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A Century of Service to the Nation

IN THIS ISSUE

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MEMBERS in the News

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Bidar, Karnataka

Patent Status	Received
Application No.	202041056167 A
Date of Filing of Application :	24/12/2020
Patent Publication Date :	15/01/2021
Title of the Invention :	TMSC- Biodiesel and Bio Compost: Textile Mill Waste Water and Solid Waste Convert into a Biodiesel and Bio Compost
Name of Applicants :	1)Dr Basappa B Kori 2) Dr Shashikant R Mise 3) Er Rajani Saranadagoudar
Name of Inventor :	1) Dr Basappa B Kori 2) Dr Shashikant. R. Mise 3) Er Rajani Saranadagoudar
The Patent	Office Journal No. 03/2021 Dated 15/01/2021, PAGE 2369

Abstract *Our invention TMSC- Biodiesel and Bio Compost is a solid and others waste that includes a mixture of wet organic material and dry organic material can be are separated using advanced mechanical separation to produce a wet organic stream enriched in wet organics and a dry organic stream. The invention is a process is provided for converting waste biomass to useful products by gasifying the biomass to produce synthesis gas and converting the synthesis gas substrate to more the one useful products and the invention is directed to the conversion of biomass wastes including municipal solid waste, sewage sludge, plastic, tires, agricultural residues, textile mill waste. The Invention also includes the steps of gasifying the waste biomass to produce raw synthesis gas, cooling the synthesis gas, converting the synthesis gas to the desired product or products using anaerobic bioconversion, and then recovering the product or products.*

PUBLICATION by Members

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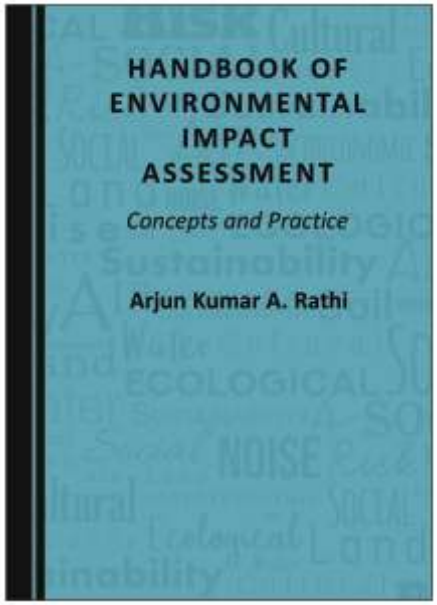

HANDBOOK OF ENVIRONMENTAL IMPACT ASSESSMENT: CONCEPTS AND PRACTICE

Due to rapid economic growth and enhancing employment opportunities, manufacturing and infrastructural projects play a vital role, especially in developing nations. Even though voluminous literature is available on environmental impact assessment (EIA), guidelines on conducting good quality assessments are lacking. It may be recognized that good EIA reports can only facilitate government decision making with sustainability considerations.

The book is the result of the review of more than 150 EIA reports and the analysis of shortcomings observed by the author. It will serve to bridge the gap in the limited understanding of EIA concepts by practitioners and practical aspects by fresh graduates. The book describes the output and salient features of a good quality EIA report and case studies to facilitate professionals preparing and appraising these reports. It will be of immense use to environment ministries, EIA practitioners, EIA appraisal authorities, project proponents, academics, and NGOs, especially in the emerging economies.

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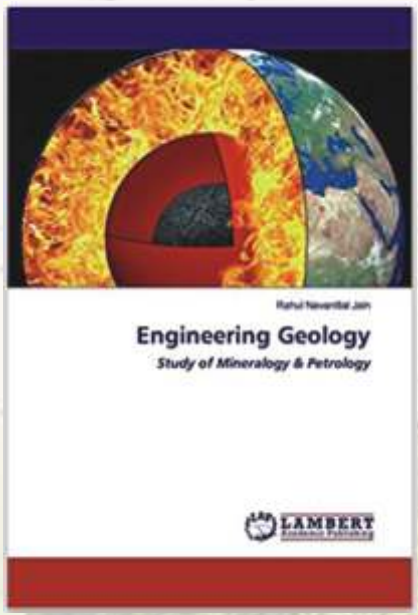

