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# Seismic Response of Indian Designed Five Storey Structure with World Earthquake Ground Motions

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**ABSTRACT.** The According to Indian IS code, 1893:2002, Sixty percent of India's landmass is susceptible to earthquakes of moderate to high intensity. And total Indian land mass is divided into four zones viz., II, III, IV and V, where V being very severe. Currently, construction of RCC structures is not only limited to cities but has also seen growth in towns and villages. In this study, four similar five storey structures are designed to withstand lateral forces generated in four Indian seismic zones. And the seismic responses of these structures are tested with various earthquake ground motions recorded at different locations of the globe. Time history analysis is carried out, and comparisons of all the results are discussed in brief. All the three-dimensional numerical models are developed using ETABS.

**Keywords:** Seismic Analysis, IS Code 1893:2002, Time history analysis, Response Spectrum, ETABS

## 1. INTRODUCTION

An earthquake may be defined as release of elastic energy by sudden slip on a fault and resulting ground shaking and radiated caused by slip. Earthquakes are one of the worst among the natural disasters. About 1 lakh earthquakes of magnitude more than three hit the earth every year. According to a conservative estimate more than 15 million human lives have been lost and damage worth hundred billions of dollars has been inflicted in the recorded history due to these. Moreover, Indian-Subcontinent, particularly the north-eastern region, is one of the most earthquake-prone regions of the world. The concept of earthquake magnitude was first developed by Richter [1], and hence, the term "Richter scale". The value of magnitude is obtained on the basis of recordings of earthquake ground motion on seismographs.

When earthquakes occur, a building undergoes dynamic motion. This is because the building is subjected to inertia forces that act in opposite direction to the acceleration of earthquake excitations. These inertia forces, called seismic loads, are usually dealt with by assuming forces external to the building. So apart from gravity loads, the structure will experience dominant lateral forces of considerable magnitude during earthquake shaking. It is essential to estimate and specify these lateral forces on the structure in order to design the structure to resist an earthquake. In practice, there are several different definitions of magnitude; each could give a slightly different value of the magnitude. Hence, magnitude is not a very precise number. Usually, earthquakes of magnitude greater than 5.0 cause strong enough ground motion to be potentially damaging to structures. Earthquakes of magnitude greater than 8.0 are often termed as great earthquakes. Intensity indicates the violence of shaking or the extent (or potential) of damage at a given location due to a particular earthquake. Thus, intensity caused by a given earthquake will be different at different places.

Earthquake codes are periodically revised and updated depending on the improvements in the representation of ground motions, soils and structures. Moreover, these revisions have been made more frequently in recent years. The Indian standard code (IS1893-2002) was also revised in 2001 and has been in effect since 2002 [2]. Based on this code book the seismic zones of India are revised as shown in figure-1.

  
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18-19  
2017-18

# Study And Development Of Various Concrete Structures With Various Mixtures Ggbs, Fly Ash And Other Component Mixtures

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**Abstract**-There have been increasing efforts in recent years to minimize the amount of cement used in concrete. Efforts at partial replacement have been successful and regulations have been promulgated to standardize and use such formulations. Research aimed at complete replacement of cement by activating industrial materials that are rich in silica and alumina with alkaline solutions is still on-going all over the world. The present study was aimed at complete elimination of cement through the development of a geo polymer concrete containing the mixture of fly ash and ground granulated blast furnace slag (GGBS), activated by sodium based alkaline activators. The effect of replacing up to 50% fly ash by GGBS was considered. The strength parameters were studied for a mixture of sodium silicate and sodium hydroxide solution having concentration 12M. The samples were cured under ambient conditions as well as in an oven at 60°C for 24 hours. Compressive and split tensile strengths of the samples were measured on 3rd, 7th, 14th, 28th, 56th and 90th days of casting. The cubes were also tested for durability parameters by ponding in NaCl and H<sub>2</sub>SO<sub>4</sub> solution for 28 and 90 days. It was observed that replacing fly ash with 30% of G gave the best results.

## Scope Of Work

This investigation is carried out to find the performance of concrete containing various supplementary cementitious materials like Alcco fine and ground granulated blast furnace slag (GGBS). Alcco fine and GGBS materials can be used in production of long lasting concrete composites. Concrete samples of M30 grade with the water/binder ratio 0.43, with various percent of GGBS (0%, 10%, 20%, 30% & 40%) were casted and optimum percentage is selected. GGBS optimum percentage is kept constant and replacement of cement is done with alcco fine at various percentages (8%, 10%, 12% & 14%) and tested for compressive strength at the age of 7, 14 and 28 days. The results were compared with conventional concrete.

In this paper, the effect of utilizing Fly ash (FA), Silica fume (SF), Ground granulated blast slag (GGBS), and various combinations of them is assessed. Their effect on the fresh stage and mechanical properties of Self-compacting Lightweight Concrete (SCCLWC) is investigated and compared to a control mix without Supplementary Cementitious Materials (SCMs). Flow ability, compressive strength, and flexural strength were the main criteria considered in the evaluation. Moreover, the applicability of the ACI 318 reduction factor ( $\lambda$ ) for flexural strength was assessed for all mixes to capture the effect of various SCMs based on the lower and upper limits of the proposed ACI 318 equation. Results from the evaluation show that SF greatly improved the compressive strength and GGBS increased flexural strength of SCCLWC. However, SF reduces the flow ability of SCCLWC. Equally important, FA achieved the lowest increase in compressive strength compared to the control mix. Furthermore, the  $\lambda$  value of 0.85 proposed by ACI 318 for sand-lightweight provides a good estimate of LWC properties even when different SCMs are utilized. However, fly ash can affect the  $\lambda$  value at early age.

## Objectives Of The Study

- To design optimum utilization of ggbs in fly ash based geo polymer concrete
- To study optimizing the use of fly ash in concrete
- To study the effect of ggbs and fine aggregate as self-cement nous material on fracture properties of self-compacting concrete
- To design an experimental investigation on strength parameters of fly ash based geo polymer concrete with ggbs

## Literature Review

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## COMPARITIVE STUDY OF BASE ISOLATORS AND VISCOUS FLUID DAMPERS ON SEISMIC RESPONSE OF RC STRUCTURES

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### ABSTRACT

*An earthquake is a sudden violent shaking of earth which results in great destruction to life as well as property by virtue of movements that were caused in earth's crust. Due to the sudden violent shaking, a large amount of energy will be released and imparted to the structure. Due to this imparted energy, the structures experiences large displacements, drifts which leads to the failure of the structure. Hence for the safety of structure there is a need to dissipate the energy imparted to the structure which can be made through earthquake protection systems. The structure can be made resistant to seismic activity by vibration control systems. The structure can be made earthquake resistant by techniques such as base isolation and provision of dampers in the structures. Base isolation is a technique of isolating the structure from the ground such that earthquake effects are reduced to a larger extent. Base isolators also increase the flexibility of the structure and reduce the forces transferred to the structure. Seismic dampers on the other hand absorb the energy provided by earthquake ground motions to the structure. The present study aims in understanding the seismic response of R C structures of varying floor levels when subjected to an earthquake ground motion such as Elcentro by using base isolation and fluid viscous dampers as vibration control system and a comparative study is made between the two vibration control systems. Models of varying floor levels of 5,8,12 and 15 which are fixed base structures were considered in the study and modal time history analysis is performed using ETABS software. All the structures were modelled with the base isolators and fluid viscous dampers and observed the variation in seismic response. The parameters considered in the study were base shear, lateral roof displacement and fundamental time period. It has been observed that base shear decreased largely to an extent of 96%, lateral roof displacement increases to an extent of 45% in base isolated structure where as base shear decreased to an extent 38%, roof displacements decreased to an extent of 71% in structures with viscous dampers when compared to bare frame structures.*

**Key words:** Base isolation, Viscous dampers, vibration control, seismic response, ETABS, Elcentro, Time history analysis.

# Comparison of Response Spectrum, Time History and Matched Time History Method in Zone V and Zone IV Earthquake Zones of Multi Storied Building as per IS 1893-2016

2018-2019  
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Anirooth Velamuri, Y. Rajesh Kumar

**Abstract:** Earthquake are one of the devastating natural calamities. Keeping in view of the varying effects of earthquake based on the nature of the location, IS 1893-2016 classified India into four zones namely Zone II, Zone III, Zone IV, Zone V. IS 1893-2016 has clearly stated that Equivalent static method can only be used for a regular building in Zone II whose height is within 15m, for all other structures Dynamic Analysis has to be used. The various Dynamic Analysis as per code are Response Spectrum, Time History and Modal Time History. A special method is developed by matching Time History function with Response Spectrum in both Frequency and Time Domain. The present work deals in analysing these methods in both Zone V and Zone IV when subjected with seismic excitations of Chamoli earthquake in Zone V and Uttarkashi Earthquake in Zone IV both of which occurred in year 1999 and both the earthquakes have same magnitude of 6.8 on Richter Scale. Parameters considered in the study are storey displacements, storey drifts, storey shears and base reactions. ETABS V.17.0.1 is used as the software tool for performing linear time history, response spectrum, matched time history and modal time history analysis of the regular structure.

**Index Terms:** Chamoli ground motion data, Linear time history analysis, Matched Time History, Response Spectrum.

## I. INTRODUCTION

Earthquake are one of the devastating natural calamities. Keeping in view of the varying effects of earthquake based on the nature of the location IS 1893-2016 classified India into four zones namely Zone II, Zone III, Zone IV, Zone V. IS 1893-2016 has clearly stated that Equivalent static method can only be used for a building whose height is within 15m and is present in Zone II for all other structures Dynamic Analysis has to be used. The various Dynamic Analysis as per code are Response Spectrum, Time History and Modal Time History. A special method is developed by matching Time History function with Response Spectrum in both Frequency and Time Domain. The present work deals in analysing these methods in both Zone V and Zone IV when subjected with seismic excitations of Chamoli earthquake in Zone V and Uttarkashi Earthquake in Zone IV both of which occurred in

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year 1999 and both the earthquakes have same magnitude of 6.8 on Richter Scale. Parameters considered in the study are storey displacements, storey drifts, storey shears and base reactions. ETABS V.17.0.1 is used as the software tool for performing linear time history, response spectrum, matched time history of the regular structure

## II. LITERATURE REVIEW

Dr. S.K. Dubey et.al [2015] conducted Dynamic Analysis on a G+20 building of height 60m situated in Zone IV. A comparison of Time History analysis and Response Spectrum analysis is performed. For time history analysis ground motion data of earthquake Delina (Alaska) 2002 is considered. It was observed that displacements and drifts storey wise are greater in Time History Analysis in comparison with Response Spectrum analysis and whereas in Base shear the values of Response Spectrum are higher than values of time history analysis.

Dr. P. S. Bokare et.al [2015] performed a comparative study on comparison of time history analysis and response spectrum, separately on time history analysis and response spectrum analysis is performed. The analysis is based on IS 1893-2002. In various papers different models were considered, different earthquake data in different zones and by using various simulation software some considering Finite Element Methods and some not. It was observed that the storey wise displacements are maximum in Response Spectrum and minimum in Time History and the difference in displacements in very low in lower storeys but predominant in higher storeys

## III. MODEL CONSIDERED FOR STUDY

A regular square building of plan dimensions 40X40m with 15 storeys and each storey of height 3m.

**Model U** :15 Storied Regular Building analysed by Time History Analysis taking Uttarkashi Earthquake

**Model UF** :15 Storied Regular Building analysed by Uttarkashi Earthquake Time History Analysis matched to Response Spectrum in Spectral Frequency Domain.

# Stabilization of Structures in Seismic Areas Subjected to Different Ground Motions

Ramachander Damera, Ilango Thaniaras

**Abstract:** Structures with seismic damage with various ground motions are playing a vital role in some areas of research due to the increase in metropolitan culture which is getting developed in the world. In our present paper we are enhancing and focusing on the structural damage with some structural damages that are occurring due earth quakes which can develop with ground motion intensity, structural performance and optimal intensity which can be used for best conclusions. The research is needed for civilization which can overcome the conditions of seismic affecting risks in seismic zones of Indian Context. An investigation like the methods of structural stability after an earth quake in developing the earthquake monitoring system vibration control ability of the structures is focused in this paper.

**Index terms :** Seismic analysis, analysis of structure.

## I.INTRODUCTION:

The Seismic waves are described as the waves of energy which can travel through the layer of earth and also result in tremor, blast, or a fountain of liquid magma that bestows low-recurrence acoustic vitality. The waves with proliferation speed rely upon thickness and medium with versatility. The refraction or impression in geophysics for seismic waves is utilized for examination concerning Earth's inner structure, and man-made vibrations which can consistently create the shallow research and subsurface structures.

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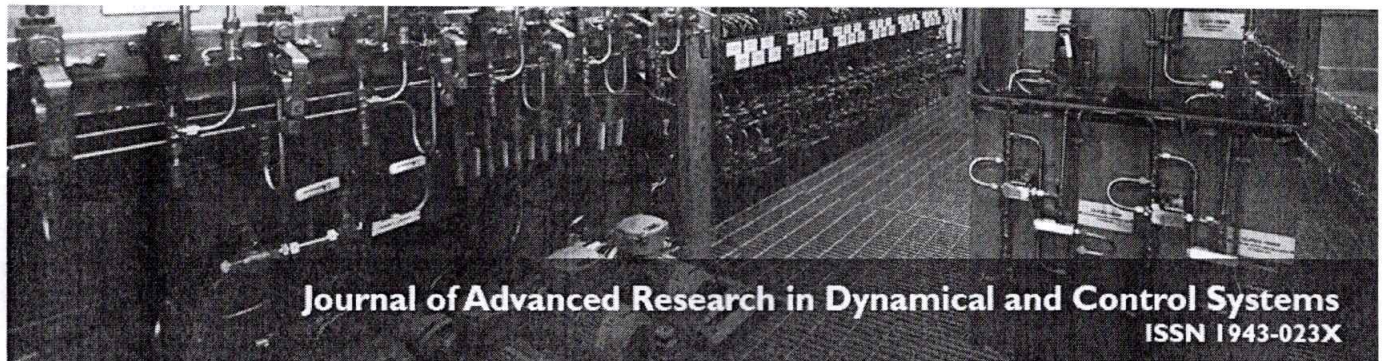
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With some upgrading parameters the seismic plan of structures has been made in light of spring like heading which are concentrated with earth shake powers with the distinction in structures which can avoid resonance. Due to the disconnection effect of shake powers with the sliding forces which can get transmitted with some structure with some pounding. [1] Due to the ground effects that are molded at the development length with can demonstrate an apex housetop with buoy and zenith that can be surveyed. As per the data which can be loaded down with basic term and the gathered with the imperativeness of stimulate grams that are made edge expanding speed limits. [2] An investigation has been done in different methods, for instance, seismic coefficient methodology and response go procedure with non straight static system. Due to these descriptive conditions the inclination ground story which can section the structure that passes on more burden diverged from the long length portion. Growing the plot for settled height the fragment forces and solidness of the structure reduces with augmentation in the point however for settled width structures it was extending. [3, 4] Analysis is led furthermore, has found the assortments for various hurt parts which can cause strong seismic tremor having little effect reliant on the last fold with technique for structure under free vibrations. Due to this we can redesign the mistake of the sections which can be mistreated with different ground developments which are same in all stages. The direct symphonious period with some ground development can be around reenact with dissatisfaction earth shiver. [5]

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Cooperative Coalitional Game Model for Channel Assignment among Cognitive Radio

Ch Ramesh Babu and Dr.K.V. Ranga Rao

Abstract:

Accuracy of detection of unused holes is the key to the success of Cognitive Radio (CR), which is performed by spectrum sensing operation in Cognitive Radio Network (CRN). In this work, we developed a cooperative coalitional game model for channel assignment among cognitive radio secondary users. The major contribution of this work is to accommodate the constraint during cooperation due to the cost of reporting time and reporting energy. A formulation has also been carried out to decide the optimal size of a possible coalition and a scheme for coalition head selection dynamically. Channel assignment is done in three different cases and they are as first fit, best fit, and worst fit. The utility of coalition is given by overall data transmitted, where the revenue is in terms of transmitted data and cost is in terms of time spent during taking decision among cognitive radio users. The proposed game has a transferable utility so that the utility can be arbitrarily distributed among the members of coalition.

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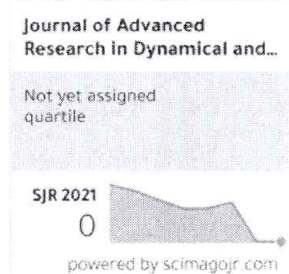
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# Preprocessing Algorithm for Computational Privacy Protection in Data Mining

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**Abstract---** This paper recommends the "Privacy-Preserving Data mining" is essentially utilized for extracting information from the dispersed data over different places without revealing the data. Dataset sustained by distinctive organizations/locations incorporated in collaboration contain redundant, noisy, missing, and unrelated information. Such information has a chance to be preprocessed to getting effective mining solutions from different destinations. This manuscript examines the fundamental preprocessing responsibilities implemented by the distinct locations to arrange the information for mining. Also to maintain the privacy, locations must perform computations together, like multiplication, division, union, addition, and intersection in a safe way. The several protective protocols are used to implement the computations on "the preprocessed datasets" whereas "classification/prediction" has been discussed the best methodologies.

**Keywords---** Privacy Preservation, Secure Sum, Secure Union, Secure Division, Data Mining, Data Preprocessing.

## I. Introduction

Let us observe the subsequent situation where different banks available in several places require status of the salary of a person to satisfying the specific criteria or need to envisage a fraud where as credit card issuing or would like to get the aspects with the salary below 50K per every month. These banks don't need to expose any data of their information in the mining process. Subsequently, mining has to be done by "preserving protection".

Each of the destinations needs to preprocess their information to get proper mining outcomes. For economic dataset, few important preprocessing errands require to be executed before implementing any method of computations. The prior methodology incorporates nominal transforming and unconditional characteristics to their numeric type and regularizing them. However, the greater part of the information mining outcomes need to be interpreted with several kinds of characteristics.

To avoid "obtaining irrelevant erroneous outcomes" whereas executing the tasks of information mining on the dataset we require to remove the unrelated data [9]. Similarly, repetitive characteristics such as "detailed occupation code (numeric attribute)" have an equal characteristic termed as "major occupation code (categorical)" in the dataset. Furthermore, in the mining procedure of discovering values, outcomes of the class and education of the specialist characteristics require a chance to be accessible at different abstraction levels. We utilize the taxonomy trees ideas.

The contribution [15] proposed the "Information perturbation, a minimization, or cryptographically techniques" have been utilized to "privacy-preserving classification". Nevertheless, "cryptographically techniques" are one of the significant methodologies for sustain and mining the privacy [3]. These techniques utilize "secure multiparty protocols" to implement computations through the discovery of knowledge. Protocols like "union, secure sum; intersection, secure log, and dot product" have been utilized within the process of "cryptographically information mining". In this manuscript, we examine the different "secure protocols" represented by us and associate them with the existing systems.

The work [5] proposes the two or more parties need to conduct on the basis of computation over their personal inputs; however neither of the party is ready to open its input to anyone else. Here, how to conduct the computation is the big issue, whereas preserving the inputs privacy. Homomorphism or commutative encryption systems are used to build the more protocols. Several encryption techniques are generally accessible and utilized in the data security. They could be classified into "symmetric (private) and asymmetric (public) keys encryption". As specified previous, some regularly utilized secure protocols are "secure sum, union /intersection protocols".



# AN EFFICIENT TREND DISCOVERY AND EVALUATING TECHNIQUE FOR TEXTUAL CONTENT MINING

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**ABSTRACT:** *As a result of the quick expansion of virtual knowledge and building up the precise knowledge wishes of the customers, the information mining process has a very important position to extract the helpful knowledge from that enormous quantity of knowledge. The extraction of those knowledge can also be accomplished the use of other knowledge mining tactics. The primary purpose of doing trend mining is to enhance wisdom discovery fashions for the efficient make the most of found out trend and follow it in space of textual content mining. In knowledge mining group, so much analysis paintings center of attention on creating an efficient trend finding set of rules which come with method akin to sequential trend mining common merchandise mining and shut sequential mining for mining helpful styles. However there's a large problem to find and replace efficient trend. In efficient trend discovery and use tactics there are primary issues. Those are:*

- *Low frequency and*
- *Trend misinterpretation drawback*

*The overall evaluation of a proposed device is designed to deal with the issues of low frequency and trend misinterpretation of trend discovery approach. The program attempts to unravel the prevailing method issues and examine the outcome generated by way of trend deployment and trend deployment wit trend co-prevalence strategies.*

**KEYWORDS:** *Knowledge Mining, Knowledge Retrieval, Trend Taxonomy Type, Textual content Mining, pattern co-occurrence matrix.*

## I. INTRODUCTION:

Prior to now many years, a few vital knowledge tactics were proposed. Those tactics come with affiliation rule mining, common merchandise set mining, sequential trend mining, closed trend mining and most trend mining,. The use of the ones trend mining tactics isn't enough as a result of successfully the use of and updating a found out trend continues to be an unending analysis factor. The primary function of doing trend mining is to improve wisdom discovery fashions for the efficient make the most of found out trend and follow it in space of textual content mining.

In Knowledge Retrieval there are a few time period primarily based strategies. Those strategies have a just right statically homes, as it helps complex theories for time period weight. On the other hand time period primarily based strategies suffered through synonymy, polysemy and homo nym the place polysemy method or extra phrases has the similar that means; and synonymy one phrase has multiple that means. Through the years, word primarily based mining strategies speculation were proposed. Words may just raise extra semantics knowledge than time period as a result of that it's going to carry out upper than the time period primarily based strategies Even words are much less ambiguous and raise greater knowledge than person phrases, like phrases, word has its personal weak spot i.e low frequency. Like that of phrases primarily based strategies, styles revel in just right statistical assets and used as an efficient choice to words. For fixing the issues of word

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# Efficient load aware scheduler for map reduce applications in cloud environment

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Most of the current day applications are compute and data intensive which laid a platform for invention of technologies like Hadoop. Hadoop uses a Map Reduce paradigm to solve the problem by using parallelism. Cloud computing environments have provided more flexibility in using Hadoop to solve Big Data problems without any investment on infrastructure procurement and maintenance and take the advantage of parallelism with required scalability. The current schedulers of Map Reduce tasks can be improved for virtual environments to reduce the cost of the services used in the cloud. This work proposes an efficient scheduler for Map reduce applications in cloud environment.

Keywords: Cloud Computing, Hadoop, Map Reduce, Virtual machine, HDFS, Scheduler

## 1. INTRODUCTION

Parallelism of tasks is one of the biggest achievements in the computing field. From the invention of MPI to current day Map Reduce framework there has been a different way of utilization of parallelism to improve the performance of the system. Multi core architectures have paved the way to utilize the parallelism to next level. Hadoop is the framework used to solve problems involving large amount of data using automatic parallelism[1] in the form of map and reduce tasks. Hadoop has a good advantage of moving computation towards data rather than normal strategy of moving data towards computation. The input data is copied into Hadoop Distributed File System(HDFS)[4] with a replication factor of 3 by default. The input data is divided into multiple chunks of fixed size( by default 64 MB in Hadoop1 and 128MB in Hadoop YARN. Hadoop execution life cycle has three phases Map Phase, Shuffle phase and reduce phase .

