

# Epitome



December 2020, Volume 5, Number 12

A Century of Service to the Nation

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# Members

in the News

## Mr R Selvaraj, FIE

*Immediate Past Chairman, Tiruchirappalli Local Centre, IEI and Former Senior Deputy General Manager, BHEL, Trichy*



Addressed the First Year students of IT Department, Anna University, BIT Campus, Tiruchirappalli in a Webinar Session on the topic 'A Journey for a Successful Future' on November 19, 2020.

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## Mr Soundra Pandi, AMIE

*Site-Incharge (O&M), Ujaas Energy Limited, C/O NTPC 5MW Solar Power Plant, Andaman and Nicobar Islands*



Delivered Lecture as a Resource Person in "National Level Webinar on Role and Scope of Engineers in Solar Power Plant" organised by the Department of Electrical and Electronics Engineering, Nehru Institute of Engineering and Technology Coimbatore on November 06, 2020

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## Mr Anand Premnath, AMIE

Successfully qualified the Assessment of Professional Competence and received Chartered Surveyor certification from Royal Institution of Chartered Surveyors, UK.



## Mr Surya Prakash Yadav, FIE, IntPE, India

*Commercial Director, Technical Services & Marine Services*



Received Golden Peacock Award for Risk Management at a ceremony in Singapore by Institute of Directors(India) in presence of His Excellency The High Commissioner of India.

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## Prof L B Sukla, FIE

*Director, Biofuels and Bioprocessing Research Center (BBRC), Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar*



Prof Lala Bihari Sukla, the eminent researcher in the field of Mining and Metallurgy, has been named in the world ranking of top two percent scientists, drawn up on the basis of subject wise analysis conducted by the Scientists of Stanford University, USA.

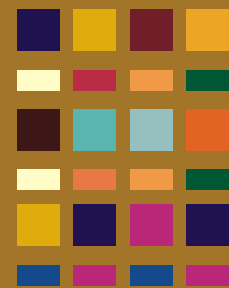
## Mr B Shyam Sundar, MIE

*Head -Enterprise Program Management office (PMO)*



Recognized as Disciplined Agilist for demonstrated a fundamental knowledge of the Disciplined Agile Process Decision Toolkit, Values, Principles and Practices.

# Publication by Members



## Mr Prasun Ghatak, MIE

Commissioning Manager, Building & Factories, L&T Construction, Hyderabad

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**Title of Paper:** "Procedure, Check List and Record Format of Trouble-Free Commissioning of Electro-Mechanical Equipment for Airport and Datacentre Projects", *International Advanced Research Journal in Science, Engineering and Technology*, ISSN (Online) 2393-8021, ISSN (Print) 2394-1588, 7(10), 2020, pp 69-86.

DoI 10.17148/IARJSET.2020.71007

URL : <https://iarjset.com/wp-content/uploads/2020/11/IARJSET.2020.71007.pdf>

**Abstract:** The fault free operation of major MEP equipment i.e. HT Switchgear, Transformer, Panels, Chiller, Cooling Tower, Pumps, AHUs, Fans are required for sophisticated Airport and Data Centre. Commissioning is the only phase where we identify all the design, quality, transportation and installation faults before handing over to operation team. In this paper, various intelligence techniques, past experience and learnings are used to commission and trial run of electro-mechanical equipment. This study focuses on making easy formats for trouble free commissioning within stringent timeline.

**Keywords:** Testing; Commissioning; Water Cooled Chiller; AHU; Cooling Tower; Pump; Ventilation Fans.

## Mr Yadvendra Singh, AMIE

Senior Research Fellow, IIT-ISM, Dhanbad

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**Title of Paper:** "Development and Experimental Analysis of Titanium Dioxide (TiO<sub>2</sub>) Coated Etched Fiber Bragg Grating Sensor for Chemical Sensing," in *IEEE Sensors Journal*, 20(15), 2020, pp 8528-8534,

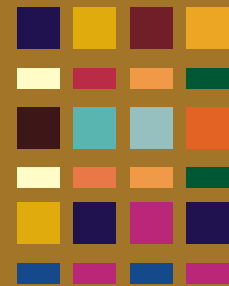
DoI: 10.1109/JSEN.2020.2983263

URL: <https://ieeexplore.ieee.org/document/9046800>

Co-authors: A Sadhu, S K Raghuvanshi

**Abstract:** This paper reports on a single-mode etched fiber Bragg grating (eFBG) sensor coated with 99.99% pure titanium dioxide (TiO<sub>2</sub>) having enhanced sensitivity for sensing of industrial chemicals such as glycerine. Cladding of grating section of single-mode fiber has been partially etched to maintain the integrity of fiber structure, yet high sensitivity is achieved by the deposition of a thin film of TiO<sub>2</sub> coating. Comparisons of sensitivities achieved with and without coating have been shown. The metal oxide coating helps enhance sensitivity by nearly 20% by increasing the interaction of the evanescent field leaking into analyte. The proposed sensor has recorded a maximum sensitivity of 11.9 nm/RIU, which is more than any other single-mode etched FBG sensor delineated so far for sensing of glycerine. In the presented paper, the characterization of coating material with X-ray diffraction (XRD), and of the resultant sensor with Atomic Force Microscopy (AFM) and Field Emission Scanning Electron Microscope (FESEM) has also been carried out as part of experimental analysis.

**Keywords:** Etched Fiber Bragg Grating Sensor; Metal Oxide Coating; Refractometric Sensor; Chemical Sensing.



## Dr Yogendra Arya, AMIE

Assistant Professor, Electrical and Electronics Engineering Department, Maharaja Surajmal Institute of Technology, C4, Janakpuri, New Delhi

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**Title of Paper:** “Optimal Automatic Generation Control with Hydro, Thermal, Gas and Wind Power Plants in 2-area Interconnected Power System”, *Electric Power Components and Systems*, 48(6-7), 2020, pp 558–571.

URL: <https://www.tandfonline.com/doi/full/10.1080/15325008.2020.1793829>

Co-authors: N Hakimuddin, I Nasiruddin, T S Bhatti

**Abstract:** This paper explores automatic generation control (AGC) of a more realistic 2-area multi-source power system comprising hydro, thermal, gas, and wind energy sources-based power plants in each control area. The wind power plants (WPPs) have been growing continuously worldwide due to their inherent feature of providing eco-friendly sustainable energy. But, operations of WPPs are associated with system stability problems due to lack of inertia. However, WPPs do not participate in the elimination of mismatch between generation and demand by AGC but disturbance can be injected by the WPPs due to the stochastic nature of wind energy. An optimal controller based on full state feedback control theory is designed to conduct the study. The system dynamic performance analysis is carried out for 1% step load disturbance in corresponding control areas. It is observed that the system dynamic graphs of deviation in area frequency and tie-line power are significantly improved with the implementation of optimal AGC controller compared to GA tuned classical controller. It has also been shown that the WPPs aid the increase in load disturbance when the input wind power reduces but it negates the effect of increase in load disturbance for increase in wind energy to the WPPs.

**Keywords:** Wind Power Plant; Hybrid Energy Sources; Automatic Generation Control; Optimal Control; Eigenvalue Analysis; Modern Control Theory.

## Mr Krishna Kumar, AMIE

Assistant Professor, Department of Civil Engineering, Rajalakshmi Engineering College

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**Title of Paper:** “Effect of Carbon Fibre Reinforced Polymer Laminates on Steel Fibre Reinforced Concrete Beams”, *International Journal of Advanced Science and Technology*, 29(7), 2020, pp 13400-13407.

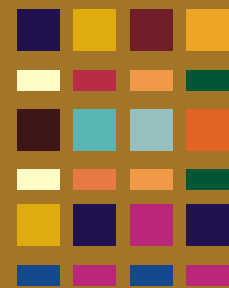
URL: <http://sersc.org/journals/index.php/IJAST/article/view/29439/16383>

Co authors: Madhavaperumal, Mahamood-ul-hasan, Karthic

**Abstract:** The objective of this study is to investigate the flexural strength and crack propagation characteristic of reinforced concrete beam with CFRP (Carbon Fibre Reinforced Polymer) laminates. CFRP laminates is bonded with epoxy resin at the soffit (tension face) of the beam. Straight hooked end steel fibres are randomly reinforced in the beam as additive up to 1% of volume of concrete. Four-point bending flexure test to complete failure were conducted on 6 beams (2 beams strengthened with single layer CFRP laminate 2 beams with two layer CFRP laminates and 2 conventional RC beam). The yield load, ultimate load carrying capacity, ductility ratio, deflection and crack propagation of the beam were measured and compared with conventional beam to investigate the strengthening effects of single layer CFRP laminate and two layer CFRP laminates.

**Keywords:** CFRP; Straight Hooked End Steel Fibre Ductility ratio; Deflection.

# Publication by Members



## Mr Asif Ahmad, AMIE

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**Title of Paper:** “Integration of RSM with Grey based Taguchi Method for optimization of pulsed TIG welding process parameters”, *Materials Today: Proceedings* 18(7), 2019 pp 5114–5127.

URL: <https://doi.org/10.1016/j.matpr.2019.07.508>

Co-author: Shahnawaj Alam

**Abstract:** This research paper focused on process parameters optimization of Tungsten Inert Gas (TIG). The traditional Taguchi method is not sufficient to solve the problem with multi response problem. However, it is important to integrated Taguchi method with Grey Retion Analysis (GRA) to solve multi response optimization problem further. Taguchi method is integrated with Response Surface Methodology (RSM) to determine optimum value of each parameters. Using orthogonal array L9 experiments were performed. Experimental data are used to obtain signal to noise ratio by using Minitab18 and then response surface plot is developed to obtain optimum level for every input parameter. Further, the process is integrated with RSM to developed mathematical model by using design expert 11 statistical software through full factorial central composite design (CCD). RSM is a useful statistical tool for process optimization to obtain the required quality of weld. The Surface plot obtained from Design Expert Software 11 represent that the actual value of response i.e. depth of penetration (DOP) and width of penetration (WOP) versus the predicted value of response are close to each other. The higher value of DOP and WOP represents higher strength; analysis of variance (ANOVA) gives the highest value of F-ratio of welding speed in DOP and WOP, this result obtained from RSM showed that welding speed is the most influencing parameter which affects response characteristics.

**Keywords:** Tungsten Inert Gas (TIG); Taguchi Method; Grey Relation Analysis (GRA); Response Surface Methodology (RSM); ANOVA.

## Mr Cawas Phiroze Nazir, FIE

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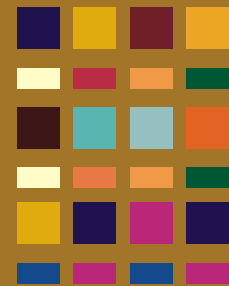
**Title of Paper:** “Solar Energy for Traction of High Speed Rail Transportation: A Techno-economic Analysis”, *Civil Engineering Journal*, 5 (7), 2019, pp 1566-1576.

URL : <https://civilejournal.org/index.php/cej/article/view/1488>

**Abstract:** To meet the growing expectation of traveling public, world railways are going ahead in a big way to introduce high speed trains Electric railways require huge amounts of energy. Many rail networks run their own dedicated power plants. With a view to augment the capacity of the rail networks grid connection so as to make the railway self-reliant, a grid tied PV solar plant with battery storage has been proposed. The present concept is based on installing solar panels along the length of a HS rail network so that the ballast-less tracks could be used as energy carriers. Ballast less tracks require little or no maintenance, and the space along the tracks provides a large surface area on which arrays of PV modules can be mounted to generate electricity from sunlight. An example demonstrates that a 330 MW grid connected PV solar plant with battery storage for the Mumbai–Ahmedabad high speed rail link, generates electricity at \$1.67× 106 /MW output and levelized electricity cost at 12.05 c/kWh. Net saving in tariff after payback period is about \$ 58 million per annum..

**Keywords:** HS Railways; Slab Track; Solar Plant; Battery Storage; Shinkansen.

# Publication by Members



## Dr N Umapathi, MIE

Associate Professor, Department of Electronics and Communication Engineering, Jyothismathi Institute of Technology & Science, Karimnagar

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**Title of Book Chapter:** "Design of Dynamic Comparator for Low-Power and High-Speed Applications". In: Kumar A., Mozar S. (eds) ICCCE 2020. Lecture Notes in Electrical Engineering, 698. Springer, 2020.

URL: [https://doi.org/10.1007/978-981-15-7961-5\\_110](https://doi.org/10.1007/978-981-15-7961-5_110)

Co-authors: Murali Krishna G, Karthick G

**Abstract:** Most of the real world signals have analog behavior. In order to convert these analog signals to digital, we need an analog to digital converter (ADC). In the architecture of ADC's, comparators are the fundamental blocks. The usage of these dynamic comparators are maximized because of demand for low-power, area efficient and high-speed ADC's. The dynamic comparator performance depends on technology that we used. This paper presents the design and analysis of dynamic comparators. Based on the analysis, designer can obtain a new design to trade-off between speed and power. In this paper, a p-MOS latch is present along with a pre-amplifier. p-MOS transistors were used as inputs in pre-amplifier and latch. The circuit operates by specific clock pattern. At reset phase, the circuit undergoes discharge state. During evaluation phase, after achieving enough pre-amplification gain, the latch is activated. The cross coupled connection in the circuit enhances the amplification gain and reduces the delay. This design has optimum delay and reduces the excess power consumption. The circuit simulations are done by using mentor graphics tool having 250 nm CMOS technology.

**Keywords:** Analog to Digital Converter (ADC); Static Comparator; Dynamic Comparator; Two-stage Comparator; Low-power; High-speed.



## Mr Rasenthiram Athavan, AMIE

Department of Civil Engineering, DGGECSurat, Gujarat

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**Title of Paper:** "Investigation of Fresh Water Cultivation from Vadamaradchy Lagoon: A Case Study of Jaffna District", *Global Research and Development Journal for Engineering, Emerging Research and Innovations in Civil Engineering (ERICE - 2019) | February 2019 e-ISSN: 2455-5703.*

URL: [https://www.grdjournals.com/article?paper\\_id=GRDCF012061](https://www.grdjournals.com/article?paper_id=GRDCF012061)

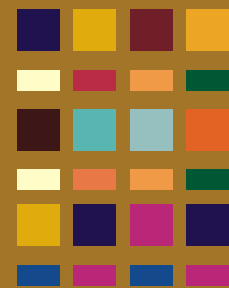
Co-authors: Mh. Mohammed Suhail, Darshan J Mehta

**Abstract:** The current state of globalization had increased the demand for ground water due to the growth in the population. In order to be more responsible in protecting the ground water resources various artificial methods had been adopted. The areas located around the Vadamaradchy lagoon in Jaffna peninsula of northern part of Sri Lanka are highly vulnerable to water scarcity and saline ground water issues due to the lack in the proper utilization of available sources. This exploration is concerned on quantitative estimation of storage capacity of Vadamaradchy lagoon and to find the most efficient hydraulic structure which can be easily accessible to solve the salinity of groundwater and to increase the water level in a productive manner of these prone areas. The study area is characterised by an average rainfall of 1298±683 mm. The catchment runoff from average rainfall (1298 mm) is 78.72 MCM and from 65% dependability rainfall (1128 mm) is 61.08 MCM. The capacity of ponds and waterways in the catchment area of Vadamaradchy lagoon is 13.66 MCM. Vadamaradchy lagoon is directly receiving 101.25 MCM from average rainfall and 87.99 MCM during 65% dependability rainfall. The lagoon is incapable to store 166.31 MCM and 135.40 MCM of water during average rainfall and 65% dependability rainfall respectively. So, in order to retain the surcharge water, it is necessary to construct 3 m height embankment around lagoon boundary. Annually pond can hold maximum 140.4 MCM of water which can easily satisfy the water requirement (30.66 MCM) of total population.

**Keywords:** Vadamaradchy Lagoon; Ground Water; Fresh Water Cultivation; Jaffna.



# Publication by Members



**Mr Agnivesh Kumar Sinha, AMIE**

Research Scholar, National Institute of Technology Raipur, Chhattisgarh

Email: sinhaagnivesh@yahoo.in



**Title of Paper:** “A Fuzzy Logic Approach for Modelling and Prediction of Mechanical Properties of Hybrid Abaca-reinforced Polymer Composite”, *Journal of Brazilian Society of Mechanical Sciences and Engineering*. 42, 282, 2020.

DoI: <https://doi.org/10.1007/s40430-020-02377-4>

Co-authors: H K Narang, S Bhattacharya

**Abstract:** At present, hybrid natural fibre-reinforced polymer composites are popularly used for their remarkable specific strength. Natural fibre polymer composites have been explored by the researchers for their sprawling use in engineering applications. To achieve better mechanical properties, it is needed to test hybrid natural fibre composites with all possible combinations of their compositions which require a lot of resources. Thus, the present work deals with the investigation of mechanical properties of hybrid abaca–epoxy composites. Experiments were carried out according to full factorial design with three input parameters namely weight per cent of abaca fibre, particle size of red mud and weight per cent of red mud. Subsequent to this, a fuzzy model is developed to predict the mechanical properties such as tensile, flexural and impact strength of hybrid abaca–epoxy composites based on the experimental results obtained by their mechanical characterisation. Membership functions were constructed such that the fuzzy model can precisely predict the mechanical properties of hybrid composites. Moreover, a set of test case experiments were conducted so as to validate the fuzzy model. It was inferred from these test case results that the developed model can be used to predict mechanical properties of hybrid composites with a maximum accuracy of 87%.

**Keywords:** Hybrid Polymer Composites; Mechanical Properties; Fuzzy Model; Abaca Fibre; Red Mud.

**Title of Paper:** “Mechanical Properties of Hybrid Polymer Composites: A Review”, *Journal of Brazilian Society of Mechanical Sciences and Engineering*. 42, 431, 2020.

DoI: <https://doi.org/10.1007/s40430-020-02517-w>

Co-authors: H K Narang, S Bhattacharya

**Abstract:** Polymer composites have become one of the most important domains in recent times for researchers. It is due to the fact that polymer composites possess better strength-to-weight ratio than the most of the conventional alloys and composites which are in use today for structural applications. Moreover, the researchers are also coming up with novel hybrid polymer composites so as to achieve the desired mechanical properties. Therefore, this review on hybrid polymer composites focuses on the mechanical properties like impact, flexural and tensile strengths of hybrid polymer composites so as to bring out the essence of their mechanical behaviour which are influenced by critical factors like selection of type, orientation and arrangement of reinforcements in polymer matrix composites. This detailed review is an endeavour to unfold the major aspects of this domain as research gaps which are untouched till date. The study shows that there is limited use of fillers (such as red mud and fly ash) and natural fibres (abaca, bamboo, ramie, coir, pineapple) in hybrid polymer composites to harness their full potential. It is also inferred from the study that there is a dearth of research pertinent to modelling, prediction and optimisation of mechanical properties of hybrid polymer composites like toughness, flexural strength, tensile strength and impact strength.

**Keywords:** Hybrid Polymer Composites; Mechanical Properties; Impact Strength; Tensile Strength; Flexural Strength.

**Title of Paper:** “Experimental Determination, Modelling and Prediction of Sliding Wear of Hybrid Polymer Composites using RSM and Fuzzy Logic”, *Arabian Journal of Science and Engineering*. 45, 2020.

DoI: <https://doi.org/10.1007/s13369-020-04997-3>

Co-author: H K Narang, S Bhattacharya

**Abstract:** Hybrid natural fibre reinforced polymer composites have emerged as an eco-friendly alternative to conventional structural materials due to their low cost and high strength-to-weight ratio. It is evident from the literature that polymer composites have found their place in tribological applications too. Therefore, in this research work, hybrid abaca–epoxy composites were fabricated using hand layup technique with red mud as filler. The influence of wt. % of abaca (A), wt. % of red mud (B) and particle size of red mud (C) on sliding wear of hybrid composite is established using response surface method (RSM). RSM also yields a mathematical model for optimization of sliding wear of hybrid composites. Composite with optimum values of A, B and C was found to be most suited for minimum sliding wear of hybrid composites. Further, on the basis of experimental data, a fuzzy logic model is also framed for the prediction of sliding wear of hybrid composites. Nine test case experiments were performed to validate the developed fuzzy model. It was observed from the results that developed fuzzy model can predict the sliding wear of hybrid composites with an accuracy of 87%.

**Keywords:** Sliding Wear; Hybrid Abaca–epoxy Composites; Response Surface Method; Fuzzy Logic Model.



## Dr Ankan Bhattacharya, AMIE

Assistant Professor, Department of Electronics & Communication Engineering, Mallabhum Institute of Technology, Bishnupur, West Bengal

Email: bhattacharya.ankan1987@gmail.com

**Title of Paper:** "Compact, Printed, UWB, Fiberglass Textile Antenna with Quadruple Band-notched Characteristics for WLAN/WiMAX", 2020 XXXIIIrd General Assembly and Scientific Symposium of the International Union of Radio Science.

DOI 10.23919/URSIGASS49373.2020.9232355

URL: <https://ieeexplore.ieee.org/document/9232355>

Co authors: Arnab De, Bappaditya Roy, Anup K Bhattacharjee

**Abstract:** Herein, a printed Ultra-Wideband (UWB) monopole antenna possessing quadruple band-notched characteristics has been investigated. A fiberglass textile composite laminate has been used as the substrate material. Complementary Split Ring Resonating Structures have been introduced at the centre of the fractal radiator to pro-create band notches for the 03.5/05.2 GHz WiMAX/WLAN bands. Two 'C-shaped' parasitic structures have been placed near both sides of the microstrip feed to generate a notch for 05.5 GHz WiMAX band. Two 'L-shaped' slits have been introduced near the edges of the fractional ground plane to produce a notch for the 05.8 GHz WLAN band. The proposed fractal monopole antenna shows UWB response from 02.7 – 11.5 GHz along with quadruple band-notched features. Simulated and measured responses tallied fairly well. The wearable textile antenna proposed here, is a novel contender for UWB communication possessing multiple band-notched features.

**Keywords:** Antennas; Ultra Wideband Antennas; Wireless LAN; WiMAX; Frequency Response; Substrates; Faces.



## Mr Himanshu Gaur, MIE

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**Title of Paper:** "A Novel Formulation of Material Nonlinear Analysis in Structural Mechanics", Defence Technology, 2020.

URL: <https://doi.org/10.1016/j.dt.2020.06.018>

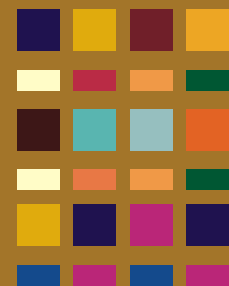
Co-author : Anupam Srivastav

**Abstract:** This article demonstrates a novel approach for material nonlinear analysis. This analysis procedure eliminates tedious and lengthy step by step incremental and then iterative procedure adopted classically and gives direct results in the linear as well as in nonlinear range of the material behavior. Use of elastic moduli is eliminated. Instead, stress and strain functions are used as the material input in the analysis procedure. These stress and strain functions are directly derived from the stress-strain behavior of the material by the method of curve fitting. This way, the whole stress-strain diagram is utilized in the analysis which naturally exposes the response of structure when loading is in nonlinear range of the material behavior. It is found that it is an excellent computational procedure adopted so far for material nonlinear analysis which gives very accurate results, easy to adopt and simple in calculations. The method eliminates all types of linearity assumptions in basic derivations of equations and hence, eliminates all types of possibility of errors in the analysis procedure as well. As it is required to know stress distribution in the structural body by proper modelling and structural idealization, the proposed analysis approach can be regarded as stress-based analysis procedure. Basic problems such as uniaxial problem, beam bending, and torsion problems are solved. It is found that approach is very suitable for solving the problems of fracture mechanics. Energy release rate for plate with center crack and double cantilever beam specimen is also evaluated. The approach solves the fracture problem with relative ease in strength of material style calculations. For all problems, results are compared with the classical displacement-based linear theory.

**Keywords:** Computational Methods; Material Nonlinear Analysis; Fracture Mechanics, Energy Release Rate etc.







## Mr Naveen Kumar B , AMIE

Assistant Professor, Department of Civil Engineering, Malla Reddy Institute of Technology, Hyderabad

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**Title of Paper:** “Strength of Bricks Prepared by Using Lime, Rice Husk Ash and Quarry Dust”, International Journal of Advanced Science and Technology, 29(4), 2020, pp. 1417-1425 , ISSN: 2005-4238.

URL : <http://sersc.org/journals/index.php/IJAST/article/view/5322>

Co-authors: Naveen Kumar B, Venkatesh S, Dr Kavita Singh, V Subbalakshmi

**Abstract:** Burnt clay bricks are very much commonly used in the construction sector. But, in the present day scenario, where the construction segment is in a stance of using creative and robust materials, the conventional bricks usage can be surpassed, keeping in view, both the cost and environment protection. In this paper, an attempt is made to study the strength of bricks produced by using lime, Rice Husk Ash and quarry dust. The lime quantity is varied between 12% - 30%, whereas, rice husk ash is maintained at 15% and quarry dust at 53%. Properties like water absorption, compressive strength along with evaluation of size and shape are determined as per the codal provisions of Indian Standard Specification. All the specimens made out of different proportions are cured and tested at the appropriate age. Graphical representations of the results are also presented for the various compressive strengths determined for the bricks produced from Lime + RHA + Quarry Dust.

**Keywords:** Compressive Strength Test; Water Absorption Test; Rice Husk Ash; Lime; Quarry Dust; Bricks.

**Title of Paper:** “Remote Sensing and Gis Based Land Use and Land Cover Information of Medchal Mandal of Medchal District”, International Journal of Engineering and Advanced Technology (IJEAT) 9(2), December, 2019, ISSN: 2249 – 8958 Retrieval Number: B5127129219/2019©BEIESP.

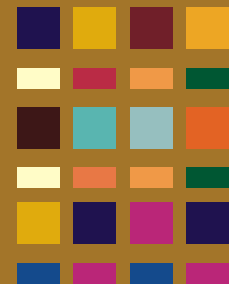
DoI: 10.35940/ijeat.B5127.129219

URL : <https://www.ijeat.org/wp-content/uploads/papers/v9i2/B5127129219.pdf>

Co-authors: Kavita Singh, MAnji Reddy, Naveen Kumar B

**Abstract:** : It is exceptionally significant to use GIS and remote sensing application for proficient need in daily life. Upcoming and contemporary technologies like data processing, earth observation geodata processing and investigation are necessary for the researcher for the development of the society on a large scale. Remote sensing information data both in digital format and image format is utilized for retrieving the information about land resources by using (DIP) digital Interpretation Techniques and (VIP) Visual interpretation techniques Techniques. The foremost objective of the given study area is to Setup land use and land cover information system to evaluate land resources by by means of GIS Remote Sensing at Arc GIS10.2.1 platform of Medchal Mandal. GIS and Remote Sensing information is the ultimate solution for the coverage of large area. Different types of layers are created from Remote Sensing images data and ArcGIS 10.2.1 Software. In the present study analysis is carried out by primary information which was generated from remote sensing data. GIS is Decision support system which helps planners and Decision makers to take correct decision for sustainable development, it also helps developers, engineers in environmental study, town planning and resource management.

**Keywords:** Remote Sensing; GIS; Landuse/Landcover; Resource Management; Town Planning.



## Mr Chandam Thoisana Singh, AMIE

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**Title of Paper:** “Cost Effective Power Factor Measurement Using Microcontroller Atmega8”, *International Journal of Scientific & Technology Research*, 8(7), 2019, ISSN 2277-8616.

URL : <https://www.ijstr.org/final-print/july2019/Cost-Effective-Power-Factor-Measurement-Using-Microcontroller-Atmega8-.pdf>

**Abstract:** This paper presents a simple, cost effective and accurate power factor measurement system implemented using ATmega8 microcontroller. In the present technological revolution power is very precious. So we need to find out the causes of power loss and improve the power system with a suitable method. Nowadays most of the product are developed with microcontroller based embedded technology. The use of microcontroller reduces the cost.

**Keywords:** Power Factor Measurement; Zero Crossing Detector; Power Triangle; Lagging and Leading Power Factor; Microcontroller Atmega8; Circuit Design; Result and Characteristics Analysis.

## Dr Perumal Raja Sivakumar, MIE

Senior Instructor, Department of Civil Engineering, North Eastern Regional Institute of Science and Technology (NERIST), Nirjuli, Itanagar, Arunachal Pradesh

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**Title of Paper:** “Effects of Non-Zero Minimum Pressure Heads in Non-iterative Application of EPANET 2 in Pressure-Dependent Volume-Driven Analysis of Water Distribution Networks.” *Water Resources Management, Springer*, 34(15), pp 5047-5059.

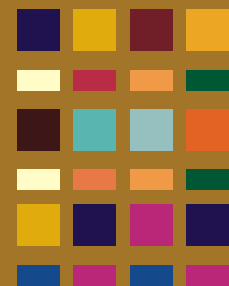
DoI: 10.1007/s11269-020-02713-2.

Co-authors: Nikolai Gorev, Rajesh Gupta, Tiku Tanyimboh, Inna F Kodzhes Pirova, C R Suribabu.

**Abstract:** While analysing a real network, the assumption of zero minimum pressure head as the elevation of demand node may lead to unrealistic results as some residual pressure is necessary to derive any outflow at the node. A more realistic minimum pressure head plays an important role for analysis of an existing or proposed network. The present study extends a novel method of pressure-dependent volume driven-analysis by investigating the effects of realistic minimum pressure heads. The novelty of the proposed method is to evaluate the practical impact of the zero minimum pressure head assumption under pressure-deficient condition in water distribution networks considering pipe isolation, fire demand, and altering total reservoir heads. The results obtained from the present method are compared with the results based on the more optimistic traditional assumption of zero minimum residual pressure-head. It is observed that time to fill the storage tanks under both normal and pressure-deficient conditions for non-zero minimum pressure head is higher. All the simulations were performed using graphical user interface of EPANET 2. Thus, the proposed approach can be used readily by researchers and practitioners without requiring any additional computational codes development.

**Keywords:** Pressure-dependent Volume-driven Analysis; Pressure-deficient Networks; Simulation Models; Non-zero Minimum Pressure Head; Water Distribution Networks.

# Publication by Members



## **Prof Dr Rai Sachindra Prasad, FIE**

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Email: drsachpd@yahoo.com



**Title of Paper:** “Evaluating Biofield Therapy Effects Using Unique Color Circle Design Implementable in Biophotonics Lab”, *IEEE International Conference on Electronics, Computing and Communication Technologies (CONECCT)*, 2-4 July 2020, Bangalore.

DoI 10.1109/CONECCT50063.2020.9198659

Co-authors: Anjali Pal, Shishir Prasad, Vikas Prasad

**Abstract:** Human nature and behavior (NaB) is hidden in its biofield. This has been described in several texts - some on scientific experiments but mostly in religious texts. Energy healing (biotherapies) is the usual method to change the physical and mental behavior which is well recognized in Complementary and Alternative Medicine (CAM). NaB and biofield relation awaits validation on scientific platform, despite a foundation laid decades ago in scientific experiments. Considering the recent advances in biophotonics research to capture biophotons emission from human biofield, it is possible to show the effect of biotherapies (energy healing, etc.) on recipients. Existing instrumentation scheme, used in biophotonics research, with addition of more optical filters can be used in NaB studies. This is the principal objective of this paper. Using spectral analysis, ultra weak biophotons emissions, captured by sophisticated CCD-based optical cameras equipped with wavelength-specific optical filters in the entire visual range (390 - 780 nm), it is shown through simulation that a real-time implementation is possible for all biotherapies experiments. The authors hypothesize that the spectral colors of biophotons hold the key to identify the effect of biotherapies as 'good' and 'bad', noting that wavelengths representing spectral colors are related to Hue of the HSV (Hue Saturation and Value) space. A unique color circle designed (CCD) to show the relation between wavelength and Hue, is the heart of the proposed procedure to demonstrate the effect of biotherapies.

**Keywords:** Human Biofield, Biophotonics, Spectral Analysis, HSV Space, Biotherapies, Nature and Behavior.

**Title of Paper:** “Unique Color Circle Design for A Novel Screening Tool to Identify Cancerous Skin Lesions”, *IEEE International Conference on Electronics, Computing and Communication Technologies (CONECCT)*, 2-4 July 2020, Bangalore.

DoI: 10.1109/CONECCT50063.2020.9198345

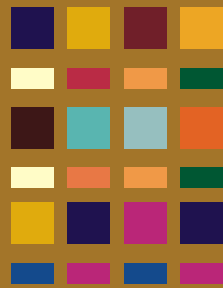
URL: <https://ieeexplore.ieee.org/abstract/document/9198345>

Co-authors: Gautam Kumar Singh; Shishir Prasad; Vikas Prasad

**Abstract:** Diagnosis of skin cancer is mostly based on clinical examination and biopsy. Despite advances in diagnostic tools, both invasive and non-invasive, more than 2 people die of the disease every hour and more than 9,500 people are diagnosed with skin cancer every day in the US. This emphasizes the need to have a screening tool which can differentiate between non-cancerous (NC) and cancerous (C) skin lesions, quickly and effectively. As most of the skin lesions are apparent to naked eyes and have different color textures, it was hypothesized that segmental analyses of photographs of suspicious lesions should be able to differentiate NC from C lesions on skin. For this study, a new and unique color circle design (CCD) for establishing a relation between wavelength (?) and hue of the HSV (hue Saturation and Value) model is proposed. Using MATLAB, enlarged dermatoscopic images of 23 authentic skin lesions (test samples) with known diagnoses were segmented in such a manner that the region of interest (ROI) included all the suspicious areas. Thereafter, the pixels data from ROI locations were standardized and transformed from RGB to HSV space. Again using MATLAB, hue (h) and Value (V) data were extracted from HSV data. Since each h represents a unique wavelength in the visible range of the spectrum, the CCD was used to identify the cancerous lesions aided by the V parameter. Using trial and error on several other skin cancer lesions (not included in the test samples), two thresholds and a set of criteria were selected to discriminate between C and NC. Results show that use of CCD has great potential as a screening tool for skin cancer detection, achieving over 90 % accuracy on the test samples.

**Keywords:** Skin Cancer; Spectral Analysis; RGB; HSV; Image-based Cancer Diagnostics.

# Publication by Members



## Mr Giridhar Maji, MIE

Lecturer, Asansol Polytechnic College, Department of Tech. Edu. & Training, West Bengal

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**Title of Paper:** “Mutual Fund Portfolio Management Using LSTM”, *International Journal of Computers and Their Applications*, 27(2), 2020, pp 65-73.

[https://www.researchgate.net/profile/Giridhar\\_Maji/publication/344590559\\_Mutual\\_Fund\\_Portfolio\\_Management\\_Using\\_LSTM/links/5f85c43192851c14bcc3d697/Mutual-Fund-Portfolio-Management-Using-LSTM.pdf](https://www.researchgate.net/profile/Giridhar_Maji/publication/344590559_Mutual_Fund_Portfolio_Management_Using_LSTM/links/5f85c43192851c14bcc3d697/Mutual-Fund-Portfolio-Management-Using-LSTM.pdf)

Co-authors: Achyuit Ghosh, Soumik Bose, Soumya Sen, Narayan C Debnath

**Abstract:** Stock market prediction is one of the most difficult computations due to the many internal as well as any number and type of external factors. It is impossible to get the exact computation hence we look for the method which gives the computation with less error. Different machine learning methods are being applied for the computations which involve many parameters. In this research work we choose Long Short-Term Memory (LSTM) for the prediction as it is computationally suitable for these types of data analysis. After doing the prediction of share price the work is extended to manage portfolio of the mutual fund. The framework has been designed in such a way so that the portfolio manager can choose any number of business sectors as well as any number of shares belong to this sector. This research work henceforth applicable for computing individual share price as well as managing a diversified portfolio.

**Keywords:** Stock Price Prediction; LSTM; Indian Stock Market; Hybrid Mutual Fund; Investment Portfolio Management.

## Mr Joyjit Chatterjee, AMIE

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Email: joyjitece@gmail.com



**Title of Paper:** “Temporal Causal Inference in Wind Turbine SCADA Data Using Deep Learning for Explainable AI”, *IOP Journal of Physics Conf. Series*, 1618 022022, 2020.

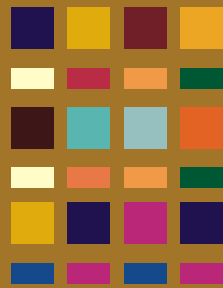
<https://iopscience.iop.org/article/10.1088/1742-6596/1618/2/022022>

Co-author: Nina Dethlefs

**Abstract:** Machine learning techniques have been widely used for condition-based monitoring of wind turbines using Supervisory Control & Acquisition (SCADA) data. However, many machine learning models, including neural networks, operate as black boxes: despite performing suitably well as predictive models, they are not able to identify causal associations within the data. For data-driven system to approach human-level intelligence in generating effective maintenance strategies, it is integral to discover hidden knowledge in the operational data. In this paper, we apply deep learning to discover causal relationships between multiple features (confounders) in SCADA data for faults in various sub-components from an operational turbine using convolutional neural networks (CNNs) with attention. Our technique overcomes the black box nature of conventional deep learners and identifies hidden confounders in the data through the use of temporal causal graphs. We demonstrate the effects of SCADA features on a wind turbine’s operational status, and show that our technique contributes to explainable AI for wind energy applications by providing transparent and interpretable decision support.

**Keywords:** Wind Energy; Deep Learning; SCADA; Causal Inference; Explainable AI.

# Publication by Members



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**Title of Paper:** "Qualitative Investigation of the Influential Factors behind Unsafe Trucking Behaviors in India", *Transportation Research Record, Journal of The Transportation Research Board*

DoI.org/10.1177/0361198120964724

URL: <https://journals.sagepub.com/doi/abs/10.1177/0361198120964724>

Co author: Pradeep Kumar Tarei

**Abstract:** India's trucking industry is highly unorganized compared with that in developed countries, as a result of which drivers do not get professional recognition in society. Low income, job insecurity, high-fatigue conditions, and continuous exposure to external environmental conditions cause job dissatisfaction, and the majority of traffic accidents in India are caused by driver negligence. This study aims to systematically examine the underlying factors that cause drivers' unsafe behavior from the following four assessment levels: personal, professional, organizational, and external factors. A purposeful sampling-based survey method was employed to collect the data. The findings of this study were compared with the opinions of the experts and results from previous studies in the literature. The study results found that the contribution of professional and organizational factors to unsafe behavior is greatest compared with external and personal factors. The study concludes with recommendations for reducing drivers' risk through planned driving schedules, ensuring social security through welfare schemes, and improving driving performance through proper training programs for preventing and minimizing damage caused by accidents, and recommends policy-based measures to trucking companies and regulatory bodies for minimizing accident occurrence.

## Announcement



### The Institution of Engineers (India)

#### Notification for

#### R & D Grant-in-Aid (2021-22)

To promote appropriate technology, assist in building up design & research talents and, most importantly, to help in nurturing potential R&D venture amongst engineering students pursuing Diploma/UG/PG/PhD courses, The Institution of Engineers (India) had instituted the R&D Grant-in-Aid program way back in 2001.

Like every year, the Institution invites applications for the session 2020-2021 for funding R&D projects and research initiatives aimed at improving the life-style of common people from engineering students pursuing full time Diploma/UG/PG/PhD engineering program from AICTE/UGC/NAAC approved Institutions/Colleges/Universities. The application form and guidelines are available in our website <https://www.ieindia.org>. The projects should be carried out under the guidance of faculty members who are Corporate Members of IEI. Membership criteria for student(s), guide(s) and Institution(s) are as follows:

Project Category	Student/Applicant Membership	Guide(s) Membership	Institutional Membership
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2. UG (BE/BTech/AMIE/Equivalent)	'Student Member' (SMIE)	AMIE/MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA / NAAC Accreditation or valid NIRF Rank
3. PG (ME/MTech/Equivalent)	AMIE/MIE/FIE	MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA / NAAC Accreditation or valid NIRF Rank
4. PhD	AMIE/MIE/FIE	MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA / NAAC Accreditation or valid NIRF Rank

The soft copy of the duly filled-up applications (in editable format), as per the proforma available in our website [www.ieindia.org](http://www.ieindia.org), should be sent through email to [research@ieindia.org](mailto:research@ieindia.org) and one printed copy of the same should reach the following address:

**Director (Technical)**

**The Institution of Engineers (India), 8 Gokhale Road, Kolkata 700 020**

Applications received in format other than that available on our website will not be accepted. Application should be forwarded through the Guide, Head of the Department or Head of the Institution. Please note that preference will be given to project proposals received from Institutions who are members of The Institution of Engineers (India) and with NBA / NAAC Accreditation or valid NIRF Rank. Kindly go through the guidelines (visit link <https://www.ieindia.org/webui/IEI-Activities.aspx#RnD-Initiative>) carefully before filling up the application.

The grant is not intended for the faculty members who have access to other avenues of research funding. Proposals received will be scrutinized and the recipients of R&D Grant will be informed accordingly.

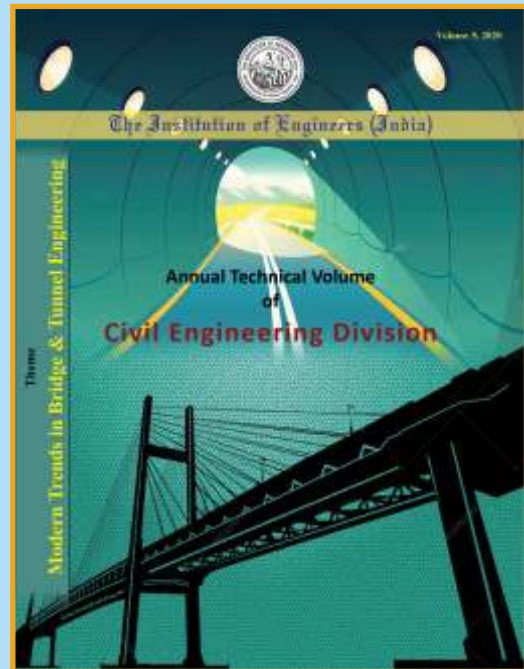
# Annual Technical Volumes of IEI will be available online shortly

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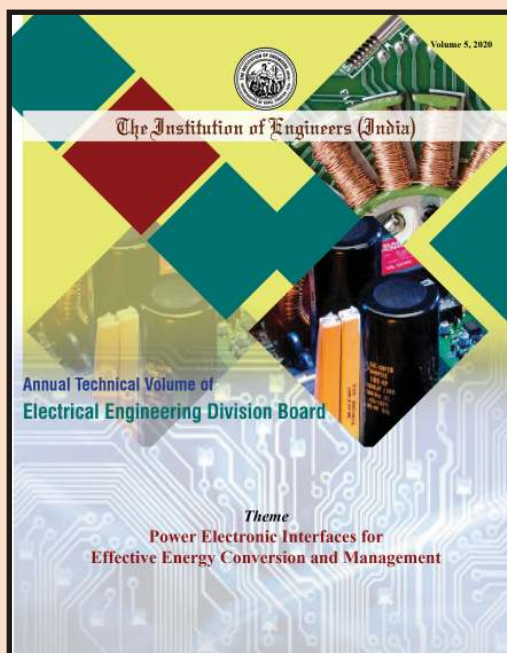
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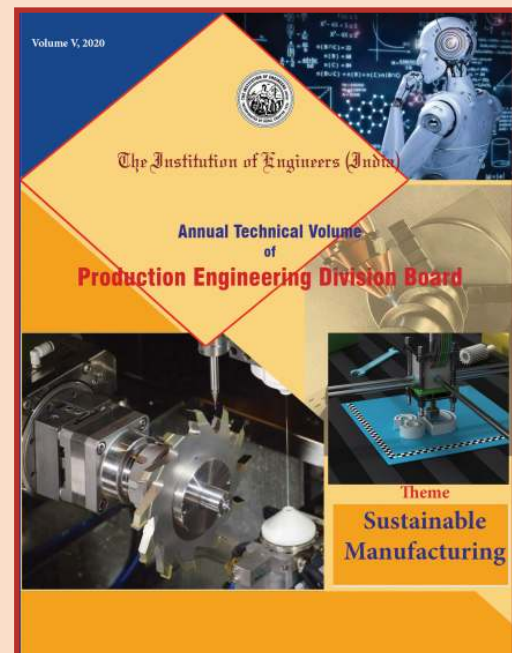
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