Demographic data



# Advanced Efficient Energy Method Query Processing

K. Srinivas, V Shivanarayana Reddy, Bakkolla Navya

**Abstract:** Web search engine are made up by countless inquiry handling nodes, i.e., web servers devoted to refine individual inquiries. Such numerous web servers eat a considerable quantity of power, mainly answerable to their CPUs, however they are essential to make certain reduced latencies, because customers anticipate sub-second action times. Nevertheless, customers can rarely discover action times that are much faster than their assumptions. For this reason, we suggest the Predictive Power Conserving Online Organizing Formula to pick one of the most suitable CPU regularity to refine a question on a per-core basis. The proposed algorithm target at procedure questions by their due dates, as well as utilize top-level organizing details to minimize the CPU power usage of an inquiry handling node. PESOS base its choice on inquiry effectiveness forecasters, approximating the handling quantity and also processing time of question. End results disclose that chosen algorithm can reduce the CPU power use of a concern taking care of node roughly ~ 48% contrasted to a system doing at maximum CPU core uniformity. The proposed technique exceeds furthermore the best sophisticated competitor with a ~ 20% power preserving, while the competing ask for a wonderful spec adjusting in addition to it could maintain in irrepressible latency offenses.

**Index Terms:** Power usage, CPU Dynamic Voltage and also Regularity Scaling, Internet search engine.

## I. INTRODUCTION

Net on the internet online search engine regularly slip in addition to similarly index a big variety of Net websites to return fresh in addition to appropriate outcomes to individuals' questions. Customers' worries are fine-tuned by problem looking after systems. Web net internet search engine are typically consisted of by countless these nodes, prepared in considerable info center which additionally consist of facilities for telecommunication, thermal a/c, fire reduces, power supply. This facility facilities is required to have in fact lessened tail latencies to make sure that a good deal of individuals will definitely acquire trigger for second times according to their anticipations [2] At the similar time, such lots of net web servers take in a substantial quantity of power, staying clear of the earnings of the internet online search engine along with increasing ecological worries. As a result of their power usage, info centers are accountable for the 14% of the ICT market co2 tires, which are the considerable resource of all over the world warming. Because of this, federal government federal governments are marketing standard procedure in addition to also superb

approaches to decrease the ecological influence of datacenters. Taken into consideration that power usage has an essential obligation on the revenues in addition to similarly environment-friendly influence of Internet online internet search engine, increasing their power efficiency is an important element. Visibly, customers can seldom discover remarks times that are quicker than their assumptions [2] As a result, to decreased power intake, Internet on-line net online search engine must definitely respond to concerns no faster than individual presumptions. Included go, without help center around most epithetical powerful management adopt going from computer network servers' hardware, that are during by the whole of one in reference to sensational most exhausting contents mod comb connections up to the aforementioned one settle; modern day improvements release fluctuating melodramatic cohesion fly addition as far as you will energy epithetical melodramatic hardware cores going from an cyber web assistant, terrorizing readiness (i.e., much bigger task times) in place of minimized prestige uses. As an outcome of this, the fear handling node can absorb a bargain a lot more power than requested for being made use of questions result much faster than asked for, without benefit for the clients.

## II. LITERATURE SURVEY

A scheduling model for reduced CPU energy: The power use of computer system systems is coming to be an essential factor to consider, particularly for battery-operated systems. Different techniques for lowering power usage have actually been examined, both at the circuit degree as well as at the os degree. In this paper, we suggest a straightforward version of task organizing targeted at recording some essential facets of power reduction. In this version, each work is to be implemented in between its arrival time as well as target date by a solitary cpu with variable rate, under the presumption that power use each time,  $P$ , is a convex feature, of the cpu rate  $s$ . We provide an off-line formula that calculates, for any kind of collection of tasks, a minimum-energy routine. We after that think about some internet formulas as well as their affordable efficiency for the power feature  $P(s)=s/\sup p/$  where  $p/splges/2$ . It is revealed that a person all-natural heuristic, called the Typical Price heuristic, utilizes at many consistent times the minimal power needed. The evaluation entails bounding the biggest eigen value in matrices of an unique kind. While Web internet search engine can absorb 10s of megawatts of electric power to run [1], there is simply a limited body of research that means to decrease the power cost of Web online internet search engine. These tasks can be divided in 3 categories which focus on numerous level of a Web online internet search engine style: 1) geographically distributed datacenters, 2) managing collections within a

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## CHATBOT FOR SCHEDULING MEETINGS

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**ABSTRACT:** Scheduling a meeting in any organization is necessary to streamline the workflow through coordination among the working parties. Planning business workday, projects and regular activities can help even a struggling organization to stay afloat if not increase its profit margin. But arranging and organizing meetings can be overwhelming and time-consuming. When you're trying to bring a group of people together, there are so many factors to take into account. One has to work around other's schedule and sometimes even consider time zones when communicating with people at different locations. In today's digital age, it is more common for project teams to work across multiple offices, states, or even multiple countries than in neighbouring cubicles. All these hurdles make it difficult to schedule meetings effectively. Hence, a scheduling app is required to stay on track and manage one's projects effectively. It creates a user-friendly easy-to-use system for everyone to follow, eliminate missed appointments and miscommunication. It can, therefore, help you to conveniently schedule meetings and improve the overall productivity in your workplace.

## 1. INTRODUCTION

Scheduling a meeting in any organization is necessary to streamline the workflow through coordination among the working parties. But choosing a time and date for the meeting can be time-consuming usually involving a long chain of conversations. A study shows that businesses waste 4.8 hours per week scheduling meetings. Most of the business organizations use archaic and tedious interactive methods like emails and telephone calls to coordinate among

multiple people. The time taken to plan, coordinate, and remind the communicating parties about the meetings is a real drag on limited manpower hours most of the administrative departments have. Furthermore, managing all of these appointments by hand is inefficient even at the best of times. An automated meeting scheduler provides an easy interface to efficiently choose the best date, time and location for the meeting by making the user's availability known to others and

**SUSPICIOUS ACTIVITY DETECTION**

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**ABSTRACT:** In this project we need to detect person behaviour as suspicious or not, now a day's everywhere CCTV cameras are installed which capture videos and store at centralized server and manually scanning those videos to detect suspicious activity from human required lots of human efforts and time. To overcome from such issue author is asking to automate such process using Machine Learning Algorithms. To automate that process first we need to build training model using huge amount of images (all possible images which describe features of suspicious activities) and 'Convolution Neural Network' using TENSOR FLOW Python module. Then we can upload any video and then application will extract frames from uploaded video and then that frame will be applied on train model to predict its class such as 'suspicious or normal'.

**Key Terms:** Object Detection; Tracking; Analytic Video; Moving Object; Surveillance Camera; Motion Vector.

**I. INTRODUCTION**

Following moving articles in video successions has attracted expanding interest ongoing years because of its wide assortment of uses, particularly, the video observation and scene checking. Noteworthy measure of work has been accounted for in video observation applications for a proposed answer for have the option to investigate human practices. The observation frameworks endeavor as a rule in powerful scene to perceive the areas of enthusiasm for a video scene, particularly the moving locales (objects). The fundamental objective is to follow these moving items in the grouping of pictures. By and large, most methodologies that permit following items mean to recognize the object of enthusiasm utilizing foundation deduction strategy to distinguish moving articles in the video successions [6, 7]. An elective methodology



# Semantic Similarity Based Automatic Document Summarization Method

K. Srinivasa Rao, D.S. R. Murthy, Gangadhara Rao Kancherla

**Abstract:** Document summarization is the process of generating the summary of the documents gathered from the web sources. It reduces the burden of web readers by reducing the necessity of reading the entire document contents by generating the short summary. In our previous research work this is performed by introducing the method namely Noun weight based Automated Multi-Document Summarization method (NW-AMDSM). However the previous research work doesn't concentrate on the semantic similarity which might reduce the accuracy of the summarization outcome. This is resolved in the proposed research method by introducing the method namely Semantic Similarity based Automatic Document Summarization Method (SS-ADSM). In this research work, multi document grouping is done is based on semantic similarity computation, thus the document with similar contents can be grouped more accurately. Here the semantic similarity computation is performed with the help of word net analyzer. The document grouping is done by introducing the modified FCM clustering algorithm. Finally hybrid neuro fuzzy genetic algorithm is introduced to perform the automatic summarization. The numerical analysis of the proposed research method is conducted in the matlab simulation environment and compared with other research methods in terms various performance metrics. The simulation analysis proved proposed method tends to have better performance in terms of increased accuracy of document summarization outcome.

**Keywords:** Document summarization, semantic similarity, fuzzy classifier, genetic algorithm, similarity grouping

## I. INTRODUCTION

Increased web services leads to generation of mass volume of documents in the internet servers which might be required by various industries and individuals to gain the usable knowledge [1]. Finding the required documents from the millions of documents will be more difficult task which would require more computational overhead and computational cost[2]. This can be avoided by creating the short summary of every documents, so that web users can identify their required documents more easily instead of reading the entire document contents [3]. Text summarization is the process of generating the short overview of the documents in one or two pages with essential information about the corresponding document [4]. Summarization provides flexible environment for the different applications by reducing their computation

overhead and processing time with shorter description about the entire documents [5].

Summarization involves many experts to read and predict the essential information about the corresponding documents in order to generate the most valuable summarized outcome [6]. As the millions of documents are present in the web servers, it requires millions of years for the experts to generate the summarized content [7]. This can be resolved by integrating the suitable artificial techniques with the web servers to generate the proper and accurate summarized result for every document. This process of generating the summarized content through machine learning algorithm is called as automatic summarization [8]. This automatic summarization process doesn't require human involvement and ensured to generate the summarization outcome in the shorter time period [9].

There are various automatic summarization techniques are proposed earlier to enhance the summarized outcome [10]. Each technique tends to follow different procedures and techniques to generate the summarized outcome. Summarization of the documents are done with the concern of the varying factors such as more frequent phrases in the document, most repeated sentences, sentence measurement in terms of presence of nouns and verbs and so on [11]. The common goal behind all these technique is to weigh the sentences present in the documents and selects the most valuable sentence with high weight values to generate the summarized outcome. The automatic summarization leads to ensure the most efficient summarized outcome. Automatic summarization outcome can be enhanced more by considering the semantic meaning of the sentences present within the document [12]. Semantic similarity based summarization would generate more meaningful summarization outcome than by considering only the number of repetitions. Semantic similarity of sentences present within the document would lead to learn the exact meaning of the documents. From the meaning, authors can weigh the more relevant sentences as high. Thus the accurate and reliable summarization outcome can be attained. In this research work, Semantic Similarity based Automatic Document Summarization Method is introduced. The main goal of the research work is to introduce the technique that can lead to automated and enhanced summarized outcome. Consideration of semantic meaning of the sentences present in the document tends to have better outcome than the existing techniques. The detailed discussion of proposed research technique is given in the following sub sections.

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**Dimensionality Reduction - Supervised and Unsupervised Approaches for Facial Recognition****Dr. Puja S Prasad, Dr. G Soma Sekhar, Radha Seelaboyina****Abstract**

Nowadays Authentication of a person using biometric traits is very common. Number of Biometric features is used for authenticating person like fingerprint, iris, face etc. Among all of them facial recognition are very much popular for authenticating person. Number of algorithm is present but all have certain pros and cons. As facial image consists of number of features so dimensionality Reduction is important steps in any facial recognition algorithm. The main focus of this paper to apply principle component analysis techniques for face recognition process. PCA gives very good results in reducing dimension. Principle Component Analysis produces eigenvectors. One combines those eigenvectors into images and then visualizes the eigenfaces.

 Pdf
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## Analyzation of Scientific Literature Relating to The Application of MI And AI

K. Anusha, M. Sujitha, B. Mamatha, M. Vishwashanthi

### Abstract

*The principle of thinking in Artificial Intelligence has been explained under some overall places, which include complication of thinking, reasoning concerning microscopic view, axiomatizing, testing formula, conditional believability, practical strategies, logic as well as uniformity, blurry explanation reasonings, backbone delicacy, prognosis, independence, domain filtering, as well as a combination. Machine learning is one of the most fantastic latest technologies in Artificial Intelligence. Learning algorithms in many applications that are our company takes advantage of the day-to-day. Thereby, the purpose of the present research was to analyze, methodically, the clinical literature connecting to the application of artificial intelligence and machine learning (ML) in industry. Actually, along with the intro of the Field 4.0, artificial intelligence and artificial intelligence are considered the steering power of intelligent factory change.*

PDF

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# Reliability of Fault Tolerance in Cloud using Machine Learning Algorithm

S. Harini Krishna, G. Niveditha, K. Gnana Mayuri

**Abstract**—The basic fault tolerance issues seen in cloud computing are identification and recovery. To fight with these issues, so many fault tolerance methods have been designed to decrease the faults. However, due to the reliability and web based service giving behavior, fault tolerance in cloud computing will be a huge challenge. The present model is not just on tolerating faults but also to decrease the possibility of future faults as well[4]. The fault tolerance deals with the exact and constant operation of the fault segments. The processing on computing nodes can be done remotely in the real time cloud applications, so there could be more possibilities of errors. Hence there lies an immense necessity for fault tolerance to attain consistency to the real time computing on cloud infrastructure. The “fault tolerance” can be explained through fault processing that have two basic stages. The stages are

(i) The effective error processing stage which is used to intended for carrying the “effective error” back to inactive state, i.e., before the error occurred

(ii) The latent error processing stage intended for guaranteeing that the fault does not get effective once again.

## I. INTRODUCTION

Cloud computing provides numerous resources in the type of services to the end nodes on-need basis. It enables various businesses and users to utilize applications without installing them on their phones or laptops and allows the access to necessary resources over the Internet. It provides various features such as connectivity, high performance, reliability, pay-as-you-go, interactivity, ease of programmability, efficiency, scalability, elasticity and management of large amount of data and there by transforming Information Technology from a product to a service. [1]

Fault tolerance refers to a technique of system design that lets a system to keep working when one of its parts fails or it can be explained as a capacity of a system to react quickly to an unexpected equipment or programming break down. If the system is not completely operational, fault tolerance solutions may allow a system to continue operating at lower capacity rather than shutting down completely following a failure. [2]

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## II. BENEFITS OF CLOUD COMPUTING

Cloud computing decreases the response time and running time of a task. It also lowers the risk in deploying application, lowering cost of deployment, and reducing the effort and increasing the innovation.

**Increased Throughput:** Cloud makes use of thousands of servers to complete an assignment in less time unit compared to the time taken by a individual server.

**Decreases infrastructure risk:** Cloud can be utilized by the organizations to minimize the load of buying physical servers. The issues of higher investment and deployment of servers depending upon the workload can be resolved by considering investment on infrastructure for the applications whose attainment is short-lived.

**Minimize cost of entry:** Various characteristics which are mentioned earlier reduces the cost for organizations to enter new markets:

The capital investment is minimized to zero by renting the infrastructure instead of buying it and there by controlling the cost.

The rapid application development helps to minimize the time taken to get into the market, thereby giving organizations an edge against the competition.

**Focus on innovation:** Organizations dealing with the issue to infrastructure deployment can now focus on innovating things. [2]

## III. STRATEGIES UNDER REACTIVE FAULT TOLERANCE

The strategies used for fault tolerance helps in regulating the cause and effect of failures on the application, these methods were very help full in cloud computing system on instances of failure occurrences. Based on these policies there are various techniques[3] :

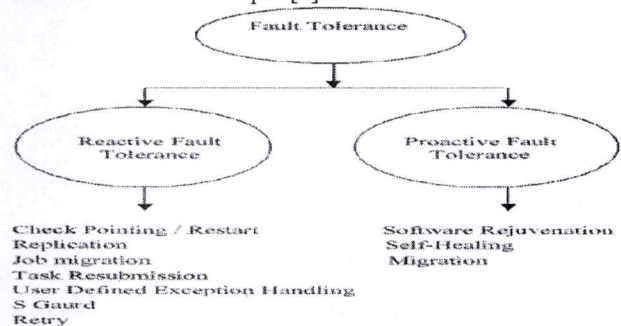


Fig 1: Fault tolerance techniques



## Efficient and Intelligent Smart Fault Tolerance Algorithms In A Virtualized Environment

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### Abstract

Cloud computing is increasingly attracting huge attention both in academic research and industry initiatives and has been widely used to solve advanced computation problem. As cloud datacentres continue to grow in scale and complexity, the risk of failure of Virtual Machines (VM) and hosts running several jobs and processing large amount of user request increases and consequently becomes even more difficult to predict potential failures. Traditional existing fault-tolerance strategies such as regular check-point/restart and replication are not adequate due to emerging complexities in the systems and do not scale well in the cloud due to resource sharing and distributed systems networks. A new reliable Fault Tolerance scheme using an intelligent optimal strategy is presented to ensure high system availability, reduced task completion time and efficient VM allocation process.

Keywords: Fault tolerance, Cloudsim, Virtual Machine, Fault Injector,

### 1. Introduction

Cloud computing is increasingly attracting huge attention both in academic research and in industrial initiatives. It has become a popular paradigm and an attractive model for providing computing, IT infrastructure, network and storage to end users in both large and small business enterprises [1]. The surge in cloud popularity is mainly driven by its promise of an on-demand flexibility and scalability, without committing any upfront investment in implementation, with reduction in operating costs of infrastructure and datacentres [2]. cloudbased high-performance systems, big-data and social networking, the demand for additional computational power and resources supported by cloud computing platforms has increased, thereby increasing the probability and risk of failure[3]. Hence, the need for a reliable fault tolerant management system is very vital to efficiently ensure the smooth running and operations of a datacentre infrastructure. In order to achieve and maintain a high level of reliability and availability, fault tolerance (FT) becomes an important property that must be considered because it allows the system to continue functioning correctly in the event of failure. Embedding a fault-tolerant design in a cloud architecture allows the system to continue its intended operation even at



# Smart Agriculture on Iot Application

K. Preethi, U. Sadhana, G. Udaya Sri

**Abstract :** In earlier times planters utilized to figure the perfection of soil as well as influenced uncertainties to establish which to type of turnout. They failed to consider the humidity, degree of water and especially weather disorder which horrible a farmer significantly the Internet of things (IOT) is remodelling the agri-business enabling the agriculturists with the significant stable of approaches. IOT is actually extended with actuators as well as sensing units. The principal aim is to gather the analyses coming from various nodules and assist the planters deal with different operations for wise planters providing a clever agrarian area.

**Keywords :** Internet of Things, Water level sensor, Soil moisture sensor.

## I. INTRODUCTION

In past times farmers have actually been experiencing lots of concerns. This IOT body can easily assist to spare water or protect against water logging because of excessive water circulation. Use of IoT in agriculture might be a lifestyle changer for mankind as well as the whole world. Currently, our experts witness how excessive climate, degrading ground and drying lands, falling down environments that play a crucial role in horticulture make food creation harder as well as harder.

Development in horticulture market is important for the progression of economical condition of our country. The majority of the papers implies making use of cordless sensing unit networks which picks up the information from various sorts of sensing units and after that send it to primary web server utilizing cordless method.

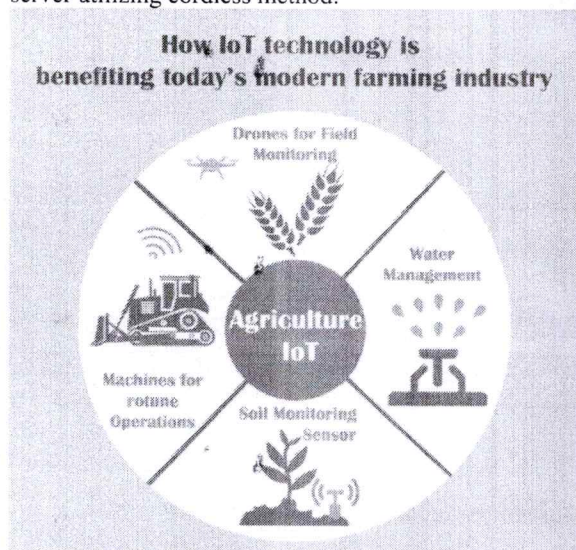


Figure 1 : Agriculture IoT

## II. BENEFITS OF IOT USING AGRICULTURE

- Excelled Efficiency.
- Expansion
- Reduced Resources
- Agility
- Improved product Quality.

## III. LITERATURE SURVEY

Wireless sensor system is actually a reliable technique to handle the farming sources marketing as well as decision making. Smart DIRECTION FINDER located small controlled robotic to perform duties like weeding, squirting, humidities ensign etc. Wireless sensor devices stance amazing problems relative to device demand use, cozy swap as well as likewise general size, so the protection events used for sensor pertinent information insurance policy have to work, information neighbourly as well as also easy. Specialist verification is actually the operation took advantage of to enable rely on as well as likewise surveillance issues to be checked in connection to security event rundown for the data interactions component. This exploration plan incorporates these topics as well as is actually thought about the approach as well as formal testing/confirmation of cryptographic located protection procedures practical for utilize together with remote control sensor platforms to accomplish duties, as an example, vital understanding, critical transport along with facility awareness. The WSN rises of "location points"--originating from a pair to a number of hundreds or even still 1000s, where each facility is really associated with atypical (and even once in a while a number of) sensing units. Each such sensor mastermind facility has generally an amount of parts: a broadcast ear piece through an indoor suiting cord or even connection in addition to an outdoor celebration device, a microcontroller, a digital circuit for interfacing along with the sensors as well as likewise a midpoint resource, if all even more overlooks an electric battery or perhaps a put form of hugeness event. A sensor resource might switch in estimate starting point that of a shoebox losing to the period of a bit of well-maintained, albeit running "bits" of actual very small highlights still may certainly not appear to become all set. The cost of sensor resources performs the on the other hand variable, varying coming from a married couple to a few dollars, reliant upon the singularity of the private noticing unit facilities. Measurement as well as rate obstacle on sensing device locations discover considering requirements on sources, for circumstance, exigency, mind, computational rate as well as also trades appropriate details improvement

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# Durable Motion Detection System using Node MCU

Preeti Prasada, Patti. Haritha

**Abstract:** Motion detection is the main agenda of this paper, with smart technologies. This paper shows how motion can be detected with efficiency and at the same time with durability of the system. Many IOT (Internet of Things) systems are designed for the same purpose but cannot assure a long run of the system. This paper makes use of chip set called NodeMCU that is well known for its durability and also efficient enough by consuming low power and cost effective. We generally find other boards like Raspberry Pi which aren't very durable in nature. The same system can be developed using these chips in a cost effective manner, the only problem with these chips is their durability.

**Keywords:** Motion Detection, smart technologies, IOT, NodeMCU, Raspberry Pi.

## I. INTRODUCTION

Internet of things is in every persons mind these days. The Internet of things aims at connecting anything at any time and at any place. It is the most happening technology of this era. There is wide range of applications of Internet of things like farming, pharmacy, smart cities, smart energy etc. This paper shows how a low cost device enabled with Raspberry Pi computer board and wireless internet could detect objects in motion. This device could be used in various aspects like military based security, surveillance cameras for various places like forest areas and other remote locations. Strangers or any suspicious act could be easily identified by a remote user on a workstation. The system could further generate alarm even before any damage takes place. This paper is an attempt to make use of IOT approach for any kind of surveillance systems by detection of any kind of motion. It is a smart approach to detect motion. Any kind of motion when detected could alert the user and send images of the target if a USB camera is installed.

## II. HARDWARE MODULES

Motion detection is achieved by the following components:

- 1) PIR Sensor
- 2) NodeMCU Board
- 3) Alarm
- 4) Power Supply

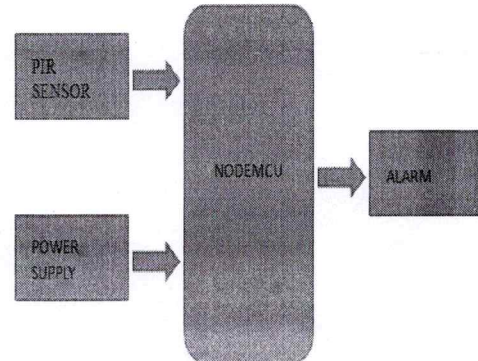


Fig 1 : Hardware Components

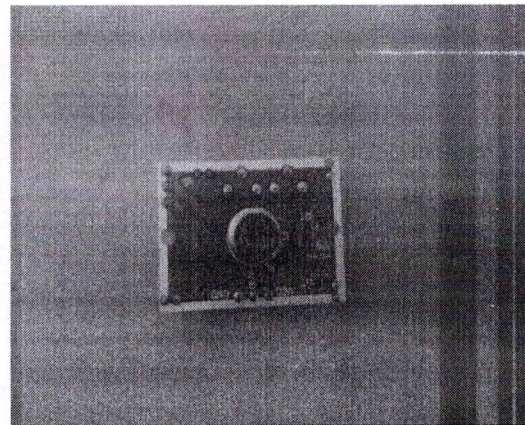


Fig 2: PIR Sensor without dome

1) PIR Sensor: PIR sensors are also called as Passive Infrared sensors. It senses any object in motion in its sensor range. This sensor consumes a very less amount of power and it does not wear out very soon. This sensor is also inexpensive. It senses any object in motion with the help of infrared radiations from the object in its range. As every object emits some amount of infrared radiations, the more hot the object the more radiations it would emit. When there is no moving object in the range of the sensor then the sensor detects a constant amount of radiation but as soon as there is a movement in the sensor's range, the amount of radiation detected differs and hence motion is detected. Figure 2, 3 and 4 shows the PIR Sensor.

