



Epitome



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Members

in the News

Prof (Dr) Sampa Chakrabarti, FIE

Professor, Department of Chemical Engineering, University of Calcutta & Associate Editor, Journal of The Institution of Engineers (India), Series E

Patent

A Continuous Reactor System For Conducting Sunlight Assisted Oxidative Degradation Of Organic Pollutants In Wastewater

Indian Patent no 328984 dated 31.3.2017 (Application no. 201731011606 dated 31.3.2017) granted in 2020.

The present invention describes a continuous open channel solar photo reactor system for conducting sunlight assisted oxidative degradation of organic pollutants in wastewater by photo-Fenton reaction. The reactor as disclosed in the present invention is a rectangular one with rectangular baffles, hence easy to construct since no special skill is required. Since the flow is through channels and not through pipes, the throughput is flexible within certain limits. The reactor can be used for degradation of wastewater from textile industries and agriculture. Since it is a flow reactor, it can easily be scaled up by arranging in parallel for higher flow rate.



Dr R Venkatesan FIE

Dr R Venkatesan, Scientist G & Head, Ocean Observation Systems, National Institute of Ocean Technology, Ministry of Earth Sciences, Chennai



Dr R Venkatesan AMIE MTech PhD working at NIOT Chennai has been elected to head 13 regional bodies under the UNESCO Intergovernmental Oceanographic Commission nominated by the Government of India Ministry of Earth Sciences for a period 2021-22 He is the first Indian to be elected to this prestigious UNESCO Committee. He is a US Fulbright Awardee and completed his first segment at the University of Massachusetts Dartmouth USA in 2019. He served IEI as a Council member and Charman of IEI Kanchepuram Local Centre, IEI.

Dr S Dharmalingam, FIE

Past Chairman, Tiruchirappalli Local Centre, IEI and Visiting Faculty, Department of Instrumentation and Control Engineering, National Institute of Technology, Tiruchirappalli

Honored as an Eminent Academician for his outstanding contributions in the field of Instrumentation and Control Engineering during the International Conference on Instrumentation and Control Engineering (ICECON 2019), held at National Institute of Technology, Tiruchirappalli on 19 December 2019. A Plaque and Scroll of Honour was presented to Dr Dharmalingam by the Chief Guest of the inaugural function, Prof Paluri S V Nataraj, Professor, Systems and Control Engineering Group, Indian Institute of Technology Bombay in the august presence of Dr (Mrs) Mini Shaji Thomas, Director, National Institute of Technology, Tiruchirappalli.



Prof Daruri Venugopal, AMIE

Professor, Department of Mathematics, OPJS University Churu, Rajasthan

Awarded Doctor of Philosophy in Mathematics from OPJS University Churu, Rajasthan on the topic "Studying the Solution of Partial Differential Equations Theory and Their Execution in Mathematical Fluid Mechanics", under the guidance of Prof(Dr)Ashwini Kumar Nagpal, OPJS University.

Dr Srinivas Vasam, MIE

Professor, Department of Civil Engineering, Siddhartha Institute of Technology and Sciences, Hyderabad

Awarded Doctor of Philosophy in Civil Engineering from Jawaharlal Nehru Technological University Hyderabad(JNTUH), Telangana, on the Topic "Investigation on Performance of Different Grades of SCC Using Recycled Concrete Aggregate" under the guidance of Prof K Jaganaadha Rao, Department of Civil Engineering, CBIT, Gandipet, Hyderabad and Prof (Retd) M V Seshagiri Rao, Department of Civil Engineering, JNTUH, Hyderabad.



Publication

by Members

Mr Jishnu Handique, AMIE

Junior Research Fellow, Department of Ocean Engineering and Naval Architecture, Indian Institute of Technology Kharagpur

E-mail: jishnu.mechanical2016@gmail.com

Title of Paper: “A Computational Investigation of the Effects of Particle Diameter and Particle–Particle Interactions on Jet Penetration Characteristics in a Gas–Solid Fluidized Bed with a Central Jet”, *Title of Journal: Flow, Turbulence and Combustion, Springer Nature, Published Online: 20th April 2020.*



DoI: <https://doi.org/10/1007/s10494-020-00132-2>

Co-author: Subrat Kotoky

Abstract: Particle–particle interactions, quantified by particle–particle restitution coefficient (e) and particle diameter (d_s) are two crucial parameters governing the flow hydrodynamics of dispersed gas–particle flows. In this work, a detailed numerical analysis has been carried out in order to get an insight into the effects of these two parameters on the jet penetration characteristics inside a bubbling gas–solid fluidized bed with a central jet. Specifically, the studies have been conducted to find out the effects of variations of these two parameters on the jet penetration length. It has been found that an increase in the value of particle diameter leads to a significant decrease in the jet penetration length for all other flow and physical properties remaining invariant. On the other hand, a gradual but substantial decrease in the jet penetration length has been observed with an increase in the values of e . Numerical investigations further reveal that there is no significant variation in the jet penetration characteristics for change in particle–wall interactions, quantified by the specular coefficient (\square).

Keywords: Jet Penetration Length; Fluidized Bed with Central Jet; Particle–particle Interactions; Particle Diameter; Gas–particle Flows.



Mr Bidyut Mahato, AMIE

Senior Research Scholar, Dept. of Electrical Engineering, IITISM Dhanbad

E-mail: bidyut1990@gmail.com

Title of Paper: “A New and Generalized Structure of MLI Topology with Half-bridge Cell with Minimum Number of Power Electronic Devices”, *IETE Technical Review, 2020.*

<https://doi.org/10.1080/02564602.2020.1726215>

Co-authors : Saikat Majumder, Sambit Vatsyayan, K C Jana

Abstract: Rapid developments in the field of high-power, high-voltage applications have led to a tremendous increase in the popularity and utility of multilevel inverters. The requirement of reduced harmonics coupled with an ever-increasing demand for clean and renewable energy sources has led to a great interest in the multilevel inverter. This paper presents a novel architecture of a single-phase multilevel inverter that utilizes fewer power electronic switches and driver circuits than various popular multilevel inverter circuits. The design presented is generalized in nature, thereby allowing for the generation of any number of levels in the output voltage. The working and modes of operation of the 9-level symmetrical configuration of the proposed topology is extensively elaborated. Simulation results from MATLAB Simulink as well as real-time hardware results have been included to verify the existence and proper working of the proposed 9-level symmetrical and 15-level asymmetrical inverter. Comparison results with other discussed configurations are also included to further establish the advantages possessed by the proposed circuit.

