# IEI Epitome

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# Announcement

# Members in the News

## Mr VB Singh, FIE
*Council Member & Chairman, Civil Engineering Division Board, IEI*

Was invited as Chief Guest by Regional Science City, Lucknow at the Valedictory Session & Award Distribution Function of 3-day Innovation Festival on 31 January 2020. Young Innovators from all over state of Uttar Pradesh participated in the Innovation Festival exhibiting their technological talents.

## Dr Wooday P Krishna, FIE
*Council Member & Chairman, Research and Development Committee, IEI*

A short film in Kannada on the life and achievements of Council Member, IEI and noted Gandhian Social Activist, Dr Wooday P Krishna has been produced by the Department of Information and Publicity, Govt. of Karnataka.

## Mr Balkar Singh, FIE
*Joint Director, Punjab Energy Development Agency, Chandigarh*

Punjab and Chandigah State Centre of the Institution honoured Mr Balkar Singh as "Distinguished IEI Graduate Engineer" for his contribution & achievements in the field of Engineering on the occasion of 75th Annual General Meeting held on 30th October, 2019 at Chandigarh.

## Dr Aniruddha Dey, MIE
*Assistant Professor, Department of Computer Science and Engineering, Bankura Unnayani Institute of Engineering, Bankura, West Bengal*

Presented his Doctoral Work titled 'Studies on Feature Extraction & Fusion for Face Recognition' and is awarded 'Honorable Mention' in recognition of his work in the PhD Symposium of The 3rd IEEE Conference on Information & Communication Technology (IEEE CICT 2019) during 06-08 December, 2019 at Indian Institute of Information Technology, Allahabad, Prayagraj, UP.

Received Outstanding Doctoral Thesis Award SoCTA2019 for his Thesis 'Studies on Feature Extraction & Fusion Techniques for Face Recognition' during 4th International Conference on 'Soft Computing: Theories and Applications', held on December 27-29, 2019 at NIT Patna.

## Mr Pratap Koppuravuri, AMIE
*Assistant Professor, Department of Civil Engineering, Narasaraopeta Engineering College (Autonomous), Narasaraopet, Guntur, Andhra Pradesh*

Received 'I2OR Outstanding Educator Award 2019' on 10 January 2020 at Chandigarh.
Presented Paper titled 'Triple Blending of Concrete by Partial Replacement of Cement with Perlite & Rice Husk Ash' in the 5th Andhra Pradesh Science Congress [APSC 2019] held at Dr B R Ambedkar University, Srikakulam during 28-30 November, 2019.

## Dr Pravin Wararkar, AMIE
Assistant Professor, Department of Electronics and Telecommunication Engineering, SVKM's Narsee Monjee Institute of Management Studies, Mumbai

Awarded Ph.D in Electronics Engineering by Rashtrasant Tukadoji Maharaj Nagpur University(RTMNU), Nagpur. The topic of his research was "Performance Analysis of Vehicular Adhoc Networks Handovers with Metaheuristic Algorithms".

# Publication
## by Members

**Mr Anil Kumar Mandariya, AMIE**

*Department of Civil Engineering, Indian Institute of Technology, Kanpur, India*

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**Title of Paper:** "Wintertime Hygroscopic Growth Factors (HGFs) of Accumulation Mode Particles and their Linkage to Chemical Composition in a Heavily Polluted urban Atmosphere of Kanpur at the Centre of IGP, India: Impact of Ambient Relative Humidity", *Science of the Total Environment, 704, 2020, pp 1-14.*

Co-authors : Tripathi S N., Gupta T, Mishra G

**Abstract:** This study reported results of the wintertime simultaneous measurements of hygroscopic growth factors (HGFs) and particle-phase chemical composition of accumulation mode particles using a self-assembled Hygroscopic Tandem Differential Mobility Analyzer (H-TDMA) and an Aerodyne High-Resolution Time-of-Flight Aerosol Mass Spectrometer (HR-ToF-AMS), respectively at a heavily polluted urban atmosphere of Kanpur, situated in the center of IGP in India. HGFs at 85% relative humidity (RH) and the size-resolved composition of ambient aerosol particles (dry electrical mobility diameters of 100 and 150 nm) were investigated. HGF_85% was found to increase with particle size. The relative mass fraction of organic aerosol (OA) and $NH_4NO_3$ are probably the major contributors to the fluctuation of the HGF_85% for both particle sizes. The HGF_85% of accumulation mode particles were observed to increase from the minimum value observed during the morning until its maximum afternoon value. This study reported two maximum (early morning and afternoon time) and two minimum values (morning and evening time) of HGF_85%s. As a consequence, the main reasons for this incremental behaviour were, increase in the ratio of inorganic to OA and oxidation level, f44 (m/z44/OA) of the OA within the particle phase. In context to the effect of ambient RH, this study reported two distinct variations of mean HGF_85% as the function of ambient RH. The positive linear relationship at low RH (LRH, RH $\leqslant$ 50%) was clearly associated with low OA loading, relatively higher substantial temperature, and wind speed. We also observed increment in f44, and effective density indicating aging of aerosol. However, HGF_85% was found to inversely decline as a function of RH at higher RH (HRH, RH > 50%) conditions, which clearly reflect the more significant contribution of primary OA and lower oxidation level of OA. Our results show the declining trend in size-resolved effective density at HRH conditions, confirming the above conclusions.

**Keywords :** H-TDMA; HGF_85%; Accumulation mode aerosol particles; OA; f44; HRH; LRH

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**Mr V Sundara Siva Kumar, AMIE**

*Assistant Professor, Department of Electronics & Communication Engineering, K V Subba Reddy Women's Engineering College, Kurnool*

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**Title of Paper:** "Internet of Vehicles for Traffic Management", *International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, 8 (4), 2019, pp 12230-12232.*

Co-authors : N Vinod Kumar, K Prasad Babu, Syed Feroz Shah Ahmed, Syed Ahmed Basha

**Abstract:** Todays world is currently using Internet- of- Things (IOT) as a Digitization towards next era. Internet-of -Things (IoT) is a world-wide network connecting all the smart objects together When-ever those smart things being connected over internet are restricted to only vehicles, then it is called as Internet of Vehicles (IOV). It is consistently increasing urban population and rapidly smart cities, vehicle ownership has been increasing at an exponential rate. Hence, traffic management has become a great problem in our day toady life. This paper focusing on traffic issues our daily life. The internet is today's world is a global phenomenon. The monitoring of net based vehicular system will be prominent solution using Speed Trackers, CCTV cameras. It is logical but that the monitoring of pollution checks and emergency response speed to road accidents. IOV is the platform where communication is established between the vehicular system and human.

**Keywords :** IOT; Traffic Management; IOV; NodeMCU

# Publication
## by Members

**Dr Ashok G Matani, MIE**

*Professor, Department of Mechanical, Engineering, Government College of Engineering, Amravati, Maharashtra*

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**Title of Paper:** "Plastic Waste in Construction and Road Making", *YOJANA, January 2020.*

**Abstract:** During the latest decades many researchers have cantered their works in using plastic waste as raw materials from second degree as an alternative to natural resources. The use of plastics coated aggregate for asphalt pavement allows the reuse of plastics waste. Plastics, are versatile packing materials and commonly used by man but they become problem to the environment. It has been proved by various studies that the coating of plastics & rubber reduces the porosity, absorption of moisture and improves soundness. Hence the use of waste plastics & rubber tyres in the form of powder for flexible pavement material is one of the best methods for easy disposal of wastes. Hence the use of waste plastics for pavement is one of the best methods for easy disposal of waste plastics.

Under the 'Swachhta Hi Sewa' programme of the Government of India, various awareness generation programmes against use of plastic, including distribution of pamphlets at toll plazas and nearby dhabas, and organizing painting / essay writing competitions in schools are arranged.

*Keywords:* Plastic ingestion; Bituminous road construction; Land filling; Incineration; Biomedical plastic wastes

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**Dr Jignesh G Vaghasia, FIE**

*Associate Professor & Head, Mechanical Engineering Department, Shree Swami Atmanand Saraswati Institute of Technology, Surat*

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**Title of Paper:** "Experimental Performance Investigations on Various Orientations of Evacuated Double Absorber Tube for Solar Parabolic trough Concentrator", *International Journal of Ambient Energy, Taylor & Francis, Published online: 22 Aug 2019.*

Co-authors: Jayesh K. Ratnadhariya, Hitesh Panchal, Kishor Kumar Sadasivuni, Deepalekshmi Ponnamma, Medhat Elkelawy & Hagar Alm-Edin Bastawissi

**Abstract:** The parabolic trough concentrator is a widely used concentrator to harness and concentrate on the solar energy. The performance of the parabolic trough concentrator depends upon its various parameters like reflecting surface, mass flow rate, concentration ratio, heat transfer fluid, rim angle, tracking of system, evacuation of absorber, and absorber tube. An absorber tube or receiver is the most important parameter that has an effect on the enhancement of heat transfer which was further specified by its material, surface coating, length, diameter, type of flow through it, number of absorber tube, various orientations of double tube, internal flow obstructions like twisted tape, different shape insertion in it etc. Different researchers had worked on different modifications of the absorber tube to increase the effective heat transfer. In this present experimental work, an investigation of the evacuated double tube absorber with its various orientations carried out for the designed and developed prototype of PTC.