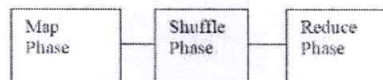


Fig. 1: Phases of Map Reduce framework in Hadoop

The Hadoop framework automatically divides the given problem into multiple tasks and executes multiple map tasks parallelly on multiple nodes. The intermediate results from map tasks are shuffled into different buckets which are hashed to different reducers. Each reducer processes the intermediate output from multiple map tasks and the output from the reducers tasks are written back into HDFS.

## 2. SCHEDULERS IN HADOOP YARN

Hadoop has built in three types of schedulers which are FIFO scheduler, Fair Scheduler, Capacity Scheduler [2]. Hadoop provides scheduler as a pluggable component which enables users to specify scheduler as per their requirements. The Resource Manager manages and allocates resources to applications in a cluster. Scheduler is a part of Resource manager that handles the scheduling policies of Hadoop cluster. User applications are placed in Queues which allows multiple users

## QoS Metrics for end to end Stable Routing in MANET

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**Abstract**— MANET dynamic routing protocols mainly used in reactive based routing in dynamic scenario and topology is unpredictable and uncertain in these cases, normal routing is not sufficient so we are changed QoS metrics to maintain end to end stable routing in the behavior of routing protocols. We are taken the QoS metrics used in AODV, TORA and DSR dynamic routing protocols and compare and analyzed in different node stupidities.

**Keywords**— MANET, Routing Protocols, QoS metric parameters.

### I. INTRODUCTION

MANET is highly dynamic wireless Networks, in MANET all nodes are moves dynamic way. MANET is not maintained centralized control but it can create self – organized network. In such way all nodes are moves randomly. Therefore, routing topology is unpredictable and uncertain. In the network all nodes act as router [1].

MANET routing protocol mainly categorized into 3 types. The first type is Proactive routing protocol, which is known as a table driven protocols provides the path pre-existing information. The second type is dynamic routing protocols, which is known as an on-demand protocol finds the path when they need. The third type is hybrid routing protocols, which supports both of proactive and dynamic routing mechanism depends on topology change [2]. We are considering the performance metrics are packet delivery ratio, throughput, load and delay in AODV, DSR and TORA.

### II. ROUTING PROTOCOLS

Here, we are discussing the performance of the dynamic routing protocols, which are AODV, DSR and TORA

#### A. AODV (Ad-hoc On Demand Distance Vector routing):

This protocol maintains and constructs the route from the source to destination within its route lifetime. Same as the DSR, the AODV broadcast a routing request from the source node using RREQ packet. Find the path in between the source and destination. All nodes maintains and originate in sequence no from the source node. The RREP packet establishing path from destination node depends on receiving

the RREQ packet sequence number. The transmission of data packets used active routing nodes only [5].

#### B. DSR - Dynamic Source Routing protocol:

The source node – S, sends a message to target node –D, at that time, verify the path availability in routing table, if the path is not, S begins Route discovery method used RREQ message broad casting to its neighbour nodes, this process continues till the D finds in the network, if it is D, then it accumulated information from RREQ message and copies in RREP message sends to S. In Route Maintenance is when a node fails to reach to D, then RERR message to broadcast to every node [4].

#### C. TORA - Temporally Ordered Routing Algorithm routing:

It supports more dynamic network, multi-hop wireless network and also it adaptive protocol it depends on link reversal [4]. It can identify more than one path in between the source and destination, the entire process 3 steps: the route identification, the route recreation and route maintenance. It provides control messages to identify to small clusters at every change of topologies.

### III. RELATED WORK

QoS maintains provides a set of information requirements meet data in network routing in between source and destination. the QoS parameters establish the safety parameters to maintains the end to end communications, the QoS requirements not only the requirement of the quick response and error handing purpose , it can be used responds depends on applications responds quickly and constantly changing requirements. The MANETs all the nodes are

# Strategies for Network Intrusion Detection using Machine Learning Algorithms

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N Radhika Amareshwari, S Ramanjaneyulu, G Swapna

**Abstract:** Spying identification is an emerging field of software development and research and networking with increasing Internet use in daily life. There have been many issues with classical IDS systems, along with other low network attack identification, high false alarm rate, and inadequate analytical capacity. The primary potential of research on the subject then is to establish a model for intrusion detection with increased performance and decreased preparation time. Machine learning is an efficient tool for analyzing any abnormal events taking place in the network activity flow. This paper proposes a mixture of two methodologies to determine any abnormal conduct in internet traffic. This paper recommends to use the principal component analysis (PCA) and Rough-set Support Vector Machine (SVM) as the hybrid intrusion detection models.

**Index Terms:** Intrusion Detection; Machine Learning; Support Vector Machine

## I. INTRODUCTION

As computer power, storage capacities and data collection increase, machine learning and artificial intelligence are more widely linked across industry and applications than ever before in recent memory. There are so many types of hazards, such as malware and DDOS attacks, on the Internet. An intrusion detection system can protect a network against such attacks. An IDS system can detect intrusions and degenerate an alert when an intrusion is detected. This intrusion detection system analyzes all traffic in a network. This is a difficult task for large datacenters. There is a huge amount of data across the data center network. Therefore, standard intrusion systems cannot complete all traffic. An intrusion detection system can alert malicious behavior administrators. Most intrusion detection systems need a lot of manual maintenance to deliver good performance. This thesis attempts to determine whether an intrusion detection system is capable of performing in an acceptable way. This is done by using algorithms for machine learning. These are algorithms that can learn and find input patterns. Automatic intrusion detection problem promises machine learning algorithms. The intent of an access control structure should not be to stop the attack, however merely to identify, detect or press release attacks, scheme and network security issues [1].

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Intrusion detection systems are usually supplemented by firewalls [2]. The other feature of the IDS is to detect anomalies outside network traffic and report them to the administrator or to prevent suspected contacts [3]. IDS is able to detect both internally and externally attacks. Several methods for network intrusion detection are proposed. The intrusion detection of anomalies in the network is a major element in network security [4],[5]. It seems very peculiar in case of behavior of data usage has discussed by the authors in [6], thereby creating a classification issue for detection systems more tuff job, namely the effectiveness and efficiency of the distinction between normal and abnormal activities. Machine learning has now been expanded to implement an effective system of intrusion detection. Machine learning methods in current intrusion detection are extremely functional and improved. In certain cases the authors in [7] presented various SVM methods and NN in [8] for making the detection of attacker in the traffic of the network for upgrading the classification rate better in the anomaly detection systems.

This study contends that new methods, like machine learning, offer a different way to close the cyber gap by reducing the number of cyber security staff necessary to investigate, evaluate and share information on malware detection. This paper proposes a new algorithm using a combination of the two machine-learning methods, Main component analysis & Rough set SVM technique, which allows the detection of anomalous network behaviors and the classification of normal and abnormal behaviors.

The main contributions and organization of this paper are summarized as follows: In section 2 we describe background details of machine learning schemes. The section 3 proposed work. The section 4 results and discussion. Finally in section 5 we concluded the paper.

## II. BACKGROUND WORKS

### Principal component analysis:

PCA is one of the widely employed data mining analytical methods to decrease degrees of freedom and to recognize data points with a maximum variance. In this technique, the emphasis is on the identification of the volume-based abnormalities in source-destination flow aggregated in backbone networks. The PCA method defines anomalous volume of traffic on a particular connection by comparing it with previous values. PCA thus separates the measurement of traffic into sub-regions that represent normal and abnormal traffic. The PCA results in the projection of a feature space on a smaller subspace, representing data by reducing feature space dimensions.

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## Developing Fault Tolerance in Cloud Computing based on Machine Learning Approaches

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

### Abstract:

The cloud computing stages are spreading very quickly. The main feature of cloud computing is the splitting into huge numbers layers. From an organization point of view, they are split into 2 layers: the client who accomplishes his application in the cloud and the cloud supplier who accomplishes the hosting center. From a specific point of view, the vast majority platforms of cloud computing exploit virtualization that intimates that they are split into three layers: they are hosts, virtual machines and applications. This cloud structuring makes it problematic to perform the operative management strategies. This manuscript concentrates on fault tolerance in cloud computing stages and more precisely on the autonomic repair in the instance of faults. It examines the suggestions about this splitting in the fault tolerance implementation. In present methods, the fault tolerance is completely controlled by the client or the supplier that indicates to fractional or wasteful results. Solutions that include collaboration among the client and the supplier are very auspicious. We delineate this discussion with experiments where selective and collaborative fault tolerance results are executed in an autonomic cloud framework, which we prototyped.

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# Soaring Performance Analytics Intelligence in Big Data Approaches

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**Abstract:** This thesis explains Big Data Phenomenon, which is characterised by rapid growth of volume, variety and velocity of data - information assets, and thrives the paradigm shift in analytical data processing. Thesis aims to provide summary and overview with complete and consistent image about the area of High Performance Analytics (HPA), including problems and challenges on the pioneering state-of-art of advanced analytics. Overview of HPA introduces classification, characteristics and advantages of specific HPA method utilising the various combination of system resources. In the practical part of the thesis the experimental assignment focuses on analytical processing of large dataset using analytical platform from SAS Institute. The experiment demonstrates the convenience and benefits of In-Memory Analytics (specific HPA method) by evaluating the performance of different analytical scenarios and operations.

**Keywords:** Big Data, advanced analytics, in-memory analytics, in-database analytics

## 1. INTRODUCTION

The world has turned into information society that highly relies on data. Since information systems generate enormous amounts of records every day, every second, it seems the world is reaching the level of data overload. It is obvious now, that in order to process such volumes of data an enormous capacity is required in terms of storage and computing resources. Whereas the growth of capacity is limited by evolution of hardware and technologies, the growth of the data volume is in fact unlimited.

Getting more specific, nowadays many organisations has adopted and broadly use information systems running on technological platforms, many their agendas has become addicted to data. In mature organisations data directly affect the logic of business processes, information has become a core of their business or business end. Hence business demands the data, furthermore availability of specific data in specific time. More and more complex and risky decision making process relies on correctness and transparency of data. 1.1 Motivation Interesting driver related to this topic mentions that the growth of data is unlimited. What is the society going to do about the data overload? How to handle and moreover to process all the data? Seems like we are having the Big Data issue.

Another driver for this topic is retrieving the information (not to gather all data for further analysis). Among all the data, how to retrieve the relevant information and within a required time? Which analytics should be applied on data? What is the balance between cost of retrieval and value of that information? What are the costs of capacity to retrieve desired information? It seems like it is all about the profit, trade-off between value of information and the cost to get it. Additionally to both drivers the challenge is to visualise the information in such a way that its value is comprehensive and understandable. The main issue is the information overload.

Analytics in the traditional mode, in terms of the Big Data, are acquiring data that may or may not be needed for analysis. This all requires an innovative point of view, a different approach,

architecture or infrastructure, if any. High performance analytics is one of them.

Adopting new technologies requires to process, discover and analyse these massive data sets that cannot be dealt with using traditional databases and architectures due to the lack of capacity resources in terms of computation and storage. High performance analytics represents one of the innovative approaches that can be applied on the increasing volumes, velocity and variety of data. 1.2 Goals Big Data Phenomenon, which is characterised by rapid growth of volume, variety and velocity of data - information assets, thrives the paradigm shift in analytical data processing. High Performance Analytics (HPA) can be considered as one of the approaches. The aim of the thesis is a research (overview, classification, discussions on problems and challenges) on the pioneering state-of-art of advanced analytics utilising various methods (HPA methods) that could escalate and optimise the computation performance of analytics.

Considering the fact that the selected area of research is currently being refined and formalised and simultaneously is emerging rapidly in proprietary definitions and solutions from multiple vendors, the goal of the thesis is to classify and provide summary and overview with complete and consistent image about the area of High Performance Analytics. Moreover, utilisation of these methods shall be demonstrated in practical assignment involving a processing of huge dataset.

## 2. BIG DATA PHENOMENON

As it has been mentioned before, the main raw material in this topic are data, Big Data. In this section, the Big Data Phenomenon is approached from its starting points and causalities. As the growth and volume of data appeared as a remarkable problem for capturing, handling and processing, it has been reactively described by many authors.

Later in this section, a definition of Big Data is provided (as it was initially described by Gartner's). Additionally, Big Data can be characterised by four dimensions (4V). Dimensions are used to materialise notion of the Big Data.

Once the phenomenon is defined, discussion about its influences and impacts may start. How does Big Data influence the information infrastructure and technologies? What are the impacts on data storing and data processing? How are the processes and architecture of information and analytics systems affected? Where are the trade-offs and dependencies between operational problems and risks on one side, and innovative possibilities and opportunities on another?

Finally, the missing part to the phenomenon is the way how to handle Big Data. That is evolving questions: Are there already existing solutions to solve the Big Data Phenomenon? What are the architectures of these solutions? Which technologies are used, or which has been designed for this purpose?

**2.1 Starting points:** How did everything start? Early in 80's and 90's, the first information systems (IS) started exploiting in enterprises and organizations across various industries. Information

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# Medical Diagnosis Based on IOT using Arduino

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## ABSTRACT

In this paper the Internet of Things using arduino has a great impact on healthcare sector. The doctor and patient communicate with each other. The doctor can access the patient's pulse rate and temperature values through the web page and the message is sent to the patient. The patient can know the condition of normal/ abnormal. If patient condition was abnormal immediately precautions have to be taken<sup>[1]</sup>. It mainly focuses on healthcare Sensors used in the IOT such as temperature and Pulse rate Sensor.

**Keywords:** Internet of Things, arduino, Pulse Rate, Temperature Sensor.

## INTRODUCTION

Internet of Things (IOT) has a great impact on today's world to incorporate several technologies and communication solutions. Smart health monitoring system is based on improving quality of human life and wireless sensors are placed on the body of patients in order to monitor their health condition.

The sensor gives us data like body temperature and pulse rate of a person. The data can be retrieved when an authorized persons requests for the same<sup>[2]</sup>. The data gets on a web page and the result is obtained in a graphical format. To the arduino sensors and Ethernet cable network were connected to function the retain mobility for monitoring the patient. Smart Health monitoring system performs various measurable factors of the patient in hospital using the Internet of Things. Smart health monitoring system is based on the Internet of Things, the patient data sends to the cloud server stores on the particular channel. The data on the channel shows in the graph format even the data can be gets on the mobile app and the doctor can be gets it monitoring purpose anywhere in the place, even can alert the doctors signal goes down to particular level of the corresponding patient.

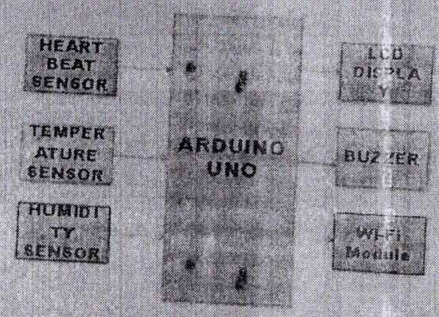


Fig. 1: Architecture of Smart Health monitoring System by using Arduino

## PROSPECTIVE AND LITERATURE WORK

The following are the requirements for performing health monitoring system

**Arduino:** Arduino board gives digital and analog input/output pins can be interfaced and also to other circuits. To load the programs from computer to arduino board we use USB to function serial communication interface.

**Breadboard:** A Breadboard is used in learning of electronic devices used in connecting the components.

**Pulse Rate Sensor:** Pulse Rate Sensor sends the light signal on the finger then the blood circulation on the finger is not constant with respect to time sensor. It uses the infrared lights on the tissue, amplified signal displayed on the monitoring signal.

**Temperature Sensor:** It reads the temperature from the temperature sensor and plugging the output pin directly into an analog input.

Centigrade Temperature= [(analog voltage in mv-500)]/10.

**Thing Speak:** Thing Speak channel used to update the data on the channel and even can be downloading on the mobile application to monitor the current status of the application.

## IMPLEMENTATION AND IT'S RESULTS

In the present world, Health monitoring is the major problem due to lack of proper smart health monitoring

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2

# A Blend Ensemble Classifier for Sentiment Decision Making in Indian Railways Tweets

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**Abstract---** Out of all social media platforms, Twitter is one of the Online Social Network that exhibits exponential growth of users and tweets every year. Tweets carry social feedback pertaining to different products or services catering to plenty of domains. In this paper, we present a framework for extracting sentiment on Indian railways tweets. Since, the result of any machine learning algorithm depends on the quality of the data set, so, in our framework, the first phase is the pre-processing model and we apply different filtering techniques. In the second phase, we clustered the tweets based on train number and features. Finally, we applied supervised machine learning using single and ensemble classifier with stacking on each cluster to extract the sentiment related on each tweet. The main objective of this paper is to make decision-support system of Indian railways based on features to passengers and organization. Our final results showed better sentiment classification compared to present state-of-art techniques.

**Keywords---** Twitter Posts, Multi-level Filtering, Dataset Creation, Feature Extraction, Ensemble Classifiers, Sentiment Classification, Indian Railway Tweets.

## I. Introduction

The emergence of social networking and virtual communities over internet has paved way for people to express their opinions on products and services. Thus, social media such as Facebook and Twitter, to mention few, facilitate micro-blogging or providing reviews or opinions. In other words social media is rich in possession opinion of public. With the invention of Online Social Networking (OSN) and other World Wide Web (WWW) applications that provide user interaction there is increased probability of obtaining and studying opinions of people [1].

There was unprecedented increase in the popularity of social media such as Google Plus, Twitter and Facebook over Internet. There is also increase of information sharing and instant communication among users across the globe [2] where people use synonyms of many words to express their views or opinion. In this situation a dictionary such as WordNet is very useful. WordNet [3] is a lexical dictionary which contains words of English meaning.

It is widely used for analyzing English sentences. This concept is also known as text mining.

Categorization, summarization and so on [4]. SentiWordNet [5] is another lexical resource publicly available. It is also used for text mining or sentiment analysis. WordNet has only semantic meanings of English words while the SentiWordNet has words with syn sets that are associated with polarities such as positive, negative and objective. Bag of Words (BOW) model is used in [6] to have set of words with a value indicating sentiment. These words are used to check whether a tweet has sentiment in it.

Literature revealed that a comprehensive framework for sentiment analysis is needed which is extendible and caters to the needs of different domains in the real world. Enterprises of different businesses can make use of the framework with systematic approaches that can help in filtering of live tweets collected and extraction of sentiments in the tweets considered. The focus of our research is to propose and implement real time sentiment analysis of tweets to make strategic decisions by the enterprises or individuals.

If one wants to travel between two stations via train, he/she can pre-calculate his journey and decisions regarding reservation based on features. Towards this end, a series of research activities are required. In this paper, our focus is on the preparation of data sets suitable for sentiment analysis. We also proposed a framework with ensemble method for sentiment analysis of tweets of Indian Railways.

The methodology for filtering has three important modules. The first module takes care of Natural Language Processing (NLP) techniques like stop word removal, stemming and lemmatization.



# Visual Analytics Dashboard Design, Development and Assessment of a Big Data

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**Abstract:** Design, Development and Evaluation of a novel Visual Analytics Dashboard for Big Data Analytics. The presented dashboard connects social activity from Facebook with a thorough event timeline of the factory disasters in the Bangladesh garment industry. Bangladesh depicts one of the largest garment industries in the world and their mostly female workers only receive a low wage. The goal of this thesis is to present a thorough understanding of the design and development processes needed to implement a Big Data Visual Analytics tool based on freely available open-source components in a robust, extensible manner. Moreover, an evaluation of the developed dashboard is performed based on a task-based user study in conjunction with software and database performance optimization. The user study concludes that the dashboard is easy to use in a productive manner without prior training and experience in using visual analytics tools. By using the presented dashboard, even novice users can gain profound understanding of the tragedies in Bangladesh, their background, and the resulting social media impact. Furthermore, the linked social media activity from eleven international companies in the garment industry can be interactively explored through different visualizations depicting actor mobility, conversation content, language distribution, and overall activity levels.

**Keywords:** Big data, Social Data, Visual Analytics, Acquisition, Sodato

## 1. INTRODUCTION

In recent years, visual analytics tools have steadily been improved and adapted in order to work with large data sets, so-called Big Data, while providing accessibility to a growing audience. Although many of these data sets have historically been of proprietary nature, the growth of social media also spurred availability of huge collections of social media activity. Various social networks, such as Twitter and Facebook, provide extensive data while being increasingly used for research and business purposes.

In light of current research on social media activity in regard to major events, such as the 2013 German Bundestag elections using Facebook and Twitter data (Kaczmarek et al.; 2013), further analysis of distinctive events and their social media impact needs to be performed using state of the art visual analytics tools.

Under these preconditions, the 2012/2013 Bangladesh textile industry disasters which prompted massive exclamation from consumers and media outlets all over the world present a series of events worth studying on a global scale. Both the viewpoints of consumers and high-profile textile industry brands alike are captured in the social media dataset, with the latter publicly perceived as an adversary to workers' rights in the textile industry.

Given the opportunity to source social media data from Facebook for a perfectly sufficient timeframe for analysis of the Bangladesh textile industry event timeline, an interactive visual analytics dashboard based on the available data is designed and developed in context of this thesis.

To assess the quality of the developed dashboard, its accessibility and interactive components are evaluated by means of user and

software testing. The evaluation is performed in order to gain a thorough quantitative and qualitative reasoning in regard to the value created for end users when visually analyzing complex event timelines such as the above-mentioned factory disasters in the textile industry. Additional insight on the impact of these events on social media activity and waves of sentiment against specific social media actors can be obtained through this analysis.

## 2. BIG DATA

Big Data is a modern terminology for large data sets which are hard to process with traditional tools due to their sheer size. Although the concept encompasses new technological developments in database and storage technology, it remains mainly a marketing term for interdisciplinary processing of available information. According to Buhl et al. (2013, p.66), "above all, [Big Data] is a multidisciplinary and evolutionary fusion of new technologies in combination with new dimensions in data storage and processing (volume and velocity), a new era of data source variety and the challenge of managing data quality adequately (veracity)".

Big Social Data is a term for Big Data which is obtained from the social media world. With Facebook and Twitter being some of the the most popular social networks on the internet, the data they provide to third parties over public and private APIs (such as the Twitter Firehose) can be called Big Social Data.

### 2.1. Visual Analytics of Big Social Data

As this thesis presents an IT artifact visualizing the Bangladesh factory disaster event timeline in light of social media activity from various companies' virtual

### 2.2. Theoretical Background

Facebook presences, a particular blend of technologies in Visual Analytics and Big Social Data is crucial.

Wong et al. (2012) underline major challenges that arise in Visual Analytics of data sets classified as Big Data, in particular scalability, summarization, difficulties in achieving smooth interactive UIs, and the development of effective methods for user-driven data reduction.

The analysis of social media actors, their actions and the artifacts they create is actively performed by researchers and businesses with focus on many different topics. For one, researchers use advanced methods of sentiment analysis to gain insight into the "reaction of people to events, topics and entities" based on Twitter data (Bravo-Marquez et al.; 2014, p.2). Additional commercial, web-based tools such as SAS exist which have a specialization on exploratory Visual Analytics of Big Data (Abousalh-Neto and Kazgan; 2012); but they lack the complexity needed for working with combined Big Social and event timeline data.

To conclude the theoretical background, previous research presents a healthy assessment of opportunities that arise through the use of Visual Analytics on large data sets, but on the other hand underlines several problems in handling of Big Social Data through traditional means of Visual Analytics software which need to be accounted for during implementation of the IT artifact.