Keywords: 9-level/15-level Inverter; –DCAC Converters; Power Electronic Switches; Sinusoidal PWM Utilization



Publication

by Members

Mr Anupoju Rajeev, FIE

Assistant professor (Ad-hoc), Department of Civil Engineering, NIT Andhra Pradesh

E-mail: anupoju@iitg.ac.in

Title of Paper: “Experimental and Numerical Investigation of an Exterior Reinforced Concrete Beam-column Joint Subjected to Shock Loading”, *International Journal of Impact Engineering*, 137, 2020, 103473.

<https://doi.org/10.1016/j.ijimpeng.2019.103473>

Co-authors: Sai Sharath Parsi, Sudharshan N Raman, Tuan Ngo, Amit Shelke



Abstract: Beam-column joints are critical elements in a special moment resisting frames as they govern the structural behavior and failure mechanisms under extreme events such as earthquake, blast, and impact. This work was undertaken to investigate the dynamic response of a reinforced concrete (RC) external beam-column sub-assembly subjected to shockwave. To this effect, a well-instrumented shock tube setup was developed to investigate the dynamic response of the joint. The shock-induced transient displacement and acceleration were measured at discrete locations along the length of the beam, and the entire shock event was recorded using a high-speed video camera. The maximum displacements acquired through the experimental study are compared with the numerical and the analytical results. These joint assemblies were incorporated with various deficiencies such as a beam weak in shear, beam weak in flexure and column weak in shear, to account for limitations in design guidelines. The influence of confining reinforcements on the shock-resistant behavior of a beam-column joint is studied. Findings from the current research indicate that steel confinement conforming with seismic design criteria strengthens the joint assemblies when subjected to shockwave loading conditions. It is also found that

additional transverse reinforcement arrests the development of shear cracks in the disturbed (D – region) of the joint. The results obtained from the finite element and analytical models agree well with the experimental results.

Keywords: Beam-column Joints; Response Spectrum; Seismic Detailing; Shock Response; Shock-tube

Title of Paper: “Implications of Impact Experiments on Honeycomb Shielded Exterior Beam-column Joint”, *Engineering Structures*, 212, 2020, 110470.

<https://doi.org/10.1016/j.engstruct.2020.110470>

Co-authors: Damith Mohotti, Amit Shelke

Abstract: The response of building structures under impact loads is a challenging subject for both numerical and analytical studies, as the available experimental data is limited. In the current research, an attempt was made to study the experimental investigation on the exterior beam-column joint against accidental and intentional impact loading. The velocity regime of the projectile was considered in the range 30–34 m/s. The response of the structural member shielded with the Aluminum honeycomb sandwich panel was compared with the unshielded beam-column joint. The target damage, failure modes, energy absorption, and evolution of cracks were examined in terms of both analytically and experimentally. Results obtained from high-speed imaging were used to obtain the projectiles incident, residual, and re-bounce velocities. The application of honeycomb shielding on the seismic group specimens shows that the ballistic limit was increased by its energy absorption characteristics. It was found that they have a 22% higher ballistic limit than that of the seismic group specimens without honeycomb shielding. The shielded honeycomb sandwich panel specimens show promising results as they absorbed 49% higher impact energy than that of seismic specimens without honeycomb shielding. The current study provides a valuable reference for designing of honeycomb panels as a sacrificial material to safeguard the engineering structures against impact loads in the intermediate velocity regime.

Keywords: Aluminum Honeycomb Shielding; Ballistic Limit; Beam-column Joints; Impact Response; Seismic Detailing; Shock tube

Title of Paper: “Comparative Study of Seismic Design and Performance of OMRF Building using Indian, British, and European Codes”, *Infrastructures*, 4(4), 71, 2019.

<https://doi:10.3390/infrastructures4040071>

Co-authors: Naveen Kumar Meena, Kumar Pallav

Abstract: In India, damage cause by some major earthquakes, such as India/Nepal 2015, Sikkim 2011, Kashmir 2005, Bhuj 2001, Latur 1993, and Uttarkashi 1991, have raised alarms to professionals. The probability of seismic risk is higher in more densely populated Indian cities, such as Bhuj, Kashmir, Sikkim, Uttarkashi, as they come under the highest seismicity zone in India. Therefore, our primary interest is to investigate the seismic performance evaluation of the buildings in these seismic prone areas. Significant research has been conducted on the seismic performance of existing buildings. However, investigations on the seismic performance of a building with different country codes for the same earthquake event has not been explored, which is crucial in providing a deeper knowledge of the seismic performance of buildings. This paper presents a comparative study of an Ordinary Moment Resistant Frame (OMRF) building designed using three major codes, Indian (IS: 456-2000, IS:1893-2002), British (BS: 8110-1997) and European (EC-2, EC-8). Six typical building models considered with earthquake (WiEQ), and without earthquake (WoEQ), and their assessments were interpreted using non-linear static analysis for determining their seismic performance. Seismic performance is compared in terms of base shear coefficient (BSC) and drift ratio that shows WiEQ models, at the drift ratio of 1.5%, the BSC was as follows; 0.78, 0.88, and 0.96 for the models designed for British, Euro, and Indian codes, respectively. The results show that the building models, that have been designed for the Indian codal provisions for both cases, performed well as compared to the other country codes. Base shear and drift ratio are the vital parameters that vary considerably among the building models. This aspect of the Indian code makes it a safer design methodology with higher reserve strength and a reasonably good displacement capacity before reaching the Collapse Prevention (CP) performance level.

Keywords: OMRF Building; Pushover Analysis; Base Shear Coefficient; Drift Ratio

Publication

by Members

Dr Kirti Jalgaonkar, MIE

Scientist, ICAR-Central Institute for Research on Cotton technology, Mumbai, Maharashtra

E-mail: jalgaonkar.kriti@gmail.com

Title of Paper: "Postharvest Profile, Processing and Waste Utilization of Dragon Fruit (*Hylocereus* Spp.): A Review," *Food Reviews International*, 2020.

