

# PROCEEDINGS

## INTERNATIONAL CONFERENCE

### ON

## RECENT TRENDS IN

# COMMUNICATION ENGINEERING

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## Classification of Natural Fiber Reinforced Composites

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Over the years, in the methods of research, the branch of Material science has seen its extremes but there are some areas open which much attention should be focussed. One such area is the natural composites. Taking the environmental problems generated by synthetic material into account, there is a need to search for the alternatives for which the natural composites are the best. Composites with a wide variety of plant material with extraordinary properties leaving us to explore the natural composites. This work focuses on the extraction of fibers from pineapple leaf, sisal plant, and date palm. The extracted fibers are being used to prepare the samples of composites. ASTM standards are being followed to test the properties of the natural fiber reinforced composite. The properties such as tensile strength, flexural strength and impact strength are being tested. The corresponding strengths are to be compared to select the best alternative.

Keywords - Composites, Natural Fiber, Pineapple, Sisal

There is a requirement of materials with unusual combination of properties, which cannot be achieved by ceramics, and polymeric materials. Many of our modern technologies demand not only the materials with specific service materials. In order to fulfill the above requirements lot of research work is going on in the field of material science.

Composite materials are chosen as one of the best engineering materials. The flexibility that can be achieved with composite materials is immense solely by changing the composition. variety of properties can be obtained thus making the composite materials substitutes for the conventional structural materials. Composite materials have a long history, though the exact date is unknown, but all recorded history contains references to some form of composite materials. The earliest recorded resin composites that have high strength-to-weight and stiffness-to-weight ratios are used in applications such as aircraft and space vehicles.

Composite materials are used in more and more construction materials. Wood and metals are the construction materials, which are used in building construction, vehicle body, furniture, etc., The growth rate of material science is increasing with the population. To meet the deficiency, man has to find suitable substitutes. The materials which are available in nature and unused so far, if put to effective. Utility will solve the problem arising out of the material science.

### COMPOSITE MATERIAL

A composite material is composed of two or more distinct constituent materials or phases, with properties that are different from those of the individual components. These materials consist of one or more discontinuous phases called reinforcement embedded in a continuous matrix. Their orientation and distribution influence the properties and performance of the composite material.

### CLASSIFICATION OF COMPOSITE

#### Classification by form

The classification of composite materials is done on the basis of the form of the components or by their nature. As a function of the form of the components, composite materials are divided into two large classes:

1. Particle reinforced composites with particles. The commonly accepted classification of composites is:

1. Fiber reinforced composites if the reinforcement is in the form the fibers. The fibers used are either continuous fibers or discontinuous fibers, chopped fibers, short fibers etc. The arrangement of fibers and their orientation allows the designer to tailor the properties of composites to obtain the materials ranging from strongly an-isotropic to isotropic in





# A Review on Random Dopant Fluctuation Impact on Within-Die Variation

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**Abstract**— Process variation creates core-speed discrepancy among the core in many-core platforms. Random variation is one of the important components that contribute into core-speed discrepancy. In the paper, a novel technique is proposed that uses footer transistors to reduce the delay and power in a many-core platform. Process variation is due to many fundamental deficiencies, impurities, and imperfections during the fabrication process at the nano-scale technologies. The results of this variation have a direct impact on two key parameters of the CMOS transistor: threshold voltage and gate length, which have major implication on the core speed and power. The random component of this variation is mostly attributed to the random-dopant fluctuation, which results in threshold voltage discrepancy among the cores. The proposed technique reduces the random dopant fluctuation by lowering the dopant density and then compensating the threshold voltage using a footer transistor minimizing the static power dissipation.

**Keywords**—Process Variation, Random Dopant Fluctuation, Footer transistor, Threshold Voltage, systematic Variation, Random Variation

## 1. INTRODUCTION

Process variation is the naturally occurring variation in the attributes of transistors when integrated circuits are fabricated. It becomes particularly important at smaller process nodes (<65 nm) as the variation becomes a larger percentage of the full length or width of the device and as feature sizes approach the fundamental dimensions such as the size of atoms and the wavelength of usable light for patterning lithography masks.

Process-induced variations arise from the imperfection in silicon fabrication, and vary from foundries to foundries. Process variation falls into two categories: die-to-die and within-die. The first category is a variation between different dies or chips. The second category, the focus of this work, is the variation within a single chip. It is also called on-chip or intra-die variation. On-chip, or within-die (WID), process variation can further be classified into two components: random and systematic. The behavior of systematic variation is primarily because of physical parameter variations such as variation due to optical proximity during the lithographic process. Non-systematic or random process variation arises from the random nature of the ion-implantation during the fabrication process. Random-dopant fluctuation (RDF) is considered one of the main contributors to the random variation component. Unlike the systematic component, the random component causes variation in the threshold voltage even within neighboring cores. Although, this variation has direct implications on all CMOS device parameters, its impact is usually quantified through two main parameters only, namely the gate length (L) and the threshold voltage (V<sub>t</sub>). In a many-core architecture, the variability of these two parameters results in considerable uncertainty of two vital design constraints: the switching speed and the power consumed by each core. For instance, when a chip experiences this kind of variation, some cores, within the chip, may be fast due to a lower threshold voltage but they are leaky and consume more static power. Other cores may be slow due to higher threshold voltage but consume less static power. Faced with such variations, a designer may decide to run the entire chip at the speed of the slowest core. As speed and power variations increase due to aggressive scaling, running the entire chip according to the slowest core becomes prohibitive due to major speed and/or power degradation.

Systematic variations are deterministic in nature and are caused by the structure of a particular gate and its topological environment. The systematic variations are the component of variation that can be attributed to a layout or manufacturing equipment related effects. They generally show spatial correlation behavior. Systematic WID variations exhibit high degrees of spatial correlation. Random or non-systematic variations are unpredictable in nature and include random variations in the device length, discrete doping fluctuations and oxide thickness variations. Random variations cannot be attributed to a specific repeatable governing principle. The radius of this variation is comparable to the sizes of individual devices, so each device can vary independently. Random variations are small changes from transistor to transistor typically modeled with a normal distribution.

Random variations stem primarily from two main sources. Non-uniform dopant implantation in the channel depletion region affects threshold voltage, and imperfect control of the lithographic process result in non-deterministic gate lengths. The variations can be summarized as the following categories as in Fig.1.

- Wafer-to-wafer variation is caused, for example, by some change in machine conditions along time of manufacturing apparatus.

Wafer level variation can be caused by any on-wafer non-uniformity in e.g. temperature and gas flow. Time dependence of lithography exposures may be also responsible.



# Spectrum Sensing in Cognitive Radio using Frequency Domain

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**Abstract:** An efficient bandwidth allocation and dynamic bandwidth access away from its previous limits is referred as cognitive radio (CR). The limited spectrum with inefficient usage requires the advances of dynamic spectrum access approach, where the secondary users are authorized to utilize the unused temporary licensed spectrum. For this reason it is essential to analyze the absence/presence of primary users for spectrum usage. So spectrum sensing is the main requirement and developed to sense the absence/ presence of a licensed user. This paper shows the design model of energy detection based spectrum sensing in frequency domain utilizing Binary Symmetric Channel (BSC), Additive white real Gaussian channel (AWGN), Rayleigh fading channel users for 16-Quadrature Amplitude Modulation (QAM) which is utilized for the wide band sensing applications at low Signal to noise Ratio (SNR) level to reduce the false error identification. The spectrum sensing techniques has least computational complexity. Simulink model for the energy detection based spectrum sensing using frequency domain in MATLAB 2014a.

**Keywords :** CR, Simulink, Energy detection, spectrum sensing.

## I. INTRODUCTION

For past few years cognitive radio research has established as a considerable interest in communication field. Fig.1 describes the spectrum sensing based CR. Basically the spectrum sensing systems are categorized into following type blind based and knowledge based methods.

Nonparametric cyclic correlation estimator is described in

[1]. For minimizing the time of a sequential detection approach is used. This method is realized in non-Gaussian and Gaussian noise situation. To reduce the noise effect multi slot cyclostationary feature detector is described in [2]. Overflow/under flow protection for time domain cyclostationary feature detector is described in [3]. This method supports overall range of the subcarriers utilized by OFDM to 4G LTE. To enhance the spectrum sensing performance cascaded filter bank channelization is described in [4]. This method supports offers less power. To reduce power in CR network sensing time period is described in [5] by using squaring law with decision rule. Model using Welch periodogram and FFT is designed in [6]. In this method Neyman Pearson hypothesis is considered. In [7], Neyman Pearson is used for energy detection method and for validating such algorithm various modulated signals that is BPSK, QPSK, DVB-T under Rayleigh fading and white Gaussian noise is described in [9] and [10]. This method provides less false detection. Low Power and area efficient SRAM structure on the basis of the GDI is designed in [12]. Smart Energy Tracking System on IOT is defined in [13]. In [14], wireless sensor applications for lively communication predictive re-alignment approach is described. For cancelling noise, in [15] they used the cascaded combination of adaptive and wavelet filter.

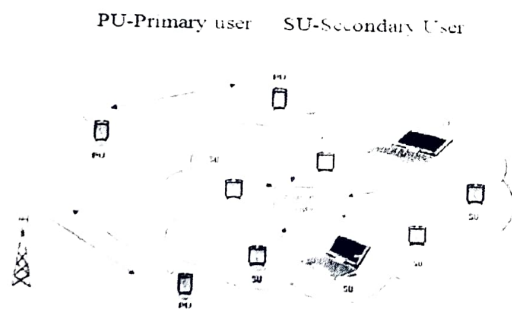


Fig. 1. Spectrum sensing in CR network.

The previous researchers mainly focus on the time domain based energy detector which increases the false detection at low SNR [16]. To overcome this problem the proposed method designed the energy detector model with less false detection of users in CR applications. Further this manuscript is planned as follows: related works in section 2, proposed works in section 3, simulation result in section 4 and Conclusion in section 5.

## II. RELATED WORK

In conventional method [6] the energy detector made up of low pass filter to avoid the adjacent signals and band noise, integrator, square law device and Analog to Digital Converter (ADC) is realized in time domain which is shown the Fig.2. But for sine waves and narrow band signals such type of realizations is hard. To overcome this problem the proposed method uses squaring the FFT magnitude to calculate the spectrum in CR network.

# To Enhance Lifetime Of WSN Using Multi-Hop Routing And Trust-Based Intrusion Detection

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**Abstract:** In this paper, we will propose redundancy management of heterogeneous wireless sensor networks (HWSNs), using multihop routing to answer user queries in the existence of unreliable and malicious nodes. The key concept behind of our redundancy management is to exploit the balancing between energy consumption vs. timeliness, and security to increase the system useful lifetime. We will use an algorithm for Redundancy Management for identifying the best redundancy level to apply to multihop routing for intrusion tolerance, to increase the query success probability and system lifetime. Then we will use a voting-based distributed intrusion detection algorithm to detect and evict malicious nodes in a HWSN. We will develop a new probability model to analyze the best redundancy level in terms of path redundancy and source redundancy, and also the best intrusion detection in terms of the number of voters under which the lifetime of a HWSN is increased. We will then apply the analysis results obtained to the design of a particular redundancy management algorithm to identify and apply the best design parameter settings at runtime in response to environment changes, to increase the HWSN lifetime. A prototype implementation in the ns2click simulator will be used to demonstrate malicious attacks launched by intruder nodes.

**Keywords:** Wireless sensor networks, multi-hop routing, timeliness, security, energy conservation, Trust-Based Intrusion Detection.

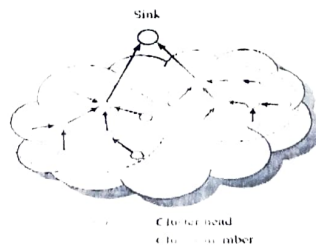
## 1. INTRODUCTION

Wireless sensor networks (WSNs) are very rapidly emerging as new area for various research. Applications of WSNs are numerous and growing rapidly from indoor deployment scenarios in the home and office to outdoor deployment scenarios in natural, military and embedded environments. Wireless sensor network (WSN) is a group of distributed sensors which are in existence and used for monitoring and recording the physical conditions of the environment. The various monitoring types include Habitat Monitoring, Hazard Monitoring and Disaster Monitoring etc. Many wireless sensor networks (WSNs) are deployed in an environment which is unattended and their recovering of energy is difficult even sometimes it is impossible. Hence, It should satisfy the timeliness, reliability and security issues. Wireless Sensor Networks run critical applications and need to be protected against various malicious attacks and faults. The balancing between energy consumption vs. timeliness with the goal to increase the WSN system lifetime has been well explored in the literature. Energy Efficiency is needed in WSN to ensure the network performance and prolong network lifetime.

According to various researches clustering is considered as an effective solution for achieving scalability, energy conservation, and reliability. In this there will be multiple Cluster Heads(CH's) and Sensor Nodes(SN) connected in a network. Which uses homogeneous nodes which rotate among themselves in the roles of cluster heads. In heterogeneous WSN (HWSN) environments CH nodes may take a more critical role in gathering and routing sensing data due to which there may exist a balancing issue between energy consumption and timeliness and may also the complication if any malicious nodes are detected and the path will be broken. Thus, the system will employ an intrusion detection system (IDS) with the goal to detect and remove malicious nodes. In most prior research focus was on using multipath routing to improve reliability, some attention has been paid to using multihop routing to tolerate insider attacks. These studies, however, largely ignored the balancing between QoS gain vs. energy consumption which can unfavourably shorten the system lifetime.

Multi-Hop routing is considered as an effective mechanism for fault and intrusion tolerance to improve data delivery in Wireless Sensor network. In multi-hop wireless networks, communication between two end nodes is carried out by using number of intermediate nodes which are used to send information from one end point to another. The basic idea behind it is that the probability of at least one path reaching the sink node or base station s as we have more paths doing data delivery.

Another approach which we will approve in this paper is the use local host-based IDS for energy conservation (in which SNs will monitoring neighbor SNs and CHs will monitoring neighbor CHs only), coupled with voting. Energy efficiency will be achieved by applying the optimal detection interval to perform IDS functions. Our solution will consider the optimal IDS detection interval that can best balance intrusion accuracy vs. energy consumption, so as to the system lifetime.





# To Enhance Lifetime Of WSN Using Multi-Hop Routing And Trust-Based Intrusion Detection

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**Abstract:** In this paper, we will propose redundancy management of heterogeneous wireless sensor networks (HWSNs), using multihop routing to answer user queries in the existence of unreliable and malicious nodes. The key concept behind of our redundancy management is to exploit the balancing between energy consumption vs. timeliness, and security to increase the system useful lifetime. We will use an algorithm for Redundancy Management for identifying the best redundancy level to apply to multihop routing for intrusion tolerance, to increase the query success probability and system lifetime. Then we will use a voting-based distributed intrusion detection algorithm to detect and evict malicious nodes in a HWSN. We will develop a new probability model to analyze the best redundancy level in terms of path redundancy and source redundancy, and also the best intrusion detection in terms of the number of voters under which the lifetime of a HWSN is increased. We will then apply the analysis results obtained to the design of a particular redundancy management algorithm to identify and apply the best design parameter settings at runtime in response to environment changes, to increase the HWSN lifetime. A prototype implementation in the ns2click simulator will be used to demonstrate malicious attacks launched by intruder nodes.

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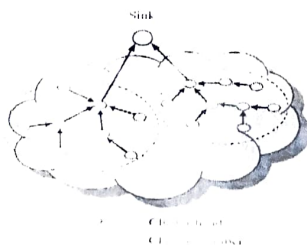
## 1. INTRODUCTION

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According to various researches clustering is considered as an effective solution for achieving scalability, energy conservation, and reliability. In this there will be multiple Cluster Heads(CH's) and Sensor Nodes(SN) connected in a network. Which uses homogeneous nodes which rotate among themselves in the roles of cluster heads. In heterogeneous WSN (HWSN) environments CH nodes may take a more critical role in gathering and routing sensing data due to which there may exist a balancing issue between energy consumption and timeliness and may also the complication if any malicious nodes are detected and the path will be broken. Thus, the system will employ an intrusion detection system (IDS) with the goal to detect and remove malicious nodes. In most prior research focus was on using multipath routing to improve reliability, some attention has been paid to using multihop routing to tolerate insider attacks. These studies, however, largely ignored the balancing between QoS gain vs. energy consumption which can unfavourably shorten the system lifetime.

Multi-Hop routing is considered as an effective mechanism for fault and intrusion tolerance to improve data delivery in Wireless Sensor network. In multi-hop wireless networks, communication between two end nodes is carried out by using number of intermediate nodes which are used to send information from one end point to another. The basic idea behind it is that the probability of at least one path reaching the sink node or base station as we have more paths doing data delivery.

Another approach which we will approve in this paper is the use local host-based IDS for energy conservation (in which SNs will monitoring neighbor SNs and CHs will monitoring neighbor CHs only), coupled with voting. Energy efficiency will be achieved by applying the optimal detection interval to perform IDS functions. Our solution will consider the optimal IDS detection interval that can best balance intrusion accuracy vs. energy consumption, so as to the system lifetime.



# Role of Machine Learning And Internet Of Things Devices: An Explorative Study With Respect To Smart City

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**Abstract**— This paper is an explorative study to analyze the role of various Machine Learning (ML) Algorithms which can be used for Internet of Things (IoT) devices. Since the growth in use of Internet of Things devices, the ease and quality of living of Human species has touched a different level. Everyday creating a huge amount of data. While Machine learning on the other hand is ensuring that this Big Data is analyzed optimally and innovatively. Through this paper we are also trying to explore the possibilities of combining these two approaches ML and IoT; to understand its application in the field of Smart cities.

**Keywords**— Machine learning, Internet of Things, Big Data and Smart city

## I. INTRODUCTION

Machine learning is one of the sub branch of artificial intelligence (AI) which makes system capable of learning and improving their performance through experience. With the presence of Big Data, Machine learning algorithm emphasize on the progress of computer programs that can access Big Data and use it for learning and making smarter decisions. [1]

Some of the applications of machine learning include image analysis, speech recognition, medical diagnosis, applications for fraud detection in a bank. However, with use of IoT devices, the data produced is also getting analyzed through Machine Learning.

Machine learning techniques are generally divided into two parts: Supervised learning and unsupervised learning. Unsupervised learning mainly deals with an unlabeled data and we don't need to supervise the machine. It helps us find all unknown patterns in the data given. It is easier for humans to get unlabeled data than labeled data.

In supervised learning we work on labeled data. We get the output of the given data with the data from the previous experience

## II. ALGORITHMS USED IN MACHINE LEARNING

A machine learning algorithm is usually divided into two phases. One is the training phase and other is the testing phase. In the training phase algorithm is trained on the data where we know what the output variable is, whereas in the testing phase the algorithm is tested on a new data and the efficiency of the algorithm is found out. Machine learning Algorithms are broadly divided into Classification, Clustering and Regression Algorithms. Here we are briefly discussing some of the commonly used in machine learning found in other literature reviews for Smart City. They are: Linear regression, logistic regression, Decision tree, K nearest neighbors, Naive Bayes.

Prediction algorithm is the most used in Smart homes applications.

### A. Linear regression

A relation is established between known and unknown variables by a regression line which is given by  $Y=a*X+ b$

Y is dependent variable

X is dependent variable

Here a, b are the parameters. The values of a, b are changed after every iteration.

### B. Logistic regression:

It's used to estimate discrete values from variables. Many functions like relu, tanh are used in this algorithm.

### C. Decision Tree:

This algorithm is mainly used for classifying problems. In this algorithm the data is split into two or more sets depending upon the variables involved.

### D. KNN:

In KNN it is assumed that similar things exist in the same vicinity. Distance of unknown points is found out from the known points and depending on the value of k, the unknown data is labelled.

## III. INTERNET OF THINGS

Today's world population is engaged all sort of connectivity, especially through Information and Communication Technologies (ICT) than ever [2]. Many researchers have claimed that by 2050, more than 70 percent of the global population is expected to be living in cities which are connected smartly [3]. The growth of population in cities and the increased dependency of human race on ICT has led to advancements



# Design And Manufacturing Of Cross-Flow Turbine To Power Coffee Processing Plant & Nearby Community Village In Kaffa Zone

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## Abstract

Hydro energy, a well-studied form of energy, takes the lions share in energy generation. Lately, it has become evident that the power generated at large scale hydro power plants will not be cost-effective for electrification of small rural villages located remarkably far from the grid lines. Thus, huge sum of money is required for the extension of major grid lines to small rural and scattered settlement settings, which in turn has created a large opportunity for more research and development in the area of micro hydro power plants development. This paper encompasses the study and analysis of the hydrology of a location found in the kaffa area of the SNNPR in Ethiopia including the corresponding design and manufacture of a cross flow turbine for the area to generate power that would be accessed by the local village and coffee processing plant. The plant is able to generate 19.39 KW's of energy with an approximate efficiency of 80 % which can light up to 152 households assuming a 3hour usage per day including powering a pulping machine with an average working duration of 8hours per day. The design initiating from the hydrological study has covered design of the runner, shaft, nozzle and belt including selection of alternator and control unit. Moreover, the absence of a clear and simple design manual for the design of this machine has inspired the research for the development of a computer program that would simplify the designing process for professionals working on cross flow turbines.

**Key words:** Micro hydro power plant, Cross flow turbine, Turbine.

## 1. INTRODUCTION

### 1.1. General Background

Ethiopia stands as one of the most water rich nations in the horn of Africa. The government has already come up with a strategy to utilize this energy in its long term plan of making the country one of the largest hydro energy producers in Africa (Web-1). There are a total of fifteen hydro power plants in the nation, including the much acclaimed Grand Renaissance Dam, out of which thirteen are fully operational (United Nations Industrial Development Organization (UNIDO) & International Center on Small Hydro Power (ICSHP), 2013).

It's important to note that these large scale hydro power plants constitute the largest share of the country's energy consumption. But it has become evident that stretching this to small rural communities with huge surplus but comparatively costly gridlines is getting to be a road block for the development of these areas. Although highly utilized in countries like china where 19,000 MW of electricity is harnessed from a total of 43,000 small hydro power facilities, Micro hydro power plants are still infant in Africa where the total theoretical potential per year is 1750 TWH, out of which the percentage of small hydro power plants takes a share of 1.59 with respect to the large hydro power plants (Gupta M, 2012). Looking onto the ample off-grid hydro energy potential of the nation, the government of Ethiopia has decided to build small hydro power plants of differing capacities at different regions around the country. However, the progress has been rather sluggish as compared to the many mega hydro power plants being built around the clock. One of the many identified regions for the development of small hydro power plants is the SNNPR (Web-2).

Amesha Mechata is a Kebele in the SNNPR located inside the Kaffa Zone, Bitta Woreda approximately 575 km's south west of the capital Addis Ababa. As a tropical setting with an expected high rainfall and sloppy topography, there are a number of streams that collect to make the locally known Menu River. The river has a very high discharge in the months May to September, decreasing accordingly in both directions during the months otherwise. Using Menu River, the high demand for electricity in Amesha Mechata Kebele could be met through the provision of small hydropower development for households, health centers, schools, commercial and social activities, and/or other mechanical equipment. Moreover, the Kaffa Zone in general and Bitta Wereda in particular are known for its large coffee farms and correspondingly one of the largest coffee production areas in the nation. Since the Amesha Mechata Kebele in the region has no accesses to electricity, the coffee plant in that Kebele uses Diesel driven generator. In this background, the development of the small hydropower plant in that region also avoids loss of foreign currency for the purchase of conventional energy source such as diesel oil.

Furthermore, the development of such micro hydropower projects plays an important role in the conservation fauna and the environment in general. The possibility of usage of other cooking methods powered by electrical power abruptly reduces the destruction of large forestry.