ENGINEERING GEOLOGY — STUDY OF MINERALOGY & PETROLOGY

Geology is the study of the Earth, the materials of which it is made, the structure of those materials, and the processes acting upon them. It includes the study of organisms that have inhabited our planet. An important part of geology is the study of how Earth's materials, structures, processes and organisms have changed over time. Even though 70% of the Earth's surface is water, there is crust under the water. The water sits on top of the crust! The Earth's crust moves! The continents have not always been arranged like they are today. The Earth's crust is divided into segments called plates. Geologists work to understand the history of our planet. The better they can understand Earth's history the better they can foresee how events and processes of the past might influence the future. A mineral is naturally occurring inorganic substance (elements or compounds). A rock is a natural aggregate of minerals. The study of rocks (Igneous, Sedimentary, Metamorphic rocks) constitutes the science of petrology which consists of a study, by all available methods, of the natural history of rocks including their origin, present condition & alteration, decay etc.

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Title of Book Chapter: Application of Machine Learning in Music Analytics

Published in the Book 'Machine Learning Applications Emerging Trends', Edited by: Rik Das, Siddhartha Bhattacharyya and Sudarshan Nandy, De Gruyter Frontiers in Computational Intelligence Series, Publisher: De Guyter, Germany, Chapter 3, Volume 5, April 2020 , pp 43-64, e-ISSN 2512-8876

DOI *: https://www.degruyter.com/view/title/561835*

Co-authors*: Amod Deshpande & Parag Kulkarni*

Abstract*: With the growth of the internet and social media, music data is growing at an enormous rate. Music analytics has a wide canvas covering all aspects related to music. This chapter provides a glimpse of this large canvas with sample applications covered in detail. Machine learning has taken a central role in the progress of many domains including music analytics. This chapter will help the readers to understand various applications of machine learning in computational musicology. Music feature learning and musical pattern recognition give conceptual understanding and the challenges involved. Feature engineering algorithms for pitch detection or tempo estimation are covered in more detail with available popular feature extraction tools. Music classification and clustering examples explore the use of machine learning. Various applications ranging from the query by humming to music recommendations are provided for efficient music information retrieval. Future directions and challenges with deep learning as a new approach and incorporation of human cognition and perception as a challenge makes this domain a challenging research domain.*

Keywords*: Computational music, feature engineering, pattern recognition, music classification and clustering, machine learning*

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Title of Book Chapter: Dry Spell and Wet Spell Characterisation of Nandani River Basin, Western Maharashtra, India

Published in the Book 'Climate Change Impacts on Water Resources', Part of the Water Science and Technology Library Book Series (WSTL) , Publisher: De Guyter, Germany, Chapter 2, Volume 98, April 2020 , pp 43-64

DOI *: 10.1007/978-3-030-64202-0_2*

Co-author : *Abhijit Mohanrao Zende*

Abstract*: With the growth of the internet and social media, music data is growing at an enormous rate. Music analytics has a wide canvas covering all aspects related to music. This chapter provides a glimpse of this large canvas with sample applications covered in detail. Machine learning has taken a central role in the progress of many domains including music analytics. This chapter will help the readers to understand various applications of machine learning in computational musicology. Music feature learning and musical pattern recognition give conceptual understanding and the challenges involved. Feature engineering algorithms for pitch detection or tempo estimation are covered in more detail with available popular feature extraction tools. Music classification and clustering examples explore the use of machine learning. Various applications ranging from the query by humming to music recommendations are provided for efficient music information retrieval. Future directions and challenges with deep learning as a new approach and incorporation of human cognition and perception as a challenge makes this domain a challenging research domain.*

Keywords*: Crop growth, Dry and wet spell, Supplementary irrigation, Water release schedule*

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Title of Book Chapter: Tuning of Controllers for a Boost Converter Used to Interface Battery Source to BTS Load of a Telecommunication Site