DoI: 10.1080/87559129.2020.1742152

Co-authors: Manoj Kumar Mahawar, Bhushan Bibwe & Pankaj Kannaujia

Abstract : Dragon fruit is a nutritious and wonderful exotic fruit cultivated throughout the arid regions of the globe, particularly Asian countries. The fruit with an attractive shape and magnificent color are refreshing with mouth watering taste. It is abundant in vital nutritional ingredients viz. carotene, calcium, fiber, vitamin B, vitamin C, and phosphorous. The fruit is processed into numerous value-added products; however, that has been limited to small-scale processing industries. In addition to pulp processing, the utilization of by products (peel, seed) will contribute to reducing waste disposal problems, imparts value to the product for food and other industrial applications. Further, extraction and application of bioactive compounds from fruit waste having the application for food fortification can enhance the overall efficacy of the process. This review highlights the technologies and processes adopted for the overall utilization of dragon fruit. Further to make rational usage of this valuable resource, systematic compilation and presentation of reported literature are required. Therefore, the present work was aimed towards the comprehensive utilization of this fruit through value addition approaches and by-product utilization.



Keywords: Dragon Fruit; Postharvest Processing; By-product Utilization; Value Addition

Mr Karthik Rajathachal Mamudur, MIE

Department of Civil Engineering, S.V. University, Tirupathi

E-mail: structuralmechanic@gmail.com

Title of Paper: "Application of Boosting-based Ensemble Learning Method for the Prediction of Compression Index," *Jr Inst. Eng. India Ser. A*, 2020.

<https://doi.org/10.1007/s40030-020-00443-7>

Co-author : Mallikarjuna Rao Kattamuri

Abstract : Obtaining geotechnical design parameters by conducting in situ or laboratory testing has always been challenging because of difficulty involved with handling, transportation, release of overburden pressure and poor laboratory conditions. Engineers thus depend on empiricism. Over the decades, many empirical correlations have been proposed to relate index properties of soils with geotechnical design parameters. Conventionally, regression-based methods have been applied to build these empirical relationships. These models though simple, often are not flexible enough to capture more complex relationships between the dependent and the independent variables. Also adding the right interaction terms or polynomials can be tricky and time-consuming. In recent years, advances in the field of data mining have produced robust and efficient ensemble machine learning algorithms like boosting methods, which not only can learn nonlinear relationships but also have strong boundaries in terms of generalization performance. However, boosting methods are yet to be used in regression problems in the field of geotechnical engineering. In this paper, a recently developed boosting method called extra gradient boosting method (XGBoost) is applied to predict the compression index of normally consolidated soils. An efficient grid search algorithm in combination with a three-way hold out technique is used to tune the hyperparameters of the XGBoost algorithm. This study suggests that application of XGBoost in combination with the grid search technique leads to an improvement of 8–11% in prediction accuracies compared to published results that used single- and multi-variable regression, artificial neural network for prediction of compression index. Consequently, XGBoost has potential applicability in estimation of soil properties.



Keywords : Consolidation Settlement; XGBoost; Extra Gradient Boosting; Regression Analysis

Publication

by Members

Dr Venkata Krishna Bhanu Chennapragada, FIE

Professor, Department of Electrical & Electronics Engineering & Dean - Academic Programs (PG & Research), Gayatri Vidya Parishad College of Engineering (Autonomous), Madhurawada, Visakhapatnam

E-mail: bhanucvk@gvpce.ac.in

Title of Paper: "Grid-connected Vs. Off-grid Solar Water Pumping Systems for Agriculture in India: A Comparative Study", *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects, Taylor & Francis, ISSN: 1556-7036 (Print) 1556-7230 (Online), 2020.*

<https://doi.org/10.1080/15567036.2020.1745957>

Co-authors: Srinivasa Rao Mantri, Rama Sudha Kasibhatla

Abstract: Grid-connected Solar Water Pumping Systems (SWPS) are being considered in India for agriculture use to improve their capacity utilization and economic viability. With good rural connectivity of grid infrastructure, India has the opportunity to meet rapidly increasing energy demand for agriculture, at the rate of 3.5% per year, with grid-connected systems to promote sustainable agriculture. The objectives of this paper are: (1) Compare the techno-economic performance of off-grid and grid-connected solar water pumping systems in India for a given location, size of the land and type of the crop. (2) Quantify the economic benefits (revenue generated) of grid-connected systems using the concept of utilizability. The result shows that the Levelized Energy Cost (LEC) of the grid-connected SWPS through Life Cycle Cost (LCC) varies from 18.6% to 50.4% of the present average cost of grid energy and is 34% to 54% less than the off-grid system depending on the size of the pump. Uncertainty analysis for quantifying the impact of uncertainties in solar resource and economic factors will be taken up as a scope for further research work.

Keywords: Grid-connected SWPS; Off-grid SWPS; Utilizability; LCC; LEC

Dr Rudresh M, AMIE

Assistant Professor, Department of Aeronautical Engineering, Dayananda Sagar College Of Engineering, Bengaluru, Karnataka

E-mail: rudresh.m1987@gmail.com

Title of Paper: "Design Optimization of Aircraft Landing Gear's Torsion Link Using Generative Design, International Journal for Science and Advance Research in Technology, 6(4), 2020 pp. 248-255. ISSN [Online] 2395 -1052.

<http://ijsart.com/Home/IssueDetail/36301>

Co-authors: Maurya Ravi Dayaram, Raghu B S, Rahul Raj, Sonu Mathew

Abstract: The paper proposes a design optimization of aircraft landing gear torsion link using Generative design on one of the most used aircraft in general aviation. Generative design is a new method of product development and innovation. This approach to torsion link innovation leads to reduce in the time spent developing prototypes along with reduced weight, improved performance, and part consolidation. Catia V5 and Fusion 360 software are used for 3D modeling and generative design of the landing gear torsion link. This academic research comprises a CAD design of Airbus a380-800's main landing gear torsion link. The aim used for this paper is to research the functionalities of the main landing gear torsion link for the defined shimmy for underlying condition and to execute structural, fatigue, modal and multibody analysis. The model is analyzed in ANSYS and Mathworks with different designs obtained from generative design.