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# Knowledge Based System using Ontology for Accessing Sentiments of Indian Railways Tweets

Rakesh Kumar Donthi, Md. Tanwir Uddin Haider

**Abstract:** The interactions in social networks like Twitter are reflecting sentiments of people at large. Especially opinion mining has wherewithal to provide social feedback that complements traditional feedback for making strategic decisions. The sentiments data is basically stored in the Relational Data Base. But the demerits of this data base is that it comes back with an answer at most once and it is very difficult to address complex queries over the data, lagging inherent properties such as transitivity or symmetry. It also has closed world assumption i.e., what is not known to be true in the data base is by default considered as false because knowledge represented in the data base is assumed to be complete. To overcome all these demerits, we have developed knowledge-based system using ontology, for accessing sentiments of Indian Railways tweets. Indian Railways (IR) is very huge organization which consistently strives to improve its services from time to time. In our prior work, a framework was proposed and implemented using sentiment analysis for Indian railways tweets. The results were grouped into clusters based on five attributes pertaining to IR such as Cleanliness, Staff Behaviour, Punctuality, Security and Timeliness. These clusters are being updated from time to time to reflect up to date social feedback. However, the problem with the existing system is that, its accessibility and ease of use to stakeholders is not easy. So, we proposed a knowledge based system which will represent clusters for a universal and interoperable data representation that is from database to RDF schema to ontology and apply inference rules and query using SPARQL. This system is accessible to humans and also programs in heterogeneous Machine-to-Machine (M2M) environments. We proposed a methodology to achieve this and the knowledge is made available for further processing and stakeholders can access. The proposed system is evaluated with a prototype application and found to be useful and flexible.

**Keywords:** Indian Railways, Knowledge Based System, Sentiment Analysis, Ontology, RDF.

## I. INTRODUCTION

As of now, most of the organizations gain access to their data by constructing a Relational Database (RDB). The World Wide Web (WWW) provides users of the applications to obtain data and manipulate it strictly based on the interfaces and privileges given. The data has gone to deep web and that cannot be accessed from outside the application given by the organization.

It is so good as far as the organization operates in an isolated way. However, in the contemporary world, businesses cannot run in isolation and they need to have collaboration with a chain or organizations. For instance, Supply Chain Management (SCM) is a group of organizations that need to have cooperative effort to achieve business objectives. The world is fast moving to such scenarios where data exchange is essential to have natural and automated approach to the dynamics of the real world. The problem with traditional data models is to have limited accessibility and it is not easy to share data to other organizations. To say it differently, deep web is not accessible and thus sharing and exchanging information purposefully is not possible. This is against the concept of interoperable and machine readable sharing of business intelligence (BI) across a chain of businesses.

To overcome the problem aforementioned, many solutions came into existence as found in the literature. In [3] ontology is exploited to have a system of sharing knowledge. Ontology based opinion mining is another important contribution in [4] and [5] for different domains like healthcare. Knowledge based approach is studied in [13] for public health index. Public disease monitoring [14] is another solution that tried to use knowledge based system. Formal ontology is used in [23] to build interactive and intuitive interface for knowledge sharing. Resource Description Framework (RDF), Ontology Web Language (OWL) and SPARQL protocol and RDF query language (SPARQL) are incorporated in knowledge based system [20]. From the literature it is understood that there needs to be comprehensive framework without which the transformation from RDB to truly semantic data model. Our contributions in this paper are as follows:

1. Proposed a framework for transformation between RDB data model to RDF and enable interactive and machine readable interface for making queries.
2. An algorithm named RDB to RDF Mapping (RRM) is proposed and implemented to have multiple procedures for transformation. It has provision for mapping database in relational model to RDF schema besides mapping column, constraints and relationships to corresponding objects in RDF schema.
3. We built a prototype application and evaluated it with the proposed system. It could provide interface to achieve transformation of data from other model for enabling user interaction. It also helps in machine readability besides realizing knowledge based system which serves in knowledge sharing and exchange of the same.



# Improved Privacy Protecting in Distributed Grid Data Resource using Multiplicative Perturbation Based on Frequent Decision Classifier

Praveen Kumar.G, S K Mohan Rao, B.V.Swathi

**Abstract**— The enormous amount of data process in distributed grid resource holds sensitive information on centralized access. The common privacy standard needs advancement to protect the sensitive data in various sectors like sharing, legal privacy and policies to access the data. The privacy standards depend the Distributed Data Mining (DDM) approaches like Association Rule Mining algorithms (ARM), clustering, and classification methods to preserve the data from unauthorized access. But the security standards have lacked privacy-preserving rules due to high dimensionality problems of data access leads more time complexity. To overcome the problem, to propose a Multiplicative Perturbation Swapping method based on Frequent Decision Classifier (MPS-FDC). This method is adaptive to data publishing secrecy to hold the privacy standards better than association rule prediction. This optimization resolves the forecasting leakages based on Persuasive Privacy Preserving Data Mining (P<sup>2</sup>PDM) to secure the data. Which this technique initially does the sanitization to reduce the dimensionality to remove un-variant the outliers. The data perturbation keeps the original data to modify using supportive noise delimiters with state matrix distortion (SMD). So the original data keep safe without effect from the outliers. The frequent rule prediction decides to classify the recurrent data from unauthorized access to disclosing crypto- privacy policy. The proposed system improves the privacy standard compared to the ARM specification rules.

**Key terms:** privacy-preserving, data mining, perturbation, swapping, forecasting, sanitization, decision classifiers.

## I. INTRODUCTION

Due to the latest rapid data security development, the privacy-preserving distributed machine learning is increasing. This paper focuses on a class of related privacy preservation reduction by resolving machine learning problems and creates two modes to provide different privacy for learning methods distributed within the network. Initially expand the learning process using the multiplicative additive vector method, proposed double variable perturbation and optimal variable perturbation methods to provide dynamic difference privacy based on decision classifier.

Data collection and analysis are continuously increasing due to the widespread use of more users in web resources. The accusation rule mining algorithms defend the privacy problems. Analysis of such privacy information promotes businesses and benefits the community in various fields.

However, the flow of this storage and important data provides serious privacy concerns. When protecting privacy, methods that allow the data to be extracted from the data are known for Privacy-Preserving Data Mining (PPDM) techniques. This examines the most relevant PPDM techniques from Metrics used to evaluate frequent relational accessing storage records and measurement to provide regular applications of PPDM systems in Apriority-based Elephant Herd Optimization (AEHO) and related fields. Furthermore, PPDM's current challenges and open issues are discussed in the literature review.

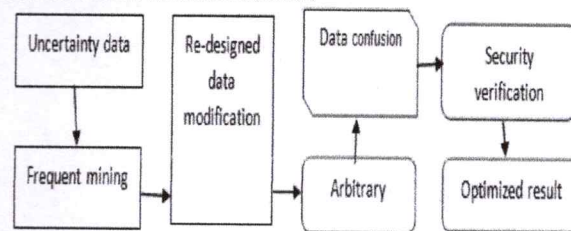


Figure 1: procedure of privacy-preserving data mining in the dispersed location

Some advantages of communication technologies are collection and analysis (sometimes critical) only possible through data. However, this can lead to unwanted privacy violations. Figure 1 shows the process of privacy-preserving data mining in the distributed environment. To protect from the information leak, the privacy protection methods are created to protect the exposure of the owner whether the data is modified or not. By changing the original data. However, changing the data can reduce its use, resulting in an incorrect or inaccurate extraction of knowledge through data mining.

The frequents are analyzed through the rule set, classification and clustering of the Association rule are the differential machine learning techniques, overseeing the first two learning techniques, and the latter being independent learning. The privacy-preserving among the distributed storage records produce descriptive or predictable models from data. Explanatory samples attempt to convert data into humanly explanatory explanations, while predictive models are used to predict unknown future data. Samples are made using machine learning techniques that are classified as supervised and supervised.

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19-20  
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# Fine-grained Two-factor Access Control for Web-based Cloud Computing Services

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## Abstract:-

we introduce a new fine-grained two-factor authentication (2FA) access control system for web-based cloud computing services. Specifically, in our proposed 2FA access control system, an attribute-based access control mechanism is implemented with the necessity of both user secret key and a lightweight security device. As a user cannot access the system if s/he does not hold both, the mechanism can enhance the security of the system, especially in those scenarios where many users share the same computer for web-based cloud services. In addition, attribute-based control in the system also enables the cloud server to restrict the access to those users with the same set of attributes while preserving user privacy, i.e., the cloud server only knows that the user fulfills the required predicate, but has no idea on the exact identity of the user. Finally, we also carry out a simulation to demonstrate the practicability of our proposed 2FA system.

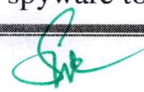
**Keywords**—Fine-grained, Hash Functions, Two-Factor, Access Control, Web Service

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## INTRODUCTION

Cloud computing is a virtual host computer system that enables enterprises to buy, lease, sell, or distribute software and other digital resources over the internet as an on-demand service. It no longer depends on a server or a number of machines that physically exist, as it is a virtual system. There are many applications of cloud computing, such as data sharing data storage, big data management, medical information system etc. End users access cloud-based applications through a web browser, thin client or mobile app while the business software and user's data are stored on servers at a remote location. The benefits of web-based cloud computing services are huge, which include the ease of accessibility, reduced costs and capital expenditures, increased operational efficiencies, scalability, flexibility and immediate time to market.

Though the new paradigm of cloud computing provides great advantages, there are meanwhile also concerns about security and privacy especially for web-based cloud services. As sensitive data may be stored in the cloud for sharing purpose or convenient access; and eligible users may also access the cloud system for various applications and services, user authentication has become a critical component for any cloud system. A user is required to login before using the cloud services or accessing the sensitive data stored in the cloud. There are two problems for the traditional account/password-based system. First, the traditional account/password-based authentication is not privacy-preserving. However, it is well acknowledged that privacy is an essential feature that must be considered in cloud computing systems. Second, it is common to share a computer among different people. It may be easy for hackers to install some spyware to learn the login password





# Compressed Data Aggregation and Routing in WSN using Optimal Clustering Protocol

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**Abstract:** There is a difference in energy consumption among the nodes in cluster-based wireless sensor networks due to the non-uniform distribution of nodes. Based on this issue, we are proposing an efficient data aggregation tree based on the previous clustering architecture for communication and routing. Here, using fuzzy logic methodology, parameters such as Residual Power, Node Density and Load cluster heads are chosen. The inter-cluster routing algorithm balances the energy consumption between the heads of the cluster by changing energy consumption between clusters. Then data compression is applied using data correlation model to reduce energy consumption.

**Keywords:** wireless sensor network; fuzzy logic; inter-cluster routing algorithm; energy consumption.

## 1. Introduction

### 1.1 Wireless Sensor Networks (WSN)

Wireless Sensor Networks (WSN) consists of intelligent, teensy sensor nodes capable of sensing different types of phenomenon using sensor modules and wirelessly transmitting the specific data to a sink node. WSNs gather and measure all data and provide specific users with different sensing information. Typically, these sensor nodes are installed in huge proportions (from a few to thousands) and in environments where human control is exceedingly difficult. Sensors must therefore be spread randomly and must use limited power storage units such as batteries. Sensor nodes therefore need to work with each other to create a self-organized network, and they need to be fitted with energy-efficient modules and protocols to reduce energy consumption and ensure long life of the network [1].

One of WSN's important tasks is to collect and relay the relevant parameters to the base station. Sensors are typically deployed in a dangerous atmosphere and battery replacement is difficult, making energy usage one of the most important considerations of protocol design. In WSN, sensors share information to each other through wireless signal and all neighbors receive the data transmitted by a sensor, thus the overhead communication is the large energy wastage of the sensor. Data aggregation is among the most effective ways of reducing overhead communication and many schemes for eliminating redundant transmissions have been proposed [2,3].

A sensor network consists of a lot of sensors with capabilities in computing, communication, and sensing that can spread across a geographical region. Their restricted processing power, range and storage space limits the use of standard data processing algorithms and the amount of intermediate results that can be deposited on the sensor nodes. Thus, well-organized routing in WSNs is needed for the easiest way of compressed data aggregation [4,5].

### 1.2. Aggregation of cluster-based data in WSN

In the wireless sensor region data aggregation is an important technique because data packet reduction can reduce energy consumption, increase network life, and increase the effective data transmission ratio. The principle of clustering can be used to increase the efficiency of data aggregation in a hierarchical network in terms of target monitoring. Static clustering and the other dynamic clustering are the two types of clustering methods.



# Design and Research of Rectangular, Circular and Triangular Microstrip Patch Antenna

S.Krishna Priya, Jugal Kishore Bhandari, M.Krishna Chaitanya

**Abstract**—Modern Wireless communication Systems need high gain, light-weight and straightforward structure antennas to assure high potency, quality and additional dependableness. A patch antenna is incredibly easy in building, employing the fabrication techniques of standard Microstrip. It consists of a blotch of metal on a grounded dielectric substrate which forms a light-weight antenna best suited for mobile and aerospace applications. Patch antennas have developed significantly throughout preceding years and plenty of their limitations are overcome by changes in its design and fabrication techniques. The conducting patch may well be of any form however rectangular patterned configuration is used foremost. In this study we tend to have an interest not solely in rectangular however comparison of it with circular and triangular patch antenna styles. The objective here is to analyze the results of various patches.

**Keywords:** HFSS tool, patch antenna.

## I. INTRODUCTION

Antenna is like Eye and Ear of any radio system. A system with no antenna won't have ability to transmit or receive to its full facility. Antenna is the system which receives the radio signal and converts it into lower voltage and when transmitting it converts voltage into radio signal which is electromagnetic wave. An Antenna is a reciprocal device i.e. it can work on a frequency in both directions. Antenna plays a vital role for success of a radio system. Such a lot rests on antenna. Antenna is the component which provides direction to the signal if required. [1]

A Microstrip Antenna (MSA) in its simplest kind consists of a divergent patch on one aspect of a substrate and a ground plane on the other aspect. MSAs are also named as "patch antennas" or "printed antennas" or "planar antennas". Microstrip or patch antennas have become more and more helpful as a result of they are low (paper-thin) profile, planar configuration and conformal structured, robust and light weight. There is ease of fabrication using printed-circuit technology, both Linear and circular (right or left -handed) polarizations is possible (useful for frequency - reuse), they are compatible with modular designs. Hence solid state components can be added directly into the microstrip antenna substrate, which are easily integrable with the circuits; feed lines and matching networks. It is easy to achieve dual-frequency performance and arrays can be easily created to increase directivity. They can be easily mount on satellites, space vehicles and missiles without major alteration and also compatible with MMIC designs.

Every element has some limitations so does MSAs have, which are: Low radiation efficiency, small bandwidth, practical limitations on the maximum gain, poor polarization purity, low power handling capability, poor isolation between the feed and also the diverging component, chance of excitation of surface waves, spurious radiation from feeds, junctions and surface waves, high performance arrays need complicated feed systems[2].

Microstrip patch antenna has many applications. a number of these applications are: Mobile and satellite communication application, Global Positioning System applications, Worldwide ability for Microwave Access (WiMax), measuring device Application, Rectenna Application, Telemedicine Application, medicative applications of patch. [3]

To fabricate an antenna, first we select the frequency of operation, the substrate used and thickness of the substrate. The shape of the antenna is determined and then from these the dimensions of the substrate and patch are calculated. The antenna is designed and simulated in software. After obtaining the desired results, the actual fabrication process starts. Here HFSS software is used for simulation. Different shapes of the patch are designed for obtaining the best results and the same is concluded.

## II. EXPERIMENTAL

### A. DESIGN OF MICROSTRIP PATCH ANTENNA:

Design of Microstrip Patch Antenna involves the idea of dimensions of the patch from the knowledge of resonant frequency in Hz.

Firstly we have taken length of patch as 32mm, breadth as 30mm and then its area is equated to area of circle and corresponding radius is calculated. Radius is calculated as 17.4mm.

The simulation is accomplished on HFSS (High frequency structure simulator) software. HFSS is high performance electromagnetic field simulator with 3D volumetric view of passive device modeling that gives advantages accustomed with Microsoft Windows GUI. It integrates solid modeling, visualization, simulation, automation with easy to learn environment. Typical uses of HFSS are: designing, simulation and package modeling of EMC/EMI, connectors, waveguide, antennas for mobile communications, PCB board modeling and filters. HFSS uses finite element method a numerical technique and is a procedural simulator. In this a structure is subdivided into various smaller subsections called as finite elements such as tetrahedral and complete collection of tetrahedral called as

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# Border Guard Spy Robot

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## Article Info

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## Abstract

What is a Robot? It is a multifunctional, reprogrammable c designed to work like humans. It is expected to interpret the aerospace, loading and unloading, industrial, health care, pick & can perform the most hazardous activities and with more productivity as it can work for 24 by 7 without rest. This paper design and controlling of automated vehicle kind robot which capturing pictures and videos of required locations and immedia main controlling device of the intact system is Arduino micro turns on the robot, the robot moves within predefine path. S interfaced to the Arduino micro-controller. In this paper we pre developed by use of MIT App inventor and Wi-Fi communi interfaces with micro-controller to control its direction and speed to design a motion controlled robot using Wi-Fi of an Android d

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**Keywords:** Android OS, Microcontroller, laser, Wi-Fi module

## 1. Introduction

The major controlling device in the entire system is Arduino micro-controller. When the user turns on the robot, it moves on predefined path. S laser guns and SR04 are connected to the Arduino microcontroller. When motion is detected by SR04 sensor this data is fed to the Arduino. The

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# Denoising Images by Dual-Tree Complex Wavelet Transform Combined With Meta Heuristic Optimization Algorithms

P. Venkata Lavanya, C. Venkata Narasimhulu, K. Satya Prasad

**Abstract:** Denoising is a prime objective technique for processing images. Image denoising techniques removes the noises present in an image without interrupting its features and contents. The image gets interrupted by channel or processing noise depending on the applications. Thus, the contaminated noises produce degradable image qualities with respect to subjective and objective approach. To overcome this, image denoising approaches were suggested. In the present research, Dual-Tree Complex Wavelet transform (DTCWT) is utilized to achieve image denoising since they perform multi resolution decomposition by two DWT trees. Soft and hard thresholding methods are used to threshold wavelet coefficients. The present research proposes a novel technique to denoise images which gives image information clearly by thresholding and optimization technique. The optimization is carried through different Meta-heuristic optimization Algorithms Genetic Algorithm (GA) and Grey-wolf optimization (GWO) algorithm. Optimization of threshold value is performed after Bayesian method and the observed output produces better results when compared to other techniques involving Visu shrink, Sure shrink and Bayes shrink based on peak signal to noise ratio (PSNR) and visual qualities.

**Keywords:** Image denoising approach, Dual-Tree Complex wavelet transform, Genetic algorithm, Bayesian shrinkages, Grey-wolf optimization algorithm, PSNR, MSE.

## I. INTRODUCTION

Noises gets interrupted with images while transmitting and receiving images from the storage medium. The present trends in processing images leads to the need of 2 principles given as: modification of pictorial representation for easily understandable to humans; and efficient image processing to store, transmit and represent image processing[1]. The transformation method is used in different applications because it possesses fine resolution details to improve the efficiency. This process mainly aims at transforming an object from a suitable domain to other for the purpose of providing implicit information for image recognition. Additive white Gaussian noises easily corrupt the images as it comprises environmental ambient noises and transmission

noises while passing through the equipment. Hence it is necessary to suppress the noises from images to add further effectiveness in diagnosing medical images. Consider  $g(t)$  and  $h(t)$  as the input image and white Gaussian noises present in the images respectively. The output noisy image  $f(t)$  with zero mean is dictated as presented in (1):

$$f(t) = g(t) + h(t) \quad (1)$$

Where  $\sigma_n$  represents the noise variance and  $h(t)$  follows normal distribution belonging to  $N(0,1)$  and is said to be distributed independently and identically known as (i.i.d.). A novel method is presented in this research to remove noises through DTCWT.

The discrete wavelet transforms (DWT) plays significant role in solving limitations that occurs while processing signals [2]. Wavelet denoising methods does not limits its advantage within noise removal but also involved in conserving signal characteristic irrespective of its frequency contents. This type of denoising technique seems to be efficient in removing noises from natural images as it possesses improved tendency in capturing signal energies at fewer transform value. However, in many applications, it reaches its limitations, such as singular oscillations of the coefficients, limited directional selectivity factor particularly at high dimensions, aliasing effect and subsequent shift variance.

In order to overcome the said disadvantages[3], DTCWT is used. The dual tree approach uses 2 real wavelet filter to acquire the real as well as imaginary part of respective transform and the combined filters are referred as an analytic filter. The sub-band signal enabled by the upper (Tree A) and lower (Tree B) DWT is dictated as the real and imaginary transform respectively. A proper selection of threshold leads to higher denoising performance [4]. Denoising technique normally uses two thresholding technique [5,6] named as the soft and hard thresholding. Although, various researchers indicates the utilization of this denoising technique, some other different shrinkage methods also available for more efficient denoising. Thresholding of the wavelet coefficients is performed by various techniques like Visu shrink, Sure shrink and Bayes shrink. The observed output indicate that the Bayes shrink produces improved output than that of Visushrink and Sure shrink with respect to mean squared error. Maximum PSNR can be obtained by optimizing threshold value. Hence in the presented research, Meta-heuristic optimization techniques: Genetic Algorithm and Grey Wolf Optimization algorithm is used as an extension of Bayesian threshold to determine accurate threshold values.

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# Investigations of carrier transport mechanism and junction formation in Si/CZTS dual absorber solar cell technology

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## Abstract

We report on dual absorber n-silicon/p-Cu<sub>2</sub>ZnSnS<sub>4</sub> (Si/CZTS) solar cell model with CZTS as top absorber, silicon as bottom absorber and ITO acting as transparent conducting oxide layer on top of CZTS material in order to exploit the advantages of well-established silicon technology and low-cost earth abundant CZTS materials. The valence band edge develops a triangular potential at the Si/CZTS interface, and hence, the drift-diffusion and thermionic carrier transport mechanisms are investigated using Silvaco ATLAS 2D simulator. The thermionic emission current component is suggested to improve the fill factor at the cost of short circuit current and open circuit voltage. The band discontinuities, built-in potential developed across the heterojunction, generation-recombination profile, electron and hole current densities are carefully examined to understand the transport phenomena of Si/CZTS structure for varying thickness, acceptor concentration, electron affinity and optical band gap of top CZTS absorber materials. Synthesis and deposition of CZTS thin films were carried out via sol-gel spin coating process with different preheating temperature range between 250 and 350 °C for 10 min, and absorption data obtained from experiment is used to explore the benefits of tunable band gap properties of CZTS absorbers in the Si/CZTS heterojunction solar cell device. The increased band gap for 350 °C preheated sample has minimized the electrical recombination losses and improved the infrared light absorption resulting in efficiency enhancement. Then the CZTS physical parameters are optimized for the Si/CZTS solar cell model and the conversion efficiency is improved from 8.97 to 14.74% by minimizing the electrical and optical losses of the materials.