# Hadoop Performance based Big Data Analysis using Cloud Computing and Amazon Web Services

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**Abstract:** The era of "Big Data" is upon us. From big consumer stores mining shopper data to Google using online search to predict incidence of the flu, companies and organizations are using troves of information to spot trends, combat crime, and prevent disease. Online and offline actions are being tracked, aggregated, and analyzed at dizzying rates. For example, questions like, how many calories we consumed for breakfast, how many we burned on our last run, and how long we spend using various applications on our computer, can be recorded and analyzed. We can lose weight by realizing we tend to splurge on Thursdays. We can be more efficient at work by realizing we spend time more than we thought on Facebook. Data warehousing and data mining are related terms, as is NoSQL. With data firmly in hand and with the ability given by Big Data Technologies to effectively store and analyze this data, we can find answers to these questions and work to optimize every aspect of our behavior. Amazon can know every book you ever bought or viewed by analyzing big data gathered over the years. The NSA (National Security Agency) can know every phone number you ever dialed. Facebook can and will analyze big data and tell you the birthdays of people that you did not know you knew. With the advent of many digital modalities all this data has grown to BIG data and is still on the rise. Ultimately Big Data technologies can exist to improve decision-making and to provide greater insights...faster when needed but with the downside of loss of data privacy.

**Keywords:** Big Data, ETL, Hadoop, Cloud, Web

## 1. INTRODUCTION

Data has been a backbone of any enterprise and will do so moving forward. Storing, extracting and utilizing data has been key to many company's operations. In the past when there were no interconnected systems, data would stay and be consumed at one place. With the onset of Internet, technology, ability and requirement to share and transform data has been a need. This marks invention of ETL. ETL facilitated transforming, reloading and reusing the data. Companies have had significant investment in ETL infrastructure, both data warehousing hardware and software, personnel and skills.

**BACKGROUND, MOTIVATION AND AIM:** With the advent of digital technology and smart devices, a large amount of digital data is being generated every day. Advances in digital sensors and communication technology have enormously added to this huge amount of data, capturing valuable information for enterprises, businesses. This Big data is hard to process using conventional technologies and calls for massive parallel processing. Technologies that are able to store and process exabytes, terabytes, petabytes of data without tremendously raising the data warehousing cost is a need of time. Ability to derive insights from this massive data has the potential to transform how we live, think and work. Benefits from Big data analysis range from healthcare domain to government

to finance to marketing and many more [1]. Big data open source technologies have gained quite a bit of traction due to the demonstrated ability to parallelly process large amounts of data. Both parallel processing and technique of bringing computation to data has made it possible to process large datasets at high speed. These key features and ability to process vast data has been a great motivation to take a look into the architecture of the industry leading big data processing framework by Apache, Hadoop. Understand how this big data storage and analysis is achieved and experimenting with RDBMS vs Hadoop environment has proven to provide a great insight into much talked about technology. Author of this thesis aims at understanding the dynamics involved in big data technologies mainly Hadoop, distributed data storage and analysis architecture of Hadoop, setup and explore Hadoop Cluster on Amazon Elastic Cloud. As well, conduct performance benchmarking on RDBMS and Hadoop cluster.

## 2. WHAT AND WHY BIG DATA

The amount of data generated every day in the world is exploding. The increasing volume of digital and social media and internet of things, is fueling it even further. The rate of data growth is astonishing and this data comes at a speed, with variety (not necessarily structured) and contains wealth of information that can be a key for gaining an edge in competing businesses. Ability to analyze this enormous amount of data is bringing a new era of productivity growth, innovation and consumer surplus. "Big data is the term for a collection of data sets so large and complex that it becomes difficult to process it using traditional database management tools or data processing applications. The challenges include the areas of capture, curation, storage, search, sharing, transfer, analysis, and visualization of this data" [2].

### 2.1 BIG DATA ATTRIBUTES

The three Vs - volume, velocity and variety - are commonly used to describe different aspects of big data. See Figure 1 [3]. These three attributes make it easy to define the nature of the data and the software platforms available to analyze [4].

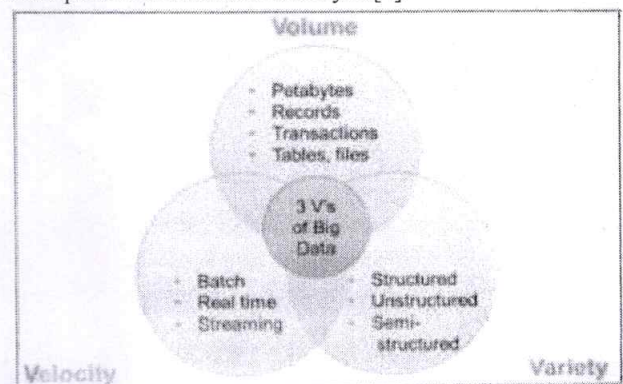


Figure 1. Three V's of big data. Source: VITRIA. The Operational Intelligence Company, 2014. <http://blog.vitria.com>, accessed April 2014.

# Breast Cancer Detection Using Artificial Neural Networks

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**Abstract-** Breast cancer is the most frequent cancer type among women, which develops in one out of eight of them. Early diagnosis is the key to preventing the negative results of the disease like unbearable pain and discomfort, tissue loss and death. For this reason, many studies of automatic diagnosis and classification system have been realized in the literature that can be helpful for radiologists and doctors. In this paper, a combined approach based on artificial neural network (ANN)'s member, Probabilistic Neural Network, and discrete wavelet transform is presented to classify cancerous tissue from mammogram images into three classes. This has resulted in classification of tumorous tissue into three classes-normal, benign, malicious. This study has resulted in further research through the application of various different filters to analyse their impact on the accuracy rates.

**Keywords-** Mammography, Magnetic Resonance Imaging, Artificial Neural Networks

## I. INTRODUCTION

The method for breast cancer detection is established using back propagation neural network and associated its outcomes with radial basis function network. Subsequently associating results bring into being back propagation neural network is the superlative method to distinguish breast cancer [1]. Breast Cancer detection Convolutional Neural Networks (BCDCNN) is intended to accelerate the diagnosis method by supporting professional to decision and cataloguing the breast cancer. Successions of mammogram images are utilized to carry out pre-processing to transform a human pictorial image into a computer pictorial image and regulate appropriate factor for the CNN classifier. Subsequently, all transformed images are allocated into CNN classifier as preparation basis. The CNN classifier will then create a prototype to identify the mammogram image. Associating BCDCNN technique with Mammogram Classification Using Convolutional Neural Networks (MCCNN), BCDCNN has enhanced the correctness concerning classification on the mammogram images [2]. Computer Aided Diagnosis system (CAD) exploited to differentiate between benign (non-cancerous) and malignant (cancerous) mammogram. CAD systems are utilized to assistance radiologist to improve diagnosis correctness. In the projected method, texture sorts from mammogram were intended using Gray Level Co-occurrence Matrix (GLCM) along 0°, from the compute sorts utmost operative sorts ensuring huge influence to attain the anticipated outcome were taken and executed to Artificial Neural Network (ANN) for training and classification, as ANN is extensively practice in numerous domains such as, pattern recognition, medical diagnosis, machine learning and so on [3]. Proposed Deep Neural Network classifier which is one of the DL designs for categorizing a dataset of 66 brain MRIs into four groups. The classifier was united with the discrete wavelet transform (DWT) the influential feature extraction instrument and principal components analysis (PCA) and the assessment of the enactment was pretty decent concluded all the concert dealings [4].

IN contemporary days, investigators have shown their consideration in the advance of biosensors to detect breast cancer by means of various biomarkers. To one side from biosensors and biomarkers, microwave imaging procedures have also been powerfully considered as an auspicious diagnostic instrument for quick and economical early-stage breast cancer recognition. Proposed aims to afford an outline on topical significant attainments in breast screening approaches and breast biomarkers along with biosensors for hastily analysing breast cancer [5]. Proposed an improved double thresholding-based method for Mammograms' image segmentation and also auxiliary the borders of the ending segmented image as an outline to the input image facilitating physicians to certainly detect the breast cancer into diverse Mammograms. The outcome is improved wise influence onto breast cancer qualitative detection into Mammograms, serving physicians for improved analysis. Generalization for the training is potential for not only x-ray based Mammograms, but also for all biomedical images, as an improved segmentation way for improved visualization, detection, and feature extraction, thus enhanced diagnosis. Moreover, this manual thresholding technique has the improvement of not only decreasing treating time but also the processing storage area [6]. Proposed fuzzy and neuro fuzzy based image fusion for medical image to improve the spectral and spatial content in the fused image and attained better results [7]. Neuro fuzzy based iterative image fusion on medical images are implemented to obtain more informative fused image for image analysis and classification for decision

## Image Resizing and Object Displacement using Seam Carving

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### ABSTRACT

As enactments are automatic, less expensive and consolidated into a continually increasing number of devices. An expanded quintessence on resizing techniques is developing to fill an image into flexible screen estimation. The storage space is limited in portable devices, there exist various methods to resize the images. The methods cropping and scaling leads to undesirable results in data or meandering in observation. In this paper, we propose an enhanced seam carving calculation using seam carving method, avoids the drawbacks of existing methods like carving off the important data from the image, changing the composition and reducing the distinct details of the image. The obtained simulations display better execution results over the existing seam carving techniques, performance is evaluated using Peak Signal to Noise Ratio (PSNR), Mean Square Error (MSE) and Structure Similarity (SSIM) metrics. The proposed work is an application of seam carving in changing the position and adjusting the viewpoint of the object in images, with more degree of freedom to the editors or photographers and it requires less memory space for storage.

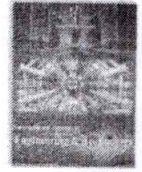
**Keywords:** Seam carving; Viewpoint adjustment; Cumulative energy map; Optimal seam.

### 1. INTRODUCTION

With aviral increase of portable media gadgets (mobile phones, PDAs, PDA's, and so on.), the operators are required to store images with less memory. The operations like image resizing and retargeting are rapidly turning into a commanding research area. Expert snappers and editors emphasize on the shade, precision, contrast and arrangement of the snaps, the authors highlight the prominence of arrangement of the objects [1,2]. There is a need to resize images and recordings to fit different gadget, shown with various perspective proportions that augments data and limits bending in the images. Conventional techniques including resampling and editing are the main alternatives till a couple of years ago. The author [3] proposed a method to extract visual features on intuition, to form a computerized classifier over machine learning. This aims to reconnoiter the correlation among the low-level content and aesthetical worth of the image. In their fundamental work [4], proposed slightly exquisite arrangement called seam carving, which works in a discrete manner, decreasing (or augmenting) a image's measurement by one seam or segment at each progression named retargeting. Later arrangements deliver great outcomes by utilizing worldwide advancement systems but they are more computationally expensive. Moreover, worldwide arrangements are not appropriate for multi-scale media applications those that enable an image or video to be retargeted to any size on the fly and grounds require reprocessing for each adjustment in size. The joint optical-digital framework is proposed [5], aims to escort the users to obtain better arrangement effects in photography. To engender better arrangement effects, author espoused eye tracking to identify imperative image content and then accompanied cropping [6]. Investigational results of user study displayed the cropped image with better aesthetical effect.

The solitary preprocessing stage is required to get the ready images or video with the aim of continuous retargeting is conceivable [4]. The novel quality assessment (QA) technique is proposed [7], using natural scene statistical model to inevitably evaluate the quality of images. This seam carving remains as a critical apparatus for image retargeting, it has its own impediments. High level elements confront their identification to enhance the seam carving calculate on, however slight work has been done to enhance the utilization of low-level components. The recognition of abnormal state components may flop and make the complete proposal come up with diminutive. These abnormal state elements can be enlarged with

  
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# A Unit Plane Edge on-off Slope Algorithm Based Fast LTVR Restoration Analysis

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## Abstract

This research paper presents a Fast LTVR (Localized Total Variation Regularized) method for restoring the degraded images by white noise, while preserving the image edge details in a constructed unit plane edge model through a Unit Plane Edge ON-OFF Slope algorithm. The noisy image contains two details; one with high noise and the other with edge fine details. The edge fine details are restored using ON-OFF Slope algorithm. The denoised image and the edge fine details are used to reconstruct the final restored image. A Unit Plane Edge restoration method is proposed in this research work to estimate the edge-mapping with the fine details. Simulation results of proposed work shows an effective image restoration algorithm comparatively with different filter based restoration methods.

**Keywords :** Image denoising, filter: ON-OFF, edge, restoration.

## 1. Introduction

Image restoration has been in researching quite thoroughly to develop an effective denoising method that can retain the original image by removing the complete noise. During the process of image restoration, the edge is so precious, which is a challenging task in image processing techniques like compression, denoising and restoration. The image denoising technique so far implemented [1-5] could able to reconstruct the image area which is beyond the edges, and could able to restore with less quality and is the first challenging task in the present scenario of this research work. And the restoration of edge pixels using TV formulation is the second challenging task, which accomplishes the primal-dual method and min-max optimization, are the approaches implemented in this research work.

## 2. Previous Work

Form the literature survey, the methods to restore an image include non-linear and linear methods, for the fined and un-fined regions of the noised image, which was proposed in [4], [5] and [6] using different methods. The authors G. Gilboa, N. Sochen, and Y. Zeevi in [4], utilises a Adaptive Total Variation (ATV) method to denoise the fine regions of image and could able adaptively estimate the image reconstruction. The method in [5], utilises a Non-Local Means method (NLM) to eliminate the noise smoothen areas. The method in [6], utilises a inverse filtering method to eliminate the additive noise present in the smooth and non-smooth areas, which is a best technique for the fine image denoising technique in spatial [7-9] and frequency [10-11] domains. Moving further, [12-13] wavelet denoising techniques have been implementing in the present scenario to reduce the computation time [14] and precision of denoising [15], one among them is Lifting-based

wavelet domain adaptive Wiener filter (LBWDF) [1] method to improve the image restoration by providing an increase in the computation time compared to traditional wavelets [16] [17]. Second among them is [8], to eliminate the neighbourhood local variance around the pixel region. Further subjective enhancement techniques proposed in have improved in estimating the noise variance in spatial and frequency domain.

The similar approach related to Total Variation (TV) proposed a minimal energy function to reduce the noise variation and total variation of the image adaptively. An approach in (FDWF)[2] Frequency Domain Wiener Filter provides a spectra power estimation through filter-based denoising method. In Edge map and Wiener Filter (EWF) [3], the denoising of details are preserved by reducing the noise levels.

## 3. Proposed Work

In this research work, comparing with the (LBWDF)[1], (FDWF)[2], (EWF)[3], (ATV)[4] and (NLM)[5], the following are the key features:

- increased image pixel preservation
- fasten the computation performance
- increased the noise estimation
- a strong denoising in the smooth regions, a variant TV method is proposed
- to preserve the fine and edge details during the higher noise areas

The proposed Unit Plane Edge ON-OFF Slope algorithm is used to de-noise the edge details by preserving the neighbour pixels in the regions of image restorations. The image denoised area is considered as fine and non-fine regions. Across the fine regions, the unit threshold value restoration is estimated and across the non-fine regions, the plane threshold value restoration is estimated. And across the edges, ON-OFF slope threshold values are applied

  
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## Brain Tissue Classification using PCA with Hybrid Clustering Algorithms

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### Abstract

Distinct algorithms were developed to segment the MRI images, to satisfy the accuracy in segmenting the regions of the brain. In this paper, we proposed a novel methodology for segmenting the MRI brain images using the clustering techniques. The Modified Fuzzy C-Means (MFCM) algorithm is pooled with the Artificial Bee Colony (ABC) algorithm after denoising images, features are extracted using Principal Component Analysis (PCA) for better results of segmentation. This improves the ability to extract the regions (cluster centres) and cells in the normal and abnormal brain MRI images. The comparative analysis of proposed methodology with existing FCM, ABC algorithms is evaluated in terms of Minkowski score. The proposed MFCM-ABC method is more robust and efficient to hostile noise in images when compared to existing FCM and ABC methods.

**Keywords:** ABC algorithm, FCM clustering, MRI, PCA, T1W-Brain images.

### 1. Introduction

Magnetic Resonance Imaging (MRI) produces a large volume of data, used by clinicians to diagnose the disease, pathology existing in the images [1]. MRI scan is a non-intrusive method, provides a good contrast between the tissues of the brain. During acquisition procedures images are affected by the undesirable signals such as noise non-illumination ailment and partial volume effect. The image segmentation is dividing an image into different anatomical structures based on the various parameters like regions, intensities, pixels, and volume. Different algorithms are developed to overcome the complexity incorporated in the process of segmentation and distinct algorithms are described in detail [2]. Various segmentation methods (thresholding, region growing, supervised, unsupervised and atlas-based methods). Fuzzy C Mean (FCM) process is introduced by Dunn, 1973 and later revised by Bezdek, 1980. The implication of the fuzzy clustering allows the pixels based on their different intensity and membership values to form the clusters. It's an iterative process and sensitive to noise and other imaging artifacts. The most commonly used method is FCM, which is used for the sequential pattern mining process in data mining and provides the accurate performance when compared to k means clustering method [3]. In segmentation of images, clustering is pondered to be image voxel as the data object and in that, each voxel is allocated to a cluster based on their similarity of selected features. The noise interfered is either gaussian or speckle noise and the image capturing equipment itself incorporates salt & pepper noise. This noise degrades the images and leads to the incorrect diagnosis of the disease. Due to this coherent noise, it is more difficult to distinguish the adequate details of the images during the diagnosis of the disease by a human expert.

Denoising methods are intended to eliminate the noise from an image without losing the original attributes of the image.

Various denoising filters are bilateral, wavelet, principal component analysis, non-local means filters are used to exterminate noise from the MR images. The analysis of various denoising filter is carried out revealed that the SANLM filter provides the better results when compared to other existing filters [4]. Thus, denoising the noisy image has become the imperative step in processing the medical MRI images. Artificial Bee Colony is inspired by means of rummaging action of bees and treated as the meta-heuristic population-based algorithm [5]. Honey bees are social bugs and demonstrate features like bee rummaging, bee ballet, crowned head bee, chore collection, cooperative decision building, shell site choice, copulating, pheromone setting and steering systems, used as the replica of intellectual solicitations. It is simple, easy to employ, highly amenable, widely used by many researchers for various optimization problems [6]. This paper outlines methods and materials in section II, the proposed MFCM-ABC is described in Section III, Section IV presents the results and discussion, Section V concludes the paper.

### 2. Methods and Materials

#### A. Modified FCM (MFCM) Algorithm

To overcome the limitations of conventional FCM algorithm, Modification in the membership function is defined as [9],

$$x_{ij}^a = \frac{x_{ij}^a P_{ij}^k}{\sum_{t=1}^k x_{ij}^a P_{ij}^k} \quad (1)$$

$$P_{ij} = \sum_{t \in N(u_j)} x_{it} \quad (2)$$

where  $p_{ij}$  -spatial function representing the probability of pixel  $u_i$  belonging to  $j^{\text{th}}$  cluster,  $N(u_j)$ -square window centered on pixel  $u_i$  in spatial dominion and  $a, k$  are parameters of window used. In a



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# Magnetic Resonance Brain Images Individual Recognition with PCA

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**Abstract:** Every individual brain is identified as unique by proper consideration of the background for individual difference in the brain functions of the brain morphology. The proposed method is implemented by using structural magnetic resonance imaging brain recognition is performed using segmentation with the Voxel-Based Morphometric (VBM) approach and Feature Extraction (FE) using Principal Component Analysis (PCA). Brain recognition is identified by computing the Euclidean distance among the image pairs, projected into the same subspace. The petite difference in the Euclidean distances is observed between the same subject when scanned twice and it is due to distinct combination of scanners used between test-training image pairs with/without scanner up-gradation. The obtained results of rank identification and receiver operating characteristic curves show that the brain morphology identifies a particular individual with less false acceptance rate.

**Keywords:** Brain morphology, Eigen brain, MRI, PCA, Recognition, VBM.

## I. INTRODUCTION

Brain morphology is the study of dimension, and structure of the brain. To identify the individual difference, occurs in the functioning of the brain and it is important to know the difference in the individual brain. The information obtained from the brain magnetic resonance imaging is unique and cannot manipulate. In early days, people started to study about brain, there is no proper technology to obtain maximum information from the scanning machines (X-Ray/CT SCAN). With recent advances in MRI techniques, the study of brain morphometric is extensively used to analyze the shape, size, and structure of the individual brain. The brain goes through structural vicissitudes throughout brain development, growth, and aging related to changes in the functioning. Most of the Neurological and neuropsychiatric disorder occurs when the brain undergoes structural changes. Apart from these reasons brain development also take part due to high-level performance such as cab riders [1], mathematicians [2], musicians [3,4], and bilingual individual [5]. Even training and practicing any special hobby or skill prone to cause changes in brain structures [6]. Here, the structural MRI images are used, during the development of manifesting the brain tissues takes place and

it's identified by structural MRI. There exist T1, T2 and proton density MRI images with different properties (contrast and brightness). In recent years, the number of automatic impartial methods has been established and extensively used to observe brain morphology, including volume- deformation-, and surface-based approaches. Among these different automated techniques, voxel- based morphometry (VBM) [7] is widely used for assessing structures of the brain and includes segmentation of tissues into gray matter (GM), white matter (WM) and cerebrospinal fluid (CSF). There exist different algorithms for extracting the features from the brain images and segmenting tumors [8, 9]

In the present study, the analysis is carried out the brain morphology is distant among different individuals and distinguishable information. The 40 subjects of structural MRI datasets were scanned twice (scanning interval=6months) are examined and among them, 12 different subjects are used for evaluation. The normalization is done using unified segmentation with VBM approach [10]; these normalized images were smoothed using the median filter for voxel-by-voxel statistical analysis. Followed by FE based on PCA and Euclidean distance is calculated between image pairs which are subjected to same subspace. This paper outlines the implementation of the proposed methodology in section 2. The results and discussion of the proposed method are described in section 3, and section 4 concludes the paper.

## II. METHODS AND MATERIALS

### A. Datasets

The datasets used in for investigation include both healthy and unhealthy brains. The 12 different subjects (6 males, 3 females, 3 diseased images) are attained from Open Access Series of Imaging Studies (OASIS). The mean age =  $45 \pm 9$  years, varies = 30 - 60 yrs. In this study, both healthy subjects are used to find the similarities and unhealthy subjects the location of the disease by using proposed brain morphology method. T1 weighted scan images are used, where T1 is spin-lattice relaxation and T2 is spin-spin relaxation. In longitudinal relaxation of T1 images, atomic nuclei come to thermal equilibrium in the magnetic field.

### B. Unified Segmentation

The normalization is done with unified segmentation [10] and Gaussian mixture model (GMM) to integrate a smooth intensity dissimilarity and non-linear registration with tissue probability maps.