## 2. CROSS FLOW TURBINE

The Cross flow turbine is family of the pelton turbine which is majorly composed of two major parts, the runner and the nozzle. The nozzle is responsible for allowing the water into the runner at a certain attack angle while the runner being a circular rotor, is responsible for being hit by the jet of water entering through the nozzle and directly rotating the shaft to which the pulley driving

# Passengers Ergonomics Evaluation Of Locally Modified Intercity Buses Addis Ababa, Ethiopia

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## ABSTRACT

In Ethiopia, locally modified midi buses are engaged in providing public transportation service for intercity long distance passengers. One of the major problems in the locally manufactured midi-buses is, the consideration given by the bus body builders for the passengers' ergonomics, safety and comforts very less. In addition to this, the absence of well stated code of practice for bus body design and approval to control the industry made the things to go in the wrong way. This study covers an analysis from the ergonomic point of view, in which diverse aspects and variables related to the comfort and securities of the users. Among the main aspects evaluated are the entry and exit of the bus, the ease to arrive at the seats, the seats dimension, and distribution of the seats. Each of these aspects is related to human body measurements, verifying its adaptation to the population of users. In addition, the dimensional data of the diverse units were compared with the values and parameters specified in the standard. Finally some suggestions appear on the actions to be taken in design terms that surely will contribute to improve the security and the comfort of the intercity passengers to get minimum levels of comfort without dumping the concerns of safety and security. This research is conducted using several methods or mixed approach, which include observation, checklist, questionnaires and interviews with different groups of passengers, transport officials, car dealers, bus body builders and technicians.

**Key words:** Comfort, Midi-buses, Passengers ergonomics evaluation, Safety.

## 1. INTRODUCTION

Transport represents one of the most important human activities worldwide. It is an indispensable component of the economy and plays a major role in spatial relations between locations [1]. The purpose of transportation is to overcome space, which is shaped by a variety of human and physical constraints such as distance, time, administrative divisions and topography.

In Ethiopia there are three modal systems of transport that exist (road, air and rail). However, studies conducted in Ethiopia in showed that about 99.31 percent of the total passengers used road transport for their mobility, 0.65 percent used airline and 0.04 percent used railway transport. [2]

Bus is one of the main alternatives of mass public transportation in Ethiopia as it is cheaper and has better coverage area than any other modes of public transportation.

Our society's increasing requirements for mobility with simultaneously growing environment is crucial for the manufacturers of light and heavy passenger vehicles and the body builders to become accustomed to the ecologically motivated requirement, which becomes more and more important with comprising on basic minimum requirements of safety and comfort. The problem areas and the whole exercise were aimed towards standardizing the essential aspects involved in the construction of the bus body considering the minimum requirements of safety and comfort for passenger.

Ergonomics is defined as the study of the design of a workplace, equipment, machine, tool, product, environment, and system which takes into consideration human being's physical, physiological, biomechanical, and psychological capabilities and optimizes the effectiveness and productivity of work systems while assuring the safety, health, and wellbeing of the workers (Fernandez and Marley, 1998). In general, the goal of ergonomics is to fit the task to the individual, not the individual to the task. [3][4]

Its fundamental aim is that all human-made tools, devices, equipment, machines, and environment should advance, directly and indirectly, the safety, well-being, and performance of human beings. This includes anthropometry, an applied discipline which is one of the cores of ergonomics. It commands ergonomic analysis which intends to design things to "fit" the human body, and therefore achieve its ultimate goal of generating "optimal" conditions which are so well adapted to human characteristics, capabilities, and desires, that physical, mental, and social well-being is achieved (Duffy, 2010). [4][5][6]

Ergonomics is applied in various industrial areas which includes transportation. It is evident that some of the vital artifacts of our daily lives are used to assist human activity and mobility. Design of cars, trains, ships, boats, planes, etc. is exhibited to enable the users an efficient, effective, and safe transportation. [4][5][6]

It is possible to carry a great number of passengers in public transport units, but in attention to the users comfort and safety, it is necessary to limit the number of passengers in such way that provide the minimum comfort that the users deserve. The population of users varies in terms of age, size, weight and mobility, making necessary to consider this factors during the design phase. Extreme cases are represented by the population of bigger size, individuals with physical limitations or disabilities, and specially population segments of elderly and children, who are naturally more susceptible to accidents. [5]

The passengers' bus transport units are classified in units of Micro Bus, Mini Bus, Midi Bus and Standard Bus (*Indian Automotive Research Association 2008, Delhi, India*). With the objective of the present work, the interest will be concentrated in the units of intercity transport midi bus, specifically with seat capacity 25 which is modified locally by bus body builders. [13]



# Review Of Axial Heat Conduction Effect In Parallel Flow Microchannel Heat Exchanger

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**Abstract:** In this paper, a comprehensive review of available studies regarding axial heat conduction effect in parallel flow microchannels is presented and analyzed. Different articles are reviewed to identify the effect of axial heat conduction on the heat transfer. The numerical, analytical and experimental studies of axial heat conduction are reviewed. The effect of different dimensionless numbers on axial conduction is studied. Axial conduction with different channel geometries and flow regimes are studied. From the reviews it reveals that the other parameters that affect the axial heat conduction are hydraulic diameter of the channel, thermal conductivity ratio and Reynolds number. There is also emphasize on the effectiveness and optimum design consideration with axial conduction effect.

**Keywords:** Parallel Flow micro channel heat exchanger, Axial heat conduction, Dimensionless number.

## 1. INTRODUCTION

Heat transfer in microchannel can suitably describe by the standard theories. The use of microchannels for removal heat is undertaking a great interest in various industrial fields such as bio-engineering, micro-heat exchanger, electronics. This type of cooling gives high performance of heat transfer. Heat transfer analysis in microchannel gives more attention due to its extensive application in micro heat exchanger. The high heat flux dissipation from microprocessor provides the focus on the studies on heat transfer in microchannel.

The performance of heat exchanger is dependent on the flow rate and properties of fluid. At micro-scale level when fluid flow inside a channel heat transfer takes place with many additional level such as electro-viscous effect, rarefaction, viscous dissipation and axial heat conduction. Rarefaction is important for small dimension (less than 5  $\mu\text{m}$  at atmospheric condition) which is compared with the mean free path of a fluid, it is common for gas flow in microchannel. Electro-viscous effect are due to the interaction of ions in the fluid with Electric double Layer (EDL) near non-conductive wall [1].

When the fluid work against the viscous heating the effect of viscous dissipation is occurs. Effect of viscous dissipation can be important for flow with Reynolds number is greater than 100 [2]. The Reynolds number affects the velocity of fluid flow inside a channel at entrance and ending region of the channel.

The microchannel heat exchanger promising with its superior thermal performance. For conventional channel the thickness of separating wall comparatively small to the hydraulic diameter of the channel, therefor the effect of axial heat conduction may be neglected in conventional heat exchanger. But for microchannel heat exchanger thickness of separating wall comparatively large to the hydraulic diameter of the channel. The microchannel heat exchanger gives extremely high heat transfer area per unit volume over a conventional channel [3]. Mehendale et.al [4] classified the channel ranges from 1 to 100  $\mu\text{m}$  as microchannels, 100  $\mu\text{m}$  to 1 mm as meso-channels, 1 mm to 6 mm as compact passage, and greater than 6 mm as conventional channel.

Kandilkar and Grade [5] modified the channel dimension scheme which is based on the smallest channel dimension scheme as shown in Table 1

Table 1-Classification of channel proposed by Kandilkar and Grade.

CHANNEL	HYDRAULIC DIAMETER
Conventional channel	$D_h > 3 \text{ mm}$
Minichannels	$3 \text{ mm} \geq D_h \geq 200 \mu\text{m}$
Microchannels	$200 \mu\text{m} \geq D_h \geq 10 \mu\text{m}$
Transitional Microchannels	$10 \mu\text{m} \geq D_h \geq 1 \mu\text{m}$
Transitional Nanochannels	$1 \mu\text{m} \geq D_h \geq 0.1 \mu\text{m}$
Nanochannels	$0.1 \mu\text{m} \geq D_h$

Kandilkar and Grade [6] also proposed the channel dimension on the basis of type of flow inside a channel for rarefaction effect of common gases at atmospheric pressure as shown on Table 2



# Effect Of Applied Axial Force On Fsw Of Aa 6082 - T6 Aluminium Alloys

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## ABSTRACT

Friction stir welding (FSW) offers nearly defect free welds with minimized distortion and fine grain structure. However, studies about the mechanism of metal joining and the effect of various process parameters for consistent and reliable results in FSW is yet to be concluded. Tool rotational speed, tool traversal speed, tool geometry, tool tilt and axial force are considered as the important process parameters for FSW. Many researchers report the effect of these parameters on weld quality and microstructural characterization. Nevertheless, the influence of the applied axial force on FSW process has not been elaborated considerably in these studies. Reported analytical and numerical analyses suggest that axial force has little effect on the weld characteristics as far as other parameters are fixed in a range sufficient to produce good welds. The effect of the applied axial force on the weld quality and mechanical strength is elucidated in this study, in detail. Weld strength and microstructural features were examined and it was found that the applied axial force has considerable effect on the quality and strength of the welds generated. Experimental and analytical results suggested that there is an optimum value for the applied axial force to obtain defect free weld even for a FSW process carried out with other parameters selected in the range for good weld formation.

**Key words:** Friction stir welding, process parameters, axial force, ultimate tensile strength, defects.

## 1. INTRODUCTION

Friction stir welding (FSW) is a promising development in material joining [1]. Joining of high strength to weight ratio materials in automotive and aviation industry has become strongly demanding in order to ensure the reduction in environmental impact and fuel efficiency. Hence progress in welding technology employing these materials plays a vital role in the manufacturing industry. FSW has been inducted as a better option for the joining of such materials especially aluminium alloys. Traditional fusion welding methods find it difficult to circumvent the situations of defects formation in these materials especially some aluminium alloys. FSW has been proved to be effective in welding 2XXX series and 7XXX series aluminium alloys and Al-Li alloys [2]. FSW is a solid state welding procedure. Since the metal joining is taken place much below the melting temperature it is deprived of many drawbacks associated with traditional welding processes [3- 6]. Owing to the low heat input FSW is capable of protecting the mechanical properties of the base material and of minimising the shrinkage and residual stresses. More over, as there are no filler materials FSW is environ metal friendly.

In FSW a stirring tool is traversed with a downward force along the faying surfaces of the base metal pieces which are held in position by clamping adequately to a base plate. The welding tool is specially made with a complex geometry which has a larger diameter part known as shoulder, which is extended to a smaller diameter part known as the pin. Friction between the tool shoulder and pin causes intense local heating of which the major part is contributed by the tool shoulder. The frictional heat plasticizes the material and forges around the tool beneath the shoulder. The shoulder confines and with the axial force presses the stirred material in the weld. The material is forced from the front towards the trailing edge, forged and in order to make a solid joint on solidification with the contact of relatively cold surrounding material. A schematic representation of FSW is shown as Figure 1. More material is pushed from the advancing side to the retreating side [7]. The obvious asymmetry in the material flow and heating is marked by considering the advancing and retreating side of the joints. Conventionally the side where the material flows with a velocity in the same direction as that of the tool is considered as the advancing side (AS) and the other side is taken as the retreating side (RS).

In FSW the frictional heat is highly localised around the shoulder and the pin which is associated with flow of plastic material. As it moves away from the tool axis the heat intensity and the material flow gradually reduces confining the 'tool effect' to a relatively smaller volume. The material part exposed to the tool effect is undergone high strain rate and intense heat. Consequently the weld region is transformed to complex micro structural entities. Based on the microstructural changes occurred the weld region can be divided in to Nugget zone (NZ), thermo mechanically affected zone (TMAZ), and heat affected zone (HAZ). NZ is that part which comes under the immediate vicinity of the pin, where the heat generation and degree of stirring is immoderate. In the TMAZ region the material microstructure is modified as a result of viscoplastic deformation and heat dissipation, but to a lesser degree than that of NZ. HAZ is located beyond the tool action region and is not subjected to any mechanical stirring. However, the grains are modified in shape and size due to the exposure of heat. Many researchers reported that the NZ exhibits dynamically recrystallised structure irrespective of various tool speeds [8, 9]. In aluminium alloys the NZ is often characterised by fine grains [10]. The part of the material in TMAZ is sustained plastic deformation, heated and softened.

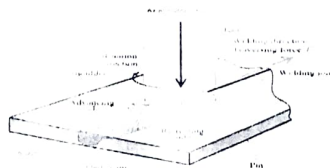


Figure 1 Schematic representation of FSW

# Efficiency Of Construction Waste Recycling

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**Abstract.** Recycling is widely used in practice in various fields of activity. However, the effect of such use does not always cover the costs of the processing. The article considers the problem of recycling waste generated while constructing residential buildings and structures. We present the results of full-scale studies of construction waste generated at construction sites in the city of Samara. We also show the qualitative and quantitative composition of the elements and analyze possible ways of their reuse. In addition, we have calculated economic feasibility of reusing building materials recycled from construction waste.

## 1. Introduction

Currently, there is an increase in the activity of urban development. Adjoining territories are built up and already existing city buildings are renovated as well. The expansion of territories is most noticeable and occurs more actively in large cities. For example, over the past decade, dozens of residential complexes have been built and continue to be built in the territory of the city of Samara: Koshelev project has increased the built-up area of the city territory by 130 hectares, Novaya Samara residential area in Krasnoglinsky district of the city occupies about 58 hectares, Southern City project has expanded the urban development in the southern part of the city by more than 1000 hectares. Such area expansion results from the increase in the number of city residents and their need to obtain comfortable housing with necessary utility systems and social infrastructure [1-4].

It is especially difficult to carry out construction work on infill areas, when worn-out buildings and structures are replaced with more comfortable and new ones (Fig. 1). In this case, all works on preparing the territory, cleaning, planning, erection and improvement are carried out in cramped conditions. During construction, adjacent residential areas suffer from a negative impact, including a large number of various construction wastes. At first, these wastes are stored on the construction site then they are to be transported to a landfill. It should be noted that at present more and more construction wastes are sorted at the place where they are formed and subsequently transported to specialized enterprises for processing into secondary raw materials [5-9]. This practice takes place in the cities of Moscow, Novokuibyshevsk, Togliatti and others. Despite this, unfortunately, construction waste recycling is not widely spread and is currently developing slowly. The main reason for this is lack of economic leverage to influence construction firms or waste management companies.



# Promoting Medical Tourism In Odisha: A Study on Issues And Challenges In Twin Cities of Cuttack And Bhubaneswar

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**Abstract**— Although the medical tourism is a recent phenomenon, this sector grows exponentially and emerges as a major force for the growth of services exports worldwide. The term medical tourism has been coined by travel agencies and the mass media to describe the rapidly growing practice of travelling across international borders to obtain hi-tech medical care. It is the fastest growing sector in the 21<sup>st</sup> century and also because many countries are interested in taking advantage for its economic potential, countries are capitalizing their popularity as tourist destinations by combining high quality medical services at competitive prices with tourist packages. Medical tourism in India is a bird eye view subject in both central and state list. Soaring medical costs, high insurance premiums, increasing number of uninsured and under insured people in developed nations, long waiting period in the home country, availability of high quality health care services at affordable rate, and internet/communication channels in developing countries, cheaper air fares, and tourism aspects are the driving forces of the outbound medical tourism. Odisha, formerly known as Orissa, is a major state in eastern India. When so many other states of India have already made their presence of medical tourism in global competition, Odisha is still lagging behind. The present health care facilities in Odisha are conducive for successful development of medical tourism in the state. However, it requires further improvement and attention by the service providers and policy makers. The study, thus undertaken to explore key issues and challenges in development of medical tourism in twin cities of Cuttack and Bhubaneswar of Odisha & suggest corrective measures to facilitate medical tourism for projecting Odisha as a medical tourism destination.

**Keywords**— Medical Tourism, Healthcare, Hospitals, Health Infrastructure and Strategy

## 1. INTRODUCTION

Tourism is one of the prominent industries of the world. It is growing at a steady pace and now it became one of the major social and economic phenomena of the modern time. Tourism now is a key driver of socio-economic progress due to its creation of jobs, enterprises, infrastructure development and export revenue earned. Public health is a multidisciplinary subject. So is tourism. In the area of public health central theme is about community health which includes prevention of ailment, sickness, disease among the people, prophylactic action against epidemic, pandemic and global scourge of deadly virus, promotion of hygiene and sanitation, looking after maternal, child, adolescent health and in recent times health of the aging population. In tourism there have been areas of interest starting from visiting religious places; it has covered cultural tourism to include visiting ancient temples,

# Extent and Causes of Gender and Poverty in India: A Case Study of Rural Hayana

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## Abstract

In spite of the enshrining anti-poverty programs and objectives of the poverty eradication programs contained in India's five year plans, women's poverty in India, even after 58 years of independence, is glaring. This paper, based on a field survey, addresses the issues of economic constraints and the denial of women's access to productive assets in the form of land ownership and human capital such as education, skill-training. The article contributes to the overall picture of female poverty at the national level. The author finds an exaggerated emphasis being placed on women laborers and inadequate economic opportunities among them as the major obstacle to reducing female poverty. Because of these constraints and discrimination, women enter into the unorganized sector, i.e. the agriculture sector.

This paper examines how lack of skills, heavy physical work of different types, long hours of work with limited payment, lack of guarantee of minimum wages, lack of job security, lack of minimum facilities at the work place are the characteristics of the informal sector which contribute to women's economic disempowerment.

*Keywords:* Women, India, poverty, Informal sector

## 1. Introduction

India's development performance and its yet 'unleashed' potential have been the subject of much discussion and debate in policy as well as in academic circles. Yet the most glaring feature of the Indian economy—its more than disturbing record in human resource development, particularly as it relates to women education—continues to receive inadequate attention. While there have been numerous policy pronouncements and government programs to improve the situation, which would contribute to poverty reduction, the reality on the ground, shows highly unsatisfactory results. In 2001, for instance 45.84 per cent women and 24.15 per cent men were illiterate.

It is estimated that 350-400 million people in India live under absolute poverty of 275 dollars per capita per annum and a majority of them are women. The Human Development Report (1990) has a succinct conclusion that poverty has a decided gender bias. Similarly, the U.N. Report on Global Outlook (2000) states that if current trends are not modified, projections indicate that the participation of women would lose income earning opportunities. The World Bank country study (2001) on "Gender and Poverty in India" presents the problems faced by poor women against a background of depressing statistics which shows how Indian women continue to be denied access to productive assets, in the form of financial credits, markets or land ownership and human capital such as education and skill-training which would enhance their abilities as economic agents.

Lifting women out of poverty will depend, to a large extent, on a better understanding of how many poor there are, where they live, why they are poor, and what



## Application of Large Prestress Strands in Precast/Prestressed Concrete Bridges

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### Abstract

The objective of this research is to investigate the advantage of using large-diameter 0.7-inch (18 mm) strands in pretension applications. Large-diameter strands are advantageous in bridge construction due to the increased girders capacity required to sustain exponential increase in vehicle numbers, sizes, and weights. In this research, flexure capacity of girders fabricated using 0.7-inch (18 mm) diameter strands will be calculated and compared to bridge capacities constructed using smaller strands. Finally, two similar bridge sections will be designed using 0.6-inch (15 mm) and 0.7-inch (18 mm) diameter strands to quantify the structural advantages of increased strand diameter. The research findings showed that a smaller number of girders is required for bridge construction when larger strands are used. Four girders are required to design the bridge panel using high performance concrete and large diameter strands, as compared to 6 girders required when regular concrete mix designs and normal size strands are used. The advantages of large strands and high-performance concrete mixes include expedited construction, reduced project dead loads, and reduced demand for labor and equipment. Thus, large strands can partially contribute to the improvement of bridge conditions, minimize construction cost, and increase construction site safety.

**Keywords:** Large Prestress Strands, 0.7-inch Strands, Pretension Applications, I-girders, Strands Spacing, High Strength Concrete

### 1. Introduction

The percentage of structurally deficient bridges within the United States National Bridge Inventory (NBI) is more than 10%, excluding railroad bridges, according to recent statistics. Structurally deficient bridges include all bridges with severe deterioration in one or more of the bridge structural components (i.e. bridge substructure, girders, and/or deck). Bridge deterioration is enough to reduce the load rating of bridge structural component. Majority of structurally deficient bridges result from increased traffic, the exponential increase of vehicle loading, environmental attacks (i.e. scour, freeze and thaw cycles, etc.), and the use of de-icing salts and chemicals in northern states. The Federal Highway Administration (FHWA) and State Departments of Transportation (DOTs) have recently launched multiple research programs to investigate the possibility of constructing bridges with longer life spans and/or using new generations of construction materials with superior characteristics to minimize maintenance, repair, and replacement activities for different bridge structural elements. New generations of construction materials include reactive powder concrete [1-4], commercially known as ultra-high-performance concrete, fiber reinforced polymers, and large diameter strands.

The main objective of this research project is to investigate the possible use of large-diameter prestressing strands in fabricating bridge I-girders with superior strength and quantify the structural advantages attained when large diameter strands are used in I-girder fabrication. The research project includes two phases: First, an analytical phase to calculate the structural advantages of using large-diameter strands in fabricating precast/prestressed concrete I-girders, as compared to current practices. Second, an experimental phase to explore the possibility of using large diameter strands without violating the AASHTO LRFD specifications for estimating strands transfer length, development length, and end zone reinforcement [5]. In this paper, the advantages of high-performance concrete and large diameter prestress strands are listed. Precast/prestressed I-girders are fabricated using larger strands, and the girder performance is tested through a full-scale destructive testing. Finally, a case study is presented, where a bridge section is designed using conventional concrete mixes and regular strands diameters and compared to similar bridge section designed using high performance concrete and large diameter strands to compare the performance of the two sections.

### 2. Literature Review

Seven-wire prestress strands are commonly used in the United States in different types of construction projects, including heavy construction. Strands of 0.5-inch (13 mm) diameter were widely used in the industry until early 1990s. Minimum strands centerline spacing was four times the strand diameter. Thus, I-girders were fabricated using strands placed at a centerline spacing of 2.0 inch. (50 mm) In 1996, the Federal Highway Administration (FHWA) released a memorandum allowing the use of 0.6-inch (15 mm) strands at 2.0-inch (50 mm) spacing and reduced the minimum centerline spacing of 0.5-inch (13 mm) strands to 1.75 inch [6]. According to the FHWA memorandum, 0.6-inch (15 mm) diameter strands are safe to use at a centerline spacing less than four times the strand diameter without violating the existing code transfer and development length equations. Currently, several research programs within the United States are investigating the possibility of using seven-wire strands of 0.7-inch (18 mm) diameter in precast/prestressed concrete industry. Large 0.7-inch (18 mm) strands have been used for decades in cable-stayed bridges and mining applications in the United States, and as post-tensioned tendons in Europe and Japan. Due to its limited applications, 0.7-inch (18 mm) strands are produced by limited manufacturers. Large 0.7-inch (18 mm) strands have a cross-section area of  $0.296 \text{ in}^2$  ( $1.9 \text{ cm}^2$ ) compared to  $0.217 \text{ in}^2$  ( $1.4 \text{ cm}^2$ ) for 0.6-inch (15 mm) strands, and  $0.153 \text{ in}^2$  ( $0.9 \text{ cm}^2$ ) for



# Experimental Verification of Natural Vibration Models of Steel-concrete Composite Beams

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**Abstract:** The article presents the results of experimental dynamic investigations of three steel-concrete composite beams. The beams differed in the stiffness of their shear connection. Steel stud connectors were used in B1 and B2 beams, whereas in B3 beam a perforated steel slat was used. The main goal of the study was to determine basic dynamic characteristics of the beams. Impulse excitation was used in the investigations. The obtained results made it possible to validate two numerical models: (i) a continuous one which was developed using the Timoshenko beam theory (ii) a discrete one which was developed according to the rigid finite element (RFE) method. After validation of the parameters of both models it turned out that both models provide results consistent with experimental results.

**Keywords:** Rigid finite element (RFE) method, steel-concrete composite beams, Timoshenko beam theory, vibrations.

## 1. INTRODUCTION

Composite structures are created as a result of connecting two or more structural components, which are often made from materials with various properties. Steel-concrete composite beams, used in civil engineering, are typical examples of such structures. A steel joist and a reinforced concrete slab resting on it are connected by means of connectors welded to the top flange of a steel I-bar. Structures of this kind are usually used as elements of floors in general and industrial building as well as main carrying girders in bridge engineering.

Over the past decades a number of papers on steel-concrete composite structures have been published. Still, although various analyses and investigations have been conducted, a certain range of issues has, as yet, not been properly researched. This mostly applies to the assessment of dynamic properties of composite structures.

The possibility of precisely assessing such properties is particularly important as far as composite bridge structures are concerned. The contribution of dynamic loads is quite significant in these kinds of structures. Trains can go now at speeds exceeding 350 km/h over railway bridges, which means that a number of the already existing structures should be adapted to the new conditions, which was pointed out by Klasztorny (2005).

An increase in both road and railway traffic intensity has led to an increased operation of the already existing objects. Owing to that it was necessary to conduct their technical inspections, in which a modal analysis can be useful.

This present paper is a continuation of Berczynski' and Wróblewski's (2005) publication, where three different, continuous models of a composite beam were defined. Timoshenko beam theory and its model turned out to be the most precise one and therefore it was used for further analyses. Unfortunately, the solution of this model must be done in an iterative way, which significantly lengthens the time necessary for calculations. Additionally, the model uses continuous connection with constant parameters instead of discretely arranged connecting elements. This fact made the authors define a discrete model. They used the rigid finite element (RFE) method, presented by Kruszewski in 1969, which he further developed with other researchers (Kruszewski et al., 1975, 1999). Currently, the method is still further developed, e.g. by Wittbrodt et al. (2006). Both computational models, i.e.



# Deep learning based conventional neural network architecture for medical image classification

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**ABSTRACT.** The enactment of automatic medical image taxonomy using customary methods of machine learning and data mining mostly depend upon option of significant descriptive characteristics obtained from the medical images. Reorganization of those skins obliges domain-specific skillful awareness moreover not a forthright process. Here in this paper we are going to propose a deep learning based cnn's named as deep cnn architecture. Which is a generic architecture and it accepts input as medical image data and produces the class or type of the disease. And we made comparison with the classical models like svm and elm.

**KEYWORDS:** deep learning, neural networks, medical image classification, processing, CNN, SVM.

## 1. INTRODUCTION

Contemporary development in the grounds of picture handling and also machine learning prompts likelihood of limiting tumor locales with less or no more human mediation. Such traditional methodology for distinguishing those districts about intrigue depends upon picture division strategies that perform either auxiliary or measurable example acknowledgment. In the previous case, the tissue association qualities are demonstrated utilizing worldwide highlights extricated from the chart built upon tissue segments (Ficsor *et al.*, 2006). Within the final situation, the surface of nearby locales moreover morphological/hierarchical qualities of tissue parts were displayed utilizing data towards the pixel and also segment stage separately (Van der Maaten & Hinton, 2008). Within another methodology dependent upon machine learning, a classifier was prepared within the test picture information towards the stage of each particular pixels moreover great number of pixels (Zaitoun *et al.*, 1998). To such particular situation, highlights vectors utilized depend upon basic nearby picture properties containing shading, morphology and also surface.

Here in the examination, we center around arranging districts within histological pictures into the tumor or also to non-tumor classes. Traditional machine-learning procedures, for example, bolster vector machine (SVM), extraordinary learning machine (ELM) has confinements within their capacity to process of these histological pictures into the crude shape (Cosatto *et al.*, 2013; Abadi *et al.*, 2016). The machine-learning framework needs cautious building and impressive space information to plan an element extractor which can change the crude information into a reasonable interior portrayal called the component vector (Sharma *et al.*, 2015). The decision of these highlights decides adequacy in favor of such classifier and isn't perfectly natural or clear. While an outcome, the execution of the SVM and also ELM was extraordinarily subject to the, and constrained by, the component extraction and also choice process. For beating this confinement of traditional machine learning strategies, deep learning (else synonymously, deep neural system) technique was suggested naturally finds portrayals required to arrangement (Sharma *et al.*, 2016). Deep learning strategies were the subset of portrayal learning techniques within what kind of numerous stages of portrayals or chains of importance are developed. Each stage of portrayal is made out of basic however non-straight modules that change the portrayal at one stage to a portrayal at a higher and somewhat more dynamic stage. Within adequate structure of these change modules, extremely complex capacities also be scholarly (Krizhevsky *et al.*, 2012; He *et al.*, 2015). The important favorable position of deep learning rather than ordinary machine learning is such the layers about highlights were not recommended through people, rather were gained from the information utilizing the broadly useful learning technique (Deng & Yu, 2014; Deng, 2012; Najafabadi *et al.*, 2015; Szegedy *et al.*, 2015).

In previous couple of periods, deep learning systems, particularly convolutional neural systems (CNN) (LeCun *et al.*, 1989), has drastically enhanced the condition-of-workmanship within discourse acknowledgment, visual protest acknowledgment, question identification and also numerous different spaces, for example, medicate revelation furthermore genomics (Cruz-Roa *et al.*, 2014; Cireşan *et al.*, 2013). All the more as of late, CNN have observed extraordinary achievement within biomedical, organic picture investigation appeals, for example, mitosis cell location on the basis of histological pictures, carcinoma tumor identification on the basis of

# Job Scheduling for Cloud Computing Using Neural Networks

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Cloud computing aims to maximize the benefit of distributed resources and aggregate them to achieve higher throughput to solve large scale computation problems. In this technology, the customers rent the resources and only pay per use. Job scheduling is one of the biggest issues in cloud computing. Scheduling of users' requests means how to allocate resources to these requests to finish the tasks in minimum time. The main task of job scheduling system is to find the best resources for user's jobs, taking into consideration some statistics and dynamic parameters restrictions of users' jobs. In this research, we introduce cloud computing, genetic algorithm and artificial neural networks, and then review the literature of cloud job scheduling. Many researchers in the literature tried to solve the cloud job scheduling using different techniques. Most of them use artificial intelligence techniques such as genetic algorithm and ant colony to solve the problem of job scheduling and to find the optimal distribution of resources. Unfortunately, there are still some problems in this research area. Therefore, we propose implementing artificial neural networks to optimize the job scheduling results in cloud as it can find new set of classifications not only search within the available set.

## Keywords

*Cloud Computing, Job Scheduling, Artificial Intelligence, Artificial Neural Networks*

## 1. Introduction

Cloud computing is an emerging paradigm that accesses network and shares computing resources with convenient and minimal management efforts, see Figure 1. It is one of the smart technologies that will reshape the world and shifts Information Technology infrastructure to third party to be available to the customers as commodities [1] [2]. The computing environment of cloud computing can be outsourced to another party to use the computing power or resources via Internet. Emerging of this technology moves the computing power and data from personal computer and portable devices into large data centers. End-users access and use all the services without knowing the physical location and the configuration of the system at the providers' sides [3] [4].

This paper is organized as follows. First, the researchers will introduce and discuss cloud computing deployment, characteristics, models and advantages. Then, the researchers will briefly discuss and introduce genetic algorithm and artificial neural networks. After that, the cloud computing job scheduling techniques are explained in details. Subsequently, the researchers will provide a literature review of job scheduling in cloud computing. Finally, conclusion and future works are discussed.

## 2. Cloud Computing Deployment, Characteristics, Models and Advantages

Cloud computing has wide acceptance due to its characteristics such as fulfilled customization, portability, availability on demand and isolation [6]. Moreover, it attracts the users due to the reduction of the cost of the provided services and at the same time improving the outcome [7]. Companies that use cloud computing do not need to invest in new infrastructure and training your employee. Using cloud computing, Small and Medium Businesses (SMB) can access to the best applications and resources at very low cost [8]. In the Information Technology industry, cloud computing is growing very fast at the same time many concerns are growing about the environment safety [8]-[10].

There are four types of cloud computing deployment: public cloud, private cloud hybrid cloud and community cloud. In the public cloud, the users access the cloud via interfaces using the web browsers. Thus, the user needs to pay only for the time duration of service usage. This will reduce the operation costs. On the other hand, public clouds are less secure compared to other clouds models, as all the software and data on this model are more vulnerable to various attacks [11]. In the private cloud, all the operations of this model are within an organization's data centers. This model is similar to the Intranet. The main advantage is that it is easy to manage the security and the maintenance and upgrades are more controlled. Compared to the public cloud where all the services and the applications are located outside the organization, in private model these services and



# An Intrusion Detection Model for Detecting Type of Attack Using Data Mining

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**Abstract.** Intrusion detection systems (IDS) are important elements in a network's defenses to help protect against increasingly sophisticated cyber attacks. This project objective presents a novel anomaly detection technique that can be used to detect previously unknown attacks on a network by identifying attack features. This effects-based feature identification method uniquely combines k-means clustering, Naive Bayes feature selection and 4.5 decision tree classification for finding cyber attacks with a high degree of accuracy and it used KDD99CUP dataset as input. Basically it detects whether this attacks are there or not like IPSWEEP, NEPTUNE, SMURF. Conclusions: Give brief concluding remarks on outcomes of what attacks are present and how to find.

**Keywords:** Clustering, Classification, Decision trees, Feature, selection, Intrusion detection

## 1. Introduction

Now, A days various types of systems are available on internet. The popular used of internet has prompted network intrusion detection to become a critical component of infrastructure protection mechanisms. NIDS can be defined as identifying a set of malicious actions that threaten the integrity, confidentiality, and availability of a network resource. Intrusion detection is basically divided into two categories, i.e., anomaly detection and misuse detection. By using Misuse detection we can search for specific patterns or sequences of programs and user behaviors that match well-known intrusion scenarios. While, anomaly detection is used to develop models of normal network behaviors, and new intrusions are detected by evaluating significant deviations from the normal behavior. While accuracy is the essential requirement of an intrusion-detection system (IDS), its extensibility and adaptability are also critical in today's network computing environment. An basic premise for intrusion detection is that when audit mechanisms are enabled to record system events, distinct evidence of legitimate activities and intrusions will be manifested in the audit data. Because of the large amount of audit records and the variety of system features, efficient and intelligent data analysis tools are required to discover the behavior of system activities. The increased reliance of government, military and commercial organizations on Internet technologies to conduct their everyday business creates a myriad of new challenges for cyber defense. The advancing complexity and variety of cyber attacks have almost rendered traditional IT defenses, such as anti-virus software or intrusion prevention systems, obsolete [1]. In addition, even the traditional strategy for defense that establishes multiple defensive layers so that penetration is next to impossible [2] is fast becoming increasingly ineffective as attackers continue to find and exploit vulnerabilities within systems. A cyber attack is a deliberate action against data, software or hardware that can destroy, degrade, disrupt or deny access to a networked computer system [3]. In recent years, data mining techniques have been employed with much success in the area of intrusion detection. In particular, the data preprocessing stage, which includes feature selection, has attracted much attention. Feature selection selects relevant subsets from the original dataset in order to minimize the effect of irrelevant and redundant features without greatly decreasing the accuracy of the classifier [8]. As a single IDS can be required to process a huge amount of data, the inclusion of erroneous, redundant or extraneous features in the analysis phase can make it difficult to detect anomalies amongst the noise increase the time and amount of processing power needed to analyze the data [9]. Therefore, an efficient feature selection technique should consider the relevancy of features, their discriminatory ability, and the number of features included in the analysis [11]. Although there are many candidate data mining techniques that can be employed, many of these techniques perform very well for detecting one specific cyber attack or specific set of cyber attacks under particular conditions.

## 2. Methodology

This paper presents a novel effects-based feature identification approach to identify sets of effects features that are statistically relevant which increased the accuracy of intrusion.

### 2.1. Data generation and collection

Acquiring data that is suitable for experimentation is a challenge within the area of intrusion detection. There are very few datasets available online, with the KDD evaluation dataset the most utilized in the existing body of research. Although this dataset includes five weeks of data and five categories of attack, there has been much debate as to the timeliness, complexity and simulation of a real network environment. In addition, as this research focuses in on the area where the actual effect takes

# ARTIFICIAL NEURAL NETWORK TECHNOLOGY IN MINING AND ENVIRONMENTAL APPLICATIONS

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**ABSTRACT:** A number of mining and environmental related problems have been approached using ANN technology. These problems commonly relate to pattern classification, prediction and optimisation. ANNs have been successfully applied to these areas and are therefore suitable for similar mining and environmental problems. The general trend in the mining industry for automation to the greatest degree calls for technologies such as the ANNs that can utilize large amounts of data for the development of models which otherwise are very difficult or sometimes even impossible to identify. The examples presented in this paper support the choice of ANNs as the basis for developing solutions to mining and environmental problems where conventional techniques fail in one way or another.

**Keywords:** ANN, Optimization, Environmental problem, conventional techniques

## 1 INTRODUCTION

Artificial intelligence (AI) tools have been in use for years in a number of mining related applications. Expert and knowledge based systems, probably the most popular AI tools, have found their way into a number of computer-based applications supporting everyday mining operations as well as production of mining equipment. In recent years, AI has provided tools for optimizing operations and equipment selection, problems involving large amounts of information that humans cannot easily cope with in the process of decision-making. These AI systems together with an ever-increasing number of sophisticated purpose-built computer software packages have created a very favourable environment for the introduction of yet another powerful AI tool, the Artificial Neural Networks.

In the '90s the mining industry has been introduced to a number of ANN based systems, some of them finding their way to a fully commercialized product, as will be illustrated by some examples in this paper. It should be noted however that these examples are very few considering the total number of applications at the research level, and the overall research effort carried out at universities and research institutes around the world.

## 2 THEORETICAL BACKGROUND

A brief introduction to the artificial neural network structure and operation is given below.

### 2.1 Artificial Neural Network Structure

The model of the artificial neuron or processing element (PE) (Figure 1) forms the basis of the artificial neural network (ANN) structure. ANNs consist of layers of interconnected PEs as shown in Figure 2. This layered structure is the most common in ANNs and is usually called the fully connected feed forward or acyclic network. However, there are ANNs that do not adopt this structure.

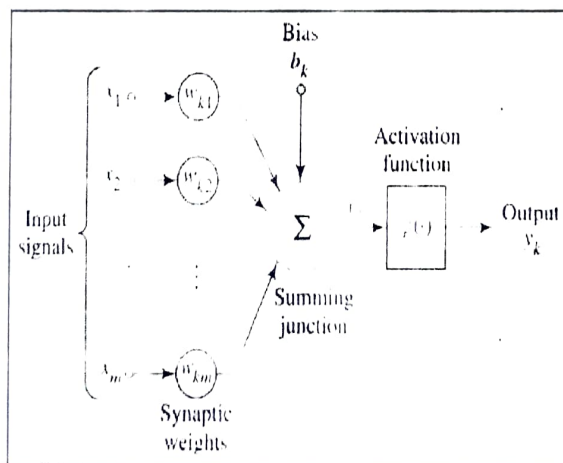


Figure 1. Artificial neuron structure or processing element (PE) (Haykin, 1999).



# ANALYSIS OF ARTIFICIAL NEURAL NETWORKS BASED INTRUSION DETECTION SYSTEM

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## Abstract

A decent method to identify ill-conceived use is through checking unordinary client action. Techniques for interruption identification dependent close by coded rule sets or foreseeing directions on-line are laborious to construct or not truly solid. This paper proposes another method for applying neural systems to identify interruptions. In the proposed technique, rather than thinking about all highlights for interruption recognition and burning through up the time in investigating it, just the important component for the specific assault is chosen and interruption discovery is finished with assistance of managed learning Neural Network (NN). The element determination is finished with the assistance of data gain calculation and hereditary calculation. The Multi Layer Perceptron (MLP) managed NN is utilized to prepare the significant highlights alone in our proposed framework. This framework improves the Detection Rate (DTR) for a wide range of assaults when contrasted with Intrusion identification framework which utilizes all highlights and chose highlights utilizing hereditary calculation with MLP NN as the classifier. Our proposed framework results, in distinguishing interruptions with higher exactness, particularly for Remote to Local (R2L), User to Root (U2R) and Denial of Service (DoS) assaults.

*Keywords— Neural Network; Multi Layer Perceptron; Remote to Local; User to Root; Detection Rate*

## 1. INTRODUCTION

System Intrusion Detection Systems (NIDS) are basic in present day registering framework to help screen and distinguish bothersome and noxious system traffic, (for example, unapproved framework get to or ineffectively designed frameworks). Most of business NIDS are mark based, where a lot of rules are utilized to figure out what establishes unfortunate system traffic by observing examples in that rush hour gridlock. While such frameworks are profoundly powerful against known dangers, signature based location bombs when assault vectors are obscure or realized assaults are changed to get around such principles [2].

Just as attempting to distinguish obscure or changed dangers, signature based identification in NIDS in genuine situations are habitually tormented by bogus positives. This is especially risky in the discovery of vindictive shellcode – a high effect danger vector permitting aggressors to acquire unapproved commandline access to both traditional PC frameworks and digital physical frameworks, for example, shrewd matrix foundation – as shellcode examples can be hard to recognize from generous system traffic [3]. systems are expanding. Therefore, securing the systems and deciding assaults are picking up significance. A Network Intrusion Detection System (NIDS) is a computerized apparatus that distinguishes and arranges the oddities in a system. They are ordered in two primary models [1] [2]. Signaturebased models decide the system assaults utilizing conduct mark of an assault. In any case, such models are just ready to distinguish recently realized assault types for abuse discovery. On account of this issue, the mark database must be refreshed with newfound assault types. These confinements [3] prompted utilize an alternate recognition model with information mining systems.

NIDS with information mining models can consequently retrain themselves to distinguish distinctive assault practices including new kinds of assaults. In abuse discovery, information mining models by and large utilize a named informational collection for preparing. Each occasion of the informational index is named as 'typical' or 'meddling'. In any case, the presentation of these models is influenced by the nature of the informational collection and naming. Then again, to forestall this issue, specialists go to abnormality identification approach. Right now, Network models are built from ordinary information and they identify the deviations in watched information. With this methodology, inconsistency location calculations can decide the new sort of assault in the system. On account of the absence of priori data in the NIDS, Artificial Neural Networks (ANN) are unreasonably utilized and well known right now.

# Efficient Intrusion Detection Mechanism using FCRM and Neural Network

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**Abstract**— The necessity of efficient intrusion detection system increased recent research to be focused on hybrid techniques for better results. In recent research plenty of intrusion detection systems have been proposed with various data mining techniques, machine learning mechanisms and fuzzy logic. Existing intrusion detection system suffered from higher false positive rate and negative rate. This paper proposes the integrated approach such as clustering with Fuzzy neural network for efficient detection rate. In this proposed approach, Fuzzy C-Regression technique is used to construct different training subsets. Then, FNN model is used to take decision making. This proposed approach significantly reduces the false positive and negative rate.

**Keywords**— *Intrusion Detection System, Fuzzy Neural Network, Fuzzy C-Regression model, false positive*

## I. INTRODUCTION

Intrusion Detection Systems (IDS) used to help detect and curb different types of attack. Nowadays the attacks in the network turn out to be unavoidable. the existing security systems cannot efficiently identify the powerful attacks such as denial of service, viruses, worms etc so that performance of the security system should be increased by using various techniques for detecting attacks earlier [3]. Many intrusion detection systems are introduced based on the statistical algorithm, heuristic algorithm and many researches has been conducting for improving the security solutions [12]. In Internet, intrusion detection system plays a vital role in detecting the network attacks, such as denial of service (DoS), viruses, worms, trojan horses, spyware, and so on.

Furthermore, various kinds of attacks reduce network performance significantly and dilemma users. However, based on the high volume of data traffic involved in a network system, effects of redundant and irrelevant data should be minimized if a qualitative intrusion detection mechanism is genuinely desirous. The main goal of IDS is to prevent the happening of intrusions in the network by classifying packets into two types of attacks and normal.

IDS has been classified based on principle that intruder features which are misuse detection and anomaly detection. The differences of these two types are in their patterns.

The misuse intrusion detection regularly examine the network and try according to some predefined signature patterns matches on the network by pattern matching techniques. The anomaly network intrusion based systems provide normal traffic patterns and try to find the deviation from the normal behavior. One of the most important things in the IDS is computational speed and comparison accuracy [15]. According to the tremendous features in each transaction of network a proper mechanism is required to derive an effective subset of features in order to recognize the intrusions.

A number of intrusion detection systems are developed based on many different machine learning techniques. Existing studies apply single learning techniques, such as neural networks, genetic algorithms, support vector machines, etc. Some systems are based on combining different learning techniques, such as hybrid or ensemble techniques[18]. In particular, these techniques are developed as classifiers, which are used to classify or recognize whether the incoming Internet access is the normal access or an attack. Considerably the hybrid approach provides better results than single classifier approach. Artificial Neural Network based Fuzzy c-means clustering is proposed to detect intrusion observed to provide better result and security. This method suffered from certain drawbacks such as lower detection precision for low frequency attacks [20].

The present research work develops an extension of the FC-ANN approach. In order to overcome the drawbacks of fuzzy c-means clustering, an efficient Fuzzy c-regression clustering approach is presented in this research work for clustering [13]. Additionally Fuzzy Neural Network (FNN) is used for better performance. KDD NSL data set is used for simulation result. KDD NSL is the subset of benchmark KDD 99 cup data set, which reduces the duplicate features of old data set. Section 2 describes the related work. Section 3 describes proposed methodology for detection and decision support in an intrusion detection system. Section 4 organized as conclusion and future work.



# Access Control Service Oriented Architecture Security

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## Abstract

Service Oriented Architecture (SOA) is one of the most popular concepts to implement computing systems. However it faces many challenges to security and many standards and frameworks come out to support it. We focus especially on the access control system using SOA and represent what are the SAML and XACML and how they are applied for Portal and Web Services.