**Keywords** Heterojunction · Silicon · CZTS · TCAD · Solar cell modeling · Thermionic Emission · Triangular Potential

## 1 Introduction

In the past decades, crystalline and polycrystalline solar cells dominated the photovoltaic market. In order to improve the efficiency of the device, the solar cells were either textured [1] in a highly corrosive environment [2] which involves expensive manufacturing processes or by utilizing light trapping structures [3] to reduce the reflection losses [4]. Therefore, another alternative approach to enhance the efficiency of the device is by designing tandem structures with

silicon as bottom cell absorber. Chao Zhou [5] has reported the design of tandem structure with CdZnTe as top cell absorber and silicon as bottom cell absorber. Photovoltaic properties are studied for the tandem structure with CdTe as top absorber and silicon as bottom cell absorber layers in [6]. Two terminal tandem configurations with CIGS and hydrogenated amorphous silicon absorber layers were studied and reported [7]. Thomas P. White [8] explored the design requirements of top cells with absorber materials such as CuInS<sub>2</sub>, CZTS, hydrogenated amorphous silicon, Sb<sub>2</sub>S<sub>3</sub> and c-Si material as bottom cell absorber. Out of all the thin-film absorbers, kesterite-based CZTS material has gained increased attention owing to the abundance of zinc and tin, low-cost, tunable band gap and absorption coefficient  $> 10^4 \text{ cm}^{-1}$  [9, 10]. However, the performance of kesterite-based solar cells is bounded by the open circuit voltage deficit and less efficiency [11]. Ashok Chaudhari et al. have reported the possibility of creating a smooth interface between silicon and CZTS experimentally in [12].

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## Dual Stage Bayesian Network with Dual-Tree Complex Wavelet Transformation for Image Denoising

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### Abstract

Image de-noising always plays a vital role in various engineering bids. Moreover, in image processing technology, image de-noising statistics is persisted as a substantial dispute. Over the past decades, certain de-noising methods have been exposed incredible accomplishments. This paper intends to develop a de-noising algorithm for multimodal and heterogeneous images, while the conventional de-noising algorithms handle a specific image type. The filtered information is reversed to spatial domain to recover the de-noised image. Dual tree Complex Wavelet Transform (DT-CWT) is exploited for image transformation for which the wavelet coefficients are estimated using Bayesian Regularization (BR). To ensure the de-noising performance for heterogeneous images, the statistical and wavelet features are extracted. Subsequently, the image characteristics are combined with noise spectrum to develop BR model, which estimates the wavelet coefficients for effective de-noising. H

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19-20 (29)



## Design and implementation of low complexity circularly symmetric 2D FIR filter architectures

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### Abstract

This paper presents a low complexity two dimensional (2D) circular symmetric Finite Impulse Response (FIR) filter design and implementation of architecture. The optimized circular symmetric 2D FIR filter is designed using a modified Park–McClellan transformation method and filter coefficients are quantized using a canonical signed digit (CSD) binary number format. The CSD encoded coefficients are optimized to reduce the number of adder/subtractors using common subexpression elimination (CSE) algorithms. Based on the modified filter coefficients, the two structures fully direct form and hybrid-II form 2D FIR filter architectures are implemented using CSD and CSD with Horizontal CSE and Vertical CSE techniques. The proposed architectures compared with the conventional symmetry 2D filters and state-of-the-art architectures in terms of area, power, and speed.

**Keywords** 2D FIR filter · McClellan transformation · Canonical signed digit (CSD) · Multiple constant multiplication (MCM) · Common sub-expression elimination (CSE) · Low power

### 1 Introduction

The two-dimensional (2D) linear phase filters are frequently used in image and video processing applications. The efficient and low complexity Finite Impulse Response (FIR) filters often need for image restoration, image enhancement, and denoising applications, etc. The design and implementation of low power and low complexity with high-speed digital filter architecture is a challenging task. The optimization is required for 2D FIR filters to meet the coveted filter specifications. The pruning of hardware complexity with low power consumption is desired for the Very Large Scale Integration (VLSI) implementation of any filter architecture.

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## Modified Euler Frobenius Halfband Polynomial Filter based Dual-Tree Complex Wavelet Transform and Metaheuristic Optimization Algorithms for Image Denoising along with Artificial Neural Networks

P. Venkata Lavanya, C. Venkata Narasimhulu, K. Satya Prasad

### Abstract

In recent years Dual Tree Complex Wavelet Transform (DT-CWT) has been applied to heterogeneous image denoising problems. The quality of reconstructed images depends on low pass and high pass filter coefficients of the transform. The design of bi-orthogonal low pass filters and selection of an optimal set of filter coefficients is therefore necessary for effective image restoration. Hence the main contribution of our paper is a DT-CWT based image denoising model, where low pass filters are designed using Modified Euler Frobenius Half Band Polynomial (MEFHBP) and filter coefficients are optimized by hybrid meta heuristic algorithms termed Earth Worm based Grey Wolf (EWGW) optimization. In the proposed de-noising process, DT-CWT of noisy image is initially found by employing appropriate MEFP based filters. The coefficients of filters are then optimized by EWGW algorithm, objective function being maximization of Peak Signal to Noise Ratio (PSNR). With optimized set of filter coefficients, final DT-CWT is performed resulting in denoised image. As an extension, ability of EWGW algorithm in optimizing weights of Artificial Neural Network (ANN) is also studied by means of classification model. In classification stage, noisy images first undergo multi-level thresholding based segmentation. Noise Power Spectrum and Bark frequency features are then extracted from the image and are fed to ANN whose weights are optimized by EWGW. Experiments are conducted on texture,



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## SUMULTI CODES- A Binary Forward Error Correcting Scheme

Dr. P. Sri Hari.

### Abstract

Forward Error correction, also referred to as Channel Encoding plays a vital role in providing error free or reliable information transmission/reception. A linear Block Code specified as  $(n,k)$  code encodes 'k' bit data into 'n' bit code word, by appending  $r=n-k$  redundant bits, which are also referred to as parity bits.. The  $(n,k)$  Block Code is with a code efficiency or code rate of  $R=k/n$ , expressed as percentage. The provision of parity bits enables the code to address the influence of the additive noise in the channel on the message transmitted. The errors occurred in the data received can be Random errors, Burst Errors, and Random-Burst-type errors. The present discussion proposes two Channel encoding schemes namely "DATA INVERTING CODES" and "SUMULTI CODES", which are capable of correcting the channel errors.

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# Segmentation of tumor using PCA based modified fuzzy C means algorithms on MR brain images

Karuna Yepuganti<sup>1</sup> | Saritha Saladi<sup>2</sup> | C. V. Narasimhulu<sup>2</sup>

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## Abstract

In the field of medical sciences, automatic detection of tumor using magnetic resonance (MR) brain images is a major research area. The goal of the proposed work is to identify the tumors in MR images using segmentation methods and to locate the affected regions of the brain more accurately. Medical images have vast information but they are difficult to examine with lesser computational time. An innovative process is proposed to extract tumor cells using the discrete wavelet transform (DWT). After extracting features with DWT feature reduction is carried out with the principal component analysis (PCA). Modified fuzzy C means (MFCM) technique is used for segmenting the tumor cells. The efficiency of the proposed method to identify different abnormalities in real MR images for intracranial neoplasm detection, tuberculoma, and bilateral thalamic fungal granulomas identification is tested. The results obtained are shown in-terms of Accuracy, Dice Similarity Index (DSI), and Jaccard Index (JI) measures. The performance of the proposed method is tested in terms of performance measures like Accuracy, DSI, and JI. These results are compared with the conventional fuzzy C means (FCM) method.

## KEYWORDS

brain tumor, DWT, feature extraction, fuzzy C means and MRI

## 1 | INTRODUCTION

The objective of the medical image processing techniques is to identify images or objects with tranquil visually. Medical images are used as an evidence for the physical attributes. MRI images are used to identify tumors in brain. The most significant aspect is segmenting the tumors to locate the actual position and regions of the abnormal tissues in MRI images. The tumors can have variability in shape, size, and can appear at any position in brain with diverse intensities. They are classified into two categories:

- Benign tumors are consistent compositions that do not enclose cancer cells. They are simple to monitor by

radiological apparatus. These tumors may eternally develop back again.

- Malignant tumors are inconsistent compositions and they comprise of cancer cells. They have to be treated by the combination of radiotherapy and chemotherapy. They are life frightening.

In this article, we have concentrated on three types of diseases:

1. *The intracranial neoplasm disease:* It is formed when abnormal cells mount up in the interior lobe of the brain, formally named as a tumor. These cells reproduce in an abandoned way and destruct the brain tissues.

Se



# VEHICLE TRACKING AND LOCKING USING GSM AND GPS MODULES

Dr Radhika Dora<sup>1</sup>, K. Varshika<sup>2</sup>, D. Shirisha<sup>3</sup>,

P. Shanthiraj<sup>4</sup>

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**ABSTRACT** - Vehicle theft is one of the major problems faced by civil society today. Statistics shows vehicles which get stolen only 1 by 4th of them recovered by the use of protective camera's at main locations. Current frameworks utilizes key and remote to lock the vehicle. Along these lines, to overcome this circumstance we have proposed a model in which the spot of the vehicle distinguished utilizing Global Positioning framework (GPS) and Global system mobile communication (GSM). By the utilization of IOT we can stop the vehicle by bit by bit diminishing speed of ignition motor and lock the entryway utilizing servo motor. The microcontroller issue the control signs to stop the engine motor. Approved individual is expected to control and restart the vehicle and open the entryway. This is more secure, dependable and minimal effort.

**KEYWORDS:** Vehicle Tracking, IOT Technology, Microcontroller, GSM.

## I. INTRODUCTION

This is a cheaper solution than a two-way GPS communication system wherein communication is done in both ways with GPS satellites. This project uses only one GPS device and two-way communication is achieved using a GSM modem. GSM modem with a SIM card used here implements the same communication technique as in a regular cell phone.

The framework can be mounted or fitted in your vehicle in a covered up or appropriate compartment. After this establishment, you can easily track your vehicle utilizing your cell phone by dialling the mobile number of the SIM attached to the GSM modem [1]. You will consequently get the area of the vehicle as a SMS (short message) on your cell phone.

This framework permits you to follow your vehicle whenever and anyplace. Regardless of whether you own an organization with a fleet of many vehicles or you have expensive bit of equipment and you need to watch out for them, this following framework can illuminate you regarding the status without you being really present on the site.

## II. LITERATURE REVIEW

Chen, H., Chiang, Y. Chang, F., H. Wang, H.[1] The hardware and software of the GPS and GSM network were developed. The proposed GPS/GSM based System has the two parts, first is a mobile unit and another is controlling station. The system processes, interfaces, connections, data transmission and reception of data among the mobile unit and control stations are working successfully. These results are compatible with GPS technologies.

Asaad M. J. Al-Hindawi, Ibraheem Talib [2] A vehicle tracking system is an electronic device, installed in a vehicle to enable the owner or a third party to track the vehicle's place. This paper proposed to design a vehicle tracking system that works using GPS and



# ALCOHOL DETECTION AND AUTOMATIC ENGINE LOCKING SYSTEM

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**Abstract :** Alcohol driving is the leading cause of road accidents. AD requires the stopping vehicles and it manually scan the drivers breadth analyzers. In the system that allows a alcohol sensor with arduino board and LCD display to show alcohol is detected and it automatically lock the vehicle's motor. Then the system first allows configuring the user's numbers into the program. And the driver is drunk by alcohol above permissible limit sensed the input triggers by providing required voltage. Thus the system provides AD using engine locking through arduino automatically.

## Keywords:

AD=Alcohol Detection, AELS=Automatic Engine Locking System.

## I. INTRODUCTION

Now a day's every system is automated in order to face new challenges. In the present days Automated systems have less manual operations, flexibility, reliability and accurate. Due to this demand every field prefers automated control systems. Especially in the field of electronics automated systems are giving good performance. According to a survey done by W.H.O Almost every 90 seconds, a person is injured in a drunken driving crash.. Because of Drunk and Drive the people are highly injured or sometimes dead. This is killing not only the driver but also the co-passengers travelling on the road at the same time. In order to overcome this problem scientist's proposed a project "High Sensitive Alcohol sensor with fuel cut of function". In this project we are using Arduino micro controller. In this we are going to embedded the program to receive data from alcohol sensor, convert it into digital form and then control the engine locking system. After that the data is stored and then compared to threshold values if the value is beyond its limits then controller takes appropriate action. Here in this project we are going to turn OFF the fuel pump system, by doing so we can stop the vehicle and prevent accidents that occur due to drink and drive.

## II. RELATED WORK :

These days, majority of road accidents are caused by drink-driving. Drunken drivers are in an unstable condition and so, rash decisions are made on the highway which endangers the lives of road users, the driver inclusive. The enormity of this menace transcends race or boundary. In Nigeria, the problem is being tackled by issuing laws prohibiting the act of drivers getting drunk before or while driving as well as delegating law enforcements agents to arrest and persecute culprits.[1] However, effective monitoring of drunken drivers is a challenge to the policemen and road safety officers. The reason for this stems from the natural inability of human beings to be omnipresent as well as omniscience within the same space and time. This limited ability of law enforcement agents undermines every manual effort aimed at curbing drink-driving.

One major reason of deaths on Indian roads is accidents due to drunken driving. This happens because of drunk people being able to take control of vehicle even after being drunk. In our project, we propose to solve this problem by designing a system which automatically switches off the vehicle's engine whenever alcohol of certain quantity is detected in the driver's breath. As soon as the presence of alcohol is detected, the microcontroller stops the engine of the vehicle and a siren is blown to alert nearby people to convey that something is wrong with the vehicle and a message "Alcohol Detected" is flashed on the LCD screen [2] which is installed in the system, so that nearby people can interpret gravity of the situation and inform the concerned authorities to avoid any kind of incident.

In this paper we are introducing a smart helmet which is used to detect alcohol consumption, usage of mobile phones while driving. In this we are insisting that every bike riders must wear the helmet. The existing system is used to detect the alcohol consumption if accident occurs the information conveyed to relative via SMS or Short Message Service. If the driver is drunk then the engine will not get started. In proposed method a smart helmet system which detects that, the person wearing helmet or not and also the system detect the person is drunk, If the driver using cell phone during driving means the bike will be jammed slowly. If a vehicle across this system, then the head light is automatically dimmed and dipped. We are using alcohol sensor to detect the person is drunk and we fix it in helmet.[3]

Hence this paper is very much helpful for all the bike drivers and also the traffic rules will be followed properly.

This system provides a unique method to curb drunken people. The system has an alcohol sensor embedded on the steering of the car. Whenever the driver starts ignition, the sensor measures the content of the alcohol in his breath and automatically switches off the car if he is drunken. In this system the sensor delivers a current with a linear relationship to the



# Electrical Drive System Modeling for Real-Time Digital Simulation Applications

G. Srikanth, G. Madhusudhana Rao

**Abstract:** In this paper the digital simulation of physical system in MATLAB-SIMULINK for real-time applications is simulated for partial-scale or full-scale and validated simulation results with the existing system. One of the applications is AC drive systems with speed adjustability not only limited to equipment's of electrical. The proper selection of AC motor drive is one of the main resolves of this paper. The efficient control of speed and torque is the second aim by considering the flux weakening regions.

**Index Terms:** Induction motor, Vector control, Flux-weakening region, Artificial Intelligent controllers.

## I. INTRODUCTION

Depending upon the types of loads now days the growing demand is increased and the complexity also increased. The main objective and challenging is testing and verification of the loads and drive system. The realistic calculations and simulation studies are done with varying loads of mechanical. There are many learning and exhaustive algorithms of controllers to control the electric drives and control irrespective of the power specifications. Several experimental and laboratory experiments and tests are been conducted.

For high-power electric drives with all customized controllers for different applications by varying electric drive is designed and tested [1]. To use fully real-time digital simulation a recent alternative way of testing that is fast becoming is quite popular. Interfacing of these simulations with industrial controllers, thus saving a lot of cost of the investment amount and an economic tool is allowed for testing of drive controller in all power ranges and offering the machine simulations flexible [2].

"Online data and signal process for analysis purposes" of the use of virtual system drive systems enables relatively easier interface to the computer and faster and Earlier hardware which replaces the equivalent model of the drive system. The commonly used drive systems are induction motor, stepper motor, servomotor and synchronous motor and the same has been tested with different conventional and AI controllers, the hardware. Recently real time systems in fully digital simulation tested with regulator as well as experimental using a simulation [1] With the problem of modeling and real-time simulation, a converter starts and stops the drive for variable speeds and applications to develop models for electric vehicles and electric hybrids [3]. Proposal

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G. Srikanth, Associate Professor, of EEE, Geethanjali college of Engineering and Technology, Hyderabad.

SG. Madhusudhana Rao, Professor of EEE, VJIT, Hyderabad, India. Country Name.

for the modeling of the drive system by block diagram representation and state space

Analysis, which is simulated in MATLAB, which is an easy to use software. State stability and production tests play an important role for variable conditions [3]. The attributes of induction machines are inherently very interesting for drive applications. They are cheap, resistant and do not have sliding contacts to use and build. When variable speed drives are used, the difficulty of induction machines and servomechanisms is that they are "difficult to control", the torque-speed ratio is analyzed and, therefore, complexity and non-linearity are analyzed [4]. An AC induction motor for more than 100 years of three-phase has proved extremely reliable when using an electromechanical conversion device. However, to act as frequency changers with modern power electronics and digital electronics to perform the required arithmetic and logic control function, induction machines are seeing increasing use in inverter applications [5]. Its characteristics have been well defined and standardized for the vast majority of that time period, it has evolved as a constant speed device operating from a constant frequency sinusoidal public service energy source and constant voltage.

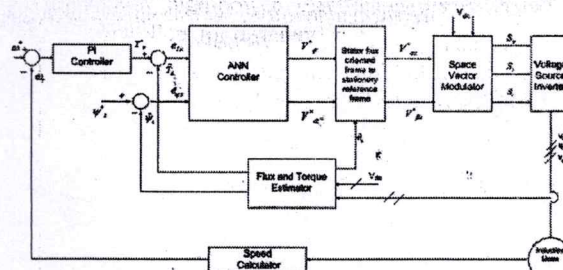


Fig 1: ANN based MTC of IM Drive

## II. FOCV CONTROL THEORY

The control of FOC strategy which produces and used for improving IM-drive ability [1].

The novel controller of basic amounts of: the rotor flux

vector  $\psi_r$  of the modeling of IM and x-y stationary coordinate system and the equations are:

$$\overline{\psi_r} = \psi_r e^{j\alpha_\psi} \quad (1.a)$$

i.e. it can be characterized as a vector with  $\psi_r$  magnitude and  $\alpha_\psi$  angle, and can be designed quite convolutely.



# Insulation integrity of grading high insulating spacer with functionally graded material in a Gas Insulated Busduct

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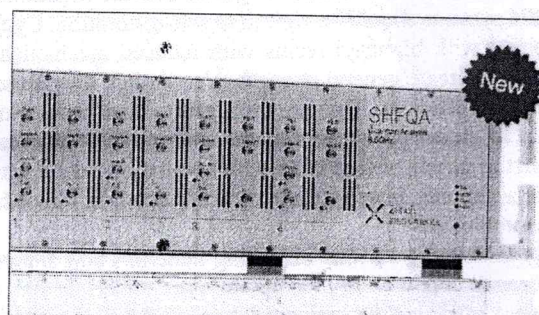
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# Field stress control of a post type grading low insulating spacer with functionally graded material in a gas insulated bus duct

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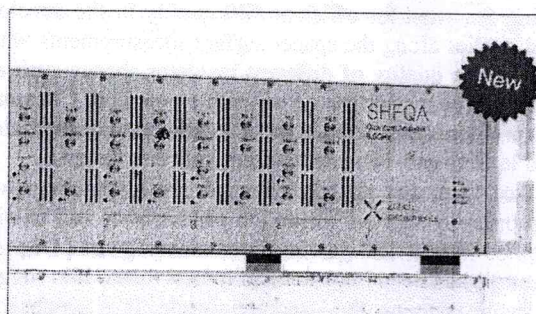
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# Computational and experimental analysis of $\text{LiFePO}_4/\text{C}$ cathode material for lithium ion battery applications

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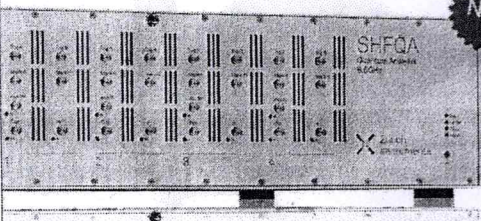
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# Synthesis and charecterization of $\text{LiMn}_{1.5}\text{Ni}_{0.5}\text{O}_4$ by sol-gel method for cathode material & it's application in Li-ion battery

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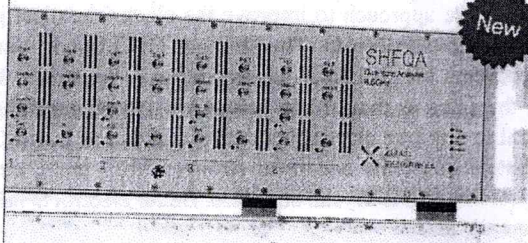
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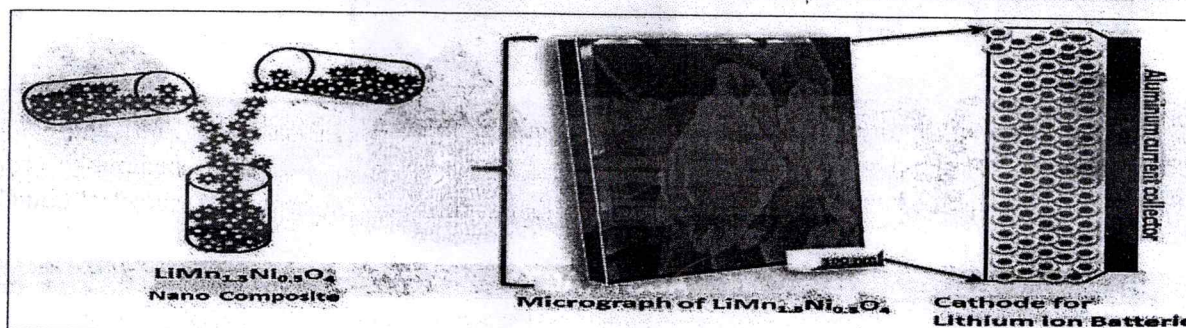


THEME: Nanotech for Energy and environment

## SYNTHESIS AND CHARACTERIZATION OF $\text{LiMn}_{1.5}\text{Ni}_{0.5}\text{O}_4$ BY SOL-GEL METHOD FOR CATHODE MATERIAL & ITS APPLICATION IN LI-ION BATTERY

Subhashini.Vedala<sup>1</sup>, Sushama.M<sup>1\*\*</sup>, K.Venkateswara Rao<sup>2</sup>, M.Aruna Barathi<sup>3</sup><sup>1, 1\*\*</sup> Department of Electrical & Electronics Engineering, JNTU Hyderabad, Hyderabad, Telangana, India 500085,<sup>3</sup> Department of Electrical & Electronics Engineering, Geethanjali College of Engineering and Technology Cheeryal, Keesara (M), Medchal (Dist.)-501301<sup>2</sup> Centre for Nano Science and Technology, IST, JNTU Hyderabad, Hyderabad, Telangana, India 500085,\*\*Corresponding author. Mobile: (+919848637597; E-mail: [m73sushama@jntuh.ac.in](mailto:m73sushama@jntuh.ac.in))

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Sol-gel Synthesis of  $\text{LiMn}_{1.5}\text{Ni}_{0.5}\text{O}_4$  NanoComposite for Lithium ion battery Applications.

### ABSTRACT

Our past decade witness to the quick growth of Li-Ion battery industry in response to the needs of electronic and information industries. Lithium Cobalt Oxide used as Initial cathode material for Li-ion batteries application it consist of high toxic nature, costly and with low energy density. Thus there need to develop new Li-Ion batteries to improve above characteristics along with efficiency and make it portable. So that can be used in electronics, transportation, and energy storage and especially in hybrid electric vehicles.  $\text{LiMn}_{1.5}\text{Ni}_{0.5}\text{O}_4$  is the best development seen so far. It is improved version of  $\text{LiCoO}_2$ . It usually overcomes all the problem of older batteries. The high initial capacity and good cycling behavior of  $\text{LiMn}_{1.5}\text{Ni}_{0.5}\text{O}_4$  powders calculated at temperatures are closely related with the higher crystallinity and retention of the spinel structure with cycling hence proved that  $\text{LiMn}_{1.5}\text{Ni}_{0.5}\text{O}_4$  is far better than other batteries. For synthesizing  $\text{LiMn}_{2-x}\text{Ni}_x\text{O}_4$ , we use sol-gel procedure. The electro chemical performances of prepared samples are tested. The crystallinity and lattice constant by X-Ray diffraction, thermal analysis by TGDTA, morphology by SEM and bonding between the atoms by FTIR were studied in this paper.