Published in Renewable Power for Sustainable Growth, Proceedings of International Conference on Renewal Power (ICRP 2020), Part of the Lecture Notes in Electrical Engineering Book Series (LNEE), Volume 723, Publisher: Springer Singapore, pp 415-426, First Online: 21 April 2021, Print ISBN: 978-981-334-079-4, Electronic ISBN: 978-981-334-080-0

***DOI** : https://doi.org/10.1007/978-981-33-4080-0_40*

***Co-authors**: M. A. Mallick & A. Iqbal*

***Abstract**: To enhance the reliability of supply to the remote load like base transceiver station (BTS) load, battery storage sources are used. However, selection of suitable number of battery units and regulation of power using a DC-DC converter is still a challenging task. A very few papers are reported in this direction. To fill this gap, method to select the number of battery units required for a given BTS load and the designing of current and voltage controller for interfacing the battery source via boost converter to the load is discussed. Bode plot analysis is carried out for the tuning of inner current and outer voltage controllers to regulate the power supply. The performance has been analyzed using MATLAB/Simulink.*

***Keywords**: Battery storage, Converter, BTS load Current controller Voltage controller*

Title of Book Chapter: Generation of HVDC from Voltage Multiplier Using Opto-Isolator and Marx Generator

Published in Renewable Power for Sustainable Growth, Proceedings of International Conference on Renewal Power (ICRP 2020), Part of the Lecture Notes in Electrical Engineering Book Series (LNEE), Volume 723, Springer Singapore, pp 501-507, First Online: 21 April 2021, Print ISBN: 978-981-334-079-4, Electronic ISBN: 978-981-334-080-0

***DOI** : https://doi.org/10.1007/978-981-33-4080-0_48*

***Co-authors**: Asim Rahman Ansari, Ahmed Riyaz & Mintu Kumar*

***Abstract**: The main function of MARX generator is to produce a high potential pulse for testing the insulation of the electrical instruments such as transformers and electrical lines. However, power losses in conventional Marx generator due to capacitor and resistor are still a challenging task. A very few papers are reported in this direction. To fill this gap, method to implement the other static devices in place of conventional components is discussed. The presented topology comprises of a MOSFET, a capacitor, and two diodes. A 555 timer has been used to give pulses to the passive elements (capacitors) to be charged in parallel during ON interval. During OFF interval, charge storage devices are connected in series with the help of solid-state switches. Hence, MOSFET is used as a switching device; lossless charging of capacitors is done with the help of diodes. A comparison between different level generators is made and result is presented. The performance of the system is evaluated with the help of simulation results of PROTEUS software.*

***Keywords**: Marx generator, Current Marx generator, MOSFET, Opto-isolator, High voltage*

Title of Book Chapter: Performance Assessment of Variable Speed Induction Motor by Advanced Modulation Techniques

Published in Renewable Power for Sustainable Growth, Proceedings of International Conference on Renewal Power (ICRP 2020), Part of the Lecture Notes in Electrical Engineering Book Series (LNEE), Volume 723, Springer Singapore, pp 729-737, First Online: 21 April 2021, Print ISBN: 978-981-334-079-4, Electronic ISBN: 978-981-334-080-0

***DOI** : http://dx.doi.org/10.1007/978-981-33-4080-0_70*

***Co-authors**: Khadim Moin Siddiqui, Rafik Ahmad & Fazlur Rahman*

***Abstract**: Nowadays, induction motor with different modulation techniques is being used in the industries with better performance. The modulation technique makes induction motor to use it in variable speed application efficiently. In the past, SPWM inverter-based variable speed induction motor has been widely accepted in the industries with satisfactory performance. But, still, industries demanding better performance of the variable speed induction motor with less harmonics in the inverter voltage. This research paper discussed two modulation techniques for induction motor performance comparison purpose first is older sinusoidal modulation technique and second is newly space vector modulation technique. The space vector-based advanced power electronics modulation technique with squirrel cage asynchronous motor is providing better results as compare to sinusoidal modulation technique. Henceforth, advanced power electronics modulation technique will be the better choice for the industries to use asynchronous motor with benefitted performance. Herein paper, the direct torque control scheme is applied together with advanced modulation technique in the efficient way for achieving better results.*