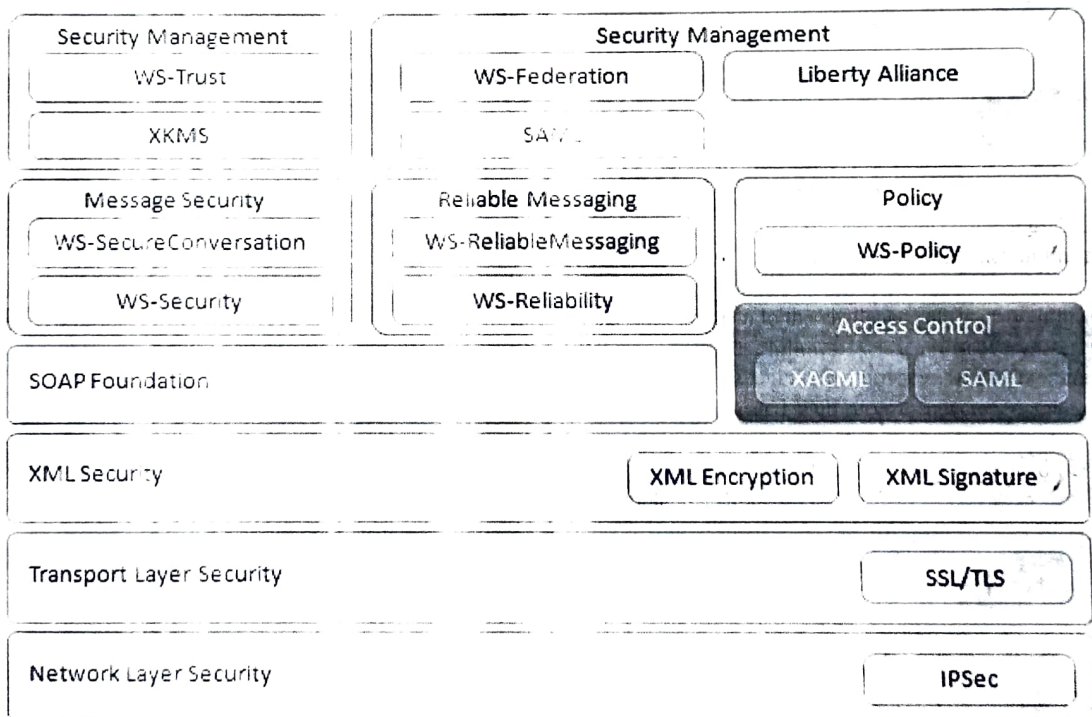
**Keywords :** Service Oriented Architecture, SOA, SOA Security, Web Service, Web Service Security, SAML, Security Assertion Markup Language, XACML, eXtensible Access Control Markup Language, access control

## 1. Introduction to Services Oriented Architecture Security

One of the most popular IT trends is Service Oriented Architecture (SOA), which is defined as follows:

Service Oriented Architecture (SOA) is a design pattern which is composed of loosely coupled, discoverable, reusable, inter-operable platform agnostic services in which each of these services follow a well defined standard. Each of these services can be bound or unbound at any time and as needed.

However, as defined, SOA has a loosely-coupled feature, which makes SOA open to the challenges of security. It means that SOA must meet several requirements. The main requirements are as follows: service discovery, service authentication, user authentication, access control, confidentiality, integrity, availability, and privacy. To ensure security in a loosely-coupled SOA environment, the open standards communities that created Web services developed a number of security standards for Web services which is one of the most active and widely adopted implementation of SOA. Figure 1 depicts a notional reference model for Web services security standards. This reference model maps the different standards to the different functional layers of a typical Web service implementation.



# Experimental Verification of Natural Vibration Models of Steel-concrete Composite Beams

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**Abstract.** The article presents the results of experimental dynamic investigations of three steel-concrete composite beams. The beams differed in the stiffness of their shear connection. Steel stud connectors were used in B1 and B2 beams, whereas in B3 beam a perforated steel slab was used. The main goal of the study was to determine basic dynamic characteristics of the beams. Impulse excitation was used in the investigations. The obtained results made it possible to validate two numerical models: (i) a continuous one which was developed using the Timoshenko beam theory (ii) a discrete one which was developed according to the rigid finite element (RFE) method. After validation of the parameters of both models it turned out that both models provide results consistent with experimental results.

**Keywords:** Rigid finite element (RFE) method, steel-concrete composite beams, Timoshenko beam theory, vibrations.

## 1. INTRODUCTION

Composite structures are created as a result of connecting two or more structural components, which are often made from materials with various properties. Steel-concrete composite beams, used in civil engineering, are typical examples of such structures. A steel joist and a reinforced concrete slab resting on it are connected by means of connectors welded to the top flange of a steel I-bar. Structures of this kind are usually used as elements of floors in general and industrial building as well as main carrying girders in bridge engineering.

Over the past decades a number of papers on steel-concrete composite structures have been published. Still, although various analyses and investigations have been conducted, a certain range of issues has, as yet, not been properly researched. This mostly applies to the assessment of dynamic properties of composite structures.

The possibility of precisely assessing such properties is particularly important as far as composite bridge structures are concerned. The contribution of dynamic loads is quite significant in these kinds of structures. Trains can go now at speeds exceeding 350 km/h over railway bridges, which means that a number of the already existing structures should be adapted to the new conditions, which was pointed out by Klasztorny (2005).

An increase in both road and railway traffic intensity has led to an increased operation of the already existing objects. Owing to that it was necessary to conduct their technical inspections, in which a modal analysis can be useful.

This present paper is a continuation of Berczynski' and Wróblewski's (2005) publication, where three different, continuous models of a composite beam were defined. Timoshenko beam theory and its model turned out to be the most precise one and therefore it was used for further analyses. Unfortunately, the solution of this model must be done in an iterative way, which significantly lengthens the time necessary for calculations. Additionally, the model uses continuous connection with constant parameters instead of discretely arranged connecting elements. This fact made the authors define a discrete model. They used the rigid finite element (RFE) method, presented by Kruszewski in 1969, which he further developed with other researchers (Kruszewski et al., 1975; 1999). Currently, the method is still further developed, e.g. by Wittbrodt et al. (2006). Both computational models, i.e.



# Deep learning based conventional neural network architecture for medical image classification

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Contemporary development in the grounds of picture handling and also machine learning prompts likelihood of limiting tumor locales with less or no more human mediation. Such traditional methodology for distinguishing those districts about intrigue depends upon picture division strategies that perform either auxiliary or measurable example acknowledgment. In the previous case, the tissue association qualities are demonstrated utilizing worldwide highlights extricated from the chart built upon tissue segments (Ficsor *et al.*, 2006). Within the final situation, the surface of nearby locales moreover morphological/hierarchical qualities of tissue parts were displayed utilizing data towards the pixel and also segment stage separately (Van der Maaten & Hinton, 2008). Within another methodology dependent upon machine learning, a classifier was prepared within the test picture information towards the stage of each particular pixels moreover great number of pixels (Zaitoun *et al.*, 1998). To such particular situation, highlights vectors utilized depend upon basic nearby picture properties containing shading, morphology and also surface.

Here in the examination, we center around arranging districts within histological pictures into the tumor or also to non-tumor classes. Traditional machine-learning procedures, for example, bolster vector machine (SVM), extraordinary learning machine (ELM) has confinements within their capacity to process of these histological pictures into the crude shape (Cosatto *et al.*, 2013; Abadi *et al.*, 2016). The machine-learning framework needs cautious building and impressive space information to plan an element extractor which can change the crude information into a reasonable interior portrayal called the component vector (Sharma *et al.*, 2015). The decision of these highlights decides adequacy in favor of such classifier and isn't perfectly natural or clear. While an outcome, the execution of the SVM and also ELM was extraordinarily subject to the, and constrained by, the component extraction and also choice process. For beating this confinement of traditional machine learning strategies, deep learning (else synonymously, deep neural system) technique was suggested naturally finds portrayals required to arrangement (Sharma *et al.*, 2016). Deep learning strategies were the subset of portrayal learning techniques within what kind of numerous stages of portrayals or chains of importance are developed. Each stage of portrayal is made out of basic however non-straight modules that change the portrayal at one stage to a portrayal at a higher and somewhat more dynamic stage. Within adequate structure of these change modules, extremely complex capacities also be scholarly (Krizhevsky *et al.*, 2012; He *et al.*, 2015). The important favorable position of deep learning rather than ordinary machine learning is such the layers about highlights were not recommended through people, rather were gained from the information utilizing the broadly useful learning technique (Deng & Yu, 2014; Deng, 2012; Najafabadi *et al.*, 2015; Szegedy *et al.*, 2015).

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This paper is organized as follows. First, the researchers will introduce and discuss cloud computing deployment, characteristics, models and advantages. Then, the researchers will briefly discuss and introduce genetic algorithm and artificial neural networks. After that, the cloud computing job scheduling techniques are explained in details. Subsequently, the researchers will provide a literature review of job scheduling in cloud computing. Finally, conclusion and future works are discussed.

## 2. Cloud Computing Deployment, Characteristics, Models and Advantages

Cloud computing has wide acceptance due to its characteristics such as fulfilled customization, portability, availability on demand and isolation [6]. Moreover, it attracts the users due to the reduction of the cost of the provided services and at the same time improving the outcome [7]. Companies that use cloud computing do not need to invest in new infrastructure and training your employee. Using cloud computing, Small and Medium Businesses (SMB) can access to the best applications and resources at very low cost [8]. In the Information Technology industry, cloud computing is growing very fast at the same time many concerns are growing about the environment safety [8]-[10].

There are four types of cloud computing deployment: public cloud, private cloud hybrid cloud and community cloud. In the public cloud, the users access the cloud via interfaces using the web browsers. Thus, the user needs to pay only for the time duration of service usage. This will reduce the operation costs. On the other hand, public clouds are less secure compared to other clouds models, as all the software and data on this model are more vulnerable to various attacks [11]. In the private cloud, all the operations of this model are within an organization's data centers. This model is similar to the Intranet. The main advantage is that it is easy to manage the security and the maintenance and upgrades are more controlled. Compared to the public cloud where all the services and the applications are located outside the organization, in private model these services and



# A Survey on Generation of Test Cases and Test Data Using Artificial Intelligence Techniques

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*Abstract*-Testing plays an important role in software development life cycle. Software testing is a critical element in software quality assurance and represents the ultimate review of specifications, design and coding. It is in general a laborious, costly and time consuming task: it spends almost 50% of software system development resources. For a good test quality the systematic design and appropriate selection of test cases and test data is essential. Test cases and test data generation is a key problem in software testing; and its automation improves the efficiency and effectiveness and reduces the high cost of software testing. The application of Artificial Intelligence techniques in Software Testing is an emerging area of research that brings about the cross fertilization of ideas across two domains. Artificial Intelligence techniques of searching are used to automate test data and test cases. The paper presents an analysis of relative efficiency in using test data and test cases using artificial intelligence techniques.

*Keywords*- Test data, test cases, artificial intelligence techniques, *da*genetic algorithm.

## I. INTRODUCTION

### A. Software Testing:

Software testing is the process of exercising and evaluating a system or system component by either manual or automated means to verify that it satisfies specified requirements and identifies the differences between the expected and actual results. It is performed for defect detection and reliability estimation. The software testing is conducted by executing the program developed with test inputs and comparing the observed output with the expected one. The main aim of testing is to cover the programming features. In White-box or structural testing, test data is design for program coverage. That means all paths of program should be executed at least once. There are three main types of coverage criteria; statement coverage, branch coverage, and path coverage. Branch coverage is widely used testing technique and it is the basis of several industry standards because it is not an extremely strict coverage criterion [14]. The Black-box or functional testing does not need any information about how the program was written. It generates test from software specification to ensure that software work properly. Gray-box testing investigates the coverage criteria of white-box method and finds all possible coverage paths.

It is difficult to test the whole software, therefore the selective parts of the software are considered or the testing. Because the input space of the Software Under Test (SUT) might be very large, testing has to be conducted with a representative subset of test cases. The test cases defined decide about the kind and scope of the test. Creation of relevant subset of test cases during software testing is a critical activity [13]. The test cases which are used to examine the SUT must possess an ability to expose the faults as well as test cases must be a representative subset of possible inputs. The quality and the significance of the overall test are directly affected by the set of test cases that are used during testing. Test data is used to create the test cases. Test data generation is the process of identifying a set of program input data that satisfies a given testing criterion [1]. This requirement of effective test cases demands the generation of Good automated test cases. Test generation technique and application of a test data adequacy criterion justifies the „Better“ test data[1]. There is need to explore these aspects of test data generation in order to increase the degree of automation and efficiency of software testing.

### B. Artificial Intelligence:

Artificial Intelligence is the science and engineering of making intelligent machines, especially intelligent computer programs. Artificial Intelligence (AI) is defined as the ability of computer software and hardware to do those things that we, as humans, recognize as intelligent behavior. These include activities as:

# An Intrusion Detection Model for Detecting Type of Attack Using Data Mining

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**Abstract** Intrusion detection systems (IDS) are important elements in a network's defenses to help protect against increasingly sophisticated cyber attacks. This project objective presents a novel anomaly detection technique that can be used to detect previously unknown attacks on a network by identifying attack features. This effects-based feature identification method uniquely combines k- means clustering, Naïve Bayes feature selection and 4.5 decision tree classification for finding cyber attacks with a high degree of accuracy and it used KDD99CUP dataset as input. Basically it detect whether this attacks are there or not like IPSWEEP, NEPTUNE, SMURF. Conclusions: Give brief concluding remarks on outcomes of what attacks are present and how to find.

**Keywords:** Clustering, Classification, Decision trees, Feature, selection, Intrusion detection

## 1. Introduction

Now, a days various types of systems are available on internet. The popular used of internet has prompted network intrusion detection to become a critical component of infrastructure protection mechanisms. NIDS can be defined as identifying a set of malicious actions that threaten the integrity, confidentiality, and availability of a network resource. Intrusion detection is basically divided into two categories, i.e., anomaly detection and misuse detection. By using Misuse detection we can search for specific patterns or sequences of programs and user behaviors that match well-known intrusion scenarios. While, anomaly detection is used to develop models of normal network behaviors, and new intrusions are detected by evaluating significant deviations from the normal behavior. While accuracy is the essential requirement of an intrusion-detection system (IDS) its extensibility and adaptability are also critical in today's network computing environment. An basic premise for intrusion detection is that when audit mechanisms are enabled to record system events, distinct evidence of legitimate activities and intrusions will be manifested in the audit data. Because of the large amount of audit records and the variety of system features, efficient and intelligent data analysis tools are required to discover the behavior of system activities. The increased reliance of government, military and commercial organizations on Internet technologies to conduct their everyday business creates a myriad of new challenges for cyber defense. The advancing complexity and variety of cyber attacks have almost rendered traditional IT defenses, such as anti-virus software or intrusion prevention systems, obsolete [1]. In addition, even the traditional strategy for defense that establishes multiple defensive layers so that penetration is next to impossible [2] is fast becoming increasingly ineffective as attackers continue to find and exploit vulnerabilities within systems. A cyber attack is a deliberate action against data, software or hardware that can destroy, degrade, disrupt or deny access to a networked computer system [3]. In recent years, data mining techniques have been employed with much success in the area of intrusion detection. In particular, the data preprocessing stage, which includes feature selection, has attracted much attention. Feature selection selects relevant subsets from the original dataset in order to minimize the effect of irrelevant and redundant features without greatly decreasing the accuracy of the classifier [8]. As a single IDS can be required to process a huge amount of data, the inclusion of erroneous, redundant or extraneous features in the analysis phase can make it difficult to detect anomalies amongst the noise increase the time and amount of processing power needed to analyze the data [9]. Therefore, an efficient feature selection technique should consider the relevancy of features, their discriminatory ability, and the number of features included in the analysis [11]. Although there are many candidate data mining techniques that can be employed, many of these techniques perform very well for detecting one specific cyber attack or specific set of cyber attacks under particular conditions.

## 2. Methodology

This paper presents a novel effects-based feature identification approach to identify sets of effects features that are statistically relevant which increased the accuracy of intrusion.

### 2.1. Data generation and collection

Acquiring data that is suitable for experimentation is a challenge within the area of intrusion detection. There are very few datasets available online, with the KDD evaluation dataset the most utilized in the existing body of research. Although this dataset includes five weeks of data and five categories of attack, there has been much debate as to the timeliness, complexity and simulation of a real network environment. In addition, as this research focuses in on the area where the actual effect takes



# ARTIFICIAL NEURAL NETWORK TECHNOLOGY IN MINING AND ENVIRONMENTAL APPLICATIONS

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**ABSTRACT** A number of mining and environmental related problems have been approached using ANN technology. These problems commonly relate to pattern classification, prediction and optimisation. ANNs have been successfully applied to these areas and are therefore suitable for similar mining and environmental problems. The general trend in the mining industry for automation to the greatest degree calls for technologies such as the ANNs that can utilize large amounts of data for the development of models which otherwise are very difficult or sometimes even impossible to identify. The examples presented in this paper support the choice of ANNs as the basis for developing solutions to mining and environmental problems where conventional techniques fail in one way or another.

**Keywords:** ANN Optimization, Environmental problem, conventional techniques

## 1 INTRODUCTION

Artificial intelligence (AI) tools have been in use for years in a number of mining related applications. Expert and knowledge based systems, probably the most popular AI tools, have found their way into a number of computer-based applications supporting everyday mining operations as well as production of mining equipment. In recent years, AI has provided tools for optimizing operations and equipment selection, problems involving large amounts of information that humans cannot easily cope with in the process of decision-making. These AI systems together with an ever-increasing number of sophisticated purpose-built computer software packages have created a very favourable environment for the introduction of yet another powerful AI tool, the Artificial Neural Networks.

In the 1990s the mining industry has been introduced to a number of ANN based systems, some of them finding their way to a fully commercialized product, as will be illustrated by some examples in this paper. It should be noted however that these examples are very few considering the total number of applications at the research level, and the overall research effort carried out at universities and research institutes around the world.

## 2 THEORETICAL BACKGROUND

A brief introduction to the artificial neural network structure and operation is given below.

### 2.1 Artificial Neural Network Structure

The model of the artificial neuron or processing element (PE) (Figure 1) forms the basis of the artificial neural network (ANN) structure. ANNs consist of layers of interconnected PEs as shown in Figure 2. This layered structure is the most common in ANNs and is usually called the fully connected feed forward or acyclic network. However, there are ANNs that do not adopt this structure.

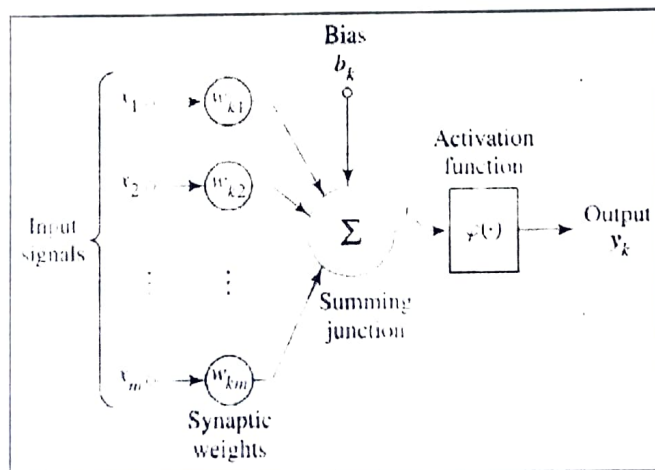


Figure 1. Artificial neuron structure or processing element (PE) (Haykin, 1999).

# ANALYSIS OF ARTIFICIAL NEURAL NETWORKS BASED INTRUSION DETECTION SYSTEM

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## Abstract

A decent method to identify ill-conceived use is through checking unordinary client action. Techniques for interruption identification dependent close by coded rule sets or foreseeing directions on-line are laborious to construct or not truly solid. This paper proposes another method for applying neural systems to identify interruptions. In the proposed technique, rather than thinking about all highlights for interruption recognition and burning through up the time in investigating it, just the important component for the specific assault is chosen and interruption discovery is finished with assistance of managed learning Neural Network (NN). The element determination is finished with the assistance of data gain calculation and hereditary calculation. The Multi Layer Perceptron (MLP) managed NN is utilized to prepare the significant highlights alone in our proposed framework. This framework improves the Detection Rate (DTR) for a wide range of assaults when contrasted with Intrusion identification framework which utilizes all highlights and chose highlights utilizing hereditary calculation with MLP NN as the classifier. Our proposed framework results, in distinguishing interruptions with higher exactness, particularly for Remote to Local (R2L), User to Root (U2R) and Denial of Service (DoS) assaults.

**Keywords**— Neural Network; Multi Layer Perceptron; Remote to Local; User to Root; Detection Rate

## 1. INTRODUCTION

System Intrusion Detection Systems (NIDS) are basic in present day registering framework to help screen and distinguish bothersome and noxious system traffic, (for example, unapproved framework get to or ineffectively designed frameworks). Most of business NIDS are mark based, where a lot of rules are utilized to figure out what establishes unfortunate system traffic by observing examples in that rush hour gridlock. While such frameworks are profoundly powerful against known dangers, signature based location bombs when assault vectors are obscure or realized assaults are changed to get around such principles [2].

Just as attempting to distinguish obscure or changed dangers, signature based identification in NIDS in genuine situations are habitually tormented by bogus positives. This is especially risky in the discovery of vindictive shellcode – a high effect danger vector permitting aggressors to acquire unapproved commandline access to both traditional PC frameworks and digital physical frameworks, for example, shrewd matrix foundation – as shellcode examples can be hard to recognize from generous system traffic [3]. systems are expanding. Therefore, securing the systems and deciding assaults are picking up significance. A Network Intrusion Detection System (NIDS) is a computerized apparatus that distinguishes and arranges the oddities in a system. They are ordered in two primary models [1] [2]. Signaturebased models decide the system assaults utilizing conduct mark of an assault. In any case, such models are just ready to distinguish recently realized assault types for abuse discovery. On account of this issue, the mark database must be refreshed with newfound assault types. These confinements [3] prompted utilize an alternate recognition model with information mining systems.

NIDS with information mining models can consequently retrain themselves to distinguish distinctive assault practices including new kinds of assaults. In abuse discovery, information mining models by and large utilize a named informational collection for preparing. Each occasion of the informational index is named as 'typical' or 'meddling'. In any case, the presentation of these models is influenced by the nature of the informational collection and naming. Then again, to forestall this issue, specialists go to abnormality identification approach. Right now, Network models are built from ordinary information and they identify the deviations in watched information. With this methodology, inconsistency location calculations can decide the new sort of assault in the system. On account of the absence of priori data in the NIDS. Artificial Neural Networks (ANN) are unreasonably utilized and well known right now.



# Efficient Intrusion Detection Mechanism using FCRM and Neural Network

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**Abstract**— The necessity of efficient intrusion detection system increased recent research to be focused on hybrid techniques for better results. In recent research plenty of intrusion detection systems have been proposed with various data mining techniques, machine learning mechanisms and fuzzy logic. Existing intrusion detection system suffered from higher false positive rate and negative rate. This paper proposes the integrated approach such as clustering with Fuzzy neural network for efficient detection rate. In this proposed approach, Fuzzy C-Regression technique is used to construct different training subsets. Then, FNN model is used to take decision making. This proposed approach significantly reduces the false positive and negative rate.

**Keywords**— *Intrusion Detection System, Fuzzy Neural Network, Fuzzy C-Regression model, false positive*

## I. INTRODUCTION

Intrusion Detection Systems (IDS) used to help detect and curb different types of attack. Nowadays the attacks in the network turn out to be unavoidable, the existing security systems cannot efficiently identify the powerful attacks such as denial of service, viruses, worms etc so that performance of the security system should be increased by using various techniques for detecting attacks earlier [3]. Many intrusion detection systems are introduced based on the statistical algorithm, heuristic algorithm and many researches has been conducting for improving the security solutions [12]. In Internet, intrusion detection system plays a vital role in detecting the network attacks, such as denial of service (DoS), viruses, worms, trojan horses, spyware, and so on.

Furthermore, various kinds of attacks reduce network performance significantly and dilemma users. However, based on the high volume of data traffic involved in a network system, effects of redundant and irrelevant data should be minimized if a qualitative intrusion detection mechanism is genuinely desirous. The main goal of IDS is to prevent the happening of intrusions in the network by classifying packets into two types of attacks and normal.

IDS has been classified based on principle that intruder features which are misuse detection and anomaly detection. The differences of these two types are in their patterns.

The misuse intrusion detection regularly examine the network and try according to some predefined signature patterns matches on the network by pattern matching techniques. The anomaly network intrusion based systems provide normal traffic patterns and try to find the deviation from the normal behavior. One of the most important things in the IDS is computational speed and comparison accuracy [15]. According to the tremendous features in each transaction of network a proper mechanism is required to derive an effective subset of features in order to recognize the intrusions.

A number of intrusion detection systems are developed based on many different machine learning techniques. Existing studies apply single learning techniques, such as neural networks, genetic algorithms, support vector machines, etc. Some systems are based on combining different learning techniques, such as hybrid or ensemble techniques [18]. In particular, these techniques are developed as classifiers, which are used to classify or recognize whether the incoming Internet access is the normal access or an attack. Considerably the hybrid approach provides better results than single classifier approach. Artificial Neural Network based Fuzzy c-means clustering is proposed to detect intrusion observed to provide better result and security. This method suffered from certain drawbacks such as lower detection precision for low frequency attacks [20].

The present research work develops an extension of the FC-ANN approach. In order to overcome the drawbacks of fuzzy c-means clustering, an efficient Fuzzy c-regression clustering approach is presented in this research work for clustering [13]. Additionally Fuzzy Neural Network (FNN) is used for better performance. KDD NSL data set is used for simulation result. KDD NSL is the subset of benchmark KDD 99 cup data set, which reduces the duplicate features of old data set. Section 2 describes the related work. Section 3 describes proposed methodology for detection and decision support in an intrusion detection system. Section 4 organized as conclusion and future work.

# Access Control Service Oriented Architecture Security

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## Abstract

Service Oriented Architecture (SOA) is one of the most popular concepts to implement computing systems. However it faces many challenges to security and many standards and frameworks come out to support it. We focus especially on the access control system using SOA and represent what are the SAML and XACML and how they are applied for Portal and Web Services.

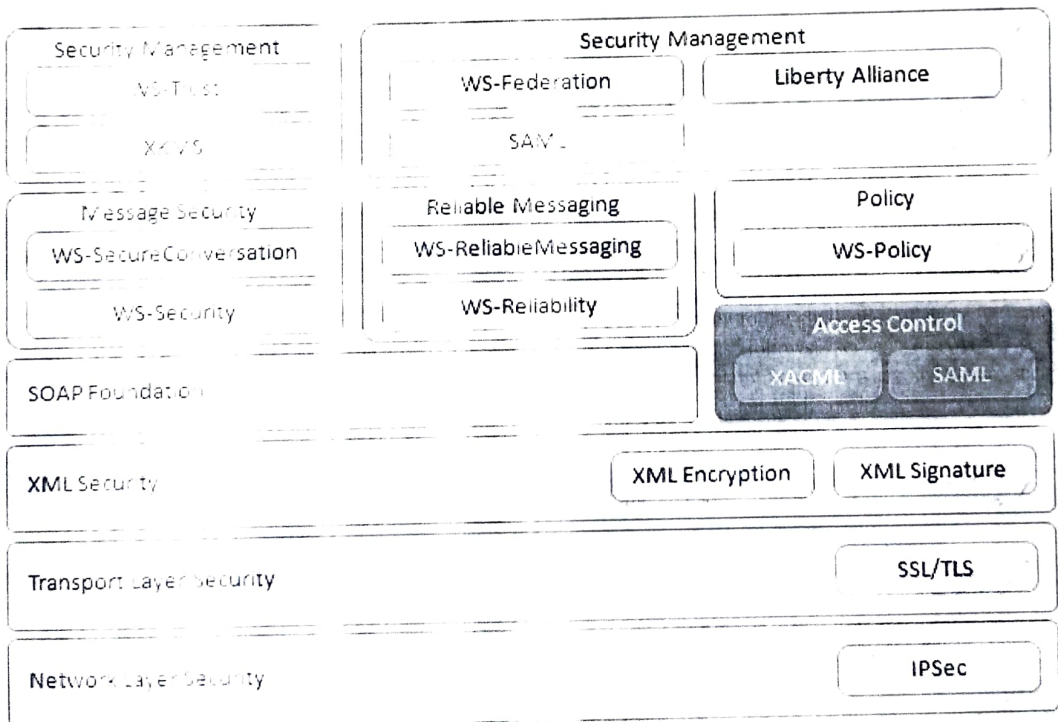
**Keywords :** Service Oriented Architecture, SOA, SOA Security, Web Service, Web Service Security, SAML, Security Assertion Markup Language, XACML eXtensible Access Control Markup Language, access control

## 1. Introduction to Services Oriented Architecture Security

One of the most popular IT trends is Service Oriented Architecture (SOA), which is defined as follows:

Service Oriented Architecture (SOA) is a design pattern which is composed of loosely coupled, discoverable, reusable, inter-operable platform agnostic services in which each of these services follow a well defined standard. Each of these services can be bound or unbound at any time and as needed.

However, as defined, SOA has a loosely-coupled feature, which makes SOA open to the challenges of security. It means that SOA must meet several requirements. The main requirements are as follows: service discovery, service authentication, user authentication, access control, confidentiality, integrity, availability, and privacy. To ensure security in a loosely-coupled SOA environment, the open standards communities that created Web services developed a number of security standards for Web services which is one of the most active and widely adopted implementation of SOA. Figure 1 depicts a notional reference model for Web services security standards. This reference model maps the different standards to the different functional layers of a typical Web service implementation.





# A Comparative Study of Various Scheduling Algorithms in Cloud Computing

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**Abstract** Cloud Computing is known for providing services to variety of users by with the aid of very large scalable and virtualized resources over the internet. Due to the recent innovative trends in this field, a number of scheduling algorithms have been developed in cloud computing which intend to decrease the cost of the services provided by the service provider in cloud computing environment. Most of the modern day researchers, attempt to construct job scheduling algorithms to increase the availability and performance of cloud services as the users have to pay for the available resources/services based on time. Considering all the above factors, scheduling plays a crucial role to maximize the utilization of resources in cloud computing environment. Through this paper, we are doing a comparative study of various scheduling algorithms and the related issues in cloud computing

**Keywords** Cloud Computing, Scheduling, Algorithm

## 1. Introduction

Cloud computing is known as a provider of dynamic services using very large scalable and virtualized resources over the Internet. Various definitions and interpretations of “clouds” and / or “cloud computing” exist. With particular respect to the various usage scopes the term is employed to, we will try to give a representative (as opposed to complete) set of definitions as recommendation towards future usage in the cloud computing related research space. We try to capture an abstract term in a way that best represents the technological aspects and issues related to it. In its broadest form, we can define a 'cloud' is an elastic execution environment of resources involving multiple stakeholders and providing a metered service at multiple granularities for a specified level of quality of service. To be more specific, a cloud is a platform or infrastructure that enables execution of code (services, applications etc.), in a managed and elastic fashion, whereas “managed” means that reliability according to pre defined quality parameters is automatically ensured and “elastic” implies that the resources are put to use according to actual current requirements observing overarching requirement definitions – implicitly, elasticity includes both up- and downward scalability of resources and data, but also load-balancing of data throughput.

Job scheduling is one of the major activities performed in all the computing environments. Cloud computing is one the upcoming latest technology which is developing drastically. To efficiently increase the working of cloud computing environments, job scheduling is one the tasks performed in order to gain maximum profit. The goal of scheduling algorithms in distributed systems is spreading the load on processors and maximizing their utilization while minimizing the total task execution time. Job scheduling, one of the most famous optimization problems, plays a key role to improve flexible and reliable systems. The main purpose is to schedule jobs to the adaptable resources in accordance with adaptable time, which involves finding out a proper sequence in which jobs can be executed under transaction logic constraints. There are main two categories of scheduling algorithm.

- 1) Static scheduling algorithm and
- 2) Dynamic scheduling algorithm.

Both have their own advantage and limitation. Dynamic scheduling algorithm has higher performance than static algorithm but has a lot of overhead compare to it.

## 2. Scheduling

There has been various types of scheduling algorithm exist in distributed computing system. Most of them can be applied in the cloud environment with suitable verifications. The main advantage of job scheduling algorithm is to achieve a high performance computing and the best system throughput. Traditional job scheduling algorithms are not able to provide scheduling in the cloud environments. According to a simple classification, job scheduling algorithms in cloud computing can be categorized into two

# Design of Odia Spell Checker with word Prediction

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## Abstract

Spell checking means to detect the error and correct the error. Spell checking is a well known task in natural language processing. Spelling error detection and correction is the process that will check the spelling of words in a document and in occurrence of any error, list out the correct spelling in the form of suggestions. Spelling checker tools use a dictionary as a database. Every word from the text is looked up in the dictionary. When a word is not present in the dictionary it will be treated as error. To overcome the error spell checker searches the dictionary for words that resemble the erroneous word most. These words are listed as suggestions for that error word and the user has to choose the best word from the list of suggestions. In this work a dictionary is created which contains odia words. Edit distance algorithm is implemented for the design of the Odia spell checker with prediction.

*Keywords*—*Spell checking, word prediction, edit distance*

## I. INTRODUCTION

Spell checking is a well-known task in Natural Language Processing which deals with error detection and correction of spelling errors. Spell checker will check the spelling of words in a document, and in occurrence of any error, a list of words will be shown as suggestion. This is a NLP problem which deals with spelling error correction. An error detector detects misspelled words, a candidate spelling generator that provides spelling suggestions for the detected misspelled word. All spelling checker tools use a dictionary as a database. The written text is looked up in the dictionary. When a word is could not find in the dictionary, it is detected as an error. To correct that error, a spell checker searches the dictionary for words that resemble the erroneous word most. These words are then listed as suggestions to the user who chooses the best word that was expected. There are two main steps in a spell checker, are Error detection and Error correction.

All the misspelled words are classified into two levels such as word level and sentence level error. At the character level the error patterns are formed. Detection of real word error needs to be compared with the detection of non word error. Several approaches based on Minimum edit distance, Similarity key, rules and N-grams are proposed to accomplish the task. Non- word errors can be classified into four major types such as substitution error, deletion error, insertion error, and transposition error. Most of the misspellings take place by slips or omissions, like slips of matras (matra or phala). Complete omission of vowel diacritical markers or some part of the diacritical markers. Wrong use of vowel diacritical markers is also noticed. Wrong uses of characters, which are phonetically similar to the correct ones, have also been observed. In the case of compound consonants (called yuktaksar in Odia), mistakes takes place are due to ignorance

A great deal of confusion has also been seen to occur in the use of dental and cerebral nasal consonant. As a result there is a chance of committing mistakes if proper spelling rules are not remembered. Similar confusion is seen in the case of three sibilant sounds in Odia (palatal, dental and cerebral). From our observation it is clear that most of the misspellings are due to

- (i) phonetic similarity of Odia characters,
- (ii) the difference between the graphemic representation and phonetic utterances, and
- (iii) lack of proper knowledge of spelling rules.

## II. SPELLING CORRECTION

It is a process of detecting and sometimes providing suggestions for incorrectly spelled words in a text. In computing, Spell Checker is an application program that flags words in a document that may not be spelled correctly. Spell Checker may be stand alone capable of operating on a block a text such as word processor, electronic dictionary. Spelling errors can be divided into two categories: Real word errors and Non word errors. Real word errors are those error words that are acceptable words in the dictionary. Non word errors are those error words that cannot be found in the dictionary. Basically spell checking consist of two functions i.e

- A. Error Detection.
- B. Error Correction.

### A. Error Detection

Error Detection means to detect the error. A string of character is separated by space bar or punctuation marks may be called a candidate words. A candidate word is a valid if it has a meaning else it is a non word. The error detection



# Implementing Case-Based Reasoning Technique to Software Requirements Specifications Quality Analysis

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**Abstract**

Software Requirements Specifications (SRS) or software requirements are basically an organization's interpretation of a customer's system requirements and dependencies at a given point in time. Basically, good quality SRS will lead to good quality software product. It is widely known that companies pay much less to fix problems or defects that are found very early in any software development life cycle (SDLC). In this study, the Software Quality Assurance (SQA) audit technique is applied to determine whether or not the required standards and procedures within the requirements specifications phase are being followed closely. The proposed online SRS quality analysis system ensures that software requirements among others are complete, consistent, correct, modifiable, ranked, traceable, unambiguous, and understandable. The system interacts with the developer through a series of questions and answers session, and requests the developer to go through a checklist that corresponds to the list of desirable characteristics for SRS. The Case-Based Reasoning (CBR) technique is used to evaluate the requirements quality by referring to previously stored software requirements quality analysis cases (past experiences). CBR is an AI technique that reasons by remembering previously experienced cases. It assists in making the SRS quality analysis process more efficient. An executable prototype is developed to demonstrate several selected features and results of the proposed SRS quality analysis system.

**Keywords:** Case-based Reasoning, Quality Analysis, Software Requirements Specifications, Software Development Life Cycle

**1. Introduction**

The Software Requirements Specifications (SRS) document states all those functions and capabilities a software system must provide, as well as states any required constraints by which the system must abide.

By definition, a requirement is an objective that must be met, while a specification describes how the objective is going to be accomplished [1]. In other words, a specification document describes how specific tasks are supposed to be done. A very critical part of the quality assurance role is proactive involvement during the system's requirements specifications phase.

In the past, several studies have determined that companies will have to pay less to fix problems that are found early in any Software Development Life Cycle (SDLC) [1]. Fig. 1 gives an idea of the cost of change [2] for changes made at different phases of the SDLC.

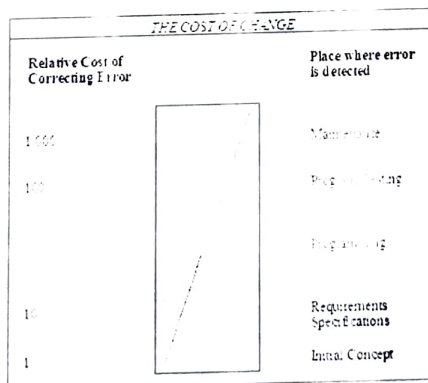


Figure 1. The cost of change at various phases of the SDLC [2]

# Friction Stir Welding of Al 5052 with Al 6061 Alloys

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## Abstract

Friction stir welding (FSW), a solid-state joining technique, is being extensively used in similar as well as dissimilar joining of Al, Mg, Cu, Ti, and their alloys. In the present study, friction stir welding of two aluminium alloys - AA6061 and AA5052 - was carried out at various combinations of tool rotation speeds and tool traverse speeds. The transverse cross-section of the weld was used for optical as well as electron microscopy observations. The microstructural studies were used to get an indication of the extent of material mixing both at the macro- and microscales. It was observed that, at the interface region, both materials exhibited similar texture despite the nonrigorous mixing of the materials in the nugget. The extent of interdiffusion of alloying elements at the interface was studied using electron probe microanalysis. The tensile testing evaluation of these specimens showed good mechanical properties. The interdiffusion of alloying elements and development of similar orientations in the nugget could have contributed to the better tensile properties of the friction-stir-welded AA5052-AA6061 specimens.

**Keywords :** friction stir welding (FSW), AA6061 & AA5052, interdiffusion, tensile properties

## 1. Introduction

The joining of dissimilar materials is vital, since it is intended to obtain a product having a combination of desirable properties of both parent materials. The difficulties in joining materials with vastly differing properties using conventional fusion welding methods are well known. The selection of an appropriate filler material (having intermediate properties) is critical. Otherwise, the possible formation of complex, brittle, intermetallic compounds can degrade the quality of the weld, resulting in inferior welds. Similarly, it is not straight forward to directly join these materials using solid-state joining methods given the compatibility issues of physical properties of the materials as well as formation of intermetallic compounds. Hence suitable interlayer which prevents the formation of intermetallic compounds is often employed in such cases.

Friction stir welding (FSW) has become an obvious choice for welding of "difficult to weld" aluminium alloys (5xxx series) or high-strength aluminium alloys (2xxx and 7xxx series). It has also facilitated welding of dissimilar aluminium alloys with same ease. The dissimilar welding of aluminium alloys has attracted more attention, since it offers an insight into many phenomena (e.g., material flow) which were not clear during the friction stir welding of similar Al alloys. Many topics like variation of microhardness, material flow, material location, temperature distribution, residual stresses, and so forth, across the interface of the abutting materials and their consequent effect on the mechanical properties are of interest to many researchers [1-3].

Lee et al. [1] studied the dissimilar lap joint FSW of AA5052-H112 and AA6061-T6 plates having thickness of 1 mm and 2 mm, respectively, with various tool rotation speeds and tool traverse speeds according to the fixed location of each material on top or bottom sheet. They found that the interface morphologies were characterized by interface pull-up and pull-down in the advancing side and retreating side. The thickness of the thinner AA5052 sheet lessened due to the vertical movement of the materials. It was identified that the amount of vertical transport increased and consequently the thickness of AA5052 decreased when the heat input was increased either by increasing the tool rotation speeds or by decreasing the tool traverse speeds. Joint strengths mainly depended on the interface morphology and vertical movement of material.

TABLE 1: Chemical composition of alloying elements in the aluminium alloys (in wt.%).

	Mg	Si	Mn	Cr	Ni	Fe	Ca	Cu	Zn	Ti	Al
AA5052	2.30	0.15	0.02	0.10	—	0.20	—	0.02	0.01	0.01	Bal
AA6061	0.92	0.60	0.06	—	0.18	0.33	0.2	—	0.03	0.02	Bal

Park and Kim [2] investigated the effect of tool rotation speed and tool traverse speed on the stirring action and friction heat during FSW experiments on dissimilar Al alloys - AA5052-O and AA6061-T6. They used a range of process parameters to determine the mechanical strength of weld nugget of the dissimilar materials. They concluded that the optimum conditions were a traveling speed of 61 mm/min and rotation speed of 1600 rpm. Their observations of the weld surface finish and plastic flow behaviour showed that the stirring effect increased and number of defects decreased when the traverse speed was decreased.



# Demonstrating and Analysis of Turbine Blade

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**Abstract:** A steam turbine is a device that extracts thermal energy from pressurized steam and uses it to do mechanical work on a rotating output shaft. The steam turbine gives the better thermodynamic efficiency by using multiple stages in the expansion of steam. The stages are characterized by the way of energy extraction from them is considered as impulse or reaction turbines. In this work the parameters of steam turbine blade varied and analysis is done for strength, life and heat transfer rates. The varied parameters are the ratio of X-axis distance of blade profile by chord length and ratio of maximum height of blade profile in Y-direction to the chord length. The 3D modeling is done by using SOLIDWORKS software. The ANSYS software is used for static, thermal analysis finally concluded the suitable design and material (titanium alloy, manganese bronze, tungsten -1) for steam turbine blade.

**Keyword:** Steam turbine, thermal energy, impulse turbine, reaction turbine, static analysis, thermal analysis

## I. INTRODUCTION

A turbine (from the Latin turbo, a vortex, identified with the Greek, signifying "disturbance") is a rotating mechanical gadget that removes vitality from a liquid stream and changes over it into valuable work. The work delivered by a turbine can be utilized for creating electrical power when joined with a generator or creating push, as on account of stream motors. A turbine is a turbo machine with no less than one moving part called a rotor get together, which is a pole or drum with edges joined. Moving liquid follows up on the edges with the goal that they move and give rotational vitality to the rotor. Early turbine precedents are windmills and waterwheels.

## II. LITERATURE REVIEW

Numerous examiners have recommended different strategies to clarify the impact of pressure and stacking on turbine edge, rotor and invest guide the different parameters. A paper on structure and examination of Gas turbine edge uses to get the characteristic frequencies and mode state of the turbine cutting edge. In this paper we have broke down past plans and officers of turbine cutting edge to do encourage enhancement, Finite component results for unattached edges give a total picture of auxiliary attributes, which can used for the improvement in the structure and advancement of the working conditions. Plan of high weight steam turbine edge tends to the issue of steam turbine proficiency had a particular spotlight on airfoil profile for high-weight turbine cutting edge, and it assesses the adequacy of certain Chromium and Nickel in opposing jerk and crack in turbine sharp edges. The productivity of the steam turbine is a key factor in both the natural and monetary effect of any coal-terminated power station. In view of the exploration introduced changes to high-weight steam turbine sharp edges can be made to build turbine proficiency of the turbine. The outcomes and determinations are introduced for a concerning the sturdiness issues experienced with steam turbine edges. The most extreme operational Von Misses Stresses are inside the yield quality of the material yet the distortion is relatively better for material CA-6 NM (Chromium Nickel). Altered answers for Steam turbine sharp edge esteems to machines to amplify their diminish life cycle costs, effectiveness, and improve unwavering quality Sanjay Kumar was explored on drag life of turbine cutting edge. Latency load is the consistent burden that will cause creep disappointment. Creep is a rate subordinate material nonlinearity in which material keeps on disfiguring in nonlinear style even under steady burden. The principle objective is to anticipate the drag life of the straightforward motivation steam turbine sharp edge, and to give the FEM approach for wet blanket investigation. The examination of turbine cutting edge for various burdens, which demonstrates that the most extreme anxieties, instigated for each situation. These burdens are inside yield point of confinement of the material and won't experience plastic mishapening amid activity result is discovered that, creep life diminishes as the pressure esteem increments. Thus, by diminishing the pressure an incentive in the segment we can expand its drag life. This was be accomplished by altering the edge structure.

## III. OBJECTIVE

The goal of this work is to make a Steam turbine sharp edge with 3D display, To think about the static - warm conduct of the steam turbine cutting edge with various materials by playing out the limited component analysis. 3D demonstrating programming (catia v5) was utilized for planning and examination programming (ANSYS) was utilized for investigation.

## Performance, Combustion and Emissions of sunflower methyl esters / diesel blends in Air cooled diesel engine

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### Abstract

In the present in advance of fossil fuel crisis, the significance of alternative fuel investigates for diesel engines desires no emphasis. Sunflower methyl esters can be used as alternative fuels to diesel since their properties are very close to diesel fuel, they are also renewable. In the present work, experiments have been carried out to assess the suitability of sunflower methyl esters as fuels in a diesel engine. In the present investigation tests were carried out on a 4.4 K W, single cylinder, direct injection, Air-cooled diesel engine.

Sunflower methyl esters used in the present investigation is mixed with diesel with different proportions (B10, B20, B30, B40, B50 and B100) as fuel in the diesel engine. The optimum results were found out from the above investigations and the performance, emissions and combustion analysis are carried out. Different graphs plotted are BP vs M.C, efficiency, cylinder pressure vs crank angle (p-d diagram) based on the combustion, emissions and performance analysis suitable conclusions are drawn and these results are presented as a paper.

**Keywords:** *Theoretical engine, Performance, Combustion, Emissions, Alternative fuel*

### 1. INTRODUCTION

Petroleum based fuels are fuels stored in earth. There are limited reserves of these stored fuels & they are not renewable with increasing power consumption and an increase in number of transport vehicles the coal pits are going to exhaust within short period. The world at present heavily depends upon petroleum fuels for transportation and for operating agriculture machinery. Diesel engines dominate the field of transportation and agriculture machinery on account of its superior fuel efficiency. The consumption of diesel in India is several times higher than that of petrol consumption. Roughly estimate of petrol and diesel consumption is 30% and 70%, respectively. Reserves appear to grow arithmetically while consumption is growing geometrically. Under this situation world will be leading to an industrial disaster [8].

The diesel engine is a major contributor to air pollution especially within cities and along urban traffic routes. In addition to air pollution that causes ground level ozone and smog in the atmosphere, diesel exhaust also contains particulate and hydrocarbon toxic air contaminants (TAC). Now society has become more aware of harmful effects of the various exhaust emission coming out of the engines and there is tremendous pressure on researchers to reduce exhaust emissions. Various harmful effects of exhaust emission are already established and known to today's society. Carbon monoxide, if inhaled, enters the blood stream and causes hypoxia, which leads to further health problems. Hydrocarbon emissions are irritant and odorants and some of them carcinogenic. Oxides of nitrogen are found to be responsible for many of the pulmonary diseases [1].

### 2. KANSA'S EMERIFICATION

Use of vegetable oils in diesel engines leads to slightly inferior performance and higher smoke emissions due to their higher viscosity and carbon residue. Filter plugging and cold starting along with higher specific consumption are observed while using vegetable oil due to their higher viscosity and lower calorific value [6]. The performance of vegetable oil can be improved by modifying vegetable oil by transesterification process. The process of converting the raw vegetable oil using methanol/ethanol in presence of catalyst like NaOH into biodiesel which is fatty acid alkyl ester is termed as transesterification.

#### Procedure for preparation of Biodiesel from sunflower oil

Sunflower oil is to be collected for further processing as bio diesel. The methodology developed / processes adopted for production of bio-diesel is given below. Whole process is described for one liter of sunflower oil. During processing of multiple quantity of sunflower oil, chemical constituents should be changed in the same proportion however timing for heating, settling and washing remain same.

- One liter of castor oil is to be taken.
- 300-350 ml of methanol & 10 ml of concentrated sulphuric acid is to be added to oil.
- The temperature of this mixture is to be set at 65-70 °C.
- This temperature of the mixture is to be maintained for about 6 hours and stirred continuously.



# ANALYSIS OF SAND MOLD USING INDUSTRIAL POWDERS AND FLY ASH

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## ABSTRACT

The greensand molding is one of the traditional ways of molding techniques usually employed for producing castings in the foundry. The main constituents of molding sand are the sand, binder and additives. The properties of the molding sand depend upon those major constituents. Since, the properties like green compression and permeability can be varied by mixing various additives with the molding sand. The casting efficiency can be improved with the help of different additives added to the greensand in the correct proportions.

The main focus of our project is to make an attempt on the analysis of the greensand mold with fly ash and clay. Fly ash and clay are the additives to be mixed with the greensand and the properties like green strength and permeability are tested and tabulated.

The standard specimen of AFS size is to be made with different proportions of clay and fly ash. The properties like green compression strength and permeability are checked with the help of permeability meter and Universal strength testing machine. The strategic points are to be evaluated and the aluminum castings are to be made as per the effective points.

*Key words: Green Sand, fly Ash, AFS standard, Permeability test, Strength test.*

## 1. INTRODUCTION

In our paper an attempt is to be made on the analysis of green sand mold with the industrial binders. Here the fly ash and clay plays vital role in the aggregate of the molding sand. The fly ash is collected from the Mettur Thermal Power Plant. The fly ash and the clay are added to the green sand as per the AFS standard norms. The various percentages of the clay and fly ash is to be added with the one kilogram of green sand and the 35ml of water.

The cylindrical sand specimen of about 50cm in height and 50cm in diameter is to be made with the help of sand rammer and then the permeability of the specimen is to be checked in the permeability meter.

The Green compression strength can be found through the Universal Strength Testing machine. The permeability and the Green Compression Strength for various compositions are to be found and the values are tabulated and compared. The casting is to be made on the strategic values by melting the aluminum in the muffle furnace and poured in to the mold.

## 2. LITERATURE REVIEW

1. *Khayat (1999)* studied workability, testing, and performance of the SCC by using fly ash. According to the author, self-consolidating concrete should be designed to meet specific applications requiring high deformability, high flow ability, and high passing ability. Observations of the author showed that the rheological properties of SCC vary in a wide range.
2. *Petsson (2001)* carried out an investigation on the mechanical properties of SCC, such as strength, elastic modulus, creep and shrinkage and the corresponding properties of normal concrete by using Portland cement, fly ash and glass filler as binding material, and quartzite sandstone as aggregates. A comparison between SCC with quartzite filler and NC without filler showed that SCC obtained about 20MPa higher strength at w/b ratio of 0.40 and about 5MPa higher strength at w/b ratio of 0.80 compared with NC.
3. *Bouzouba and Lachmi (2001)* reported the use of SCC incorporating high volumes of class F fly ash. Self-compacting mixture had a cement replacement of 40%, 50%, and 60% by class F fly ash and developed compressive strength ranging from 26 to 48 MPa. The results showed that an economical SCC could be successfully developed by incorporating high volume of Class F fly ash.
4. *Zhu et al (2001)* studied the uniformity of in situ properties of the SCC in full scale structural elements. They reported significant reduction of chloride diffusivity of SCC with fly ash.
5. *Yanjun et al (2002)* carried out an investigation on the optimum mix parameters of high strength SCC with ultra pulverized fly ash. The results of this research indicated that the sand ratio could not be less than 40%.

# Experimental Investigation On Flyash Based Geopolymer Bricks

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## ABSTRACT

The purpose of the present study is to investigate the behaviour of Fly ash based Geopolymer eco Bricks and its Durability, the size of the bricks were adopted was 190mmx90mmx90mm. The brick were cast with fly ash to river sand and eco-sand (silica sand) with the Different ratios of 1:1.6, 1:1.8, 1:2 by weight. The optimum water/ binder ratio of 0.416 was selected as per available literature. The water/binder ratio is the ratio of solution (NaOH and water) to fly ash. Bricks will be casted in this study under ambient curing. Visual inspection of Geopolymer mortar samples did not reveal any recognizable change in colour and remained structurally intact though the exposed surface turned slightly softer. Through Optical microscope, corroded surface could be seen which increased with time of exposure. After exposure in the acid solution for 18 weeks, the Geopolymer samples almost lost its alkalinity and showed very low weight loss in the range from 0.54% to 0.28% of initial weight. Loss of weight was found higher for specimen with higher percent of Na<sub>2</sub>SiO<sub>3</sub>. Results obtained in the present study indicate that Geopolymers are highly resistant to sulfuric acid.

**Keywords:** Experimental, Investigation, Flyash, Geopolymer Bricks

## 1. INTRODUCTION

### 1.1 Geopolymer

Geo polymers are new materials for fire- and heat-resistant coatings and adhesives, medicinal applications, high-temperature ceramics, new binders for fire-resistant fiber composites, toxic and radioactive waste encapsulation and new cements for brick. The properties and uses of geo polymers are being explored in many scientific and industrial disciplines: modern inorganic chemistry, physical chemistry, colloid chemistry, mineralogy, geology, and in other types of engineering process technologies. Geo polymers are part of polymer science, chemistry and technology that forms one of the major areas of materials science. Polymers are either organic material, i.e. carbon-based, or inorganic polymer, for example silicon-based. The organic polymers comprise the classes of natural polymers (rubber, cellulose), synthetic organic polymers (textile fibers, plastics, films, elastomers, etc.) and natural biopolymers (biology, medicine, pharmacy). Raw materials used in the synthesis of silicon-based polymers are mainly rock-forming minerals of geological origin, hence the name: geo polymer.

### 1.2 Geopolymer Resins And Binders

- Fire-resistant materials, thermal insulation, foams;
- Low-energy ceramic tiles, refractory items, thermal shock refractories;
- High-tech resin systems, paints, binders and grouts;
- Bio-technologies (materials for medicinal applications);
- Foundry industry (resins), tooling for the manufacture of organic fiber composites;
- Composites for infrastructures repair and strengthening, fire-resistant and heat-resistant high-tech carbon-fiber composites for aircraft interior and automobile;
- Radioactive and toxic waste containment;

### 1.3 Geopolymer Cements And Bricks

1.3.1 Low-tech building materials (clay bricks),

1.3.2 Low-CO<sub>2</sub> cements and bricks.



# Remote Monitoring and Control System for DC Motor using Zigbee Protocol

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## Abstract

Wireless based industrial automation is a prime concern in our day-to-day life. The approach to Zigbee Based Wireless Network for industrial Applications has been standardized nowadays. In this project, a wireless control and monitoring system for a DC motor is realized using the Zigbee communication protocol for safe and economic data communication in industrial fields where the wired communication is either more expensive or impossible due to physical conditions.

The project involves the design of remotely starting, stopping, controlling and monitoring the D.C motor through computer interface using a Zigbee wireless motor control module. The module also includes the continuous online monitoring of the motor parameters such as current, voltage, temperature, speed via radio frequency (RF) data acquisition system and storing them in a database designed using Visual basic. The designed system hence provides continuous online monitoring, controlling and protection of the motor in real time. This work is oriented towards improving the remote controlling abilities of the system while keeping the hardware requirements minimum.

The system is fully controlled by the Personal Computer from a remote location through Visual Basics GUI (Graphical User Interface). The GUI is developed based on the requirement of the user. The Personal Computer will continuously monitor all the Data from remote processing unit and will store the received data in its database.

An 8-bit AVR microcontroller has been used in this work to interface the various sensors using the IEEE 802.15.4 standard, Zigbee protocol. Zigbee is a wireless communication protocol which has the characteristics of low power consumption, low cost and self organizing features. The designed embedded system can be used in applications such as food industry, chemical industry, etc.

**Keywords:** ATMEGA-16 controller, DC Motor, Monitor & Control System, Speed Sensor, WSN, Zigbee.

## 1. INTRODUCTION

The efficient design and implementation of WSN (Wireless Sensor Networks) has become an emerging area of research in recent years [1]. The vast potential of Wireless Sensor Networks is an emerging area of research in recent years. WSN consists of spatially distributed autonomous sensors to monitor physical or environmental conditions like temperature, sound, pressure and to cooperatively pass their data through the network to a main location. The advantage of wireless sensor network is that they can be used with ease in the environment where wired system cannot be used or if used, are to be treated with caution, for example, in medical treatment. The WSN is built of nodes- it may vary from few to several thousand [2]. Each sensor node has typically several parts- radio transceiver with internal or external antenna, a microcontroller for interfacing with the sensors, energy source or battery. Different types of WSN are- Wi-Fi, Bluetooth, Wimax, PAN (Personal Area Network), smart transducers, ZigBee.

This project is to automatize the industrial system using an wireless embedded system using advanced technologies. The purpose of this project is to improve the data acquiring system and also to provide adequate data logging for particular area. Now a day's every system is automated in order to face new challenges[3][4]. In the present days Automated systems have less manual operations, flexibility, reliability and accurate. Due to this demand every field prefers automated control systems. Especially in the field of electronics automated systems are giving good performance. And this is realized by making use of Zigbee technology for communication. Zigbee is new wireless technology guided by IEEE 802.15.4 Personal Area Network standard. It is primarily designed for the wide ranging controlling applications and to replace the existing non-standard technologies. It currently operates in 868MHz band at a data rate of 20Kbps in Europe, 914MHz band at 40kbps in USA, and the 2.4GHz ISM bands Worldwide at a maximum data-rate of 250kbps.

## 2. ZIGBEE PROTOCOL

Zigbee is a low power spin off of WiFi. It is a specification for small, low power radios based on IEEE 802.15.4 – 2003

# An Introduction to Inventory Management with reference to Bokaro Steel Plant

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## ABSTRACT

This paper includes introduction of Inventory Management along with the practices of Inventory Management in SAIL-Bokaro Steel Plant (BSL) in order to analyze role of different types of inventories towards different sources to maintain their position in the steel market, to find out the practices of maintaining inventories and to study the techniques of controlling inventory, to meet the demand so that production & turnover are smooth. Now a days steel industries is even more dynamic than it was not a decade ago. In BSL 80% of coal is being imported from abroad because of its good quality it is further converted into Coke by heating in coke oven plant as it is one of the major raw material in formation of steel and it cost high to firm & require proper maintenance. 60% of sales is used in purchase of raw material which incurred high expenditure. In India for exporting of semi/finished goods, excise duty is not levied in order to attract exporter results in foreign exchange. This study will also be helpful for the company's future strategy's point of view. Company can quickly take required steps to rectify the existing problems and enhance its performance.

*Keywords: inventory management, Just- In Time Inventory, holding inventory, movement of inventories*

## 1. Introduction

Inventories are stockpile of the products a firm is offering for sale in the components that make up the product. An inventory is composed of assets that will be sold in future in the normal course of business operation. The assets which firms store as inventory in anticipation of need are Raw material, Work-in-process (semi-finished goods) and finished goods. The raw material inventory contains items that are purchase by the firm from others and are converted into finished goods through production process. The work-in-process inventory consists of items currently being used in the production process. They are normally semi-finished goods inventory consists of items that have been produced but are yet to be sold.

The aspect of management of inventory is especially important in respect to the fact that in country like India, the capital block in terms of inventory is about 70% of the current assets. It is therefore, absolutely imperative to manage efficiently and effectively in order to avoid unnecessary investment in them. Although to maintain low inventories may prove to be profitable but to maintain very low inventories may prove risky on the contrary.

A company should maintain adequate stock of materials for a continuous supply to the factory for an uninterrupted production. It is not possible for a company to procure raw material instantaneously whenever needed. A time lag exists between demand and supply of material. Also, there exists an uncertainty in procuring raw material in time at many occasions. The procurement of materials may be delayed because of factors beyond company's control e.g. transport disruption, strike etc. Therefore, the firm should keep a sufficient stock of raw material at a time to have streamline. Other factors which may incite us to keep stock of inventories is the quantity discounts, expected rise in price.

The work-in-process inventory builds up because of the production cycle. Production cycle is the time span between the introduction of raw material in to the production and the emergence of finished goods at the completion of production cycle. In the production cycle completes, the stock of work in process has to be maintained. Efficient firms constantly try to make the production cycle smaller by improving their production techniques.

The stock of finished goods has to be held because production and sales are not instantaneous. A firm cannot produce immediately when goods are demanded by customers. Therefore to supply finished goods on regular basis, their stock has to maintain for sudden demand of customers, in case the firm sales are seasonal in nature, substantial finished goods inventory should be kept to meet the peak demand. Failure to supply products to customer, when demanded, would mean loss of the firm's sales to the competitors.

The basic objective in holding raw material inventory is separate purchase and production activities and in holding finished goods inventory is to separate production and sales activities. If raw material inventory is not held, purchase would have to be made regularly at the time of usage. This would mean production interruptions and high cost of ordering.

A sufficiently large inventory has to be maintained of finished goods so as to meet the fluctuating demands. If a close link is maintained between the sales and the production department then an organization can do with a small inventory also. In the process, inventory is also necessary because production cannot be instantaneous. But it should be seen that the size of production cycle should be small.



# Design and Material Optimization of Jeep Leaf Spring

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**Abstract**— The Automobile Industry has shown increase interest for replacement of steel leaf spring with that of composite leaf spring. Since the composite material has high strength to weight ratio, good corrosion resistance. The paper describes static and dynamic analysis of steel leaf spring and laminated composite Multi leaf spring. The objective is to compare displacement, frequencies, deflections and weight savings of composite leaf spring with that of steel leaf spring. The dimensions of an existing conventional steel leaf spring of a Light design calculations. Static and Dynamic Analysis of 3-D model of conventional leaf spring is performed using ANSYS 14.5. Same dimensions are used in composite multi leaf spring using Aluminum Alloy unidirectional laminates. Analysis is done by layer stacking method for composites by changing reinforcement angles for 3 layers, 5 layers and 11 layers. The weight of composite leaf spring is compared with that of steel leaf spring. The design constraints are stresses and deflection. A weight reduction of 27.5 % is achieved by using composite leaf spring in its style sheet.

**Keywords**—Structural Steel, Kevlar/Epoxy, Aluminium Alloys, Leaf Spring, Static Analysis, Dynamic Analysis  
FEA

## I. INTRODUCTION

Suspension can be considered as a link between the wheels and the body. It absorbs quick loadings and collects the elastic energy. Design fundamentals are based on the strength and comfort. The strength characteristics are usually determined according to the suspension type and loading. The comfort design fundamentals originate from the fluctuation and vibration point of view. The basic idea for the design is to generate the wanted elasticity and maintain the driving comfort. Suspensions mechanisms also can use different types of springs in the mechanism. The most common are the coil spring, torsion bar, pneumatic, and leaf spring. The choice of spring normally has little effect on suspension performance.

## II. OBJECTIVES

In the present scenario, weight reduction has been the main focus of automobile manufactures. The suspension leaf spring is one of the potential items for weight reduction in automobiles as it accounts for ten to twenty percent of the unsprung weight, which is considered to be the mass not supported by the leaf spring. The introduction of composite materials made it possible to reduce the weight of the leaf spring without any reduction on the load carrying capacity and stiffness. studies were conducted on the application of composite structures for automobile for automobile suspension system.

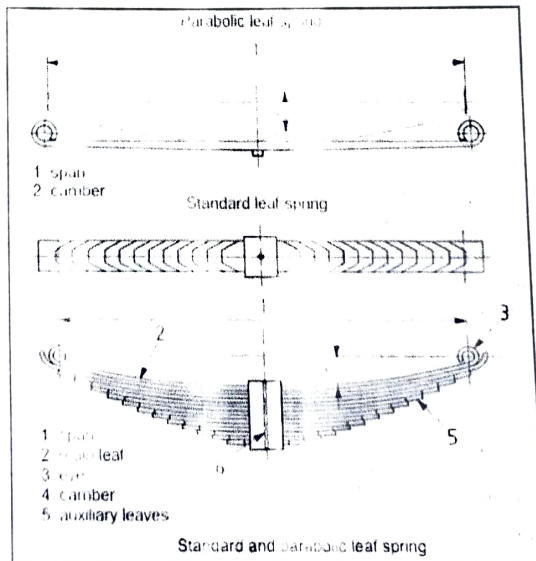


Fig. 1: Parabolic of Leaf Spring

# PREPARATION AND PROPERTIES OF ALPHA NAPHTHOL-FORMALDEHYDE RESIN WITH NANO- HYDROXY APATITE

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## ABSTRACT

In this work, the preparation of resin material and reinforcing materials were discussed and then composite preparation was made. Then alpha naphthol- formaldehyde polymer was synthesized and mixed with nano-hydroxyapatite for increasing the properties of material like melting and boiling point. Then to check the mechanical property like hardness of the composite. Though, the behavior of the polymer composites will be changed due to the addition of hydroxyapatite. While preparing the composites, epichlorohydrin was blended in order to epoxidized through the hydroxyl group. Then the composite material were taken and shaped into ASTM standard with the help of compression molding machine for testing the mechanical property of the material. In this, hexamethylene tetramine was used for curing the composite in the machine. The composite powder was taken to find the morphological characteristics with the help of SEM and XRD analysis. Finally the mechanical property like hardness were assessed for the composite and melting and boiling point were measured and compared with matrix material.

*Key words: naphthol, hydroxyapatite, Hexamethylenetetramine, naphthol-formaldehyde.*

## 1. INTRODUCTION

Generally the polymer materials have bad mechanical properties when compared to metals but the properties of polymer is gradually increased due to less weight and corrosion less. Here naphthols are aromatic hydrocarbons which are derived from naphthalene and this is belongs to phenol family. So, only naphthol was used as matrix material for enormous application similar to phenol.

Generally, these are positioned isomers which are 1-naphthol and 2- naphthol from hydromaphthalene. In this 1-naphthol was made by heating naphthalene with sulphuric acid and caustic soda and 2-naphthol was formed from fusing process. Naphthols were slightly soluble in water but completely soluble with alcohols, ethers and caustic alkalis. But in general, there were enormous changes in the properties of the material by small amount of reinforcing material in the composite materials. For example, with the addition of nanotubes of carbon has made improvement in mechanical and thermal properties. Similarly there were several types of nano materials were added in the composites through which electrical, strength, specific mechanical and heat properties were changed [Habaib a. al laee et al.<sup>6</sup> (2009)]. So, in to increase the properties the material, the reinforcement with other materials is done. Here, polymer matrix used is alpha naphthol [K. J.D.R. Paul et al. (2008)]

## 2. MATERIALS

Naphthol-formaldehyde, which was called as naphthol-methanol, because it was based on the structure and synthesis manner. This was one type of thermosetting resin which was non-transparent, made from naphthol and formaldehyde heated with the source of ammonia or pyridine. These resins are used as dyes. Like naphthol and melamine resins, naphthol-formaldehyde polymers are now employed primarily as dye chemical in textile industries and hair dyes. Naphthol-formaldehyde resins are lighter in color than phenol-formaldehyde resins.

## 3. REINFORCING MATERIAL

Hydroxyapatite (HA) is a member of the apatite family of calcium phosphates whose chemical formula is  $(Ca_{10}(PO_4)_6(OH)_2)$  with the Ca/P stoichiometric ratio of 1.67. Hydroxyapatite has been used in biomedical applications like preparation of bones and teeth. Then by using this specific property of hydroxyapatite, there were several research done in biomedical application with polymer composites. Because these types of composites have produced increased properties like mechanical, bioactivity, biodegradation, etc. [Kacey G. Marra et al, 8 (1999)]. Generally hydroxyapatite has been produced into nano-sized particle with some known methods like wet chemical method, hydrothermal micro emulsion, etc. In this hydrothermal microemulsion method was best known for preparing the particle into nano-



# NUMERICAL SIMULATION OF CENTRIFUGAL CASTING FOR FUNCTIONALLY GRADED METAL-MATRIX COMPOSITES

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## ABSTRACT

Functionally graded materials (FGMs), particularly in the form of Al-SiC metal matrix composites (MMC) are advanced materials, having high abrasion resistance, high toughness and thermal resistance at the surface. Coating casting is one of the method for processing this type of MMC, but accurate control of the reinforcement particle distribution has not yet been completely obtained. In this work, mushy state solidification characteristics in centrifugal casting are numerically simulated using computational fluid dynamics (CFD) techniques to study the distribution of reinforcement particles. Effect of process parameters such as rotation of reinforcement particles are examined by varying rotational speed and volume fraction of reinforcement. Further investigation on the characteristics of cooling curves during solidification process is also carried out. Volume of fluid (VOF) method is used to simulate the multi-phase fluid flow during the industry rate of solidification. Solidification patterns and cooling curves generated clearly show a strong influence of process parameters on the distribution of reinforcement particles and solidification rate.

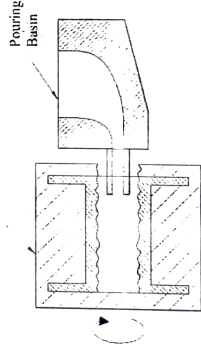
**Key words:** Centrifugal casting, CFD, Functionally graded materials, Mathematical modeling, Solidification pattern.

## 1. INTRODUCTION

Functionally Graded Material (FGM), belongs to a class of advanced materials with varying properties along the change in direction. FGM is a two phase heterogeneous composite characterized by a compositional gradient from one component to the other. In FGMs the one property of matrix phase component is mated with other property of reinforcement phase component. FGMs offer great promise in applications where the operating conditions are hazardous like for example, wear resistance linings, cutting tool insert coating, protective coating on turbine blades, rocket heat shields, catalyzers, thermoelectric generators, internal combustion engine components, plasma facings, and main actuating valves, etc. Several fabrication methods are employed to produce FGMs. Functionally graded materials can be classified into two types, thin and bulk FGM. Thin FGM are relatively thin surface coating, while the bulk FGM require bulk pieces of coatings. Thin surface coatings FGM are produced by Deposition technique, Plasma Spraying, Self-propagating High temperature Synthesis etc. Bulk FGM is produced using powder metallurgy, centrifugal casting etc [1]. Owing to the importance of FGM, there are lots of research work are carried out regarding the material processing and properties of the FGM. Among various fabrication methods centrifugal castings acquire high mechanical strength and fine grained structure. Inclusions and impurities are lighter and high production rate [2]. Centrifugal casting is widely used for casting thin-wall cylinders. It uses the centripetal force to distribute the molten metal inside the mold. In centrifugal casting there is a fixed mold which is rotating along the corresponding axis. The melts centrifugally move towards the mold wall because of the centripetal force. The melt will solidify after cooling. A schematic of the process can be seen in figure 1.

Figure 1 Working principle of centrifugal casting

Due to its high temperature and invisible mold condition in centrifugal casting, makes it difficult to know the



mechanism of the molten metal inside mold, it is important to know the mechanism of the molten metal inside mold,

# THE IMPACT OF AMBIENT TEMPERATURE ON PERFORMANCE OF SIMPLE BRAYTON CYCLE

Pradipta Kishore Das<sup>1</sup>, Pragyati Priyadarshini<sup>2</sup>

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## ABSTRACT

In this study, the performance analysis of the simple Brayton cycle is studied. The net power and total efficiency of system are chosen as the performance criteria. The variable parameters selected for analysis are the compressor pressure ratio and ambient temperature. The others variables are assumed constant. The equations for calculating the power and efficiency are formulated as a function of these decision variables. As a result, design objective has been solved and the design conditions giving maximum power and efficiency have been determined.

*Keywords: Brayton cycle, Gas turbines, Decision Variables, Ambient temperature, Compressor pressure ratio*

## 1. INTRODUCTION

Gas turbine are known to have a number of attractive features: short installation time, lightness, simplicity, high flexibility and reliability, low capital cost, fast starting and loading, high power density, better environmental performance etc. Therefore, the use of gas turbines in the meeting peak loads, cogeneration and combined cycle systems is the fastest growing in recent years [1-6].

Brayton cycle typically operates at significantly higher temperatures than steam cycles. Gas turbine blade cooling systems enable increasing the gas turbine inlet temperature above the metallurgical temperature limits of turbine blades. The maximum fluid temperature at the turbine inlet is about 973 K for steam cycles, but about 1673 K for gas turbine cycles. Since gas turbine cycles have high average temperature, it can be expected that the thermal efficiency is very high. However, the thermal efficiency is lower than steam cycles because of the high gas temperature in the gas turbine inlet, etc [7-8]. There are many studies about gas turbine performance [9-16]. Shukla and Singh [6] deal with the study for performance evaluation of steam injected gas turbine power plant with inlet evaporative cooling. They research the combined effect of inlet evaporative cooling, steam injection and film cooling on the power augmentation of simple gas turbine power plant. Then, thermodynamic modelling is performed along with results showing the influence of inlet evaporative cooling on various performance parameters of steam injected gas turbine power plant. The effect of ambient temperature on electricity production and fuel consumption of a simple cycle plant is examined at temperatures close to its conditions in Turkey by Erdem and Sevilgen [13]. In this study, the effect of ambient temperature on performance, power and efficiency of the simple Brayton cycle is investigated. As a result, developed model has been solved at the design conditions giving maximum power and efficiency have been determined.

## 2. THERMODYNAMIC MODEL

Figure 1 shows the schematic diagram of simple Brayton cycle. In Figure 1, C is the compressor, CC is the combustion chamber, GT is the gas turbine and G is the generator.

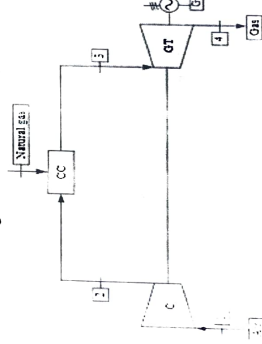


Figure 1 The flowchart of simple Brayton cycle

There are many studies given performance equations of simple Brayton cycle in literature. Furthermore, many of these equations can be obtained easily from balances of mass and energy for cycle [5, 7, 13, 17]. So, in this section it is given only basic equations such as net power ( $N_B$ ) and overall efficiency ( $\eta_B$ ) for simple Brayton cycle (Eq. 1-2).  $N_B$  and  $\eta_B$  are the objective functions to be maximized thermodynamically.



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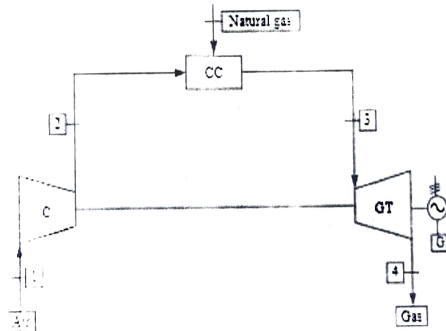


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## P Role of Building Codes in Seismic Assessment

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<sup>2</sup> Civil Engineering, Gandhi Engineering College, Bhubaneswar

### ABSTRACT

In previous times the buildings and structures were not planned for the seismic loads. But when high intensity of earthquake comes in India it resulted in destruction and desolation in structures. Therefore to provide safety to buildings Indian standards introduced the building codes to reduce the earthquake impact on the structures. In this paper the role of various building codes has been discussed briefly. For the designing and calculation of earthquake loads IS 1893:2002.(part I is used and role of various buildings codes and their provision and guidance is mainly discussed)

**Key words:** seismic loads, high intensity of earthquake, safety, building codes

### 1. INTRODUCTION

In the past 3 centuries over 3 million people have died due to earthquakes and earthquake related disasters. Therefore Indian standard code of practice was published in 1957 for the guidance of civil engineers in designing of buildings. It included the provisions for the basic design loads (dead loads, live loads wind loads seismic loads) in the design of buildings. The main intention of building codes are to protect public health, safety and general welfare as they relate to the construction and occupancy of buildings and structures. Building codes offers enhanced protection against the threats of natural disasters to make our buildings more resilient, sustainable and livable for generations to come, which lower the price of mitigation for building owners. IS 1893 was primarily in print in 1962 as 'Recommendations for Earthquake Resistant Design of Structures' which provides seismic zone map and specifies seismic design force. This force depends on mass and seismic coefficient of structures. For example, a Building in Bhuj will have 2.25 times the seismic design force of an indistinguishable building in Bombay. In the same way, the seismic coefficient for a single storey Building may have 2.5 times that of a 15- storey Building. IS1893:2002,(part 1) contain provisions that are universal in nature and those related for buildings [1]. The other four parts of IS1893 will cover: IS 1893:2002,(part 2) Liquid-Retaining Tanks, both elevated and ground supported[2]; IS 1893:2002,(part 3) Bridges and Retaining Walls IS 1893:2002 [3]; (part 4) Industrial Structures [4] IS 1893:2002 (part 5) Dams and Embankments [5]. These four documents are in preparation. In dissimilarity, the 1984 edition of IS1893 had provisions for all the above structures in a single document. This standard was revised in 1970, 1975 and then in 1984. IS 4326:1993 Earthquake Resistant Design And Construction of Buildings - Code of Practice This standard provides direction in range of materials, special features of design and construction for earthquake resistant buildings together with masonry construction, timber construction, prefabricated construction etc. IS 13827:1993 Improving IS 13828:1993 civilizing Earthquake Resistance of Low Strength Masonry Buildings Earthquake Resistance of Earthen building IS 13920:1993 Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic forces

The main intention of this paper is to revise the building codes for seismic assessment and provide essential improvement in the IS codes for the design of buildings to resist earthquake and seismic loads.

### METHODOLOGY

The principle of building codes is to shelter public health, safety and broad welfare as they relate to the construction and residence of buildings and structures. Building codes offers enhanced protection neighboring to the fear of natural disasters to make our buildings more rough sustainable and inhabitable for generations to come.

IS 1893:1984 Criteria for Earthquake Resistant Design of Structures - This standard deals with earthquake resistant design of structures and is appropriate to buildings; elevated Structures; bridges; dams etc. It also gives a map which divides the country into five seismic zones based on the seismic intensity. The revised 2002 edition provisions of the technical committee decided to revise the standard into five parts which deal with different types of structures:

Part 1: General provisions and Buildings

Part 2: Liquid Retaining Tanks - Elevated and Ground Supported

Part 3: Bridges and Retaining Walls

Part 4: Industrial Structures Including Stack Like Structures Part 5: Dams and Embankments

## I. DESIGNING FOR LATERAL LOAD



# MECHANICAL PROPERTIES OF FIBER REINFORCED CONCRETES PRODUCED FROM BUILDING DEMOLISHED WASTE

Dr.Gopalcharan Behera<sup>1</sup>, Dr.P.V.S. Vara Prasad<sup>2</sup>

<sup>1</sup>Civil Engineering, Gandhi Engineering College, Bhubaneswar

<sup>2</sup>Civil Engineering, Gandhi Engineering College, Bhubaneswar

## ABSTRACT

In virtually every field of industry, studies are being conducted to find ways and means to decrease burden on the environment as well as to make effective use of our limited natural resources. Preservation of the environment and conservation of the rapidly diminishing natural resources should be the essence of sustainable development. The enormous amounts of demolished concrete produced from deteriorated and obsolete structures create severe ecological and environmental problems. One of the ways to solve this problem is to use this Building Demolished Waste (BDW) concrete as aggregates. The brittleness of concrete can be overcome by spreading fibers discretely in concrete. In the present work, Fiber Reinforced Recycled Aggregate Concrete (FRRAC) was developed independently using two different types of fibers namely Glass Fiber and Polypropylene Fiber having individual applications. The mechanical properties were evaluated for a grade of concrete (M20), for different replacements of Recycled Concrete Aggregate (RCA) in Natural Aggregate (NA). It was observed that there was 15-17 % increase in split tensile strength and about 14 % improvement in flexural strength with addition of fibers in recycled aggregate concrete. The values obtained were also compared with the Indian Standard Codal Provisions. The increased energy absorption capacity in FRRAC indicates higher toughness and better post elastic deformations in the event of seismic actions.

**Key Words :** Building Demolished waste (BDW), Fiber Reinforced Recycled Aggregate concrete (FRRAC), Sustainability, Flexural strength, Mechanical properties

## INTRODUCTION

The use of recycled aggregates in concrete opens a whole new range of possibilities in the reuse of materials in the building industry. The utilization of recycled aggregates is a good solution to the problem of an excess of waste material, provided that the desired final product quality is reached<sup>1</sup>. This reduces the consumption of the natural resources as well as the consumption of the landfills required for waste concrete. Recycling is the act of processing the used material for use in creating new product<sup>2</sup>. The usage of natural aggregate is getting more and more intense with the advanced development in infrastructure area. Technology today has advanced so far that it is forcing us to think of new concept called sustainability<sup>3,4</sup>.

To employ recycled aggregate derived from concrete waste in a reinforced concrete structure, properties as compression resistance, recycled aggregate water absorption ratio, recycled aggregate crushing resistance and concrete modulus of elasticity can give away important information on understanding the mechanical behavior and provide indications of the new product's reliability<sup>4,5</sup>.

The use of fiber reinforced concretes (FRC) has increased in building structures because the reinforced fibers in concrete may improve the toughness, flexural strength, tensile strength, impact strength as well as the failure mode of the concrete<sup>6</sup>. The properties of fibers that are usually of interest are fiber concentration, fiber geometry, fiber orientation, and fiber distribution. Polypropylene and Glass fibers have various applications in concrete like crack control, prevent coalescence of cracks, and change the behavior of the material by bridging of fibers across the cracks<sup>7</sup>. In other words, ductility is provided with fiber reinforced cementations composites because fibers bridge crack surfaces and delay the onset of the extension of localized crack.

## AIMS AND OBJECTIVES

In the present paper, laboratory investigations were conducted on recycled aggregates to appreciate the utility of recycled aggregate used as a coarse aggregate for standard concrete mix proportions using mineral and chemical admixtures. In the

International Conference on Recent Trend in Communication Engineering (ICRTCE), (8<sup>th</sup> - 9<sup>th</sup> Feb, 2018)

# An Experimental and Numerical Comparison of Flow Hydraulic Parameters in Circular Crested Weir Using Flow3D

Dr. P.V.S. Vara Prasad<sup>1</sup>, Mr. Subhansu Muduli<sup>2</sup>  
<sup>1</sup>Civil Engineering, Gandhi Engineering College, Bhubaneswar  
<sup>2</sup>Civil Engineering, Gandhi Engineering College, Bhubaneswar

## Abstract

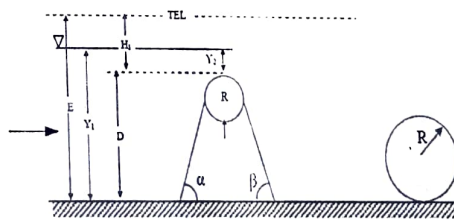
Circular crested weirs consist of a circular crested of upstream and downstream walls. These weirs are widely used in hydraulic engineering as water discharge structures and can be used to control water level in channels and tanks. In the present study, using Flow3D software, hydraulic properties were investigated to find weir geometry optimization through CFD method. Also, this study attempted to investigate flow on some sections of circular crested weirs in 3 groups and 11 models. Upstream and downstream slope changes as well as the height of the weir were also studied. To validate the model, laboratory models were used. In the research, flow depth parameters on crest, pressure distribution, velocity distribution, energy loss on circular crested weirs, as well as the height and changes of upstream and downstream slope were evaluated. Flow depth on the body of circular crest in this state is about  $0.71 (H_1)$ . Upstream slope changes on flow depth on the weir's crest revealed that increasing upstream slope causes to the increase of flow relative depth ( $H_1/R$ ) on the crest about 62%. Downstream changes in  $H_1/R$  values less than 0.7 have no significant effect on discharge coefficient; however, increasing  $H_1/R$  values seems to cause more change in slope.

**Keywords:** Circular Crested Weirs, Flow3D, CFD, Upstream Slope of Weir, Downstream Slope of Weir.

## 1. Introduction

At the late 19th century and at the beginning of the 20th century, cylinder weirs (circular crested weir without upstream and downstream slopes) were common before ogee spillways. During the 19th century, the attempt to improve the capacity of weirs discharge capacity leads to designing circular crested weirs. In water distribution systems, due to their reliability and easy construction compared to other weirs, circular crested weirs can be used to measure the intensity of flow as well as water discharge structures in channels and tanks. The simplest type of circular crested weirs is includes a circular crest with the radius of  $R$  and upstream and downstream walls. These walls are tangentially installed on the surface of the crest. This set is vertically placed at the path of flow [1 and 2]. Figure 1 shows a circular crested weir with geometrical parameters and hydraulic parameters. Hydraulic parameters include depth on crest' maximum point ( $Y_2$ ), total water load at upstream of crest surface ( $H_1$ ), water depth at upstream ( $Y_1$ ) and geometrical parameters entail weir crest radius, upstream and downstream walls' slope ( $\alpha, \beta$ ) [3].

According to the studies performed by Bazin, during the 19th century, advancement was performed to improve discharge capacity of these weirs which finally led to designing circular crested weirs [4]. Kreeger (1917) developed Bazin's studies to identify ogee weir profile. He also performed some experiments about circular crested weir profile which was later used in designing France's Burgundy Dam [5]. Sarginson (1972) investigated the effect of surface tension on discharge coefficient of circular crested weirs. He used models with ventilation, water and Lissapol N liquid with  $0.034 < \sigma < 0.059$  N/m ( $\sigma$ = surface tension) and crest's radius of 0.0068-0.00315 m. in the interval of  $2 < H_1/R < 4$ , he presented a relation to determine discharge coefficient [6].





# A Parametric Study of Jointed Plain Concrete Pavement Using Finite Element Modeling

Mr Subhransu Muduli<sup>1</sup>, Sibashish Rai<sup>2</sup>

Civil Engineering, Gandhi Engineering College, Bhubaneswar  
Civil Engineering, Gandhi Engineering College, Bhubaneswar

## Abstract

Concrete pavements face various types of distresses such as longitudinal, transverse, and joint cracking due to traffic loading and thermal stresses. The objective of this investigation was to develop Three-Dimensional Finite Element Model (3D-FEM) to assess the performance of dowel in Jointed Plain Concrete Pavement (JPCP). Finite-element modeling is a powerful tool that can be used for the simulation of the structural response of pavements under the effects of different loading condition. Most of the previous studies ignored important factors, including the combined effect of dynamic axle loads and thermal gradient. Overcoming the shortcomings of the previous studies, this study investigated the pavement response under the effect of some model parameters. The result of the study was verified by a comparison with field measurements. Results also showed that the combined negative gradient and axle loads located at the transverse joint subject the top of mid-slab, to high tensile stress that may explain the initiation of top-down cracks. These stresses increase under corner loading when the slab length is increased. In general, the study presented that the developed 3D-FEM is suitable for identifying the effect of different design features including pavement geometry, material properties, thermal gradients, and axle load and configuration on the structural response of rigid pavements.

**Keywords:** jointed concrete pavement, finite element modeling, thermal gradient, dowel bar, ABAQUS

## Introduction

The first model of a rigid pavement as a slab-on-grade system was presented by Westergaard in the 1920's. He developed this method to calculate stresses and deflections in rigid pavements due to interior, edge and corner loads (later Westergaard, 1927). The poor assumption concerning the modeling of thin slab layer and foundation and the thermal loads, and modeling load transfer devices were the main weaknesses of the Westergaard method (Wang, Sargious & Cheung, 1972).

A substantial amount of research and developments have been conducted for years to provide an analytical tool that would be able to model and analyze the behavior of rigid pavements. Several analytical softwares for modeling jointed concrete slabs on top of elastic foundations have been developed in the last five decades. The development of a 3D-FEM comprises a major part of the new design methods (Brill, Hayhoe & Lee, 1997).

Nonlinear thermal gradient yield stresses in slabs owing to their external and internal restraints, including subgrade reaction, edge contact between adjacent slabs and slab-foundation friction as the external restraints due to thermal curling and thermal expansion or contraction. The restraining interaction of surrounding layers across the slab depth, which resists against the distortion of the slab as a consequence of the nonlinear thermal gradient, can produce additional internal stresses in the slab (Zokaei-Ashtiani et al. 2013; Ioannides, Peng, & Swindler, 2006).

## Development a Conceptual Framework for Industrial and Hazardous Wastes Rating Systems

Sibashish Rai<sup>1</sup>, Smruti Ranjan Parida<sup>2</sup>

*Civil Engineering, Gandhi Engineering College, Bhubaneswar*

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### Abstract

Production of a large volume of industrial and hazardous waste with various compositions makes the need for comprehensive management and consequently the concept of waste rating more tangible. Despite numerous waste rating systems presented so far, analyzing the makeup of such systems play a significant role in meeting human health. In this study, the structure of 34 rating systems of industrial and hazardous waste have been analyzed based on both quantitative and qualitative standpoints and the results are presented as a formational-conceptual framework. Results showed that every rating system is formed of two parts of formational fundamentals and functional indices, which the first part has a longitudinal relation with the second. While lowly considered, this study is focusing on the formational fundamental part in the rating systems of industrial and hazardous waste, as intellectual prerequisites in suggesting a new system. Some of the factors in the first level are: dependence of the organization which determines the policy and general goals of a rating system, time of presenting the method during which remarkable changes take place in computing methods of the rating systems, infrastructures and facilities which are efficient in the accuracy and scope of the system and finally references and standards causing variations in definitions and final results of the rating system. Furthermore, factors such as: aspects of the study and style of use are identified in second level of formational fundamentals. Finally, the fundamentals are presented in a formational-conceptual framework for better perceiving and more effective use.

**Keywords:** Industrial and Hazardous Waste, Waste Rating Systems, Conceptual Framework, Formational Fundamentals, Functional Indices.

### Introduction

In recent years, industrial developments and technology revolutions associated to human needs have made up negative footprints in environment such as serious damages to ecosystem, production of large amounts of waste (low or high hazard), environmental pollutions, destruction of certain species and even more important and jeopardizing human health and increase of death [1-6]. Industrial waste, more specifically hazardous ones after creating, has to be collected, stored, transported and finally recycled or disposed. In all of its activities, physical and chemical properties of species, particularly properties that are determining flammability, corrosion and reactivity play significant role [7]. Tracks of spread of such wastes in environment remain remarkable as long as treated, stored, transported and disposed incorrectly [8]. Although the definition of hazardous waste, articulated by US environment protection agency and there is no unique and internationally accepted definition for it, identifying waste in every country is based on four main factor which are introduced by this organization, followed as: (1) flammability, (2) reactivity, (3) corrosion and (4) toxicity [9]. Various organizations such as World Bank [10], World Health Organization (WHO) [11], US Environment Protection Agency [12], American congress in protection and recycling of resources [13] Federal law [14, 15], have presented various definitions and scientific and practical guidelines for management of hazardous waste. In common opinion of all of these organizations, chemical and industrial wastes are a group of hazardous waste. If not managed properly, causes risks at different levels for human and environment and, various characteristics of hazardous waste leads to intensification of waste management troubles [16].

Generally, wastes have different levels of hazardous characteristics and damaging potential and it is not possible to treat them in the same way in different steps. For instance, there are a lot of differences in production of sludge waste of petrochemical industries and sludge resulted from treatment unit of detergent industry from the view point of collection and transportation as well as final disposal. Regarding the wide range of industrial superfluous materials generated in various sections, they can be categorized based on different standards such as: metagenesis, risk level and method of disposal [17]. This hazard based classification introduced a concept in 1980 as waste rating based on hazard and damage potential to human and environment. Researchers and various groups have presented multiple rating systems. The important point among all presented systems is the formation of a hazard rating system and intellectual foundation relying on it, which have not been taken care in previous studies and the main goal have been concentrated on indices and affecting routs of waste (i.e. on hazard party (i.e. human or environment)).

The aim of this study the formational analysis of rating systems of industrial and hazardous waste and proposing the most important fundamentals of these systems. In other words, fundamental indices of a rating system and enough attention to them lead to improvement in efficiency of a rating system in a formational-conceptual framework. The components of this framework are at different levels of precision and arouse sensitivity. According to conformity of a rating and scoring system of waste and its fundamentals, more accurate results are anticipated. Achieving these goals, the history of studies on rating systems of industrial and hazardous waste and theoretical and practical fundamentals used in them are assessed.



# Compressive strength of high performance concrete by using different type of additives

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Civil Engineering, Gandhi Engineering College, Bhubaneswar

**Abstract** - The objective of this study is to evaluate the structural strength of high performance concrete by utilizing green and pozzolanic material as supplementary cementitious material. About 95 Specimens of different mix proportions were analyzed in the study. This study primarily focuses on the Strength characteristics for estimating the 7, 14 and 28 days Compressive strength with constant W/C ratio of 0.35. Detailed laboratory investigations are performed covering almost all the available Supplementary cementitious materials nearby area in Delhi, NCR.

The study helps in identifying influence of SCMs on strength characteristics of HPC. The use of alternative material of Portland cement leads to reduction of emission gasses and impact on production capacity of cement plant and provides a strategy to reducing the cost of waste disposals. This research work will enhance and accelerates the decision making process in the pre, during and post construction phases of any infrastructure projects.

**Key Words:** High, Supplementary and Cementitious Material, Waste Material, Concrete, Mechanical property.

## 1. INTRODUCTION

Sustainability is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987). Therefore, sustainable development is disturbed with protecting the world's resources and sharing its benefits for the betterment of generations to come.

In order to fulfil its commitment to the sustainable development of the whole society, the concrete of tomorrow will not only be more durable, but also should be developed to satisfy socio-economic needs at the lowest environmental impact (Aitcin, 2000). In his prediction for the 21st century concrete construction, Swamy (1998) stated "bearing in mind the technical advantages of incorporating PFA, slag, SF and other industrial pozzolanic by-products in concrete, and the fact that concrete with these materials provides the best economic and technological solution to waste handling and disposal in a way to cause the least harm to the environment. PFA, Slag, SF and similar materials thus need to be recognized not merely as partial replacements for PC, but as vital and essential constituent of concrete". Thus, using various wastes or by-products in concrete is a major contribution of the 21st century concrete industry to the sustainable development of human society.

It is mistaken to bestow that supplementary cementitious materials were used in the concrete only because of their availability and just for economic considerations. These materials present some unique desirable properties which cannot be met by using OPC only (Neville, 1995a). For producing high performance concrete (HPC), it is well recognized that the use of supplementary cementitious materials (SCMs), such as Silica Fume (SF), Alccofine and Fly Ash (FA) are necessary. The concept of HPC has definitely evolved with time. Initially it was equated to high strength concrete (HSC), which certainly has some merit, but it does not show a complete and true picture.

There is a need to consider other properties of the concrete as well which sometimes, may even take priority over the strength criterion. Various authors proposed different definitions for HPC. According to Forster (1994), "High Performance Concrete is a concrete which made with appropriate materials, combined according to a selected mix design; properly mixed, transported, placed, consolidated and cured so that the resulting concrete will give an excellent performance in the structure in which it is placed, in the environment to which it is exposed and with the loads to which it will be subjected for its design. Thus, HPC is directly related to durable concretes. There are numerous ways to measure the durability of concrete. The resistance to chloride, water and air penetration is some of the simplest measures to determine the durability of concrete. The penetration of water, chloride and other aggressive ions into concrete primarily governs the physical and chemical processes of deterioration (Monteiro, 1993).

As stated in introduction, one of the main objectives of this research was to produce data from a systematic investigation so as to contribute to the development of performance based specifications for HPCs. Although the latter was not part of this research, it was considered to be essential to measure both physical properties and durability characteristics of HPCs containing both binary and ternary blends of Portland cement and supplementary cementitious materials. The criteria for assessing the quality of hardened HPCs are dependent on their intended purposes. For instance, a HPC designed for a sulphate exposure condition needs to be assessed differently from that designed to resist a marine exposure condition. This means that a general research on HPC with the aim of producing data contributing to the development of performance based specifications should not be confined to one transport property or durability mechanism. This performance based specifications will be beneficial for developing countries like India as industries

# The Impact of Employee Engagement on Organization's Productivity

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## Abstract

Employee engagement has emerged as a popular organizational concept in recent years. It is the level of commitment and involvement an employee has towards their organization and its values and beliefs. An engaged employee is aware of business context, and works with colleagues to improve performance within the job for the benefit of the organization. Employee engagement initiative has a direct impact on the organization's productivity. All organizations want their employees to be engaged in their work. Employee engagement is linked to customer satisfaction which is linked to an organization's financial success. Engagement comes about when enough people care about doing a good job and care about what the organisation is trying to achieve and how it goes about doing it. This caring attitude and behaviour only comes about when people get satisfaction from the jobs they do believe that the organisation supports them and work with an effective HR manager.

In this paper a literature review from various research findings and corporate practices are employed using a descriptive study technique. It projects the impact of employee engagement on organization's productivity. It also presents the factors influencing the employee engagement and organizational outcomes.

**Keywords:** *Employee Engagement, Organisation, Outcomes, Productivity, Retention.*

## Introduction:

Over the past decade, many authors have written on the topic 'Employee Engagement'. Kahn (1990) was the first to coin the term engagement as he described how people can "use varying degrees of their selves - physically, cognitively and emotionally in work role performances". Employee engagement is not the only term used to describe the positive attitudes and behaviour of employees at work. Other terms commonly used are 'commitment', 'organisation citizenship behaviour' and the 'psychological contract'. The policy and practice implications of employee engagement are often captured in 'high involvement work practices' and 'high performance working'.

Employee Engagement is arguably the most critical metric for organizations in the 21st Century. Employee engagement is directly influenced by growth of the organization, value addition experienced by employees and employee perception of the organization. HR practitioners believe that the engagement challenge has a lot to do with how employee feels about the about work experience and how he or she is treated in the organization. It has a lot to do with emotions which are fundamentally related to drive bottom line success in a company. Employee engagement initiative has a direct impact on the organization's productivity.



## Safety Analysis Construction sites in India.

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**Abstract:** Safety is an important aspect in relation to construction works. Construction work involves risk of fatal injuries or even death. Safety is a major concern and can be ensured with proper equipments, safety precautions and education about risks involved. Even the country's government can play significant role by issuing strict rules and regulations to be followed at construction sites. In my view workers must also be provided with minimum life cover according to their human value. Thus, the research work has been done to ensure the safety of masons, laborers, project managers and everybody related to construction work.

**Keywords:** Construction technologies, Safety measures, Government control.

### INTRODUCTION

Safety is the preservation of the lives, property and environment by taking preventive reserves to prevent accidents, destruction and pollution through accident prevention programs. It is the state of being "safe", the condition of being protected against physical, mental, spiritual, social, financial, political, emotional, psychological, educational or other types or consequences of damage, failure, error, accidents, harm or any other event which could be non-desirable.

Safety can also be defined as the control of known hazards to achieve an acceptable level of risk. This can take the form of being protected from the event or exposure to something that causes health or economical losses or damages. It can include protection of people or of their possessions.

Safety is the condition of a "steady state" in an organization or place, doing what it is supposed to do. "What it is supposed to do" is defined in terms of public codes and norms, associated architectural and engineering designs, corporate insight and mission statements, and operational scheme and personnel policies. For any organization, place, or function, large or small, safety is a normative concept. It collates with situation-specific definitions of what is expected and acceptable.

### I. PLACING THE FIGURES



Figure: Picture showing workers working with safety equipments, which are helmet and gloves.

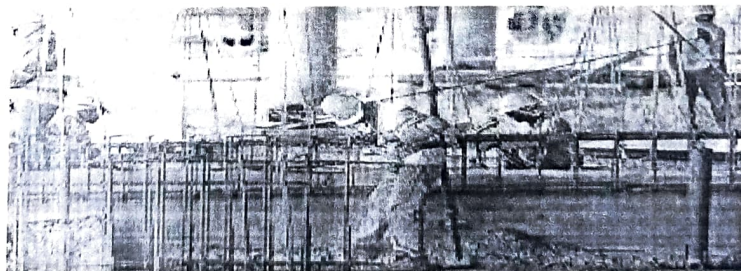


Figure: Picture showing workers at construction site

## Cost Optimization and Sensitivity Analysis of Composite Beams

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### Abstract

This study presents exact solution analysis for the cost optimization of Composite Beams (CB) based on the Load and Resistance Factor Design (LRFD) specifications. Matlab code formulation is applied to analysis of sensitivity for various parameters such as cost of concrete, steel beam, span length, concrete slab thickness, compressive strength of concrete, steel beams space and shear connectors on CB. Almost 20 thousands design were analysed to obtain various contour which be found that it is feasible, efficient and effective and capable in optimization of composite beam designs.

The obtained results represent that many of the contour are capable by achieving substantial cost savings for composite materials. Therefore, the analysis can be developed for practical designs to structural designers. A parametric study was also conducted to investigate the effects of IPE, IPB, INP profiles, UNP size and thickness of slabs and beam length on the cost optimization of CB.

Keywords: Composite Beam; Cost Optimization; Sensitivity Analysis.

### 1. Introduction

The design of composite beams is highly iterative and complicated which is depending on the design parameters, a design can be full composite or partially composite. In the case of design has to consider plastic deformation on the basis of the LRFD and American Institute of Steel Construction (AISC) codes. Many researchers has been applied cost optimization of composite beam using prediction models such as neural dynamics, discrete using a floating point genetic algorithm, one way waffle slab and slab formwork using charged system search algorithm, social harmony, improved harmony search, ant colony system and genetic algorithm models [1-11]. Adeli and Kim [12] implemented genetic algorithm to cost optimization of composite floor. The total cost function includes the costs of concrete, steel beam and shear connectors. And design was based on the AISC and LRFD in the plastic design concepts. Based on a comparison with example designs presented could concluded that a formal cost optimization can result in substantial cost savings. In another one [13] three different materials: concrete, steel, and formwork used to minimize the cost as well as weight minimization which can be applicable for beams, slabs, columns, frame structures, bridges, water tanks, floor plates, shear walls, pipes, and tensile members. The concluded that life-cycle cost optimization of structures where the life-cycle cost of the structure over its lifetime is minimized instead of its initial cost of construction only.

Another view of this work due to sensitivity analysis of optimization is better to mention some work what has been done prior. There is some works on sensitivity analysis such as sensitivity analysis of reinforced concrete beams, composite floor systems channel-section and hollow-section trusses, design optimization of shell and tube heat exchangers, Structural optimization, honeycomb sandwich cylindrical columns under axial crushing loads, frequencies are modes for composite laminated structures, lateral-torsional buckling resistance of steel beams, machine repair problem and frequency sensitivity analysis for beams carrying lumped masses with translational and rotary inertias [14-23]. Hongbone is study the economic optimization and sensitivity analysis of photovoltaic system in residential Building which deals with optimal size of grid-connected photovoltaic (PV) system for residential application. He use simple linear programming model to minimize the annual energy cost of a given customer, including PV investment cost, maintenance cost, utility electricity cost, subtracting the revenue from selling the excess electricity. And the sensitivity of levelized cost and simple payback period to various economic and technical circumstances has been analyzed [24].



# A State-of-the-Art Review on Soil Reinforcement Technology Using Natural Plant Fiber Materials: Past Findings, Present Trends and Future Directions

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## Abstract

Incorporating sustainable materials into geotechnical applications increases day by day due to the consideration of maintaining healthy geo-environment and future generations. The environmental issues associated with conventional synthetic materials such as cement, plastic-composites, steel and ashes necessitate alternative approaches in geotechnical applications. Recently, natural fiber materials in place of synthetic material have gained momentum as an emulating soil-reinforcement technique in sustainable geotechnics. However, the natural fibers are innately different from such synthetic material. The behavior of fiber-reinforced soil is influenced not only by physical-mechanical properties but also by biochemical properties. In the present review, the applicability of natural plant fibers as oriented distributed fiber-reinforced soil (ODFS) and randomly distributed fiber-reinforced soil (RDFS) are extensively discussed and emphasized the orientation of RDFS based on the emerging trend. Review also attempts to explore the importance of biochemical properties of natural fibers on the performance in subsoil reinforced conditions. The treatment methods which enhance the strength and lifetime of fibers are also presented. While outlining the current potential of fiber reinforcement technology, the use of bio-gases have been highlighted at their importance. Finally, the review briefly documents the future direction of soil reinforcement technology by associating bio-mediated technological line.

**Keywords:** natural fibers; synthetic material; biochemical properties; sustainable geotechnics; oriented distributed fiber-reinforced soil (ODFS); randomly distributed fiber-reinforced soil (RDFS)

## 1. Introduction

Soil is a porous media that exhibits weak behavior in tension, with geotechnical properties that vary with environmental factors. High demand has been made for unstable and erosive lands with poor geotechnical properties due to the ever increasing population growth and urbanization. Therefore, development of effective stabilization techniques for these environmentally sensitive lands and soils has been called for [1].

In the past, there were myriad of soil improvement techniques have been proposed and implemented to stabilize the weak lands prior to the constructions. The suggested improvement methods can be mainly categorized into two types: (i) Mechanical methods of stabilization and (ii) Chemical methods of stabilization. Mechanical methods include deep placement and replacement, stage constructions, preloading, stone columns method, soil nailing and synthetic soil reinforcement applications. The chemical methods of stabilizing consist of deep in-situ mixing and surface stabilizations by using cement, fly ash, bottom ash, bentonite, gypsum, silica fume and blast furnace slag [3-6]. Also, the chemical stabilization techniques were widely incorporated with the ashes of several organic materials derived from burning process [7]. However, the above conventional stabilization techniques (mechanical and chemical) are coupled with severe environmental issues such as global warming via large carbon-dioxide emissions, high energy cost, environmental (air, land and water) pollutions, depletion of non-renewable resources and influx of heavy and dangerous substances to the geo-environment [8-10]. Therefore, ecofriendly applications are highly preferred in the field of Geotechnical and Geoenvironmental engineering due to deliberation on healthy future of the globe. Thus, the current intentions of Engineers are targeting on modifying the existing weaker ground and soils using ground improvement techniques by ensuring sustainability in land use [11-13].

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# Study the Using of Reed Mats in Asphalt Pavement Layers

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## Abstract

During the service life, the asphalt pavement layers subjected to various detrimental types of distresses such as permanent deformation, fatigue, stripping and shoving which lead to the complete failure of the pavement. To improve the permanent deformation (rutting) is the importance distresses which cause impact on the high way performance and reducing the service life of the pavement. The research aims to utilize locally available materials and environment friendly as reinforcement layer. The program of this research include preparing asphalt mixes represent surface layer by using locally available materials and using the reinforcement layer which made of reed. The permanent deformation test has been done with three temperatures (40°C, 50°C and 60°C) and four locations of the reed mats. The test results of the wheel-Track for the rutting measurement showed that the rut depth decrease in reinforcement layers as compared with conventional cement layers for all temperature testing. The reed netting embedded bottom and middle of wearing layer has the best amount of improvement (75%, 84% and 85%).

**Keywords:** Asphalt Pavement; Distresses; Permanent Deformation; Reed; Wheel-Track; Improvement.

## 1. Introduction

The asphaltic paving mixture during the service life it is normally subjected to various detrimental types of distresses. These distresses are caused by weather, load, construction practices and deceleration of vehicle at checkpoints and deflection materials. Some of this serious failure includes permanent deformation or rutting, fatigue, stripping and shoving which lead to the complete failure of the pavement. Such types of failures reduce the performance of asphalt pavements, which does not cause bad ride quality to motorists, but also are caused the higher cost at life cycle, some of the mentioned distresses are related to the asphalt cement binder and it can be controlled significantly by modifying the material with chemical additives [1]. Pavement reinforcement recently became an important part of designing and rehabilitating pavement systems which improve pavement performance, increase the service life and reduce its current premature failures [2]. Base or subbase reinforcement is defined in flexible pavements to support vehicular traffic over the pavement structure, improve the service life and obtain equivalent performance with a reduced structural section [3]. Signs of distresses in the roads due to high traffic loads and the urban environment. The environmental variations, especially between day and night as well as between summer and winter are greatly affected the durability of asphaltic pavement. During summer the high pavement temperature that reduces the stiffness of paving mixture that results in pavement deformation[4]. In Iraq, for a little recent year after reconstruction of the pavements, permanent deformation distress was appeared at several locations in the highways, because of the increasing of traffic loading, the hot claimant condition during summer days, and poor quality control as shown in Figure 1 [5].



## Effectiveness of Preventive Maintenance Treatments on Road Pavements

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### ABSTRACT

Transportation departments worldwide have usually allocated resources for building new infrastructures; recently, the focus has instead moved towards maintaining and preserving existing assets and allocating funding in a more effective way. Several studies have already determined that carrying out maintenance on pavements retaining high performance effectively results in savings from both cost and performance perspectives; a preventive maintenance approach indeed, maintenance, if applied at the right time using the right treatment, is able to extend the service life of a pavement; acting proactively on pavement deterioration therefore represents a key role for optimizing maintenance and rehabilitation strategies. Although several references discuss the advantages of a preventive maintenance approach, a very small amount of data on its short and long-term effectiveness is available. In common practice, pre-established treatments are therefore often applied regardless of the type of distress, traffic, and timing of the intervention, thus wasting resources without guaranteeing any substantial improvement in pavement performance.

The present paper aims to analyze and quantify the benefits of adopting a preventive maintenance approach. A considerable amount of pavement sections were analyzed in the state of Virginia (USA) and the effectiveness of various preventive maintenance treatments was evaluated in order to quantify the extension of life provided to pavements. Post-treatment deterioration curves were developed according to the experimental data gathered.

Since effectiveness of treatments was also found to be affected by traffic levels and structural capacity of pavements, several deterioration models were plotted. Research findings can be exported and generalized to be applied to a variety of pavement maintenance situations encountered by road agencies.

### 1. INTRODUCTION

Presently, one of the most critical problems that affect the infrastructure system is the optimization of available resources, which are usually very limited, to preserve high system performance. Keeping road pavements at a high level of performance entails an effective maintenance plan over their service lives. Maintenance, if scheduled at the proper time and adopting the right treatments, can significantly reduce the overall costs while preserving the asset at higher performance over the long-term. An effective pavement management system (PMS) that continuously monitors the current road conditions is therefore desirable for predicting future deterioration, properly schedule maintenance activities, and correctly allocate budget. Unfortunately, a vast majority of road authorities and municipalities do not collect any sort of pavement data on maintenance effectiveness in current practice. The quality control of road pavement projects has been historically focused on achieving minimum standards just after the placement but almost nothing has been recorded during the pavement service life. Moreover, a general lack of monitoring and therefore a significant uncertainty of long-term pavement be-

## Geotechnical Uncertainties and Reliability Theory Applications

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**Abstract:** Slope engineering is nowadays in great demand of proper risk management. Predictions regarding slope performances are subjugated by uncertainties. This includes uncertainties related to soil properties, model uncertainties and human uncertainties. In this study author discusses reliability analysis principles in relation with conventional practices and to prove its efficiency three case studies of Malaysian slope failures has been taken for further clarification. It is also mentioned that the concluded probability of failure still needs more refinement as no human uncertainties has been considered in this probabilistic analysis.

Probabilistic analysis afford greater insight into design reliability, hence, supporting the engineering judgment and reaping the decision-making process. So, the intelligibility, effortlessness and cost/time effectiveness are indispensable essentials in order to successfully express and commune a probabilistic methodology to practicing engineers.

**1. Introduction**

In the field of geotechnical engineering (Phoon 2005) highlighted two major sources of uncertainties. First source refers to the error in design soil properties and the second source is geotechnical calculation models. The first source of geotechnical uncertainty is complex because of spatial variability, quality of equipments, procedures used and models used to fit the measurement with design properties. In this regard a significant role is played in furnishing realistic statistical estimates of design soil properties and to offer strategies for calibration of geotechnical reliability based design equations (Dey and Ghahayy et al. 1995).

Model uncertainty arises due to mismatching of theory, adopted in prediction models and reality. Model uncertainties may be divided into conceptual, Numerical uncertainty consists of simplified computational suppositions like 2-D model versus 3-D empirical calibrations as in case of SPT blow counts and settlements and mathematical estimations. Conceptual uncertainty reflects in progressive failure, progressive development of internal erosion, undrained against drained strength characterization, time dependent softening processes. Regarding model uncertainty, use of different data bases is also observed as one of the major source in producing biased results (Lacasse and Nadim 1996). Recently, here for example current method of predicting offshore pile foundation capacities, they are on the basis of load tests on the small diameter piles. The configuration of piles means pile length, diameter and capacity is not compatible in many ways. One most authentic way of quantifying model uncertainty is comparison of model predictions with observed performance. One can discuss about the comparison of settlement of footings on sand with Pecks and Bazaaras model on SPT. This case shows high level uncertainty. As ratio of observed to predict settlement carries a mean of 1.46 and standard deviation of 1.52 (Baecher and Christian 2003).

Slope engineering is nowadays in great demand of proper risk management. Predictions regarding slope performances are subjugated by uncertainties. This includes uncertainties related to soil properties, model uncertainties. Slope failures and poor functioning of slopes are not rare; it is increasing worldwide. Conventional slope practices are not sufficient to conquer the uncertainties. Reliability index is more significant measure of safety/stability rather than factor of safety. Slopes having high reliability index will expect to perform satisfactorily as compared to low reliability index slopes. If the reliability index is alarmingly low, it may be categorize as hazard. Reliability index of slopes is defined by a safety factor separating from unity, divided by number of standard deviations of safety factor. Once the shape of probability density function is estimated, the reliability index can be used to estimate the probability of failure. (Peterson 1992) reported in his work that through a fuzzy logic analysis of reply to a survey of geotechnical engineers, (Gnanaprakasam, Mitschani et al. 1992) ascertained Table 1. These criteria bracket together up to standard levels of probability of failure with various design conditions. Criteria for minimum values of reliability index for natural slopes may also be defined by taking potential failure mode, location and type of slope and consequences into consideration (Gnanaprakasam and Elmetteij 2003).

(Husein, Alkawi, Hassan et al. 2000) worked on the same lines to counter uncertainties by taking two reliability analysis tools. This study specifically provides a methodology (Figure 1) to analyze the uncertainties involved in slope stability. Two methods of First Order Reliability Method (FOSM) and Monte Carlo Simulation (MCS) have been taken into account to quantify the uncertainties present in calculated safety factor. Two slopes are taken as an example the



# Properties of Hybrid Fibre Reinforced Geopolymer Concrete under Ambient Curing

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**Abstract:** The manufacture of Portland cement releases carbon dioxide. The environmental problems caused by cement production can be reduced by finding a substitute conventional concrete material. An environmental friendly concrete is developed by replacing cement by flyash and GGBS and there by forming geopolymer concrete. Evolution of geopolymer concrete under ambient temperature broadens its suitability and applicability to concrete based structures. Different molarities of sodium hydroxide solution i.e. 8M, 10M and 12M are taken to prepare different mixes and the compressive strength is calculated for each of the mix. From that optimum molarity was obtained and which is used for further studies. The steel fibres are added in this mix at varying percentages of 0, 0.25, 0.5, 0.75 and 1. After getting the optimum percentage of steel fibres, the polypropylene fibre are varied at 0, 10, 20, 30 and 40 percentages of steel fibre with optimum steel fibre ratio as constant. The curing temperature was fixed at room temperature for 24 hours. The specimens are tested after the ages of 28 and 90 days. The tests were conducted for cement, chemical admixture, and coarse aggregate & fine aggregate. The concrete specimens were tested for mechanical properties of concrete namely, cube compressive strength, splitting tensile strength and flexural strength.

**Keywords:** Polypropylene Fibre, Geopolymer, Flyash, GGBS

## 1. Introduction

The applications of concrete in the area of infrastructure, habitation, and transportation have greatly prompted the development of civilization, economic progress, and stability and of the quality of life. However, due to raw materials, some inherent disadvantages of Portland cement are still difficult to overcome. There are two major drawbacks with respect to sustainability. About 1.5 tonnes of raw materials is needed in the production of every tonne of Portland cement, at the same time about one tonne of carbon dioxide (CO<sub>2</sub>) is released into the environment during the production. Another effort to make environmental friendly concrete is the development of inorganic aluminosilicate polymer, called Geopolymer, synthesized from materials of geological origin or by-product materials such as fly ash, that are rich in silicon and aluminium. It was found that heat-cured low-calcium fly ash-based geopolymer concrete possesses high compressive strength, negligible, very little drying shrinkage and moderately low creep.

**Geopolymer:** It is an inorganic alumina-silicate polymer is synthesized from predominantly silicon and aluminium materials of geological origin, or by-product materials such as fly ash, ground granulated blast slag (GGBS). Ground Granulated Blast Slag was replaced in different proportions to fly ash to enhance various properties of concrete. Geopolymer concrete do not require any water for matrix formation, instead the alkaline solution react with Silicon and Aluminium present in the fly ash. Geopolymer is synthesized by reacting aluminosilicate-reactive material with strong alkali solutions, such as sodium hydroxide (NaOH) or potassium hydroxide (KOH), sodium silicate or potassium silicate. The mixture can be cured at room temperature or temperature over 1. The GPC was found to have a high degree of strength when it had inorganic binder based on alumina and silica containing materials like fly ash and GGBS. But, as in conventional reinforced concretes, the GPC also needs to be reinforced.

be reinforced with steel bars for its large scale utility in civil engineering structural applications. Hence, the investigations on behaviour of Reinforced GPC (RGPC) were undertaken.

The objectives of the work can be summarized as

- To obtain the optimum molarity.
- To develop the proper mix proportion for geopolymer concrete
- To obtain the optimum of steel fibre reinforced geopolymer concrete.
- To obtain the optimum hybrid fibre content in GPC
- Comparison of results of geopolymer concrete specimens with hybrid geopolymer concrete specimens.

## 2. Experimental Investigation

The main objective of the study is to investigate the impact of steel fibres and hybrid polypropylene-steel fibres on the mechanical properties and ultimate strength of geopolymer concrete under ambient curing condition. The experimental programme consisting of casting and testing of steel fibre reinforced geopolymer concrete specimen and hybrid fibre reinforced geopolymer concrete specimen, to study their mechanical properties.

### Test On Constituent Materials

**Flyash:** Low-calcium, Class F, obtained from the silos of Mettur Thermal Power Plant in Tamil Nadu. It is refractory and alkaline in nature, having fineness 2.98 and specific gravity 2.36

**Ground Granulated Blast Furnace Slag:** Different laboratory tests were conducted on GGBS to determine Fineness, Specific Gravity. The specific gravity is 3.21 and fineness 2.78. The results conforms to the IS