**Keywords:** XRD, TGDTA, SEM, FTIR

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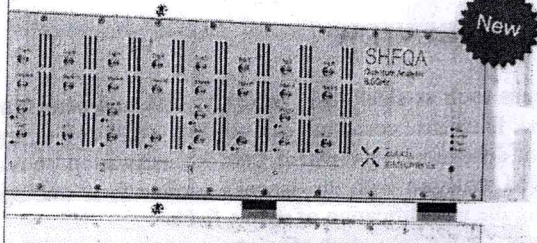
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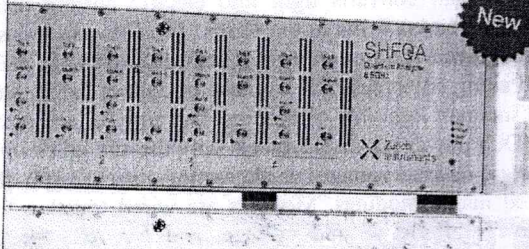
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# Induction motor design analysis for electric vehicle application

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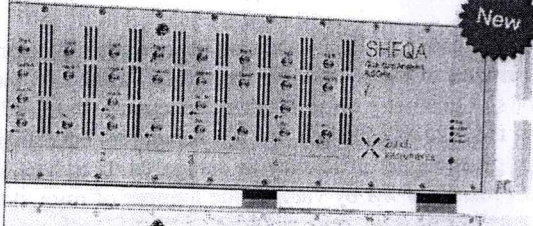
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# A consecutive parameter extraction technique for IGBT compact model

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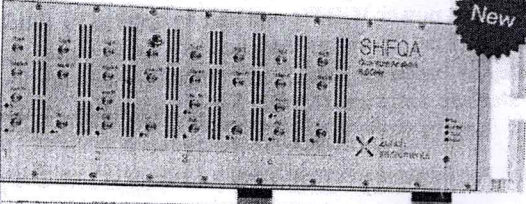
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# Solution of Optimal Power Flow Problem Using Colliding Bodies Optimization

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**Abstract**—A new evolutionary algorithm called colliding bodies optimization (CBO) considered in this paper to solve optimal power flow (OPF) problem in a power system network. CBO is based on natural phenomenon of one dimensional collision between two objectives. It does not have any control parameters and simple in structure. IEEE 30-bus system with various objective functions like, minimization of total fuel cost with valve point loading effect, minimization of emission profile are considered to test the feasibility and effectiveness of the CBO algorithm. In comparison with the other existed methods presented in the literature, the proposed CBO algorithm gives better optimal solutions for single objective OPF problems.

## INTRODUCTION

Optimal power flow (OPF) has a significant importance in power system planning and operation control. OPF was first defined by Dommel and Tinney in 1960. The main goal of OPF is to find a most favorable settings of any given objective function by adjusting the some of control variables to satisfy the set of equality and inequality constraints imposed by the power system. The control variables include real power outputs except slack bus and voltage magnitudes of generated buses, shunt var compensators connected at various buses, and transformer taps. The equality constraints are the nonlinear power flow equations, and inequality constraints are the load buses voltage magnitudes, transmission line flows, slack bus real power output and reactive power limits of the generators [1].

Various analytical and conventional methods are used to solve the OPF problems like, linear programming (LP) [2], Interior point [3], Newton method [4]. Nevertheless, these methods are difficulty to solve the objective functions and constraints are nonlinear. In order to defeat the drawbacks in conventional methods and to get approximate optimal solution evolutionary algorithms such as, genetic algorithm (GA) [5], tabu search (TS) [6], differential evolution (DE) [7], evolutionary programming (EP) [8], artificial bee colony (ABC) [9], particle swarm optimization PSO [10], teaching learning based optimization (TLBO) [11], shuffle frog leaping algorithm (SFLA) [12], are developed to solve the several OPF problems.

Recently, Kaveh and Mahdavi developed a new evolutionary called colliding bodies optimization (CBO) [13] to solve the continues optimization problems. CBO is a multi-agent algorithm and it is inspired from natural phenomenon of one-dimensional collision between two objective bodies. In CBO each agent is considered, as a colliding body (CB) with specified mass and velocity. A collision occurs between any two pair of objects and its new positions are updated with new velocities based on the collision laws. The main advantage of CBO is that, does not have any tunable parameters and simple in its structure. The CBO algorithm has been successfully applied to many real world problems [14, 15] and obtained results are proven that the CBO is effective and superior to solve the optimization problems. In this paper, CBO is applied to solve the OPF problems of IEEE 30-bus system with different objective functions.

The remaining paper is organized as follows: Section II explains the OPF problem formulation. Section III gives a brief introduction of collision laws and the procedure of the proposed CBO algorithm to solve the OPF problems. Section IV summarizes the simulation results of different objective functions and finally, conclusions are described in Section V.



## Adaptive Neuro Fuzzy Based Maximum Torque Control of Three Phase Induction Motor

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Received: 10<sup>th</sup> December 2017, Accepted: 17th January 2018, Published: 28th February 2018

### Abstract

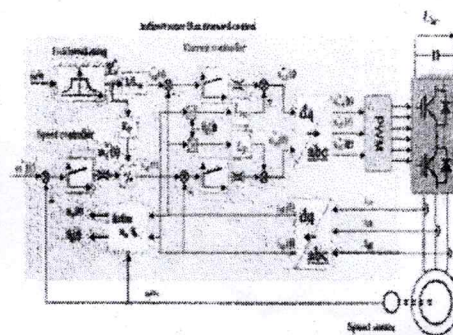
This paper manages the Maximum Torque Control of IM drives utilizing ANFIS. In modern control hypothesis, the IM is depicted by various arithmetical models, as per the engaged control technique. The proposed approaches straightforwardly direct the machine stator flux as indicated by the desirable torque, utilizing an optimal stator flux reference. In this manner, the proposed technique is appropriate for motor control conspires that depend on coordinate motion control, for example, coordinate torque control or direct torque vector control. Utilizing ANFIS, especially the neural systems, execution and operation of acceptance IM is progressed. This paper presents ANFIS based MTC of Three-phase IM. The execution of the intellectual controller has been examined through MATLAB/Simulink condition, for various operational conditions. At last, the outcomes are watched that ANFIS based controllers give preferable reactions over alternate controllers

**Keywords:** ANFIS, Torque Control, Induction Motor, MATLAB/Simulink.

### Introduction

For any machine we expect less error, most extreme output for that we have to control the torque. In three phases IM the maximum torque control can be accomplished in various techniques. The controlling of most extreme torque should be possible in customary controllers, for example, corresponding controller, relative in addition to essential controller however these are particularly helpful in steady state and for linear systems. In any case, the P, PI controller has primary disfavor is tuning of parameters  $K_p, K_i, K_d, T_d, T_i$  (and also other problems like the high starting overshoot, sensitivity to controller gains and sluggish response due to sudden disturbance) In about the same period, there were also advances in control methods and Artificial Intelligence (AI) techniques. Artificial Intelligent strategies mean utilization of master framework, fluffy rationale, neural systems and hereditary calculation. Experts soon understood that the control of IM drives can be improved by receiving automated interpretation based techniques like The Artificial Intelligence (AI) methods, for example, Expert System (ES), Fuzzy Logic (FL), Artificial Neural Network (ANN), and Genetic Algorithm (GA) have been connected broadly responsible for

Control of IM drives. Among all the branches of AI, the ANFIS appears to have more significant effect on Power electronics and IM Drives.



**Fig.1.General Configuration of Maximum Torque Control of Three Phase Induction Motor**

The ANFIS is able of learning the preferred mapping involving the inputs and outputs signals of the system without Significant the exact arithmetical representation of the system. Since the ANFIS do not use the arithmetical representation of the system, the same. The ANFIS are excellent estimators in non linear systems [6] - [8]. Various ANFIS based control approach have been implemented for MTC of induction motor drive to conquer the system drawback. In this paper, NN flux point estimation, segment range and switching vector range design projected.

### Adaptive Neuro Fuzzy Inference System

A neuro fuzzy structure is a fuzzy structure that practices a derived learning algorithm or stimulated by the theory of neural networks to determine its factors (fuzzy set and fuzzy rules) by handling data models. NFC is the arrangement of Fuzzy Inference System (FIS) and NN. The fuzzy logic is activated permitting to the fuzzy rule and NN is accomplished based on the training data. The neural network formation data set is generated by fuzzy rules. The NFC function is clarified in the following section.

### Fuzzy Logic Controller

Fuzzy control system is a control system based on fuzzy logic –a mathematical system that analyzes along input values in terms of logical variables that take on continuous values between Zeros and ones.



## Additive Manufacturing for VADs and TAHs - a Review

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**Abstract.** Heart disease or Advanced/Congestive Heart Failure (CHF) is one of the serious causes of death. Due to availability of low volumes of donor hearts, there has been an ongoing development of Mechanical Circulatory Support (MCS): Ventricular Assist Devices (VADs) and total heart replacement by Total Artificial Hearts (TAHs) for over 60 years. MCS systems had seen three phases of advancement. The first generation were largely mechanical devices and had pulsatility in their action, but were highly cumbersome, unreliable due to fatigue cracks and required an external pneumatic power and control. Smaller and continuous flow devices are the second generation MCS devices. Because of compact sizing they were suitable for implantations and were more durable than the first generation devices. Problems like pump thrombosis drove the development of motors with levitating or hydrodynamic rotors, leading to the development of third generation devices. Manufacturing of these electromagnetic devices for implantation has to adhere to the constraints of compatibility, space and weight. With the advent of new biomaterials, additive manufacturing is reportedly playing a significant role. Additive manufacturing reported for electromagnetic and electronic components had yielded considerably good performance. This paper reviews materials in electrical and electronics and also in bio medical sector suitable for Additive Manufacturing. An attempt is made to identify the materials that may be suitable for VADs and TAHs and the challenges to use AM techniques that complement each other to create next generation integrated-VADs and integrated-TAHs.

### 1. Introduction

Due to the less availability of donor hearts [1], there has been an on-going development of Mechanical Circulatory Support (MCS) as VADs and as total heart replacements by TAHs for over 60 years as bridge to transplant or as a destination therapy [2-6]. Natural myocardial performance when replaced by MCS in pre-transplant patients was shown to improve post-transplant rates of mortality [7-9].

Mechanical circulatory frameworks had seen three phases of advancement. The first generation mechanical circulatory support devices were largely mechanical devices, which were highly cumbersome, unreliable due to small fatigue cracks and required an external pneumatic power and control. These devices had Pulsatility in blood flow. Smaller and continuous flow devices are the second generation MCS devices, which were electro-mechanical. They were more reliable and compact than the first generation. The lifetime was limited to 1-2 years, but failed to get pulsatility in flow. Diminished nature of pulsatility increased the pressure gradients on the aortic valve; left ventricular recovery rate got slower [10]. Problems like pump thrombosis prompted the development of non-bearing type of devices leading to the development of third generation devices, where the rotors/pumps magnetically/hydrodynamically levitate, thereby providing better hemocompatibility [11]. Manufacturing of these electromagnetic devices for implantation has to adhere to the constraints of space and weight apart from being bio-compatible. Researchers are trying to understand why the blood interacts with the artificial surfaces of the pumps to cause clotting and inflammation and thereby develop surfaces that avoid the same [13].

Longevity, hemocompatibility issues combined with predicted increasing demand for heart valve replacements has evoked the search for alternative fabrication methods of heart valve replacements [14].



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# SOLAR ENERGY MEASUREMENT SYSTEM

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\*\*\*

## ABSTRACT:

This project aims to develop a measurement of solar energy using Arduino Board technology. In this research, three parameters measured are voltage, current and Maximum Power Point Tracking. The voltage is measured using the voltage sensor because the voltage generated by the solar panel are large for the Arduino as receiver. The current is measured using the current sensor module that can sense the current generated by the solar panel. These parameters as the input value for the Arduino and the output is sent to Thingspeak. Maximum Power Point Tracking, frequently referred to as MPPT, is an electronic system that operates the Photovoltaic (PV) modules in a manner that allows the modules to produce all the power they are capable of producing. ThingSpeak is an IoT analytics platform service that permits to collect, visualize and analyze live data streams in the cloud. ThingSpeak gives instant visualizations of the information posted by our devices to the ThingSpeak. The main controlling device of the whole system is an Arduino microcontroller. Solar panel, voltage sensor, current sensor, ESP8266 Wi-Fi module are interfaced to Arduino.

**Keywords:** Arduino, ESP8266 Wi-Fi module, Solar Panel

## 1. INTRODUCTION

The impacts of global warming are being felt across the globe. We have to reduce our dependence on fossil fuels and start using clean energy instead. Solar energy is an example of promising renewable sources that is presently being used in the world for meeting rising demands of electric power. This power is the conversion of sunlight into electricity, sunlight is

collected either directly by using photovoltaics or indirectly using concentrations of solar energy. In this project a solar panel is used which keeps monitoring the parameters of the solar panel like the voltage, current and Maximum Power Point Tracking. Maximum Power Point Tracking, frequently referred to as MPPT, is an electronic system that operates the Photovoltaic (PV) modules in a manner that allows the modules to produce all the power they are capable of. MPPT is not a mechanical tracking system that "physically moves" the modules to make them point more directly at the sun. MPPT is a fully electronic system that varies the electrical operating point of the modules so that the modules are able to deliver maximum available power.

The main controlling device of the whole system is a Arduino microcontroller. Solar panel, voltage sensor, current sensor, ESP8266 Wi-Fi module are interfaced to Arduino. The microcontroller initially measures the voltage and current from solar panel and wind turbine without load connected. Also, the microcontroller measures the voltage and current from solar panel under load conditions. The Arduino microcontroller takes the decision of operating the load through PWM (Pulse Width Modulation) until the maximum voltage is obtained from solar panel without degrading the load performance. The values of voltage and current are to Thingspeak through Wi-Fi module. To perform this intelligent task, Arduino microcontroller is loaded with an intelligent program written using embedded 'C'. An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main devices used in embedded products are Microprocessors and Microcontrollers. Microprocessors are commonly referred to as general purpose processors as



# Colliding bodies Optimization Algorithm for Solution of Economic Dispatch with Valve-Point Loading Effect

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## Abstract:

The paper represents a novel of Colliding Bodies Optimization (CBO) algorithm to solve economic dispatch problems. CBO algorithm is based on natural phenomena on one-dimensional collisions between bodies, with each other by considering as an object with their respective mass. So, after their collision of two moving bodies with their new velocities, these collisions may cause the loads to move their better positions in the search of space. This method is proposed by CBO algorithm and is tested by considering three and six generating unit systems on different loads on objective function like minimization of total fuel cost with loading effect. The attained results have proved that the CBO algorithm provides the best result when compared with ones.

Keywords: Colliding Bodies- Optimization algorithm, Economic dispatch.

## 1.INTRODUCTION

Now-a-days there has been raised the complexity in power system operations due to increase in load demand and power system security issues. One of the best tools is Economic Dispatch (ED) for optimal power outputs of all the committed generating units to minimize the total fuel cost by satisfying several operation and control in modern energy management system. The idea of economic operation is to schedule the constraints.

ED is a nonlinear, non-convex, large-scale optimization problem. Therefore, several mathematical methods are applied to solve the ED problems such as quadratic programming (QP) [1], Lagrangian relaxation [2], Branch and bound (BB) [3], and linear programming (LP) [4, 5]. All these methods are excellent to solve the convex ED problems. Nevertheless, these methods are difficult to find an optimal solution due to non-convex nature of ED problem. Therefore, to defeat shortcomings the above methods and to get a near global optimal solution evolutionary algorithms, namely genetic algorithm (GA) [6], particle swarm optimization (PSO) [7], tabu search (TS) [8], differential evolution (DE) [9], evolutionary programming (EP) [10], evolution strategy (ES) [11], artificial bee colony (ABC) [12], harmony search (HS) [13], firefly (FF) [14], symbiosis optimization search (SOS) [15], and Colliding Bodies Optimization (CBO) [16] algorithms are developed to solve ED problems.

Recently, Kaveh and Mahdavi [16] developed Colliding Bodies Optimization (CBO) algorithm to solve the continuous optimization problems. CBO method is based on the natural phenomenon of one-dimensional collision between two bodies with two adjacent objective bodies. In this method, each parameter is considered as a colliding body with specified mass and velocity. So, after their collision of two moving bodies with their new velocities, these collisions may cause the loads to move their better positions in the search of space. In this paper, CBO is applied to solve the ED problem of three and six-generators of different loads on objective functions.

The remaining paper is organized as below:

Section 2 is explained as ED problem Formulation. Section 3 is explained about the CBO laws and proposed the algorithm to solve ED problem. Section 4 is explained about the simulation results of different objective functions and finally, conclusions are explained in section 5.

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# ORNITHOPTER

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**ABSTRACT:** In recent years the subject of flying vehicles propelled by flapping wings, also known as ORNITHOPTERS, has been an area of interest because of its application to micro aerial vehicles (MAVs). These miniature vehicles seek to mimic small birds and insects to achieve never before seen agility in light. This renewed interest has raised a host of new problems in vehicle dynamics and control to explore. In order to better study the control of flapping wing light we have developed a large scale ornithopter. It is capable of carrying a heavy (400 gram) computer and sensor package and is designed especially for the application of controls research. The design takes special care to optimize payload capacity, crash survivability, and field repair abilities. This thesis covers the design process of both the mechanical and electrical systems of the ornithopter and initial control experiments.

**Keywords:** ORNITHOPTER, MAV, Payload Capacity.

## 1. INTRODUCTION

An Ornithopter (from Greek *ornithos* "bird" & *pteron* "wing") is an aircraft that flies by flapping its wings. Designers seek to imitate the flapping-wing flight of birds, bats. Though machines may differ in form, they are usually built of the same scale as these flying creatures. An ornithopter is an aircraft that flies by flapping its wings. Inspired by nature, we intend to make a remote controlled ornithopter as our project. This is the beginning of a new era in flapping-wing flight. The wings had a set range of motion and we could only control the speed. This system mimics the real bird in the nature. In this project we used arduino controlled motor and gears to drive the flapping mechanism of the wings.

## 2. COMPONENTS USED

### 2.1. On Board

**1. Arduino UNO / NANO :** Arduino uno is an open source microcontroller board based on microchip ATmega328P microcontroller and

developed by Arduino.cc. It is used to encode and decode data.

**2. Servo Motors :** Servo motors are DC motors that allow for precise control of the angular position. They are DC motors whose speed is slowly lowered by the gears. The servo motors usually have a revolution cut off from 90° to 180°. A few servo motors also have a revolution cutoff of 360° or more. It is used to control the motion of the tail.

**3. BLDC Motor :** A brushless DC electric motor (BLDC motor or BL motor), also known as electronically commutated motor (ECM or EC motor) and synchronous DC motors, are synchronous motors powered by direct current (DC) electricity via an inverter or switching power supply which produces electricity in the form of alternating current (AC) to drive each phase of the motor via a closed loop controller. The controller provides pulses of current to the motor windings that control the speed and torque of the motor. It is used to create flapping mechanism.

**4. Electronic speed control :** An electronic speed control or ESC is an electronic circuit that controls and regulates the speed of an electric motor. It may also provide reversing of the motor and dynamic braking. Miniature electronic speed controls are used in electrically powered radio controlled models. Full-size electric vehicles also have systems to control the speed of their drive motors. It is used to control the speed of BLDC motor on the command of slider potentiometer.

**5. Lithium polymer battery :** A lithium polymer battery, or more correctly lithium-ion polymer battery (abbreviated as LiPo, LIP, Li poly, lithium-poly and others), is a rechargeable battery of lithium-ion technology using a polymer electrolyte instead of a liquid electrolyte. High conductivity semisolid (gel) polymers form this electrolyte. These batteries provide higher specific energy than other lithium battery types and are used in applications



# Booklet Counting Machine

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**Abstract** - Booklet counting machine proposes the idea of fast and efficient counting of booklets without human effort. Here, for the functioning of the machine employs Infra-Red (IR) sensing technology to sense the booklet and sends the signal to the controller board. Eventually, it sends the signal to the input terminals of display board to show to count that has been counted and Peripheral Interface Controller (PIC) Microcontroller is employed. It makes the machine to function more accurate. It uses two modes of counting viz., Infinite counting and finite counting modes. In finite counting mode, the booklets to be counted is given as input, whereas infinite counting mode is used to count the number of booklets loaded in the tray. It finds a numerous application in many fields. This project is proposed as a remedial measure for the problem raised in the exam cell of the college.

**keywords** - PIC Microcontroller, Infra-red Sensor, Infinite counting, Finite counting.

## I. INTRODUCTION

The earlier machines were available only to count the Booklets. But there is a need in the exam cell of every educational institutions and universities to count the question and answer booklets and distribute to concern exam halls. Here, it needs extra human effort to do it and there is a chance for the human error to occur. This may lead to mess at the time of examinations. Hence, we come up with the idea of project to count the booklets in an efficient manner. Booklet counting machine employs the embedded system Peripheral Interface Controller for the functioning of the machine. It makes the machine more accurate in functioning. The usage of PIC controller makes the interfacing of the display and programming of the proposed project more convenient and efficient. To perform this task, microcontroller is loaded with an intelligent program written using embedded 'C' language and Electrical and Electronics technology[1] is used.

## II. LITERATURE SURVEY

Growing number of routine and research activities, in a wide variety of fields, have the counting of certain types of objects (cells, people, Stationary, etc.) as one of their main components. In most cases, such counting procedure is performed manually, for that reason, several methods for automatically counting the objects of interest have been proposed. Manual counting of different objects has been invented to reduced manual work like Cash/Currency counting machines, Paper counting machines, Color Sorting machines. Such advances accompanied by,

The first automatic bill counting machines (or money counting machines) were introduced in the 1920s in the United States and were produced by the Federal Bill Counter Company of Washington, D.C. These machines were designed to increase efficiency in tellers in the Federal Reserve Bank and reduce human error. The machine would stop once a set "batch" of notes was reached allowing a teller to insert a wooden block to keep batches separate.[2]

The Paper counting machine at the beginning of the third millennium B. MATIC designed and realized the "Pack Mover" the only paper counting equipment to count, pick and shift a pack of given number of sheets directly from the pile.

For Counting a booklet manually is time taking process, so in order to reduce it the booklet counting machine is to be designed and developed.

## III. CONCEPTUAL BACKGROUND

An embedded system[3] is a computer system designed to perform one or a few dedicated functions often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. By contrast, a general-purpose computer, such as a personal computer (PC), is designed to be flexible and to meet a wide range of end-user needs. Embedded systems control many devices in common use today and are controlled by one or more main processing cores that are typically either microcontrollers or digital signal processors (DSP). Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale. Physically embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. This booklet counting machine is concept based on the currency counting machine For Office automation We use systems like fax machine, modem, printer etc.

## IV. BLOCK DIAGRAM & WORKING

The fundamental working principle of booklet counting machine is like the printer, copier machine and currency counting machine. It consists of Regulated Power Supply, PIC microcontroller, Relay with Driver, 4x4 Keypad, LCD display with Driver, IR Sensors, Crystal Oscillator, DC motor, Reset Buttons, Switches. In this machine, it has two modes of counting they are, Finite and Infinite modes. It works as when the booklets to be counted are loaded, next select the mode of counting with the switch. When it is switched to finite mode, it shows in LCD to enter the number of booklets to be counted through keypad, if the selected



# SINGLE AXIS SOLAR PANEL TRACKER AND POWER OPTIMIZATION USING PIC-MICROCONTROLLER

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**Abstract:** In this project we explain about solar tracking system using a combination of micro-controller, DC motor and light dependent resistors (LDR's) with the primary aim of improving the power efficiency of the solar panels. The main component of this tracker is PIC16F72 micro-controller which is programmed to detect the sunlight with the help of LDRs and then actuate the DC motor to position the solar panel in such a way so that it gets the maximum sunlight. Thus, this system can achieve maximum illumination and can reduce the cost of electricity generation by requiring minimum number of solar panels with proper orientation with the sunlight. This work is an application development done in college project.

**Keywords:** Power Optimization, Solar Panel, LDR's, DC Motor, PIC 16F72 Microcontroller.

**1.INTRODUCTION:** The purpose of this project is to design and construct a solar tracker system that follows the sun direction for producing maximum output for solar powered applications. Achieving balance between power consumption and power production is a bigger challenge today. The best way to solve this imbalanced equation is to use solar energy as efficiently as possible. The problem in the usage of solar energy is with solar cell panel should be exposed maximum to the sun light. If the solar panel is fixed in a particular direction then the sun light intensity varies from morning to evening. Moving the solar cell panel in the direction of sun can increase the solar energy generated from the solar cell. This project consists of few sun light sensors and a motorized mechanism for rotating the panel in the direction of sun. Microcontroller based control system takes care of sensing sunlight and controlling the motorized mechanism. This system works continuously without any interruption.