***Keywords**: Power electronics, modulation techniques, Squirrel cage asynchronous motor, Direct torque control IGBT inverter, Time domain analysis, Performance assessment*

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Title of Paper: **Review of Recent Progresses in Thermoelectric Materials**

Published in Advances in Engineering Materials, Select Proceedings of FLAME 2020, Lecture Notes in Mechanical Engineering, Part of the Lecture Notes in Mechanical Engineering book series, Springer Singapore, pp. 269-280, First Online: 17 April 2021, Print ISBN 978-981-33-6028-0, Online ISBN 978-981-33-6029-7

DOI: *https://link.springer.com/chapter/10.1007%2F978-981-33-6029-7_26*

Co-author *: Pawan Kumar Singh Nain*

Abstract: *Thermoelectric (TE) technology facilitates the direct conversion of heat into electricity and vice versa. Thermoelectric materials attract researchers since they facilitate a promising green energy solution in the form of solid-state cooling and power generation. However, the low energy conversion efficiency restricts the use of TE materials in real-world applications. Developing highly efficient thermoelectric materials is necessary to benefit the environment as well as the economy. The performance of a particular TE material is generally evaluated by the dimensionless figure of merit (ZT). Recent years have witnessed progress with new techniques in maximizing the ZT values of various thermoelectric materials. In this review, we summarize recent development in thermoelectric materials for a specific temperature range, which has been developed to improve their maximum ZT value up to 95% at the same temperature.*

Keywords: *Thermoelectric materials, Thermoelectric performance, Dimensionless figure of merit, Seebeck coefficient*

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Title of Paper: Forest Fire Detection Using Combined Architecture of Separable Convolution and Image Processing

2021 1st International Conference on Artificial Intelligence and Data Analytics (CAIDA), Publisher: IEEE, Date Added to IEEE Xplore: 11 May 2021, pp 36-41, Electronic ISBN:978-1-6654-1511-8, Print on Demand (PoD) ISBN:978-1-6654-3041-8

DOI *:https://doi.org/10.1109/CAIDA51941.2021.9425170*

Co-author: *Sreejata Dutta*

Abstract: *Early detection and classification of wildfires using aerial image-based computer vision algorithms like convolution neural networks and image processing techniques have lately gained much attention due to the record-setting wildfire events worldwide. Past studies have demonstrated varying degrees of success in implementing forest fire classification algorithms using variants of well-known sophisticated convolutional neural network architectures, which require extensive computation time for training but demonstrate comparatively high false alarm rates and low predictive power. To accurately detect small-scale forest burns, which typically marks the onset of larger catastrophic events, a combined architecture of separable convolution neural network and digital image processing using thresholding and segmentation is proposed in this paper. The proposed architecture is simple and hence computationally less expensive. Performance evaluation on the test data yielded excellent results in terms of high sensitivity, of about 98.10%, and a low specificity of 87.09%.*

Keywords: *Forest fire, image processing, deep learning, separable CNN, image classification, thresholding*

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Title of Paper: **Self-healing in Concrete using Ureolytic Species of Bacteria and Yeast**

IOP Conference Series: Materials Science and Engineering, Volume 1116, IOP Publishing Ltd, Published Online: 26 May 2021, International Conference on Futuristic and Sustainable Aspects in Engineering and Technology (FSAET 2020) 18-19 December 2020, Mathura, India

DOI: *https://doi.org/10.1088/1757-899X/1116/1/012154*

Co-authors: *Juned Ahmad & Snober S. Mir*

Abstract: *Structural members made of concrete may develop micro cracks within themselves with time due to shrinkage and temperature effects, which instigates untimely failures. After the second hydration of concrete, some cracks and pores are still left unsealed leading to the auxiliary degradation and lessened service life. The use of ureolytic species of microorganism with concrete aids in the sealing of these cracks without expulsion of any precarious fumes or constituents detrimental to the environment, which is present in various chemical sealants accessible in the market. The ureolytic bacterial species is capable of producing calcium carbonate precipitate in the presence of urea and calcium substrate. The precipitate formed has the ability to cure the cracks and pores that would have occurred during placing or in their service life. In this paper, the comparison between bacteria and yeast infused concrete with the control concrete in terms of durability aspects like compressive strength, behaviour in acidic exposure and water absorption rate has been determined. The amount of calcium carbonate generated with the same growth conditions has been determined for both bacteria and yeast infused concrete, which will help in evaluating the nature of different microorganisms for self-healing mechanism. The result of this study is that Yeast has the potential to be used as a microbe in self-healing of concrete.*