Keywords: Generative Design; Aircraft Landing Gear; Design Optimization.

Publication

by Members

Mr Salil Madhav Dubey, AMIE

Madhav Institute of Technology and Science, Gwalior

E-mail: salil.dubey3107@gmail.com

Title of Paper: “Combined Economic Emission Dispatch of Hybrid Thermal-PV System Using Artificial Bee Colony Optimization”, *Nature Inspired Optimization for Electrical Power System, Algorithms for Intelligent Systems*, ISSN, 2524-7565 ISBN 978-981-15-4003-5, Springer, 2020, pp 55- 67.

https://link.springer.com/chapter/10.1007/978-981-15-4004-2_5



Co-authors: Hari Mohan Dubey, Manjaree Pandit

Abstract : Economical and reliable provision of electricity has been one of the most significant research objectives since decades. With time, various economic load dispatch (ELD) techniques have emerged in power market. Apart from using these methods, changes in the use of conventional source of energy and incorporating non-conventional sources have emerged in recent years. Solar photovoltaic (PV) generation helps reducing emissions and dependency on fossil fuels. This chapter presents combined economic emission dispatch (CEED) of a hybrid thermal solar PV system. Artificial bee colony (ABC) algorithm is used as optimization tool for the scenario involving six thermal plants and thirteen solar plants. The effectiveness of this method is compared and validated with other methods available in recent literature.

Keywords : Economic Load Dispatch; Economic Emission Dispatch; Artificial Bee Colony Algorithm; Solar PV System

Title of Paper : “Dynamic Scheduling of Energy Resources in Microgrid using Grey Wolf Optimization”, *Nature Inspired Optimization for Electrical Power System, Nature Inspired Optimization for Electrical Power System*, ISSN, 2524-7565 ISBN 978-981-15-4003-5, Springer, 2020, pp 69-82.

https://doi.org/10.1007/978-981-15-4004-2_6

Co-authors : Hari Mohan Dubey, Manjaree Pandit

Abstract : Continuous and sustainable electricity is one of the major concerns in this modern world. This has led to the implementation of microgrid (MG) in order to establish an independent, efficient and cost-effective power supply system. The generation in MG can be conventional or non-conventional but due to increasing power demand, high fuel prices, scarcity of fossil fuels and degrading environment, there is a growing demand of using renewable energy sources (RS) for power generation. Solar PV units play an indispensable part in producing clean energy and coping with this modern-day power demand challenges. Grey wolf optimization (GWO), which is a metaheuristic technique inspired by the hierarchical hunting mechanism of grey wolves, is used in this chapter for solving a multi-objective problem in a dynamic environment of a microgrid. Dynamic dispatch is a more practical way which aims to provide an optimum solution in a scheduling horizon over twenty-four hours a day. A hybrid system comprising six conventional thermal plants and a solar farm containing thirteen solar PV units are discussed in this chapter. The performance and effectiveness of GWO are compared and validated with other two well-proven methods ABC and DE.

Keywords : Microgrid RS Integration; GWO; Dynamic Scheduling Solar Farm; Multi-objective Scheduling

Title of Paper : “Smart Grid Communication: A Survey of State-of-the-Art. In: Pandit M, Srivastava L, Venkata Rao R, Bansal J. (eds)”, *Intelligent Computing Applications for Sustainable Real-World Systems. ICSISCET 2019. Proceedings in Adaptation, Learning and Optimization*, 13. Springer, Cham, 2020, pp 524 - 534.

https://doi.org/10.1007/978-3-030-44758-8_48

Co-authors: Hari Mohan Dubey, Manjaree Pandit

Abstract : The existing power grid has undergone drastic changes within a decade, in order to deal with the increase in energy demand. With the integration of different distributed energy resources (DERs) for a group of interconnected loads within a defined electrical boundary, microgrid came into existence. However, with the increased use of effective communication, automation and monitoring skills the microgrids are technologically advanced with fast response and are referred to as 'Smart Grids'. In smart grid, efficient and reliable communication is incorporated to improve the efficiency, sustainability, and stability of the whole system. This paper presents a review on the different types of available communication methods and protocols which are used for data communication within and outside a smart grid based power supply system.

Keywords : Smart Grid Communication Methods; Communication Protocols Microgrid

Publication

by Members

Mr Jeyaraman Anandha Kumar MIE

Lecturer Department of Textile Processing, GRG Polytechnic College, Kuppepalayam, S.S.Kulam, Coimbatore, Tamil Nadu

E-mail:anna_781@rediffmail.com

Title of Paper: "Disruptive Technologies in Fashion Industry," *International Journal of Engineering Applied Sciences and Technology*, 4 (11), 2020, ISSN No. 2455-2143, pp 163-166.

<https://www.ijeast.com/papers/163-166,Tesma411,IJEAST.pdf>



Abstract: Fashion is one of the key industries that is currently being redefined by digital disruption. This phase of digital disruption has not been good news for traditional players in the industry. Traditional fashion companies and brands have been slow to adapt to this new shift and are feeling the heat. This change is to react to the shift from offline to online sales, which innovative digital technologies accelerated. The impact of this disruption can be seen everywhere in the fashion industry from production and supply chain to marketing and sales. Digital devices, platforms, and technologies such as smart phones, social media, advanced data analytics, artificial intelligence, and e-commerce are re-shuffling the market dynamics. Fashion reflects the change in aesthetic, economic, political, cultural, and social life. Individuals and society use fashion to communicate their taste and lifestyle. The common tastes and lifestyle of society collectively form and represent the taste and lifestyle of that society. Those new emerging lifestyles are interpreted by fashion designers into fashion concepts and then translated into fashion commodities. Although the fashion industry developed first in Europe and America, today it is an international and highly globalized industry, with clothing often designed in one country, manufactured in another, and sold in a third. This paper discusses the trends redefining how business is done in the fashion industry.

Keywords: Fashion; Disruption; Channels; Fashion Retailers; Wearable Technology

Mr S Manikandan, AMIE

Assistant Professor & HOD/IT, E.G.S. Pillay Engineering College (Autonomous), Nagapattinam

E-mail: profmaninvp@gmail.com

Title of Paper: "Real-Time Traffic Flow Prediction and Intelligent Traffic Control from Remote Location for Large-Scale Heterogeneous NETWORKING USING TensorFlow," *International Journal of Future Generation Communication and Networking*, 13 (1), 2020, pp 1006-1012.

<http://serse.org/journals/index.php/IJFGCN/article/view/7557/4410>

Co authors : M. Chinnadurai, D Maria Manuel Vianny, D Sivabalaselvamani



Abstract: Deep learning is an emerged technique to predict future and intelligent mechanism to monitor the process. Traffic Flow prediction is important function of collection traffic information and dissemination. Conventional intelligent approaches are used in large and small scale networks using supervised and unsupervised learning techniques. Traffic flow prediction and mitigating traffic control in remote location is an important factor in large scale networks. In this paper, we used Deep convolution neural network and Tensorflow is used to prediction of traffic flow using real time traffic data from various locations. Deep belief network is an intelligent traffic control mechanism for predicting traffic load, deep neural network and analyzing decision networks. The computer based Tensorflow is applied in deep neural networks demonstrates that our proposed supervised model is trained by deep learning approach. Our proposed model is able to achieve an improved performance in traffic flow, demonstrate large scale network traffic control using conventional routing approach and the accuracy rate is 95% tested by Tensorflow.

Keywords: Traffic Flow Prediction; Intelligent Traffic Control; Tensorflow; Deep Convolution Network; Deep Belief Network

Publication

by Members

Prof (Dr) Sampa Chakrabarti, FIE

Professor, Department of Chemical Engineering, University of Calcutta & Associate Editor, Journal of The Institution of Engineers (India), Series E

E-mail: sampac.2008@gmail.com



Title of Paper: "Development and Characterization of a Continuous Solar-collector-reactor for Wastewater Treatment by Photo-Fenton Process", *Solar Energy* 177 (2019) pp 364–373.

DOI: 10.1016/j.solener.2018.11.036

Co-authors: Amrita Dutta; Nayan Das; Debasish Sarkar

Abstract: Design, hydrodynamic modeling and performance characterization of a low cost, non-concentrating type solar-collector-reactor has been presented in this article. The reactor comprises of interconnected parallel channels, which are open at the top to receive sunlight. Because of its modular structure, the reactor can be easily scaled up to any required size. The hydrodynamic features of the reactor were investigated using computational fluid dynamic simulation along with the standard residence time distribution analysis. Primary performance characterization study was conducted in solar photo-Fenton remediation of two model pollutants, namely Trypan blue dye and Dichlorvos pesticide. Under optimum parametric conditions of pH, FeSO₄-H₂O₂ dosage ratio and inlet concentration, the primary pollutants were recorded to degrade by more than 94%, which clearly marks the efficacy of the proposed design. In addition to the simulated wastewater, the reactor performance was also tested in treatment of effluent obtained from jute dyeing unit, where 58% COD reduction was achieved.

Keywords: Open Channel Flow; Continuous Reactor; Solar Photo-Fenton; Computational Fluid Dynamics (CFD).



Dr Jayant Gajanan Joshi, MIE

Lecturer in Electronics (Selection Grade) at Government Polytechnic, Nashik, Maharashtra

E-mail: jgjoshiantenna@gmail.com

Title of Paper: "Wearable Right Angle Triangular Microstrip Patch Antenna for MBAN Application", *National Conference on Biomedical Engineering (NCBE-2020) sponsored by Department of Scientific and Industrial Research, Venue: National Institute of Technical Teachers Training and Research (NITTTR), Chandigarh, January 22-24, 2020.*

Co-authors: Mandar P Joshi and Shyam S Pattnaik

Abstract: This paper discusses the design and implementation of wearable slotted and compact 450-450-900 isosceles triangular microstrip patch antenna for medical body area network (MBAN) applications. The designed antenna resonating at 2.36 GHz MBAN frequency. The proposed design of wearable antenna offers measured impedance bandwidth (S₁₁ < -10 dB) of 18 MHz with gain more than 8 dBi. The antenna is fabricated using inexpensive foam substrate having thickness of 1.5 mm. The overall size of substrate is 65 × 65 mm². The designed antenna is fabricated and tested. The measured results are found to be in good agreement.



Keywords : Wearable; Slotting; MBAN; RAT

Title of Paper : "Hexagonal Slotted Wearable Microstrip Patch Antenna for Body Area Network", *Second International Conference (IEEE PuneCom 2019) on Innovating Technology for Humanity, Pune, Dec 18-20, 2019.*

Authors: Mandar P Joshi and Shyam S Pattnaik

Abstract : This paper presents design of slot cut hexagonal microstrip patch antenna for body area network application. The antenna is resonating at 2.45 GHz with impedance bandwidth of 70 MHz with gain of 9.14 dBi. The hexagonal microstrip patch antenna is diagonally fed and a slot is etched inside radiating patch to realize circular polarization (CP). The antenna exhibits 20 MHz of axial ratio bandwidth. The overall size of antenna is 80 × 80 mm². The parametric analysis of slot length has been carried out to determine length of slot. The proposed antenna is fabricated using inexpensive flexible foam substrate and measured results are found to be in close agreement with simulated results.

Keywords : Slot; Polyethylene; BAN; Wearable; Circular Polarization

Publication

by Members

Dr B Venkateswara Rao, FIE

Associate Professor, Department of Electrical and Electronics Engineering, Vilagapudi Ramakrishna Siddhartha Engineering College, Kanuru, Vijayawada, AP

E-mail: drbvrao@vrsiddhartha.ac.in

Title of Paper: “Enhancement of Line-Based Voltage Stability of Energy System with Thyristor Controlled Series Capacitor Using Cuckoo Search Algorithm”. In: Deepak B, Parhi D, Jena P (eds) *Innovative Product Design and Intelligent Manufacturing Systems*, pp 641-650. *Lecture Notes in Mechanical Engineering*. Springer, Singapore, 14 March 2020, Online ISBN 978-981-15-2696-1, Publisher: Springer, Singapore.

DoI https://doi.org/10.1007/978-981-15-2696-1_61

https://link.springer.com/chapter/10/1007%2F978-981-15-2696_61

Co-authors: Sateesh B, Uma Maheswari R, Nagesh Kumar G V, Sobhan P V S.

Abstract: Preserving stable conditions on encountering with small disturbances under normal or slightly overloaded conditions is termed as voltage stability. Maintaining voltage stability is one of the leading factors for energy system networks. In this paper, new line established voltage stability index entitled fast voltage stability index (FVSI) is proposed for optimal placement of Thyristor Controlled Series Capacitor (TCSC). Optimal tuning of TCSC is obtained using cuckoo search algorithm (CSA) to increase the voltage stability of the energy system established on minimization of total voltage deviation of the system. The CSA is coded in MATLAB and the performance is tested on IEEE 30 bus system with voltage deviation minimization as an objective function. TCSC is a series-connected device in the flexible alternating current transmission system (FACTS) family. It was capable of controlling the power flow through the line and also controls the line-based voltage stability. In this paper, TCSC is merged in CSA-based Power Flow to optimize the total voltage deviation. Results attained by CSA are related to that attained by genetic algorithm (GA) in both without and with TCSC conditions. These results show that CSA produces better results compared to GA for solving optimal tuning of TCSC



Keyword: FACTS Device; Cuckoo Search Algorithm; Optimal Tuning; TCSC

Title of Paper: “Hybridization of Particle Swarm Optimization with Firefly Algorithm for Multi-objective Optimal Reactive Power Dispatch”. In: Deepak B, Parhi D, Jena P (eds) *Innovative Product Design and Intelligent Manufacturing Systems*, pp 673-682. *Lecture Notes in Mechanical Engineering book series (LNME)*. Springer, Singapore, 14 March 2020, Online ISBN 978-981-15-2696-1, ISSN: 2195-4356, Publisher Springer, Singapore.

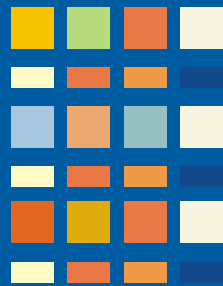
DoI https://doi.org/10.1007/978-981-15-1696_64

https://link.springer.com/chapter/10.1007%2F978-981-15-2696-1_64

Co-author: Manasvi Kunapareddy

Abstract : Reactive power management is very crucial for stable operation of the system. The ultimate aim of reactive power dispatch (RPD) is to set the control variables to its optimal values to minimize the objective function of real power losses in lines and voltage deviation satisfying all the equality and inequality constraints. The multiobjective function is also proposed to solve both the objective functions simultaneously. This paper presents hybridization of two optimization techniques, one is particle swarm optimization (PSO) and the other is firefly algorithm (FA) represented as hybridization of particle swarm optimization with firefly algorithm (HPSOFA), which is used to yield a better result. This hybridization is carried out in MATLAB for IEEE 14 and 30 bus systems.

Keywords : Firefly Algorithm; HPSOFA; Multi-objective; PSO; Real Power Losses; Voltage Deviation



Publication

by Members

Mr Arunava Kabiraj Thakur, MIE

Department of Electrical Engineering, Techno Main Salt Lake, Kolkata

E-mail: arunava.kabiraj007@gmail.com

Title of Paper: "Development of Generalized Model of 3-Phase Induction Motor for Performance Study during Different Distorted and Unbalance Voltage", *International Journal of Computer Sciences and Engineering (EISSN: 2347-2693)*, 8 (2), 2020, pp 18-25.

DoI: 10.26438/ijcse/v8i2.1825

Co-authors: Arabinda Das; Palash Kumar Kundu



Abstract : Due to the introduction of FACT devices in power supply system and complicated control in power industry, presence of harmonics in power supply system is a common problem. It increases day by day and it distorts and unbalances the supply voltage. Due to unequal transformer tap settings, open delta connected transformer banks, unbalanced distribution of single phase loads supply voltage unbalance may occurs. Three phase induction motor is the main workhouse of modern industries. Due to the application of such a polluted supply voltage the performance of three phase induction motor may be affected seriously and this may affect the load connected with the drive system. To take correct measure during torque and speed control, it is required to know the performance during voltage unbalance and distorted supply due to different harmonics. To mitigate this, an attempt has been made to develop a generalized model of a three phase induction motor for online performance study of torque and speed during different distorted and unbalance supply voltage. In doing this, Matlab/Simulink has been used to develop a model based on generalized theory of induction motor. Finally, using the model, performance has been studied during application of different distorted and unbalanced supply and reported.

Keywords: Modelling of Induction Motor; Torque and Speed Monitoring; Harmonics and Unbalance Voltage Detection



Mr N Soundiraraj, AMIE

Assistant Professor, Department of Electronics and Communication Engineering, PSNA College of Engineering and Technology, Dindigul

E-mail: soundar06@gmail.com

Title of Paper: "ANFIS Controller for Voltage Compensation in Renewable Energy Applications", *International Journal of Recent Technology and Engineering*, 8 (5), 2020, ISSN: 2277-3878, pp.3985-3987.

Co-authors: Dr M Thiruvani, K Karthigaivel, Dr A Sajitha Banu

Abstract: This article presents the adaptive neuro fuzzy inference system (ANFIS) based controller for voltage compensation in micro grid. The micro grid has more number of voltage source converters for distribute the electric energy to the small consumers. If any kind of load change in a system has a very small impact in the output voltage of the system, which is extremely sensible. This is due to unbalanced load present in connection point, further increases this problem. In order to minimize the unbalanced load effect an ANFIS based controller has been connected with the traditional voltage source converter control circuit here, the ANFIS controller fix the reference current gain equal to the unbalanced voltage. This reference current received from ANFIS controller is added with the voltage control loop output to fix the changed current reference for a current control loop. The proposed control logic is verified both simulation and experimentally.



Keywords: Unbalanced Voltage; Voltage Source Converter; Micro Grid; Adaptive Neuro-fuzzy Inference System (ANFIS) Control.

Publication

by Members

Dr Rama Rao P V V, FIE

Dean (Research & Development), Sri Vasavi Engineering College (Autonomous), Pedatadepalli, Tadepalligudem, Andhra Pradesh

E-mail: drramarapvv@gmail.com

Title of Paper: "Water Monitoring System in Aquaculture using IoT", *TEST Engineering and Management Journal* Published by The Mattingley Publishing Co., Inc., ISSN: 0193-4120, 83, March - April 2020, pp 9199 - 9203.

<http://www.testmagzine.biz/index.php/testmagzine/article/view/5275>

Co-authors: M Koteswara Rao, K N H Srinivas, T D N S S Sarveswara Rao

Abstract: Water is a natural resource and is becoming a more valuable asset due to scarcities and misuse. Water resource management planning has respect to all the rival demands for water and seek to allocate water on a reasonable source to satisfy all uses, demands. Water monitoring is an important since it helps determine future Irrigation expectations, Industrial needs, drinking and household purpose etc. So for this purpose a new approach IoT based multi-purpose water monitoring system is developed in this project. This system contains sensors which measure quality parameters like pH, temperature sensors, and Dissolved oxygen (DO) Sensor. The data from these Sensors are collected by Beagle Bone Black board development kit. After processing the data, the board will send the data into Cloud using GSM module. The user can access the data at any time from the cloud and also message/alarm is send to the farmer at the Time of crisis. Based on the data, precautions can be taken in time to increase productivity and minimize losses.

Keywords: Beagle Bone Black; pH; Temperature; Turbidity; Conductivity; GSM; Cloud.



Dr Yeshpal Vasishta, AMIE

Executive Engineer, Himachal Pradesh Public Works Department

E-mail: vasishtayeshpal@rediffmail.com

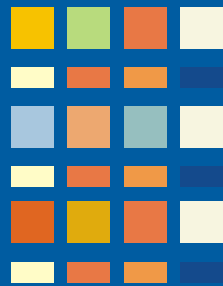
Title of Paper: "Ultimate Load in Beam Column Joints under Opening Moment using Genetic Algorithm", *International Journal of Recent Technology and Engineering (IJRTE)* ISSN: 2277-3878, 8 (3), 2019.

<https://www.ijrte.org/download/volume-8-issue-3/>

Co-authors : Dr. Yeshpal Vasishta, Prof. Ashok Kumar Gupta

Abstract: Genetic Programming (GP) is an independent domain, an approach for problem-solving which evolved the computer programs for finding solutions to the problems. The study was carried out by performing the experiments and validation of obtained results under opening moments was done analytically using finite element modelling (FEM) of fibrous and non-fibrous concrete corner joints. Genetic Programming is used to generate the mathematical formula. Fibers like flat crimped-type steel fibers, hooked steel fibers and straight steel fibers with aspect ratio (AR) 30 & 50 and four volume fraction 0.5%, 1.00%, 1.50% and 1.75% have been used. Ultimate load is calculated using GP by generating a mathematical model for various types of fibers and compared with experimental values obtained which proved to be in the closed proximity.

Keywords: Genetic Programming; Opening; Closing Bending Moment; Finite Element Modelling.



Book Review

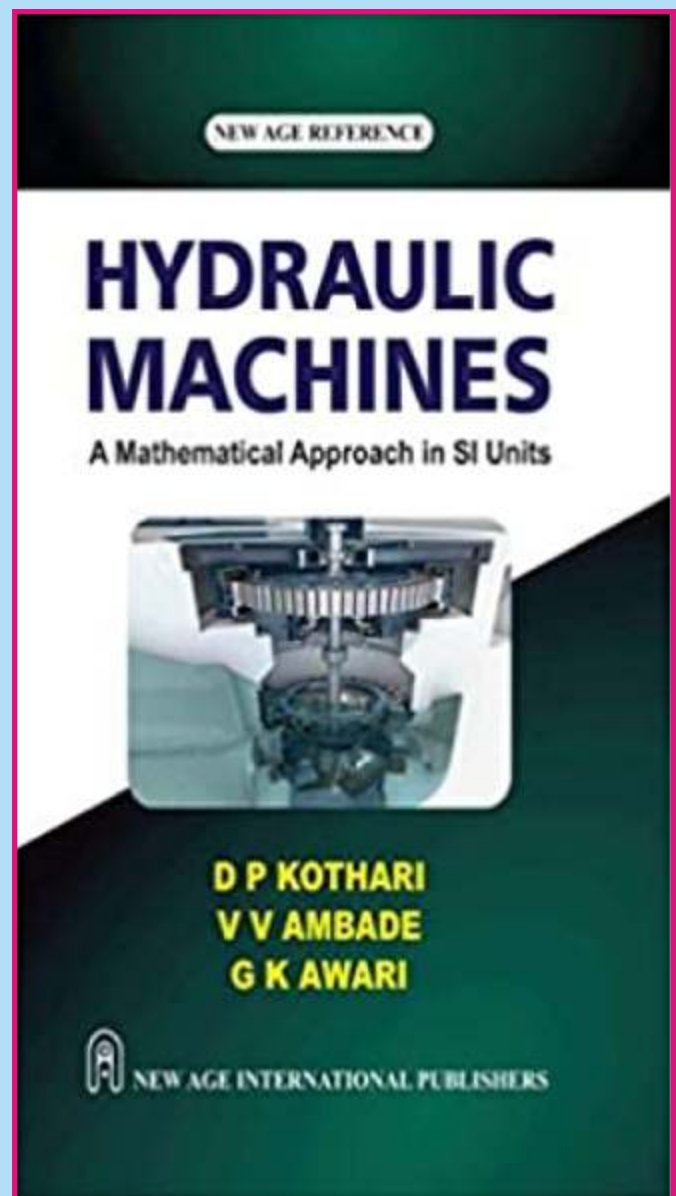
Hydraulic Machines (A Mathematical Approach in SI Units)

Dr D P Kothari, FIE
Mr V V Ambade, AMIE
Dr G K Awari, FIE

E-mail: gkawari@gmail.com

The book contains comprehensive treatment of the hydraulic machines in simple, lucid language and enveloping a large number of solved numericals properly graded, including typical examples from examination point of view. The book is mainly aimed to cover the curriculum at undergraduate, postgraduate and diploma engineering courses in most of the Universities and Boards in India. This book serves as an ideal resource for students of Mechanical Engineering, Automobile Engineering, Chemical Engineering, Electrical Engineering, Library and Information Science.

At the end of each chapter, objective questions and unsolved examples have been added to make the book a comprehensive unit in all respect. The book is also useful to prepare for the competitive examinations including GATE, IES, UPSC and other public sector undertakings. The readers are provided with an understanding of how to apply fundamentals of hydraulic machines to design the turbines and pumps; cope up with the complexities of understanding velocity triangles in hydraulic machines; and achieve high level of understanding of the topics as well as confidence in problem solving skills.



Publisher : New Age International Publishers, 7/30 A, Daryaganj, New Delhi 110002

Announcement



The Institution of Engineers (India)

Notification for R&D Grant-in-Aid (2020-21)

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 in 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 IEL. Membership criteria for student(s), guide(s) and Institution(s) are as follows:

Project Category	Student/Applicant Membership	Guide(s) Membership	Institutional Membership
1. Diploma	Exempted [Membership of Student Chapter is desirable]	AMIE/MIE/FE	Not Mandatory
	Preferably 'Student Member' (SME)	AMIE/MIE/FE	Applicant's institute should preferably be an Institutional Member with valid NIRF Rank.
2. UG (BE/BTech/AMIE/Equivalent)	'Student Member' (SME)	AMIE/MIE/FE	Applicant's institute should preferably be an Institutional Member with NBA / NAAC Accreditation or valid NIRF Rank
3. PG (ME/MTech/Equivalent)	AMIE/MIE/FE	MIE/FE	Applicant's institute should preferably be an Institutional Member with NBA / NAAC Accreditation or valid NIRF Rank
4. PhD	AMIE/MIE/FE	MIE/FE	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, should be sent through email to 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.

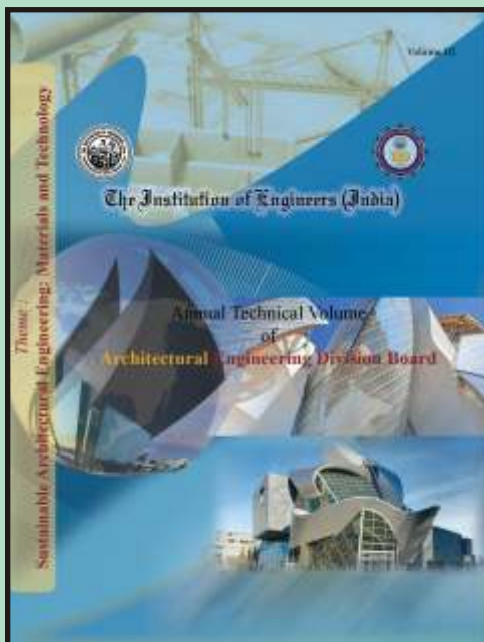
The grant is not intended for the faculty members who have access to other avenues of research funding. Proposals received will be scrutinized and the recipients of R&D Grant will be informed accordingly.

Call for Papers for Annual Technical Volume

Engineering Division Board / Committee	Theme	Last Date for Paper Submission	E-mail ID for Paper Submission
ASDB	Increasing Role of Indian Aerospace Industries for Aeronautics, Space Projects and Systems	31/7/2020	asdb@ieindia.org
CHDB	Sustainable Mechanisms for Recycling of Waste water: Chemical Engineering Aspect	31/8/2020	chdb@ieindia.org
MCDB	Advances in Thermodynamics and Heat Transfer	31/7/2020	mcd@ieindia.org
MRDB	Blue Economy: Challenges and Opportunities in the Field of Marine Engineering	31/7/2020	mrdb@ieindia.org
PRDB	Sustainable Manufacturing	31/7/2020	prdb@ieindia.org

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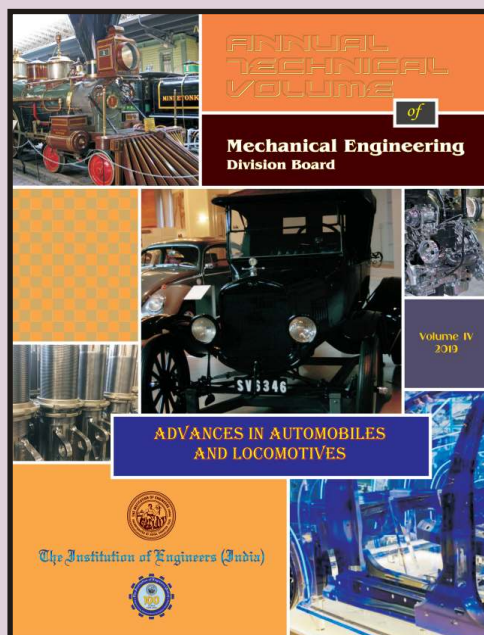
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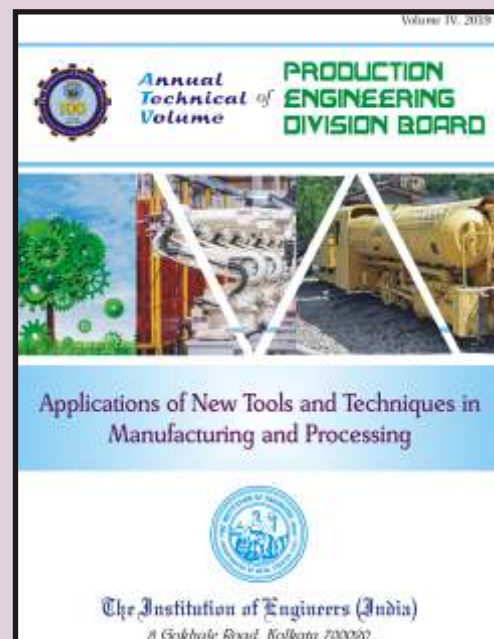
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President : Er Narendra Singh

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Mr T Chakraborty, Ms A Dutta, Mr P Chakraborty,

Ms H Roy, Mr S Bagchi

Telephones : 91-33-2223 8311/14/15/16

E-mail : newsletter@ieindia.org

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