## 2. BLOCK DIAGRAM:

Microcontroller based Solar Tracker with DC Motor Control

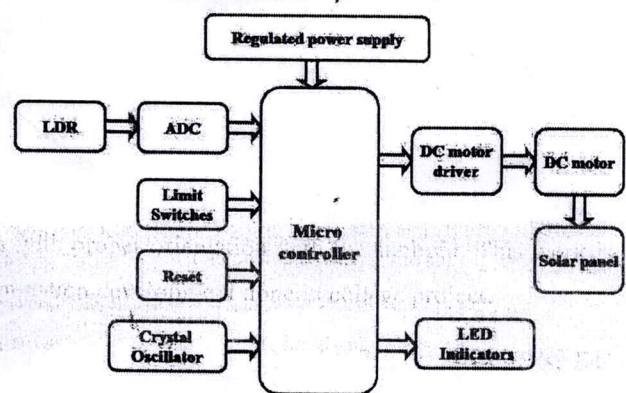


Fig.1 Block Diagram

## 2.1 REGULATED POWER SUPPLY:

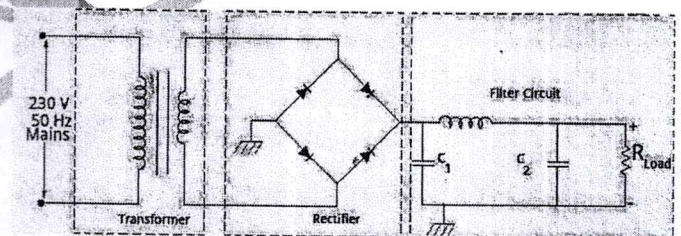


Fig.2.1 Circuit Diagram of Regulated Power Supply.

The Regulated supply here is used in conversion of 230V 50 Hz supply to 12 V DC supply to Charge PIC Microcontroller.

- Transformer – Steps Down 230v AC to 12V AC supply.
- Rectifier – Converts 12V AC to 12V DC varying output supply.
- Filter Circuit – filters the varying DC supply by sending small ripples.
- Regulator – Eliminates the ripple by setting DC supply to a Fixed Voltage i.e., 12V.



# A Smart Street Lighting System Using Solar Energy

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**Abstract :** This paper aims at designing and executing the advanced development in embedded systems for energy saving of street lights. Nowadays, human has become too busy, and is unable to find time even to switch the lights wherever not necessary. The present system is like, the street lights will be switched on in the evening before the sun sets and they are switched off the next day morning after there is sufficient light on the roads. this paper gives the best solution for electrical power wastage. Also the manual operation of the lighting system is completely eliminated. In this paper the two sensors are used which are Light Dependent Resistor LDR sensor to indicate a day/night time and the ir sensors to detect the movement on the street. the microcontroller PIC16F72 is used as brain to control the street light system, where the programming language used for developing the software to the microcontroller. Finally, the system has been successfully designed and implemented as prototype system.

**Keywords:** Street light, LDR, IR Sensor, Solar Energy, Microcontroller.

## 1. INTRODUCTION

Automation has created a bigger hype in the electronics. The major reason for this hype is automation provides greater advantages like accuracy, energy conversation, reliability and more over the automated systems do not require any human attention. Any one of the requirements stated above demands for the design of an automated device. The energy conversation is very important in the current scenario and should be done to a maximum extent where ever it is possible. Energy can be effectively conserved if we can control the traffic lights on the highways by glowing them only when there is traffic on the road, and this is all most impossible to detect the arrival of a vehicle manually without the presence of light. So in this situation we should think about a system which is capable of sensing the arrival of vehicle and ON the lights and turn OFF as soon as the vehicle leaves the area.

Our solar panel based street light controlling system is the result of this idea. This was designed with a vehicle detecting sensor which is capable of sensing the arrival of a vehicle. It drives the same information to a micro controller. The micro controller is interfaced with the street lights and it is the responsibility of the controller to switch the status of the lights with respect to the acknowledgement received to it from the vehicle sensor. The major advantage of the device is it not only controls the status of the light but also controls the intensity of the light with respect to the intensity of the light received from the vehicle. The power supply to the street is supplied from solar panel.

The basic firmware for the microcontroller is written in Embedded C language and compiled using PIC compiler. The compiler generates the Hex code for the microcontroller and the Hex code is stored /programmed in flash memory of micro controller.

## 2.BLOCK DIAGRAM OF AUTOMATIC STREET LIGHTING SYSTEM

The block diagram of street lighting system as shown in Fig. 1 consists of microcontroller, LDR, and IR Sensor. By using the LDR we can operate the lights, i.e. when the light is available then it will be in the OFF state and when it is dark the light will be in ON state, it means LDR is inversely proportional to light. When the light falls on the LDR it sends the commands to the microcontroller that it should be in the OFF state then it switch OFF the light, the IR sensor will be used to turn ON or OFF the light according to the presence or absent of the object. All these commands are sent to the controller then according to that the device operates. We use a transistor to act as an ON/OFF switch.

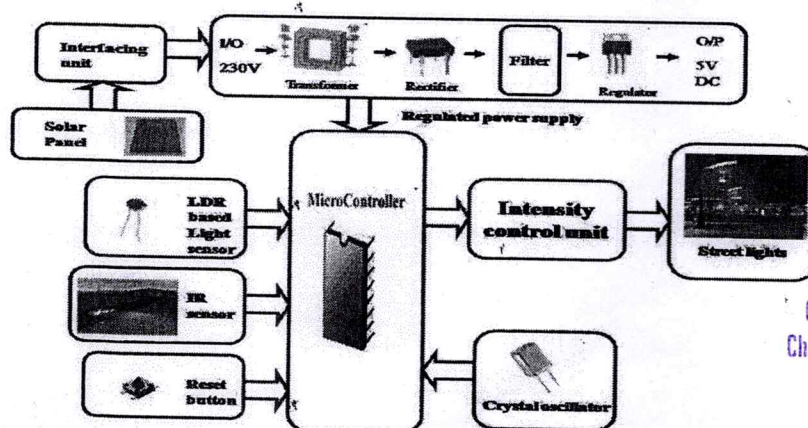


Fig: 2. Block Diagram of Automatic Street Lighting System

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# PROTOTYPE OF FUELLESS ELECTROMAGNETIC TRAIN

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**Abstract:** Diesel or electric train, whichever it may be involves enormous maintenance, these days almost all the train routes are electrified and hence electric trains gained lot of popularity. In fact electrification of train route involves huge investment and moreover it is very difficult to run the grid or pantograph through the existed tunnels. Since the pantograph causes mechanical oscillations, occasionally gaps may be present in the over head lines resulting arcing by which current carrying conductors will be damaged. To overcome all these problems here a mini model of Electro-Magnetic train is designed which acquires electric energy through air, so it doesn't have any physical contact with power cables. Wireless power transmitting technology is implemented here for which non-radiative safe power transmitters are used. Since the rail routes are exposed to the sun, solar energy can be utilized for generating and transmitting the electric energy which can be used to run the train. But since it is a prototype module, normal power source is utilized to energize the power transmitting coils. The main advantage of the system is, since it doesn't have any complex parts, it can be called as maintenance free train.

**Keywords:** Power Transmitters, Solar Energy, Electromagnetic Train, Pantograph, Mechanical oscillations, Magnetic Levitation.

## 1. INTRODUCTION

The concept of Electro-Magnetic Propulsion (EMP) is used to create movement in the model train and it is the principle of accelerating an object by the utilization of a flowing electrical current and magnetic fields. Electro-Magnetic Field in which electric energy will be transmitted from one coil to the other coil in a closed circuit is known as transformer action and here iron core is essential to create magnetic flux. In another case using the concept of wireless power transfer technology, electric energy can be transmitted from one coil to the other without any core here air core coils can be used. The primary coil is known as power transmitting coil and the secondary coil can be called as power receiving coil. In this method when the primary coil is operated at a high frequency, electric energy will be radiated in to the air up to a little distance. When the power receiving coil arranged parallel to the power transmitting coil, it grabs energy through air. Here this concept is used to create movement in the model train. In this concept, the simulation train mechanism doesn't contain any power source attached to its body. The moving mechanism that contains 4 grooved wheels attached to its chassis is equipped with power receiving coil. The output of this coil is used to energize the motor through its control circuit designed with control keys, time delay circuit, relays, limit switches, etc. Since wireless power transfer technology is playing dominant role in this project work, the description is as followed. Wireless power is one of the new terms that define this century. In the age of mobility, the need for wireless power transfer (WPT) is growing fast. There are several approaches for transferring the electric power wirelessly. In this paper, short range power transmitters are described in which power will be transmitted in Uni direction which is also known as point to point power transmission without using any conducting cable.

Resonant Inductive Coupling method is implemented here such that electrical energy will be transmitted to one inductive coil to the other coil with a gap of greater than 5 to 10 cm's. The range depends up on the many factors, size of the coil, power handling capacity of the driving circuit, frequency etc., are the main parameters to enhance the distance. Here the concept is to provide supply to the moving mechanism such that since the power receiving coil is arranged below the chassis of model train, higher rating power coils with huge size diameter is not required and therefore, here small diameter coils of around 5" coils are used. Transmission of electrical energy from a power source to a consuming device without using discrete manmade conductors is very use full for many applications where interconnecting wires are inconvenient, hazardous, or are not possible. The theme presented here is the best solution for short range energy transmitters.

## 2. Methods of Wireless power transfer

There are various methods for transmission of electric energy which are [2]-

1. **lasers:** Lasers are widely used for the wireless power transmission, propulsion and space exploration.
2. **Microwaves:** Microwaves and radio waves can also be used. However the bulk transmission results in higher losses and thus reduces efficiency.
3. **Induction:** The use of electromagnetic induction principle for the transmission of power. The scope of this paper is limited to the transmission of power through this method.

## 3. BASIC PRINCIPLE OF WIRELESS TRANSMISSION USING ELECTROMAGNETIC INDUCTION

Electromagnetic induction is a phenomenon that has been well known since Michael Faraday first described it in 19th century. The law states that "whenever there is a change in magnetic field associated with a conductor, an emf is induced in it." The direction current due to the induced emf is such that it opposes the cause producing it (Lenses law). The transmission of electricity wirelessly adopts the same principle. Its working is same as that of a transformer.

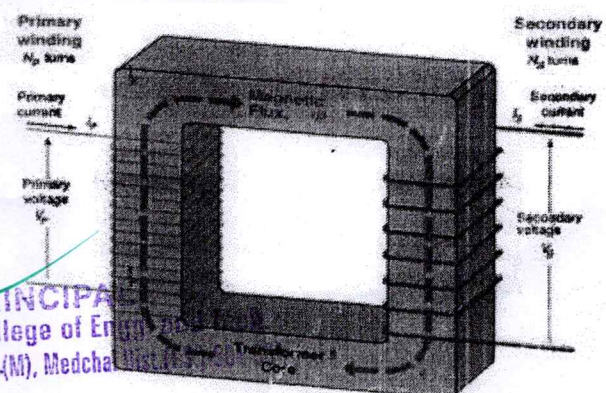


Fig1. Normal Transformer



# SUBSTATION SURVEILLANCE USING QUADCOPTER

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## Abstract

*Automaton (Unmanned ethereal vehicle) is an electronic gadget which is remote controlled based airplane used to accomplish vertical trip with steadiness utilizing KK2.1.5 load up and it tends to be utilized for live spilling and furthermore for catching pictures utilizing camera and as innovation progresses increment the exhibition and diminishes the expense of microcontroller so overall population can structure their own automaton. The primary point of this venture is for live gushing and gathering pictures. This automaton incorporates an edge, flight control load up, engines, electronic speed controllers, a transmitter, a collector, LiPo battery and camera interfaced with the pack. Singular parts were tried and confirmed. Tuning and alignment of the PID controller were done to acquire adjustment on every hub. As of now, the automaton can appropriately balance out itself. The point of the undertaking has been accomplished, bringing about stable and catching pictures.*

**Keywords:** Drone, KK2.1.5 board, Transmitter, Receiver, Motors, Camera for Surveillance.

## INTRODUCTION

A Drone has the potential for performing many tasks where humans cannot enter, for example, high temperature and high-altitude surveillance in many industries, rescue missions. A Drone has four propellers with motors that generate the thrust for

lifting the aircraft. A drone is also called as the Quadcopter. The basic principle behind the quadcopter is, the two motors will rotate in the clockwise direction the other two will rotate in an anticlockwise direction allowing the aircraft to vertically ascend. While taking the flight with the help of a camera we can have live streaming and capture images.

Surveillance is the close observation of a person, group of people, behaviors, activities, infrastructure, building etc for the purpose of managing, influencing, directing, or protecting. There are several different methods of surveillance, including GPS tracking, camera observation, stakeouts, data mining and profiling, and biometric surveillance among others. Traditional observational surveillance methods are typically limited by the stationary nature of the camera, which is usually handled manually or fixed upon a tripod or other structure. Aerial surveillance can be performed using a helicopter; whilst this achieves the desired result, it is also very costly.

Unmanned aircraft systems provide the ideal solution to the problems and limitations faced by other surveillance methods. Drone surveillance presents an easier, faster, and cheaper method of data collection, and a number of other key advantages. Drone planes can enter narrow and confined spaces, produce minimal noise, and can be equipped with night vision cameras and thermal sensors, allowing them to provide imagery that the human eye is unable to



# AUTOMATIC POWER FACTOR CORRECTION USING ARDUINO

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## ABSTRACT:

In this Industrial age as wastage of power is a global concern, efficient generation of power is crucial task. These days many industries in the country face monetary losses and electrical burden which are inductive in nature and therefore causing slacking power factor. The Purpose of this project is to present a simple and economical design of an Automatic power factor correction for single phase loads. This system uses relay to switch the capacitor banks in order to correct the power factor of lagging loads. The switching operation of relay is controlled by Arduino. Arduino is programmed in such a way that it can monitor the system and calculate the power factor of the loads by sensing the signals from Current Transformer, Potential Transformer and keep the power factor above 0.9 by energizing the capacitors in parallel to the connected load by Relay switching.

**Keywords:** Relay, Arduino, Current Transformer, Potential Transformer, Power Factor

## 1. INTRODUCTION

By observing current scenario of technological revolution, we can say that power is very valuable. As the usage of inductive loads in industries is increasing day by day it will have an impact on the power factor value of the system due to which efficiency of the power system decreases. This causes lagging power factor that gives high penalties to consumers. The high penalty situation is tackled by the Power Factor Control. Power Factor Control is a method of reducing the disagreeable effect of loads that causes power factor to drop down to lesser than one. In A.C circuits, the power factor can be described as a proportion of the actual (Real) power that does the work and the Apparent power which is provided to the circuit. Real power is well characterized as the circuit's capacity for performing work in a specific

time. This project provides continuous power factor correction without manual capacitive bank loading. The limit of engrossing the reactive power created by a heap is called Power Factor Rectification. The Reactive Power charge on your electricity bill is directly targeted against those companies who do not demonstrate clear energy efficiency use. You will find this charge itemized on electricity bill. Reactive power charges can be made significantly smaller by the introduction of Power Factor Correction Capacitors which is a widely recognized method of reducing an electrical load and minimizing wasted energy, improving the efficiency of a plant and reducing the electricity bill.

## 2. COMPONENTS USED

### ARDUINO UNO:

The Arduino Uno is a microcontroller board based on the Microchip ATmega328P microcontroller. It consists of digital and analogy pins that may be interfaced to various boards and circuits. The board has 14 digital and 6 analogy pins, and is programmable with Arduino IDE. The Arduino board can be powered by the external 9-volts battery or by USB cable. The inputs to the Arduino are power supply, X-OR. It collects the data from input and accordingly gives commands to Relay and LCD display.

### Relay

A Relay is an electrically operated switching device as it works to isolate or change the state of electric circuit from one state to another. It consists of set of input terminals and operating contact terminals.

### Capacitor bank:

The Capacitor bank is a grouping of several identical capacitors interconnected in parallel or in series with one other. These banks are typically



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## Modular Current Cell topology of Seven and Fifteen Level CSI with Reduced Count

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**Abstract.** CSIs are noticeable highlights contrasted with VSI. The CSIs are a reduced amount of influenced by grid voltage changes, their control is straightforward and they have natural short circuit security. This investigation proposes a novel seven level CSI. The proposed methodology is performed with parallel association of two-switch modules. The estimation of current sources in every module, can be worked in two ways of task: symmetric and asymmetric. In this purposed topology the CHB created as far as the quantity of switches, the quantity of sources, add up to device switch power, and power misfortunes. It demonstrates an extraordinary change in execution of the projected symmetric and asymmetric Configurations are contrasted with customary structures. The projected circuit demonstrates a fascinating element which is the common emitter connection of the main switches. This course of action prompts straightforward gate drive circuits. The seven-level symmetric topology and fifteen-level asymmetrical topology are reenacted and the research facility models of them are materialized. The presented simulation results validate the feasibility of proposed topologies.

**Keywords:** Multilevel voltage source inverter (MVSI), Multilevel current source inverter (MCSI), current cells, Level shifted Pulse width modulation (LS-PWM).

### 1 Introduction

Recent days, the development of highly -efficient semiconductor devices like MOSFET, IGBT gate, integrated gate-switching thyristor (IGCT), double thyristor switched port ( GCT), and the deactivation thyristor transmitter (ETO) have conducted several investigations trends in advanced-power rectifiers, such as multilevel inverters [1,2]. alter benefits of multilevel inverters [3,4] are THD and voltage in inductors and switches, reducing  $dv / dt$  or reducing  $di / dt$  in high power applications and reducing EMI. Multilevel rectifiers are categorized into two types : MVSI and MCSI. Numerous articles have been developed to improve MVSI in the designate of devices, the amount of voltage levels, nominal power, etc. [5,6]. Furthermore, one of the endeavor solutions to deal with the harmonic output current of the inverter and the THD obligatory by various external standards such as IEEE-1547, IEEE-929. In high-power industrial applications where high voltages and currents are needed, such as IM drives [4], stable

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# Design Of A Multilevel Inverter Performance Using Interline Power

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**Abstract.** There is a large increase in power demand and by using Flexible AC transmission systems (FACTS) controllers various steady state control problems in power system can be resolved. In FACTS devices converters form the main component. Apart from the existing multilevel inverters here a new design of inverter is proposed which aims at reducing the number of switches and thus reducing the switching losses. The scheme proposed here is used on an Interline Power Flow Controller (IPFC). The inverter can produce the pulses with different width and magnitude and the output almost resembles a sine wave. The proposed multilevel inverter is applied to an IPFC for protecting voltage sags, swells and momentary interruptions. The dynamic performance is analyzed and verified through MATLAB/SIMULINK.

## INTRODUCTION

The transmission power in ac systems can be given by  $P = V_s V_r \sin \delta / X$  thus by appropriate assumptions achieve desirable power flow control can be achieved. Flexible AC Transmission System (FACTS) controllers conceptualized during 1980's are mostly used for solving different power system steady state control problems. [1, 2]

The quick growth of power electronics in FACTS technology helped in development of FACTS controllers which are classified in two different groups-Thyristor-controlled FACTS controllers and Voltage Source Converter (VSC) based FACTS controllers. VSC-based FACTS controllers symbolize the novel technology for ac transmission system compensation. [3, 4]

One of the VSC-based FACTS controllers includes the Interline Power Flow Controller (IPFC) which is the main issue of this paper. [1, 3, 4]

Gyugyi first proposed Interline Power Flow Controller which can compensate a number of transmission lines at a substation. [5]

IPFC has two or more SSSC with a common dc-link. The major component of these FACTS devices is a converter, and various types of converters have been already proposed which aim at reducing the harmonics [6].

This paper proposes a unique design of inverter with reduced number of switches which is used for FACTS controllers [7]. The proposed multilevel inverter is applied to an IPFC which has been used to prevent voltage sag and swell and to improve power quality problem. The dynamic performance is analyzed and verified through with the help of MATLAB /SIMULINK software.

  
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# Genetic Algorithm with Multi-Parent Crossover Solution for Economic Dispatch with Valve Point Loading Effects

Innovations in Electrical and Electronics Engineering pp 429-438 | Cite as

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Conference paper

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## Abstract

During recent times, different researchers have presented various techniques for different optimization problems. In current literature on genetic algorithms (GAs), a genetic algorithm with multi-parent crossover (GA-MPC) has been found to be more efficient than other hybridized or modified GAs. In this paper, a GA with a new multi-parent crossover has been proposed to get solution economic dispatch (ED). The current algorithm is verified on 3-unit and 5-unit generator systems by considering minimization of fuel cost. The obtained results are proved the effectiveness of the GA-MPC over the other methods mentioned in the paper.

## Keywords

Genetic algorithm   Economic dispatch   New multi-parent crossover  
Valve point effect

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# The Application of Genetic Algorithm with Multi-parent Crossover to Optimal Power Flow Problem

Innovations in Electrical and Electronics Engineering pp 417-427 | Cite

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Conference paper

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## Abstract

Optimal power flow problem (OPF) with continuous, non-smooth function solved with various optimization methods in the literature, OPF can be solved easily by using evolutionary algorithms such as genetic algorithm. Genetic algorithms are widely used in practice. In the current work, IEEE 30-bus system with several objective functions is solved using genetic algorithm with a new multi-parent crossover (GA-MPC) and this was identified to be better than the other algorithms reported in the paper.

## Keywords

Genetic algorithm Multi-parent crossover Optimal power flow

Sum of voltage deviation

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## References



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# Mechanical Properties of Similar and Dissimilar Metals of Monel 400 and SS 321 by Using Gas Tungsten Arc Welding (GTAW) Process

**Citation:** Rikka, S. and Malkapuram, D., "Mechanical Properties of Similar and Dissimilar Metals of Monel 400 and SS 321 by Using Gas Tungsten Arc Welding (GTAW) Process," SAE Technical Paper 2019-28-0141, 2019, doi:10.4271/2019-28-0141.

## Abstract

In the present study the fabrication of joints between the nickel base alloys and steels of various grades have been under taken, joining of these metals has assumed new importance by virtue of their widespread in nuclear and aerospace applications. Such joints provide excellent strength, oxidation and corrosion resistance. This paper deals with the study of weldability, and mechanical properties of weld joints of two different alloys such as nickel based alloy- monel 400 and austenitic

stainless steel AISI 321. The joining of the similar and dissimilar metals is carried out by GTAW process and by employing two different types of filler rods SS321 and ERNiCrMo-3. Mechanical properties such as Ultimate Tensile Strength, Young's Modulus are found as per ASTM testing standards. Percentage of Elongation also found to know the joint efficiency and Microhardness survey across the weld joint to estimate the hardness variations at different locations such as Weld zone of the metal, Heat Affected Zone (HAZ), and Base metal.

## Key Words

GTAW process, UTS, Hardness, Nickel based alloy - monel 400 and AISI 321

## Introduction

The different welding parameters used like welding current and voltage, gas flow rate and successfully joined the 2 dissimilar metals with the help of ERNiCrMo-3 filler wire. The defect of lack of penetration doesn't create great impact, also increase in hardness resulted in decrease of tensile strength, and due to continuous heat inputs, there was more residual stresses developed and prominent formation of coarse grains at HAZ of both the metals in CGTA welding process [1,2]. Fracture occurred at the parent metal of Monel 400 contributing for the ductile mode of failure [2]. According to base metal, hardness value of welding zone decreased and the value of welding zone is higher heat affected zone. Coarse grained structure in HAZ occurred, the hardness of HAZ affected, negatively. The failure started via crack in heat affected zone and fracture carried out in heat affected zone. Fracture which carried out 304 SS material joined TIG welding is ductile [3]. When the joints were welded by Post Weld Heat Treating method in four different cycles in inert nitrogen atmosphere by using two different electrode materials like ENiCu-7 and ENiCrFe-3. The hot cracking resistance of this dissimilar joint is satisfactory when using ENiCrFe-3 electrode. The weld joints exhibit good mechanical properties and tube/tube joints can be welded successfully [4]. Joining the two dissimilar metals by GTAW technique with

two different filler wires one is ENiCu7 and the other is E309L by selecting different parameters, the tensile strength properties of dissimilar weld metals using ENiCu-7 filler wire are better than E309 [5]. Welding process has a detrimental effect on corrosion behavior and bio compatibility of 316L SS, solution heat treatment could improve the corrosion behavior, corrosion test results revealed that the weld metal in the as-weld sample is the cathodic part [6]. GTA welding could be employed to join Monel 400 and AISI 316 employing ERNiCrMo-3 filler wire and migrated grain boundaries were found at the weld zone [7]. The fracture occurred at the parent metal of Monel 400 for ENiCu-7 weldment; whereas failure was witnessed at the HAZ of monel 400. The average tensile strength of ENiCu-7 weldment is greater than the ERNiCrMo-4 weldment. The impoverishment in tensile strength of ERNiCrMo-4 weldment shall be attributed to the presence of unmixed zone [8]. The TIG welding stainless steel 304 having better yield strength, ultimate strength and tensile strength than SMAW welding [9]. Mathematical models have been developed to study the effect of process parameters on tensile strength and percent elongation. Optimization was done to find optimum welding conditions to maximize tensile strength and percent elongation of welded specimen [10]. The Fatigue strength of weld joint is increased by increasing both joint angle and welding current. The Fatigue strength of welding





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## Design and Analysis of Aluminium-Flyash Composite for Connecting Rod

Suresh Nuthalapati and Devaiah Malkapuram, Geethanjali College of Engg. and Tech.