Keywords: *Bacteria infused concrete; Yeast infused concrete; Acid attack; Self-healing; Durability*

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Title of Paper: **Discussion of "Extending the Global-Gradient Algorithm to Solve Pressure-Control Valves" by Gioia Foglianti, Stefano Alvisi, Marco Franchini, and Ezio Todini**

Journal of Water Resources Planning and Management, Volume 147, Issue 7, July 2021, Published online: 21 April 2021

DOI : *https://doi.org/10.1061/(ASCE)WR.1943-5452.0001407*

Co-authors: *Nikolai B Gorev; Vyacheslav N Gorev; Inna F Kodzhespirova; Igor A Shedlovsky*

Title of Paper: **Closure to "Dynamic Pressure-Dependent Simulation of Water Distribution Networks Considering Volume-Driven Demands based on Noniterative Application of EPANET 2" by P. Sivakumar, Nikolai B. Gorev, Tiku T. Tanyimboh, Inna F. Kodzhespirova, C. R. Suribabu, and T. R. Neelakantan**

Journal of Water Resources Planning and Management (ASCE), Volume 147, Issue 8, August 2021, Published online: 01 June 2021

DOI : *https://doi.org/10.1061/(ASCE)WR.1943-5452.0001429*

Co-authors: *Nikolai B Gorev, Tiku T Tanyimboh, Inna F Kodzhespirova, C R Suribabu & T R Neelakantan*

Work is a discussion of already published article, hence Abstract and Keywords are not included

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Title of Paper: **Enhanced Multifunctionality of CuO Nanoparticles Synthesized using Aqueous Leaf Extract of Vernonia Amygdalina Plant**

Results in Chemistry, Elsevier B.V, Volume 3, January 2021

DOI: *https://doi.org/10.1016/j.rechem.2021.100141*

Co-authors *: H C Ananda Murthy, Tegene Desalegn Zeleke, K B Tan, Suresh Ghotekar, Mir Waqas Alam, Kah-Yoong Chan, P F Sanaulla, M R Anil Kumar, C R Ravikumar*

Abstract: *We report the synthesis of medicinal plant, Vernonia amygdalina Del. mediated green copper oxide nanoparticles (VeA-CuO NPs). The presence of two absorbance maxima, λmax 1 and λmax 2 at 436 nm and 452 nm, respectively confirms a mixture of biomolecules surface amalgamated CuO NPs with different morphological features. The FT-IR spectra of the plant leaf extract and VeA-CuO confirmed the efficient role of biomolecules as capping and stabilising agents. The XRD patterns of NPs approved high crystallinity of CuO. The purity of the NPs was corroborated by SEM-EDAX analysis. The average particle size of the NPs was found to be 19.68 nm. In addition, the combined TEM, HRTEM and SAED analysis substantiated the presence of CuO with a d-spacing value of 0.2854 nm, which conformed to CuO (1 1 1). The antibacterial assay revealed that VeA-CuO NPs were synergistic in their influence versus bacterial strains, S. aureus, E. coli, P. aeruginosa, and E. aerogenes. The uppermost zone of inhibition of 15 mm was observed for E. aerogenes. The bioactive compounds capped around the CuO NPs served the effective role in disrupting the cell wall of bacterial strains. The degradation efficiencies for Indigo carmine (IC) and Malachite green (MG) dyes by NPs were found to be 95% and 91%, respectively. The lowest degradation half-life was recorded to be 16.55 min for MG dye. In addition, the better electrode stability revealed by CV and EIS studies, confirms the multi-functional nature of VeA-CuO NPs, these CuO NPs exhibited multifunctional applications.*

Keywords: *CuO NPs, Vernonia amygdalina Del., