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**Effect of alccofine and fly ash on analytical methods of self-compacting concrete**

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Authors: Bode Venkata Kavyateja, J. Guru Jawahar, C. Sashidhar

**Abstract**

Cement is the most significant component in concrete. Large-scale manufacturing of cement consumes more energy and releases harmful products (carbon dioxide) into the atmosphere, adversely affecting the environment and depleting natural resources. A lot of research is going on globally, concentrating on the recycling and reuse of waste materials from many industries. A significant share of research is focused on finding cementitious materials alternatives to ordinary Portland cement. Many industrial waste by-products, such as quartz powder, metakaolin, ground granulated blast furnace slag, silica fume, and fly ash, are under investigation for replacement of cement in concrete to minimize greenhouse gases and improve the sustainable construction. In this research, the effect of a new material, i.e., alccofine as a partial replacement (i.e., 0%, 5%, 10%, and 15%) and constant fly ash dosage (i.e., 25%) on thermogravimetric analysis, X-ray diffraction analysis, Fourier transform infrared spectroscopy, scanning electronic microscopy analysis on concrete were studied. Adding alccofine and fly ash showed a significant improvement on the analytical methods of self-compacting concrete.

# Effect of stiffeners in cleat angle based precast beam-column connections under reverse cyclic loading

[Thulasirajan Krishnan](#)  , [Revathi Purushothaman](#)

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## Abstract

Generally, wet connections are preferred for joining the beam and column elements of conventional precast concrete frame, which significantly affect the advantages of speedy and cost effective construction. Moreover, after an earthquake, the monolithic form of wet connections leads to the irreparable damages of structural elements. Thereby consumes significant downtime for the reuse of the building. In order to address these issues, the present study focuses on the performance of mechanical device (cleat angle) connections with the incorporation of damage avoidance and easily demountable with that of the monolithic connection in terms of load-displacement behavior, load envelope curves, deformation capacity, secant stiffness, energy dissipation, equivalent viscous damping and stiffness degradation. From the test results, the cleat angle with stiffener (single and double) connections performed satisfactorily as compared to that of precast connection with unstiffened cleat angle. Overall, the cleat angle connection with single stiffener satisfied the criteria of speedy construction, easily demountable with minimal structural damage and recommended for the moderate seismic regions.

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## Introduction

Precast concrete construction have intrinsic advantages such as faster construction, cost effectiveness, enhanced quality control through factory fabrication of structural elements and reduced site formwork and labors [1], [2]. The field investigation of past earthquakes revealed that the failure of the precast concrete structures is due to poor connection details [3], [4]. The structural integrity and force transfer between the precast beam and column elements depends on their connections, which play a major role in seismic events. According to the International Federation for Structural Concrete, the precast beam-column connections are classified as equivalent monolithic and jointed connections [5]. The equivalent monolithic connections are wet connections, which uses a significant amount of cast-in-situ concrete in the connection region to cover the exposed reinforcements [6]. Even though, the seismic performance of equivalent monolithic connections emulates the traditional monolithic connection but significantly

# Experimental Investigation of Exterior Mechanical Precast Beam Column Connections using Internal Dissipators under Seismic Loading

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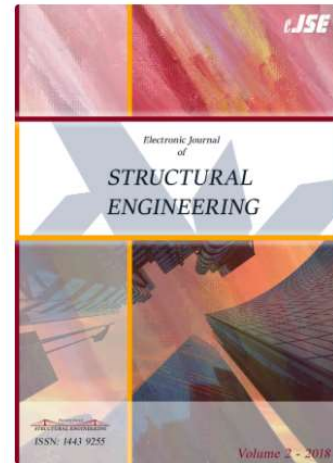
DOI: <https://doi.org/10.56748/ejse.182642>

**Keywords:** Precast beam column connection, Seismic loading, Cleat angle, Stiffener, Internal dissipator

## ABSTRACT

This paper investigates the development and testing of the proposed one-third scaled precast beam column specimens using cleat angle and unbonded threaded rod connection (internal dissipator) under reverse

cyclic loading. One monolithic specimen for reference and two precast specimens were studied. The parameters considered in the precast specimens were the presence of stiffener and the action of cement grouting in the predetermined gap of the beam column interface region. The load and displacement were measured for the cyclic loading and thereby strength, hysteretic behaviour, energy dissipation, stiffness, ductility and stiffness degradation were computed and compared. The experimental results showed that the performance of monolithic specimen was superior to precast specimens. The performance of precast specimen with cleat angle and stiffener was found to be superior to precast specimen without stiffener.



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# Development and testing of damage controllable precast beam–column connection under reverse cyclic loading

[Thulasirajan Krishnan](#)  & [Revathi Purushothaman](#)

*Asian Journal of Civil Engineering* **21**, 1343–1354 (2020) | [Cite this article](#)

## Abstract

The prime goal of this research is to develop a damage controllable system in the precast beam–column connection using un-bonded steel rods (dissipaters) and cleat angle. To achieve this goal, two precast specimens were studied and their seismic performances were related to the monolithic specimen. One-third model specimens were studied. The column and beam elements were connected using cleat angle and un-bonded steel rod (dissipaters) in the first precast specimen. The second precast specimen was similar to the first specimen, but modified with the provision of channel section and steel duct at the beam end region. Reverse cyclic loading under displacement control was applied to the specimens. The damage mechanism, peak strength, force–displacement envelope curve, hysteretic response, energy dissipation, secant stiffness, hysteretic damping ratio and stiffness degradation were assessed and compared among the specimens. The dissipater's strain profiles were also estimated. From the test results, the modified precast specimen suffered the minimal stiffness degradation with 12% peak strength enhancement in the positive direction with respect to the monolithic specimen. The seismic performance of modified precast specimen was higher to the unmodified precast specimen. It is concluded that the provision of channel section and steel duct to the precast beam–column connection improved the seismic performance with minimal structural damage.

# The Effects of Magnetics Water and Properties of Concrete with Flyash

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**Abstract**— this research investigates the effects of magnetic water on compressive strength, porosity and sorpitivity on samples prepared with magnetic water .test variables include the magnetic strength of water and curing age. The results shows that the compressive strength of concrete samples mixed with magnetic water with is higher than prepared with normal tap water. The compressive strength water is more significant early age the best results achieved for water absorption and porosity were obtained at magnetic strength of treated water is of 1t.the best results for sorpity was obtained at magnetic strength of treated water is of 0.9t.

**Key words:** Magnetics Water, Concrete with Flyash

## I. INTRODUCTION

Concrete is the majority of widely used man-made building material on the universe and cement is used to produce around 2.5 t (over one cubic meter) of concrete per person per year.

Concrete structures have been constructed since the discovery of Ordinary Portland cement (OPC) in the middle of the nineteenth century. The effect of OPC with water results in hydration products, which glue the reacting cement particles with each other to form a hard cement paste. When cement and water are combined with sand, the producing product is called mortar. If the mix also contains coarse aggregate, the resulting product is called concrete. Right from the invention of the concrete, the concrete has under gone many changes to suit the needs in the construction sites. Many additives and admixtures are being included to change the physical form of concrete and also concrete without cement, aggregates is under use. One essential thing for the word concrete to acquire strength is hydration or some other reactions by usage of water for mixing the ingredients, so water is very essential for the hydration process to take place in the concrete made with OPC

Water consumption is rising as the manufacture and human needs grow. Industrial sector comes in the second place with 20 % water consumption after the agricultural sector which accounts for 70 % of water use. In concrete manufacturing practice there is more than one billion tonnes of water devour each year. Water used in concrete manufacturing plays effective role in the concrete mix, starting from governing the hydration process of cement, along with proper curing in order to reach the desired strength is not mention managing the workability and permanence of the concrete structure. Drinking water or tap water is usually used in concrete manufacture to avoid the aspect of impurities. This limitation along the limited availability of drinking water across the planet raised the important issue of optimizing the use of water in concrete constructions. Using magnetized water is encouraging potentials in saving water amount used in the concrete construction.

## II. OBJECTIVE OF THE PROJECT

- 1) The main objective is to improve the workability and strength of concrete using magnetic field treated Water and to reduce the Cement content in the concrete mix.
- 2) To improve the workability and strength of concrete using magnetic field treated water and flyash to Reduce the cement content in the concrete mix
- 3) Then the best results for the 72hrs of the magnetic field treated water and flyash.

## III. PROCEDURE

The properties of constituent of concrete, cement, sand, coarse aggregate and water is analyzed based on standard investigational procedures laid down in IS codes. The standard investigational procedures are adopted for the determination of normal firmness, initial and final setting times and compressive strength of cement.

These are conducted of coarse aggregate and fine aggregate to find the water soaking up, specific gravity and bulk density. Slump test is conducted on fresh concrete and also test were conducted of hardened concrete to find compressive strength.

## IV. MATERIALS

The materials are used in experimental investigations are:

- 1) 53 grade OPC ( Ordinary Portland Cement)
- 2) Fine Aggregate
- 3) Coarse Aggregate
- 4) Magnetized water
- 5) Potable water
- 6) Fly ash

The properties of these materials are given in following section.

### A. Test on Cement:

Portland cement grade 53 is used in this test. It is the basic ingredient of concrete, mortar and plaster. Cement is anshapeless (glassy) powdered siliceous material that Is Answer to the alkali contented in cements to react with the lime in the high pH environment in concrete to form added C-S-H (calcium silicate hydrate) binder with the opining structure of the concrete. The chemistry related with certain Pozzolana, such as sulfides, carbon, sulfates, and alkalis can be completely harmful to the long-term permanence of the concrete. As shown in Fig 3.1

# Optimization of Aggregate Gradation and its effects on properties of normal strength concrete(M20)

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\*\*\*

**Abstract** - Aggregate as the main constituent of concrete about 70.0% to 80.0 % occupy the total volume of the concrete. They highly affect the both fresh and hardened concrete properties of the concrete. By using the optimization techniques such as Talbot's grading curve or Power curve, Coarseness factor chart and Fineness modulus. The cement content can be reduced, it gives the dense arrangement and improve the properties of the concrete such as workability, durability, compressive strength, etc., from this experimental investigation by using of this optimization of combined aggregate gradation the concrete is prepared by using the different N values are 0.45,0.55,0.65 and 0.75 based on the fineness modulus. In this experimental investigation the mix design is done for Normal strength concrete of 20MPa based on IS 10262:2009 and optimization techniques and prepared specimen. The tests are conducted on fresh and hardened concrete like Slump test, Bulk density of concrete, Compressive strength, Rebound hammer, Ultrasonic pulse velocity and water absorption test. Based on the test results the N value is 0.45 for maximum compressive strength and high workability. Cement content can be reduced up to 15% is possible for 20Mpa normal strength concrete based on the test results.

**Key Words:** Coarseness factor, Workability factor, Power Curve, Fineness modulus, Slump, Compressive strength

## 1. INTRODUCTION

In concrete the main constituents are cement, water, aggregates. In cement concrete the aggregates are occupy nearly 70% to 80% of the volume concrete. Normally aggregates is the important constituents in the concrete. It gives as structure of the concrete. The aggregates effects on the properties of fresh and hardened concrete. The aggregates reduce the shrinkage and economy of the concrete. By use of the aggregates their influence on cement concrete properties like strength, durability workability etc. For the achievement of high economy, the aggregates should be made clean, strong, bond strength, shape and texture, specific gravity, bulk density, voids, moisture content, fineness modulus and porosity. The concrete mix preparation made by using of cement, coarse aggregates of two different sizes such as 20mm, 10mm, fine aggregate and potable water used for mixing. The coarse aggregates give the good structural ability to the concrete and fine aggregates fill the gaps between the coarse aggregates, remaining gaps in fine aggregates fills by the cement paste. The used coarse aggregates also increasing the bulk density of the concrete. Normally from production of the concrete, cement is the most expensive material about 55% to 60% of the total cost of the production of concrete material. The paste content only 25% to 35% of the total volume of the concrete. The properties of the concrete can be improved by using well graded aggregates, the well gradation in aggregate can be attained by optimization of aggregate gradation in these views the importance of optimization of the aggregate is arises. The most suitable of aggregates gradation for concrete mix, however will depends up on actual grading, particle sizes and surface texture.

The optimization of aggregate grading is the most advantage technique for economical and technical reasons. By using of this optimization combined gradation of aggregates mixing cement content is reduced up to 10% to 15% of the total volume of the concrete and durability of concrete increased by decreasing the permeability, decreasing drying shrinkage and cracking of the concrete. By increasing the volume of aggregates in total volume of concrete porosity and voids will be decreased it will lead to increasing the structural performance of concrete.

The optimization of the combined aggregate gradation provides the densest arrangement of aggregates in given volume of concrete, it also decreases the volume of cement paste required for sufficient workability.

The optimization results to improve in the workability, finish ability, pumpability and reduced segregation, when compare to the concrete poorly graded aggregate gradation. It also reduced the shrinkage was directly reducing the cement paste in cement concrete with possible of the increasing the aggregate content in concrete and reduced the shrinkage translates into reduced concrete.

## 2. LITERATURE REVIEW

The Fuller and Thompson has given groundbreaking work on optimization gradation to the concrete on greatest strength and workability. They concluded to attain high density, aggregates should be well graded in sizes and combined with cement paste. An ideal maximum density curve was developed. The maximum density achieved was mainly due to the greatest density of the

# Effect of Fly Ash and Quarry Dust on Properties of Concrete

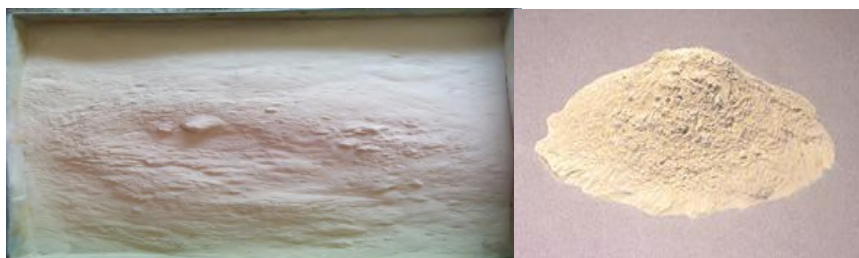
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**ABSTRACT:** The present work is an attempt to use Quarry Dust and Fly Ash as partial replacement for Sand and Cement respectively and to study the effect of them on the mechanical properties and quality assessment of concrete at different replacement levels. The experimental study has to be made to present the variation in the strength of concrete when replacing cement by fly ash with 0%, 10%, 20% and 30% by weight of cement and sand by quarry dust from 20%, 30% and 40% by weight of sand. The studies are to be made to ascertain the properties of M20 grade concrete by using fly ash as partial cement replacement and Quarry dust as partial fine aggregate replacement to determine the compressive strength experimentally at the curing age of 7, 14, 28, 56, 90 days at ambient room temperature and split tensile test and ultrasonic pulse velocity test at 28 days of curing period.

**KEYWORDS:** Fly ash, Quarry Dust.

## I. INTRODUCTION

Fly ash is the one of the fine powder major waste material produced from many thermal power plants. the utilization of fly ash as a low cost mineral admixture in concrete instead of dumping it as a waste material can have great beneficial effects.



**Fig: 1 Fly Ash**

This quarry dust which is released directly into environment can cause environmental pollution. To reduce the impact of the quarry dust on environment and human beings, this waste can be used to produce new products or can be used as admixture in concrete so that the natural resources are used efficiently and hence environmental waste can be reduced.

# Stabilization of Leachate Effected Laterite Soil using Bio-Enzyme(Terrazyme)



**S.Sameer, T.Sai Krishna, K.Sai Abhinav, K.Narasimhulu**

**Abstract:** *The present study provides an effective technique of improving properties of leachate effected soil using bio-enzyme named TERRAZYME. Soil pollution is an consequence especially in a country like INDIA unscientific disposal and dumping of solid waste leads to generation of leachate. High concentration of leachate has less pH value (i.e., acidic in nature) which reduces the particle size. Due to reduction in particle size the properties of soil are also effected. A laboratory testing program was carried out on soil to determine the behavior of leachate effected soil and terrazyme. For that we performed particle size analysis, compaction and California bearing ratio tests on 5% 10% and 15% leachate effected soil to vary the degree of contamination. Terrazyme is a natural non-toxic, non-flammable, non-corrosive liquid enzyme formulated fermented from vegetables that improves the engineering qualities of soil, facilitates higher soil compaction densities and increases stability. It can be used as soil stabilizer and also improve CBR value, durability and decreases the omc, plasticity index of soil. Terrazyme on soil is permanent and soil becomes biodegradable in nature. So we used terrazyme as a stabilizing agent to improve the properties of leachate effected soil. By using this enzyme we can improve the strength effectively, mainly California bearing ratio.*

**Key Words:** *Laterite soil, Leachate, Terrazyme, CBR*

## I. INTRODUCTION

Unscientific disposal of waste creates a very important supply of soil pollution. Soil pollution leads to modification of the physical, chemical and biological properties of soil. Leachate is generated in landfill sites by chemical reaction processes (products of organic chemistry changes in organic substances) or is that results of water penetration. Its composed of enormous amounts of each organic and inorganic compounds, associated their concentration depends to the age of a landfill site. Leachate from an improperly created landfill results an intensive contamination of soil to a lower place and adjacent to the dumping space. In reference to any potential application, information of the geotechnical characteristics of leachate contaminated soil is needed. Although this current landfill engineering stress on pollution reducing technology (by victimization appropriate liner material to avoid the migration

of leachate/hazardous waste chemicals generated during landfill), open dumping is extensively practiced in republic of India. The leachate generated from such landfill sites cause serious environmental risks to the surroundings by causing contamination of soil. Leachate from a lowland varies wide in composition depending on the age of the landfill and also the kind of waste that it contains. It will typically contain each dissolved and suspended material. The generation of leachate is caused in the main by precipitation percolating through waste deposited during a landfill. Once in reality with decomposing solid waste, the percolating water becomes contaminated and if it then flows out of the stuff its termed leachate. Extra leachate volume is created throughout this decomposition of element material manufacturing a good vary of different materials including methane, carbon dioxide and a fancy mixture of organic acids, aldehydes, alcohols and straightforward sugars. during a landfill that receives a combination of municipal, commercial, and mixed industrial waste, however excludes important amounts of focused specific chemical waste, landfill leachate could also be characterized as a water-based resolution of four teams of contaminants; dissolved organic matter (alcohols, acids, aldehydes, short chain sugars etc.), inorganic macro elements (common cations and anions as well as sulfate, chloride, iron, aluminium, zinc and ammonia), significant metals (Pb, Ni, Cu, Hg), and organic compounds like halogenated organics, (PCBs, dioxins, etc.). The physical look of leachate once it emerges from a typical landfill site may be a powerfully odoured black, yellow or orange colored cloudy liquid. The smell is acidic and offensive and should be terribly pervasive because of hydrogen, nitrogen and sulphur. The process of rising the strength and durability of soil is thought as soil stabilization. It is the method of mixing and mixing materials with soil to enhance bound properties of soil. A perfect soil stabilizer ought be simply available, economical and ecofriendly. Terrazyme is an efficient and non-corrosive liquid protein that extensively enhances the properties of the soil used for construction of roads. It is a wetting agent and its application assists within the expulsion of water from soils, and also helps within the lubrication of soil particles and will increase the compatibility of the many forms of soils. Its reaction of with several of those materials is especially owing to the ion-exchange capability of clay minerals. Terrazyme is used for various forms of soil starting from black cotton soils to hard murrum soils. It is used for all those forms of soil that includes a minimum 10% of clay particles. Soils once being treated with terrazyme begin behaving sort of a semi rigid pavement structure with abundant reduced porousness. Terrazyme is also designed to improve soil strength by increasing the density of the initial compaction and facilitating the removal of pore water, which helps in minimizing the destructive impact of water under load

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# Delineation of groundwater potential zones in Sathyavedu area, Chittoor District (Andhra Pradesh), South India, using geospatial technologies

[Veeraswamy Golla](#) 

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## Abstract

Assessment of the potential zone of groundwater recharge is extremely important for the protection of water quality management in groundwater systems. Groundwater potential areas are identified with the help of RS and GIS techniques. In this study, a standard methodology was used for the determination of groundwater potential areas by using the integration of RS and GIS techniques. The composite maps (geology, geomorphology, lineaments, slope, soils and drainage) were generated using GIS tools. The accurate information to obtain the above parameters can be considered for the identification of the groundwater potential areas. The maps are generated using satellite data (LISS-III IRS-P6) and Survey of India (SOI) toposheet of scale 1:50,000. Then, it was integrated with Arc GIS Software for the evaluation of various geomorphic units and demarked the groundwater availability. The groundwater potential

of scale 1:50,000. Then, it was integrated with Arc GIS Software for the evaluation of various geomorphic units and demarked the groundwater availability. The groundwater potential zones are classified into five categories like very poor, poor, moderate, good and excellent. In overall, the study area predominately is occupied with denudation hills and pediment slope and contains the less groundwater potential. This groundwater potential information will be useful for the effective identification of a suitable location for the extraction of groundwater.

# Assessment of Groundwater Contamination with Emphasis on Sulfates, Barites Mining Area, Mangampeta, Andhra Pradesh, India



**Veeraswamy Golla**, Balaji Etikala, Nagaraju Arveti, S. R. Sradha, N. Janardhan, M. Rajasekhar and M. Subbarao

**Abstract** In the Mangampeta mining area, 15 groundwater samples were collected in a polyethylene bottles, measuring pH and EC at the same time water samples were sent to the laboratory to analyze the various physicochemical properties of water. On this basis, the quality of drinking water and irrigation water was estimated. Parameters including PH, EC, TDS, hardness and certain cations and anions were observed in drinking water quality. These are fairly suitable for drinking purposes in concentrated area, and the second part measures the parameters such as sodium percentage, Kelly ratio, sodium absorption ratio, potential salinity, non-carbonated hardness and magnesium ration. The concentrations of sulfate in mining region ranged from 447 to 1880 mg/l in drinking water. The vicinity of Mangamapeta, which is highly polluted by sulfate ions due to the existence of natural barite ore deposits, interacts with groundwater.

**Keywords** Physicochemical parameters · USSL diagram · Concentration of sulfates diagram · Wilcox diagram · Gibb's diagram · Chadha's and correlation diagram

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# Statistical and Analytical Evaluation of Groundwater Quality of Atmakur Area, SPSR Nellore District, Andhra Pradesh, South India



Balaji Etikala, **Veeraswamy Golla**, Nagaraju Arveti, Sreedhar Yenamala, Prasad Mannala and P. L. Keshava Kiran Kumar

**Abstract** A statistical approach for instance cluster and factor modes was performed to categorize 21 wells in the Atmakur area of SPSR Nellore District based on groundwater hydrochemistry. The collected groundwater samples were examined for physico-chemical specifications and major ion chemistry like pH, electrical conductivity, TDS,  $\text{Ca}^{2+}$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{K}^+$ ,  $\text{Cl}^-$ ,  $\text{HCO}_3^-$  and  $\text{SO}_4^{2-}$  using standard methods. Additionally, chloro-alkaline indices and Gibbs ratio were executed to the analysed data to assess the dominant processes controlling groundwater chemistry of the region. Ca–Mg– $\text{HCO}_3$  was the main hydrochemical facies in Chadha's classification. The end results showed that silicate weathering (which is further endorsed by scatter diagram of  $\text{HCO}_3^-$ ,  $\text{SO}_4^{2-}$  versus  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ , dissolution of sulphates and chlorides due to the fertilizers and intense agricultural activities, water–rock interaction and reverse ion exchange are responsible for the groundwater chemistry in this region.

**Keywords** Cluster analysis · Factor analysis · Groundwater · Gibbs ratio · Indices of base exchange · Atmakur · SPSR Nellore · Andhra Pradesh

## 1 Introduction

Groundwater is one of the indispensable characteristic assets essential for human beings, house assistance, manufacturing industry, cultivation and allied activities [1]. Diversity in groundwater chemistry of a region is related to physico-chemical parameters that are significantly affected by geological processes and human activities [2].

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## Land Use/Land Cover Classification in Parts of the Sathyavedu Area, Chittoor District (Andhra Pradesh), India by using Remote Sensing and GIS Techniques

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### Abstract

The aim of the present study is to identify the land use and cover analysis of Sathyavedu area, Chittoor district, Andhra Pradesh, India by using Geographical Information System. The present study has been employed with survey of India toposheet Nos. 57 O/14, O/15, 66 C/2, and C/3 and Remote sensing LISS-III data. On the basis of field study, topographical maps and satellite data, we have been determined 15 categories in the study area. These are: built up (rural), mining/industrial, hamlets and dispersed household, reservoir/tanks, river/stream/drain, river/stream/drain, lakes/ponds, canal, scrubland open, scrubland dense, barren rocky, cropland, aquaculture/pisciculture, agriculture plantation, forest plantation and forest. Overall, the majority of land is occupied with forest land followed by cropland.

**Keywords:** Land use, land cover, satellite imageries, remote sensing and GIS

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### INTRODUCTION

Land use practices vary significantly across the world. The United Nations Food and Agriculture Organization (UNFAO) Water Development Division explains that "Land use concerns the products and benefits obtained from the use of the land as well as the land management activities carried out by humans to produce those products and benefits [1]. Land covers include grass, asphalt, trees, bare ground, water bodies, rocks and soils which are observed over the land. The information about the land cover is mandatory in water resources as well as for land and vegetation resource conservation, utilization and management so as to detect the changes in areas where there are frequent variations [2]. There are two primary methods for capturing information on the land cover: field survey and analysis of remotely sensed imageries [3]. Land change models can be built from these types of data to assess future shifts in land cover. The land use refers to the link between the land cover and the action of people living in the environment. It involves the arrangements, activities, and contribution of

people in a specific land cover for generating, maintaining or changing it [4]. Land cover refers to features of the land surface, which may be natural, semi-natural, managed or manmade. They are directly observable by the remote sensor. Land use, on the other hand, refers to activities on land or classification of land according to how it is being used, such as residential, industrial, commercial, agricultural, recreation, etc. Not always directly observable, interfaces about land use can often be made from land cover [5]. Remote sensing data can provide land cover information rather than land use information. The properties measured with remote sensing techniques relate to land cover, from which, land use can be inferred, particularly with ancillary data or a prior (already known) knowledge [6]. Identifying, delineating, and mapping land cover is important for global monitoring studies, resource management, and planning activities. Identification of land cover establishes the baseline from which monitoring activities (change detection) can be performed, and provides the ground cover information for baseline thematic maps [7].

# Characterization of groundwater chemistry using multivariate statistical analysis in parts of Nellore mica schist belt (Andhra Pradesh), India

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## ABSTRACT

The aim of the current study is to identify ground water chemistry through multivariate statistical techniques, using both factor analysis and cluster analysis. It is controlled by geogenic influence in the groundwater, agriculture activity like usage of fertilizers, rainwater infiltration and flow of water, dissolving of silicate group of minerals like soda-feldspars and plagioclase feldspar, besides weathering processes. 40 groundwater samples have been collected from the Nellore mica schist belt area of the Nellore district in Andhra Pradesh (South India) and analyzed for different physicochemical parameters, like pH, electrical conductivity (EC), total dissolve solids (TDS), hardness, alkalinity, primary cations sodium ( $\text{Na}^+$ ), potassium ( $\text{K}^+$ ), calcium ( $\text{Ca}^{2+}$ ), magnesium ( $\text{Mg}^{2+}$ ), anions bi-carbonates ( $\text{HCO}_3^-$ ), chloride ( $\text{Cl}^-$ ), sulphide ( $\text{SO}_4^{2-}$ ) and fluoride ( $\text{F}^-$ ). The structural equation modeling has been carried out through MINITAB. 2 and XLSTAT software's. Gibb's diagram highlighted the source of the origin of these chemical parameters due to rock-water interaction. Normalized bivariate plots indicate that the chemical elements are generated from the silicate weathering in the study area, where overall, the groundwater chemistry has been found responsible for dissolution of the ferro magnesium minerals (silicate group of minerals).

**Key words:** Groundwater chemistry, Factor analysis, Cluster analysis, Gibbs diagram, Scatter plots diagram, Nellore mica schist belt

## INTRODUCTION

Water is a fundamental product with an unparalleled value after air and assumes a huge part in the biosphere (in creatures and plants kingdoms), air and lithosphere (Aderogba, 2005; Mayer's, 2005; Nagaraju et al., 2017; Veeraswamy et al., 2019a, b). It is used in human settlements for drinking, sanitation, washing and agriculture. Water can occur as surface water in lakes, rain, and stream and in addition to groundwater wells, boreholes, and springs. Groundwater assets are dynamic in nature and are influenced by factors like industrialization, and urbanization and thus, its preservation is of fundamental importance. Ascertaining the quality of water is important before its utilization for different purposes, like, drinking, rural, recreational and mechanical utilizations (Brindha and Elango., 2011; Mohan Babu and Viswanadh, 2013; Nagaraju et al., 2014a). Hydrochemical assessment of groundwater is also important (Aghazadeh and Mogaddam, 2010), as the quality of water plays a prominent role in both agricultural production and human health. The hydrogeochemical investigations are also helpful in identifying quality of water (Nagaraju et al., 2014b; Karthikeyan et al., 2011). The hydrochemistry of groundwater reveals the natural processes involved in governing the chemical elements dissolved in water, major part of which comes from the weathering of rocks and soils and a minor part from atmospheric precipitation (Nagaraju et al., 2006). Anthropogenic disturbances are also increasingly play a role in the changing of groundwater quality. The over-exploitation of aquifers for agricultural, industrial and urban uses along with structural and climatic conditions increases the possibility of deterioration of groundwater. Discharge of untreated or inadequately treated waste water, contaminated agricultural runoff from farms and discharge of untreated

sewage, can all lead to the contamination of groundwater in aquifer. Groundwater is almost globally important for human consumption as well as for the support of habitat and for maintaining the quality of base flow to rivers. Groundwater is internationally essential for human utilization and in addition for the help of living organisms and for keeping up the nature of the base stream to waterways (Ravikumar and Somashekar, 2011).

In a part of the Nellore mica schist belt, a comprehensive geochemical examination was carried out in order to identify groundwater quality. The analysis was done to detect possible sources of pollution and to a general characterization of the water quality in the studied area, which was carried out by means of multivariate statistical tools like Principal Component Analysis, cluster analysis and mapping tools to understand the groundwater hydrochemistry, identify its control mechanisms, and evaluate the groundwater quality comprehensively.

## STUDY AREA

The study area belongs to a part of the Nellore schist belt. It is included in the toposheet Nos. 57 N/12, N/15, N/16 and covers an area of 247.79 km<sup>2</sup>. It is located between longitudes 79° 42' 30" E and 79° 54' 30" E and latitudes 14° 13' 0" N and 14° 16' 30" N and lies in a subtropical climate with a mean annual temperature of 24.3°C to 40°C. The humidity is usually in the range of 6–84 %. The annual normal rainfall of the study area is about 1084 mm. The mean daily maximum temperature in the district is about 40°C in May and the mean daily minimum temperature is about 20°C in December/ January, most of the study area is occupied by dendritic pattern. (www.cgwb.gov.ap.in; Sarma, 1998). The study area is shown in Figure 1.



# Geochemical characteristics of iron ore deposits and processing of Landsat-8 data (geology, geomorphology and lineaments) in semi-arid region and using geospatial techniques

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## Abstract

The main aim of the present study is to investigate geochemical analysis of iron ore and iron-enriched mineralised zones and their source identification by understanding lithological, structural and geomorphological units. The geology, geomorphology and lineament maps were prepared with help of Landsat 8 OLI satellite data and prepared thematic layers in two mandals namely Veerapunayunipalle and Pendlimarri of YSR Kadapa District, AP, India. Subsequently, geochemical analysis was performed in the mineralised zones to know the type and grade of the iron ore. The study revealed that the iron ore in the study area is of haematite (Fe<sub>2</sub>O<sub>3</sub>) type, and its mineralisation is confined to lineaments trending in E-W direction and are derived from ferruginous quartzites and shales belonging to the Cuddapah Supergroup. Based on the geochemical investigation, the overall grade of iron ore in respect of a Fe % in the study area is 39.04 which is commercially considered as lower grade and is useful for cement industry except for some villages like Chabali (56.76% Fe), Tummaluru (55.53% Fe), Animala (54.19% Fe) which is used for the steel industry.

**Keywords** Landsat 08 OLI satellite image · Geochemistry · Geology map · Geomorphology and lineament map

## Introduction

Geochemical prospecting is a one significant technique in mineral exploration processes, for knowing the percentages of the metal content in study area (Garrett et al. 2008). A mineral surveyor looks for surface exposure of minerals, by monitoring irregularities in colour, shape or rock composition. Biogeoprospecting of minerals involves the examination of plants and animals activities that can lead to indication of occurrence of minerals (Horsnail 2001).

Landsat satellite series, new practices and methodologies have employed in mapping mineralised zones on the basis of band ratios, band combinations and mapping of other auxiliary datasets, which were hydrothermally altered rocks, oxidation products, lithological units, vegetation anomalies

and other important information to geologists (Abdelsalam et al. 2000; Drury 2001; Carranza and Hale 2002; Myint et al. 2005; Liu et al. 2007; Goetz, 2009; Mia, and Fujimitsu 2012; Pour and Hashim 2010; Diego Fernando Ducart et al. 2016; Golla et al. 2019). Moreover, satellite remote sensing provides a synoptic view, which is helpful in identification of landforms, linear features and structural elements (Javed and Wani 2009; Adham et al. 2010). Earlier a number of researchers have adopted these techniques (Thirunavukkarasu et al. 2008; Raja et al. 2012; Feizi and Mansouri 2013; Kumari et al. 2014 and Murali Krishna and Nooka Ratnam 2016). A geological, structural and morphological-based remote sensing study was carried out in two mandals namely Veerapunayunipalle and Pendlimarri. Landsat 8 OLI imagery was used to map lithology, morphology and lineaments associated with low-grade iron mineralisation to know the structural control and the source identification of iron accumulations. In the study area, no previous works have been carried out to map iron ore mineralised zones in terms of lithology, morphological and structures by using RS, GIS and field verifications with the geochemical analyses in prospecting iron ore deposits. Hence, an attempt has been made to comprehend the mapping of iron-enriched mineralised

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# A Study on Seismic Response of Multi-storeyed Buildings with Shear Walls and Fluid Viscous Dampers using ETABS

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**Abstract**— Earthquake is the one of the significant disaster that can affect the performance and safety of any RCC building to the highest level possible. Hence there is imminent need to arrest the damage by seismic forces and make the RCC structures to withstand for earthquakes. Many alternate retrofitting techniques have emerged which can alter the response of RCC structures in resisting the seismic forces. Retrofitting the existing structures with dampers or providing shear wall as an integral part of the structure was among them. Dampers have a wide range of advantages like they can be erected in an easy way, cost effective and can be installed in the desired orientation such that the strength and stiffness requirements will be met. The present work deals with comparison of response of RC framed structures with fluid viscous dampers and shear walls. For this study, a reinforced concrete framed building (G + 9) was modeled and analyzed in three parts 1) Model without shear wall and Fluid viscous damper (Base model) 2) Model with shear wall 3) Model with Fluid viscous dampers. The response of the structure for the above conditions have been evaluated using E-Tabs 2015 for seismic forces for different seismic zones. In this study parameters like Lateral displacement, Storey shear and Storey drift have been carefully evaluated and were used to compare the seismic response of RCC structures with fluid viscous dampers and shear walls.

**Keywords:** Shear Wall, Fluid Viscous Damper, Storey Displacement, Storey Drift, Storey Shear

## I. INTRODUCTION

Any RCC building exhibits its response to ground motions during earth quake in the form of deformations across the various elements of load-bearing system. Hence internal forces arise with in the structural members and displacements are meant to be unavoidable in such scenarios. With varying stiffness and mass of the buildings, the resultant displacement demands varies from structure to structure.

In general, buildings with stiffness being of higher magnitude and mass being of lower value exerts smaller horizontal displacements demands. Thus it can be concluded that the maximum amount of horizontal displacement that a building can withstand is limited by its stiffness and mass. As a structural engineer one have to select appropriate strengthening method such that the displacement demand of a building will be maintained well below its displacement capacity.

This can be achieved by decreasing the displacement demand or by improving the displacement capacity of the structure. Dampers or shear walls are found to be excellent resisting systems for buildings subjected to high lateral loads such as seismic or wind loads. The process of increasing the lateral resistance of RCC framed is achieved by fusing RCC framed structures with either shear walls or by dampers as the structures are seismically inadequate by themselves.

Dampers have potential advantages in terms of practical and economic aspects. Because of their lighter mass they can be easily retrofitted into any existing structure. They can be installed with minimal disruption to the building.

## II. MODELLING & ANALYSIS

For this study, an RCC building (G + 9) fused with Fluid viscous dampers and shear walls in various seismic zones (i.e., zone- II, III, IV and V) was selected. Using IS456:2000 for gravity loads and IS 1893:2002 (part 1) for lateral loads (earthquake loads) each floor in the frame was analysed and designed. To estimate the performance of Fluid viscous dampers and shear wall in RCC building there is a need to study parameters as Lateral displacement, Story shear, Story drift. The structure is analysed with liner static and dynamic analysis method using ETABS 2015. The following load combinations are accounted as per IS 1893-2002, clause 6.3.1.2

- 1) 1.5(DL+IL)
- 2) 1.2(DL+IL+EL)
- 3) 1.5(DL+EL)
- 4) 0.9DL+1.5EL

The different types of models that are used for the study are

- 1) Model without Fluid viscous dampers and shear wall (Base model)
- 2) Model with Shear wall
- 3) Model with Fluid viscous dampers

Fluid viscous dampers and shear walls are placed at the middle bays and all these models were analysed for seismic forces at different seismic zones using E tabs 2015 software.

The Structural details of the structure

General Description		
Plan dimension	20.11 x 20.11 m	
Structure	OMRF	
No. of storeys	G + 9	
Floor to floor height	3.00 m	
Foundation type	Isolated footing	
Soil strata	Hard	
Member Properties		
Slab Thickness	150mm	
Beams	330 x 450 mm	
Columns	500 x 650mm	
Wall Thickness	Exterior wall	230mm
	Interior wall	115mm
Shear wall thickness	175mm	
Dampers	FVD 750 kN	
Material Properties		
Grade of concrete	M40	
Grade of steel	Fe 500	
Density of concrete	25 kN/m <sup>3</sup>	
Density of brick	19.20 kN/m <sup>3</sup>	



## POWER QUALITY IMPROVEMENT BY USING ANFIS TO CONTROL AND ENERGY MANAGEMENT OF A LARGE SCALE GRID CONNECTED PV SYSTEM

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### Abstract

Power quality is featured as an essential parameter in present day control systems. In addition, lattice associated photovoltaic power plants are expanding fundamentally in size and limit. Somewhere else, because of the dynamic mix of nonlinear loads in the grid, the main job of a Solar Energy Conversion System (SECS) isn't just to catch the most extreme power from sun based yet, likewise to guarantee some auxiliary services and improve the quality of power. This paper shows a novel methodology devoted to improve the management of dynamic power generation, reactive power compensation and power quality of a SECS, while ensuring the likelihood of abusing the full limit of the Power Conditioning System (PCS) and the Photovoltaic System (PVS). The proposed control algorithm is connected to an extensive scale PVS associated with the grid through a cascade of a DC-DC converter and a PWM inverter. This control technique deals with the SECS capacity's needs, between principle dynamic power generation, reactive power compensation and active filtering in such an approach to ensure a smooth and stable DC voltage and guarantee a sinusoidal grid current. Top need is given to the dynamic power generation over power quality improvement. At that point, need is given to reactive power compensation over mitigation of current harmonics consumed by the non-linear load associated with the Point of Common Coupling (PCC). In addition, the entire system maximum points of confinement of active and reactive powers have been resolved in the (PQ) control plane based on PVS accessible power, converters evaluated power and DC bus voltage smoothness and stability. At long last, adaptive neuro-fuzzy inference system (ANFIS) control system committed to the estimation of the inverter current commands is proposed so as to abuse the full limit of the SECS and regard the decided power limits. Simulation results affirm the viability and the execution of this control methodology and demonstrate that the SECS can work at its full power while the power quality can be improved by reactive power compensation and active filtering.

**Keywords:** Power decoupled control, Harmonic currents, Power quality, Active filtering, Reactive power compensation, SECS full power exploitation, ANFIS

### I. Introduction:

Worldwide energy crisis and environmental concerns from customary fossil fuels have pushed analysts to elective energy sources which are cleaner, inexhaustible and produce less natural effect (Kandemir et al., 2017). Among these elective sources, sunlight based PV energy based generation is a standout amongst the most famous and promptly accessible sustainable power sources. Specifically, huge scale network associated PVSs have expanded and expected to develop quickly in future because of a few preferences, for example, simplicity of establishment, silent operation, more secure task with lower operational expenses, and ecological advantage (Liu et al., 2015a; Roy and Mahmud, 2017). Regardless of various points of interest of PVSs associated with the utility grid through power hardware converters, it is important to control the grid current amid typical/broken conditions and guarantee grid synchronization (Lakshmi and Hemamalini, 2016). Additionally, it is realized that the broad utilization of present day electronic devices and nonlinear burdens prompts the issue of no sinusoidal current and reactive power drawing from the source.



# VEHICLE-TO-HOME (V2H) OPERATION MODE OF AN EV BATTERY CHARGER

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**Abstract—** This paper proposes an operation mode of an EV Battery Charger with V2H system mode. For such purpose of these vehicle-to-home (V2H) operation mode we adapted an on board bidirectional battery charger prototype to allow the Grid-to-Vehicle, Vehicle-to-Grid (V2G) operation modes. Along the paper are presented the hardware topology and the control algorithms of this battery charger. The idea underlying to this paper is the operation of the on-board bidirectional battery charger as an energy backup system when occurs a power outages. For detecting the power outages were compared two strategies, one based on the half-cycle RMS calculation of the power grid voltage, and another in the determination of the RMS value based in a Kalman filter. The experimental results were obtained considering the on-board EV battery charger under the G2V (Grid-to-Vehicle), V2G (Vehicle-to-Grid) and V2H (Vehicle-to-Home) operation modes. The results show that the power outages detection is faster using Kalman filter up to 90% than other strategy. This also enables a faster transition between operation modes when a power outage occurs.

**Index Terms—** Backup Power Supply, Bidirectional Battery Charger, Electric Vehicles, Kalman Filter, Vehicle-to-Home (V2H).