**Citation:** Nuthalapati, S. and Malkapuram, D., "Design and Analysis of Aluminium-Flyash Composite for Connecting Rod," SAE Technical Paper 2019-28-0166, 2019, doi:10.4271/2019-28-0166.

### Abstract

In this modern era of rapid growth of technology and need of economical machining processes and materials, there is an increasing demand for new materials for different mechanical applications. Composites with fly ash as reinforcement are likely to overcome the cost barrier for wide spread applications in automotive and small engine applications. To improve wettability, elements such as Mg and Si are added into Al melt to incorporate the ceramic particles. The chemical composition and engineering properties of fly ash, its physical

and chemical properties make it an ideal raw material for producing various application based composites. The main objective is to fabricate an Aluminium-Flyash composite material suitable for parts like engine connecting rod which demand high strength and temperature sustainability at comparatively less weight. The composite will be made using casting process and Engine connecting rod will be designed in AutoCAD software. The design will be analyzed with the help of Ansys with Aluminium and Aluminium-Flyash composite (at different compositions).

### Introduction

A composite material is a material made from two or more constituent materials with significantly different physical or chemical properties. We know different types of composite materials like reinforced concrete and masonry, composite wood such as plywood, reinforced plastics such as fiber-reinforced polymer or fiber glass, ceramic matrix composites (composite ceramic and metal matrices), Metal matrix composites and other Advanced composite materials. The most advanced examples perform routinely on spacecraft and aircraft in demanding environments.

Historically, In olden days a man made composite materials like straw and mud used for building construction. Wattle and daub is one of the oldest man-made composite materials, at over 6000 years old and Concrete is also a composite material. The first artificial fiber reinforced plastic was Bakelite which dates to 1907 although natural polymers such as shellac predate it. One of the most common and familiar composite is fiber glass, in which small glass fiber are embedded within a polymeric material (normally an epoxy or polyester). The glass fiber is relatively strong and stiff (but also brittle), whereas the polymer is ductile (but also weak and flexible). Thus the resulting fiberglass is relatively stiff, strong, flexible, and ductile.

Composites are made up of individual materials referred to as constituent materials. There are two main categories of constituent materials: matrix (binder) and reinforcement. At least one portion of each type is required. The matrix material surrounds and supports the reinforcement materials by maintaining their relative positions. The reinforcements impart

their special mechanical and physical properties to enhance the matrix properties. The common types of composite materials may be Fiberglass, Carbon Fiber, Natural Fiber (Wood, Flax, Hemp, etc.) and Alloys of metals. Also the composite materials are classified, based on the matrix materials the composites are classified as Metal Matrix Composites (MMC), Ceramic Matrix Composites (CMC), Polymer matrix Composites (PMC). Based on reinforcement materials are Particulate composites, Fibrous composites, and Laminate composites.

In this experiment using Al and Flyash with different percentages. Today, the general purpose engine parts like connecting rods, bolts, nuts, shafts and many others are produced using steel or alloys of steel like stainless steel, forged steel etc. The force handled by the steel parts is enormous when compared to other materials like aluminum.

Though the life of these parts is impressive, the weight to force ratio is less (i.e.) the weight of the steel parts is more when compared to other materials. Whereas the forces handled by materials which less weight is of minimum value. Aluminium is a common material used for automotive parts but can handle less value of pressure. The more is the pressure, the less would be the life of the part.

Connecting rods made from Aluminium are only used for racing car engines because of their less weight more energy is being conserved in the process when compared to steel connecting rods, but the Aluminium connecting rods are replaced way before their prescribed life time due to the adverse breakage which occurs in the engine at that point of time.



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# "ANALYSIS AND OPTIMIZATION OF ENGINE CYLINDER HEAT TRANSFER THROUGH FINS OF VARYING GEOMETRY AND MATERIAL"

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**Abstract** The Engine cylinder is one of the major automobile components, which is subjected to high temperature variations and thermal stresses. In order to cool the cylinder, fins are provided on the cylinder to increase the rate of heat transfer. By doing thermal analysis on the engine cylinder fins, it is helpful to know the heat dissipation inside the cylinder. The principle implemented in this project is to increase the heat dissipation rate by using the invisible working fluid, air. We know that, by increasing the surface area we can increase the heat dissipation rate. So designing such a large complex engine is very difficult. The main purpose of using these cooling fins is to cool the engine cylinder by air. The main aim of the project is to analyze the thermal properties by varying geometry, material and thickness of cylinder fins. Parametric models of cylinder with fins have been developed to predict the transient thermal behavior. The models are created by varying the geometry, rectangular, circular and curved shaped fins and also by varying thickness of the fins. The 3D modeling software used is Pro/Engineer. Thermal analysis is done on the cylinder fins to determine variation temperature distribution over time. The analysis is done using ANSYS. Transient thermal analysis determine temperatures and other thermal quantities that vary over time. The variation of temperature distribution over time is of interest in many applications such as with cooling. The accurate thermal simulation could permit critical design parameters to be identified for improved life. Presently Material used for manufacturing cylinder fin body is Aluminum Alloy 204 which has thermal conductivity of 110-150W/mk. We are analyzing the cylinder fins using this material and also using Aluminum alloy 6061 and Magnesium alloy which have higher thermal conductivities.

**Key words:** Geometry, Fins, Material, Heat transfer, Effectiveness, Pro-E, ANSYS.

## 1. INTRODUCTION

**Internal Combustion Engine** The internal combustion engine is an engine in which the combustion of a fuel (normally a fossil fuel) occurs with an oxidizer (usually air) in a combustion chamber. In an internal combustion engine, the expansion of the high-temperature and -pressure gases produced by combustion applies direct force to some component of the engine, such as pistons, turbine blades, or a nozzle. This force moves the component over a distance, generating useful mechanical energy.

**1.1 NECESSITY OF COOLING SYSTEM IN IC ENGINES** All the heat produced by the combustion of fuel in the engine cylinders is not converted into useful power at the crankshaft. A typical distribution for the fuel energy is given below: Useful work at the crank shaft is 25%, Loss to the cylinders walls 30%, Loss in exhaust gases 35%, Loss in friction 10%.

**1.2 LITERATURE SURVEY** Heat engines generate mechanical power by extracting energy from heat flows, much as a water wheel extracts mechanical power from a flow of mass falling through a distance. Engines are inefficient, so more heat energy enters the engine than comes out as mechanical power; the difference is waste heat which must be removed. Internal combustion engines remove waste heat through cool intake air, hot exhaust gases, and explicit engine cooling. Cooling is also needed because high temperatures damage engine materials and lubricants. Internal-combustion engines burn fuel hotter than the melting temperature of engine materials, and hot enough to set fire to lubricants. Engine cooling removes energy fast enough to keep temperatures low. Most internal combustion engines are fluid cooled using either air (a gaseous fluid) or a liquid coolant run through a heat exchanger (radiator) cooled by air. Marine engines and some stationary engines have ready access to a large volume of water at a suitable temperature. The water may be used directly to cool the engine, but often has sediment, which can clog coolant passages, or chemicals, such as salt, that can chemically damage the engine. Thus, engine coolant may be run through a heat exchanger that is cooled by the body of water. Most of liquid-cooled engines use a mixture of water and chemicals such as antifreeze and rust inhibitors. The industry term for the antifreeze mixture is *engine coolant*. Some antifreezes use no water at all, instead using a liquid with different properties, such as propylene glycol or a combination of propylene glycol and ethylene glycol. Most "air-cooled" engines use some liquid oil cooling, to maintain acceptable temperatures for both critical engine parts and the oil itself. Most "liquid-cooled" engines use some air cooling, with the intake



# Analysis of Internal Damping in Rotating Shaft

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K. Raju, M. Ravindra Gandhi, Rajasekhar Vangala and N. Suresh

**Abstract** In most of the applications of vibration compared to the elastic and inertia forces, the magnitude of damping forces is small. Under certain circumstances, these small forces may, however, create great influence. Damping is one of the important parameters in the study of dynamic systems. It is generally measured under conditions of cyclic motion and is defined as the energy dissipation in a mechanical system whose free oscillations decrease with time, resulting in a decrease in its amplitude of vibration. From a theoretical point of view, there are two different methods to measure damping, i.e., time response methods and frequency response methods. In rotating machinery, the measurement of damping by applying time response methods and frequency response methods is very difficult. Due to that reason, there is a lack of experiments to measure damping in rotating machinery. This paper discussed Kelvin-Voigt approach for measuring damping in mechanical systems. The mechanical system analyzed in this thesis is a rotating shaft. In general, damping can be explicit through different parameters as damping ratio ( $\zeta$ ) or loss factor ( $\eta$ ). Therefore, the objective about this paper is to determine one of these parameters by means of measuring simple variables such as forces or displacements.


**Keywords** Kelvin-Voigt model • Viscoelastic material • Internal damping

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# Flexural Fracture Analysis on 2D and 3D Weaved Carbon-Silicon Carbide Composites



S. Sapthagiri and S. Nagakalyan

**Abstract** Propelled materials, for example, constant fiber-fortified artistic grid composites offer huge improvements in an assortment of properties when contrasted with their mass, solid partners, etc. These properties incorporate essentially the ductile pressure, flexural stress, and crack parameters. Anyway to date, there are not really any logical examinations that gave an account of carbon fiber based propelled earthenware composites where SiC is utilized as the lattice. The present work is an endeavor to draw out the flexural fractural quality properties alongside a nitty-gritty examination of the crack conduct of 2D and 3D woven carbon ceaseless fiber strengthened (silicon carbide) ceramic-matrix composite (CFCC) materials. The crack propagation conduct has been dissected in two symmetrical indents and the introduction and its esteem are available in this paper.

**Keywords** Ceramic-matrix composite • Flexural strength • Fracture behavior • Three-point bend test

## 1 Introduction

Normally, earthenware frameworks are the conspicuous decision for high-temperature applications. High modulus of flexibility and low pliable strain, which most earthenware production have, that have joined to make the disappointment of endeavors add fortifications to acquire quality enhancement. The utilization of support with high modulus of versatility may deal with the issue to some degree and present pre-worrying of the fiber in the earthenware grid is as a rule progressively turned to as an alternative. At the point when earthenware production has a higher

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# Finite Element Analysis on Fly Wheel Cup Manufactured with Polymer Matrix Composite (PMC) reinforced with Fly Ash

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**Abstract.** In this paper, a polymer matrix composite (PMC) which is widely used in Aerospace, automobile and other engineering applications, which is reinforced with fly ash is taken in different weight ratios for manufacturing of Fly wheel cup. The principle target of this paper is to determine the behavior of fly wheel cup which is manufactured by deep drawing process using polymer matrix composite (PMC). In order to find the behavior of finite element analysis technique is used to find the deformation and equivalent elastic strain. Deformation of Fly Wheel Cup was found in the range of 0.0017 m – 0.008 m, and the level of equivalent elastic strain was found in the range 0.0087 – 0.04. And compared the results with Mild Steel, which is presently in use.

## INTRODUCTION

In sheet metal framing activities, springback of the part during emptying to a great extent decides if the part fits in with the structure measurements and resistances. Limited component reenactments were performed so as to think about the interrelationship of the clear measurements and interface conditions on the springback for an axis-symmetric cone like part made by flex shaping. Affectability examination done utilizing the limited component technique (FEM) showed that the size of springback and the general dimensional quality are exceptionally impacted by the underlying elements of the clear. An ordinary enhancement technique joined with FEM was utilized to get ideal clear measurements that can decrease springback [1]

Engineering parts made of composite materials find expanding applications going from shuttle to little instruments. Present day propelled polymer composite materials have opened another degree of silent, ointment free, high versatility and accuracy equipping in power and movement transmission. In this paper results got by static pressure examination of composite apparatuses utilizing a three-dimensional limited component approach are displayed. Execution of two orthotropic material riggings are given and looked at gentle steel gear. The correct comprehension and assessment of rigging quality and execution is a n significant essential for any solid application. The tooth root district of an apparatus which typically encounters high pressure and potential to disappointment has been deliberately researched. This PC reproduction strategy can be utilized as a helpful apparatus for assessing quality and foreseeing disappointment of the polymer composite spike gears. From the outcomes it is reasoned that composite material, for example, carbon/epoxy and E-glass/epoxy can be through as a material for control transmission spike outfits in the rigging box. The paper investigate the attributes of composite material apparatus box at reasonable structure organize for explicit weight decrease to get improved vitality productivity, commotion decrease, higher characteristic recurrence, erosion opposition and to oppose higher torque. The investigation proposed for high cycle fatigue (HCF), low cycle fatigue (LCF), creep burst, and static material properties as a



## Plasma current effects on the microstructure of solution precursor plasma spray YSZ coatings

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**Abstract** -The Solution Precursor Plasma Spray (SPPS) process has been used for obtaining Zirconia coatings as Thermal Barrier Coatings (TBCs). In this study an in house developed Zirconyle nitratesolution precursor plasma spray setup has been used. In this process the coating is built up by horizontal and vertical passes of the plasma torch across the substrate. The microstructural characterizations of coatings were carried out by scanning electron microscope (SEM) and X-ray diffraction (XRD). Significant effect of plasma current has been observed on the zirconia coatings.

**Index Terms**—Solution precursor, Plasma Spray, TBCs, Plasma current

### 1. Introduction:

Thermal spraying is an advanced materials processing technique which has found wide acceptance in many high technology industries. High temperature, high velocity flame is produced to heat, melt and spray material introduced into the flame. In general, thermal spray coatings have a very fine (micron sized) grain structure. Nano grained deposits and nanosized particles have superior properties compared to conventional materials. Reduction of the particle size of the thermal spray feedstock improves the homogeneity and properties of coatings.

The Liquid Precursor plasma spray (LPPS) is using to a great extent driven by the gas turbine industry, Automobile industry and in particular the manufacturing of the thermal barrier coatings (TBC) that protects the surfaces of metallic parts in the hottest zones of gas turbines used for the generation of electricity and propulsion of aircraft [1-2].

The thermal spray processes have been using the different kind of powder feed stocks such as for the coating. It has been widely used for various purposes like to protect from corrosion, improve durability and oxidation resistance properties at high temperature and it can reduce the metal service temperature [3-4]. The Solution Precursor Plasma Spray is recently developed for the fine spray. It is same as the existing conventional spraying processes with the only difference that instead of powders the feed is in the form of solution precursor. The liquid solution precursor material is injected into the plasma jet by a nozzle. Rapid heat-up and vaporization of precursor droplets in the formation of particles, which will be heated and accelerated to the substrate to generate coatings. In order to gain a better quality and performance of the coating, liquid precursors are sprayed into the plasma jet to generate finely structured coatings [5]. Deposition of small, melted particles leads to fine microstructure with the improvement in certain mechanical properties like hardness and strength. The different kinds of solutions or suspension precursors have been used for the different purposes. With normal APS process it's not possible to feed powder with size finer than 5-10µm due to the effects of surface forces on powder flow [6]. The atomized droplets of precursor undergo rapid





# Experimental Investigation of Microstructure and Mechanical Properties of Brass–Iron Joined by TIG Welding Process

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## Abstract

Brass is widely used as engineering material in marine and process industry in light of its high quality, corrosion resistance, electrical, and high warm conductivity. It is easily shaped and possesses a gratifying appearance. Notwithstanding, it is hard to weld brass. The principal issue with brass alloy while welding is dissipation of zinc. Subsequent to welding, the weld area and warmth influenced zone end up permeable, since the measure of zinc in the metal combination is diminished because of vanishing, and it loses the physical and compound properties which it typically has. In this paper, a brass–iron, which is widely used in marine and process industries, is taken and welding is done with Tungsten Inert Gas (TIG) welding process with different parameters such as root gap, flow rate, diameter of electrode, and flow of current. The principal target of this paper was to determine mechanical properties, such as tensile strength, hardness, and microstructure of TIG welded brass joints. Weld zone and heat-affected zones of brass welded test are seen by scanning electron microscopy (SEM) to decide zinc dissipation in 2D pictures. Tensile strength and hardness tests are performed by utilizing universal testing machine (UTM) and Vickers hardness testing machine separately according to ASTM principles. Tensile strength of brass weld tests was found in the range of 27.102–263.62 N/mm<sup>2</sup>, level of elongation was found in the range 0.72–3.80% and hardness of brass weld test was found in the range 85.9–160.33 HV. How evaporation of zinc is decreased in metal weld test is seen at weld zone (WZ), heat-affected zone 1 (HAZ1), and heat-affected zone 2 (HAZ2).

## Keywords



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# Effect of Twist Angle and RPM on the Natural Vibration of Composite Beams Made up of Hybrid Laminates



Rakesh Potluri, V. Diwakar, K. Venkatesh and R. Sravani

**Abstract** Rotating beams are crucial components that have a wide range of application in the aerospace and mechanical engineering fields. Some of the applications of the rotating composite beams include the helicopter blades, wind turbine blades, and propellers but rather than having a straight beam they are generally twisted which gives some added advantage to them. Having a good understanding of their behaviour, especially the natural frequencies of the structure, is crucial for designing a very good structure. In this paper, the effect of the pre-twist angle, rotation speed on the natural vibration behaviour of the rotating composite beams made up of a hybrid laminate was studied. A comparison between the natural frequencies and mode shapes of the composite beam with and without rotation and pre-twist effects was performed. The hybrid laminate was designed and properties of the laminate were found using the CLT theory, executed in the MATLAB software. Finite element analysis (FEA) was used for performing this work using the ANSYS Workbench software.

**Keywords** Rotating beams · Modal frequencies · Hybrid laminate · Twist angle · RPM (revolutions per Minute) · FEA (finite element analysis)

## 1 Introduction

In modern times, the metal beams used for the structural purpose are being replaced by the composite ones due to their inherent benefits offered by the composite materials. Rotating beams are usually found in applications such as wind turbines, turbomachinery, robotic sensors, and helicopter blades. Usually, the beams can be classified

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# Microstructure, frequency and temperature dependent dielectric properties of zinc ferrites

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**ABSTRACT:** Ferrite with the general formula  $\text{ZnFe}_2\text{O}_4$  was prepared by microwave hydrothermal (M-H) method. The as-synthesized powder was pelletized and samples were sintered at different temperatures (600, 700, 800 and 900°C). The grain size was varied by sintering the ferrite at different temperatures up to 900°C. The characterization studies were conducted by X-ray diffraction (XRD) and scanning electron microscopy (SEM). Dielectric constant ( $\epsilon'$ ) and dielectric loss tangent ( $\tan \delta$ ) were measured as a function of frequency and temperature. DC conductivity ( $\sigma_{ac}$ ) was measured by temperature variation. A significant influence of sintering temperature on the microstructure and electrical properties was detected.

## 1. INTRODUCTION

Nanoscale magnetic particles are attracting more interest in the scientific community because of its efficient applications in color imaging, catalysis, data storage, drug delivery, ferrofluids and magnetic refrigeration systems [1].

Spinel ferrites are commercially important materials because they're excellent electrical and magnetic properties [2]. These classes of materials have been the subject of extensive studies by physicists and chemists alike. A whole range of distribution of cations is possible in spinels which can be represented generally by the formula  $(\text{Me}^{2+})_x\text{Fe}^{3+}_{1-x}[(\text{Me}^{2+})_{1-x}\text{Fe}^{3+}_{1+x}]_y\text{O}_4$  where the ions inside the brackets are said to occupy octahedral sites (B) and the ions outside the bracket occupy the tetrahedral sites (A) [3]. In the above formula when  $d=1$ , it is called normal spinel. When  $d=0$  it is called an inverse spinel. When  $d=1/3$  it is called random spinel. From the fundamental point of view, these materials serve as ideal candidates for studying ferrimagnetism and ferromagnetic properties.

Zinc ferrite belongs to the normal spinels [4]. The properties of zinc ferrites have been the subject of study by many investigators over the last two periods. It has been established that structurally  $\text{ZnFe}_2\text{O}_4$  is a normal spinel where it can be written as  $[(\text{Zn}^{2+})_A(\text{Fe}^{3+})_B]\text{O}_4$  and its net magnetization is zero. Research on zinc ferrite showed that zinc ferrite is antiferromagnetic because of B-B interactions with a Neel temperature of about 10 K. It behaves as a paramagnet above the Neel temperature [5]. The abnormalities in the magnetic properties of zinc ferrite have been reported [6]. For case, Lotgering et al. [6] detected abnormal behavior in the paramagnetic susceptibility of zinc ferrite. In their neutron diffraction studies, Brockhouse and others [7] found the presence of a short-range order of parallel spins separated by 0.29 nm.

In the present investigation, the nanopowder of  $\text{ZnFe}_2\text{O}_4$  was prepared using M-H method. The advantage of M-H method is given elsewhere [8]. The s-prepared powder was characterized using XRD, and SEM, frequency and temperature dependent dielectric properties ( $\epsilon$ ) and conductivity properties were studied and discussed in this paper.

## 2. EXPERIMENTAL METHOD

Pure zinc nitrate  $[\text{Zn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$  and iron nitrate  $[\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}]$  were dissolved in 100 ml of de-ionized water. The molar ratio of powders was adjusted to obtain the composition  $\text{ZnFe}_2\text{O}_4$ . An aqueous NaOH solution was added to the mixture until the desired pH (~ 9.45) value was obtained. The precipitate was transferred into an autoclave and was treated with M-H method. In this method, the precipitate was taken into Teflon lined vessel and placed inside the microwave digestion system (Model MDS-2000, CEM Corp., Mathews, NC) and samples were synthesized at 165°C/45 min. Our M-H system is fully computer controlled one and uses 2.45 GHz microwaves and can be operated at 0-100% full power (1200±50W). The products obtained were filtered and then washed repeatedly with de-ionized water, followed by freeze-drying overnight. The prepared powders were weighed and the percentage yields were calculated from the expected and the amount that was actually



## Fourth order computational method for two parameters singularly perturbed boundary value problem using non-polynomial cubic spline

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**Abstract:** In this paper, we proposed a fourth order finite difference scheme using non-polynomial cubic spline for the solution of two parameters singularly perturbed two-point boundary value problem having dual boundary layer on a uniform mesh. In this method, the first order derivatives in the non-polynomial cubic spline finite difference scheme are replaced by the higher order finite differences to get the discretisation equation for the problem. The discretisation equation is solved by the tridiagonal solver discrete invariant imbedding. The proposed method is analysed for convergence and a fourth order rate of convergence is proved. The numerical results are compared with exact solutions and the outcomes of other existing numerical methods.

**Keywords:** two parameters; singularly perturbed; two point boundary value problem; dual boundary layer; characteristic equation; non-polynomial cubic spline.

**Reference** to this paper should be made as follows: Phaneendra, K. and Mahesh, G. (2019) 'Fourth order computational method for two parameters singularly perturbed boundary value problem using non-polynomial cubic spline', *Int. J. Computing Science and Mathematics*, Vol. 10, No. 3, pp.261–275.

**Biographical notes:** K. Phaneendra is working as an Assistant Professor at the Department of Mathematics, University College of Science, Saifabad, Osmania University, Hyderabad, India. He did his PhD from N.I.T. Warangal in the area of numerical methods for singular perturbation problems. His area of research is numerical solution for a class of singularly perturbed which includes differential difference equations, singular boundary value problems and multi parameter problems. He published 36 research articles in various international journals.

G. Mahesh is Research Scholar in the Department of Mathematics, University College of Science, Saifabad, Osmania University, Hyderabad, India. His area of research is numerical solution to two parameter singularly perturbed boundary value problems. He published two research articles in reputed journals.





Review article

# Can Non-bonded Pair of Electrons of $Sp^3$ Nitrogen with Two Single $\sigma$ -Bonds on Either Side Still Transmit Substituent Electronic Effects to the Reaction Site? Reversal of Attenuation Effect by $Sp^3$ Nitrogen-A Chemical Education Perspective



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## KEYWORDS

Taft equation

Attenuation effect

$Sp^3$  nitrogen

Carbamic acids

## ABSTRACT

Dependence of reactivity of organic molecules on substituents was a well-established phenomenon in terms of Hammett and Taft equations in physical-organic chemistry. The well-known Hammett and Taft linear free energy relationships were extensively used in elucidating the organic reaction mechanisms. The exponential depletion of Hammett reaction constant ( $\rho$ ), as a function of distance in terms of increasing the number of  $sp^3$  carbon atoms ( $-CH_2-$ ) between the reaction center and the substituent, is understood from our laboratory experiments. But, introduction of  $sp^2$  carbon atoms ( $-CH=CH-$ ) between the reaction center and the substituent enhances the Hammett reaction constant ( $\rho$ ). In the present work, we have tried and observed the same and even little more effective transmission of substituent effect through  $sp^3$  nitrogen ( $-NH-$ ). However, the presence of a  $sp^3$  carbon by the side of  $sp^3$  nitrogen ( $-NH-CH_2-$ ) depletes the substituent effect in the usual manner in *N*-phenyl glycines. Probable explanations were presented in support of our observation. In the present work, the observations were manifested in terms of Taft  $\rho^*$  values instead of Hammett  $\rho$  value as the  $pK_a$  values of only 4-nitrophenylcarbamic acid and carbamic acids and the Taft  $\sigma^*$  values of 4-nitrophenyl and H are available from literature.

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# Preparation and characterization of red emitting Yttrium Vanadate phosphor doped with Eu(III): $Y_{1-x}VO_4: Eu_x$

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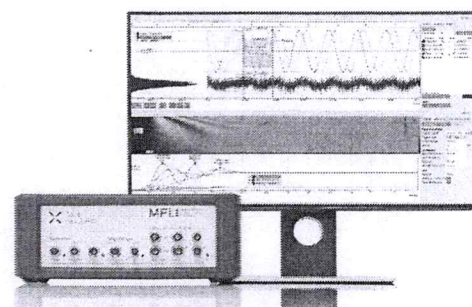
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19-20-13

# Thermoluminescence Characteristics and Dosimetric Aspects of Li<sub>2</sub>O-CaO-B<sub>2</sub>O<sub>3</sub> Glasses Doped with Rare Earth Ions

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**Abstract.** Thermoluminescence (TL) characteristics of X-ray irradiated pure and doped with four different rare earth ions (viz., Pr<sup>3+</sup>, Nd<sup>3+</sup>, Sm<sup>3+</sup> and Eu<sup>3+</sup>) Li<sub>2</sub>O-CaO-B<sub>2</sub>O<sub>3</sub> glasses have been studied in the temperature range 303-573K; the pure glass has exhibited single TL peak at 424K. When this glass is doped with different rare earth ions no additional peaks are observed but the glow peak temperature of the existing glow peak shifted gradually towards higher temperatures with gain in intensity of TL light output. The area under the glow curve is found to be maximum for Eu<sup>3+</sup> doped glasses. The trap depth parameters associated with the observed TL peaks have been evaluated using Chen's formulae. The possible use of these glasses in radiation dosimetry has been described. The result clearly showed that europium doped calcium borate glass has a potential to be considered as the thermoluminescence dosimeter.

**Keywords:** Thermoluminescence, Borate glasses, Rare earth ions

## INTRODUCTION

Oxylithiumborate glasses are considered as good materials for dosimetry applications since they are relatively moisture resistant when compared with the pure borate glasses. The understanding of the glass structure by detailed studies on radiation induced defect centres has been an interesting subject of investigation in recent years. Recently Hashim et al. reported the thermoluminescence dosimetry properties and kinetic parameters of lithium potassium borate glass co-doped with titanium and magnesium oxides [1]. Thermoluminescence study of MnO doped borophosphate glass samples for radiation dosimetry [2] and the influence of copper ions on thermoluminescence characteristics of CaF<sub>2</sub>-B<sub>2</sub>O<sub>3</sub>-P<sub>2</sub>O<sub>5</sub> glass system [3] reported by Swamy et al. Thermoluminescence properties of CaO-B<sub>2</sub>O<sub>3</sub> glass system doped with GeO<sub>2</sub> reported by Tengku Kamarul Bahri et al. [4].

The boric acid (B<sub>2</sub>O<sub>3</sub>) is used in the present study since it is one of the good glass formers and can form glass alone with good transparency, high chemical durability, thermal stability and good rare-earth ion solubility [5]. Addition of alkaline-earth oxide CaO into these glass matrices is expected to increase the resistance of the glasses to the moisture [6]. The glass containing Li<sub>2</sub>O as network modifier was seen as bubble free, highly stable and moisture resistant, suitable for a systematic analysis [7].

Lithium tetraborate glass system is a known and important starting material in the development of applications of radiation dosimetry for a long period, since its effective atomic number  $Z_{\text{eff}} \approx 7.25$  has the property of being nearly tissue equivalent that makes it as a very promising material in the field of personal and clinical dosimetry and for other applications like X-ray phosphors, scintillators and thermoluminescent detectors [2,8-11]. However, pure



# Shielding Effectiveness studies of NiCuZn ferrite-Polyaniline nanocomposites for EMI suppression applications

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**Abstract.** Electromagnetic interference shielding effectiveness (EMI SE) of multifunctional NiCuZnFe<sub>2</sub>O<sub>4</sub>-Polyaniline are studied. The nanocrystalline NCZ-PANI nanocomposites were prepared by the mechanical milling process. The structure and the morphology of the nanocomposites were investigated by Fourier Infrared spectroscopy (FTIR) and scanning electron microscopy (SEM). Electromagnetic properties and EMI SE behaviors were performed over a frequency range of 8.2-12.4 GHz (X-band) and 12.4-18 GHz (Ku-band). The results show that for nanocomposites, the values of the real ( $\epsilon'$ ) and imaginary permittivity ( $\epsilon''$ ) and imaginary permeability ( $\mu''$ ) increase, while the value of real permeability ( $\mu'$ ) decreases as the filler content (PANI) increases. The contributing effects of PANI content on total shielding efficiency ( $SE_{total}$ ) of different samples were investigated. The maximum EMI SE of 29 dB is obtained for a composite of 50 wt.% PANI with the dominant shielding by absorption ( $SE_A$ ) of electromagnetic radiation. The enhanced electromagnetic shielding performance of nanocomposites is attributed to the increment of both magnetic and dielectric losses due to the incorporation of conducting PANI in magnetic NCZ matrix. Synthesis parameters such as the amount and particle size of PANI and NCZ affect significantly the morphology, the conductivity, and the microwave absorption properties of the final materials. The possibility to modulate the electromagnetic properties of the composite materials is of great interest to fabricate microwave absorbing and electromagnetic shielding materials with high performances.

## INTRODUCTION

To reduce the impact of electromagnetic interference (EMI), EMI shielding materials have been widely investigated. Normally, metals have been used for EMI shielding materials as they have high conductivity and dielectric permittivity. [1, 2] However, metals have disadvantages, such as their corrosion, weight properties, and poor processability.[3] Ferrite-polymer nanocomposites have been used extensively in the shielding of electromagnetic noise due to their excellent electromagnetic properties.[4-6] The polymer and ferrite composites can be used as EMI suppressor materials to avoid the disadvantages seen in metals.[7,8] The complex permittivity and permeability are closely related to the high-frequency dielectric and magnetic properties of magnetic particles and volume fraction of the fillers in the composites. Ferrites are used as magnetic fillers in the composites due to the high magnetic loss, high chemical stability, and high resistivity, etc. The high-frequency dielectric and magnetic properties can be tuned by varying the ferrite concentration in the ferrite-polymer composites.

In the present investigation, various Polyaniline (PANI) loaded Ni<sub>0.48</sub>Cu<sub>0.12</sub>Zn<sub>0.4</sub>Fe<sub>2</sub>O<sub>4</sub> (NCZ) matrix nanocomposites were prepared at room temperature. The NCZ can be used in microwave devices and electromagnetic suppression fields due to their high saturation magnetization, excellent chemical stability, and corrosion resistance. The composite powders were the effect of the volume fraction of PANI on the frequency dispersion characteristics of the complex permittivity ( $\epsilon'$  &  $\epsilon''$ ), permeability ( $\mu'$  &  $\mu''$ ) and EMI SE properties were studied and the obtained results were discussed in the paper.



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Educación

Química



# NON-ASSOCIATIVE BEHAVIOR OF THIOPHENOLS: TROUTON'S RULE, RAMSEY-SHIELDS- EÖTVÖS EQUATION AND APPLICATION OF HAMMETT EQUATION TO THE SURFACE TENSION DATA – A CHEMICAL EDUCATION PERSPECTIVE

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## Abstract

Non-associative behavior of thiophenols is explained on the basis of Trouton's rule, proton acceptor-donor cites and application of Hammett equation to the surface tension data of thiophenols.

## Keywords

Trouton's rule, Proton acceptor-donor cites, Hammett equation

*Comportamiento no asociativo de los tiofenoles: regla de Trouton, ecuación de ramsey-shields-eötvös y aplicación de la ecuación de Hammett a los datos de tensión superficial: una perspectiva de educación química*

## Resumen

El comportamiento no asociativo de los tiofenoles se explica sobre la base de la regla de Trouton, las citas del donante aceptor de protones y la aplicación de la ecuación de Hammett a los datos de tensión superficial de los tiofenoles.

## Palabras clave

La regla de Trouton, las citas del donante aceptor de protones, la ecuación de Hammett

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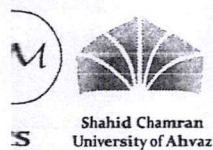
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# Effect of Chemical Reaction on Bioconvective Flow in Oxytactic Microorganisms Suspended Porous Cavity

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In this paper, the bioconvective flow in a porous square cavity containing oxytactic microorganism in the presence of chemical reaction is investigated. The bioconvection flow and heat transfer in porous media are modeled based on the Darcy model of Boussinesq approximation. The governing partial differential equations are solved using the Galerkin finite element method. The computational numerical results are presented by the streamlines, isotherms, isoconcentrations of oxygen, isoconcentrations of microorganisms, Nusselt number, average Sherwood numbers of oxygen concentration and microorganisms. The key parameters such as bioconvection Rayleigh number ( $R_b$ ), chemical reaction parameter ( $K_r$ ) and Rayleigh number ( $R_a$ ) are presented and analyzed. It can be deduced that the chemical reaction has a greater effect on the swimming of the microorganisms, average Nusselt number, and density number.

**Keywords:** Thermo-bioconvection, Oxytactic Microorganisms, Porous square cavity, Chemical reaction, Finite Element

## 1. Introduction

Recent investigations on convective heat transfer in porous media are ascribed to the enormous applications, utilization and storage of thermal/geothermal energy, reservoirs of petroleum, devices of catalytic converters, recovery of underground pollutants, underground feeder cables, technology of porous ceramic burners, food industry, recovery, chemical reactors, chemical separations, moisture migration in stored grain, thermal cooling of equipment, heating of rooms, combustion, etc. The basic nature and the increased volume of work in this field are adequately archived in the books by Nield and Bejan [1], Ingham and Pop [2], Vafai [3], Pop and Ingham [4]. Bioconvection in cavities of various geometries discovers a salient feature for engineering analysis. It has huge applications in engineering, such as solar applications, building applications, electronic industry, etc. Natural convection in the porous square cavity are investigated by Rahman et al. [5] and Balla et al. [6-8]. The latest development in fluidic devices is heat transfer in porous media with bioconvection phenomena. Bioconvection refers to a convective movement of fluid-induced by the swimming of motile microorganisms. Different types of microorganisms can be found, showing various swimming behaviours. Negatively geotactic microorganisms swim

  
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## Writing Skills Sessions in English Language Curriculum - A Broader Prospective to teach Environmental Awareness in Undergraduate English Classes

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### Introduction

"Look deep into Nature, and then you will understand everything better" — Albert Einstein

"Nature always wears the colors of the Spirit" — Ralph Waldo Emerson

### Nature, Literature, Language and Learner

English Language and Literature classes in Undergraduate Courses are the most interesting, instructive and entertaining sessions in the campus life. From the fables of Chaucer to the Post-modern Literature, Nature is depicted as the binding force of inspiration to the writers and readers of all genres. Nature nurtures, nourishes, motivates so it is the primary duty of every English Teacher to be an advocate of tuning and turning the young minds to experience the wonders of nature and express the same, spontaneously in any form of writing.

### Present Situation

School and Intermediate Education in South India specially in the states of Telangana and Andhra Pradesh is highly focused on the goal of securing a seat in Medicine or Engineering or any Professional Undergraduate Course. This leads to a massive destruction of the inherent imagination of the tender minds where the concentration of the Teaching Methodologies are exclusively designed to secure more percentile in Maths, Physics and Chemistry. English Language Learning is only secondary and marks scored in English subject are not credited for admission into Undergraduate Courses. This adherence of associating less importance to English Language leads to mugging up dictated notes or officially released Bazaar Guides to the student fraternity thereby reducing the element of individual expression in English among the Learners. It's shocking to notice that sometimes a student who cannot frame a meaningful Sentence in English Language scores 80-98% in this subject because of the impeccable mugged-up notes presented in the Intermediate Papers. At this juncture the English Teacher has a





# Bioconvection in oxytactic microorganism-saturated porous square enclosure with thermal radiation impact

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## Abstract

This investigation addresses bioconvection of oxytactic microorganisms in a porous square enclosure by thermal radiation impact. The bioconvection flow and heat transfer in porous media are formulated based on Darcy model of Boussinesq approximation. Appropriate transformations lead to the non-dimensionalized governing partial differential equations. Galerkin finite element method for the resulting equations is computed. The role of relevant parameters on the streamlines, isotherms, isoconcentrations of oxygen and microorganisms and average Nusselt number is analysed in the outputs. It is revealed that the flow intensity of bioconvection is pronounced with larger Rayleigh number and reduced with radiation parameter. Furthermore, the temperature distribution is affected significantly with Rayleigh number. Radiation parameter serves to fasten the heat transfer in the enclosure. Oxygen density is enhanced with Rayleigh number and radiation parameter. The profile of motile isoconcentrations is boosted with Rayleigh number. The stability of microorganisms is improved with the radiation parameter.

**Keywords** Thermo-bioconvection · Oxytactic microorganisms · Thermal radiation · Porous square cavity · Finite element method

## List of symbols

$b$	Chemotaxis constant, $m$
$C$	Concentration of oxygen
$C_{\min}$	Minimum concentration of oxygen required for microorganisms to be active
$C_0$	Concentration at free surface
$C_p$	Specific heat at constant pressure
$D_C$	Diffusivity of oxygen, $m^2 s^{-1}$
$D_n$	Diffusivity of microorganisms, $m^2 s^{-1}$
$g$	Acceleration due to gravity, $m s^{-2}$

$K$	Permeability of the porous medium
$k^*$	Mean absorption coefficient
$L$	Length of porous cavity, $m$
$Le$	Lewis number
$n$	Number density of motile microorganisms
$n_0$	Average density of the microorganism
$N$	Dimensionless number density of microorganisms
$Nu_Y$	Local Nusselt number
$Nu_{avg}$	Average Nusselt number
$Nn_Y$	Local Sherwood number of microorganisms
$Nn_{avg}$	Average Sherwood number of microorganisms
$p$	Excess pressure above hydrostatic
$Pe$	Peclet number
$q_r$	Radiative heat flux
$Ra$	Rayleigh number of porous medium
$Rb$	Bioconvection Rayleigh number
$Rd$	Radiation parameter
$Sh_Y$	Local Sherwood number of oxygen concentration
$Sh_{avg}$	Average Sherwood number of oxygen concentration
$T$	Temperature, K
$T_H$	Temperature at hot wall, K
$T_C$	Temperature at cold wall, K
$T_\infty$	Ambient temperature, K
$u, v$	Velocity components in x, y-directions, $m s^{-1}$

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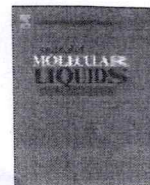
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# Investigation of temperature dependent dielectric relaxation studies of 1,4-Butanediol/DMSO binary mixtures at the microwave frequency

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## ABSTRACT

In the present manuscript, we are reporting the complex dielectric permittivity of 1,4-Butanediol/Dimethylsulfoxide binary mixtures for entire concentrations in the temperature range of 298.15 K–323.15 K. The complex dielectric permittivity is measured in the frequency range of 20 MHz–20 GHz. The dielectric relaxation time ( $\tau$ ) of the binary mixtures are analyzed by using the Havriliak-Negami equation. Redlich-Kister polynomial equation is used to fit the excess molar volume ( $V_m^E$ ), excess permittivity ( $\epsilon^E$ ), excess refractive index ( $n_D^E$ ), excess inverse relaxation time ( $1/\tau^E$ ). The molecular association and structural packing in the liquid mixture are analyzed by using thermal expansion coefficient ( $\alpha_p$ ) parameter. The ordering nature of the molecular dipoles is discussed by evaluating the Kirkwood correlation factor ( $g^{eff}$ ) and stability of the system by thermodynamic quantities. The experimental dipole moments of the pure and equimolar binary system are determined by using Higasi's method and compared with the theoretical dipole moment values obtained from DFT/B3LYP methods. Confirmation of hydrogen bond between 1,4-butanediol and DMSO is supported with the FT-IR and UV-Vis spectroscopy methods. The experimental dielectric and spectroscopic studies confirm the existence of hydrogen bond between the liquid mixtures.

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## 1. Introduction

The interaction of electric energy with the material mainly depends upon the characteristic property of the material, which plays a significant role in the determination of structural properties of the compounds. The usage of microwave heating has become important in the field of food processing, synthesis of chemical compounds, local heating of the biological tissues and medicinal industry [1–5]. The capability of the material to absorb microwave energy depends upon the macroscopic permittivity, which is connected with the dielectric loss of the material [6,7]. By choosing the proper polar solvent in the chemical industry can stimulate or prevent the chemical reaction, and modify the structural dynamics of the system. Hence, the study of dielectric properties of the polar liquids in the microwave frequency region is very much important in understanding the applications of microwave energy. The dielectric study of the liquid mixtures having the hydrogen bond donor and acceptor group compounds is useful for a various number of applications in the field of biological, medical, material science and technology [8,9].

Dielectric relaxation studies of 3-Nitrotoulene with diethylacetamide, dimethylsulfoxide binary mixture are studied by Ajay Chaudhari et al. [10] and their studies reveal that effective dipoles rotate slowly in the mixture due to the hindering field produced by the multimers in the solution. The equilibrium properties of butanediols and temperature dependence of shape factor is studied by Zhuravlev et al. [11] and explained that relaxation time depends upon the structural rearrangement of the molecules in the solution. The homogeneous and heterogeneous interaction between a series of three butanediols with 1,4 dioxane is studied by Gilani et al. [12–15] and dipropylsulfoxide in aqueous medium by Gabrielyan et al. [16]. Their studies confirm the presence of hydrogen bonding in the solutions affecting the excess dielectric parameters. The acoustic and thermodynamic properties of butanediols with respective pressure and temperature studied by Edward Zorebski et al. [17] and they reported that thermal expansion, compressibilities are increased with increase in the chain length of the molecules. The average number of hydrogen bonds, bonding energy associated with alcohol-DMSO mixtures are evaluated by Jia Guo-Zhu et al. [18,19] and chemical stability, the reactivity of the anilines, phenols in a nonpolar solvent medium by computational HOMO and LUMO calculations [20]. Molecular dynamics of the hydrogen bond network in the ethanol-water mixtures are reported by

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Research Article

# Numerical Approach for Differential-Difference Equations with Layer Behaviour

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## Abstract.

difference equations having layer behaviour, with delay as well advanced terms. The retarded terms second order singular perturbation problem. A finite difference scheme using non polynomial spline of the first derivatives. Tridiagonal algorithm is used to solve the resulting system. The method is exemplified on numerical examples with various values of perturbation, delay and advance parameters.

Also, the convergence of the proposed method has also been established.

## Keywords.

absolute error

MSC. 65L10; 65L11; 65L12

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## 1. Introduction

and in the potential in nerve cells by random synaptic inputs in dendrites [18].

  
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## FITTED DIFFERENCE APPROACH FOR DIFFERENTIAL EQUATIONS WITH DELAY AND ADVANCED PARAMETERS

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**Abstract:** A difference scheme involving acceptable fitting parameters is suggested for differential equations with delay and advanced terms, the solutions of which show boundary layer behaviour. First, the original problem is reshaped into asymptotically comparable second order singular perturbation problem using Taylor series approximation for the retarded terms. In order to obtain precise solution, fitting parameters are introduced in difference scheme using modified upwind differences for the first order derivatives. Thomas procedure is used to solve the resulting tri-diagonal difference system. The method is tested on numerical examples for various values of the perturbation, delay and advance parameters. Computed maximum absolute errors are tabulated. Numerical experiments are shown in graphs and the effects of small shifts have been studied on the boundary layer region. Also, convergence has been established of the proposed method.

**Keywords:** boundary layer; delay and advance parameters; modified upwind; singular perturbation problem.

**2010 AMS Subject Classification:** 65L10, 65L11, 65L12.

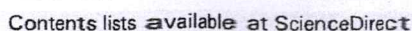
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## ABSTRACT

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- Key words:
- Boiling points
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- Aliphatic amines
- Aliphatic fluorides
- Aliphatic hydrocarbons
- IFT equation

Normal melting point of a solid is the temperature at which it changes its state from solid to liquid. At the melting point the solid phase and the liquid phase exist in equilibrium. And normal boiling point of a liquid is a property at which the vapor pressure of the liquid becomes equal to the atmospheric pressure. The four types of intermolecular forces: hydrogen bonding, ionic forces, Van der Waals dipole-dipole interactions and Van der Waals dispersion forces (London forces) and sometimes the polarizability affect the melting and boiling points. Hydrogen bonding is one of the key factors that largely affect both melting and boiling points of solids and liquids respectively having functional groups such as OH, NH<sub>2</sub> and a most electronegative atom F. And they are also affected by polar electronic effects of the substituents and by the size of the molecule due to the presence of the van der Waals attractions. Using Lindemann's equation  $T_{mp} = \frac{4\pi^2 m v^2 c^2 a^2}{k_B}$  and strong foundation of Trouton's two empirical rules  $\Delta S_{latent} = \frac{\Delta H_{latent} \times \text{Density}}{273 + T_{mp}}$  and  $\Delta S_{vaporization} = \frac{\Delta H_{vaporization}}{273 + T_{bp}}$ , Taft Linear Free Energy Relationship (LFER) is applied to the temperature of phase transitions (solid to liquid and liquid to vapor) of alkyl alcohols, alkyl amines, alkyl fluorides and aliphatic hydrocarbons. Two loci are observed in each case one with a negative slope for electron donating substituents and the other with a positive slope for electron withdrawing substituents with a minimum at CH<sub>3</sub> substituent (Taft  $\sigma^* = 0.00$ ). The decreasing trends in both the melting and the boiling points with decrease in electron donating power of substituents and the increasing trends in both the melting and the boiling points with increase in electron withdrawing power of substituents are explained with two interpretations of hydrogen bonding in alcohols, amines and fluorides yielding the same dimers.

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The astonishing efforts in the direction of application of LFER to various physical properties like surface tension ( $\gamma$ ) [1-8], dipole moments  $\mu$  [8] and melting points [9] from our laboratory have ever been increasing with a good degree of success. Quantitative solubility-structure relationships for several *meta*- and *para*-substituted benzoic acids in benzene and in cyclohexane [10] and in 1, 4-dioxane and *tetra*-hydrofuran (THF) [11] were studied. Even the application of Hammett equation to melting points of some benzene derivatives were touched and left without any reasonable arguments [12]. Katritzky

et al. gave a one line concluding argument on the application of QSPR models to the melting points of benzene derivatives in terms of molecular packing and intermolecular interactions [13]. There was a brief report on the application of Hammett equation to the dipole moments [14].

Schreck [15] had described this in an article on non-linear Hammett relationships as what appears to be the only physical property that gives non-linear Hammett plots. But solubilities are not completely physical properties as the solubility would be a function of ionizing capacity and ionization is a chemical property which depends on the dielectricity of the solvent and it will be taking place at a localized ionization site. This gets support from the variation of Hammett  $\rho$  with solvent polarity [16,17].

It is from our laboratory who uncorked the detailed application of LFER to purely physical properties like surface tension ( $\gamma$ ) [1-8], dipole moments ( $\mu$ ) [8] and melting points [9] except its mention on

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## Short Communication

## Is interfacial tension of a liquid-air interface thermodynamically a cyclic process?

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## ABSTRACT

Brønsted ( $\log k_b = \beta pK_a^{H^+} + C$ ) and Taft ( $\log k = \rho^* \sigma^* + \log k_0$ ) linear free energy equations are applied to the interfacial tension data of N-substituted anilines. The significance of the values of the constants Brønsted  $\beta$  (0.096) and Taft  $\rho^*$  (0.091) are explained in terms of proton transfer from the acid to the aniline, which is accelerated by electron donating groups. The deprotonation of protonated aniline is accelerated by electron withdrawing groups. Since any thermodynamic property associated with any kind of reaction is a point group, the fact that Brønsted  $\beta$  and Taft  $\rho^*$  have similar values with opposite sign indicates that the total process taking place at the aniline-air interface is a cyclic one.

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## 1. Introduction

Our laboratory has for some time had an interest in the application of Linear Free Energy relationships to surface tension data [1–5] and to the nucleophilic solvation of aliphatic ammonium ions [6]. In the present article we apply the Brønsted and Taft equations to the interfacial tensions of some N,N-disubstituted anilines. To our knowledge this is the first time this analysis has been reported in the literature. The opposite signs and similar values of the trend lines of Brønsted  $\beta$  and Taft  $\rho^*$  are explained based on thermodynamic considerations.

## 2. Experimental data source

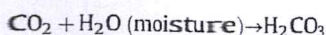
Data on the interfacial tensions of N,N-disubstituted anilines is from reference [7] and references cited therein. The  $pK_a$  and Taft  $\sigma^*$  values of N,N-disubstituted anilines are from reference [8]. All linear correlations were completed using KaleidaGraph software. Fig. 1 was drawn using ChemDraw.

## 3. Discussion

The main difference between surface tension and interfacial tension is that surface tension is defined in terms of a single liquid surface which is in contact with a gas phase, usually air. Interfacial tension, on the other hand is understood as occurring at the interface of two immiscible liquids. Surface tension is actually a derivation of interfacial tension where the force resulting from the second surface is negligible or zero. The surface tension of a pure liquid is simply the interfacial tension at the liquid-air interface, because the surface tension of air is zero. This is the case because surface tension needs a surface, and for a surface there must be two different phases in contact with each other. Gases do not form inter-phase surfaces. Surface tension is caused by inter-molecular forces that keep molecules in a liquid together. Such forces do not exist or are negligible in the gas phase as the gas thermodynamically is assumed to be a very dilute system.

Fig. 1 shows a typical example of an aniline-air interfacial system.

Air always contains small amounts of carbon dioxide which dissolves in the moisture present in the air making it slightly acidic, with a pH of 5.7. This becomes a source of protons ( $H^+$ ):



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## Frequency and temperature dependent dielectric studies of propylene glycol-sulfolane binary mixtures in the microwave frequency region

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Dielectric relaxation

 $\epsilon^{\text{eff}}$  factor

Helmholtz free energy

DFT

HOMO-LUMO calculations

## ABSTRACT

The dielectric permittivity of propylene glycol/sulfolane binary mixtures have been determined at various temperatures in the frequency range of 0.02  $\nu/\text{GHz}$ –20 using open-ended coaxial probe method. The permittivity spectra of propylene glycol/sulfolane mixtures with an asymmetric shape is observed. The experimental dielectric permittivity, relaxation time values are used to obtain remaining excessive parameters such as excess permittivity ( $\epsilon^{\text{E}}$ ), deviation in refractive index ( $\Delta n_D$ ), excess inverse relaxation time ( $1/\tau$ )<sup>6</sup>, Kirkwood effective correlation factor ( $g^{\text{eff}}$ ) and active thermodynamic parameters. Redlich-Kister polynomial equation is used to fit the excessive dielectric parameters. The molecular interaction between propylene glycol and sulfolane binary mixtures is interpreted in terms of short and long-range interactions among the dipoles. The experimental dipole moment values are compared with the theoretical dipole moment values from DFT/B3LYP, MP2 methods. Natural bond orbital (NBO) analysis is performed on the optimized geometrical structure of the above system to understand molecular interaction between the binary mixtures in terms of hydrogen bonding. The chemical stability of the system is studied from the HOMO-LUMO calculations. The energy of H-bond interaction between propylene glycol and sulfolane binary mixture is calculated from the single point energy calculations, and the results are correlated.

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## 1. Introduction

The temperature and frequency dependent dielectric relaxation studies of liquid mixtures play a significant role in the investigation of various processes such as intra and intermolecular interactions, rotational dynamics of the molecules, interfacial polarization, relaxation process, solute-solvent interactions and strength of the interaction among the dipoles. The study of interest in carrying the dielectric spectra of binary and ternary liquid mixtures resides in analyzing the molecular dynamics of the systems and describing the possible variation from the pure components of the liquids and their ideal mixtures. The non-covalent interactions present in the liquid systems such as hydrogen bond, Van der Waals, and electrostatic forces play an essential role in the field of biological activity, enzyme catalysis, and drug design [1]. The dielectric studies of different polar binary mixtures at different concentrations and temperature lead to analyze the strength of the hydrogen bond interaction in terms of thermodynamic parameters, ordering nature of the dipoles and their mutual interactions [2–6]. The dielectric relaxation spectroscopy is one of the sensitive methods to detect small changes occur in the structural parameters of a molecule in a liquid

system. Several researchers performed dielectric studies on different liquid compounds in water as well as in alcoholic medium in recent past [7–17], at the same time molecular simulations are also performed to interpret experimental results [18–22]. The different spectroscopic studies such as FT-IR, proton NMR, and Neutron diffraction studies are also carried by the researchers to confirm the existence of hydrogen bond between the different liquid mixtures [23–25].

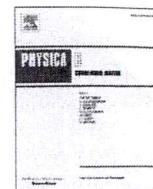
The present work is in continuation of our systematic studies in order to understand the molecular interaction between binary mixtures of propylene glycol and sulfolane. In our previous paper [43] (Vishwam et al.), we reported the molecular interaction behaviour of propylene glycol in ethanol medium and the data is interpreted in terms of thermodynamic parameters, strength of the hydrogen bond interaction from the single point energy method.

In the present manuscript, we are interested to analyze the effect of sulphonyl group on the dielectric relaxation process of propylene glycol medium. The molecular interaction of sulfolane in propylene glycol is studied in terms of short and long-range ordering of the dipoles, excess molar volume ( $V_m^{\text{E}}$ ), molar polarization ( $P_m$ ), Natural Bond Orbital analysis to identify the position of hydrogen bond. The chemical stability of the molecule is studied by Highest Occupied Molecular Orbital and Lowest Unoccupied Molecular Orbital (HOMO, LUMO) calculations and Redlich-Kister polynomial fitting procedure for excess dielectric

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# Dielectric relaxation and thermodynamic study of Dimethylformamide/1,4-Butanediol binary mixtures in the temperature range 298K–323K

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### Keywords:

Dipole moment  
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## ABSTRACT

In the present paper, the permittivity of Dimethylformamide (DMF) with 1,4-Butanediol (BD) binary mixtures are determined at the temperature range of 298 K–323 K in the microwave frequency. Dipole moment ( $\mu$ ), excess molar volume ( $V_m^E$ ), partial molar volume ( $V_{m,i}$ ), excess permittivity ( $\epsilon^E$ ), excess refractive index ( $n_D^E$ ), excess inverse relaxation time ( $1/\tau$ ), thermal expansion coefficient ( $\alpha_p$ ), excess Helmholtz energy ( $\Delta F^E$ ) are determined at different temperatures. Redlich-Kister polynomial equation is used to fit the excess parameters. Havriliak-Negami equation is used to analyse the relaxation time of the binary mixtures throughout the measured temperature range. The heteromolecular interaction between DMF and 1,4-Butanediol binary mixtures are interpreted in terms of Kirkwood correlation ( $g^{\text{eff}}$ ) factor. The stability of the system is analysed from the activation energy ( $\Delta G^*$ ), enthalpy ( $\Delta H^*$ ) and entropy ( $\Delta S^*$ ) parameters. The various mixing rules were applied in order to estimate the permittivity and refractive indices of the binary system at different temperatures.

## 1. Introduction

The complex permittivity of binary liquid mixtures provides information regarding the solute-solvent interactions and also the existence of monomers and multimers in the solution. The permittivity is a macroscopic parameter plays a significant role in understanding the nature of molecular interaction between polar-polar, polar in a non-polar liquid medium and also the alignment of dipoles in the solution [1–10]. The profound knowledge in thermodynamics and transport properties of pure liquids and their binary mixtures is essential to solving many chemical engineering problems, heat and mass transfer, and drug design calculations. The temperature dependent dielectric relaxation studies of different polar liquids at different microwave frequency region can yield the information regarding the structure of the molecule, inter and intra molecular hydrogen bonding and orientational polarization of the dipoles [11–23]. Investigation of permittivity of polar liquids having the hydrogen bond donor and acceptor group compounds are very much useful for various number of applications in the field of biological, medical, material science and technology [24,25].

Dimethylformamide (DMF) is a polar (hydrophilic) aprotic solvent with a high boiling point. DMF is used as a solvent in peptide coupling for pharmaceuticals, pesticides production, manufacture of adhesives,

synthetic leathers, fibre films and surface coatings. Whereas 1,4-Butanediol (BD) is used in the manufacturing of plastics, fibres, and as solvent for many chemical reactions. Several researchers and scientists reported the dielectric relaxation of DMF in the different solvent medium such as toluene, benzene, benzoates, 3-Nitrotoluene in the recent past [26–37]. Stockhausen et al. [38] studied the dielectric relaxation of BD + DMF binary mixtures in the range of 5 MHz–72 GHz at 20 °C. The relaxation times of the binary mixtures are interpreted in terms of empirical equation by considering viscosity terms and the rotation of carbon chain group. Navarkhele et al. [39] also studied the dielectric relaxation behaviour of BD + DMF binary mixtures in the frequency range 10 MHz–20 GHz between the temperatures 20 °C–40 °C. The relaxation time of these mixtures is calculated from the Cole-Cole plot and the molecular interaction are discussed in terms of excess permittivity and Kirkwood g factor [40]. The physico-chemical properties of the binary mixtures of DMF with alkanols and their interactions are interpreted by considering the molar volume and refraction values [41]. Whereas in the present study we have considered volumetric and thermal expansion ( $\alpha_p$ ) parameters [42,43], electrical dipole moment, molar polarization [23], long-range and short-range interactions between the dipoles by excess Helmholtz energy ( $\Delta F^E$ ) equation [44], thermodynamic quantities [45] to interpret the molecular interaction between 1,4- Butanediol

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# Attenuation Effect in Twenty One Different Proton Dissociation Equilibria Brought on One Rope: A Chemical Education Tool for Evaluation of $pK_a$ of Proton Dissociation Equilibrium of Any Substituted Benzene ( $XC_6H_5$ )

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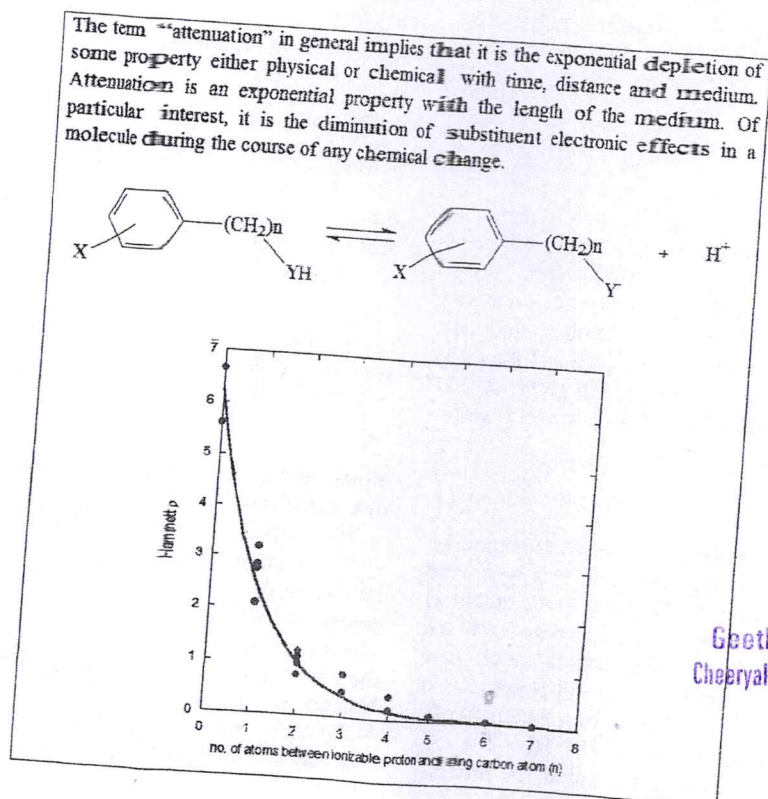
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**Abstract** The strong empirical relation,  $\rho = (2.4)^{(2-1)}$ , between the Hammett  $\rho$  for proton dissociation of several acids and the number, "T", of atoms between the ionizable hydrogen and the ring carbon (Andrew Williams, Free Energy Relationships in Organic and Bioorganic Chemistry, Royal Society of Chemistry, Cambridge, 2003, p. 75) is used to construct a graph for twenty one different proton dissociation equilibria. The plot of Hammett  $\rho$  versus number of atoms  $i$  between ionizable hydrogen and the ring carbon atom is observed to be an excellent exponential-decay locus. A good average and intelligent value of Hammett  $\rho$  is obtained for the benzene dissociation equilibria by interpolating the locus of the correlation on to Y-axis. Using this Hammett  $\rho$  value and the Hammett equation  $\log [(K_a)_X / (K_a)_H] = \rho \sigma$ , the  $pK_a$  value can be calculated for any substituted benzene knowing the  $pK_a$  value of benzene to be 4.3. The points for proton dissociation equilibria of phenylethyl ammonium ions and benzyl alcohols deviated from the graph hence not included in the correlation. Possible explanations are given for deviation of these two equilibria.

## Graphical abstract



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## RESEARCH ARTICLE

# ON THE EXISTENCE OF $\psi^\alpha$ BOUNDED SOLUTION FOR A NON-HOMOGENOUS FUZZY FIRST ORDER MATRIX DIFFERENCE SYSTEM WITH AN APPLICATION TO TWO-POINT BOUNDARY VALUE PROBLEM

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Citation:- Divya, L. Nethi, Sailaja, P., Subbalakshmi, B. and Murty, K.N. 2020. "On the existence of  $\psi^\alpha$  bounded solution for a non-homogenous fuzzy first order matrix difference system with an application to two-point boundary value problem", International Journal of Current Research, 12, (5), 11384-11389.

## Introduction

Difference equations occur as a natural description of observed evolution phenomena. The aim of this paper is to present a criteria for the existence of at least one  $\psi^\alpha$ -bounded solution of the system of fuzzy non-homogenous first order difference equation

$$x(n+1) = A(n)x(n) + b_n \quad (1.1)$$

where  $A$  is a  $(k \times k)$  discrete matrix and  $x$  is a  $k$ -vector.  $b_n$  is a column matrix of first order  $k$ . We assume that the system (1.1) has at least one  $\psi^\alpha$ -bounded solution on  $N$  for every  $\psi^\alpha$  summable matrix function  $b_n$  on  $N$ .

The existence of  $\psi$ -bounded solutions of linear system of differential equations on time scales are established in [1]. This theory in fact unifies both continuous and discrete systems in a single framework. Our main goal in this paper is to establish  $\psi^\alpha$ -bounded solutions of fuzzy linear system of first order difference equations and obtain the existing results as a particular case [2]. We also present a set of sufficient conditions for the fuzzy first order difference system to be completely controllable and observable. The main advantage of our approach is difference inclusions and hence is unique of its kind. The results established in [3] are used as a tool to establish our main results in this paper.



19-20



# Two-Point Boundary Value Problems Associated With First Order Fuzzy Differential Equations–Existence and Uniqueness

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## Abstract:

Existence and Uniqueness of solutions of Two-Point boundary value problems associated with first order fuzzy differential system are established. Differential inclusion approach is used as a tool to obtain existence and uniqueness.

## Key words:

Fuzzy sets and systems, Fuzzy rule, Green's Matrix, Dynamical systems, Lipschitz condition

2010C : 34A10, 34B15, 26E50

## 1. Introduction:

In modeling real systems one can be frequently confronted with a system of first order matrix differential equation. Fuzzy boundary value problems constitute a very interesting and important class as it includes differential inclusions. The theory of fuzzy sets, fuzzy valued functions and necessary calculus of fuzzy functions have been discussed in the recent monograph by Lakshmikantham and Mohapatra [8]. Existence and Uniqueness of initial value problems associated with first order fuzzy differential equations.

$$y' = f(t, y)$$

(1.1)



# Complex permittivity and permeability properties analysis of NiCuZn Ferrite-Polymer nanocomposites for EMI suppressor applications

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**Abstract.** The complex permittivity and permeability studies of NiCuZn ferrite-paraformaldehyde (NCZ-PFD) nanocomposites for electromagnetic interference (EMI) suppressor applications are presented. The NCZ Ferrite and nanocomposites were prepared via microwave hydrothermal and ball-milling, respectively. The nanocomposites were characterized by X-ray diffraction (XRD) and scanning electron microscopy (SEM) the results indicate that the NCZ-PFD nanocomposites were successfully prepared without impurities. The complex permittivity and permeability were measured over frequency range of 8.2-12.4 GHz and 12.4–18 GHz. The results show that for nanocomposites, the values of the real ( $\epsilon'$ ) and imaginary permittivity ( $\epsilon''$ ) and imaginary permeability ( $\mu''$ ) increase, while the value of real permeability ( $\mu'$ ) decreases as the polymer content increases. Dielectric relaxations were studied using cole-cole plots of complex permittivity. Magnetic relaxation dispersions were analyzed using cole-cole plots of complex permeability. The possibility to modulate the electromagnetic properties of the composite materials is of a great interest to fabricate microwave absorbing and electromagnetic shielding materials with high performances.

## 1. Introduction

The capability of a material to shield electromagnetic energy, whether or not its undesirable energy entering a system or escaping a system and it's far called as its shielding effectiveness. It is along with losses due to absorption, reflection, and multiple reflections [1]. The primary mechanism of EMI shielding is generally reflection and for this kind of the radiation by using the shield, it needs to have mobile charge carriers (electrons or holes) which interact with the electromagnetic fields in the radiation. For this reason, the shield tends to be electrically conducting, without an excessive conductivity. As an instance, a volume resistivity in the order of  $1 \Omega\text{cm}$  is commonly used. A secondary mechanism of EMI shielding is generally absorption. For significant absorption of the radiation, the shield must have electric and/or magnetic dipoles which interact with the electromagnetic fields in the radiation.

Metals, along with ferroelectrics and ferrites are typically utilized in EMI suppression and those materials have many risks in terms of their weight, corrosion and physical rigidity [2]. Many scholars have done investigations of the absorption properties of one-component electromagnetic wave absorbers using ferroelectrics, ferrites, conducting polymers and other new absorption materials [3, 4]. However, in comparison with multicomponent materials, the application possibilities of one-component materials are confined due to their poor absorption efficiencies and relatively narrow bandwidth. These properties could be overcome with the development of latest composite materials. Out of all composite materials,





# Solid State Root Preparation, Characterization and Electrical Properties of NiCuZnFe<sub>2</sub>O<sub>4</sub> / Paraformaldehyde Nanocomposites

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**Abstract.** In this investigation, the structural and electrical properties of nanocomposites of NiCuZn ferrite (NCZ) and paraformaldehyde (PFD) synthesized by solid state mixing route are reported. Synthesized nanomaterials have been characterized by FT-IR and TGA techniques. FT-IR results confirm the presence of NCZ and PFD in the samples. The DC conductivity measurements have been investigated. The dielectric constant  $\epsilon'$  and dielectric loss  $\epsilon''$  were found to increase as the PFD content increased to 50% and to decrease as the PFD content further increased. A dielectric cole-cole diagram can be obtained by plotting the dielectric loss  $\epsilon''$  against the dielectric constant  $\epsilon'$ . The cole cole diagram is generally used for studying the dielectric polarization characteristics by following the variation of dielectric loss  $\epsilon''$  with dielectric constant  $\epsilon'$ . From this work, it is possible to deduce interfacial polarization and dipolar polarization from dielectric cole-cole plots.

## 1. Introduction

The knowledge of the electric and magnetic properties of nanocomposite materials over a broadband frequency range is an essential requirement for accurate modelling and design in several engineering applications. Such applications span printed circuit board design, electromagnetic shielding, biomedical research and determination of EM radiation hazards [1-3]. The electric and magnetic properties of materials usually depend on several factors: frequency, temperature, linearity, isotropy, homogeneity, and so on. The interaction of incident electromagnetic fields with a material can be successfully investigated only when accurate information on the complex permittivity and magnetic permeability is attained. For example, from the knowledge of the frequency dependence of the complex relative permittivity and magnetic permeability of a material, the shielding effectiveness of a structure made of that material can be predicted.

Since polymers have the merits of lightness and good processability, and overcome the limit of the use of sintered ferrites as the electromagnetic wave absorber, many studies on the conducting polymer composite have been explored. One of those results, the polymer-ferrite composite, has been widely used as the electromagnetic wave absorber in the microwave band. The electromagnetic wave absorbing characteristics of the absorber due to magnetic loss can be determined from composition, complex permittivity, and permeability of composite. Since the electromagnetic wave-absorbing properties are directly related to the electromagnetic properties, it is of importance to analyze the electromagnetic properties of the absorber.

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## AN ITERATIVE METHOD FOR SOLVING NON-LINEAR TRANSCENDENTAL EQUATIONS

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**Abstract:** In this paper, we introduced a new method to compute a non-zero real root of the transcendental equations. The proposed method results in better approximate root than the existing methods such as bisection method, regula-falsi method and secant method. The implementation of the proposed method in MATLAB is applied on different problems to demonstrate the applicability of the method. The proposed method is better in reducing error rapidly, hence converges faster as compared to the existing methods. This method will help to employ in the commercial package for finding a non-zero real root of a given nonlinear equations (transcendental, algebraic and exponential).

**Keywords:** transcendental equations; secant method; non-linear equation; iteration method.

**2010 AMS Subject Classification:** 65H04, 65H05.

### 1. INTRODUCTION

Most of the engineering and scientific problems are expressed as nonlinear transcendental equations for which the evaluations of roots are more complicated. Such nonlinear equations

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## Influence of Slip and Heat and Mass Transfer Effects on Peristaltic motion of Power-law fluid Prone to the Tube

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**Abstract.** Present study deals with the study of peristaltic motion of a power-law fluid with nanoparticles in a tube with permeable walls. Heat and mass transfer effects and slip effect are studied in this investigation. Axial velocity, pressure gradient and frictional force are expressed analytically and investigated various parameter effects on these flow variables. The present model revealed that, heat transfer coefficient and mass transfer coefficients increases in the region  $[-1, 0]$  and decreases in the region  $[0, 1]$  with the increase of thermophoresis parameter and shows an opposite behavior with the increase of Brownian motion parameter. Pressure drop increases with the increase of slip parameter. Frictional force decreases with the increase of slip parameter and converges to 1.

### 1. Introduction

Peristalsis is very important phenomena in the human body. This phenomenon has many biological and industrial applications. Many researchers have done investigations in the peristaltic transport. (Brasseur et al. (1987), Valanis and Sun (1969), Mishra and Ramachandra Rao (2003), K. M. Prasad (2009), Hayat et al. (2014), Chandra and Pandey (2018)).

"Power-law fluid is a fluid in which the shear stress at any point is proportional to the shear rate at that point raised to some power". The problems based on non-Newtonian fluids have many applications and hence good number of researchers started working in this area. Ostwald-de Waele model is widely used model for non-Newtonian fluids focusing on power-law rheology. Power-law fluids are classified into three different types of fluids as given below:

$n$	Type of Fluid
$<1$	Shear-Thinning Fluids
$=1$	Newtonian Fluid
$>1$	Shear-Thickening Fluids

Many researchers done their research in this field (El Naby and El Shamy (2007), Hayat et al. (2006), Shukla and Gupta (1982)).

Nanofluids have many biomedical and industrial applications. New techniques are used using nanofluids for cancer treatments and for safer surgery for the delivery of drugs. A good amount of



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