*Keywords :* Orientations of absorber tube; Solar parabolic trough concentrator; Heat transfer enhancement by modified absorber; Evacuated double tube absorber

# Publication
## by Members

**Mr Giridhar Maji, MIE**

*Electrical Engineering Department, Asansol Polytechnic, Department of Tech. Edu.& Training, Asansol, West Bengal*

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**Abstract:** In social network analysis, one of the important aspects is to identify the nodes that are vital to the information diffusion process such as viral marketing, worm propagation in a computer network, disease spreading, etc. The degree centrality measures only the local influence of a node whereas, others like closeness and betweenness capture the global impact. K-shell centrality uses the position/location of anode in the network to estimate its spreading ability. Most of the above techniques except degree perform well when the network is complete. The degree centrality does not require complete network information but fails to identify many important nodes due to limited use of only local information. In this paper, we propose a new measure namely "potential edge weight based k-shell degree neighborhood" centrality to rank the node's spreading ability without depending on the degree of completeness of the network. The proposed method uses node degree and k-shell index along with a derived network parameter to assign potential edge weights to the connecting links between two nodes. Information propagation is simulated using Susceptible-Infected-Recovered (SIR) epidemic model and performance comparison of the proposed method is done using Kendall's rank correlation with other ranking techniques. Experiments on real network establish the superiority of the proposed method in identifying influential spreaders in comparison to a degree, k-shell and other standard ranking techniques. Computationally the proposed method is cost-effective even with large complex networks.

*Keywords :* Influential spreader identification; Centrality measures; K-shell; Degree centrality; Potential edge weight; Kendall's rank correlation

**Mr Faizal N, MIE**

*Lecturer, Department of Computer Science, University of Kerala, Kariavattom, Trivandrum*

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**Abstract:** Security of information is becoming main criteria while transferring information through communication networks. Nowadays images are used as information source; therefore its security from unauthorized or unintended access is important. Image encryption play an important role in protecting images from hacking and stealing while sending over an unsecured channel. The proposed method is a combination of encryption using Hill cipher algorithm along with Elliptic curve for enhanced security. Elliptic curve cryptographic method is used to make the system to asymmetric from the less secured symmetric key encryption technique; hill cipher algorithm. In our proposed method we use both grayscale images as well as color images regardless its size. Steganography of actual image with a cover image before encryption is an advantage. The cover image is selected as it mocks like an informative to unauthorized access. Least Significant Bit (LSB) steganography method is used here as it provides more security than any other methods.

*Keywords:* Image encryption; Visual cryptography; Hill cipher; Steganography; Elliptic curve cryptography

**Mr Srikanth Satish Kumar Darapu, MIE**
*Assistant Professor, Department of Civil Engineering, GIT, Gandhi Institute of Technology and Management (GITAM Deemed to be University), Visakhapatnam, Andhra Pradesh*

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**Title of Paper:** "Determination of Ground Water Stressed Regions of Visakhapatnam District using ArcMap", *International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, 8 (4), 2019*.

Co-authors : Hema Sumanth Bomma, Kode Venkata Sayi Sankeerth, Swathi Boosala

**Abstract:** Water is essential for human life, which is vastly used for basic needs like drinking and other domestic, irrigational and industrial purposes etc. The main sources of water are classified as surface and sub-surface sources. The surface water resources are varied like rivers, ponds, lakes etc. but the sub-surface resources are only water bearing aquifers. Day by day the sub surface water is degrading due to many reasons like pollution, climate change etc. Therefore, studies on conservation of ground water is important. For the present study, data of ground water levels for eleven years (2007-2017) at 69 locations of various mandals (zones) in Visakhapatnam district (Andhra Pradesh, India) was obtained from the A.P. Ground Water and Water Audit Department, Visakhapatnam. By using ArcMap of ArcGIS and the spatial and temporal variations were mapped onto the base map of Visakhapatnam. The results indicated 'water stressed areas' in the study region. It was observed that the ground water levels dwindled drastically in the years 2016 and 2017. The results of the study highlighted the immediate necessity to scale up the ground water conservation measures and efficient design of the ground water resource systems in the area.

*Keywords:* Ground water conservation; ArcMap; Temporal variation and spatial variation of ground water; Water scarcity; Water stress

**Title of Paper :** "Transient Analysis of Thermal Treatment Processes Carburizing and Nitriding of Steel Components by Numerical Modeling and Simulation", *International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, 9 (2), 2019*.

Co-authors : Swathi Boosala, M Nagendrababu, Ch Suresh

**Abstract:** The purpose of carburizing, nitriding and carbonitriding is to increase the strength of components. Elements such as carbon, nitrogen and carbon-nitride are diffused into the components at high temperature convective environment. The amount of diffusion is to be regulated by controlling the temperature and time of diffusion. Time and temperature of process govern diffusion rate and strength of the component. Numerical modeling is applied by energy balance approach i.e., equating rate of change of energy is equal to energy transferred by conduction, convection and radiation. By non dimensionalising relations for the mentioned critical parameters were obtained. The phenomenon of convection, radiation and conduction are taken together for the purpose of numerical modeling. Variation of temperature and depth of diffusion of component for the taken components i.e., sphere and cube was plotted in transient state. For both numerical analysis and simulation the boundary conditions i.e., for carburization the ambient temperature is 9500C with carbon monoxide as the carburizing agent and for nitriding the ambient temperature is 5300C with nitrogen as nitriding agent and the component taken is of steel which is initially at room temperature were taken. Results obtained from numerical modeling and simulation were compared with each other and observed that in both analyses the variation of temperature with time and depth of diffusion is almost linear. Final differential equation obtained in numerical modeling is a single order non linear differential equation which is solved in MATLAB using finite difference approach. Data obtained from MATLAB were plotted for variation of surface temperature and geometric dimension with respect to time.

*Keywords:* Carburization; Nitriding; Mass diffusion; Energy balance; Numerical modeling; Simulation; Critical parameters

**Title of Paper :** "Influence of Addition of Micro Silica on Strength Properties of Basalt Fiber Reinforced Multi Blended Concrete", *International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, 9 (1), 2019*.

Co-authors : K Anupama Reddy, Venkata Ramesh Kode, Potharaju Malasani

**Abstract:** In recent years, the development of multi blended mix concrete has gained attention due to its multiple advantages and environmental friendliness. This paper has attempted to examine mechanical properties of Multi blended concrete of M30 grade made with micro silica and basalt fibers. To reduce the deleterious effects of the production of cement on the environment, concrete is being developed by substituting admixtures like GGBS and Fly Ash in place of cement. Multi blended concrete developed with Fly ash and GGBS showed depletion in the mechanical properties. Micro silica & Basalt fibers were added to this mix additionally to overcome this deficiency. Initially four series of mixes of multi blended concrete were developed with a composition of Fly ash 20% and GGBS 30%, 40%, 50% & 60% as replacement of cement. For better performance, micro silica at 5% by weight of cement and Basalt fibers at 0.2% by volume of concrete were added. The mechanical properties such as Split tensile & Compressive strengths were studied at the age of 7 & 28 days. The results showed that M30 grade multi blended concrete can be achieved with 30% GGBS, 20% fly ash, 5% micro silica, 0.2% basalt fibers.

*Keywords:* Multi blended concrete; Fly ash; GGBS; Micro silica; Basalt fibers; Split tensile & compressive strengths

**Mr K Syam Sundar, MIE**

*Deputy Executive Engineer (Elec.), Operation &amp; Maintenance, AP Transmission Corporation (APTRANSCo.,), Andhra Pradesh*

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**Abstract:** Due to increasing demand of electricity, power system is becoming complex day by day. Limitations of space for constructing substations, rights of way constraints for erecting new lines, environmental concerns, etc. demands for alternatives which effectively manage the power supply system. Aged equipment caused stability problems leading to risks on the power system. Most of the equipment commissioned decades back is in service today and has significant residual life to be utilised before discarding them. For developing countries, it is important to retain and utilise this equipment further. Hence the retrofit of aging substation has brought considerable economic benefits and cost savings. Retrofitting activity is an addition of additional equipment to the existing system which gives better performance.

Effective dynamic monitoring and control of grid can be accomplished with the help of automation in sub stations. Development in communication technologies made it possible to control and monitor sub stations from local and remote centers. Automated sub stations are very efficient and need no man power and no associated human errors. Substation automation can be structured into three levels: process, bay and station-level automation. The key components include Intelligent Electronic Devices (IEDs), Bay Controller Units (BCUs), Human-Machine Interface (HMI), Communication interface and Supervisory Control And Data Acquisition (SCADA) systems. Data exchange is to be realized using IEC 61850 protocol with a switched Ethernet communication in fibre-optic cables.

The basic inputs of current and voltages from CTs and PTs are taken and converted into digital format. Each measurement IED senses the quantity and sends its digital equivalent to BCU on demand. Identically each control IED receives command from BCU and converts it to desired electrical, mechanical or electromechanical output. Status IED conveys status of contacts (Close-Open). IEDs collect data and communicate directly through Ethernet switches over local area network (LAN). BCU is another key component of SAS, which helps in managing close or open commands of the switchgear and the operations of the protective relay equipment. BCUs are installed in switchyard in separate panels and performing task of acquiring and publishing data. Substation information display, controls, alarms, etc. are provided at HMI through a single line diagram. The communication network in the substation enables data flow within bay and between bay and station. An additional communication link is established between the station level and remote work station, which enables to sharing of important substation data with load despatch centre (LD). Some of the key data generated by the SAS includes: Disturbance recording data, hormonic distortion of system voltage/ current, tract of events, metering and measurement data, etc. SAS also generates MIS data, reports and graphs etc. from remote control centre.

Size of the control room is reduced since it houses only monitoring devices. The bay kiosk system for control and protection are located near bays in the yard. No control and power cables from the yard to control room are required. On the secondary equipment side the most obvious physical change will be from copper cables to fiber optic cables. The massive reduction of secondary cabling will mean reduced cost for cables associated trenches, etc. The cyber security is an important criterion for a secure, efficient and reliable operation of the Automated Sub-Station. It is crucial to have policies that encourage the deployment of advanced automation technologies for power systems. The retrofit and upgrading of substations significantly enhanced the reliability and stability. This paper discusses the recent trends/ need of retrofitting of conventional substations to Automated Sub-Stations (SAS).

*Keywords :* Retrofit; Substation Automation System (SAS); Communication; IEC 61850; Switched ethernet; Cyber security

# Publication
## by Members

**Dr Pala Gireesh Kumar, AMIE**

*Head of the Department, Department of Civil Engineering, Shri Vishnu Engineering College for Women, Bhimavaram, West Godavari, Andhra Pradesh*

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**Title of Paper:** "Studies on the Sinkages of Rigid Plain Wheels and Lugged wheels on TRI – 1 Lunar Soil Simulant", *Journal of Terramechanics, 82, 2019, pp 35-42*.

https://doi.org/10.1016/j.jterra.2018.12.002.

**Abstract:** This paper summarises the experimental work and analytical work carried out to determine the wheel sinkage of plain rigid wheels and lugged wheels, traversing on TRI-1 Lunar Soil Simulant (Plain and lugged wheels: small wheel- 160 mm×32 mm and large wheel- 210 mm × 50 mm) with different number of lugs (N = 8, 12, 16) and lug height (h = 5, 10, 15 mm). Bekker and Reece pressure sinkage models are considered to determine the theoretical sinkage, and outlined in the present study. Comparisons of the analytical results with the experimental results are also carried out. The comparisons hold good for plain rigid wheels and in 2 cases, for lugged wheels (Small and Large), with 16 lugs of height, 5 mm. For all other combinations of lugged wheels (no. of lugs = 8, 12 and height of lugs = 5 mm, 10 mm and 15mm), the predicted values are found to be less than the experimental values. For efficient functioning of the rover, optimization of wheel dimensions is a must. A new sinkage model accounting gravity effect and aspect ratio is developed, based on experimental results for wheel sinkages on TRI-1 simulant, the range of results obtained for different cases are examined.

*Keywords :* TRI-1 lunar soil simulant; Sinkage model; Aspect ratio; Lug

**Title of the Paper:** "Level of Service of Urban and Rural Roads - A Review", *Technical Volume, 34th Indian Engineering Congress, ISBN 978-81-942561-5-1, pp. 204-210, Dec 27-29, 2019, Hyderabad.*

**Abstract :** With rapid growth of population in urban and rural areas, purchase of motorized vehicles is also grown and the demand for proper transportation network, which can give good compatibility to the road users, has become a major challenge in India. Level-of-Service (LOS) is one such parameter in terms of compatibility that gives a quality measure for the operational conditions within a traffic stream, i.e., generally in terms of service that is provided by the road to the user. This paper investigates on the existing level-of-service models for urban and rural roads reported by researchers globally. A new approach for finding level-of-service was introduced, i.e., using volume to capacity ratio (v/c), average speed of the vehicles, percentage speed reduction and so on are also discussed and presented. This paper brings out the collective information on LOS and its findings using analytical models which can estimate/predict compatibility levels of various road users in heterogeneous traffic conditions in urban environment. However, very few research works has been carried on LOS for rural roads and there is ample scope for doing further research. This paper also presents insights of problems associated with LOS.

**Keywords :** Level of service; Compatibility; Cluster analysis; v/c ratio; speed

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**Title of Paper:** "Suppression of Thermo-Acoustic Instabilities Using Helhmoltz Resonator", *IEEE Xplore 2019, pp 01-06* .

DoI: 10.1109/ICNTE44896.2019.8945994

Co-authors : B Kudachi, S Joy, S Phansalkar, V Pillai, T Thomas

**Abstract:** In combustion chambers due to coupling between unsteady heat release and pressure fluctuations the thermo-acoustic instabilities are developed. These instabilities create structural vibration and damage. Therefore, there is a need to develop a technique which can effectively control these instabilities. The present work focuses on passive control using Helmholtz Resonator. The Rijke tube setup has been developed for characterization of thermos-acoustic instabilities. The maximum suppression of thermo-acoustic instabilities was observed at Helmholtz resonator position X /L = 0.6. The experimental results show that approximately 10 dB reduction for the 2 nd mode of instability was achieved whereas, the Helmholtz Resonator was not effective for 3 rd mode as there is a change in heat source location and frequency of instability.

*Keywords :* Thermo-accoustic instabilities; Helmholtz resonator; Rijke tube

**Mr Arun Manohar Gollapudi, AMIE**
*National Institute of Technology Warangal, Telangana*

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**Title of Paper:** "Modeling and Simulation of a High-redundancy Direct-driven Linear Electromechanical Actuator for Fault-tolerance under Various Fault Conditions", *Engineering Science and Technology, an International Journal, 2020, ISSN 2215-0986*.

https://doi.org/10.1016/j.jestch.2019.12.007

Co-authors : Vasu Velagapudi, Srikanth Korla

**Abstract:** The high-redundancy actuator (HRA) is a linear displacement actuation system, which consists of a large number of small electromechanical actuation elements arranged in a series and parallel configuration. The performance of a HRA with 9 direct-driven linear electromechanical actuators was analyzed under different fault conditions with the aid of the MATLAB simulation model. The results showed that the HRA has the capability to provide inherent fault-tolerance. Hence, the sudden failure of the system in the presence of fault was avoided. However, the capability of the actuator was found to be reduced gradually depending upon the number of faults.

*Keyword:* Fault-tolerance; High redundancy actuator; Electromechanical actuator; Actuator faults; MATLAB/simscape.

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**Dr Yogendra Arya, AMIE**
*Assistant Professor, Electrical and Electronics Engineering Department, Maharaja Surajmal, Institute of Technology, Janakpuri, New Delhi*

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**Title of Paper:** "Impact of Ultra-capacitor on Automatic Generation Control of Electric Energy Systems using an Optimal FFOID Controller". *International Journal of Energy Research, 43(14), 2019, Wiley, pp. 8765–8778.*

DOI: https://doi.org/10.1002/er.4767.

**Abstract:** Automatic generation control (AGC) acts as a significant part in alleviating dynamic oscillations and sustaining constancy in frequency and scheduled tie-line power to establish the reliable, secure, and stable operation of electric energy systems under dynamic conditions. AGC needs energy storage system (ESS) and elevated expert, intelligent, and flexible control strategies to ensure generation-demand balance in modern complex structured energy systems following inconsistent load demands. Hence, this paper utilizes a new fuzzy fractional order integral derivative (FFOID) controller along with ultra-capacitor (UC) ESS to solve AGC issue in energy systems effectively. The imperialist competitive algorithm is employed to tune the output scaling factors like integral, derivative, and noninteger order of integrator/derivative of FFOID controller using ISE performance index. Initially, the technique is applied on a one-area nonreheat thermal system. Then, to demonstrate its competency and scalability, the study is boosted to prevalent two-area nonreheat thermal, two-area multisource multi-unit hydrothermal, and three-area reheat thermal energy system models. The advantage of the proposed controller is demonstrated by juxtaposing the outcomes with those offered by various best claimed intelligent control approaches expressed in the contemporary literature and fuzzy proportional integral (FPI)/fuzzy FO PI (FFOPI) controller. The UC with the FFOID controller outperforms other methods. The robustness analysis proves that parameters of the utilized controller acquired at nominal situation are healthy enough and necessarily not needed to retune under broad alterations in the system loading/parameters, size/position of load perturbation, and under the appearance of system constraints and random load pattern with/without noise.

*Keywords :* Energy storage system; Ultra-capacitor; Electric energy system; Optimal FLC; AGC; GRC; FO

# Publication
## by Members

**Mr K Anandhanarayanan, MIE**
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Co-authors : Anandhanarayanan Kamalakannan, Shiva Shankar Ganesan and Govindaraj Rajamanickam

**Abstract:** Image segmentation and classification are the two main fundamental steps in pattern recognition. To perform medical image segmentation or classification with deep learning models, it requires training on large image dataset with annotation. The dermoscopy images (ISIC archive) considered for this work does not have ground truth information for lesion segmentation. Performing manual labelling on this dataset is time-consuming. To overcome this issue, self-learning annotation scheme was proposed in the two-stage deep learning algorithm. The two-stage deep learning algorithm consists of U-Net segmentation model with the annotation scheme and CNN classifier model. The annotation scheme uses a K-means clustering algorithm along with merging conditions to achieve initial labelling information for training the U-Net model. The classifier models namely ResNet-50 and LeNet-5 were trained and tested on the image dataset without segmentation for comparison and with the U-Net segmentation for implementing the proposed self-learning Artificial Intelligence (AI) framework. The classification results of the proposed AI framework achieved training accuracy of 93.8% and testing accuracy of 82.42% when compared with the two classifier models directly trained on the input images.

*Keywords:* Self-learning annotation scheme; K-means Clustering; U-Net; Deep learning; Skin lesion image

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## ANNOUNCEMENT

### International Conference on
### Advances in Materials and Structures AMAS-2020
### 4-5 May, 2020

### Department of Civil Engineering
### Pondicherry Engineering College, Puducherry

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# Environmental Systems Modeling

**Prof (Dr) Ram Kailash Prasad,** *FIE*

Environmental systems are complex in nature and its modelling often provides the only means by which the results of the environmental problems are visualised and extrapolated to similar environmental problems. Thus the Environmental Systems Modeling is a numerical experimentation to solve the real world problems and its intervention with the help of available techniques rather than the physical experimentation. The subject matters of the book is very relevant in today's contest when the world is facing the problems of surface and groundwater pollution and planning for a strategy to restore the natural conditions of river, lake and underground water and other water bodies.

Few books are available today, which specialize exclusively on individual topics of the chapter discussed in this book. However, a single book that caters the need of the students studying the subject area, emphasizing the basics of the Environmental Systems Modeling with illustrated examples and potential application in real system, is normally preferable for classroom teaching. Also, most of the books available in the market are beyond the affordable range of the students.

In this book, Chapter 1 deals with the overview of the model whereas Chapter 2 covers the basic environmental modeling. Chapter 3 deals with the fate and transport process for Groundwater and surface water flow. Chapter 4 deals with the river water quality modeling, Streeter Phelps Equation for dissolved oxygen modelling, nitrification, distributed BOD input along channels. Chapter 5 deals with the factors affecting natural process in Lake, Lake eutrophication, measures of eutrophication, and modeling of Lakes as a completely mixed systems. Chapter 6 highlights some of the important aspects of the air quality modeling and Chapter 7 covers the application of optimization technique to water and environmental processes.

Publisher : Standard Publishers Distributors, Delhi 110006
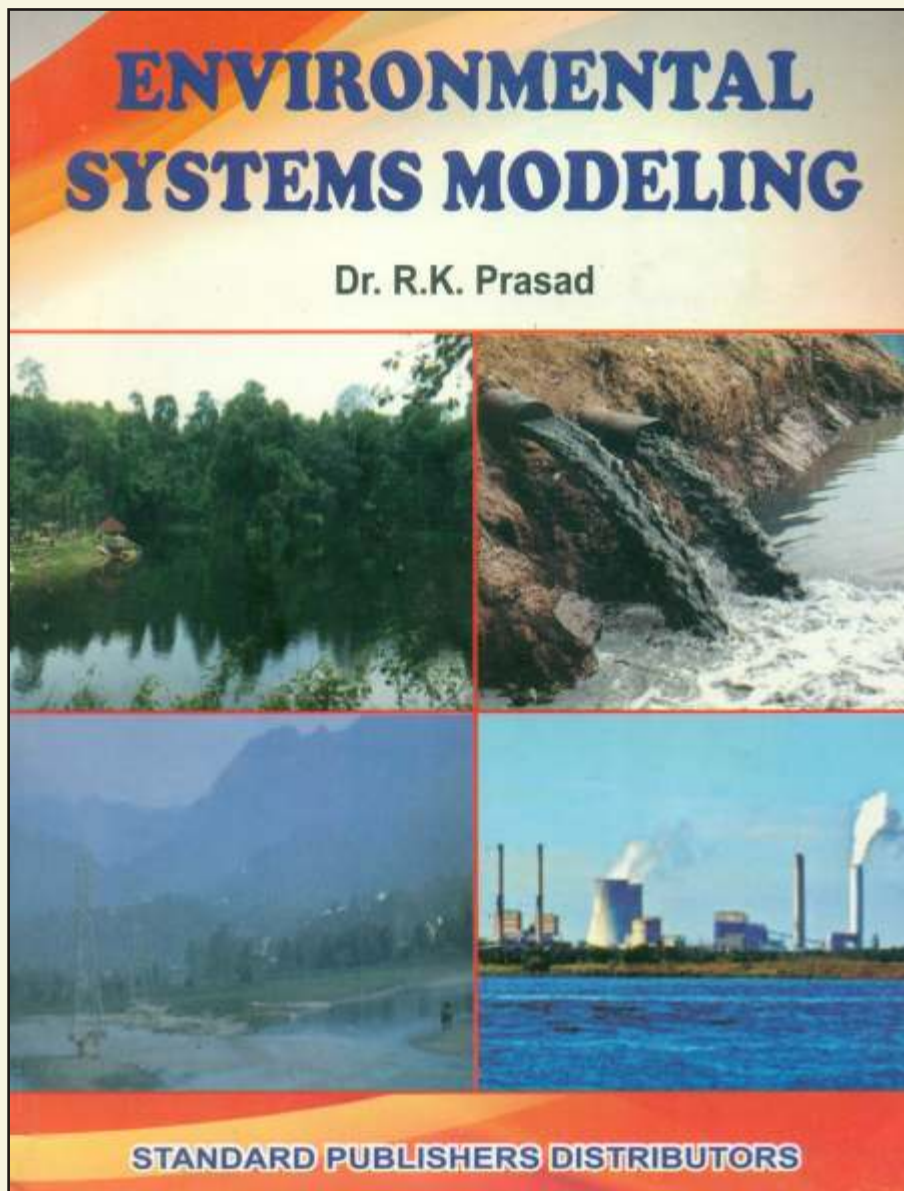
# Announcement

## Contribution for Centenary Celebrations of
## The Institution of Engineers (India)

The Institution of Engineers (India) has entered its next Century in September 2019 and we intend to celebrate this significant landmark in a befitting manner. Various International Seminars are being organized in India and Overseas on contemporary and innovative themes culminating in Global Engineering Congress next year. Also, IEI has launched a special outreach programme to induct new members into its' fold along with an image enhancement programme to project the Institution both nationally and globally.

For this purpose, an IEI Centenary Fund has been established and the finances accrued by way of donation/sponsorship would be utilized to organize various events in the Centenary Year.

The contribution made under this section is exempted as per Section 80G of the Income Tax Act 1961, if made by cheque/draft/NEFT.

Details of IEI Centenary Fund are as follows.

| | |
|---|---|
| Name of the Fund | IEI Centenary Fund |
| Bank | HDFC Bank |
| A/c No | 50100301303426 |
| IFSC Code | HDFC0000469 |

## Technical Activities
## by
## Institutional Members

### National Seminar
### on
### "Application of Laser in Manufacturing"
*to be organised by*
### GIET University
Gunupur, Rayagada, Odisha
### March 14-15, 2020
Mobile No.: 9861876251; Email: prabinapatnaik@giet.edu

[https://www.ieindia.org/webui/IEI-Publication.aspx#annual-technical-volume]
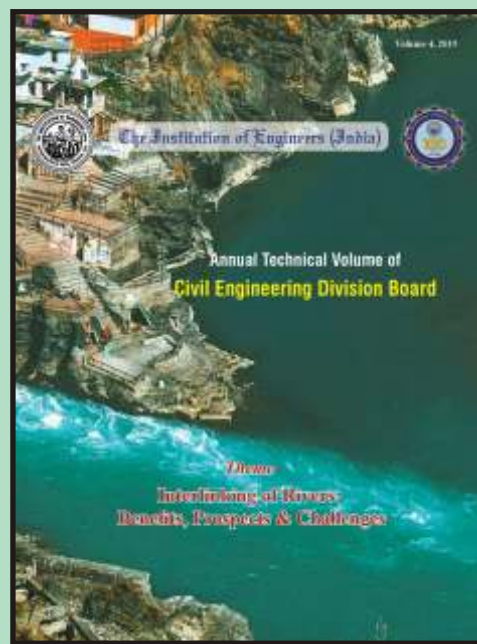
## Architectural Engineering Division Board
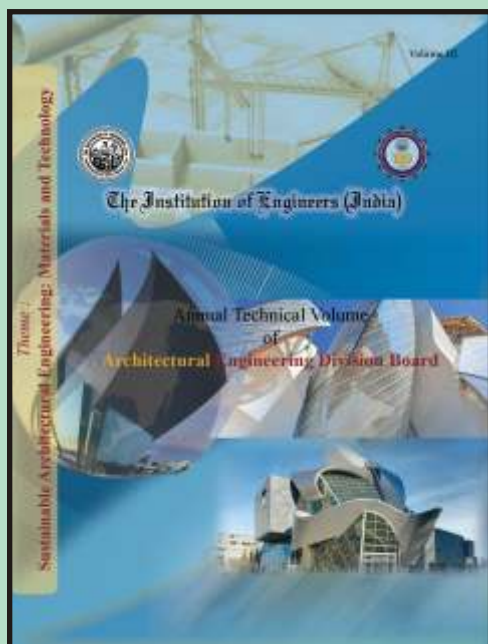


**Theme**
**Sustainable Architectural Engineering:**
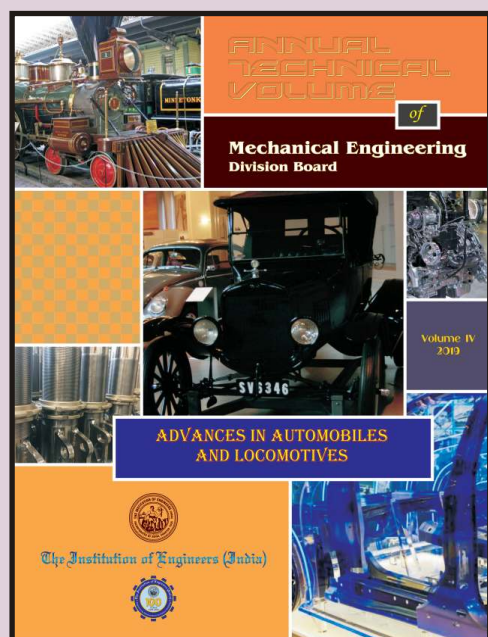**Materials and Technology**

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**Theme**
**Interlinking of Rivers Benefits**
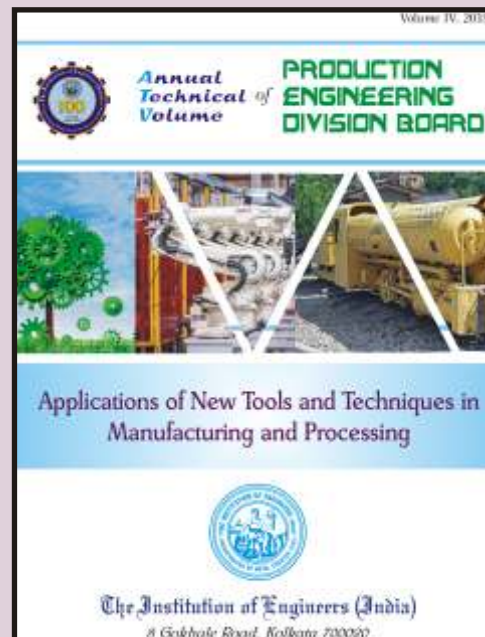**Prospects & Challenges**

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