## I. INTRODUCTION

Electric Vehicles (EVs) are being introduced as a new promising transport in different countries around the world [1-3]. As example, for the US it is foreseeable that EVs will represent 64% of the light vehicles sales in 2030[4]. As consequence of this new paradigm, new challenges and opportunities will arise. The main challenge is related with the regulation of the battery charging process from the power grid [1] [5]. This represents a challenge because will be required a significant amount of energy during the charging process and power quality problems cannot be neglected in such scenario [6-8]. On the other hand, the main opportunity that must be addressed is related with the capacity of these vehicles to store a significant amount of energy. There by besides the battery charging process, identified as Grid-to-Vehicles (G2V)[9],the EVs can also be used to produce reactive power [10] and to deliver part of energy stored in the batteries back to the power grid. This process is Identified as Vehicle-to Gird (V2G)[11-14]. These challenges and opportunities are more relevant considering the advances in smart grids and micro-grids [15],where these vehicles will be a key technology [16],[17]. In this scenario, This paper proposes an opportunity to the EVs operation that is associated with the Vehicle-to-Home (V2H) paradigm [19]. This opportunity consists in use the EVs as a home backup power supply. Therefore, is proposed an enhanced

V2H operation mode. The operation of the EVs as voltage source was already proposed by NISSAN through the “LEAF to HOME” system. This system uses a dedicated “EV Power Station” to supply home loads [20]. This type of opportunity for smart home will be a key technology for the expansion of electric mobility sector in smart grids [21], [22]. According to NISSAN, this initiative is a contribution to a zero-emissions society. The main drawback of the “LEAF – to- Home” is that it can only be used in the place where the equipment is installed. In order to avoid this drawback, in the [23] is presented an on-board bidirectional battery charger capable to operate as G2V, V2G AND V2H in the place where the EV is parked. As presented through the operation as V2H, the EV can provide energy to any load connected to the EV in island mode. However, it has not the capability to operate as backup power supply. This paper joins the main benefits of aforementioned systems. i.e., the EV can be used as backup power supply ac home and supply loads in isolated mode. This opportunity is more relevant taking into account that private vehicles are parked at home between 9p.m. and 6 a.m. [24].

The most common backup power supply is the Uninterruptible Power Supply (UPS), Which can be on-line or off-line [25]. Despite the benefits of the on-lone UPS in protect the loads continuously, in the most of the situations, the off-line UPS is suitable to protect the loads during power outages. Therefore, this paper proposes the use of an on-board EV battery charger as backup power supply operating like an off-line UPS. The EV on-

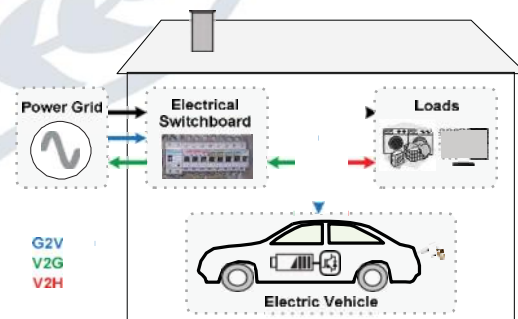


Fig.1. Operation of an Electric Vehicle as backup power supply



## FUZZY CONTROLLER BASED VIRTUAL INERTIA AND SMALL SIGNAL STABILITY ANALYSIS OF DC MICRO GRID

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### Abstract-

In this paper we use power converters to control the inertia occurred in the wind energy system which shows the effect on the DCmicrogrid. Among many controlling methods the change rate of the DC voltage is very fast under power variation. In this study, a distributed virtual inertia control is proposed to enhance the inertia of the DCmicro grid and decrease the change rate of the DC voltage. The kinetic energy in the rotor of the permanent magnet synchronous generators (PMSG)-based wind turbine, the energy stored in batteries and the energy from the utility grid is used to improve the inertia in the DCmicrogrid. By introducing a virtual inertia control coefficient, a general expression of the inertial power provided by each controllable power sources is defined. The proposed inertia control is simply a first-order inertia loop and is implemented in the grid-connected converter, the battery interfaced converter and the PMSG interfaced converter, respectively.

The small-signal model of the DCmicro-grid with the proposed inertia control is established. Finally, a typical DCmicrogrid is built and simulated in Mat Lab/Simulink, and the effectiveness of the proposed control strategy and correctness of the stability analysis are verified.

Index Terms-DC Micro-grid; Virtual inertia; Battery storage; fuzzy control; Small signal stability.

### I. Introduction

With the increasingly serious problems of energy shortage and environmental pollution, renewable energy has attracted more and more concerns. As an effective way to integrate the distributed renewable energy sources, microgrids have been widely developed. Microgrids can be generalised as ac and DCmicrogrids. Compared to ac microgrids which require multiple ac/DC and DC/ac conversions, DCmicrogrids have higher efficiency and reliability. Therefore, they have great potential in applications such as future building electrical systems, data centres, and plug-in hybrid electric vehicles [1, 2]. Distributed energy resources (DER), such as wind, solar photovoltaic, and energy storage units, are usually connected to the DCmicrogrid through fast-response power electronic converters. Under the classic control strategy of the interface converters [3, 4], the kinetic energy stored in the rotor of permanent magnet synchronous generators (PMSG)-based wind turbines and the energy stored in energy storage units cannot be used to slow down the dynamics of DC voltage. In the event of load switching or output fluctuations of intermittent DERs, dynamic support to the DC voltage can only be provided by DC capacitors [5]. As a result, the DC voltage will fluctuate drastically and the stability of the DCmicrogrid will be reduced [6]. To address the low inertia issue of DCmicrogrids, several solutions have been proposed. Since the inertia of DCmicrogrids is mainly provided by DC capacitors, one straightforward way to increase the inertia of DCmicrogrids is to adopt larger capacitors. In DCmicrogrids, electrolytic capacitors are usually used as DC capacitors. Due to the disadvantages of electrolytic capacitors, such as bulky volume, low power density and short lifespan, larger DC capacitors are not acceptable for the scale expansion and application of DCmicrogrids. An approach using super-capacitors to improve the inertia of DCmicrogrids is presented in [7]. However, the costs of super capacitors are relatively high. Moreover, when the DCmicrogrid is in the steady-state operation, the super

# Binary PSO approach for CEED problem in power system including solar energy

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**Abstract**—The harmful ecological effect by the emission of gaseous polluted from fossil fuel power plants can be reduced by proper load allocation among various generating units of the plant, but this load allocation may lead to increase operating cost of generating units and non-commensurable fuel cost. Various types of economic dispatch in power systems such as multi area economic dispatch with tie line limits, economic dispatch with multiple fuel options, combined economic and emission dispatch problem. This Combined Economic Dispatch and Emission Dispatch problem is a Multi objective problem. This Multi objective problem can be converted in to single objective problem by using penalty factor. This project presents Combined Economic Dispatch Models developed a system consists of multiple photovoltaic plants. Reliable and inexpensive electricity provision is one of the significant objective have been developed in order to address the challenge of continuous and sustainable electricity provision at optimized cost. Problem formulated was implemented on two test cases and results obtained from lambda-iteration, as conventional technique and proposed technique results are compared in terms of Cost, Emission, Convergence and No of iterations..

**Index Terms**—Economic Dispatch, Renewable energy, Solar PV generation, Penalty factor.

## I. INTRODUCTION

An important research has been show up around the world for expansion of continuous, renewable and efficient energy structure in order to meet the requirements of increased population and to reduce the requirements of increased population and to reduce the expanded the use of fossil fuels. Expanding energy prices, environmental concerns and expeditious depletion of the known fuel reserves have significantly increased the extension of renewable energy resources. The power sector of Pakistan is designed as an interconnected system and heavily relies on typical sources of generation. This system needs adjustments and improvement in order to meet the twenty first century specifications. Pakistan's energy incorporate span of almost 67% thermal and 30% hydel resources. According to Pakistan's energy year book 2012 [1], total generated electrical energy in Pakistan during 2010–2011 was 95,365 GW hand part of different sources is: thermal power 64.3%; hydel29.9% and nuclear and imported 5.8%. In thermal power, oil include the largest part of 35.2% followed by natural gas 29.0% and coal0.1%. On the other hand, the country has a large hidden of solar energy which has been predicted to be everywhere of 2900 GW in [2]. In [3], the author explain the energy scheme of Pakistan and reviewed conventional and Renewable Energy (RE) resources of the county in detail. The author has been exhibited the supply, generation and using of available resources in significant manner. The

paper is focused on RE advancement projects in the country, recent progress, planning and public sector goals in this field. On average, solar global insolation of 5–7 kW h/m<sup>2</sup>/day in almost95% areas of Pakistan with persistence factor of over 85% has been reported in [4,5]. Economic Dispatch (ED) is a significant and most constant step in power system operational planning [6]. ED is a development complication that set aside power to each committed generating unit so as to underestimate the total operational cost, subject to constraints. Different constraints build power balance, power limits of generators, prohibited operating zones, ramp rate limits etc. Several optimization capacities with equality and non-equality constraints have been used for ED and reported in literature [7]. In the past of ED dates back to 1920 [8]. Up till 1930 development methods used were the base load method and first-rate point loading. In early 30s, equal additional price tag method was take advantage to complete better conclusions [8]. In those days analog computers were used for computational achievement. First computer for transmission loss penalty factor was built up in 1954. By 1955 electronic prong commentator was developed. Digital computers were used for ED first time ever in 1954 and are being used till date [9]. The authors in [10] have approach the capacity of ED used during 1977–1988; optimal power flow, dynamic dispatch, ED in relation to Automatic Generation Control (AGC) and ED with non-conventional sources has been evaluated. Power system subsist of thermal generators has been broadly used to evaluate ED problem. Input–output (consultation productivity) cost curves of thermal generating units are mandatory for ED. The input–output price-tag curve of a thermal generating unit is achieved by multiplying cost per unit heat and its input–output (consultation productivity) heat rate curve[11]. In present days multi-valve steam turbines and multiple fuel turbines are regularly used in generating units. The ED with piecewise quadratic cost function (EDPQ) and ED with restricted operating zones (EDPO) are the two non-convex ED problems [12]. Valve point effects producing a ripple like no convex input–output heat rate curve. Complex constrained ED is forwarded by intelligent methods including Genetic Algorithm (GA), PSO [13,14], Neural Network (NN), Evolutionary Programming(EP), Tabu search etc. [15–17]. Kennedy and Eberhart introduced PSO in 1995 [18]. In this method, movement of particles is dependent on local and social components of velocity. Moreover, maximum value of velocity, V<sub>max</sub>, is also an important parameter. Its low value results in local exploitation while a higher value results in global international analysis. To obtain a better control over local exploitation and global research, an inertia factor x is introduced in[19]. ED with both cost and emission minimization becomes multiobjective optimization problem and is named as Combined Emission Economic

# A NOVEL ON POWER QUALITY IMPROVEMENT OF SOLAR PV UNDER GRID CONNECTED MODE

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**Abstract:-** In this paper grid-connected PV system presented. PV system consists of a photovoltaic module, a boost converter, and voltage source inverter. To boost the panel voltage DC-DC boost converter is used and ANFIS based ICM (Incremental Conductance Method) MPPT. ANFIS controller will be a new technique which is often used to optimize the total performance of the Photovoltaic system. In this paper, the grid-connected PV system performance is evaluated and harmonics occurred in the system are optimized. This ANFIS controller is definitely effective, simple and easy at minimal cost. The entire proposed technique continues to be modeled in addition to simulation using Mat lab/Simulink software.

**Keywords:** Photovoltaic (PV); boost converter; ANFIS controller; Incremental Conductance Method (ICM); Voltage Source Inverter (VSI).

## 1. INTRODUCTION

It is clear that fossil fuels are mangling the climate and that the status quo is unsustainable. There is a broad scientific consensus that the world needs to reduce greenhouse gas emissions more than 25 percent by 2020[1] and more than 80 percent by 2050. The idea of harnessing the sun's power has been around for ages. The basic process is simple. Solar collectors concentrate the sunlight that falls on them and convert it to energy. Solar power is a feasible way to supplement power in cities. In rural areas, where the cost of running power lines increases.

The need for renewable energy sources is on the rise because of the acute energy crisis in the world today. India plans to produce 20 Gigawatts Solar power by the year 2020, whereas we have only realized less than half a Gigawatt of our potential as of March 2010. Solar energy is a vital untapped resource in a tropical country like ours [2].where, IPV is PV cell current, is submersion current,

It is possible that the world will face a global energy crisis due to a decline in the availability of cheap oil and recommendations to a decreasing dependency on fossil fuel. This has led to increasing interest in alternate

power/fuel research such as fuel cell technology, hydrogen fuel, biodiesel, solar energy, geothermal energy, tidal energy and wind. Today, solar energy and wind energy have significantly alternated fossil fuel with big ecological problems.

## 2. MODELING OF PV Panel

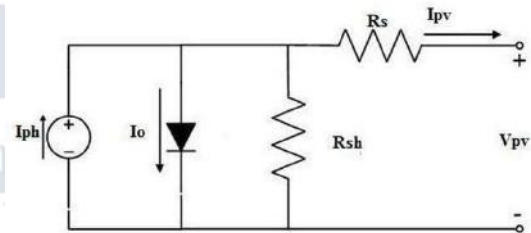


Fig.1 Equivalent Circuit of PV Cell

Figure 1 gives the proportional circuit of PV cell. Characteristics of PV cell can be acquired by utilizing the accompanying equation1

$N_s$  is no. of arrangement associated cells,  $N_p$  is no. of parallel associated cells,  $k$  is Boltzmann steady ( $1.38 \times 10^{-19}$  J/K),  $q$  is electron charge equivalent to  $1.607 \times 10^{-19}$  C,  $T$  is Nominal temperature,  $R_s$  is arrangement obstruction. The non-coordinate condition, generally relies on the light, temperature, and reference esteems. The reference regards normally suited working condition of temperature is  $25^\circ\text{C}$  and radiation is  $1000 \text{ W/m}^2$ . The quantity of arrangement associated cells is 5 and number of parallel associated cells are [3] of PV

## MODELING OF BOOST CONVERTER

To increase the output voltage of PV system, the boost converter is used. MPPT controller gives PWM signals, IGBT is used to control the DC voltage. The boost converter

# Reduction of voltage sags and harmonics by using dynamic voltage restorer

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**Abstract**—a Dynamic voltage restorer (DVR) is introduced to reduce voltage sags and harmonics is preferred. In this work, the construction of the DVR has shunt and series converters coupled back to back by a dc- to dc step up converter. The existence of the dc to dc step up converter access the DVR to reduce voltage sags for longer period. The series converter coupled to the supply side and the shunt converter coupled to the load side. By this, no requirement for using long dc capacitors in this. The control strategy of the recommended DVR is rests on the hysteresis voltage control. The recommended DVR is simulated using MATLAB/SIMULINK. Time domain simulations are preferred to examine the working and behavior of the DVR with linear and non-linear loads

**keywords**—dynamic voltage restorer; total harmonic distortion; dc-dc step upconverter;harmonics; voltage sags

## 1. INTRODUCTION

Dynamic voltage restorer (DVR) is a series coupled flexible ac transmission systems (FACTS) controller adopted to reduce voltage sags in uneven situations in distribution systems. The DVR has distinct system techniques. These techniques are: (i) DVR with no storage and supply-side coupled shunt converter, (ii) DVR with no storage and load-side-coupled shunt converter, (iii) DVR with energy storage with varying dc-link-voltage and (iv) DVR with energy storage and with constant-dc link voltage. The preferred DVR is a DVR with no storage and load side coupled shunt converter to acquire maximum gains from the device. The control strategy has two control loops; the internal loop for producing the gate signal of the switches of the DVR and the external loop for the reference voltage signal of the DVR.

## 2. CONFIGURATION AND CONTROL OF DVR

The shunt converter coupled to the load side is uncontrolled rectifier, has uncontrollable dc output voltage  $V_{dc1}$ . The uncontrolled rectifier is coupled to the load bus by a step down transformer. The dc resultant voltage of the rectifier  $V_{dc1}$  is the input voltage of the dc-to-dc step up converter. The resultant voltage of the step up converter  $V_{dc2}$  is the input dc voltage of the VSC of the DVR. By this, the uncontrolled rectifier receives non-linear current, the DVR can able to reduce all harmonics obtained with the load voltage.

### 2.1 DC VOLTAGE CONTROL OF THE DVR

The step up converter restricts the duty cycle D to withstand its dc output voltage  $V_{dc2}$  at the reference value  $V_{dc2ref}$ . It can be achieved using proportional and integral (PI) controller as shown in Fig. 1. The PI controller compares between  $V_{dc2ref}$

and  $V_{dc2}$  to cause the error  $e_{vdc}$ . The error  $e_{vdc}$  is passed by the PI controller to trigger the respective duty cycle D which in turns fed into the switching pulse generation block to generate the switching pulses of the MOSFET.

### 2.2 VOLTAGE SAG DETECTION SCHEME

Fig.2 represents a SIMULINK model of the sag detection scheme. In Fig.1 the 3-phase instantaneous output voltage ( $v_{sa}$ ,  $v_{sb}$  and  $v_{sc}$ ) from the voltage sag detection model is the first

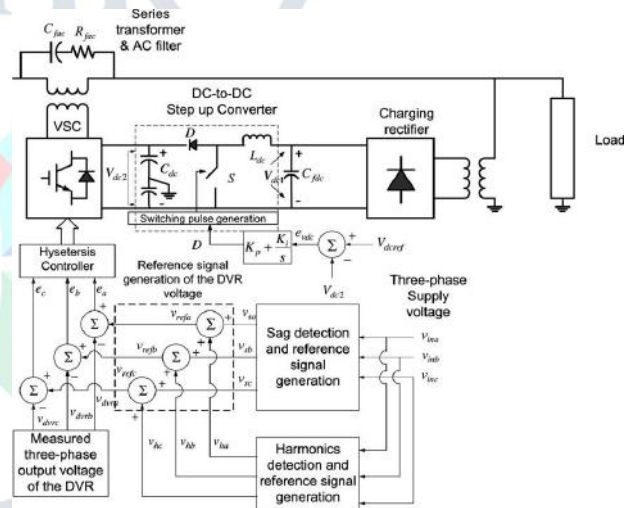


Figure1: schematic diagram of the DVR

# A Multi-functional Dynamic Voltage Restorer for Emergency Control in Distribution Systems

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## ABSTRACT:

The dynamic voltage restorer (DVR) is one of the modern devices used in distribution systems to protect consumers against sudden changes in voltage amplitude. In this paper, emergency control in distribution systems is discussed by using the proposed multifunctional DVR control strategy. Also, the multi loop controller using the Posicast and P+Resonant controllers is proposed in order to improve the transient response and eliminate the steady-state error in DVR response, respectively. The proposed algorithm is applied to some disturbances in load voltage caused by induction motors starting, and a three-phase short circuit fault. Also, the capability of the proposed DVR has been tested to limit the downstream fault current. The current limitation will restore the point of common coupling (PCC) (the bus to which all feeders under study are connected) voltage and protect the DVR itself. The innovation here is that the DVR acts as virtual impedance with the main aim of protecting the PCC voltage during downstream fault without any problem in real power injection into the DVR. Simulation results show the capability of the DVR to control the emergency conditions of the distribution systems.

*Keywords:* Dynamic voltage restorer (DVR), emergency control, voltage sag, voltage swells.

## I. INTRODUCTION

Voltage sag and voltage swell are two of the most important power-quality (PQ) problems that encompass almost 80% of the distribution system PQ problems. According to the IEEE 1959–1995 standard, voltage sag is the decrease of 0.1 to 0.9 p.u. in the rms voltage level at system frequency and with the duration of half a cycle to 1 min. Short circuits, starting large motors, sudden changes of load, and energization of transformers are the main causes of voltage sags [3]. According to the definition and nature of voltage sag, it can be found that this is a transient phenomenon whose causes are classified as low- or medium-frequency transient Events. In recent years, considering the use of sensitive devices in modern industries, different methods of compensation of voltage sags have been used. One of

these methods is using the DVR to improve the PQ and compensate the load voltage. Previous works have been done on different aspects of DVR performance, and different control strategies have been found. These methods mostly depend on the purpose of using DVR. In some methods, the main purpose is to detect and compensate for the voltage sag with minimum DVR active power injection. Also, the in-phase compensation method can be used for sag and swell mitigation. The multiline DVR can be used for eliminating the battery in the DVR structure and controlling more than one line. Moreover, research has been made on using the DVR in medium level voltage. Harmonic mitigation and control of DVR under frequency variations are also in the area of research.

The closed-loop control with load voltage and current feedback is introduced as a simple method to control the DVR in Also, Posicast and P+Resonant controllers can be used to improve the transient response and eliminate the steady-state error in DVR. The Posicast controller is a kind of step function with two parts and is used to improve the damping of the transient oscillations initiated at the start instant from the voltage sag. The P+Resonant controller consists of a proportional function plus a resonant function and it eliminates the steady-state voltage tracking error. The state feed forward and feedback methods, symmetrical components estimation, robust control, and wavelet transform have also been proposed as different methods of controlling the DVR. In all of the aforementioned methods, the source of disturbance is assumed to be on the feeder which is parallel to the DVR feeder. In this paper, a multifunctional control system is proposed in which the DVR protects the load voltage using Posicast and P+Resonant controllers when the Source of disturbance is the parallel feeders. On the other hand, during a downstream fault, the equipment protects the PCC voltage, limits the fault current, and protects itself from large fault current. Although this latest condition has been described in using the flux control method, the DVR proposed there acts like a virtual inductance with a constant value so that it does not receive any active power during limiting the fault current. But in the proposed method when the fault current passes through the DVR, it acts like series variable impedance (unlike where the equivalent impedance was a constant).

# Multi Object and Dynamic Query Based CBIR System using DCT Incorporated with HOG and HTF

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**Abstract:** This work contributes multi object detection and dynamic query image based retrieval system. Generally, finding relevance and matching user expectations is very critical based on query key information and these results irrelevant responses which will produce low similarity index. Consequently, CBIR system took a major responsibility of identifying new objects, retrieving similar objects or contents based on multi query and dynamic keywords with improved recall and precision as per requirement of the users. At this juncture, Discrete Curvelet Transform with the incorporation of HOG and HTF based approach is proposed to handle commercial image, medical images and types of multi model images. This proposed approach mainly focuses on extracting scaled features for finding correlation among the query and database images. To start with the process, query image is decomposed into multi level sub images to extract set of texture features at two levels. These features are estimated by Gray Level Co-occurrence Matrix (GLCM) and HOG descriptor based techniques is adapted to find scaled vectors with reduced dimensionality. This method outperform compared as compared to existing method is authenticated from experimental results.

**Key Words:** image retrieval, HOG, curvelet transforms, GLCM.

## I. INTRODUCTION

With the advent of the digital technology, there is various form information with larger scale accessed in different types search engine. Timely data collection and more relevant data collection is one of the primary processes of retrieval system. Content Based Image Retrieval (CBIR) is the key component for availing instant resourceful data in the search engine, which is another thirist area in research scope [1], [2]. The basic step involved in CBIR is retrieving highly correlated images from database by feeding query image based on relevance. Practically, CBIR involves the contents like, texture, shape or color based searches. Therefore, feature selection is a key stage in content-based retrieval [3], [4]. Figure 1 describes the general process and operation of CMIR system. There are plenty of sources of information are accumulated in database and its profiles are maintained as feature vector during preprocess [5][6][8]. When query image is given as an input, its feature values are estimated and are compared with the database feature with some statistical measures. Then, based on rank from higher

similarity index to the lower similarity index retrieved images are ordered.

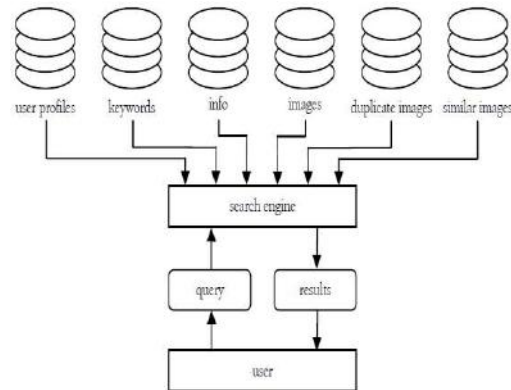


Figure 1 General CBIR system

## II. RELATED WORK

Juan Miguel Medina et al (2012) proposed a novel approach to medical image retrieval using a fuzzy object-relational database management system (FORDBMS). This paper concentrates on X-ray images of patients suffering from scoliosis (a medical condition in which the patient's spine is curved) from which spine descriptions are obtained. Subsequently, query images are matched to retrieve relevant images with a certain oriented pattern. Results show high accuracy when evaluated by medical experts. A comparison study with other dynamic CBIR systems, the revealed work here is domain independent, flexible, and highly scalable.

SubrahmanyamMurala et al (2012) mitigated LTrP method for CBIR system. The proposed approach encompasses the connectivity between the current pixels to its surrounding pixels, based on the orientation of the image objects the movements of the feature vectors are evaluated using the differentiation scheme in X-Y directions. The efficiency of the proposed scheme is compared with LBP, Gabor filter and LTP based approaches and the synthesized results tested with benchmark data.

## III METHODOLOGY

DCT with the incorporation of HOG and HTF based approach is proposed to handle commercial image, medical images and types of multi model images. This proposed approach mainly focuses on extracting scaled features for finding correlation among the query and database images.

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## Analysis of Super-Capacitor Hybrid Energy Storage System (HESS) for Electric Vehicles by using Simulink

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**Abstract:** The expansion of Electric Vehicle numbers would lead a significant decrease in harmful gases emission. Energy storage and power boost are one of the major issues in the development of Electric vehicles. In order to improve the Energy Storage System (ESS) and overall efficiency of Electric Vehicles, a Hybrid Energy Storage System (HESS) with super-capacitor is used. Hybrid energy storage system is used to optimize the energy management for Electric Vehicles. This strategy allows using a smaller battery for low power and the second powerful technology like super-capacitor to supply the very high power during Acceleration and Regeneration brake. Super-capacitor is an auxiliary power source on Electric Vehicles, which is used to improve working condition of the battery and also improve the acceleration performance of the vehicle. The central focus of this paper is to improve the performance of the Energy Storage System of the Electric Vehicles of an optimal control algorithm design based Hybrid Energy Storage System (HESS) of a Li-ion battery power dynamic limitation rule-based control based with respect to the state of charge (SOC) of the super-capacitor. In the meantime the Magnetic Integration Technology adding a second order Bessel low pass filter is introduced to DC-DC Converter of Electric Vehicles. As a result the size of battery is minimized. A battery and super capacitor collaboration can reduce the average energy consumption and the mileage in one charge of electric vehicle will also enlarge. Finally the simulation results based on MATLAB/SIMULINK demonstrate the proposed HESS applied on Electric vehicle and control strategy of HESS based on both conventional controller (PID) and fuzzy controller.

**Keywords:** Hybrid Energy Storage System, Integrated Magnetic Structure, Electric Vehicles, DC-DC Converter, Power Dynamic Limitation.

### I. INTRODUCTION

Energy Storage Systems (ESSs) are of critical importance in electric, hybrid electric and plug-in hybrid electric vehicles (EVs, HEVs, and PHEVs) [1]–[9]. Of all the energy storage devices, batteries are one of the most widely used. However, a battery-based ESS has several challenges providing the impetus to look for additional solutions [1]–[5]. In battery-based ESSs, power density of the battery needs to be high enough to meet the peak power demand. Although batteries with higher power densities are available, they are typically priced much higher than their lower power density counterparts. A typical solution to this problem is to increase the size of the battery. However, this also causes an increase in cost. In addition, thermal management is a challenge for batteries to safely work in high power-load conditions not only to cool down the battery, but also to warm up the battery in cold temperatures in order to reach the desired power limits. In addition, an issue concerning the life of the battery is the balancing of the cells in a battery system. Without the balancing system, the individual cell voltages tend to drift apart over time. The capacity of the total pack then decreases rapidly during operation, which might result in the failure of the total battery system.

This condition is especially Severe when the battery is used to do high-rate charge and discharge [6], [7]. In addition to these issues, applications that require instantaneous power input and output typically find batteries suffering from frequent charge and discharge operations, which have an adverse effect on battery life [6], [7]. For such systems, it is crucial to have an additional ESS or a buffer that is much more robust in handling surge current. In order to solve the problems listed previously, hybrid energy storage systems (HESS) have been proposed [3]–[5], [10]–[12]. The basic idea of an HESS is to combine super capacitors (SCs) and batteries to achieve a better overall performance. This is because, compared to batteries, UCs have a high power density, but a lower energy density. This combination inherently offers better performance in comparison to the use of either of them alone. Several configurations for HESS designs have been proposed, which range from simple to complex circuits. Based on the use of power electronic converters in the configurations, HESS can be classified into two types: passive or active. Conventional active methods use one or multiple full size dc/dc converters to interface the energy storage device to the dc link.



# Reduction of Losses in Ten Bus Distribution System Using STATCOM

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## ABSTRACT

STATCOM is capable of improving the voltage of weak buses in distribution systems. This paper deals with Design, Modeling and Simulation of Ten Bus System using Matlab Simulink. The Ten Bus Distribution (TBS) Systems with and without STATCOM are modulated, Simulated and the results are presented here. The Simulation Results indicate that the real power loss and reactive power loss are reduced by introducing multiple numbers of STATCOMs. The STATCOMs are introduced at the weak buses and the reduction in losses was observed.

## 1 Introduction

The traditional steady state stability studies and transient stability take into account the active power flow  $P$  and power angle  $\delta$  and generally assume constant receiving and sending end bus voltage. The reactive power flow  $Q$  and voltage fall during heavy current flow is neglected. This approach could not explain the several black-outs in USA, Europe, Japan etc. during the last quarter of the twentieth century. The blackouts were due to voltage collapse. During voltage collapses, the bus voltage starts falling and as a result power transfer  $P$  through the transmission line starts reducing resulting in ultimate voltage collapse and loss of system stability of entire network. That's why voltage stability studies have received more attention and have acquired a vital place in power system studies. Voltage collapse phenomena take place where reactive power management is inadequate.

The application of power electronics in the electric power transmission plays an important role to make the system more reliable, controllable and efficient [1]. Due to deregulation, environmental legislations and cost of construction, it is becoming

increasingly difficult to build new transmission lines. Thus it is essential to fully utilize the capacities of the existing transmission system. The Flexible AC Transmission System (FACTS) has become a popular solution to our large/over extended power transmission & distribution system. FACTS devices are proving to be very effective in using the full transmission capacity while increasing power system stability, transmission efficiency and maintained power quality and reliability of power system. These devices are mainly based on either voltage source converter (VSC) or current source converter (CSC) and have fast response time. As an important member of FACTS devices family, STATCOM has been at the centre of attention and the subject of active research for many years. STATCOM is a shunt connected device that is used to provide reactive power compensation to a transmission line. This controller can either absorb or inject reactive power whose capacitive or inductive current can be controlled independent to the AC line voltage. Thus, STATCOM can enhance the transmission line load ability by extending the MW margin and improves the oscillation of voltage transients through efficient



## MAXIMUM POWER POINT TRACKING OF PHOTOVOLTAIC (PV) ARRAY USING PSO

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### Abstract

This Project presents Particle Swarm Optimization and Incremental Conductance-ANN methods is used to find the optimum operating parameters of a solar photovoltaic panel under varying atmospheric conditions. A fast and dynamic MPPT technique is desirable to track environmental variations without losing too much energy gains. In order to track the maximum power, an intelligent controller based MPPT algorithm for a standalone PV system is presented in this paper. For that purpose, hybrid techniques based Particle Swarm Optimization (PSO) and Incremental Conductance Artificial Neural Network (INC-ANN) are proposed and comparative analyses are made. In addition to that, mathematical modeling of PV array is analyzed using a single-diode model using MATLAB/Simulink environment. It is evident from the results that the control scheme based on the hybrid INC-ANN with MPPT method is promising in tracking the maximum power with less oscillations under variable climatic conditions and load variations compared to other available techniques.

**Index Terms:** Particle Swarm Optimization, Maximum power point tracking, Constant power generation control, PV systems, Perturb and Observe, Incremental conductance.

### 1. INTRODUCTION :

A rapid growth of industries and population needs energy to maintain the economic development. The combustion of fossil fuels to generate electricity is one of the largest sources of CO<sub>2</sub>(is a heat-trapping “greenhouse” gas) emissions, which will cause the increasing hazard of global warming and climate changes. During the last decade, non-conventional energy sources such as wind, solar, bio-mass, geothermal and hydro power showed penetration growth all around the world. The absence of CO<sub>2</sub>emission and free availability made these energy sources more attractive in the recent years. Owing to low installation cost and sun light throughout the year, solar PV energy system is of high interest and most promising energy source for future energy demand. However, it suffers

# A Research on Producer Gas in Internal Combustion Engines

Uppalapati.Babu, L. Kumararaja

**ABSTRACT**---Energy is a crucial requirement for economic and social improvement of any country. Sky rocketing of fossil fuel prices has lead to rising interest in various alternative fuels like producer gas, CNG, alcoholic fuels, vegetable oils. Producer gas is relatively a low calorific value fuel gas which can be used in compression ignition and spark ignition engines. Producer gas will be generated from any carbonaceous material as well as from different types of biomass. The engine power de-rating is usually 15-30% when producer gas is used in CI engines instead of diesel. It is mainly because of the variation in stoichiometric air/fuel ratio requirements for producer gas and diesel.

**Keywords** - Biomass, Internal combustion engine, Engine power, Producer gas.

## I. INTRODUCTION

Biomass is considerate as one type of renewable source of energy with great possible to supply the world energy requirements [1]. The application of biomass will offer a lot of positive solutions - a renewable supply of energy services, together with heat, power, and transportation fuels, which reduce the effects due to carbon dioxide and sulphur dioxide emissions into the atmosphere. It also will gives energy security and increase rural economy through the substitution of coal, crude oil and gas. Worldwide biomass positioned fourth as energy resources, providing around 14% of the total world energy requirements. Biomass is significant sources of energy for which are developing countries, giving 35% of their total energy [2, 3].

Gasifier unit is a one of the chemical reactor, where the biomass materials like Rice Husk, Wood, Charcoal, etc. be able to converts into a fuel in the gaseous form are called producer gas, which contain hydrogen, carbon monoxide, methane, nitrogen, and carbon dioxide. This fuel contains a calorific value of 4 to 5 MJ/m<sup>3</sup> can burnt directly with high efficiency. It has the flame temperature is about 1100°C.

Gasification process is not regarded as a brand new technology since it was already utilised during the Second World War. Throughout this era, a variety of vehicles in Europe were powered with charcoal gasifier (ANON-FAO Report, 1986). It is evaluated that more than seven million vehicles in South America, Europe, Pacific Islands and Australia were changed over to run on the producer gas for the duration of Second World War.

## II. KNOWLEDGE REVIEW FOR PRODUCER GAS UTILIZATION

The main technologies presently used to convert biomass to energy are thermo-chemical and biochemical conversion processes. The main types of thermo-chemical conversion technology of biomass in to energy are drying, pyrolysis, combustion, and reduction processes.

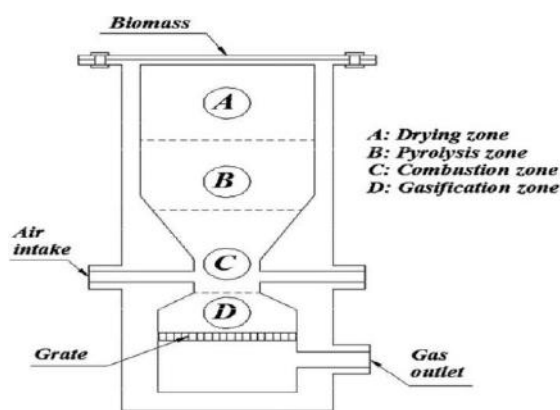


Fig.1: Downdraft Gasifier

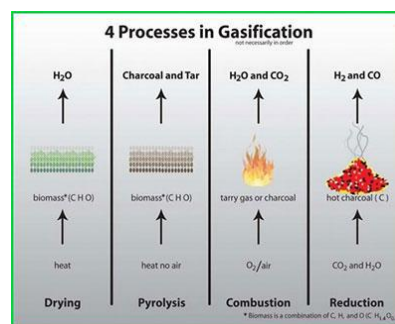
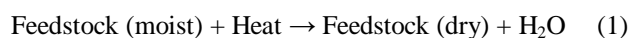


Fig.2: Four processes in gasification

### A. Drying zone

In this section, the biomass is brought at top place of the gasifier. Because of the heat from lower part of a gasifier, the biomass gets dried in drying portion [4–8]. The moisture from the biomass flows downwards in form of vapour and enters into the oxidation zone.



### B. Pyrolysis zone

In this zone, the temperature is more than 250°C; due to the high temperature causes the biomass feedstock decomposition is occurs. Here large particles are split into

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# EFFECT OF SHOT PEENING EXPOSURE TIME ON SURFACE PROPERTIES OF AA7075 ALUMINIUM ALLOY

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**Abstract--** Aluminium alloys are used in various fields of engineering, aerospace, automobile and construction industries. But they have poor wear resistance due to low hardness. In the present research, the influence of shot peening treatment on microhardness and surface roughness of AA7075-T6 alloy was investigated. With this target, the aluminium alloy specimens were shot peened for 35, 70, 105 and 140 s time. According to results, the shot peening treatment increases microhardness and surface roughness up to 105 s. The specimen after 140 s peening shows the marginal improvement in microhardness and slight reduction in surface roughness. The morphology of the specimens before and after shot peening were investigated by scanning electron microscopy (SEM).

**Keywords—**AA7075 aluminium alloy, shot peening, microhardness, surface roughness, morphology.

## INTRODUCTION

Aluminium alloys are abundantly used in Airframe materials, automobile and construction industries. The attractiveness of aluminium is that it is a relatively low cost, light weight [1], also owing to their high specific strength and good corrosion resistance. Nevertheless, due to higher mechanical properties such as surface hardness and tensile strength have been demanded for AA7075 alloy to prolong their service performance. These demands could be simply satisfied by modification of the surface properties [2-3]. There are wide variety of surface modification technologies available to change the surface properties of materials in the present research world. However some surface coatings are also applied on aluminium alloys by means of some hard composite coatings. These coating will enhance service life of parts under sliding environment because of improved hardness. But these coatings are little bit complicated and costlier than some cold working techniques. These cold working techniques can also improve surface hardening of metals.

Thus for all aerospace materials the mechanical, chemical and electrochemical surface treatments (eg. Shot peening, pickling and anodizing) can be adapted to enhance service performance [4]. Shot peening (SP) is one among mechanical surface treatments, in which the surface of a part is bombarded with many small spherical media of approximately uniform size called shots. The surface and sub-surface alterations produced via shot peening could be synopsisized as; i) plastic deformation [5-6], ii) work hardening [7], due to the increase in dislocation density and reduction in grain size. The shot peening process can be under control and repeat for optimum benefits. To achieve this, the process parameters must be identified and controlled [8]. According to [9], there are many fundamental parameters affecting the shot peening processes. The most common are as follows:



## Effect of surface characteristics on electrical resistivity of shot peened SiC<sub>p</sub>/AA6061 composite by 4PCPs method

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### ABSTRACT

The present study evaluates the effect of shot peening time on the surface characteristics and electrical resistivity of SiC<sub>p</sub>/AA6061 composite fabricated via stir casting route. The composite microstructure after casting was examined by optical microscopy. The surface characteristics and electrical resistivity were analyzed by X-Ray Diffraction (XRD) and Four-Point Collinear Probes (4PCPs) methods respectively. The results showed that the grain size decreases and Full Width at Half Maximum (FWHM) increases with increasing the shot peening time. The grain refinement (33.7 nm) and FWHM broadening (0.29°) of the sample after 140 s peening caused to lower the electrical resistivity (0.09 Ω-cm). The effect of work-hardening induced by shot peening have influenced the surface characteristics and the electrical resistivity of SiC<sub>p</sub>/AA6061 composite.

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### 1. Introduction

The composite materials have enormous applications in the field of automobile, aerospace and allied industries [1] because of their excellent strength, stiffness, density, thermal and electrical properties [2]. The low electrical resistivity and good thermal conductivity possessed by the composites, have attracted its usage in the electrical contact and electronic packaging industries in the recent years [3]. One of the paramount properties of metal matrix composites in the field of electrical and electronics is the electrical resistivity. The electrical resistivity of the composite can be increased by increasing the volume fraction and decreasing the reinforcement size. Moreover the deformation regions consisting residual stresses and dislocations around the reinforcement during fabrication also affects the resistivity of the composites reported by Chang et al. [3]. Recently, the grain refinement with decreased grain size attracted the materials towards improvement in mechanical, tribological and electrical properties of metallic materials. The nanocrystalline (NC) materials showing novelty in increasing the electrical conductivity by the influence of grain refinement [4]. The electrical resistivity is directly proportional to

the grain size and inversely proportional to the electrical conductivity. Suzuki et al. studied the electrical conductivity and lattice defects in nanocrystalline (NC) cerium oxide thin films, concluded that when the grain size reduced from 40 nm to 10 nm, then a 100-fold improvement in the electrical conductivity exhibited by the cerium oxide thin films [5]. The electrical conductivity of the alloys and heavily doped ceria were determined as a function of grain size proposed by [4,6].

On the other hand, Kocich et al. characterized the Cu-Al clad composite after processed through rotary swaging by repeated action of rotating dies [7]. Characterization results showed that the grain refinement with ultra-fine grain structure and structure restoration of composite achieved by swaging process. The swaging as a cold working technique accelerated the work-hardening in the composite. The above changes after swaging imparted to the improvement of electrical conductivity and ultimate tensile strength of the composite. Hence, the cold working is a beneficial technique because it improves the work-hardening of metals by plastic deformation. During this process, the dislocations moves to a new places, resulting for generation of additional dislocations. These modifications could contributes to alter the grain size and structure restoration in the metals.

Nevertheless, shot peening (SP) is a cold working technique in which the metal surface is bombarded with small spherical media

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# Experimental Evaluation of Injection Pressure and Injection Timing on Diesel Engine

K. Rajasekhar, B. Jayachandraiah, S. Nishanthi

**ABSTRACT---** An attempt is made in this paper to conduct experiments to study the effect of different injection pressure with different injection timing of a Diesel Engine and evaluate performance and emission characteristics.

The experiments are conducted at different Load conditions of 0%, 25%, 50%, & 75% and Full Load by varying injection pressures of 200 and 220 Bar with different injection timings at 19°, 23° and 27° bTDC. Output results shows that engine operating at 220 bar pressure gives nearly 1% more brake thermal efficiency than lower pressure irrespective of the injection timing whereas brake specific fuel consumption is found to have significant changes at the initial conditions. It is also shows that the CO emissions decrease with increase in injection pressure and advancement in injection timings at 220 bar and 27° bTDC but also those conditions yield the lowest CO emission because of the NOx emissions increase with increase in injection pressure.

**Keywords:** Single cylinder, Brake Power, Performance Characteristics

## 1. INTRODUCTION

Compression Ignition (CI) Engine is a type of IC Engine where the diesel fuel is injected into engine cylinder after end of compression stroke and combustion takes place due to elevated temperature of the air in the cylinder.

## 2. LITERATURE REVIEW

Bridjesh and Arun Kumar[1] have proved that as the fuel injection increases, performance characteristics, like Brake Thermal Efficiency and Brake Power increase. Rostami, et al., [2] have conducted experiments to study the effect of fuel injection timing on the performance of a Diesel Engine using diesel-biodiesel blends by running the engine at speeds of 1200, 1600, 2000 and 2400 rpm.. Hani Chotai [3] has explained that pollutant emissions and fossil fuel depletions from Diesel Engine after review on published research papers relating to varying injection pressure and timing and NOx emissions. Deva Kumar et al, [4] have proved that there are various that influence performance of Engine Rajendra Prasad [5] has conducted experimental study on a single cylinder Direct Injection Diesel Engine at 150 N/m<sup>2</sup>, 170 N/m<sup>2</sup> and 190 N/m<sup>2</sup> injection pressure.

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## 2.1 Objectives of the paper

An attempt is made in this paper to stud the effect of Fuel Injection Pressure with different fuel injection timings on a single cylinder Diesel Engine by conducting experimental work to evaluate the Engine performance characteristics at 200 bar 220 bar with different Injection Timings of 19°, 23°, 27° from bTDC.

## 3. EXPERIMENTAL WORK

Experimental setup is shown in Figure -2 followed by Engine specifications in Table -1 and experimental input conditions in Table-2.

## 4. EXPERIMENTAL SETUP



Fig. 2: Single cylinder water cooled Diesel Engine

Table - 1: Engine Specifications

Manufacturer	Kirloskar Oil Engine Ltd.
Type	Single cylinder Diesel Engine
Model	TV1
Type of cooling	Water cooling
Arrangement of cylinder	Vertical
Bore	87.5 mm
Length	110 mm
Compression ratio	17.5: 1
Speed	1500 rpm
Rated power	7HP
Lubricant	SAE 30/SAE 40

Dynamometer Specifications:

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# Experimental Investigation and Optimization of EDM Process parameters on Al6061 by using TOPSIS and comparison with Genetic Algorithm

S. Siva Sankar M. Vijay Kumar Reddy

**ABSTRACT---** *Electro Discharge Machining (EDM) is a nontraditional machining process where complex as well as intricate shapes can be machined. Only electrically semi conductive materials can be machined by this method and is one amongst the necessary machining processes for machining high temperature-resistant, strength alloys. For attaining the most effective performance of the EDM method, it's crucial to hold out constant style responses like Surface Roughness, Material Removal Rate etc. it's essential to think about most variety of input parameters to induce the higher result.. In the present work, an investigation of the optimization and influence of process variables on Surface Roughness, Removal Rate of Al6061 alloy material with the help of electrical discharge machining. Proper setting of these technique parameters were determined by Taguchi methodology victimization four factors every at three levels to know the behavior of characteristics like removal rate of material , Surface Roughness. Finally TOPSIS( Technique for order of preference by similarity to ideal solution) algorithm has been applied for multi-objective victimization of the responses of EDM method on Al6061 alloy. The best effectiveness of the TOPSIS algorithm is compared with the genetic algorithm (GA). It is found that the TOPSIS algorithm behaves better compared to GA with esteem to best possible process response values.*

**Keywords—** EDM, MRR, Surface Roughness, Al6061 alloy, TOPSIS.

## I. INTRODUCTION

Reasons behind usage of Unconventional machining used to machine complex surfaces, high strength alloys, troublesome shapes, high accuracies surface finish and automation requirements. EDM has been replacement of ancient cutting tool operations. Most of traditional machining techniques like grinding, drilling and edge, etc. are didn't machine geometrically tough form, size are easily machined by EDM unconventional machining process.

*1.1 Order Preference will be based on Similarity to Ideal Solution (TOPSIS)*

It was initially suggested by Hwang Yoon during 1981. After that it got modified by Yoon and Kin, 1987 then by Hwang, Lai and Liu, 1993 to fulfill the requirements. It works on the principal of positive ideal and negative ideal solution. These ideal solutions are in the nature of

hypothetical for which the experimental outcomes should be in the given limits (max & min). It suggests solution, it has not only nearest to maximum hypothetical result and also longest from minimum hypothetical result. The possible idea is to find a result based on the compactness-factor between the feasible and the ideal solutions. TOPSIS technique is described in the form of mathematical nature as follows. In this method first the process has carried out by TOPSIS method with a decision matrix. This consists of alternatives in row and attributes in columns. Format of matrix can be described with the aid of below equation.

$$D = \begin{matrix} a_1 & x_{11} & x_{12} & \cdot & x_{1n} \\ a_2 & x_{21} & x_{22} & \cdot & x_{2n} \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ a_i & x_{i1} & x_{i2} & \cdot & x_{in} \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ a_m & x_{m1} & x_{m2} & \cdot & x_{mn} \end{matrix}$$

Where,  $a_i$  ( $i:1,2,3,4, \dots, m$ ) describes all potential alternatives,  $x_j$  ( $j:1,2,3,4, \dots, n$ ) gives the attributes associated with performance of alternatives  $j= 1, 2, 3, \dots, n$  and  $x_{ij}$  is performance of  $a_i$  with a relation to  $j$ .

In this step, decision matrix is employed to amass the normalized matrix. The formulae for  $r_{ij}$  is represented as follows

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{t=1}^m x_{it}^2}}$$

$r_{ij}$  reveals the normalized performance of  $a_i$  with relevance  $x_j$ .

Weighted normalized decision matrix is find out by using equation as follows.

$$V_{ij} = W_i * r_{ij}$$

And we can get the weighted normalized decision matrix,  $V = [v_{ij}]$ .

$$\sum_{nj=1} W_j = 1$$

then positive ideal (best) and negative ideal(worst) solutions are required to be calculated during this step.

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# Influence of Nanocrystalline Structure on Wear and Corrosion Behavior of Al-SiC<sub>p</sub> Composite

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## Abstract

Functionally graded (FG) Al-SiC<sub>p</sub> composites fabricated via centrifugal casting are widely used in automobile components particularly a brake rotor disc because of its high SiC fraction at the outer periphery. However, when operated in corrosive environment like road deicing salts the disc is highly sensitive to the corrosion due to high SiC fraction. But, the nanocrystalline (NC) structured surfaces synthesized by severe plastic deformation (SPD) method have excellent wear and corrosion resistance at the surface. Therefore, shot peening (SP) as a SPD method conducted on one side of the stir casted FG Al composite having 10 wt% SiC<sub>p</sub> constant reinforcement in order to create NC structured surface. The SP treatment continued for 70 s and 140 s durations. Thereafter, the surface characteristics of the composite before and after SP were estimated by XRD and then the composites were tested by wear and corrosion tests. The results revealed that the SP for 140 s duration favors the induction of hardened layer, higher grain refinement (NC structure) and dislocation density which promotes the occurrence of high surface hardness, thus significantly improving its wear properties. However, higher dislocation density resulted from longer duration shown deterioration to the corrosion resistance. Whereas, the attained degree of NC structure is more pronounced over dislocation density resulted after 70 s SP duration, thereby composite showed excellent corrosion resistance. Thus, the composite with 70 s duration possessed excellent corrosion and relatively good wear properties too.

## Keywords

Functionally Graded Al-SiC<sub>p</sub> Composite, Shot Peening, NC Structure, Wear, Corrosion

## 1. Introduction

Aluminum metal matrix composites (AMMCs) offer superior benefits over an



# MULTI - OBJECTIVE OPTIMIZATION OF PROCESS PARAMETERS IN ABRASIVE WATER JET MACHINING BY USING VIKOR

By

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## ABSTRACT

Abrasive water jet machining (AWJM) process is one of the unconventional machining processes used in many industrial applications. Abrasive water jet machining process withstand very high operating pressures and also the flow of abrasive particles are at very high water pressure is made to remove material from work surface by erosion process. In AWJM process pure water and abrasive particles such are  $\text{SiO}_2$ , beads of glass; aluminum oxide and silicon carbide are majorly used. In this work, optimization of process parameters on the material removal rate, kerf width and surface roughness of Al6082 are done by using AWJ machining process. The experiments were conducted according to Taguchi Experimental design using four factors each at three levels to determine the effect of output responses like material removal rate, surface roughness and kerf width. Finally, multi-criteria optimization and compromise solution (VIKOR) algorithm has been applied for multi-objective optimization of the responses of Electrical Discharge Machining (EDM) process on Al6082 alloy.

Keywords: AWJM, MRR, Kw, SR, Al6082, VIKOR.

## INTRODUCTION

Water stream or jet machine utilizes cold supersonic abrasive degradation to cut practically any metal or nonmetal. The profoundly pressurized water stream is constrained through a modest zone which diverts rough garnet to dissolve the material. Grating water stream and unadulterated water fly both begin with pressurized water, with pressure up to 4100 bar, at that point is transmitted to the cutting head where the pressurized water goes through a modest gap in gem opening. The weight is traded for speed at which is the water fly dissolves the material and cut them. The rough garnet is blended into water-stream and is quickened like a slug out of a rifle. As per the working guideline of AWJM, a profoundly pressurized water fly quickens the air driven rough particles to from a high vitality grating water stream which strikes the work-piece and evacuates the material as shown in Figure 1. The favorable circumstances acclaimed for

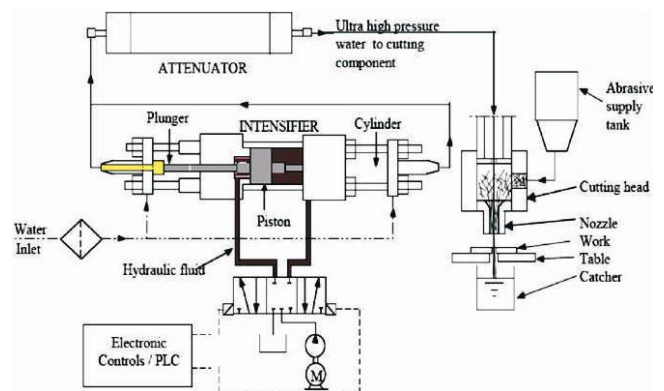


Figure 1. Schematic of Abrasive Jet Machining

AWJM might be recorded as: for all intents and purposes no residue, low power necessities, no warm anxieties, high cutting pace, no fire risks, better nature of cutting, diminished striation and viable on an expansive assortment of materials. Rough water stream is broadly utilized in the machining of materials, for example, titanium, steel, metal, aluminum, stone, inconel, any sort

# Planning and Characterization of Green Synthesized Ferric Oxide ( $\text{Fe}_2\text{O}_3$ ) Nanoparticles

**Kalathur Kumar, S. Arul, Vanki Pratap Kumar**

**ABSTRACT**--The ongoing improvement and execution of new advancements have prompted new time, the nano-transformation which unfurls the job of plants in bio and green combination of nanoparticles which appear to have drawn significant unequivocal consideration from a perspective of blending stable nanoparticles. Green standard courses of orchestrating have risen as a choice to defeat the confinement of ordinary strategies among which plants and microorganisms are significantly misused. Thus the present investigation imagines the biosynthesis of nanoparticles from plants which are developing as nanofactories. Ferric Oxide ( $\text{Fe}_2\text{O}_3$ ) nanoparticles were incorporated via completion of water under the surrounding conditions. Ferrous Sulfate and Sulfur were broken up in Salt Petra with a molar proportion of 2:1. Citrate particles were utilized as nucleation stabilizers. The reactor was loaded up with a latent argon environment and the NPs were gradually accelerated by dropping of  $\text{KAl}(\text{SO}_4)_2$  under an overwhelming blend. The moderate arrangement of nanoparticle seeds was trailed by a quicker development of centers and a moderate development of shells balanced out by citrate particles for the entire time. The tanish red item was accelerated with  $\text{CH}_3\text{CO}_2\text{Na}$ , centrifuged for 5 minutes at 2,500 rpm, and the pellet scattered in argon-foamed water. This means they were rehashed twice to dependably wash the NPs. In the present work the writer contemplates Synthesis and Characterization of  $\text{Fe}_2\text{O}_3$  nanoparticles.

**Index Terms**—Plants, Nanoparticles, Green synthesis, Ferrous Sulphate,  $\text{Fe}_2\text{O}_3$  and SEM

## I. INTRODUCTION

The rise of nanotechnology has given a broad research as of late by crossing with different parts of science and shaping effect on all types of life. The idea of nanotechnology was initially started with an address conveyed by Richard Feynman in 1959. Nanotechnology is a field of science which manages generation, control and utilization of materials extending in nanometers. In nanotechnology nanoparticles inquire about is an imperative viewpoint because of its incalculable applications. Nanoparticles have communicated huge advances attributable to the wide scope of utilizations in the field of Manufacturing, bio-medical, sensors, antimicrobials, impetuses, hardware, optical filaments, horticultural, bio-marking and in different zones.

## II. FABRICATION OF NANOPARTICLES FROM PLANTS

The union of sporadic state of Ferrous nanoparticles from the extracellular fluid dried clove buds (*Syzygium aromaticum*) was accounted for and FTIR portrayal uncovered that the unreservedly water solvent flavonoids of clove buds are in charge of bioreduction of Ferrous particles. Essentially, unrefined ethyl-acetic acid derivation concentrate of *Ulva fasciata*, was assessed for nanoparticles union brought about polydispersed nanoparticles with size extending from 28-41nm. The combination of antimicrobial ferrous nanoparticles utilizing tissue culture-determined callus and leaf of the saltmarsh plant, *Sesuvium portulacastrum* L. was considered. The callus separate could deliver ferrous nanoparticles, superior to anything leaf extricate. The combination was affirmed by utilizing X-beam diffraction range. TEM brought about the arrangement of Ferrous nanoparticles with a round formed and the size going from 5-20nm. Fourier change infrared (FTIR) spectroscopy uncovered the nearness of proteins, flavones and terpenoids which were in charge of the adjustment of the ferrous nanoparticles. The orchestrated iron nanoparticles indicated huge action against clinical strains of microscopic organisms than the fungi<sup>15</sup>. The fluid concentrate of flower petals was utilized for the investigation of biosynthesis of gold nanoparticles showed gold nanoparticles upon described by UV- VIS spectroscopy, FT-IR spectroscopy, X-beam diffraction and vitality dispersive X-beam spectroscopy. FT-IR spectroscopy uncovered the nearness of biomolecules that have essential amine gathering ( $-\text{NH}_2$ ), carbonyl gathering,  $-\text{OH}$  gatherings and other balancing out useful gatherings that are in charge of the adjustment of gold nanoparticles. X-beam diffraction design indicated high virtue and face focused cubic structure of gold nanoparticles. The measure of gold nanoparticles was dictated by Dynamic light dissipating system and it was observed to be around 10 nm<sup>18</sup>. The bio creation of gold nanoparticles came about to rely upon various parameters like temperature and pH impacts on its combination utilizing the watery concentrate of *Macrotyloma uniflorum*. Biosynthesized nanoparticles were recorded by UV-noticeable spectroscopy, transmission electron microscopy (TEM), X-beam diffraction (XRD) and FTIR investigation. The high crystallinity with FCC period of nanoparticles was broke down by HRTEM pictures, SAED and XRD designs. The extent of the nanoparticles was extending from 14-17nm and FTIR

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# Shot peening effect on surface characteristics and mechanical properties of aluminum matrix composite

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## ABSTRACT

**Keywords:**  
Al-SiC<sub>p</sub> Composite,  
Shot Peening,  
Grain Refinement,  
Microhardness,  
Tensile Strength,  
Percentage of Elongation

*In this work, the effect of shot peening (SP) and its duration on surface characteristics and mechanical properties of FG Al-SiC<sub>p</sub> composite reinforced with constant amount (10 wt.%) of SiC particles were studied. The composite surface characteristics after SP with 0, 70 and 140 s duration were investigated by XRD and surface topography by SEM. Moreover, Surface roughness, microhardness and tensile behavior of all the specimens were also studied. Results showed that the SP treatment favors to induce nanocrystalline (NC) structure with refined grains and improved other surface properties too which are enhanced along SP duration. It was also revealed that the grain refinement after SP provoked to rise the values of hardness, tensile and yield strengths. In contrast, longer SP duration causes reduction in percentage of elongation and increased surface roughness. However, SP is industrially popular method due to its superior benefits compared to other surface treatment methods.*

## 1. Introduction

Aluminum matrix composites (AMCs) have received significant demand in aircraft, marine and automotive applications because of their high specific strength, hardness and modulus etc. [1]. Introducing a fine grain structure and high dislocation densities in the surface region due to microstructural changes were enabled the metallic components to improve the mechanical properties such as hardness, tensile strength and ductility of the AMCs. Therefore, extremely small grain size and high dislocations developed in the surface of Al<sub>3</sub>Zr/AA6061 casted AMC via friction stir process (FSP) had shown an excellent improvement in tensile properties of the composite [2]. The tremendous improvement in composite tensile strength after FSP can be attributed to enormous reduction in the grain size and which was strengthened the AMC according to Hall-Petch relation pronounced by the authors after their investigation.

The Hall-Petch relation have such an ability to define how the materials receive the strength by

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virtue of its reduced grain size and which is having an inverse relationship with grains size. Because smaller grains can possess higher ratios of surface area to its volume of the bulk material which in other words higher grain boundaries to respective dislocations. This concept is perfectly proved in the case of material subjected to the severe plastic deformation (SPD). Hence, the mechanical properties such as microhardness and tensile strength of the AMC improved well owing to the reduction in grain size after surface modification via FSP as one of the SPD method [3]. In addition to the improvement in strength as defined by Hall-Petch relation, the defects such as pores, coarse grains and segregation appeared on the surface of AMC after casting had vanished when it was subjected to SPD [4].

Therefore, the surface modification by SPD enabled the composite to have small size grains accompanied by high dislocations which in turn improves the mechanical properties of the AMCs. Besides, the industry has an everlasting requirements such as low cost, high productivity, simplicity, flexibility and time saving methods for better efficiency. In order to satisfy the above requirements one of the SPD method shot peening (SP) is a chosen process for surface modification and practical method to increase



## PAPER

## Synthesis and characterisation of magnesium matrix composite reinforced with titanium dioxide nanoparticulates

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P C Elumalai<sup>1,2</sup>  and R Ganesh<sup>2</sup><sup>1</sup> Research Scholar (PT), Centre for Research, Anna University, Chennai-25, India<sup>2</sup> Department of Mechanical Engineering, Velammal Engineering College, Chennai-66, IndiaE-mail: [elumalaipc.me@gmail.com](mailto:elumalaipc.me@gmail.com)**Keywords:** magnesium, hot extrusion, nanoindentation, 3D microstructure, micro-computed tomography

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**Abstract**

In the present work, magnesium matrix composite reinforced with titanium dioxide (TiO<sub>2</sub>) nanoparticulates was synthesized using powder metallurgy (solid-state processing) technique followed by hybrid microwave heat treatment and hot extrusion. Commercially available magnesium particulates of average particle size 60–300 μm and titanium oxide nanoparticulates of average particle size ~21 nm was used in this study. Extruded samples of pure magnesium and magnesium titanium dioxide (Mg-TiO<sub>2</sub>) nanocomposites were characterized for their physical, surface and internal microstructure (2D & 3D), elemental composition and mechanical behaviour. The experimental density and porosity of the composite specimens increases gradually with increase in addition of TiO<sub>2</sub>. Scanning electron micrographs (SEM) composite samples revealed that the nano TiO<sub>2</sub> particulates distributed uniformly throughout the matrix with no significant agglomeration. The same was confirmed through 3D internal microstructure also. The elemental composition, crystalline structure was measured using x-ray diffractograms (XRD) which confirm that no foreign elements exists. Further, the microhardness and nanoindentation of composite samples showed an increasing trend with increase in addition of TiO<sub>2</sub> nanoparticles.

**1. Introduction**

Magnesium matrix composites are regarded as best solution for replacement of aluminium alloy, titanium alloy and its composites. Monolithic pure magnesium consists many holistic properties such as low density (1.74 g cm<sup>-3</sup>), high thermal conductivity (156 w/mK at room temperature), high specific strength, good electromagnetic shielding performance, good strength to weight ratio, low melting point (650 °C) and low elastic modulus (42–45 GPa). Reinforcement of magnesium matrix with large volume proportions of hard ceramic/metallic nanoparticulates always improves the morphological, mechanical, thermal and tribological properties of composite. The fabrication of magnesium matrix composite reinforced with ceramic nanoparticles using stir casting, squeeze casting, spray forming, DMD and powder metallurgy has been reported in [1–8]. However, the low stiffness, poor formability and poor corrosion resistance of magnesium based alloys and its composites hinder their use in wet environment and different structural applications.

Jie Chan *et al* [2] fabricated Mg-Al composite using hot pressing sintering (powder metallurgy technique) followed by hot extrusion and studied the density, SEM microstructure and compression characteristics of extruded composite. AZ91/FAs composite using negative infiltration was developed by K N Braszczyńska-malik *et al* [3], exhibited the density and microstructure of fabricated samples, similar characterisation was reported by C D Li, X J Wang *et al* [4] for Mg-Zn/CNTs composite using stir casting and hot extrusion. DMD technique followed by hot extrusion process studied by Amit kumar *et al* [5], explored the microstructural, damping, microhardness and tensile properties of Mg-3Al-La alloy. Ganesh kumar and Manoj Gupta *et al* [9] attained fine grain size, increase in hardness and increase in UTS of Mg- Ti nanocomposite fabricated by DMD technique and hot extrusion, same was reported by Mui Hoon Nai *et al* [10] and Tiong Hon Damienomg *et al* [11] for Mg- TiN

# DESIGN AND ANALYSIS OF DIFFERENT TOOL PROFILES IN FSW PROCESS BY USING UG (NX) AND ANSYS

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**ABSTRACT-** Friction-stir welding (FSW) is an advanced solid-state joining process (the metal is not melt) that takes place at a temperature below the melting point of the materials to be joined. It provides better mechanical and metallurgical properties of the weld without conventional defects. This welding process is done by using conventional milling machine, and heat is generated between the rotating tool and the work material, which leads to a very soft region near the FSW tool. It then mechanically intermixes the two pieces of metal at the place of the joint, and the softened metal can be joined using mechanical pressure, which is applied by the rotating tool.

The process of welding lower temperature materials by friction stir welding (FSW) is used to magnesium, titanium, and aluminium alloys, now it is extended to weld mild steel. Two types of the tool materials are made of stainless steel(SS), and titanium(Ti) which is designed for friction stir welding to determine the joint properties and microstructure, and hence the tool material is one of the most important and critical parameter that influences the FSW process.

In the present study, different shapes of tools like hexagonal, tapered, truncated (pyramidal) and also circular were designed with the help of UG (NX). Then static (tool rotational velocity 1000 rpm) and thermal (temperatures and convection on plates and tool also) boundary conditions are applied to the working process to analyze the welding parameters by using ANSYS software. And the results of deformation stress and heat flux for different shapes of tools were calculated.

Finally, the three different shapes of tool properties for two types of tool materials are compared one with another, to find best tool profile that can be more useful in the field of manufacturing.

**Key words:** Friction stir welding, Structural analysis, UG (NX), ANSYS

## I. INTRODUCTION

### 1.1 FSW

Friction stir welding (FSW) is a generally new joining procedure that has been utilized for high generation since 1996. Since, softening does not happen and joining of metals happens underneath the dissolving temperature, a brilliant weld is made. This trademark significantly lessens the evil impacts of high warmth input, including twisting, and dispenses with hardening deserts.

### 1.2 HISTORY OF FSW

Friction stir welding was developed by The Welding Institute (TWI) in December 1991. TWI recorded effectively for licenses in Europe, the U.S., Japan, and Australia. TWI then settled TWI Group-Sponsored Project 5651, "Development of the New Friction Stir Technique for Welding Aluminum," in 1992 to further examination this system.

## II. FRICTION STIR WELDING PROCESS

### 2.1 WELDING

Welding is a procedure where at least two sections are joined for all time at their contacting surfaces by a reasonable use of warmth and additionally weight. Frequently a filler material is added to encourage blend.

### 2.2 FRICTION STIR WELDING,

Friction Stir Welding is a strong state joining process, which implies that the articles are joined without achieving softening point. The welds are made by the consolidated activity of frictional warming, mechanical disfigurement and blending impact because of a pivoting apparatus.

In FSW, a tube shaped carried device with a profiled stick is pivoted and dove into the joint region between two bits of sheet or plate material. The parts must be safely cinched to keep the joint appearances from being constrained separated. Frictional warmth between the wear safe welding apparatus and the work pieces makes the last relax without achieving dissolving point, enabling the instrument to navigate along the weld line. The

# Development of Secure Transport System Using VANET

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## Abstract

The Ad-Hoc Network for vehicle (VANET) is expected to necessarily develop the secure transport systems by providing timely effective information distribution has being interested as Vehicular Adhoc Networks (VANETs) for several years since the distribution type of networks able to contribute important developments in terms of road security, where the most of contracts accepted flooding approaches to warn all the knobs, as well as the traffic controls and the accident. The proposed solution is crucial based on an approach of bundle, where a bunch head is conscript among a group of transports and a technique, for the formation of the relative positions of the nearby knobs. Some ideas are defined as the distance every bunch head establishes a local coordinate system and measures the positions of all its neighbors in the group using the distances measured between transports. In the aim to reduce the measure time in dangerous situation, the guidance of the equivalent system of the first bunch head, the global systems are considered the same. This new solution contributes sufficient location data and efficiency to support basic network operations. Finally the data analyses are notified with the help of NS-2.

**Keywords:** VA NET, NS-2, Intelligent Transport System (ITS).

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## 1. Introduction

Real-time video broadcast has high need of terms on bandwidth and delay, while VANET's is described by much defined radio effects and high flexibility. Furthermore, to ensure that good behaviour under any type of locations, also study the concussion of GPS drift on its Scheme. So that, [4] the affection of global positioning system (GPS) signals to terrains, transports cannot to get their positions, when they inside tunnels or on a road surrounded by high rise where satellite signal is blocked. To address the issues, they proposed a novel Grid based On-road localization Technique (GOT), where

transports with and without correct global positioning system (GPS) signals self establish into a Vehicular Ad-Hoc Network (VANET), transfer place of line data ,help each other to compute an correct location for all the transports internal organization [2].

The superiority of place procedure to require that some of organization knobs (beacons) know their location, and these knobs act as a source for place of the rest organization knobs. Transports, equipped with Global Positioning Systems (GPS) receivers, are mostly used as beacon. However, not all the transports have been equipped with their GPS. Also we give an overview of

# Data Communication and Networking Concepts in User Datagram Protocol (UDP)

T. Vedavathi, R. Karthick, R. Senthamil Selvan, P. Meenalochini

**Abstract:** In most popular standards, the UDP (User datagram protocol) plays a vital role in Internet protocol. Normally, in the networking concepts are not required for set up communication between data paths and also the channels. It has used to addressing several different function and also provides data integrity at the source and destination. TCP and SCTP are designed for many applications in the network interface if error free network needed. So that, to improve the performance metrics of teaching learning process, the wireless technology based networking concepts involved major parts.

**Keywords:** User Datagram, Internet Protocol, Internet of Things.

## I. INTRODUCTION

The basic RFC 768 protocol was designed by David P. Reed in 1980. The error correction and checking are achieved by UDP protocol stack avoids the overhead of such processing. Due to transmit again and again, the dropping packets are waiting for time-sensitive applications. RFC 768 was used more in simple message oriented transport layer protocol [1]. The message delivery for upper layer protocol and the UDP messages are sent once, there is no state for the UDP layer retains in it for all users applications, it should be calculated by means of desired transmission reliability.

Application specific UDPs attributes are:

1. The network type protocol are simply suits for query and response protocol, also it is a transaction oriented protocol [2].
2. For modelling that is Internet protocol provides datagrams for remote cell and file systems in network.
3. For a full stock protocol, the trivial file transfer protocol used in bootstrapping.
4. IPTV has very much amount of clients are available in stateless.
5. Real time streaming protocol are used in online games which makes transmission delays.
6. The broadcast application is only suits in multicast precision time protocol.

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## PORTS

To maintain point to point communication, we can use datagram for specific application and also use data sockets for retransmission once packet lost. The multiplexing concepts evolved from software based structure applicable by means of port number. The acceptable port range varies between 0 to 65535 whereas the expected message can be reserved for Port 0 [3]. There are three port numbers which was governed by IANA. First, UNIX based port number (0 to 1023). Second, (1024 to 49151) are used in particular registered services. Third, (49152 to 65535) are allotted for any application specific. For all communication based endpoints were running through software designs.

## II. PACKET STRUCTURE

The User Data gram protocol holds 16 bits of data with the combination of source fields as well as checksum in IPV4. But the usage of IPV6 is kept reserved [4].

### Source port number

If the state is idle, the port is zero initially [5]. The ephemeral port is used for the client which identifies the port number from sender. The best example for the user friendly port number is assigned the server as the source host.

### Destination port number

If assumption made for destination port number, the server will act as superior port number which also identifies the receiver's port. Now the client has the ephemeral port number.

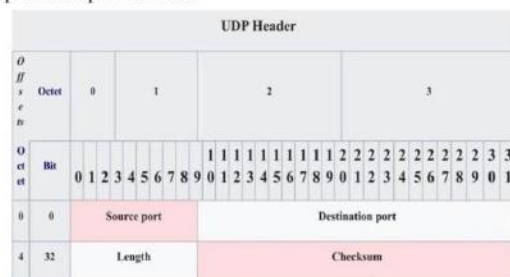


Figure 1. The basic functional packet structure of UDP. Length

The several bytes of UDP data and header specify its length. The total size of UDP is about 65535 bytes with the minimum length of 8 bytes. In IPV4 protocol is about 65507 to be imposed the actual data length. The important IPV6 protocol have larger amount of UDP header with

## AN ADVANCED EMBEDDED SYSTEM FOR WOMEN SAFETY USING ARDUINO IDE

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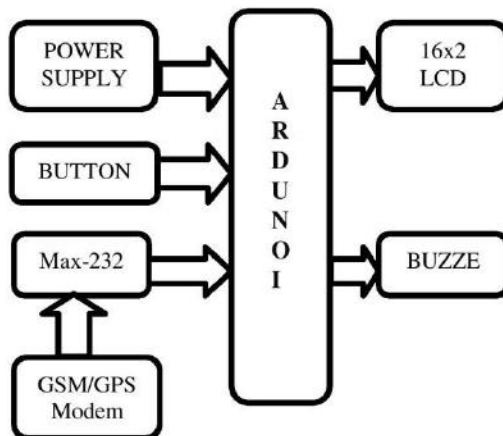
**Abstract**— India which sees itself as a promising super power and an economic hub, is still trapped in the clutches of various patriarchal evils like molestations, dowry, crime against women, worst among all is rape. In today's world, women safety has become a major issue as they can't step out of their house at any given time due to fear of physical/sexual abuse and violence. So, in an attempt to curb this menace, the atrocities against the women can be now brought to an end with the help of a Women Safety Device. This safety device consists of a microcontroller, buzzer, shock circuit and an emergency pushbutton switch. On sensing the emergency situation, once the switch is pressed this device fetches the current location of woman by using GPS and sends it to emergency contacts via Global System for Mobile (GSM) module. The safety device also includes a buzzer to alert nearby people and a shock giver circuit which is intended to hurt the attacking or abusing person, due to which there is a chance for the women to escape.

**Index Terms**—About four key words or phrases in alphabetical order, separated by commas.

### I. INTRODUCTION

The modified system is to design portable device for the security of women. It consists of power supply, buzzer, shock circuit, GPS and GSM modem[5]. It is a distinct aid product designed to keep the user and their associate safe 24/7. It is filled with features for both everyday safety and real emergencies [3]. Our aim is to provide you with firmest and natural way to connect your nearby hand. Here we introduce an device which ensures the safety of women. It's a quick responding mechanism that helps women during trouble. When someone is going to harass, she can press the Emergency button that is attached to the device and the location information is sent as an SMS alert to few predefined emergency numbers in terms of latitude and longitude using GPS and GSM. At the same time, activates the Buzzer to capture the attention of the people nearby for help and a shock giver circuit which is intended to hurt the attacking or abusing person, due to which there is a chance for the women to escape. The program is developed in embedded language to demonstrate the system capability in providing real time response. Thus the girl can be safe and she can feel protected.

### II. BLOCK DIAGRAM



### POWER SUPPLY:

The primary function of a power supply is to convert one form of electrical energy into another and, as a result power supplies.

### LCD DISPLAY:

LCDs are available to display arbitrary images which can be displayed or hidden, such as preset words, digits and 7 segment displays as in a digital clock. They use some basic technology, except that arbitrary images are made up of a large number of pixels, while other displays have larger elements.

### GSM MODEM:

Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. The received values from the transmitter are sent as an SMS to the few predefined emergency numbers.

### GPS:

GPS, in full Global Positioning System, space-based radio-navigation system that broadcasts highly accurate navigation pulses to users on or near the Earth. In the United States' Navstar GPS, 24 main satellites in 6 orbits circle the Earth every 12 hours. In addition, Russia maintains a constellation called GLONASS (Global Navigation Satellite System). Calculates persons position on the planet based on the location of the satellites.

### BUZZER:

It is the audio signaling device. In case of emergency, used in order to sound the alarm tone of the buzzer to alert the near by people.

### BUTTON:

Button acts as a switch. It activates the whole device.

### MAX 232:

MAX232 is an IC. It is used in the communication system for the conversation of voltage levels on TTL devices that are interfaced with the serial port and the microcontroller.



## HI-TECH ENERGY METER AUTOMATIC LOAD CONTROL BY USING 8051

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### ABSTRACT

Nowadays automation is being implemented in all the fields. However it is seen that electricity service providers still use the same old method of reading meters manually from house to house. Our proposed project will send all the details of the meter to the service provider as well as the consumer through a SMS by using GSM module. The use of ZigBee will help in quick data transfer wirelessly. The use of LCD display will help in notify demanding the consumers about any changes in the power supply by the service provider. The load can be controlled from both the ends by consumer and service provider with the help of relay circuit. Thus this project will be both service provider and consumer friendly. The detection of electricity theft can also be done through the use of this system. This method is however tedious and time consuming and thus not prove sufficient in most of the situations. There may be a situation such that meter is installed inside the consumer's house and if he is out of town then the average of previous bills is taken to generate the new bill even if consumption might be low. This situation if faced in many cases may prove a burden for the service provider as well as consumer. Many consumers may not cooperate with meter readers for any reason such as they might consider it as an invasion of their privacy. Also there might arise a condition where the reading is noted wrongly by the reader. To overcome this and many other such unwanted situations the use of energy meter with automatic load control using GSM technology along with ZigBee can be implemented in this sector. The use of ZigBee will bring in wireless data transfer thus the process of meter reading or any service related to the meter connection is fastened. ZigBee can cover a range upto considerable distance in meters. Nowadays the procedure to incorporate ZigBee in various areas for automation is being considered. ZigBee in automation of meters is thus a safe and fast method. A GSM modem can accept any kind of GSM network and act as a mobile phone with its own unique phone number. The applications of this modem are SMS control, data transfer.

### Keywords:

Keil IDE, UC flash, Proteus, Micro Controller, Crystal, GSM modem

### INTRODUCTION

This project is aimed to design an automatic meter reading system using wireless technology GSM. A GSM modem provides the communication interface. It transports device protocols transparently over the network through a serial interface. A GSM modem is a wireless modem that works with a GSM wireless network. This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily. The modem can either be connected to PC serial port directly or to any microcontroller. Due to the drastic changes in technology in the last decade, so many advancements were introduced in electricity departments. The present system is like, a person from electricity department has to go to each and every house to take the readings from the digital meter and present these details to the billing department and after all their processing, they generate a bill and another person comes and gives the electricity bill to us and finally we have pay the bill.

## SIMULATION OF BEAM STEERING FOR ACTIVE ARRAY RADARS

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### ABSTRACT

Beam steering means changing the direction of main lobe of a radiation pattern. In the past beam steering is done by using mechanically controlled servo motors, in that to steer the beam it takes more delay. Such mechanical steering is not suitable for observing fast moving targets because of latency in beam steering. Even though we can completely remove the grating lobes in mechanical beam steering, it's difficult to maintain such radars. To overcome this problem, we are using electronic beam steering by using the phase shifters, because it steers the beam within microseconds. The implementation of beam steering is easy when compared to mechanical beam steering. In radio and radar systems, electronic beam steering may be accomplished by changing the relative phases of the RF signals driving the elements. It is highly effective since it maintains the gain of the antenna and offers flexibility in the steering range of the antenna. Antenna consists of TR module (Transmitting and Receiving module), which creates the phase shifting required to electronically steering the antenna beam. Beam steerable antennas have become very popular in modern day antenna propagation because there are no moving paths or complicated feed networks, this method of beam steering can have great use for light weight and low cost scanning antennas. It increases the gain and directivity of antenna. By using OCTAVE, we have performed the calculation of array factor, half power beam width for linear array and planar array. We have observed that for both linear and planar array, the beam width will be depending on the inter-element spacing and number of elements in the antenna.

### Keywords

Radiation pattern; Beam steering; Servomotors; latency; grating lobe; TR module; linear array.

### Introduction

Phased array antennas can adopt a number of different configurations, including linear, planar and circular. This paper focuses on linear active phased array antennas whose unit cell is formed by a sub array of radiating elements, each fed by a transmit and receive module that can provide amplitude and phase control. Linear phased arrays use the progressive phase excitation between the elements to scan the antenna beam electronically over one dimension, while using the element amplitude distribution to control the pattern shape. The main advantages offered by phased arrays over conventional systems are increased scanning speed, high reliability and multifunction capability. These advantages make the use of this technology the most logical choice for the next generation weather radars.

### Design Goal and System Configuration

The original antenna system, which consists of 1,024 dual polarization three element Yagi antennae arranged in the form of a  $32 \times 32$  matrix, the antenna array has been configured in the form of 64 subarrays, each having 16 antennae ( $4 \times 4$  Yagi) so that they can be combined as required and also used for spaced antenna reception of the atmospheric signal. Importantly, it allows scalability, implying that one can use parts of the system or full system or even augment the system. At the same time, it has been designed to have independent transmit receive (TR) unit for each antenna so that the system works as a fully active phased array system. Currently, the system uses one set of antenna (north south aligned antennae) for transmission and reception, and the option to

## GREENHOUSE MONITORING SYSTEM

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### ABSTRACT

Greenhouse Monitoring System is the technical approach in which the farmers in the rural areas will be benefitted by automatic monitoring greenhouse environment. It replaces the direct supervision of the human. Greenhouse is a building where plants are grown in a controlled manner. In general, greenhouses are usually affected by the weather and plant diseases, as a result, their yield can be minimized and thus income is reduced. Through the analysis of the current situation of greenhouses, this system proposes a low-cost solution for identifying of infected plant leaves of agricultural greenhouse. The proposed system is an embedded system which will closely monitor the microclimatic parameters of a greenhouse on a regular basis round the clock for cultivation of crops or specific plant species. The purpose of this work is to design a labour free, sensor based greenhouse monitoring system. The system comprises of microcontroller and sensors. Since a microcontroller is used as the heart of the system, it makes the set-up low-cost and effective nevertheless and flexible. This embedded system has three sensors, they are temperature sensor, humidity sensor and soil moisture sensor. As the system also employs an LCD display for continuously alerting the user about the condition inside the greenhouse, the entire set-up becomes user friendly. Nowadays due to urbanization and lack of land availability there is a great need to construct the Greenhouses which will be reserved mainly for growing crops. With the advancement of technology we can monitor the multiple Greenhouses using IOT from the central location wirelessly.

#### Keywords

Greenhouse, Agriculture, Embedded System, Arduino

### Introduction

A greenhouse is mainly used to grow certain types of plants throughout the year or plants that require continuous monitoring to achieve high quality and quantity. At present most of the greenhouses are manually controlled and monitored. This method of greenhouse monitoring is labour intensive and time consuming. The Internet of Things concept can be used in greenhouse to increase the productivity by using various sensors to sense the environmental parameters. The Internet of Things is a network of devices that are connected via internet and together with web services communicate with each other. This paper proposes a system to monitor and automatically as well as manually control the system in greenhouse using temperature sensor, humidity sensor and soil moisture sensor. If the sensed data crosses a predefined threshold range an alarm will be triggered which will alert the user. In today's greenhouses, many parameter measurements are required to monitor and control for the good quality and productivity of plants. But to get the desired results there are some very important factors which come into play like Temperature, Humidity and Water, which are necessary for a better plant growth. Keeping these parameters in mind to build an Automatic Green House Controlling System over WIFI module using Arduino. This system is very efficient for growing good quality plants. The other important part of this project is that it is fully automatic. Arduino automatically turns on and turns on the appliances. Firstly to make this project reader needs knowledge about getting start with arduino and LCD interface with arduino. Continuous monitoring of these environmental variables provides valuable information to better understand, how each factor affects growth and how to maximize crop productiveness. The optimal greenhouse micro climate adjustment can enable us to improve productivity and to achieve remarkable energy savings especially during the winter in northern countries. WSN, composed of hundreds of nodes which have ability of sensing, actuation and communicating, has great advantages in terms of high accuracy, fault tolerance, flexibility, cost, autonomy and robustness compared to wired ones. Moreover, with the onset of IoT and M2M communications, it is poised to become a very significant enabling technology in many sectors, like military, environment, health, home and other commercial areas. IoT is a general term, covering a number of technologies that allows devices to communicate with each other, with or without human intervention. An example application, presented in this paper, is the MicaZ node based greenhouse application, which in a timely manner provides a possibility for screen monitoring of detailed data about the conditions of the greenhouse. Furthermore, the suggested setup can be incorporated with other internet and messaging services (i.e. Web, WAP, SMS) to provide communication for farmers. The most common used system to control and measurement of environmental parameters in greenhouse depended on wired connection for data transmit. In addition, this

## Hybrid Multiplier-based Optimized MAC Unit

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### ABSTRACT

Wherever there is a need for high-performance computing applications there is an evident demand of an efficient high-speed multiplier. Multiplication takes most significant time as compared to other arithmetic operations. Multipliers are the most essential blocks in every high-performance computing architecture like Digital signal processing (DSP). MAC unit which consist of Multiplier and Accumulator plays an important role to decide the performance of any DSP block. The better performance of MAC unit fulfills the parameter of fast computation and real-time processing capabilities of a DSP. Over the years number of ideas have been proposed to improve the performance and mitigate the excessive partial product term generation during conventional multiplication approach. In this paper, we have focused on proposing the MAC architecture using an integrated Hybrid binary Multiplier and integrated CLA adder network. The integrated multiplier is a combination of Karatsuba algorithm and Urdhva Triyagbhyam sutra from vedic mathematics. CLA adder network consist of CLA and conditional sum adder which helps to reduce addition time by performing parallel addition. 32\*32 Hybrid multiplier is synthesized and simulated using Xilinx ISE 14.5 software .

### Keywords

DSP; MAC unit; Karatsuba multiplication algorithm; Urdhva Triyagbhyam Sutra; CLA; Verilog HDL; FPGA

### INTRODUCTION

The Multiplication and accumulation (MAC) operation is the main computational block in Digital Signal Processing (DSP) architecture. This block decides the overall performance of the architecture as it has significant & dominating execution time. Designing high speed MAC is the demand for real time DSP applications those covers the application area like Machine vision, Avionics (Radar), defence, audio signal processing. To reduce the computation time ,power consumption and complexity of circuit the Analog signal processing is being performed in digital domain with the help of various DSP algorithms like DFT, FFT. These algorithms have two basic operations i.e. multiplication and accumulation. By reducing the partial product generation during multiplication improves the speed of the MAC.. In this paper, we introduce the MAC unit architecture implemented using runtime reconfigurable hybrid binary multiplier design. Since multiplication consumes the significant execution time of of the MAC unit there is a need of high speed multiplication algorithm that can compensate/mitigate this significant contribution of multiplication step. Excessive partial product generation in a higher bit multiplication limits the performance of a multiplier.

We have implemented the multiplication with the combination of ancient Vedic mathematics and Karatsuba algorithm. Multipliers implemented with vedic mathematics helps to reduce the computational complexity of DSP applications like FFT, DFT, MAC unit with less number of partial product generation during multiplication. Vedic mathematics was rejuvenated from the Vedas which are ancient scripture of Indian culture. Vedic is a Sanskrit word emerged from Sanskrit language which means the collection of information. Swami Bharati Krishna Tirthaji Maharaja gave main sixteen sutras as his dedication to Vedic mathematics after eight years of rigorous research. The conventional method of multiplication involves the approach of multiplying two binary numbers by multiplying each bit of multiplier with each bit of multiplicand and finally sums the all partial product. This approach is associated with the complexity level of  $O(n^2)$  for multiplication of two n-bit numbers and  $O(n)$  for addition [2].

### RELATED WORK

Various architecture of multiplier is proposed using the different vedic sutras in literatures [2] [5] [6] [7]. C. Eyupoglu[4] implemented the multiplication using Karatsuba algorithm. The analysis is made done for various bit lengths. Examination parameters for the implemented design were chosen, the number of multiplications and the time taken for multiplication. Other literatures can be also found which gave an extensive study and implementation results of different kind of efficient fast adder network [18] [19]. Monisha Yuvraj et. al. [16] proposed a novel multiplier design which integrates all major sutras of vedic mathematics. Multiplier is designed integrating all these sutras and designed logically multiplexed in such a way that makes it capable of deciding which multiplier block is to be used for optimum results based on the nature of input. Used vedic scaling techniques extends the application up to 64 bits operations. The literature also tabulates the implementation results and compares the results with conventional multiplier and accumulator unit. Li Husn [17] suggested MAC unit architecture using radix-4 Booth algorithm which results into reduced complexity and minimal switching activity that ensures a low power design.

The integration of proper multiplication schemes along with an efficient fast adder network can results an optimized MAC unit architecture. The proposed architecture is motivated from the demand of this integration to improve the performance of MAC unit.

# FACIAL EXPRESSION RECOGNITION SYSTEM USING RASPBERRY PI

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**Abstract**— Emotions play a very important role in our day to day life for communication purpose. In this work, user's emotion using its facial expressions can be detected. These expressions can be derived from the live feed via system camera or any pre-existing image available in the memory. Human emotions are mainly classified into seven emotions i.e. Neutral, Happy, Sad, surprised, Anger, Disgust and fear which a human face can make according to the different situations one may find itself in. It has a vast scope of study in computer vision. The entire project is classified into three major steps i.e. Face detection, facial feature extraction and classification. The main hardware used in this project is Raspberry pi. The objective of this paper is to develop a system which can analyze the image and predict the expression of the person.

**Keywords-** *Emotion Detection, Face recognition, Image Processing, Raspberry Pi, Computer Vision, Feature Extraction.*

## I. INTRODUCTION

Image processing is a method to analyze and manipulation of a digitized image in order to improve its quality. In order to get an enhanced image or to extract some useful information from the raw image we perform some operations on it. It is a type of signal processing in which input is an image and output may be image or features associated with that image. It is an effective and efficient way through which an image can be converted into its digital form subsequently performing various operations on it. One of the most important applications of Image Processing is Facial Expression Recognition. Our emotion is revealed by the expressions in our face. It plays an important role in interpersonal communication. Some applications related to this include Personal identification and Access Control, Forensic application, Human-Computer interaction and so on.

It consists of three basic steps:

- *Scanning the image:* A raw image is acquired which has to be used for further operations. The main aim of this step is to extract information which is suitable for computing.
- *Analyzing and Manipulating:* The image is converted into digital form by using a digitizer.

# Classification and Change Detection of Tirupati Urban Area using Erosion and Dilation Based PCA Transform



M.Dharani, G.Sreenivasulu

**Abstract:** In remote sensing, the identification of the land use and land cover (LULC) changes in the global and local region are developed by classification and detection algorithms. This classification system can be developed to meet the needs of state agencies, and Federal for an up-to-date analyze of LULC throughout the entire selected of region area. The multispectral images have multiple low-resolution bands due to lack of sensory acquisition problem, haze-covered on earth objects and atmospheric distributions. So difficult to analyze the full information, the user wrongly interprets the information. Image processing applications can be done for compress and enhance the details of land surface details. The Principal Component Analysis and Morphological operations are implemented for compressing and feature extract the color and earth object values with good accuracy level. Change Detection between the time difference of the proposed enhanced images for land objects classes was computed. The most extensive land cover change category identification of the Tirupati urban Agricultural and forest area for the last 14 years. The change analyzed by using the image differencemethod for obtaining the changing level of the forest and urban development areas between two-timeintervals.

**Keywords :** Multispectral images, Principal component analysis, Morphological operations, haze, enhancement, Land use.

## I. INTRODUCTION

Satellite images are captured from a very long distance so; they contain too much noise and distortion because of atmospheric barriers. After capturing the image, some radiometric and geometric corrections are carried out on it. However, they are not sufficient for all the applications. It is very important to enhance the restored image before using it. Satellite image enhancement is the technique which is most widely required in the field of satellite image processing to improve the visualization of the features[14]. The digital image processing techniques help improve the quality of the objects for getting better feature extraction of the values of

the object. The spatial and frequency domain methods are implemented for enhancing their details, but individual band processing techniques are complexity, avoid this complexity with dimensionality reduction technique instead of using each band compression of the total multispectral image. Object edges are very important for separating the one class from another class is that total global region of the image. Morphological operations are one of the most suitable technique to enhancing the edge or high sharpening details. So combinational of principal component analysis and morphological operations are one of the great methods for improving the object details from multispectral satellite images. The proposed method by using principal component analysis and morphological operations for enhanced the color, brightness and sharpening details of the local and global area of the low-resolution image. The Compression can be done by dimensional reduction with PCA and sharpening the edge details by morphological operations. The statistical redundancy between the components of high-dimensional vector data enables a lower-dimensional representation with less loss of information[9][10].

### A. Study area

Tirupati 13°34'- 13°45' N, 79°15'- 79°29' E is the world famous pilgrim city of Lord Sri Venkateswara and it is the speediest developing city in the lower range of Seshachala hills in the Chittoor district of Andhra Pradesh. It covers an area about 499 Sq.km and consists of Tirupati urban and rural areas and its surroundings. The midyear temperature ranges from 35 to 48° Celsius and the winter temperature ranges from 18 to 20° Celsius. Classification There are two types of classification are mostly preferred for classification of the objects using the clustering process are unsupervised classification and supervised classification. Mostly the user knows the details of about training samples.

This method gives superior results compared with other classification methods. In unsupervised classification, the computer only can be formed as groups based on the intensity of each individual pixel. These pixels are considered as the same class. In this method supervised classification can be done by with clustering process.

### B. Land use and Land cover classification

LULC changes are shown an important role in monitoring and managing the environmental changes

[4].Theagricultural, vegetation and water bodies are not constant level in various seasons, which are changes in seasonally.

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## **Compact CSRR Etched UWB Microstrip Antenna with Quadruple Band Refusal Characteristics for Short Distance Wireless Communication Applications**

**Rayavaram Kalyan<sup>1,\*</sup>, Kuraparathi T. V. Reddy<sup>2</sup>, and Kesari Padma Priya<sup>3</sup>**

**Abstract**—This communication enlightens design, simulation, fabrication and testing of a novel compact CSRR etched ultra-wideband (UWB) patch antenna with quadruple band refusal characteristics. The planned antenna contains chamfered bevel slot rectangular radiating material with a complementary split ring resonator (CSRR) etched on one side and an incomplete ground plane on the other side of the substrate. To understand band rejection characteristics, four circular slots with different radii are etched on the radiating material as CSRR to reject bands at Worldwide Interoperability for Microwave Access (WiMAX) at 3.5 GHz, Indian National Satellite (INSAT) at 4.6 GHz, Wireless Local Area Network (WLAN) services at 5.8 GHz, and Wideband Global SATCOM (WGS) at 8.2 GHz. The rejected bands center frequencies are perfectly coupled at particular slots with different radii. This compact antenna is effective and useful for short areas and can be easily incorporated in small devices. The results show that the antenna has a bandwidth from 2.77 GHz to 13 GHz. This antenna gains a worthy harmony between the simulated and measured results.

### **1. INTRODUCTION**

In real world of communication, high speed data transfer is a very important feature, and to achieve it many techniques have been adopted in wireless communication technology. Among those for short areas, ultra-wideband (UWB) is an effective and attractive procedure. In recent ages UWB grows widely in communication due to its ultra-high frequency bandwidth, low energy density, extremely low power transmission levels, great safe and excessive reliable communication solutions, unintended detection, and many others. UWB becomes more popular after Federal Communication Commission (FCC) allocated the bandwidth ranging from 3.1 to 10.6 GHz in February 2002 which can be used for short areas [1]. According to the literature many types of UWB antennas were stated time to time [2–4], and the bandwidth enhancement techniques such as chamfering, bevel and step shape designs of the radiating material and defective ground plane are reported [5–7]. Huge research on these systems carried some challenges including matching the impedance, low substrate size, low fabricating cost, etc. Different narrow bands are included in this UWB spectrum such as WiMAX at 3.5 GHz (3.3 GHz–3.7 GHz), INSAT at 4.6 GHz (4.5 GHz–4.8 GHz), WLAN services at 5.8 GHz (5.75 GHz–5.85 GHz), and WGS at 8.2 GHz (7.9 GHz–8.4 GHz), which create interference with the UWB system. To reject particular bands in the UWB spectrum various resonators for single band rejection characteristics [8, 9], double band rejection characteristics [10, 11], triple band rejection characteristics [12, 13], and quadruple band rejection characteristics [14–22] are studied. This research proposes a novel design of a compact CSRR etched ultra-wide bandwidth antenna with sensible rejected bands.

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# Parallel and Serial Graph Coloring Implementations with Tabu Search Method

Rutanshu Jhaveri, Narayanan Prasanth, Jayakumar K, **Navaz K**

**Abstract:** One of the well-known property of graph is graph coloring. Any two vertices of a graph are different colors such that they are adjacent to each other. The objective of this paper is to analyse the behavioral performance of Tabu Search method through serial and parallel implementations. We explore both parallel and serial Tabu search algorithm for graph coloring with arbitrary number of nodes.

**Index Terms:** Algorithm analysis, Graph coloring, Parallel processing, Tabu search.

## I. INTRODUCTION

A graph is an illustrated representation of different sets of objects and the links between these objects. These links together give an abstract representation of relationships. In graph theory, the objects are called vertices, whereas the links in between them are called edges. A vertex is defined as an entity and on the other hand the edge, is said to be the relationship or association between these two entities. Vertex coloring is the most common graph coloring problem. The problem starts off simply, you have  $m$  colors and need to find a way to color the vertices of your graph in such a manner, where no two adjacent vertices connected by an edge have the same color. The minimum number of colors that one completes coloring a Graph  $G$ , is called the chromatic number. Other examples of graph coloring types include Edge Coloring – no vertex is incident to two edges, which have the same color, and Face Coloring – Geographical Map Coloring. However, we choose to avoid using these for our analysis as we are planning to work with vertices which are easier to calculate and visualize when speaking about a classroom arrangement or any such application. In addition, the aforementioned coloring techniques can be transformed into Vertex Coloring using various matrix operations. Various algorithms are used to find the Chromatic number for any Graph. They use different approaches and provide varying results depending on the graph size. In this paper, we evaluate the behavioral performance of Tabu Search method through serial and parallel implementations. The number of cores and

graph size would be determining factors for each algorithm. The structure of the paper as follows: Section 2 presents the relative study of the work. Section 3 discusses the graph coloring algorithm and section 4 produces the implementation results and its discussion. Section 5 conclude the paper.

## II. RELATED WORKS

Allwright et al. [1] presented some parallel graph coloring algorithms dependent on understood sequential heuristic calculations, and contrast them and some existing parallel algorithms. These calculations are actualized on both SIMD and MIMD parallel models and tried for speed, effectiveness, and for shading arbitrary triangulated networks and diagrams from sparse matrix. Buhua Chen et al. [2] introduced a new parallel genetic algorithm to take care of the Graph coloring problem (GCP) in view of Computer Unified Device Architecture (CUDA). All the operators such as initialization, crossover, mutation and selection are designed to be parallel in threads. Additionally, the execution of their algorithms is contrasted and alternate algorithms utilizing benchmark charts, and exploratory outcomes demonstrates that their calculation merges significantly more rapidly than different calculations and accomplishes focused execution for solving GCP. Frank et al. [3], the paper portrays another graph coloring algorithm, the Recursive Largest First (RLF) coloring algorithm. Adding onto RLF, an assortment of existing coloring methods are introduced and their execution on a wide scope of test data is contrasted with that of the RLF algorithm. Additionally portrayed is a methodology for producing arbitrary graphs with known chromatic number. The presence of such a technique, until now ailing in the test writing, gives a standard strategy to testing the exactness of graph coloring algorithms. Gend Lal et al. [4] describes an efficient algorithm for GCP colouring problem using less number of colours. The proposed scheme is applicable for all types of graphs. The algorithm divides the neighbours of a vertex into two categories N-type and V-type, and checks the colour filled in V-type neighbor before filling in the current vertex. Algorithm selects a colour from the list of colours,  $K$  every time from the beginning of the list colour so that it can make use less number of colours. They also compare their results with those obtained using genetic algorithms, Brown's algorithm and other heuristics algorithms. Michael Elkin et. al. [5] initiate the study of combinatorial algorithms for Distributed Graph Coloring problems. In a distributed setting a communication network is modeled by a graph  $G = (V, E)$  of maximum degree  $\Delta$ . The vertices of  $G$  host the processors, and communication is performed over the edges of  $G$ .

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# Predicating Early Reviewers Based on Their Rating Behaviors for Product Marketing on Websites

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**Abstract** - Online reviews have become an essential source of data for users before making a notified buying choice. Initial surveys of stock manage to have a great impression on consequent product purchases. In this paper, we consider the initiative to study the behavioral aspects of advanced reviewers into their posted reports on a few real-world extensive e-commerce platforms, i.e., Amazon and Yelp. In particular, we classify product lifetime into three sequential stages, specifically beginning, bulk and stragglers. A customer who has posted a report in the opening stage is granted as an advanced critic. We quantitatively define advanced critics based on their grading behaviors, the usefulness scores obtained from others and the association of their reviews with product demand. We have noticed that (1) an early reviewer points to specify a greater average rating score, and (2) an advanced reviewer tends to post much more worthy reviews. Our analysis report of stock reviews also suggests that advanced reviewers' grades and their received helpfulness scores are possible to influence product demand. By observing the review posting method as a multiplayer racing game, we introduce a unique margin-based embedding standard for the advanced critic prediction. Great experiments on two various e-commerce datasets have explained that proposed strategy exceeds the number of competitive baselines.

**Keywords:** Early reviewer, early review, embedding model.

## I. INTRODUCTION

The development of e-commerce websites has permitted users to distribute or share shopping participation by posting stock reports, which regularly contain helpful opinions, comments, and feedback towards a stock. As before-mentioned, a majority of consumers will consult online reports before reaching a notified shopping decision. It has been informed regarding 71% of global online consumers view online reports before purchasing a stock [2]. Goods reviews, especially the advanced reviews (i.e., the articles posted in the beginning stage of a stock), have a large impact on subsequent stock businesses. We invite the buyers who posted the advanced reviews of reviewers. Although advanced reviewers provide only a humble relationship of reports, their ideas and feelings can define the achievement or frustration of original and different products and services. It is necessary for businesses to distinguish advanced reviewers since their feedbacks can support businesses to improve shopping policies and change stock designs, which can ultimately guide to the fulfillment of their new products and services. It is important for companies to identify early reviewers since their feedbacks can help companies to adjust marketing strategies and improve product designs,

which can eventually lead to the success of their new products.

As that can see those early reviewers are extremely valuable for stock buying. Therefore, in this paper, it takes the lead to study the performance of properties of advanced reviewers by their posted reports on illustrative e-commerce platforms, e.g., Amazon and Yelp.

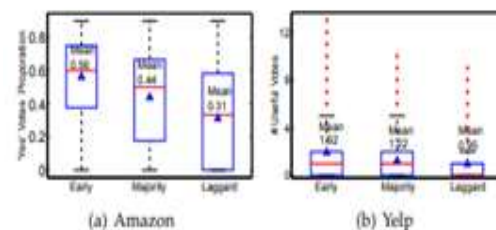


Fig.1. Comparisons of the helpfulness scores by the three categories of reviews.

That intends to conduct efficient analysis and make an exact prediction on early reviewers. This trouble is completely correlated to the selection of innovations.

To design the functions of early reviewers, we produce a principled the method in two real-world high review datasets, i.e., Amazon and Yelp. Much more accurately,



## Effective Maintenance of Path Stability Using ACO-PLF Mechanism in MANETs

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**Abstract:** Ad hoc networks are the infrastructure-less networks that are easily deployable and self-configuring, with each constituent node performing like a transceiver. The nodes are free to move subjectively in Mobile ad-hoc networks (MANET). Thus, the network's wireless topology may be haphazard and may alter rapidly. The main important aspect to be handled is choosing a proper path for transmitting data in case of Link Failure (LF). The main concern of the research work is maintaining the path stability in the occurrence of LF in the network. Ant Colony Optimization (ACO) is used for optimizing the Routing Protocols (RP) such as Ad-hoc on demand Distance Vector (AODV). The Prediction of LF (PLF) mechanism is used for choosing the stable/proper path in the occurrence of node LF in the maintenance phase of distance vector RP based on Neighbour Node (NN). Hence, AODV-ACO-PLF is used for efficient transmission of data packets in the ad-hoc networks by maintaining stable path in-case of LF. The path stability is also maintained in presence of LF in the networks by choosing a different path using PLF Prediction Mechanism. The "AODV-ACO-PLF" methodology is used for finding the ideal way to communicate with the source and destination by giving better results in End-to-end delay (6%), drop (5%), packet delivery ratio (7%), and energy consumption (7.5%) than existing methodology such as Path Selection Algorithm based on Hamming Distance and delay parameters (PSA-HD) and Predict Failure in AODV (PF-AODV) methodology in MANET.

**Keywords:** Ad-hoc on demand distance vector, Ant colony optimization, Maintenance phase, Mobile ad-hoc networks, Neighbour node and prediction of link failure.

---

### 1. Introduction

Mobile Ad-Hoc Network (MANETs) is one kind of self-configuring and dynamic wireless network, which processes several movable user equipment. The router utilizes the connection state steering worldview and floods their data to every single other course in the network. Every single portable node in the system independently refreshes their data in the connection state [1]. Multi cast AODV (MAODV) depends on the multicast RP by finding stable route and adjust to network topology changes [2]. A productive routing algorithm should be steady and furthermore energy saving also adjustable in dynamic network condition. [3]. High versatility of the MANET nodes diminishes the dependability of network communication. The high versatility of the nodes makes it extremely hard to predict the dynamic

routing topology in a dynamic system [4]. Connection breakage starts the procedure of rerouting either at the sender node or at the source node [5]. Privacy-preserving and truthful detection of packet dropping attacks in Manet uses HLA based public-auditing architecture by ensuring packet-loss notification by every individual node in the networks. The detection of misbehaving nodes in the network, while transmitting data from source to destination is not addressed in a proper way [6].

The Ad-hoc On Demand Multiple Path Distance Vector (AOMDV) protocol is the most appropriate for detecting multiple paths to the destination. The identification of mobility of mobile nodes can be tackled by retransmission strategy. The AOMDV protocol does not provide better results in case of throughput and control packet overhead [7]. The multipath choice is done by utilizing three unique

# EFFECTIVE IMAGE PROCESSING TECHNIQUES BASED IRIS ATTENDANCE SYSTEM

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## Abstract

In this paper, the iris prediction gives an incipient conception for Biometric benchmark process. Biometrics is the most secure and utilize-cordial benchmark implement. Iris perception technology contains pattern perception and optics method. It identifies an individual person by utilizing their individual physical characteristics. Iris perception system is very wide compared with other biometric systems. The main wholesomeness of iris perception system is its stability and uniqueness that results in a single enrolment for the lifetime. It provides increasingly varies than the fingerprint and the other biometrics systems, where the information cannot be stolen.

## Keywords:

Iris Prediction System, Pattern Analysis, Biometric Authentication, Human Eye

## 1. INTRODUCTION

Biometric authentication is a security process that relies on the unique biological characteristics of an individual to verify that he is who is verbalizes he is. Biometric authentication systems compare a biometric data capture to stored, attested authentic data in a database. If both samples of the biometric data match, authentication is substantiated. Typically, biometric authentication is utilized to manage access to physical and digital resources such as buildings, rooms and computing contrivances.

Once visually perceived mostly in spy movies (where it might be acclimated to bulwark access to a top-secret military lab, for example), biometric authentication is becoming relatively commonplace. In advisement to the security provided by hard-to-fake individual biological traits, the acceptance of biometric verification has withal been driven by accommodation: One cannot clearly forget or lose ones biometrics. The oldest kened utilization of biometric verification is fingerprinting. Thumbprints made on clay seals were utilized as an expedient of unique identification as far back as antediluvian China. Modern biometric verification has become virtually instantaneous and is increasingly precise with the advent of computerized databases and the digitization of analog data.

## 2. TYPES OF BIOMETRIC AUTHENTICATION TECHNOLOGIES

1. Retina scans engender an image of the blood vessel pattern in the light-sensitive surface lining the individual's inner ocular perceiver.
2. Iris perception is utilized to identify individuals predicated on unique patterns within the ring-shaped region circumventing the pupil of the ocular perceiver.

3. Finger scanning, the digital version of the ink-and-paper fingerprinting process, and works with details in the pattern of raised areas and branches in a human finger image.
4. Finger vein ID is predicated on the unique vascular pattern in an individual's finger.
5. Facial perception systems work with numeric codes called face prints, which identify 80 nodal points on a human face.
6. Voice identification systems rely on characteristics engendered by the shape of the verbalizer's mouth and throat, rather than more variable conditions.

## 3. HUMAN EYE WITH LOCATION OF IRIS

In humans and most mammals and birds, the iris (plural: irides or irises) is a thin, circular structure in the eye, responsible for controlling the diameter and size of the pupil and thus the amount of light reaching the retina. Eye color is defined by that of the iris. In optical terms, the pupil is the eye's aperture, while the iris is the diaphragm. The human eye with iris location Shown in Fig.1.



Fig.1. Human Eye and Iris Location

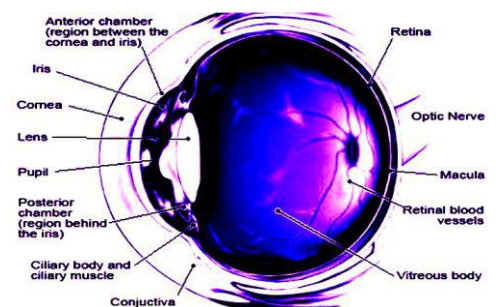


Fig.2. Anatomy of Eye (Picture of Eye Anatomy Detail)

The Fig.2 represents the details of eye anatomy and this illustrates the ocular perceiver is our organ of visual perception. The ocular perceiver has a number of components which include but are not constrained to the cornea, iris, pupil, lens, retina, macula, optic nerve, choroid and vitreous.

# Technologies of Internet of Things for Healthcare services

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**Abstract**—IoT has been shown as a big potential for qualifying and improving healthcare services; such as monitoring at anytime and anyplace. These services acquire various bio- signals using different sensors, including electroencephalogram (EEG), electrocardiogram (ECG), electrical signal of the heart, electromyogram (EMG), electrical signal of muscles, Respiratory Rate (RR), and body motion. The collected information from these sensors can be processed, stored, or broadcast to a remote device (e.g. Cloud server). This paper provides an overview of the main medical sensors in IoT and a review of the current state-of- the-art of IoT projects, and technologies required for healthcare services. The paper specifically, focuses on the using of IoT technologies in the healthcare area nowadays. A conclusion regarding the current stage of development and open issues are presented.

**Keywords**—Internet of Things (IoT); Healthcare; Alzheimer diseases; Cloud Computing; M2M; Quality of Life (QoL); Embedded Systems; Sensors; RFID; NFC; Big data.

## I. INTRODUCTION

Today, the use of technology to improve the quality of life is becoming a common attribute of modern society. When the technology is oriented to improve the Quality of Life (QoL), it is referred to the Internet of Things (IoT) [1]. IoT is a network of interconnected 'smart' devices, allowing collecting information and managing physical objects [1]. According to the Cisco research groups, the number of internet connected devices became larger than the number of the people on the Earth, as many suppose, is the actual changeover to the Internet-of-Things [2]. The much consumption of these devices and systems that connect to the IoT affect the business in several industries such as medicine and healthcare [3]. According to the World Health Organization (WHO) study, it is found that from 57 million global deaths, 63 % are dying of diseases such as; chronic diseases, pulmonary diseases, heart failure, cancer, Blood pressure, and Glucose. Obviously, traditional model of periodic care in the clinic and hospital- based settings is suboptimal for improving these disease outcomes [4]. Indeed, in daily life, the prevention and treatment of the vital diseases like chronic diseases, Alzheimer diseases, Blood pressure, and heart failure take place outside of traditional clinical settings. From this point, IoT provides several advantages to the medical area for example; intelligent IoT wearable devices, in combination with mobile medical applications that allow patients to capture their health data remotely as shown in Fig. 1. Further, IoT healthcare services are expected to increase the quality of life and decrease costs [23].

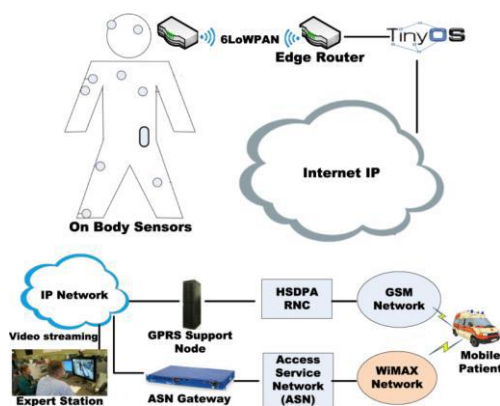


Fig. 1 wearable sensors and personalized healthcare [4].

Healthcare uses IoT for real-time tracking of patients and medical devices. Examples of IoT Healthcare use cases include the following: (1) Fall detection, which is considered a main public health concern. Over recent years, the number of companies that offer systems and services intended at detecting falls has increased radically. Fall detection systems, typically worn around the waist or neck; include intelligent accelerometers that differentiate normal activities from actual falls. These systems are already improving the quality of life of many disabled or elderly people living independently. (2) Tracking of medical devices, it is very essential for hospitals, especially in crowded emergency rooms with large medical staff. IoT solutions are being used to identify the exact location of such devices, identify last user.

The remainder of the paper is organized as follows. Section II shows a brief overview of the most important technologies related to IoT. Section III presents the latest IoT projects in the healthcare area. Section IV provides the IoT architecture for healthcare systems. In section V, a survey about the most important issues in IoT for healthcare. Finally, concluding remarks and future work are reported in section VI.

## II. IOT TECHNOLOGIES FOR HEALTHCARE

IoT-based healthcare systems involve a number of technologies that allow IoT devices to obtain data from the physical world;



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## A review on various optimization techniques of resource provisioning in cloud computing

K. Sumalatha, M. S. Anbarasi

### Abstract

Cloud computing is the provision of IT resources (IaaS) on-demand using a pay as you go model over the internet. It is a broad and deep platform that helps customers build sophisticated, scalable applications. To get the full benefits, research on a wide range of topics is needed. While resource over-provisioning can cost users more than necessary, resource under provisioning hurts the application performance. The cost effectiveness of cloud computing highly depends on how well the customer can optimize the cost of renting resources (VMs) from cloud providers. The issue of resource provisioning optimization from cloud-consumer potential is a complicated optimization issue, which includes much uncertainty parameters. There is a much research avenue available for solving this problem as it is in the real-world. Here, in this paper we provide details about various optimization techniques for resource provisioning.

### Keywords

resource provisioning, optimization techniques, uncertainty, virtual machines, IaaS

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# Integrity and Load Balancing in Big Data Systems

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## Abstract

Huge information gives current need to information stockpiling with an adaptable and dynamic stockpiling that can develop. Data uprightness is the conservation and the assurance of the precision and consistency of information over its whole life-cycle. Information region is the fundamental element for giving quick recuperation of information in the capacity condition. In the current work, Meta Data Indexing and Integrity Checking are utilized for traffic burden adjusting and recuperation of lost information part utilizing remote check in distributed storage. The primary disadvantage of the prior framework, it uses dispersed access for checking and recuperation of information, which may once in a while prompts time delay. In the proposed framework, we use TPA based Integrity Verification and Data Recovery, which may help in decreasing the time postponement and traffic befuddle mistakes. The framework utilizes Third Party Auditor, that will be confirm the status of the servers in each occasional interims for the lost association or information. The client documents will be portioned and sent to the servers and the list will be spared in the TPA. The fundamental preferences of the proposed framework is progressively proficient, higher investigative of information records, tedious.

**Keywords:** *Dynamic Storage; Data Integrity; Metadata Indexing; Third Party Auditor.*

## Article History

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## I. Introduction

Huge Data has been imagined as the cutting edge design of IT undertaking, because of its not insignificant rundown of remarkable favorable circumstances in the IT history: on-request self-administration, universal system get to, area autonomous asset pooling, fast asset flexibility, utilization based evaluating and transference of hazard. As a troublesome innovation with mindful ramifications, Cloud Computing is changing the very idea of how organizations use data innovation. One crucial part of this outlook changing is that information is being incorporated or redistributed into the Cloud. From clients' view, including the two people and activities, putting away data remotely into the cloud in an adaptable on-request design brings intriguing advantages: alleviation of the weight for capacity the board, regular information access with free geological areas, and shirking of capital use on equipment,

programming, and work force systems for upkeeps, and so forth[8-9].

While these advantages of utilizing mists are verifiable, because of the sloppiness of the Cloud as isolated regulatory substances, the internal activity subtleties of cloud specialist co-ops (CSP) may not be known by cloud clients information redistributing is additionally surrendering client's definitive power over the destiny of their information. Distributed storage gives an on-request information redistributing administration model, and is picking up popularity because of its obstruction and low support cost[10]. Notwithstanding, security concerns emerge when information stockpiling is redistributed to outsider distributed storage suppliers. It is fundamental to empower cloud clients to check the trustworthiness of their subcontracted information, in the event that their information have been inadvertently ruined or malevolently conceded by insider/outcast strikes. One noteworthy utilization



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# Machine Learning Based Web Risk I

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## Abstract

Web applications have increasingly become one of the cu releases and representing data and information over the wo security susceptibilities have controlled to various types of at paper is thus intended to look into the use of supervised-macl include; genetic algorithms and support-vector machines, as t of the key web application layer threats. Some of the most c threats include; remote file inclusion attacks, SQL injections, As the internet keeps growing each other day, it has become web threats as well as leveraging the powers of machine learn prospective methods in order to make the detection more eff we would use genetic algorithm and support-vector machines threats in the application layer due to the millions of data req this information, I will come up with a conclusion wher effectiveness, viability and weaknesses of each of the key t vector machines proved to be more effective compared to performance and viability

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**Index Terms;** *SQL injection, RFI, XSS, GA, SVM, Parser, the Requests*

## I. INTRODUCTION

In the recent past, the level of technology has been growing very fast, especially the number of devices

named “zero-day” whic damages for quite a long t made by various people lik

# Contribution of Travel and Tourism Industry in boosting Indian Economy

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**Abstract:** - Travel and Tourism Industry has flourished in the past few years, significantly contributing to the nation's Gross Domestic Product, foreign exchange earnings and employment. Many developing countries have seen tourism as the major source of foreign exchange earnings. Tourism industry in India is growing and it has vast potential for generating employment and earning large amount of foreign exchange besides giving a boost to the country's overall economic and social improvement. In terms of the countries' share of contribution to global Travel & Tourism growth last year, two countries dominate; one quarter 25% came from China while the USA provided a further 12%. Other major contributors include India with a 6% share, while Turkey, France and Japan each contributed 4% to the sector's growth in 2018. 2019 was another year of strong growth for the global Travel & Tourism sector reinforcing its role as a driver of economic growth and job creation. Moreover, tourism is a multi-dimensional activity, basically a service industry. It would be required that all ways of the central and state government, public-private partnership and voluntary organisations become active partners in endeavour to attain the sustainable growth in tourism in India would become a world player in tourism industry. The present paper elaborates about the contribution of travel and tourism industry in the development of Indian economy.

**Index Words:** Travel & Tourism, Foreign Exchange Earnings, GDP, COVID-19.

## I. INTRODUCTION

Travel and Tourism industry constitute an integral part of Growing Indian economy. India boasts of an immensely rich cultural heritage including numerous languages, traditions and people. The country holds its uniqueness in its diversity and hence has adapted itself to international changes with poise and comfort. The recognition of tourism as an instrument of economic and social development has been rather late in most of the developing countries especially in India (Shiji.O, 2016). Tourism is growth oriented industry with its impact on the employment and foreign exchange potential of the country. Among the various service industries, tourism in India is the largest and fastest growing in the country. It has a vast impact on creation of jobs and national economy that plays a major role in other aspects of the country's growth and development. It is widely accepted that tourism is among the world's fastest growing and largest industries on the basis of its economic benefits.

According to the World Tourism Organization (UNWTO), tourism is 'number one in the international services trade', accounting for 40 per cent of global trade in services and 6 per cent of total world trade. USA and China remained the world's largest Travel & Tourism economies in 2018, together accounting for 35.2% of the world's total Travel & Tourism GDP, followed by Japan, Germany and the UK. The top 20 economies where Travel & Tourism GDP growth exceeded global growth of 3.9% include Turkey (+15.0%), the Philippines (+8.9%), Hong Kong (+7.5%), China (+7.3%), India (+6.7%), Thailand (+6.0%), Russia (+4.2%) and France (+4.1%). Over the next decade, strong growth in the sector is set to continue, particularly across Asia where China will overtake the USA as the world's largest Travel & Tourism economy. Meanwhile, India's Travel & Tourism contribution to GDP will more than double, enabling the country to climb from eighth position in 2018 to third place by 2029. During 2019, 10.89 million foreign tourists arrived in the country and the world tourist arrivals expected to increase by 43 million every year on an average from 2010 to 2030. The population particularly aged 65 years and above is emerging as an important category of Indian travellers, the senior travellers are approximated at 1.3 million in 2011, are set to rise to 7.3 million by 2030.

In developing countries like India tourism has become one of the major sectors of the economy, contributing to a large proportion of the National Income and generating huge employment opportunities. It has become the fastest growing service industry in the country with great potentials for its further expansion and diversification. However, there are pros and cons involved with the development of tourism industry in the country. Over the decades, tourism has experienced continued growth and deepening diversification to become one of the fastest growing economic sectors in the world.

Tourism has become a thriving global industry with the power to shape developing countries in both positive and negative ways. No doubt it has become the fourth largest industry in the global economy. Tourism sector is third largest foreign exchange earner. The tourism industry in India has seen growth in last decade though it is still behind other Asian countries like China and Korea. The issues like prolonged militancy tussle in the country's northernmost part and



# Influence of Homogeneous and Heterogeneous Chemical Reactions and Variable Thermal Conductivity on the MHD Maxwell Fluid Flow due to a Surface of Variable Thickness

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**Keywords:** Maxwell fluid, homogeneous-heterogeneous reaction, variable thickness, variable thermal conductivity

**Abstract.** In this report, the effects of homogeneous-heterogeneous autocatalytic chemical reaction together with the variable thermal conductivity in the Maxwell fluid flow due to nonlinear surface of variable thickness are investigated. Thermal radiation and heat generation / absorption effects are also incorporated in the analysis. Appropriate scaling analysis is implemented to reduce the mathematical model describing the physics of the problem in to a set of nonlinear differential equations and are subsequently solved computationally. Graphical illustrations indicating the effect of pertinent parameters on momentum, thermal and solutal boundary layers are presented and discussed. The study reveals that velocity distribution shows a decreasing (increasing) tendency for larger values of wall thickness parameter when the velocity power law index is less (greater) than unity. The concentration of the homogeneous bulk fluid with catalyst at the surface decreases with increasing chemical reaction rate parameters.

## Introduction

The chemical reactions are broadly classified into homogeneous (reaction between two gases or between two liquids) and heterogeneous (reaction between a liquid and a gas) types based on the catalyst used in the reaction. Composite relations exist between homogeneous and heterogeneous reactions and they occur in biochemical mechanism, food processing, hydrometallurgical industry, manufacturing of ceramics and polymer products, formation and dispersion of fog, and crops damage via freezing etc. To analyse the homogeneous-heterogeneous reactions occurring in a two-dimensional stagnation-point flow, [1-2] introduced a mathematical model, considering the reacting systems as first order and with equal and different diffusivities for reactant and auto catalyst. Hayat *et al.* [3] addressed the time independent three-dimensional flow of a Maxwell fluid over a surface with bidirectional stretching taking the homogeneous-heterogeneous reactions. Rana *et al.* [4] investigated the composite impact of wall slip, internal heat source and homogeneous-heterogeneous reactions in a mixed convective oblique Casson fluid flow over an inclined stretched surface. Animasaun *et al.* [5] discussed the homogeneous-heterogeneous reactions with different diffusivities coupled with nonlinear radiative heat in a viscoelastic fluid flow considering the effect of induced magnetic field. Gireesha *et al.* [6] reported the convective flow of the MHD non-Newtonian Carreau-Casson liquids over a deformable surface taking the heterogeneous and homogeneous reactions into account. Vajravelu *et al.* [7] analysed the flow and mass transfer of an upper-convected Maxwell fluid with homogeneous-heterogeneous first-order chemical reactions exposed to a magnetic field. Ramzan *et al.* [8] addressed the homogeneous-heterogeneous reactions in a third-grade fluid flow with Cattaneo-Christov heat flux. Hashim and Khan [9] analysed the Carreau fluid flow over a slendering sheet in the presence of homogeneous-



## ORIGINAL ARTICLE

# V-CaHAp as a recyclable catalyst for the green multicomponent synthesis of benzochromenes



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## KEYWORDS

Green synthesis;  
V-CaHAp catalyst;  
One-pot reaction;  
Recyclability;  
Benzochromenes

**Abstract** A simple and efficient one-pot method has been developed for the synthesis of benzochromenes (**4a–k**) using V-CaHAp as a heterogeneous catalyst by the condensation of aldehydes,  $\beta$ -naphthol and malononitrile in ethanol as solvent at room temperature for 20 min. The reaction, with this catalyst was carried out under mild reaction conditions with very good to excellent yields (89–98%). The material can be recycled very easily and reused for at least 6 runs without substantial loss in activity, which makes this methodology environmentally benign. We achieved a feasible and cost-effective synthesis by using non-toxic materials and minimal catalyst which is easy to handle.

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## 1. Introduction

Multicomponent Reactions (MCRs) are reactions where more than two reactants put together in a single step form a product containing all the important parts of the starting reactants (Horton et al., 2003; Cioc et al., 2014; Pirrung and Sarma, 2004). Hence, all the reactants,

reagents and catalyst react sequentially to form the anticipated product which normally requires a simple and direct method. MCR addresses the principles of synthetic efficiency and reaction design. These types of reactions are flexible, convergent and atom efficient in nature, which makes them eco-friendly and sustainable (Pirrung and Sarma, 2004; Slobbe et al., 2012; Domling et al., 2012). Moreover, diversity can be obtained easily by tuning the reacting components. Even more eco-friendly reactions are achievable if they are promoted by heterogeneous catalyst. MCRs are important and are applied in pharmaceuticals, agrochemicals and among other applications (Slobbe et al., 2012; Domling et al., 2012).

Heterogeneous catalysis has been in use since the start of organic chemistry (Marc-Olivier and Chao-Jun, 2012; Herrmann and Kohlpaintner, 1993). The activity and selectivity of these catalysts are enhanced by the surface of a support. Hence, the effective surface area of the reagent is increased significantly. The catalyst can be reused

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## ORIGINAL ARTICLE

# Ultrasound mediated green synthesis of pyrano[2,3-c]pyrazoles by using Mn doped ZrO<sub>2</sub>



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## KEYWORDS

Ultrasound;  
Green synthesis;  
Multicomponent reaction;  
Pyrazoles;  
Heterogeneous catalyst;  
Reusability

**Abstract** Mn doped zirconia is utilized as an environmental-friendly and efficient catalyst for an ultrasound mediated four-component coupling reaction, containing dimethylacetylenedicarboxylate/ethyl acetoacetate, hydrazine hydrate, malononitrile, and aromatic aldehyde. These reactions were performed under green solvent conditions, to yield pyrano[2,3-c]pyrazole-3-carboxylate/pyrano[2,3-c]pyrazole-5-carbonitrile derivatives (**5a–g** and **7a–g**) with good to excellent yields (88–98%). The structures of the compounds were identified and confirmed by <sup>1</sup>H NMR, <sup>15</sup>N NMR, <sup>13</sup>C NMR, FT-IR and HR-MS spectral data. The prepared catalyst Mn/ZrO<sub>2</sub> was synthesized and fully characterized by various techniques including P-XRD, BET, SEM and TEM analysis. The main benefits of this process are short reaction times, easy work-up, reusability of the catalyst and no chromatographic purifications.

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## 1. Introduction

A major challenge faced by chemical and pharmaceutical industries is the improvement of supportable manufacturing procedures to synthesize targeted compounds in an energy-efficient and cost-effective benign manner (Doble and Kumar, 2007). In this regard, ultrasound irradiation has been acknowledged as an important technique to achieving green synthetic procedures. This technique can be an auspicious alternative for modern heterocyclic synthesis. Several ultra-sonication induced organic transformations offer additional accessibility in the field of synthetic heterocyclic chemistry due to the phenomena of cavitation. Cavitation is a physical process that creates, enlarges, and implodes gaseous and vaporous cavities in an irradiated liquid, thus enhancing the mass transfer and allowing chemical

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## A Variant Group Assignment Three Dimensional Model Using Pattern Recognition Technique

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### ABSTRACT

This model is a “Variant Group Assignment Problem” the goal is to find an optimal cost by scheduling the workers/ agents such that one to one assignment for a task and ensuring that all tasks should complete with minimum cost.

Let us consider a set of workers  $W=\{1,2,\dots,n\}$ , a set of jobs  $J=\{1,2,\dots,p\}$ , with time schedule  $K=\{1,2,\dots,k\}$  represents a time which influence a cost as a third dimension. The set of workers are subdivided into  $p$  different groups (according to their skill)  $N=\{N_1 \cup n_2 \cup \dots \cup N_p\}$  in which the skilled group of workers/ persons perform their task at their preferable schedule / time and from the remaining group of workers perform the remaining task/jobs in remaining schedule, so that all the jobs has to perform with minimum cost by using pattern recognition technique.

**Keywords:** Assignment, time schedule, cost, third dimension, pattern recognition technique.