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# An Effective Low Power Frequency Synthesizer for On-Chip Clock Generation

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**Abstract:** The variability and leakage current in nanoscale CMOS technology may debase the circuit exhibitions altogether. To suit the above issues in a wide-run stage locked circle (PLL), a self-healing prescaler, a self-healing voltage-controlled oscillator (VCO), and an aligned charge pump (CP) are displayed. This PLL is created in a 65-nm CMOS technology and its dynamic zone is 0.0182 mm. For the self-healing VCO, its deliberate recurrence run is from 60 to 1489 MHz. At the point when this PLL works at 855 MHz, the deliberate rms and crest to-crest nerves are 8.03 and 55.6 ps, separately. The deliberate reference goad is - 52.89 dBc. This PLL devours 4.3 mW from 1.2 V supply without supports. The proposed structure includes an engineering joining a LC quadrature voltage-controlled oscillator (VCO), two example and-holds, a stage interpolator, advanced coarse-tuning and rotational recurrence recognition for tweaking. Like multiplying delay-locked loops (MDLLs), this design limits jitter gathering to one reference cycle, as jitter amid one reference cycle does not add to the following reference cycles. Additionally, rather than utilizing multiplexer switches normally utilized in MDLLs, the reference clock edge is infused by stage interjection to help higher frequencies and

lower jitter. Usefulness of the recurrence synthesizer is approved between 8–9.5 GHz, LC VCO's scope of activity. First-request dynamic of the procurement has been broke down and shown through estimation. The yield clock at 8 GHz has a coordinated rms jitter of 490 fs, top to-crest intermittent jitter of 2.06 ps and all out rms jitter of 680 fs. Diverse parts of jitter have been examined and separate estimations have been done to help the analysis.

**Keywords:** nanoscale CMOS technology, Leakage Current, clock multiplier, frequency synthesizer, interpolation.

## 1. INTRODUCTION

At the point when a CMOS technology ways to deal with a nanometer scale, the non-idealities [1], [2], for example, variability and leakage current, may altogether influence the circuit exhibitions. The procedure variability prompts the huge varieties to debase the gadget coordinating and exhibitions. It might result in just a couple of passes on a wafer to meet the objective execution details. The undesired leakage currents additionally debase the precision and goals of simple circuits and make advanced powerful circuits not to work appropriately [3], [4]. For a pMOS transistor





## IMPLEMENTATION OF REMOTE MEDICAL NURSING MONITORING SYSTEM USING ARDUINO

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### ABSTRACT

*It is necessary to monitor the patient time to time by giving them proper attention. But it is missing in some hospitals. Hence in this paper we proposed an effective remote medical nursing monitoring system. If any patient of a particular bed need any medical assistance, the patient press that key which is present near the bed, then the key will be activated and the camera will be positioned towards the patient bed automatically if patient needs doctor's assistance, by pressing another key the message will be sent to the doctor through Bluetooth, after visiting the patient doctor has to press a special key, which means he visited the patient and it will be visible on LCD display. Finally, the project we designed for particularly taking care of general ward patients.*

**KEYWORDS:** *Arduino, Blue-tooth, LCD, Motor, H-bridge.*

### 1. INTRODUCTION

The Subject of mechatronics which means a united frame work is constructed with mechanical part, Arduino, video monitoring, camera included in this project which is positioned towards the *calling* patient. LCD is to display the messages which are visible to patients, what key there have pressed. The current

technology, which involves the subject of mechatronics can restrict the motion of camera, it will be positioned at the middle of the two beds. For this purpose magnetic switches and limit switches are used and they are supposed to be installed near the beds. The video camera is arranged over the sliding channel mechanism and it will be moved horizontally within a specific span of time. In this paper we propose to arrange two mini beds near that beds three keys there are doctor calling, medicine, food and two keys are arranged for doctor and that key is pressed after visiting the patient.

If patient press any particular assistance key then the message will be send to that persons and the message will be displayed in LCD, by pressing key, camera will be moved from home position to particular patient bed and wireless video monitoring will be appear at the receptionist section. Finally, this project is designed for especially taking care of general ward patients in government hospitals; medical assistants

  
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# ROBUST VIDEO WATERMARKING USING A HYBRID ALGORITHM OF SVD AND DWT WITH SECURED QR CODE

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**Abstract :** This paper discusses a new video watermarking scheme which is non-blind hybrid technique based on singular value decomposition (SVD) and discrete wavelet transform (DWT). The proposed hybrid algorithm partitions the host image into blocks and each of them is transformed into U, S and V components by SVD. And then, a set of blocks with the same size as watermark are selected according to the feature of the S component. To get better quality and to make less prone to noise and improve its robustness DWT is applied to both images and shown in LL band. In addition to this, it also uses a secret key which will improve its security by allowing an only desired person to insert or extract the watermark. The experimental results show that the proposed watermarking scheme is robust for video processing operations such as rotation and addition of noise and extracts the watermark more efficiently than the video watermarked schemes proposed recently.

**IndexTerms - Watermarking, Discrete Wavelet Transform, Security, Robustness**

## I. INTRODUCTION

With the rapid development of network technology, vast multimedia data is communicated over the network. Every day lots of data in the form of emails, chats, images and videos are being transmitted over long distances in a span of a blink of an eye. One person sitting at one corner of the globe can communicate with another person sitting at any other corner of the globe. Digitization has dramatically changed the way one looks at his life and the way he has started leading their life. More and more digital multimedia data are available today, which can be perfectly copied and rapidly disseminated at large scale. Although network transmission is convenient and fast, the multimedia data passing through the network is often attacked and tampered by malicious attackers. This consequently has raised concerns from the content owners, when they realized that traditional protection mechanisms, such as encryption, were no longer sufficient. Sooner or later, digital content has to be decrypted and to be presented to human consumers. At this very moment, the protection offered by encryption no longer exists. As a result, digital watermarking, the art of hiding information in a robust and invisible manner, has been investigated as a complementary technology. Digital watermarking technology is an effective means to hide copyright information in the original content to protect the authenticity of the intellectual property. It is a concept which closely relates to steganography, in a way that they both hide a message inside a digital signal. However, it is the goal that separates them. Watermarking is used to hide a message related to the actual content of digital data, while steganography is used when the digital data has no link with the message, and it is used as an upper layer to hide its existence. Multimedia security has become extremely important for internet technology because of the ease with which the data can be manipulated, copied and distributed. Video watermarking differs from image watermarking. A video contains large spatial and temporal redundancy. There exists a complex trade-off between different parameters like imperceptibility, data payload and temporal synchronization of video frames. The data payload is the number of bits that are embedded by the watermark. The fidelity is another property of the watermark that tells about the distortion that the watermarking process is bound to introduce, which should remain imperceptible to a human observer. Finally, the robustness of a watermarking scheme can be seen as the ability of the detector to extract the hidden watermark from the altered watermarked data caused by various attacks. It finds its application in various domains and platforms such as fingerprinting, a technique to trace the source of illegal copies, Online Location, when Internet search services continuously look at the web for the watermarked video content and notify the owner of where their content was found. Broadcast monitoring, Copy and Control of playback and Content Filtering.



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## SMART APARTMENT WITH AUTOMATIC WATER MANAGEMENT AND SECURITY ALERT SYSTEM

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### ABSTRACT

In this paper, we present a detailed model of a smart apartment with the use of Smart Water Management System and Security Alert System. Water Management concept is to measure and display the water consumption of individual flats. We adopt a pre-paid concept using smart card technology which is designed as detachable smart card, because it is supposed to be recharged when the debit is exhausted. Since security is prime concern in life these days. Every flat of the apartment is to be equipped with the MQ2 Sensor to sense gas leakage, IR Receiver to detect fire, MEMS to detect Earthquake and Limit Switch to measure the limit of dustbin.

**KEYWORDS:** Smart card, MQ2 Gas Sensor, IR Receiver, MEMS Sensor, Limit Switch

### 1.INTRODUCTION

The project "Smart Apartment with Automatic Water Management and Security Alert System" is a live project, prototype module constructed for the live demonstration. The system is designed for

domestic applications like apartments and individual colony's where many families live together in one particular area. Generally, at these places, the source of water is from over headwater tank and the society or management of that particular colony or apartment collects some amount monthly as maintenance charge. Most of this amount is utilized for common electricity bill; this electricity bill is paid for energizing the water pumping motor and energizing the corridor or streetlights. In this regard, irrespective of water consumption, flat or lump sum amount is collected from the water consumers. This is a poor approach, because the consumption differs from consumer to consumer, a small family consumes less water, whereas the big family consumes more water and amount paid by both the families are same, this is injustice. To avoid this problem, this project work is taken up, which measures and controls the flow of water to the individual houses and according to the water consumption, amount will be charged from the house owners.

The demonstration module is designed with MQ2 Gas sensor has high sensitivity to

# Data Hiding using JPEG Steganography

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**Abstract:-** Steganography and Steganalysis are two side of the same coin. This paper discuss about how a message or data can be hidden inside an image using JPEG Steganography. Along with this, RC5 encryption and Chaos cryptography are also used so that, an outsider is not able to access the data within the image. This paper also discuss about how a data is stored or hidden inside an image and how we can recover data from the same image. This type of systems are made to make our applications and data more secure from the threats. This paper focus on using lifting wavelet transform (LWT) instead of using old methods like DCT.

**Keywords:-** Steganography, RC5Encryption, Chaos Cryptography, Lifting Wavelet Transform.

## I. INTRODUCTION

Security plays an important role in the world of information technology. It is necessary to secure our data from being access, stolen and manipulated. During communication there is a high risk that data can be accessed by the third party. We are able to hear many news about data hacking. The hackers are able to access the data and files because the security levels are low when they were implemented on the systems. To ensure high security we must use several techniques and methods to overcome these problems. It should be always keep in mind whenever we are implementing a system where we have to store a confidential data or files, we should implement high-quality level of encryption and decryption process which in turn make our system highly secure.

This paper mainly briefs about how a message or data can be conceal in an image with high amount of security level. The data or text are encoded and then they are stored into an image. The image in which data is embedded is known as Stego image. Whenever a person sees a stego image, it will look like a normal image, but the person cannot able to see the data hidden in that image. This is the quality of Steganography where a third party is not able to see the data and the image is also transferred securely from sender to receiver. To embed message into an image and to extract same message from that mage is not a huge process, but to prepare this system we should know how Chaos cryptography, RC5 encryption and Lifting Wavelet Transform are done. The security level of the system depends upon the algorithm we are preparing, so that third party is not able to extract our data.

## II. DESCRIPTION

### A. Steganography

Steganography means hiding or covering a text, image or file into another image, file or video. It's an art of hiding data where a sender and receiver knows a secret message is hidden into a file, where a third person cannot suspect that data is hidden into a image. Once a data is embedded into the image Its not an easy task to extract message from it.

Steganography has become more popular because, both data and communication between two parties are secured. This is the main advantage of steganography over cryptography.

### B. Steganalysis

Steganalysis is a process of detecting data which is hidden into an image, video or another file. The main use of steganalysis is to identify any data which is hidden, if it is found that any data is covered or concealed by another file or image, the process will also help to recover the hidden data.

### C. RC5 Encryption

Secret messages or data or not embedded directly into an image. With the help of RC5 encryption the original message is encoded. This encoded text is known as Cipher text. The obtained cipher text is then store into an image. RC5 is a symmetric key block cipher, which works fast when implemented. We use RC5 encryption because it has more number of iterations and strong key. Due to RC5 encryption data security level becomes more flexible.

### D. Chaos Cryptography

Chaos cryptography is a study where a data is transferred from sender to receiver with high security in the presence of third party. Chaos cryptography algorithms are created in such a way that the result obtained from that algorithm produce confusion. This helps the quality of the security level of the system.

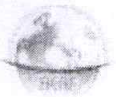
### E. Lifting Wavelet Transform(LWT)

Lifting wavelet transform is commonly used because it design wavelets and perform discrete wavelet transform. By using this transform, it is very useful because two different works designing wavelet and DWT are done simultaneously. It is also easy to understand and can be used for irregular sampling.



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## ACCIDENT DETECTION WITH MEMS AND ALERT SYSTEM FOR MEDICAL EMERGENCY

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### ABSTRACT

*The motor vehicle population is growing at a faster rate than the economic and population growth. Accidents and the death rate due to road accidents, especially two wheelers are also increasing at an alarming rate. Most of the accidental deaths that happen due to lack of immediate medical assistance, on the facility for providing immediate medical assistance to accident area can reduce the fatality to greater extends. In this project the arduino microcontroller Atmega328 is interfaced with MeMs. This entire system should be placed on a moving vehicle*

**KEYWORDS:** Accident detection; MemS; Gsm; Gps.

### 1. INTRODUCTION

With the increasing global demand for security, identification of people and assets and the merginations directive into unions, expansion and complexity of transport networks, raises the demand for Vehicle Tracking System. Vehicle Tracking System or Automatic Vehicle Location System (AVL) is now one of the most popular technological changes in all over the world that is going to make our personal and business life lot easier. As the term suggests, it enables one to track or monitor the location of vehicle in instant time. Primarily, the system

functions with the help of different technologies like the Global Positioning System (GPS), traditional cellular network such as Global System for Mobile Communications (GSM). But GPS is more effective and accurate in this field. As far as vehicle tracking in India is concerned, its uses and market are expected to increase within a couple of years.

The main concept of the proposed project work is to identify the crashed vehicle position (location Program has been developed which is used to locate the exact position of the vehicle and also to navigated track of the moving vehicle on Google Map. GPS provides highly accurate position information and can be used for a variety of land, sea, and air applications. GPS, which began as a military application, has become a viable tool for many commercial and personal applications. One such application has been a vehicle location tracking system (VLTS). These tracking systems incorporate a GPS receiver and a wireless transceiver that allow a remote unit to track the vehicle's position. GPS Tracking device acquire GPS signals from GPS

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# Implementation of Low Power and Memory Efficient 2D FIR Filter Architecture

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**Abstract:** A memory efficient design is analyzed to derive a low power-area-delay two dimensional (2D) Finite Impulse Response (FIR) filter architecture. The parallel processing concept is introduced in the fully direct-form 2D FIR filter. Due to this, memory reuse is carried out, and it reduces the overall storage memory of the FIR filter. The non-separable 2D FIR filter structure is designed and implemented with block size  $L$  and filter length  $N$ . The high speed and power efficient multipliers and optimized Carry Look Ahead (CLA) adders are used in the arithmetic module of the FIR filter and a pipelined adder unit is used for the final computation of the filter output. The switch level modification in the logic gates is proposed to reduce the area, power and delay of the adders. This proposed architecture is represented in HDL code and validation is carried out in CADENCE environment using NC Simulator and RTL Compiler synthesis tool. The area, power and delay reports are generated and compared with existing memory efficient 2D FIR filter hardware structures. The power is reduced to 44% and delay is reduced by 20% using Modified CLA (MCLA) adders and pipelining in the design.

**Index Terms:** 2D-FIR, low power Multiplier, Parallel prefix adder, CLA, and memory reuse.

## I. INTRODUCTION

In the two-dimensional signal processing such as image, video processing applications and for bio-medical signal processing [1], 2D digital filters are most frequently used. In the biometric systems, for feature extraction [2] and face recognition purpose [3] 2D filters are desired. The two-dimensional concept can be applied for both FIR and Infinite Impulse Response (IIR) filters, but 2D FIR filters are more popular than IIR filters in terms of stability and simplicity of the design.

### A. Related Work

To implement a memory efficient and less hardware complexity 2D FIR architecture, some investigations are carried out on existing structures. The symmetry 2D filters are discussed in [4]. The hardware metrics analysis and VLSI (Very Large Scale Integration) architectures for several symmetrical IIR and FIR filters are presented. Here, the un-symmetry frequency response is decomposed into sub components after that desired symmetry is obtained. This research paper provides four-fold symmetry IIR and FIR filters with less number of multipliers. In [5], the generalized formulas are defined to derive the new 2D VLSI filter

architectures using sub filter blocks with local interconnection framework without any global broadcasting. In this work, FIR filter with quadrant symmetry and IIR filters with separable denominators are realized with the advantage of less number of multipliers. Many systolic architectures are implemented for 2D FIR filters to achieve optimization in an area, power, and delay. Few papers are considered to examine the concept of 2D Filters. In [6], the new systolic transformation technique and modified reordering schemes are accomplished to implement 2D systolic FIR and IIR filters. Due to the combinations of these two techniques, lower quantization error, local broadcast, zero latency, and satisfactory critical paths are achieved. Another systolic transformation based on reordering of delay elements and summations, a new VLSI systolic array FIR and IIR filter structures [7] are realized. In this, a detailed logic gate level structure is presented with low latency, local broadcast with an accepted number of multipliers and delay elements. A bit level VLSI architectures for one dimensional and 2D filter are discussed in [8]. These structures are regular, modular and also compatible with other dedicated systems. In this work, hardware utilization and throughputs are improved with less latency. These structures are good enough for optimization due to structure modularity and simplicity. These existing structures consist of many delay or storage elements in the data path to overcome the global signal broadcast. Memory complexity is a major issue in existing structures. The memory complexity affects the area occupancy and power consumption of the structure [9]. A memory-centric 2D FIR filter in non-separable and separable models are proposed in [10] with some penalty of power and delay. In this structure, through-put increased  $L$  - times when compared with previous works, but the hardware modules also increased to  $L$  times. The high number of hardware modules increases the area and power consumption. In this paper, a memory efficient 2D FIR filter with low power-area, and low delay architecture is proposed. In the proposed work, block based input processing is used for the reduction of memory storage and to achieve memory reuse in the fully direct-form 2D FIR filter. In the fully direct-form structure, the registers are placed in an input data path only, whereas in fully transpose-form the registers are placed in the intermediate signal level [10]. The fully direct-form structure is converted into an optimized block-based architecture with memory reuse. The architecture consists of the arithmetic module and memory modules. The arithmetic module consists of a functional unit (FU) and adder block. In the FU, the important module is a multiplier which consumes more power and requires more hardware resources.

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# Rice Grains Categorization using Neural Network

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**Abstract:** Rice is one of the most important food crop consumed by all the human beings. In this paper, an algorithm is used to classify three different varieties of rice based on their features. The proposed algorithm is a supervised learning algorithm which consists of five steps. The steps include image acquisition, image segmentation, feature extraction, neural network classifier and decision making. Fifty four color features and six texture features are extracted from each rice kernel. After passing these features to feed forward neural network, it identifies and counts the different types of rice kernels and displays the result. The overall classification accuracy rate is 98%.

**Keywords:** Acquisition, segmentation, neural network

## I. INTRODUCTION

In the current grain-handling systems, grain type is assessed by visual inspection. The evaluation process for this is tedious and time consuming. The decision making capability of a person can be affected by different parameters like fatigue, eyesight and mental state caused by biases and work pressure and also working conditions such as improper lighting condition, etc. Hence, this needs to the automation of process by developing an imaging system that should acquire the rice grain images, rectify, and analyze it. In this project, we propose a simple, effective and high accuracy vision-based approach using pattern recognition techniques to identify rice varieties. The specific goal was to generate the optimal color and texture features for classifying the rice varieties with increased accuracy rate.

### A. Software Components

- 1) Operating system: Windows XP/7
- 2) Coding Language: MATLAB
- 3) Tool: MATLAB R2015b

### B. Proposed Method

In the proposed method, a new approach for classification of rice kernels variety using Feed-Forward Neural network is presented. Here three varieties of rice grains are taken namely Basmati, Masoori and Raw rice grains and the features of each type are calculated and trained to neural network.

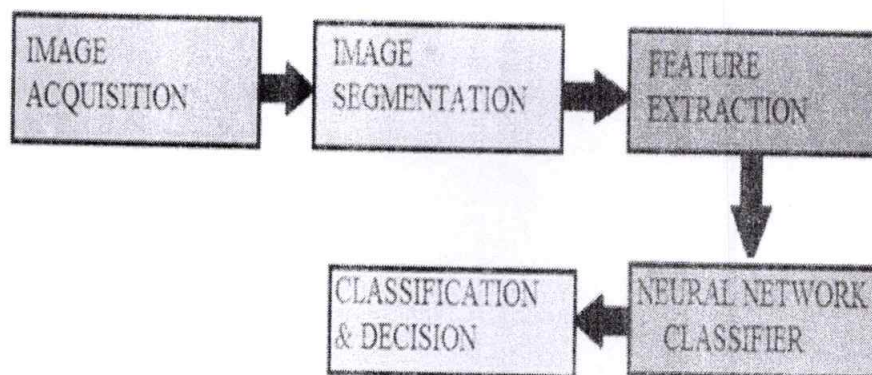


Fig 1: Block Diagram

The block diagram shown in figure-1 illustrates the procedure for recognition and classification of rice grains. It consists of following steps: Image Acquisition, Image Segmentation, Feature Extraction, Neural Network Classifier and Classification & Decision.

## DESIGN AND ANALYSIS OF DUAL FREQUENCY PENTAGON SHAPED SLOTTED MICRO STRIP PATCH ANTENNA USING HFSS SOFTWARE

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### ABSTRACT

*In this paper we give the design and analysis of dual frequency microstrip patch antenna. Instead of basic rectangular microstrip patch we introduce a pentagonal slot on the rectangular patch to get perfect impedance matching. Design and Simulation is performed using HFSS software. Obtained results reveal that, choosing a 50 ohm coaxial feed at perfect position the antenna operates at frequencies 7.95GHz and 9.48GHz respectively with corresponding bandwidths of 260MHz and 300MHz.*

*Different antenna parameters are measured and are compared in contrast with the single pentagonal slot microstrip patch antenna. The antenna has good resonance characteristics.*

**KEYWORDS:** Microstrip patch antenna, Dual frequency, coaxial feed.

### 1. INTRODUCTION

Nowadays the most developing ways of communication is wireless communication. Antennas play a major role in wireless communication. They act as both transmitters and receivers. So, antenna performance is directly

proportional to the efficiency of wireless communication.

In the 1970s antenna technology was looking towards microstrip antennas. By the early 1980s the fabrication of microstrip antenna became quite popular. During the past ten years printed antennas have been largely studied. The advantages of the microstrip antenna is its highly stable structure, less weight, different feeding methods, small size, cost efficiency, compatibility with devices. A general microstrip patch antenna consists of a radiating patch on top of dielectric substrate and a ground plane on the bottom of the substrate. The patch is generally made of conducting material such as copper or gold. The patch is generally made up of a conducting material such as copper or gold and can take any possible shape like rectangular, circular, triangular, and elliptical or some other common shape. The radiation in microstrip antenna is mainly due to fringing fields between the patch edge and the ground plane. In the contacting method, the RF power is fed directly to the radiating patch using a connecting element such as a Micro strip line or probe feed. In the non-contacting scheme,

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# Implementation of MAC Protocol for Analysis of Traffic in Smart Cities

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**Abstract---** Human beings made Smart Transportation system as an essential need in their daily activity in the present era. For avoiding the road accidents in the present busy lives, it is necessary to create an application which is capable of transferring the emergency information between the vehicle and roadside units. This paper explains such network. The betterment of safety and no safety message delivery will be done by the MAC protocol. Threats occurring with 802.11p MAC protocol will be observed here. Hybrid MAC is capable of accessing two channels simultaneously, so that it can provide better performance during increased traffic load. MAC layer protocol is a challenging architecture for the vehicular network system. It is because of frequent changes in the topology of the vehicular network, huge quality of service requirements, infrastructure inadequacy, and automobile nodes during high speed. If the position of the vehicle is nearer to the network then the operation of the algorithm begins. New vehicles generate the request for sending the message. If there is any availability of the channel, then the channel is allocated and initiates the communication. If it is an old vehicle then it directly goes to the communication monitoring. The vehicle will be in a queue position if there is no availability of channels. When the channel becomes free then it gives first priority to the vehicles which are in the queue. The main aim of the Hybrid MAC protocol is to ensure that all vehicles get a proper channel accessing for conveying their message. Hybrid MAC is capable of reducing the loss of packet, delay in overall function, and collision reduction.

## I. Introduction

The advanced achievements of wireless communication technology in last few years, made the users to have a superfluity of new networking [1] research fields concentrating at enlarging connectivity to the atmosphere where the wired connections are not possible. Under these circumstances, VANETS has become one of the most fascinating and reassuring for analysts and automotive industries. The public government has given its assurance with the proviso of safer roads and smooth driving. VANET's are not only limited for road safety but also capable of controlling the vehicle traffic [2] in traffic like bottleneck flow control route inflation for commercial applications like sharing of files, accessing the internet and reporting about parking location.

This paper explains the perception of vehicular networks by demonstrating various types of communication and the important concepts involving these networks. If observed at worldwide present projects they are committed to the exaltation of VANETs. The last part explains the types of network architectures [3] proposed for supporting the VANETs. Due to accidents occurring in present-day traffic man is trying for making his journey safer and acceptable. Even the government also needs a journey with better road safety for technical and cultural evolutions. Since, last decenniums public force and automobile industries are targeting at the development of transportation systems safety by lowering the result of fast approaching accidents and lessening the amount of injuries happening on road.

Although, all these precautionary scopes are capable of providing only restricted securities because they will focus only on stage post accidents. Types of equipment like airbags and seat belts are capable of reducing the accidents but not for complete prevention. This identification of the shortage of passive measures made the developers to work in the direction to completely avoid accidents instead of trying to reduce the damage. Automobile manufacturers have taken a drastic step of enhancing the drivers for the range of awareness. If the destruction cannot be avoided, then the automobile industries are productively preparing the vehicles for reducing the injuries. For example, the sensor [4] gives the early warnings to the drivers about the accidents and condition of the vehicles.

# Smart Grid Operation Using Hybrid Renewable Sources

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**Abstract-** This paper deals with a new approach to design a smart grid, which generates electricity using hybrid renewable sources that will provide uninterrupted power supply to the load. In the current work, solar and hydel power sources are applied to a rechargeable battery for harvesting energy through the charging circuits. The voltage of this battery is incessantly monitored through voltage track and microcontroller. If the battery voltage is less than pre specified value, relay circuit automatically switch-off the supply of that battery where the load is connected through an inverter and connects to another battery through relay driver circuit, which makes uninterrupted power supply to the load.

**Keywords-** smart grid, micro grid, renewable energy, energy storage system, hybrid power, solar energy.

## I. INTRODUCTION

Energy is an indispensable factor for the economic growth and development of a country. Energy consumption is rapidly increasing worldwide. To fulfill this energy demand, alternative energy sources and efficient utilization are being explored. There are many forms of renewable energy sources available, which are solar, wind, biomass, hydroelectric, tidal etc., and their efficient utilization is comprehensively reviewed [1]. Also the trend in research and development for the technological advancement of energy utilization and smart grid system for future energy security is presented... Results show that renewable energy resources are becoming more prevalent as more electricity generation becomes necessary and could provide half of the total energy demands by 2050. To satisfy the future energy demand, the smart grid system can be used as an efficient system for energy security. Smart grid opens the door to new application with far-reaching interdisciplinary impacts, providing the capacity to safely integrate more renewable sources, it also delivers significant environmental benefits by conservation and renewable generation integration. In this paper solar and hydel are used as renewable sources [3] to maintain the continuity in generation of electricity, and a microcontroller is used to control the grid in all circumstances. The present work is to prove the viability of hybrid solar-hydro smart grid operation that could provide power during peak periods, thereby improving overall utilization and economics of the smart grid. The rest of the paper is assigned as follows- Section 2, describes the block diagram of smart grid operation using hybrid renewable sources and its operation, Section 3, describes results and discussions of smart grid operation using hybrid renewable sources.

## II. BLOCK DIAGRAM

Fig.1 shows the block diagram of the present work. Solar and hydel power generation sources are applied to the rechargeable battery of 12V for energy harvesting through the charging circuits. The voltage of this battery is continuously monitored through voltage circuit and microcontroller. As the voltage circuit is given as input to the microcontroller, depending on the required voltage, if it is less than the required voltage then it is automatically cut-off the supply of that battery by sending a signal to the driver circuit through microcontroller. The load connected through an inverter gets disconnected from that battery and connects to another battery through relay driver circuit which also makes uninterrupted power supply to the load, which has been successfully implemented and tested, the observations and analysis are shown in table 1 and figure2. At the same time to achieve maximum power from the solar panel, a tracking system is included, it consists of LDR'S (Light Dependent Resistor) as they are connected to the microcontroller, they sense the light and give signal to the microcontroller which in turn gives

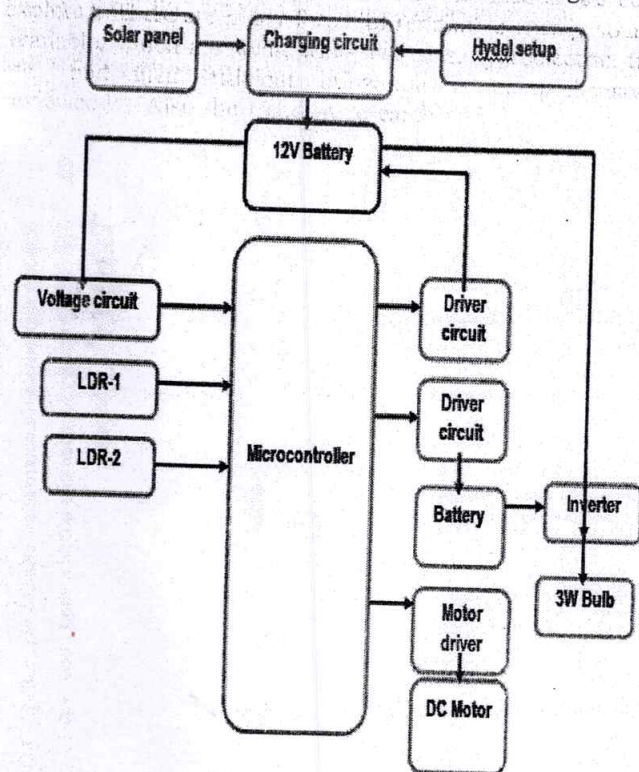


Fig.1: Block Diagram

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# INTENSIFICATION OF POWER SYSTEM DYNAMICS USING TCSC BASED HYBRID SERIES CAPACITIVE COMPENSATION

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**Abstract :** This paper exemplifies about the proposed Hybrid series capacitive compensation scheme using Thyristor controlled series capacitor (TCSC) to improve the power system dynamics as it has the dormant of damping power swing as well as the sub synchronous resonance oscillations. The proposed model is explained in a single line and a double line scheme for damping the power system oscillations of three generators and two loads power system to verify the efficiency. In single line scheme, two phases are compensated by fixed series capacitor (Cs) and the third phase is compensated by Thyristor controlled series capacitor (TCSC) with a fixed capacitor (Cc) where as in double line scheme one phase is compensated by fixed series capacitor (Cs) and the other two phases are compensated with a TCSC in series with a fixed capacitor (Cc). The obtained results are proved that the proposed model reduced the fault clearing time in comparison to the without compensation.

**Keywords:** FACTS devices, Phase imbalance, series compensation, Thyristor Controlled Series Capacitor (TCSC), Phase Locked Loop (PLL).

## INTRODUCTION

We know that today's power system is a complex network because, generation of power does not locate near to the load centers and different generating stations are connected through a grid. The integrated power system results into a low frequency inter-area oscillation [1]. When there is a imbalance between generation and load in each system that results disturbances in transmission lines, those disturbances may cause due to the loss of excitation, loss of prime mover, failure and faults in transmission line and sudden change in the load. Due to that disturbances, some oscillations may occur, which lead to voltage collapse and frequency collapse. In order to overcome these problems Flexible Alternate Current Transmission System (FACTS) devices has been introduced, which play a vital role in controlling the power flow in AC networks that will control both active and reactive power which results in improving the power system transient stability [2]. There are different FACTS devices available in the literature namely, TCSC, SSSC, SVR etc [1]. The FACTS devices can be used to provide the damping in the series sub synchronous capacitance (SSSC) which has been used to intensify power system dynamics [3-5]. The use of phase imbalanced TCSC compensation proves to be effective in improving power system dynamics as it has the dormant of damping the power swing as well as sub synchronous resonance oscillations [6]. In this hybrid capacitive compensation scheme there are two cases, in first case, two phases are compensated by fixed series capacitor (Cs) and the third phase is compensated by fixed capacitor (Cc) in series with TCSC, this type of scheme is called single line compensation. Where as in second case, one phase is compensated with fixed series capacitor (Cs) and another two phases are compensated with TCSC in series with fixed capacitor (Cc), this type of scheme is called double line compensation. The TCSC control is initially set to the equivalent compensations at the power frequency combined with the fixed capacitor yield a resultant compensation equal to the other two phases in single line compensation equal to other phases in double line compensation. Thus, the phase balance is being maintained at the power frequency while at any other frequency, a phase imbalance is created.

The remaining paper is arranged as follows, Section 2 explains about thyristor controlled series capacitor. Section 3 gives information about TCSC in transmission line. Section 4 explains about results and execution. Finally conclusions are given in section 5.

## THYRISTOR CONTROL SERIES CAPACITOR (TCSC)

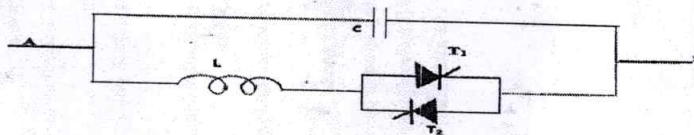


Fig.1 Circuit diagram of TCSC

Fig. 1 explains the block diagram of a thyristor control series capacitor (TCSC) in that an inductor and capacitor are connected in series with the thyristor set. When a fixed capacitor is connected with the thyristor-controlled reactor (TCR), TCSC is formed. This TCSC is connected with a Transmission lines to reduce sub synchronous reactance and improve transmission efficiency. This TCSC can be operated in both inductive mode as well as capacitive mode and it is operated by applying the gate pulses. The impedance is lowest at 90° firing angle and the operation is done between 49°-68° firing angles [1].

## TCSC IN TRANSMISSION LINES

TCSC is connected in series with the in transmission lines. Here two different cases are considered. In case 1, TCSC is connected to one phase and the Reactance is measured with respect to other two phases and it is called single line scheme, where as in case 2, TCSC is connected to two phases in series with the line capacitance and these two reactances are measured with respect to another phase.

# MICROPROCESSOR BASED FIRE PROTECTION SYSTEM IN TRAIN

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**Abstract:** This paper is about how fire accidents in railway industry can be controlled by more advanced method. In the past few years it has been seen that the railway maintenance scenario has been improving but still not up to the mark. One of the reasons behind it is the often-occurring train fire accidents which were un avoidable. So, a prototype has been introduced to overcome this problem and provide safety in a better way. This prototype, which is controlled by a microcontroller helps to stop the fire even before it starts spreading. To overcome fire, a system which is having automatic sensor monitoring, fire alarm warning and fire extinguishers are based on wireless sensor network technology<sup>[1]</sup>. This system can monitor real-time related parameters such as temperature and humidity in each coach. From the information being transferred from the sensor to the microcontroller, precautions for suppression of fire and sending the smoke out from the AC compartment are made.

**Index Terms:** Microprocessor devices, train fire accidents, Bi-monthly.

## 1.INTRODUCTION:

The trains are vehicles used for transporting people and goods, goods which are highly inflammable and flammable materials. Though, it is suggested to avoid such materials but the train itself has fire conducting and expanding materials within, moreover the train moving at high speed gives air as a source for the expansion of fire, as air comes under one of the important elements of the fire triangle. This prototype has been made by a group of college students using basic microcontroller-based devices and wireless communication system. It has the ability to resolve the problem and bring down the train fire accident causality ratio in the future. This is a device which require no man power after the installation of the prototype on the roof top of every compartment of the train. Along with the bi-monthly inspection which is done by the Indian Railways in every coach this prototype could also be considered for inspection to avoid loose connections and short circuit errors.

### 1.1. LITERATURE SURVEY:

While working back at Southern Indian Railways, Lallaguda as an intern the author saw the need of understanding that the current railway scenario has to be changed because the fire accidents in train have been increasing recently<sup>[4]</sup>. The temperature in middle eastern and Asian countries are reaching heights, in such cases a small fire can also reach



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# AUTOMATIC PLANT WATERING SYSTEM

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**Abstract :** Irrigation is the art of applying water to the plants/ fields to grow and to increase the quantity as well as quality of the fruits, food grains etc., Automatic irrigation system is a modern method of irrigating the vegetables, fruit fields, farms, gardens and land scraping areas as against the conventional method, which uses large number of men- hours and uncontrolled water quantity. This project work describes about "Automatic Plant Watering System" designed with arduino microcontroller. The main purpose of the project work is to apply water to the plants automatically motor to the field whose soil is dry. This is electrically controlled equipment, when the soil is found to be dry; automatically the controller moves the pumping motor to that particular plant and energizes the relay to activate the water pumping motor and supply water to the field or plants.

**IndexTerms -** Arduino, Soil moisture sensor, Relay, Pumping motor.

## I. INTRODUCTION

In India agriculture is the most important occupation of the people. More than 60% of our total population depends for their subsistence on agriculture. After independence due to various development projects introduced in the field of agriculture, production of food grains has been continuously increasing. The entire Indian economy mainly depends on agriculture. Any fluctuation in agriculture income will directly affect the India's national income. In this regard, a thought is given to develop an Automatic Plant irrigation System designed with micro-controller.

For this purpose relay is used, to energizing the pumping motor to supply water to the plants. The relay is energized automatically when the soil is dry, similarly the relay can be closed automatically when the soil is in wet condition. For sensing the soil condition copper electrodes are used.

For this purpose magnetic switch and limit switches are used and they are supposed to be installed near the plants. The pumping motor arranged over the sliding channel mechanism will be moved horizontally within a specified span. This moving mechanism also carries the permanent magnet; this magnet can be positioned below the pumping motor at certain distance, thereby it moves along with pumping motor. Whenever the magnet passes over the magnetic switch, it will be activated automatically and generates active low signal for the controller, based on this information generated by the magnetic switch, microcontroller can understand the position of pumping motor. The same way at the extreme end positions of the pumping motor moving mechanism, limit switches are placed, one at the home position and the other at the second field. Magnetic switch is present at the first field. This controller unit is programmed to position the pumping motor and supply water depending up on the soil sensor information.

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## Hybrid Smart Shoe

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### Abstract

The paper aims in designing a system, which helps in charging of a mobile phone using solar power and piezo electric energy by wireless transmission. In this paper a new hybrid model of producing electricity using foot step based on piezo electric sensors and with a solar panel is developed. Piezoelectric sensor is a device that uses the piezoelectric effect to measure pressure, acceleration, strain by converting them to an electrical charge. In this current work generation of electrical power as non-conventional method by simply walking or running on the foot step and by using solar panel to harvest solar energy as electrical energy.

**Keywords:** Battery, mobile charging, piezoelectricity, piezoelectric effect, smart shoe, solar energy, wireless charger.

### 1. Introduction

Now a day's energy crisis is the most important issues around the World. Especially in remote areas energy crisis is a big problem. So this will be a great media to solve this energy crisis problem in remote areas. This is used to charge mobile charging and also in street lighting purpose.

In today's era, energy is the diehard need of world. For which various methods of energy generation are developed. But, methods employed for these purposes are expensive, space consuming, material consuming, and hazardous to environment. The power plants need large amount of land for which deforestation and rehabilitation of settlements is to be done. This in turn affects entire

ecosystem and entire social system. Also these power generation leads to depletion of resources. Therefore there is a vacuum for alternative efficient ecofriendly power resource<sup>[8]</sup>. RES sources are good and efficient. Different RES are solar, wind, tidal, piezo. In this present work there are different ways to generate piezoelectric effect<sup>[5]</sup>. Thus piezoelectric power generation can be a good alternative for fossil fuels. It is clean, non-hazardous, easy implementable, inexpensive and ecofriendly source of energy. There is no byproduct in this power generation. It occupies less space and is easily portable. This is to implement this piezoelectric effect in various ways to generate energy. This system can be used at domestic levels as well as at high industrial level. We are implementing this as a small level for power generation and charging small gadgets like mobile phones<sup>[6]</sup>. Piezoelectric sensors generate electricity resulting from pressure and mechanical vibration. Piezoelectricity is exploited in a number of useful applications, such as the production and detection of sound, piezoelectric inkjet printing, generation of high voltages, electronic frequency generation<sup>[3]</sup>.

Solar energy is a light radiant and it receives heat from the Sun that is harnessed using a range of ever-evolving technologies. Solar power is the conversion of energy from sunlight into electricity, either directly using photovoltaic (PV), indirectly using concentrated solar power, or a combination. Concentrated solar power systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. Photovoltaic cells convert light into an electric current using the photovoltaic effect<sup>[2]</sup>.

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# DESIGN AND OPERATION OF BATTLE TANK USING ARDUINO CONTROLLED BLDC AND STEPPER MOTORS

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## ABSTRACT

The paper is aimed to develop an unmanned "Automatic Military Battle Tank using Arduino controlled Brushless DC motors (BLDC)". BLDC motors constitute the most recent development in a long evolution of motor era. The stepper motor in the tank allows rotating the device gun in required directions (i.e., clockwise or anti-clockwise directions) to shoot the enemies throughout conflict in directions.

**Key Words:** BLDC motor, Stepper motor, Arduino, Battle tank, Sensors.

## 1. INTRODUCTION

Military tank or Battle tank is an armored fighting vehicle designed for front-line combat, with heavy firepower, sturdy armor, tracks and a powerful engine providing correct battlefield maneuverability. The battle tank includes two predominant components namely, **Hull:** It is the body of the tank. It consists of Battery, Sensors, Arduino and BLDC motors. The hull's job is to transport the top portion of the tank, the turret, from place to place. **Gun Turret:** The turret is an armored shape helping one or more weapons-typically heavy cannon and multiple system guns. It consists of a stepper motor. With firing delay unit.

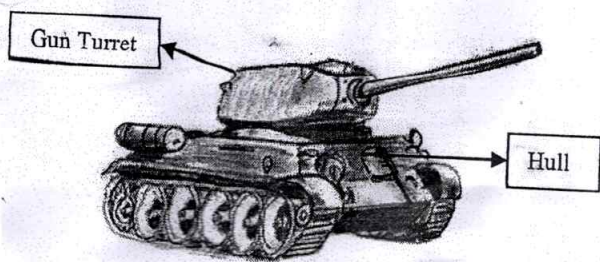


Figure.1 Military Tank

India took 35 years to make its first warfare tank and it changed into a complete disaster. Later DRDO decided to make the tank, known as "Arjun"[1]. Based at the preceding paper's research, efficiency may be advanced with the aid of selecting BLDC automobiles and IoT machine.

BLDC automobiles are used to transport the tank in distinctive directions controlled by using Bluetooth operation and the stepper motor is used to rotate the gun turret to fire the enemies, which is operated robotically in keeping with the commands given by way of Arduino relying on the sensor's output.

In this way, there's no want for human operation inside the war tank. Simply, this study is completed in an effort to rescue the lives of soldiers at the border. Further, this will be advanced via setting sensors around the tank or even with the aid of implementing Digital image processing.

The remaining paper is arranged as follows, Section 2 explains about Block Diagram and gives information about components functioning, Section 3 explains about operation and Flow chart, and section 4 gives conclusion and finally References are mentioned.

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## Synthesis and characterization of soft magnetic nanomaterial for transformer core application

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### Abstract

The structure of magnetic materials is an essential parameter for specifying magnetic characterization of the transformer core. This proposed work will enhance magnetic characterization of transformer cores by using new nanotechnology techniques. The magnetic nanomaterials are to be synthesized using bottom-up and top-down methods such as eco-friendly i) Co-precipitation method: In the precipitation method the precipitation of substances normally soluble under the employed conditions. An inclusion occurs when the impurity occupies a lattice site in the crystal structure of the carrier, resulting in a crystallographic defect, which can occur when the ionic radius and charge of the impurity are similar to those of the carrier. An adsorbate is an impurity that is weakly bound (adsorbed) to the surface of the precipitate ii) Ball-milling method: A ball mill is a key piece of equipment for grinding. It is widely used for cement, silicate products, new type building materials, fire proof materials, chemical fertilizers, black and nonferrous metals, glass, ceramics, etc. A ball mill can grind ore or other materials that can be ground by either wet or dry processes. Ball milling increases the surface area of a solid material and allows preparation of the desired grain size.

Synthesized powders were characterized by XRD and particle size analyzer for structural characterization, FESEM, PSA, EDAX, HRTEM for morphological and topological characterizations, thermal (TGA/DTA) characterizations and electrical characterization by using LCR meter. The new design, the effects of variant types and concentrations of magnetic-nanoparticles on magnetization loss of transformers cores were studied with respect to traditional transformer cores. Optimal types and concentrations of nanoparticles were defined for controlling of reluctance and magnetization loss of transformer cores using vibrating sample magnetometer (VSM). The effective magnetic parameters of synthesized magnetic nanocomposites for the transformer cores (single phase and three-phase) are to be compared and analyzed with existing core materials.

**Index Terms-** XRD; FESEM ; EDAX ; PSA , VSM.

### I. INTRODUCTION

Transformer Core should have the following properties Low Permeability, High Resistivity, Low Hysteresis losses, Low Eddy Current Losses. The last two decades have seen vigorous progress in the synthesis of nanomaterials to search for nanoparticles with improved physical and chemical properties. In particular, the Ni-Zn ferrite nano crystals which are seen as an important soft ferrite which have been extensively studied due to their super-paramagnetic properties suitable for high-frequency applications such as rod antennas and cores of inductors and transformers[1]. It has been shown that the properties of ferrite nanoparticles are generally



## Automatic Changeover Switch

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### Abstract

The paper deals with the basic operation and implementation of an Automatic Transfer Switch in a situation where it switches the supply from the mains supply or backup supply and vice-versa. The automatic changeover switch uses 555 timer for its implementation. The operation of the 555 timer as a bistable multivibrator is the main principle and the driving factor of the automatic changeover switch. An Automatic Transfer Switch (ATS) is often installed where a backup generator is located, so that the generator may provide temporary electrical power if the utility source fails. The main application which is being reflected upon is the use of automatic transfer switch in buildings where in case of the failure of the mains supply, the backup generator supply is automatically switched and hence the continuity of supply is maintained. This is especially useful when there are tall buildings where operation of lifts are compulsory even during adverse conditions of power failure. These automatic changeover switches are now manufactured using several schemes and designs like relay design, microprocessor design and so on. They are also used in home lighting systems and also used to drive other DC loads.

**Keywords :** Automatic Transfer Switch (ATS), Bistable Multivibrator, 555 Timer

### 1. Introduction

A transfer switch is an electrical switch that switches a load between two sources. Normally sufficient time exists between the switching of the supply. ATS is implemented only in these applications. This also ensure that there is no arcing present while switching. Some transfer switches are manual, in that an operator effects

the transfer by throwing a switch, while others are automatic and trigger when they sense one of the sources has lost or gained power. An Automatic Transfer Switch<sup>[1]</sup> (ATS) is often installed where a backup generator is located, so that the generator may provide temporary electrical power if the utility source fails. ATS is widely used in many buildings as nowadays every building and apartment has its own backup generator in case of power failure or power cut. Normally ATS is connected to both primary and backup power sources hence it serves as an intermediary between equipment and the power supplies, acting as an electrical relay. There has been a history<sup>[9]</sup> regarding the usage of automatic changeover switch. Initially Manual Transfer Switches were available which were very comfortable to use. The user could easily use it according to the requirement. Then Semi - Automatic Transfer Switches were available. It is generally used when the user owns a manual start generator system. Thirdly and finally the need of automation had given rise to the need of ATS. It ensures smooth switching with additional features of safety and parameter monitoring. To install this the wiring has to be done carefully to ensure all the operations take place smoothly and backflow of power can be avoided.

### 2. General Applications

There are several other general applications. The circuit can be used as a home lighting system<sup>[2]</sup> with few modifications. It can be used to drive other DC loads like a DC motor of any electronic appliance or other toy applications. Buildings and cooperative housing societies use ATS to switch from mains supply to backup generator during power failure or equipment failure or due to other reasons. ATS are also used in emergency solar generating systems.

# PI CONTROLLER BASED DSTATCOM IN DISTRIBUTION POWER SYSTEM FOR ENHANCEMENT OF POWER QUALITY

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## Abstract

Power quality problems in distribution systems are mainly due to transients in the distribution line voltage, such as voltage flicker, sag voltages, and voltage spikes. D-STATCOM is a FACTS device that is used to compensate the flow of reactive power in the distribution network. Many of the loads in the distribution system are inductive loads that consume more reactive power. For this reason, the load power factor deteriorates and this limits the actual current flow in the distribution line. In this paper, addressed to the development of a D-STATCOM, based on Active Power Filter (APF) with PI controller, that improves the load voltage profile in the distribution line. The D-STATCOM voltage output is made by carrying a distributed system voltage for VAR generation control. The implemented design of the D-STATCOM is done in MATLAB / Simulink using the PI controller.

**Keywords:** D-STATCOM, MATLAB / Simulink, Active Power Filter (APF), PI controller.

## 1. Introduction

In the late nineteenth century, the problems in the power transmission system are limiting the transfer of voltage and power fluctuations, which were observed falls and oscillations during load changes due to an unbalanced reactive power. Most loads in the AC power system consume reactive power due to the reason for the presence of reactance. The strong consumption of reactive power leads to a poor quality of the voltage that affects the quality of the system's energy. Today, these power quality problems have an even greater impact on reliable and safe power supply in electrical systems and energy transfer in the world of globalization and privatization. New electronic power supply configurations have been introduced with the development of fast and reliable semiconductor devices (GTO and IGBT), which translate into better power transmission and load flow control. The FACTS devices can obtain a rapid and reliable control on the transmission parameters, i.e. the line impedance, the voltage and the phase angle between the sending end and the receiving end. Our goal is to control custom power for low voltage distribution and improve the quality of power and reliability of supply that affects sensitive loads. Custom power devices are very similar to FACTS and are called D-FACTS. The most popular custom power supply device (D-FACTS) is UPQC, DVR and D-STATCOM. Among these, D-STATCOM is very popular and can offer an economical solution for reactive power compensation and unbalanced load in the distributed power system. The performance characteristics of the D-STATCOM depend on the control algorithm, i.e. on the elimination of the current harmonic components. There are many control strategies for this purpose, which are reported in the literature and some are immediate compensation, instantaneous symmetrical components like instantaneous reactive power theory (IRP) frame synchronous reference theory (SRF) calculation and phase diagram. Among these control schemes, the theory of instantaneous reactive power and the synchronous rotary reference frame are more widely used. In this article, it focuses mainly on compensation for voltage drop, floods and final reception interruptions. Dynamic performance is analyzed and verified through simulation. D-STATCOM is a custom power device that is rapidly

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## Power Generation from Piezo Materials

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### Abstract

This paper deals with generation of electricity through Piezo plates. The aim is to convert the mechanical energy into electrical energy using piezoelectric material that generates electric power as non-conventional method by simply walking or running on steps. Piezoelectric transducers are a type of electroacoustic transducer that convert the electrical charges produced by some forms of solid materials into energy.

**Keywords:** Piezo Material, Mechanical Energy, Electrical Energy, Electroacoustic transducer.

### 1. Introduction

Renewable sources of energy refer to those sources that are naturally replenished in a continuous manner. Among those solar energy, wind energy, hydal energy are the main sources. As shown in figure 1, the country's installed power generating capacity of 334.4 gigawatt as of January 2018 is the world's fifth-largest. Over the last five years, India put up 99.21 GW of additional capacity. Out of this, 91.73 GW was generated from thermal sources, 5.48 GW from hydro and 2 GW from nuclear sources.[1]

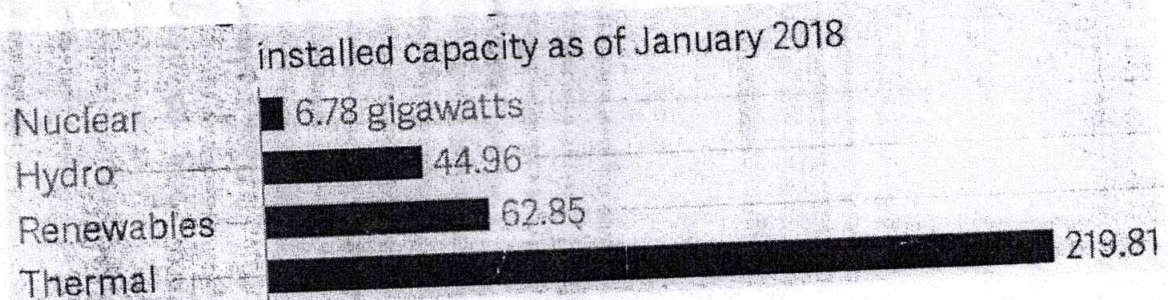


Figure 1. Power Plants Installed

This paper further explains information about piezoelectricity in section 2, Block diagram of the proposed work in section 3. Section 4 explains results and observations. Section 5 explains advantages, disadvantages and applications. Section 6 gives the conclusion of the paper

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# Performance Analysis of Classical Controllers Tuned Using Heuristic Approaches for Frequency Regulation

Applications of Computing, Automation and Wireless Systems in Electrical Engineering  
pp 457-465 | Cite as

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Conference paper

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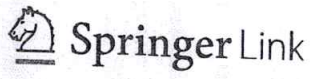
Part of the Lecture Notes in Electrical Engineering book series (LNEE, volume 553)

## Abstract

This paper presents the performance analysis of classical controllers tuned using heuristic approaches for frequency regulation. The system under study comprises of two areas each having one thermal turbine in each control area. The frequency regulation is achieved using different classical controllers whose controller gains have been optimized using heuristic techniques namely genetic algorithm (GA) and gravitational search algorithm (GSA). To overcome the concerns of local trapping in local minima, hybridized GSA incorporating the concept of opposition learning and disruption, i.e., disrupted oppositional learned gravitational search algorithm (DOGSA) has also been used for

  
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# Krill Herd Algorithm for Solution of Economic Dispatch with Valve-Point Loading Effect

Applications of Computing, Automation and Wireless Systems in Electrical Engineering  
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Conference paper

First Online: 01 June 2019

Part of the Lecture Notes in Electrical Engineering book series (LNEE, volume 553)

## Abstract

The article presents a novel bio-inspired Krill Herd (KH) algorithm to solve economic dispatch problems. KH algorithm is based on crowding behavior of the krill individuals and achieves a near global optimum solution by using three main actives. The proposed algorithm is tested by considering three and six generating unit systems on different loads on objective function. The attained results have proved that the KH algorithm provides remarkable results as compared with the other optimization algorithms reported in the literature.

## Keywords

Krill Herd algorithm Evolutionary algorithm Economic dispatch Valve-point effect  
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## A Review on FACTS Controller based Total Transmission Capability Computation of a Deregulated Power System

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### ABSTRACT:

Available Transmission capability (ATC) from past few decades is approved as the framework to satisfy industrial needs and Federal Energy Regulatory Commission (FERC) requirements. In a Deregulated power system network ATC is the unutilised transmission capability of the transmission network for the transfer of power for further commercial use over and above already committed usage. In practical power markets, there are a wide range of margin determination methodologies, approaches, applications and algorithms to compute ATC. The purpose of the paper is to present a review and better define the margins using different approaches for their determination and application. This paper also focuses on the use, types and location of FACTS Controller in a deregulated power system to maximise the ATC further.

**Keywords:** Available Transmission capability, Deregulated power system, Flexible AC transmission systems.

### 1.INTRODUCTION:

Deregulation in a power system refers to restructuring of the rules and economic incentives set by the government to control and drive Vertically Integrated Electrical Utility (VIEU) in an electrical power industry. The companies participating in the power transaction activities focus mainly on maximizing the Total Transfer Capacity thereby minimizing load shedding without violating a pre-established reliability level, therefore in a new deregulated environment Available Transfer Capacity planning is very much needed when a new generation/load is added to increase the Power Transfer Capacity[1]. Available Transfer Capability calculation provides the usefulness to transmission customers in their evaluation

## Effect of Process Parameters in MIG Welding on Mild Steel IS 2062

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### Abstract

The main objective of this paper is to predict and optimize MIG welding of some economically important similar materials or dissimilar materials in industry through applying a statistical approach to SPSS software, develop mathematical models and optimize the welding operation. This was achieved by controlling selected welding parameters; V-butt angles, welding current and welding voltage position, to relate the ultimate tensile strength to the selected input welding parameters. The materials studied in this work are Mild steel IS2062.

The experimental results which are obtain corresponding to the effect of different V-angles such as 30°, 45° and 60° at, different welding current such as 80 Amp, 100 Amp and 110 Amp and various welding voltage 17 Volt, 19 Volt and 20 Volt on ultimate tensile strength of welding of Mild Steel IS2062, are used to find out the significance of input parameter on output by using SPSS and ANSYS method, static analysis and thermal analysis.

This result shows better ultimate tensile strength prediction capability and applicability to such industrial MIG welding leading to effective selection of machining parameter for better ultimate tensile strength.

**Keywords:** Ultimate tensile strength, Analysis of object (ANSYS), Modelling in Pro-E, Metal inert gas (MIG) welding, SPSS Software.

### INTRODUCTION

Welding is a manufacturing process of creating a permanent joint obtained by the fusion of the surface of the parts to be joined together, with or without the application of pressure and a filler material. The materials to be joined may be similar or dissimilar to each other. The heat required for the fusion of the material may be obtained by burning of gas or by an electric arc. The latter method is more extensively used because of greater welding speed.

Welding is extensively used in fabrication as an alternative method for casting or forging and as a replacement for bolted and riveted joints. It is also used as a repair medium e.g. to reunite a metal at a crack or to build up a small part that has broken off such as a gear tooth or to repair a worn surface such as a bearing surface.

MonikaK. *et al.* [1], analyzed the Mechanical Properties of MIG Welded Dissimilar Joints under the effect of heat input. Welding current, voltage and speed of wire determines the heat input. The IS2062, IS45C8, IS103Cr1 were used as a base material. 1.2 mm diameter copper coated mild steel was used as a filler wire. The both joints (IS2062 & IS45C8) and (IS2062 & IS103Cr1) increased the tensile strength when increased with the heat input and also increased the hardness value when decreased with the heat input. M.Aghakhani *et al.* [2] have done work on optimization of gas metal arc welding process parameter for increase quality and productivity of weldment. In this research work for increasing quality and productivity of weldment they have considered weld dilution as output parameter and effect of input parameter wire feed rate (W), welding voltage (V), nozzle-to-plate distance (N), welding speed (S) and gas flow rate (G) was found on it. The base material use for experiment is ST-37 steel plate and the mixture of 80% argon and 20% CO<sub>2</sub> is use as shielding gas. The experiment was designed by Taguchi's L25 orthogonal array and analysis was carried out by ANOVA method also they develop mathematical model for weld dilution. From the experimental result they found that the wire feed rate has the most significant effect on the weld dilution while gas flow rate has no effect on weld dilution. C. N. Patel *et al.* [3] evaluated the parameters; welding current, wire diameter and wire feed rate to investigate their influence on weld bead hardness for MIG welding and TIG welding by Taguchi's method and Grey Relational Analysis (GRA). From the study it was concluded that the welding current was most significant parameter for MIG and TIG welding. By use of GRA optimization technique the optimal parameter combination was found to be welding current, 100 Amp; wire diameter 1.2 mm and wire feed rate, 3m/min for MIG welding.

### EXPERIMENTAL WORK

The machine use for performing the experiment is AUTOK600 SYNERGIC, manufactured by ESAB India Limited in Gujarat Apollo Equipments Ltd.

#### Work piece material

From the literature survey of past researchers it is show that the material selection in manufacturing process is most important think as per process availability and customer's requirement. There is number of material used in modern

2018-28-0047 Published 09 Jul 2018



## Coefficient of Thermal Expansion and Elastic Modulus of $\text{SiC}_p/\text{Al}_2\text{O}_3$ Ceramic Matrix Composites Prepared by Directed Metal Oxidation Process

Devalah Malkapuram, Geethanjali College of Engg and Tech

*Citation:* Malkapuram, D., "Coefficient of Thermal Expansion and Elastic Modulus of  $\text{SiC}_p/\text{Al}_2\text{O}_3$  Ceramic Matrix Composites Prepared by Directed Metal Oxidation Process," SAE Technical Paper 2018-28-0047, 2018, doi:10.4271/2018-28-0047.

### Abstract

The present paper, it is aimed to prepare  $\text{SiC}_p/\text{Al}_2\text{O}_3$  ceramic matrix composites using Directed Metal Oxidation process large enough dimension specimens for the measurement of physical properties. Continuous oxidation of an Aluminum alloy with suitable dopant along with a preform of SiC has lead to the formation of alumina matrix surrounding silicon carbide particulates.  $\text{SiC}_p/\text{Al}_2\text{O}_3$  ceramic matrix composites fabricated by the Directed Metal

Oxidation process, possess required physical properties such as coefficient of thermal expansion (CTE) and elastic modulus, all at an affordable cost of fabrication.  $\text{Al}_2\text{O}_3$  matrix composites reinforced with different volume fractions of SiC particulates were investigated for physical properties such as coefficient of thermal expansion (CTE) and elastic modulus. The composites with SiC volume fraction of 0.43 were found to possess a CTE as of as  $5.0 \times 10^{-6}/\text{K}$  and an elastic modulus of 262 GPa.

### Keywords

Ceramic matrix composites, Metal infiltration, Silicon carbide, Physical properties

## 1. Introduction

Ceramics have excellent strength-to-weight ratio when compared to advanced metals and alloys. These attractive properties can also be maintained to extremely high temperature, which make them a sole choice for high temperature applications. A variety of structural applications of ceramic materials ranging from high temperature gas turbines and adiabatic diesel engines to cutting tools and other wear-resistant parts. In each of the said applications, beneficial properties of ceramics such as high stiffness, strength and hardness, low density, and good resistance to corrosion, oxidation, and wear at high temperatures have been explored. With the ever-increasing performance requirements of engineering materials, the properties of monolithic materials are pushed to their limits. Monolithic ceramics possess high strength but lack the fracture toughness, required in many applications, such as components in jet engines. Ceramic materials have properties that make them ideal candidates for many elevated temperature applications such as heat exchangers and turbine engines components. Due to the refractory nature of ceramics, they are, at times, the only choice for a material that can potentially satisfy the most demanding requirements particularly at high temperatures. In addition to offering high melting or decomposition temperatures, many ceramics possess other

attractive features such as low density, high temperature strength, high hardness and resistance to creep deformation, thermochemical stability and lack of reactivity in contact with other materials and various atmospheres, and, last, but not least, high wear resistance.

Ceramic materials have properties that make them ideal candidate for low density, high temperature strength, high hardness, thermo-chemical stability band, and high wear resistance. Probably the most critical disadvantage of ceramic materials is the relatively low fracture toughness, i.e., resistance to the propagation of a small crack [1]. Fracture toughness of ceramic materials can be improved by the incorporation of second phases that possess high magnitudes of toughness, of which metallic reinforcement offers great scope. Further, fibers being anisotropic, pose processing limitations such as shape and demands for specialized techniques for the incorporations of fibers are certain [2]. Addition of second phase particles, both ductile and brittle, not only affects the microstructural-features but also mechanical properties [3, 4, 5, 6].

The main objective of this paper is to understand the physical properties such as coefficient of thermal expansion and elastic modulus. However any little work in this context was found to be focused at specific volume fraction of SiC that are relevant to industrial applications. Further, a systematic





# Mathematical Model Validation of Experimental Results of $\text{SiC}_p/\text{Al}_2\text{O}_3$ Ceramic Matrix Composites Prepared by Directed Metal Oxidation of an Al Alloy

Devaiah Malkapuram, Geethanjali College of Engg and Tech

Citation: Malkapuram, D., "Mathematical Model Validation of Experimental Results of  $\text{SiC}_p/\text{Al}_2\text{O}_3$  Ceramic Matrix Composites Prepared by Directed Metal Oxidation of an Al Alloy," SAE Technical Paper 2018-28-0046, 2018, doi:10.4271/2018-28-0046.

## Abstract

In this paper,  $\text{SiC}_p/\text{Al}_2\text{O}_3$  ceramic matrix composites are fabricated with specimen of dimensions measuring  $70 \times 70 \times 20$ , in mm with varying volume fractions in the range of 0.35 to 0.43. The purpose of this paper is to compare experimental results namely physical properties of  $\text{SiC}_p/\text{Al}_2\text{O}_3$  composites with mathematical models. The model predictions were compared with the experimental data

In the present paper, different mathematical models are used to comparison of physical properties such as coefficient of thermal expansion and modulus of elasticity of  $\text{SiC}_p/\text{Al}_2\text{O}_3$  composites with different volume fractions of SiC in the range of 0.35 to 0.43. The comparison experimental results with mathematical models provide detailed information about the results of these comparisons. The models were capable of predicting the data for some scenarios fairly well.

## Keywords

Ceramic Matrix Composites,  $\text{Al}_2\text{O}_3$ , SiC, FEM, Mechanical and Physical Properties

## 1. Introduction

Ceramics have excellent strength-to-weight ratio when compared to advanced metals and alloys. These attractive properties can also be maintained to extremely high temperature, which make them a sole choice for high temperature applications. A variety of structural applications of ceramic materials ranging from high temperature gas turbines and adiabatic diesel engines to cutting tools and other wear-resistant parts. In each of the said applications, beneficial properties of ceramics such as high stiffness, strength and hardness, low density, and good resistance to corrosion, oxidation, and wear at high temperatures have been explored. With the ever-increasing performance requirements of engineering materials, the properties of monolithic materials are pushed to their limits. Monolithic ceramics possess high strength but lack the fracture toughness, required in many applications, such as components in jet engines. Ceramic materials have properties that make them ideal candidates for many elevated temperature applications such as heat exchangers and turbine engines components. Due to the refractory nature of ceramics, they are, at times, the only-choice for a material that can potentially satisfy the most demanding requirements particularly at high temperatures. In addition to offering high melting or decomposition temperatures, many ceramics possess other

attractive features such as low density, high temperature strength, high hardness and resistance to creep deformation, thermochemical stability and lack of reactivity in contact with other materials and various atmospheres, and, last, but not least, high wear resistance.

In this paper, validation of  $\text{SiC}_p/\text{Al}_2\text{O}_3$  composites fabrication through directed metal oxidation process [1], and its mechanical and physical properties was modeled which had been experimentally tested and reported by Devaiah *et al.* [1]. This is followed by a comparison of the finite element with experimental results on  $\text{SiC}_p/\text{Al}_2\text{O}_3$  composites fabrication through directed metal oxidation process in the following study.

## 2. Experimental Work

In the present work,  $\text{SiC}_p/\text{Al}_2\text{O}_3$  composites with different volume fractions were prepared by directed metal oxidation process. This was comprised of two steps namely preparation of SiC preforms with different volume fraction and appropriate heat treatment schedule to aid formation of  $\text{Al}_2\text{O}_3$  matrix. The volume fraction of SiC was varied by using SiC particulates of different grit sizes namely # 100, # 120 and # 220 [1]. The  $\text{SiC}_p/\text{Al}_2\text{O}_3$  composites fabrication as mentioned



## Friction Stir Welding of Aluminum 6082

Santosh Aadhari and Devajan Malkapuram, Geethanjali College of Engineering and Tech

Citation: Aadhari, S. and Malkapuram, D., "Friction Stir Welding of Aluminum 6082," SAE Technical Paper 2018-28-0051, 2018, doi:10.4271/2018-28-0051

### Abstract

Friction Stir Welding (FSW) overcomes many of the problems associated with traditional joining techniques. FSW is a solid-state process which produces welds of high quality in difficult-to-weld materials such as aluminum and is fast becoming the process of choice for manufacturing lightweight transport structures such as boats, trains and aero planes. A rotating cylindrical tool with a profiled probe is fed in to a butt joint between two clamped workpieces, until the shoulder, which has a larger diameter than the pin, touches the surface of the workpieces. The probe

is slightly shorter than the weld depth required, with the tool shoulder riding at the top of the work surface. In this dissertation two Aluminum 6082 plates were joined with friction stir welding technique. The primary objective of this work is to study the effect of root gap and variation in tool speed on the properties of base metal i.e. AL6082. AL6082 base plates were friction stir welded with a root gaps of 0.25 mm, 0.5 mm and 0.75 mm at variable tool speeds of 1400 rpm and 1800 rpm. The analysis was carried out for different parameters such as Microstructure variation, Hardness and tensile strength by using Universal testing machine as per ASTM standards.

### Keywords

Aluminum, Friction Stir Welding, Tensile strength, Hardness, Universal Testing Machine, Root gap, tool speed

## 1. Introduction

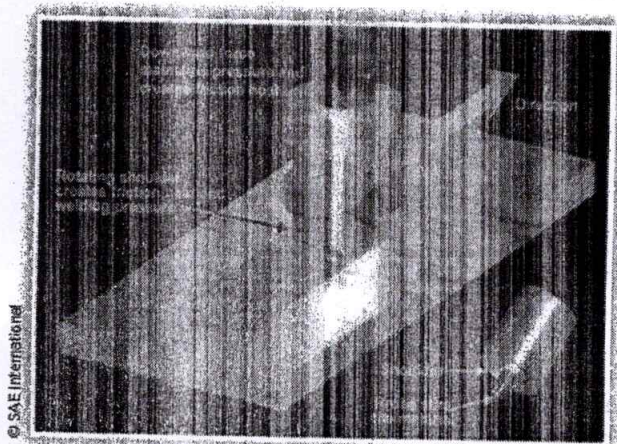
Friction welding is a class of solid-state welding processes that generates heat through mechanical friction between a moving work piece and a stationary component, with the addition of a lateral force called upset to plastically displace and fuse the materials. Technically, because no melt occurs, friction welding is not actually a welding process in the traditional sense, but a forging technique, however due to the similarities between these techniques and traditional welding, the term has become common. Friction welding is used with metals and thermoplastics. There are different types of friction welding such as Rotary Friction Welding, Inertia Friction Welding, spin welding, friction surfacing, Friction Stud Welding, Linear Friction Welding, Friction transformation processing and Friction stir welding.

### 1.1. Friction Stir Welding

Friction stir welding is a solid-state welding process. Solid state welding, as the term implies, is the formation of joints

in the solid state, without fusion. Solid state welding includes processes such as cold welding, explosion welding, ultrasonic welding, roll welding and forge welding.

FIGURE 1.1 Friction stir welding



## Force and Deformation Analysis for Determination of Optimum Fixture Configuration

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### Abstract

An important aspect in the design of a good fixture is that of imparting sufficient rigidity to the entire work piece surface that are to be machined. Rigidity refers to the ability of the system to withstand applied loads with minimal deformation. A good fixture must be able to completely restrain the work piece to counter any possible cutting forces and couples in machining stages.

The present study aims at implementing finite element analysis and finite element optimization techniques to determine the optimum fixture configuration for drilling through a deformable work piece. The 3-2-1 locating principle has been used and in order to simulate real time conditions contact elements have been used at the interfaces of the work piece and the fixturing elements. The desired fixturing characteristics are optimized with respect to the objective function. Excessive clamp forces and improper location may cause large elastic deformations in the work piece. Hence the lateral deflection of the work piece is chosen as the objective function. ANSYS software is used to carry out the Finite Element Analysis and optimization. Three case studies have been taken to illustrate the method. Comparison has been made between the initial and optimum fixture configuration.

**Keywords:** Optimization, Fixture, Finite Element Method, ANSYS, Force

### INTRODUCTION

Fixtures are essentially work holding devices, which locate and restrain a work piece while some operation is being performed on it. These operations include machining, welding, assembly, inspection etc. Nowadays various analyses are being done in order to develop an accurate fixture structure for reducing dimensional variations in the final product. Some of the analysis includes geometric, kinematic, force and deformation analysis. Usually force analysis is concerned with checking whether the forces applied by the fixtures are sufficient to maintain static equilibrium in the presence of cutting forces. Deformation analysis considers that a part may deform elastically and/or plastically under the influence of cutting and clamping forces so that desired tolerances will not be achieved. Fixtures are used to locate and constrain a work piece during a machining operation, minimizing work piece and fixture/tooling deflections due to clamping and cutting forces are critical to ensuring accuracy

of the machining operation.

Traditionally, machining fixtures are designed and manufactured through trial-and-error, which prove to be both expensive and time-consuming to the manufacturing process. To ensure a work piece is manufactured according to specified dimensions and tolerances, it must be appropriately located and clamped, making it imperative to develop tools that will eliminate costly and time-consuming trial-and-error designs. Proper work piece location and fixture design are crucial to product quality in terms of precision, accuracy and finish of the machined part. Theoretically, the 3-2-1 locating principle can satisfactorily locate all prismatic shaped work pieces. This method provides the maximum rigidity with the minimum number of fixture elements. To position a part from a kinematic point of view means constraining the six degrees of freedom of a free moving body (three translations and three rotations). Three supports are positioned below the part to establish the location of the work piece on its vertical axis. Locators are placed on two peripheral edges and intended to establish the location of the work piece on the x and y horizontal axes. Properly locating the work piece in the fixture is vital to the overall accuracy and repeatability of the manufacturing process. Locators should be positioned as far apart as possible and should be placed on machined surfaces wherever possible. Supports are usually placed to encompass the center of gravity of a work piece and positioned as far apart as possible to maintain its stability. The primary responsibility of a clamp in fixture is to secure the part against the locators and supports. Clamps should not be expected to resist the cutting forces generated in the machining operation. Mass production methods demand a fast and easy method of positioning work for accurate operations on it.

Afzeri *et al* [1], studied the automatic mechanism using pin type fixture for holding a workpiece during machining process. The hybrid optimization algorithm is introduced to obtain the optimum configuration of pin type fixture. Combination between Genetic Algorithms (GAs) and Particle Swarm Optimization (PSO) algorithms is enable to determine optimum clamping respect to minimum workpiece deformation. Spherical type pin fixture with array arrangement in two opposite side conforms geometry of workpiece through to two supporting action. Deformation as effect of clamping force and friction slip are predicted by simulation of pin-workpiece clamping model and analyzed by Finite Element methods. Guohua Qin *et al* [2] considering the great impacts of the application sequence of multiclamps on

18-19-55

# Manufacturing of Die Using Rapid Prototyping Technique

T Siva Prasad\* and Malkapuram Devaiah\*\*

The paper applies Rapid Prototyping (RP) technology using 3D-CAD model of the check specimen as associate input. Factory-made casting in wood pattern is compared with the RP model. The casted specimen has been tested for impact strength and surface properties. The experimental results showed that there is not much variation within the impact strength of the casted specimen, and there is a little variation in surface property of casting. It is found that the surface finish of the casting obtained by RP pattern is better than the wood pattern casting. To verify the usability of RP in manufacturing plant, the time and price needed to organize the RP and wood pattern are compared.

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**Keywords:** Rapid Prototyping (RP), 3D Printer, Computer-Aided Design (CAD), Complex pattern

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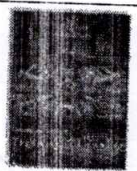
## Introduction

Rapid Prototyping (RP) involves a cluster of techniques, used to quickly fabricate a scale model of a physical part or assembly without the need of rather an expensive model, and using 3D Computer-Aided Design (3D CAD). Construction of the parts or assembly is typically done using 3D printing or "Additive Layer Manufacturing" (ALM) technology. Layering technique in an exceedingly speedy prototyping machine adds material in a layering method to make the required form. ProE modeling software is employed to form the 3D solid model of the die. It is a multi-platform CAD/Computer-Aided Manufacturing (CAM)/Computer-Aided Engineering (CAE) software suite. 3D slicing software package (3D Printer OS) could be a piece of software package running on a computer. It acts like associate interpreter for 3D printer. Once a 3D file is fed, the 3D slicer computer code then cuts the object into several horizontal layers and produces a path so that a print-head will follow line by line. High speed CNC machining units will be able to build elements layer by layer.

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## Temperature Field and Residual Stress of Butt Welding for IN182 Plate

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### Abstract

The welding process is a nonlinear phenomenon in nature which leads to deformation and residual stresses in weldments. To overcome structural changes in the weldments the computational packages can be effectively used for analyzing the changes in its life. Inconel alloys have excellent mechanical properties and are used in the industrial applications. The present simulation is carried out for single pass butt-joint. Simulation studies are used for effective selection of process parameters for improving mechanical properties in weld structures. In this work, coupled thermo-mechanical simulation process was carried out for predicting the temperatures, distortion and residual stress distribution in the weldments using Finite element analysis at the transverse direction on the welded surface.

Keywords: GTAW welding process, Heat flux, FEA, Transient analysis, Residual stress.

### Introduction

Welding is one of the important manufacturing process and Inconel materials are typically used in the manufacture of ships, automobiles, chemical industries, gas turbine components and aerospace etc. In weld structures, the weld residual stresses and distortions are caused due to the presence of localized heat in the weld beads. Distortion in weldments leads to inaccuracy in dimensions and causes difficulty during assemblies and increases the fabrication overheads. Changheui Jang et al[1] have reported the similar welding for understanding the behavior of microstructural and mechanical properties in the weldments. The welding process includes transient thermal heating and undergoes expansion and contraction, based on the physical properties of the materials. The welded components will be subjected to residual stresses and undergo distortion in the structures. The welding simulation of the butt joints with thermal history, residual stresses and distortion in weldment for similar and dissimilar weldings have been carried out in various zones in weld surface[2-3]. The similar joining of SS316 to IN182 was carried out to study the micro hardness and micro structural properties[4]. A three-dimensional model of the joint for tube-block with J-groove for austenitic stainless steel was simulated using Quick Welder software to understand the residual stress and distortions developed in multi-pass joints [5]. The welding of thin plate structures was simulated for distortions which cause an effect in the assembly of the structures. The weld distortion of weldments was estimated by simulation with two computational approach by a thermo-elastic-plastic finite element method and an elastic finite element method [6-7]. The two and three-dimensional welding simulations on stainless steel SUS304 by GTAW, was carried out with ABAQUS finite element analysis for understanding the thermal behavior of the material transient condition that leads to residual stress in the simulated structures [8]. The welding simulation on stainless steels of

different grades have been reported with two and three-dimensional finite element models using the appropriate heat flux for laser beam and arc welding process to be aware of heat transfer and its response on distortion and residual stresses [9-10]. Simulation of welding of multipass pipe girth thick plate was investigated with two-dimensional axisymmetric model using finite element analysis for residual stress [11].

In this paper, thermo-mechanical analysis has been carried out for the temperature distribution and studied residual stress distribution with single pass butt welded joint of Inconel 182 alloys. The double ellipsoidal heat flux was used for simulation, which helps to optimise parameters for reducing the residual stresses in the weldments.

### 2. Finite Element Analysis

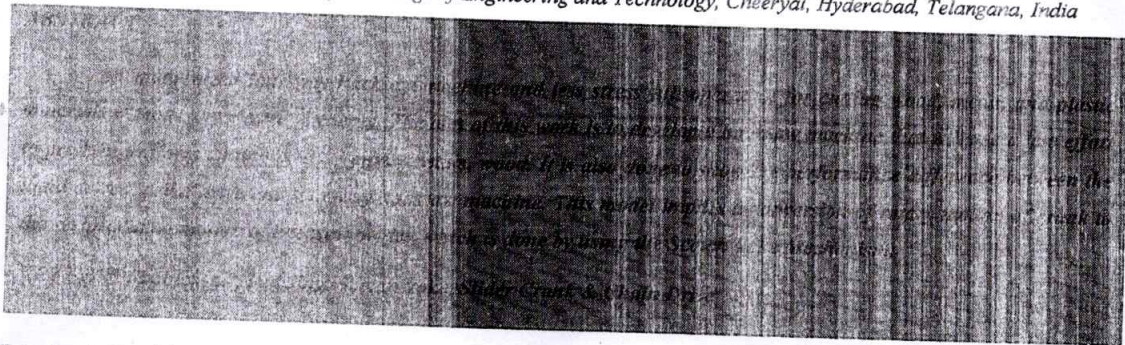
For the analysis, the thermal element SOLID 90[12] which is a higher order version of the three dimensional eight node thermal element SOLID70 and has 20 nodes with a single degree of freedom, temperature at each node is used. The 20-node elements have compatible temperature shapes and are well suited to model curved boundaries. If the model containing this element is also to be analyzed structurally, the element should be replaced by the equivalent structural element. The geometry, node locations, and the coordinate system of the element are shown in Fig.1. Fig.2 shows the well known double ellipsoidal heat source model, which was proposed by Goladk[13] for three-dimensional numerical welding simulation for arc welding process. The temperature dependent thermal and mechanical properties are shown in Fig.3a and structural properties like yield strength, young modulus Poisson's ratio and thermal expansion are shown in Fig.3b.



## MANUFACTURING AND ANALYSIS OF FOUR-WAY HACKSAW MACHINE BY PEDALING

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### INTRODUCTION

The main objective of our project is to design a portable robust machine which can perform multiple machining operations like cutting simultaneously using pedal power with less human effort, without using electric power. And also this work is to design a machine to overcome the stress attached to hand cutting, operations of engineering materials by turning it into an exercise for body fitness. When pedaling the conversion of To and Fro motion about the hacksaw by the rotation of the wheel. In that, the size and shape are same as to a by cycle. This equipment can be run by a very low energy. The Machine works with pedal power. The input rotatory motion is integrated using chain drives and sprockets to get high angular velocity.

### WORKING

A multiple machining setups which are run by the pedal has a simple operating mechanism it means the arrangement of chain and sprocket gear. When pedaling the conversion of To and Fro motion about the hacksaw by the rotation of the wheel. Such type of process is called a slider crank mechanism.

The Machine works with pedal power. The input rotatory motion is integrated using chain drives and sprockets to get high angular velocity.

The hacksaw getting a To and Fro motion by the pedaling, then the disc is rotating. The pipe vice is fixed at the end to hold the workpiece tightly in a straight position. When applying human energy on to the pedal, then the chain rotates it means it is connected to two sprockets which give the movement to hacksaw blade. The movement of the blade cut the workpiece which is placed on the work holder.

18-19-(58)

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## COMPARISON OF MECHANICAL PROPERTIES FOR CARBON, E-GLASS AND HYBRID (CARBON & E-GLASS) COMPOSITES

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### ABSTRACT

Hybrid polymer composites are the materials made by combining two or more different type of fibers in a matrix. Hybrid polymer composite material offers the designer to obtain the required properties in a controlled considerable extent by the choice of fibers and matrix. The properties are tailored in the material by selecting different kinds of fiber incorporated in the same resin matrix. They offer wide range of properties that cannot be obtained with a single type of reinforcement. Due to its high specific strengths, high specific modulus, low densities, light weight etc. based on its applications. Presently they are playing a vital role in aerospace, defence, transport, sport applications. Worldwide researches are keenly interested in finding out their behavior in real life exposed to various environmental conditions, variety of loads etc.

In this paper, We fabricated carbon, e-glass and hybrid composites by using hand layup technique in uni-directional orientation with epoxy as a matrix material and conducted various tests such as tensile, compression on Universal Testing Machine (UTM) and hardness. The results are validated with FEA and observed that Al-6061-T6 which is used in manufacturing of military aircraft landing mats, truck bodies and frames etc. has a tensile strength of about 310.25Mpa. The tensile strength of hybrid fiber is 341Mpa which is higher than Al 6061-T6. We have compared the experimental results with ansys results and found that the experimental values are very close to the ansys results. But when compared within the fibers carbon fiber exhibited more strength when compared to other fibers

**Keywords:** Polymer composites, Hybrid polymer, Carbon fibers, E-glass, Hand layup.

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# Finite Element Analysis of Hydraulic Press Emphasis with Minimum Deformation and Thickness Optimization

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**Abstract:** In hydraulic press, the force generation, transmission and amplification are achieved using fluid under pressure. The liquid system exhibits the characteristics of a solid and provides a very positive and rigid medium for power transmission and amplification. There is easy transmissibility of large amount of energy with practically unlimited force amplification by use of hydraulics. The function of the major component like frame, bottom plate, bed, top box are to absorb forces, to provide precise slide guidance and to support the drive system and other auxiliary units.

In the present work, a deep drawing press is designed with usual procedure and layout of components of the closed type press is done for 2000KN i.e. 200 tonnage. The press designed is modeled in CATIA V5. The model is exported in ANSYS workbench to carry out the analysis. Initially the press is analyzed for the given dimension with the load and maximum deflection and stress is found. By observing the total deflection in the direction of load, some modification in the structure of the press is suggested and by incorporating the changes the press is re-analyzed. The series of analysis are carried out to optimize the thickness of the plate of the press material. It is found that the stresses induced in the press material are within the safe limit and deflection is also under acceptable limit. A comparative study is made to know the analysis procedure by considering the full press.

**Index Terms:** Frame, Incorporate, auxiliary, Re-analyze.

## 1. INTRODUCTION

Fluid power is a technology which deals with the generation, control and transmission of forces and movement of mechanical element or system with the use of pressurized fluids in a confined system. Both liquids and gases are considered as fluids. Fluid power system includes a hydraulic system (hydra meaning water in Greek) and a pneumatic system (pneumatic meaning air in Greek). Oil hydraulic employs pressurized liquid petroleum oils and synthetic oils, while pneumatic employs compressed air that is released to the atmosphere after performing the work. Generally, in the industry there are three methods used for transmitting power from one point to another. Mechanical transmission is through shafts, gears, chains, belts, etc. Electric transmission is through wires, transformers, etc. Fluid power is through liquid or gas in a confined space. A hydraulic press or machine using a hydraulic cylinder to generate a compressive force. It uses the hydraulic equivalent of a mechanical lever.

The hydraulic press depends on Pascal's principle: the pressure throughout a close system is constant. One part of the system is a piston acting as a pump, with modest mechanical force acting on a small cross sectional area; the other part is a piston with diameter tubing (which more easily resist pressure) is needed if the pump is separated from the press cylinder. Various types of pressing machines are available like 1) Frame Throat Type, Straight Sided and Column type, 2) Four Pillar Type, H-Frame Type.

Finite element analysis (FEA) is a powerful engineering tool. It can solve many kinds of engineering problems to high degree of precision as necessary. The finite element is a numerical method for solving ordinary & partial differential

equations. The finite element method (FEM) referred as finite element analysis is a computational technique used to obtain approximate solution of boundary value problems in Engineering. The mathematical model includes simplified problem with the analysis then it can be applied for solving it.

## 2. FEA AND MODAL ANALYSIS

To analyze the given press structure model for various boundary conditions ANSYS 14.5 is selected. The model is imported, meshed and applied various boundary conditions and solve. The dynamic behavior of the structure elements at its resonance can be analyzed by modal analysis approach. The detailed dynamic behavior of any structure can be analyzed by ANSYS modal analysis. These types of problems of structural, dynamic modal analysis can be analyzed by finite element analysis procedure. Modal analysis of cross joint assembly in ANSYS workbench. ANSYS workbench is a tool for both modeling and analysis that involves in all types of problem solving such as like steady state, thermal, stress, modal, fluent etc. Several such problems can be solved by using the model analysis technique. In this project work modal analysis tool is used for analysis of hydraulic joint.

### 1. DESIGN CONSIDERATION FOR BASED FRAME OF HYDRAULIC PRESS

#### Material Properties

Mild steel is the most common form of steel because its price is relatively low while it provides material properties that are acceptable for many applications. Mild steel contains 0.16-0.29% carbon. Mild steel has a relatively low tensile strength, but it is cheap and its surface hardness can



12/15/20

# Studying The Effect Of Co-Efficient Of Friction On The Work Piece In Grinding By FEA

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**Abstract:** High surface finish required for making products is generally done by grinding, in this process stresses are induced in the work piece due to loading.

This paper reflects the methodology and results obtained from ANSYS software tool which is used for evaluating the stress induced and contact pressure under static condition of work piece. The grinding wheel of titanium carbide is used to grind different materials [iron and steel in this paper are considered] of work pieces for different co-efficient of friction. The result of the different combinations of work piece and co-efficient of friction are tabulated and compared.

**Index terms:** Grinding, Grinding wheel, Stress, Contact pressure

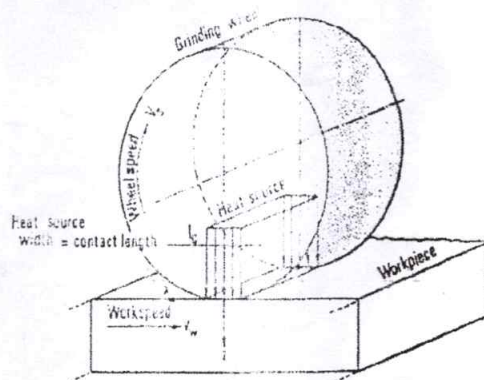
## 1. INTRODUCTION

Grinding is an abrasive material removal and surface generation process used to shape and finish components made of metals and other materials. The precision and surface finish obtained through grinding can be up to ten times better than with either turning or milling.

Grinding employs an abrasive product, usually a rotating wheel brought into controlled contact with a work surface. The grinding wheel is composed of abrasive grains held together in a binder. These abrasive grains act as cutting tools, removing tiny chips of material from the work. As these

abrasive grains wear and become dull, the added resistance leads to fracture of the grains, weakening of their bond. The dull pieces break away, revealing sharp new grains that continue cutting. The requirements for efficient grinding include:

- Abrasive components which are harder than the work
- Shock- and heat-resistant abrasive wheels
- Abrasives that are friable. That is, they are capable of controlled fracturing



FEA

Modeling is the process of producing a model is a representation of the construction and working of some system of interest. The purpose of a model is to enable the analyst to predict the effect of changes to the system. On one hand, a model should be a close approximation to the real system and incorporate most of its salient features. On the other hand, it should not be so complex that it is impossible to understand and experiment with it. A good model is a judicious trade-off between realism and simplicity. Modeling

are two types they are 2-D geometric modeling, 3-D modeling.

## 2. ANALYSIS

Treatment of engineering problems basically contains three main parts: create a model, solve the problem, analyze the results. ANSYS, like many other FE-programs, is also divided into three main parts (processors) which are called preprocessor, solution processor, postprocessor.

Preprocessor

*Signature*

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# THERMAL CHARACTERIZATION OF FIBER REINFORCED POLYMER COMPOSITES AND HYBRID COMPOSITES

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## ABSTRACT

Hybrid composite materials are the great potential for engineering material in many applications. Hybrid polymer composite material offers the designer to obtain the required properties in a controlled considerable extent by the choice of fibers and matrix. The properties are tailored in the material by selecting different kinds of fibre incorporated in the same resin matrix.

In this paper, the thermal properties of GFRP, CFRP, and Carbon and Glass fibers reinforced epoxy hybrid composite will be studied. The composites using are all uni-directional. The compression moulding technique will be adopted for the fabrication of hybrid composite materials. The thermal properties such as Glass transition temperature, Thermal conductivity, Specific heat capacity are calculated using Dynamic mechanical Analysis (DMA), Differential scanning Calorimetry (DSC), Thermo gravimetric analysis (TGA) respectively.

**Key words:** Hybrid polymer Composites, fibers, thermal properties, compression moulding technique.

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<http://www.iaeme.com/IJMET/issues.asp?JType=IJMET&VType=10&IType=4>

## 1. INTRODUCTION

Composites are one of the most advanced and adaptable engineering materials known to men. Progresses in the field of materials science and technology have given birth to these fascinating and wonderful materials. A composite material can provide superior and unique mechanical and physical properties because it combines the most desirable properties of its constituents while suppressing their least desirable properties. When considering high end engineering applications, composites are to be made lightweight and strong so as to improve the performance of the application. The in plane properties like tensile strength and stiffness



# Influence of Slip on Peristaltic Motion of a Nanofluid Prone to the Tube



K. Maruthi Prasad and N. Subadra

**Abstract** Influence of slip on peristaltic motion of a nanofluid prone to the tube is studied under the assumption of long wavelength and low Reynolds number. The equations governing the flow are solved and closed-form expressions for velocity, pressure drop, time-averaged flux and frictional force have been obtained. The effects of various parameters like Brownian motion parameter, thermophoresis parameter, local temperature Grashof number, local nanoparticles Grashof number, slip parameter and inclination on these flow variables have been studied. Streamline patterns and trapping phenomena have been studied and sketched through graphs at the end.

**Keywords** Nanofluid · Permeable walls · Brownian motion parameter · Thermophoresis parameter · Local temperature Grashof number · Local nanoparticle Grashof number

## 1 Introduction

'Peristalsis is a mechanism of fluid transport that occurs widely in many physiological situations such as food mixing and chyme movement in the intestines, movement of ovum in the female fallopian tube, transport of urine through ureters'. Peristaltic motion of Newtonian fluids has been investigated by many researchers under various conditions [1-3].

Nanometer dimension materials show unique physical and chemical characteristics. Therefore, nanotechnology has a vast contribution in the industry. Nanofluids

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# A Goal Programming Approach for an Effective Financial Budget of an Indian State

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## Abstract

For a welfare country, the effective financial budget planning is always a challenging task. Though the goals of any financial budget are about the welfare of the country, yet the priorities may change from year to year, to fulfill the economic growth of the developing countries like India. In financial budgeting, the economical priorities of the democratic countries like India depend on the ethics or the promises given by the ruling political party. Besides that, the administrator has to consider various goals in obtaining a satisfactory solution to the financial budget. In this research paper, a State from India is considered and various goals were taken in to thoughtfulness. Multi-decision making problems can be solved by goal programming. The strength of the goal programming model is that it can solve multiple objectives simultaneously and can obtain an optimal solution that satisfies all the objectives and constraints. The objectives change frequently. The goal programming model stated in this research paper can indicatively overcome the changes happening from time to time and can be successful in constructing the effective financial budget.

**Keywords**—Goal programming, Goal priorities, Effective Financial budget, Indian state economy.

## 1. Introduction

India is a developing country with mixed economy. India is the third largest economy by nominal gross domestic product (GDP) and ranks fourth in power purchasing parity (PPP). The country ranks 141<sup>st</sup> [12] in per capita GDP (nominal) with \$1723 [12] and 123<sup>rd</sup> [12] in per capita GDP (PPP) with \$6,616 [11]. After 1991 economic liberalization, India achieved 6%-7% [13]

average GDP growth annually. In the fiscal year 2015 and 2017 India's economy became the world's fastest growing major economy surpassing China. India topped the World Bank's growth outlook for the first time in fiscal year 2015-16, during which the economy grew 7.6% [13]. Growth is expected to have declined slightly to 7.1% [13] for the 2016-17 fiscal year. According to the IMF, India's growth is expected to re-bounce to 7.2% [13] in the 2017-18 and 7.7% [13] in 2018-19 fiscal years.

In India, there are three types of sectors based on economy and GDP. They are a. Agriculture (primary sector) b. Industry (secondary sector) and c. Services (tertiary sector). In the agriculture sector, India holds world's second position in the agricultural production [13]. The agriculture contribution to the GDP is declining since from 1951, yet it is still the major sector of the Indian economy. Industry sector is having a steady share in the Indian economy and becoming the fastest growing e-commerce markets. In the service sector, India's contribution is increasing very rapidly from 2001. Information technology services (IT), business process out source (BPO) services and software services are the major exports of India in the service sectors.

Rapid increase in the contributions from the three sectors results in the growth of Indian economy. The development in Agriculture and allied services, industry and minerals, infrastructure, transportation, taking up of new irrigation projects, tourism, creating the farming jobs, providing health coverage, rural development, technical education, urban development, housing, water supply, sanitation, energy, labor and employment etc.. Leads to notable increase of Indian economy and per capita GDP. The development in the above said sectors can be achieved by the effective

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## The Term, "Restriction" in Phase Rule Rendered More Intelligible: A Chemical Education Article for Undergraduate Students of Chemistry in India

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### Abstract:

We have a mathematical relation for the determination of components (C),  $C = C' - r$  where C' is the total number of chemical constituents or species, and r is the number of restrictions or restrictive conditions, which is seldom used and taught in Indian Universities and colleges. In this article, we have made an attempt to elaborate the term restriction, taking few examples from one of the staple engineering textbook in India. Even though this equation  $C = C' - r$  appears simple, the meaning of the term r is difficult to comprehend. Therefore, we thought that elaboration of the term is of much use to both the teacher and to the taught. More importantly there appears some conceptual flaw in the calculation of components for particular reaction in this book. And this flaw is reoccurring from the past 25 years. Our endeavor is to rectify this flaw in the interest of students, teachers and chemistry audience at large.

**Keywords:** Phase, Components, Restrictions Constituents and Phase rule.


### INTRODUCTION

In phase rule, components (C) is equal to difference between the number of chemical species in the system and the number of equations relating the concentrations of these substances in an equilibrium system. This definition is especially useful in the case of constituents, which are capable of chemical interactions.

### DISCUSSION

The meaning of the crucial sentence 'equations relating the concentration of these substances' in the foregoing paragraph is nothing but the restrictions imposed on the independent existence of the concentration of the substances. When the substances are related by equality, it overtly reflects that their freedom to exist

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## A Facile Synthesis of N'-Arylidene-2-((7-bromo-2-methylpyrido[2,3-b]pyrazin-3-yl)oxy)acetohydrazides

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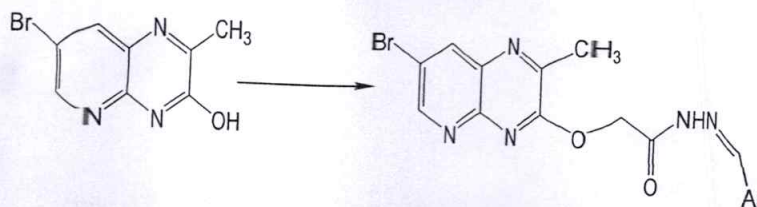
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### ABSTRACT

5-bromo 2,3-diamino pyridine and ethyl pyruvate react each other to form 7-bromo-2-methylpyrido[2,3-b]pyrazin-3-ol (1) which further reacts with ethyl chloroacetate and form ethyl 2-((7-bromo-2-methylpyrido[2,3-b]pyrazin-3-yl)oxy)acetate (2). Compound 2 on reaction with hydrazine hydrate gives 2-((7-bromo-2-methylpyrido[2,3-b]pyrazin-3-yl)oxy)acetohydrazide (3), which on condensation with different aldehydes produce N'-Arylidene-2-((7-bromo-2-methylpyrido[2,3-b]pyrazin-3-yl)oxy)acetohydrazides (4a-e).

### GRAPHICAL ABSTRACT



A facile synthesis of N'-Arylidene-2-((7-bromo-2-methylpyrido[2,3-b]pyrazin-3-yl)oxy)acetohydrazides

**Keywords:** Heterocycles, Aldehydes, Antitumor agents, Hydrogen bond, Corrosion, Hormones

### INTRODUCTION

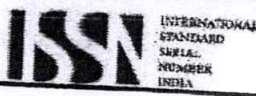
Pyrido[2,3-b]pyrazine (5-azaquinoxaline) derivatives are very important nitrogen-containing heterocycles, that are extensively used for their pharmacological and therapeutic properties [1]. Pteridine and quinoxaline are structural analogues of them. Studies have shown that such compounds are widely involved in several fields, as they exhibit antimalarial, anti-cancer [2], antibacterial and anti-allergic activities [3]. They also exhibit antimutagenic behavior [4]. Pyrido[2,3-b]pyrazine derivatives are well-known for their strong inhibitory activities of phosphodiesterase [V (PDE IV), the production of Tumor Necrosis Factor (TNF), Platelet derived growth receptor, gonadotropin releasing hormone, IgE production [5]. Pyrido pyrazine derivatives are broadly used as corrosion inhibitors for metals in acid environments, since they own the nitrogen and oxygen atoms which can easily be protonated to exhibit good inhibitory action on the corrosion of metals [6].

Mutations affecting Epidermal Growth Factor Receptor (EGFR) activity could result in cancers such as squamous-cell carcinoma of the lung, anal cancers, glioblastoma and epithelial tumors of the head and neck. The identification of EGFR as an oncogene (a gene that has the potential to cause cancer) has led to the development of anticancer therapeutics against EGFR, called "EGFR" inhibitors. Among them, using small molecule inhibitors to inhibit the EGFR tyrosine kinase is the most appropriate method, which acts on the cytoplasmic side of the receptor. Without kinase activity, EGFR is unable to activate itself, which is a prerequisite for binding of downstream adaptor proteins [7-9].

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Dear Shafiq  
Dr. Madhu



18-19-2019



**Innovative Teaching Methods in English Language Laboratory for B. Tech Students**

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**Abstract**

ICT is a boon to enhance the teaching learning process and it is proved as one of the blooms of the educational activity in improving effective and meaningful learning. The use of Internet (Social media) for the classroom activities under the supervision of the faculty can make the learning interesting and meaningful. As the language on Whatsapp is mostly English, it has become easier to improve this skill. The present generation of students is found active in communication with the society or social groups through various Social media groups. Innovation and Language go hand in hand. Both technology and English language are found to be equally important and necessary skills.

**Keywords:** ICT, Language Learning, Motivating, Techno- savvy, Whatsapp

**Introduction**

Teachers who are Techno- savvy may utilize the Web 2.0 tools to enhance language building even after school hours. These tools can be of great help for the parents too, as there is a facility for the parent account, along with the teacher and student to monitor the work of their child. The role of Information and Communication Technology, hereafter called as ICT, in particular, the use of internet in education sector plays a vital role in bringing the facts closer to the understanding of the learners. ICT is a boon to enhance the teaching learning process and it is proved as one of the blooms of the educational activity in improving effective and meaningful learning.

The use and the impact of ICT on the society is pervasive and has become part of our live. It can be termed as a necessary evil. It is also not surprising to see its significant role being played in education all over the world. Salehi and Salehi (2012) opined that as a learning tool in education, ICT is being integrated in different fields and instructions. It is used extensively not only as part of national curriculum requirements but also as management assessment diagnostic and statistical tool. The use of Internet (Social media) for the classroom activities under the supervision of the faculty can make the learning interesting and meaningful. Using (Internet) Social media network



# A Subclass of Meromorphic Functions Defined by Convolution

18-19 (68)

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## ABSTRACT

In this paper we define a subclass  $\Sigma_g(\alpha, \lambda)$  of Meromorphic univalent functions using convolution. We study some geometric properties of this subclass. In the first section of this chapter we discuss a coefficient characterization for a function of  $\Sigma_p$  to be a function of the class  $\Sigma_g(\alpha, \lambda)$ . we also discuss growth and distortion properties for functions of the class  $\Sigma_g(\alpha, \lambda)$ . In the second section of this chapter we find radii of starlikeness and convexity for the functions of the class  $\Sigma_g(\alpha, \lambda)$ . In the third section we find extreme points for the class  $\Sigma_g(\alpha, \lambda)$ .

**Index Terms** - Meromorphic, Univalent, Convolution.

## INTRODUCTION

Let  $\Sigma$  be the class of functions of the form  $f(z) = \frac{1}{z} + \sum_{n=1}^{\infty} a_n z^n$  defined on the punctured unit disk  $U^* = \{z \in \mathbb{C} : 0 < |z| < 1\}$ .

Let  $\Sigma_p$  denote the class of meromorphic functions of the form

$$f(z) = \frac{1}{z} + \sum_{n=1}^{\infty} a_n z^n, \quad z \in U^*, \quad a_n \geq 0 \text{ for } n = 1, 2, 3, \dots \tag{1.1}$$

which are defined on the punctured unit disk  $U^* = \{z \in \mathbb{C} : 0 < |z| < 1\}$ .

If  $f(z) = \frac{1}{z} + \sum_{n=1}^{\infty} a_n z^n$  and  $g(z) = \frac{1}{z} + \sum_{n=1}^{\infty} b_n z^n$  are two functions in  $\Sigma$ , the Hadamard product or convolution of  $f$  and  $g$  is defined by

$$f(z) * g(z) = \frac{1}{z} + \sum_{n=1}^{\infty} a_n b_n z^n, \quad z \in U^*.$$

Logra et al [2] introduced meromorphic starlike functions of order  $\alpha$  and type  $\beta$ , when the coefficient series expansion about the origin are all positive and denoted by  $\Sigma_p^*(\alpha, \beta)$ . And obtained many useful results such as characterization of coefficients, distortion property, radius of convexity, extreme points for the class  $\Sigma_p^*(\alpha, \beta)$ .

Witha et al. [4] defined a new class of meromorphic functions

$$M_p(\alpha, \lambda) = \left\{ f \in \Sigma_p : \operatorname{Re} \left( \frac{z f'(z)}{(\lambda-1)f(z) + \lambda f'(z)} \right) \geq \alpha \right\} \text{ for } 0 \leq \alpha < 1, 0 \leq \lambda < 1, z \in U^*$$


obtained coefficient inequality, growth and distortion bounds, radii of meromorphic starlikeness and meromorphic convexity for this class  $M_p(\alpha, \lambda)$ .

**Definition [2]** A function  $f(z) \in \Sigma$  is called meromorphically starlike univalent of order  $\alpha$ ,  $\alpha < 1$  if and only if

$$-\operatorname{Re} \left\{ \frac{z f'(z)}{f(z)} \right\} > \alpha, \quad z \in U^*.$$

**Definition [2]** A function  $f(z) \in \Sigma$  is called meromorphically convex univalent of order  $\alpha$  for  $\alpha < 1$  if and only if

$$-\operatorname{Re} \left\{ 1 + \frac{z f''(z)}{f'(z)} \right\} > \alpha, \quad z \in U^*.$$

  
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## Attenuation Effect as a Tool to Explain $sp^3$ Carbon ( $-CH_2-$ ) is a Good Electron Insulator and a $sp^2$ Carbon ( $-CH=CH-$ ) is a Good Electron Transmitter: An Undergraduate 1-h Chemistry Classroom Tutorial

R. Sanjeev<sup>1</sup> · R. Ravi<sup>2</sup> · V. Jagannadham<sup>3</sup>

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© The National Academy of Sciences, India 2019

**Abstract** Physical basis of chemical reactivity in organic molecules was to determine the electronic effects which govern the rate of a reaction put forth by the substituents during the course of a given reaction. This is known as “*substituent effect*.” This concept was first developed by Hammett in the form of a linear free-energy relationship (LFER) popularly known as “*Hammett equation*.” This substituent effect would generally attenuate in an exponential manner as the distance between the reaction center and the substituent increases. This was developed by Williams (Free-energy relationships in organic and bioorganic chemistry, Royal Society of Chemistry, Cambridge, 2003) in the form of an empirical exponential equation. Using the Hammett equation and with help of Williams 2003 explanations on attenuation effect, we have tried to explain why a  $sp^3$  carbon is a good  $\sigma$ -electron insulator and a  $sp^2$  carbon is a good  $\pi$ -electron transmitter.

**Keywords** Hammett equation · Attenuation effect · Electron insulator and electron transmitter · Classroom tutorial

### Introduction

The term “attenuation” in general implies that it is the exponential depletion of some property either physical or chemical with time, medium and distance. In this direction, study of the attenuation effect in aromatic [2, 3] and aliphatic systems [4] is a major breakthrough from our laboratory not reported earlier. The ultimate conclusion is the hybridization of carbon would eventually affect the magnitude of Hammett  $\rho$  in the carboxylic acid dissociation equilibria [2, 3]. Using the magnitude of Hammett  $\rho$  values of dissociation equilibria of homologous series of carboxylic acids we have given a simple and lucid

18-19 (69)

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## Tetrahedral Nature Determines the Stability of Reactive Intermediates: A Chemical Education Perspective

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### ABSTRACT

Hammett equation is applied and the magnitude of substituent effect in terms of Hammett  $\rho$  has been estimated for the deprotonation equilibria of highly unstable arenium ions (Wheland intermediates)  $\text{XC}_6\text{H}_6^+ \rightleftharpoons \text{XC}_6\text{H}_5 + \text{H}^+$  based on the attenuation effect of methylene group on the dissociation equilibria of anilinium ions, benzyl ammonium ions and 2-phenylethyl ammonium ions. The Hammett  $\rho$  was found to be 14.3. The Hammett  $\rho$  for the deprotonation equilibria of pyridinium ions  $\text{XC}_5\text{H}_4\text{NH}^+ \rightleftharpoons \text{XC}_5\text{H}_4\text{N} + \text{H}^+$  was estimated from the plot of  $\log K_a$  vs Hammett  $\sigma$ , this value is 5.90. The magnitude of substituent effect in terms of Taft  $\rho^*$  has been estimated for the deprotonation equilibria of methanium ions  $\text{RCH}_4^+ \rightleftharpoons \text{RCH}_3 + \text{H}^+$  based on the attenuation effect of methylene group on the dissociation equilibria of aliphatic amines and was found to be 6.9. The Taft  $\rho^*$  for the deprotonation equilibria of alkyl ammonium ions  $\text{RNH}_3^+ \rightleftharpoons \text{RNH}_2 + \text{H}^+$  was estimated from the plot of  $\log K_a$  vs Taft  $\sigma^*$ , this value is 3.28. The large differences in the Hammett  $\rho$  of 8 units when carbon is replaced with nitrogen as heteroatom in the six-member aromatic ring and 3.6 units of Taft  $\rho^*$  when carbon is replaced with nitrogen in aliphatic derivatives respectively is explained.

### INTRODUCTION

The frequent over viewing and dealing with Hammett and Taft equations is a continuous well documented observation from our laboratory<sup>1-16</sup>. In all these studies application of Hammett and Taft equations is dealt in detail and even to physical properties like dipole moments, surface tensions and melting points of several organic compounds.

But application of Hammett and Taft equations to very unstable intermediates is a challenging task. Application of Hammett and Taft equations to arenium ions<sup>10</sup> (Wheland intermediates,  $\text{XC}_6\text{H}_6^+$ ) and methanium ions<sup>15</sup> (super acids,  $\text{RCH}_4^+$ ) is itself novel. In the present work we tried to explain why the deprotonation equilibria of arenium ions (Wheland intermediates,  $\text{XC}_6\text{H}_6^+$ ) and methanium ions (super acids,  $\text{RCH}_4^+$ ) are more susceptible to substituent



  
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# Application of dielectric mixtures formulae to $\text{PbTiO}_3$ based glass-ceramic systems

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J. Shankar, G. Neeraja Rani, and V. K. Deshpande



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Abstract

aching is always a challenging task. It is challenging as the  
the changing methodologies and techniques, especially when  
ites. Technological innovations have brought in perceptible  
learn and especially teach. The present paper focuses on the  
s of using flipped classroom techniques and e-learning. The  
n conducted using flipped classroom model with Web 2.0 tools  
ODLE. Integrating technology in teaching English Language is  
English Language teaching is restricted to the limited time given  
e table. It is found that using technology in teaching augmented  
and learning time.

eaching with e-learning prepares the students for their future.

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## Electrical Properties of Lead Free $\text{Sr}_{0.8}\text{Na}_{0.1}\text{Sm}_{0.1}\text{Bi}_4\text{Ti}_4\text{O}_{15}$ Ceramics

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### Abstract

Polycrystalline  $\text{Sr}_{1-2x}\text{Na}_x\text{Sm}_x\text{Bi}_4\text{Ti}_4\text{O}_{15}$  (SNSBT) belongs to bismuth layer structured ferroelectric (BLSF) materials with  $x=0.1$  have been prepared by sol gel method. XRD analysis confirms single phase formation with orthorhombic structure. Scanning electron micro graph of the material shows plate like grains with random orientation. Dielectric and impedance measurements carried out from room temperature to  $600^\circ\text{C}$  at different frequencies. Piezoelectric and electromechanical coupling coefficients are calculated from resonance and anti-resonance frequencies. Cole-Cole plots showed non-Debye behaviour.

**Keywords:** BLSF; Orthorhombic; Dielectric; impedance; piezoelectric properties;

### 1. Introduction

The family of Bismuth layer structured ferroelectric (BLSF) Arrivillius (1949) materials received significant attention for their application to electronic functional devices such as piezoelectric actuators, resonators and high temperature sensors etc. Subbarao (1962). Cross and Pohanka (1971). The general formula of BLSF is  $(\text{Bi}_2\text{O}_2)^{2+}(\text{A}_{m-1}\text{B}_m\text{O}_{3m+1})^{2-}$ , where A can take mono-, di-, trivalent ion or combination of them, B can be  $\text{Ti}^{4+}$ ,  $\text{Nb}^{5+}$  or  $\text{Ta}^{5+}$  and m can take integers 1 to 5. Subbarao (1996). BLSF are characterized by their low dielectric constant, High Curie temperature ( $T_c$ ), large anisotropy in electromechanical coupling factor ( $k_t/k_p$ ), high mechanical quality factor ( $Q_m$ ) and low temperature coefficient of resonance frequency. Ikegami and Ueda (1974). Takenaka and Sakata (1984). It is possible to modify the dielectric and ferroelectric properties by changing chemical composition. The effect of A-site substitution is more obvious than that of B-site substitution, since the cations in B sites are similar in size and do not play a major structural role in polarization process for BLSF. Jannet et al (2003).

The ac impedance analysis is known to be a powerful means to separate out the grain boundary and grain-electrode effects, which usually are the sites of trap for oxygen vacancies and other defects. It is also useful in establishing space charge polarization and relaxation mechanism. In view of the importance of ac impedance

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## Relaxation dynamics of L-alanine in water medium investigated by dielectric relaxation spectroscopy

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### ABSTRACT

The complex dielectric permittivity of L-alanine in aqueous medium at different concentrations and different temperatures were measured in the microwave ( $0.02 < \nu/\text{GHz} < 20$ ) frequency region by using open-ended coaxial probe technique. From the reflection coefficient and impedance data, the real and imaginary part of the dielectric permittivity values is determined. It is observed that there is a decrease in the real part of the dielectric permittivity up to certain frequency and an increase in the imaginary part of the dielectric permittivity with increase in the molar concentration of L-alanine in water medium. Based on the experimental data the average relaxation time values are calculated and its behavior is analyzed in terms of bound water and free water molecules. The theoretical dipole moment of L-alanine is calculated at gaseous state as well as in aqueous medium by using PCM and IEFFPCM model at HF, DFT/B3LYP and MP2 calculations using 6-311G\* basis set. Analysis between experimentally determined parameters and computed dipole moments were discussed. The mean molecular polarizability is calculated from the Lippincott  $\delta$  function potential model and compared with the Le Fèvre method of polarizability values.

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### 1. Introduction

The study of dielectric relaxation behavior of biological liquids is a task of great importance because it provides valuable information on the structural dynamics of molecules. Most of the biological systems contain the hydrogen bonds between molecules [1]. This hydrogen bond plays an important role in the various bio functional activities, metabolic reactions, protein synthesis, drug designing, and electrical properties of the material. Dielectric relaxation spectroscopy (DRS) technique is so sensitive to detect changes in the molecular dynamics, inter molecular bonding between the molecules and orientation of the dipoles. The understanding of intermolecular hydrogen bonding, typical relaxation behavior of proteins solutions attracted many researchers for the study of interest for recent and past [2–14]. The electromagnetic characteristic of basic amino acids in solution and its applications in microwave sterilization as well as mechanism process explained by Chen Meng et al. [15]. Floros et al. [16] analyzed the lysozyme with molecular dynamics simulations in terms of the dielectric function and the results were explained by the hydration shell decomposition approach. Godfrey et al. [17] interpreted the rotational spectra of two conformers of alanine together with molecular orbital calculations using a larger

basis set (6-311G\*\*). Degtyarenko et al. [18] applied the Born-Oppenheimer molecular dynamics simulations of an L-alanine zwitterion solvated in water medium by considering the whole system relatively larger in size i.e. the L-alanine amino acid and 50 water molecules have been treated quantum mechanically.

### 2. Experimental and computational details

The chemical sample used in this work such as L-alanine of analytical grade is procured from SRL Pvt. Ltd., Mumbai, India is taken in a different molar concentration levels (0.1 to 1 M) in double distilled water medium with respective maximum solubility. The complex dielectric permittivity ( $\epsilon^* = \epsilon' - j\epsilon''$ ) of these samples is measured in the microwave frequency range 20 MHz–20 GHz using the open-ended coaxial probe method [19,20] between 298 K–323 K. The high frequency dielectric permittivity ( $\epsilon_\infty$ ) is measured by using Abbe refractometer. The dipole moment of the L-alanine molecule is calculated theoretically at gaseous state as well as in aqueous medium by using IEFFPCM and PCM model at the DFT/B3LYP and MP2 using 6-311G\* basis set using Gaussian software-03 [21–28]. The difference in energy between aqueous L-alanine and L-alanine (gaseous state) provides the information regarding the strength of the hydrogen bond interaction between L-alanine and water molecules and which is tabulated in the Table 1, respectively. The average dielectric relaxation time is determined from

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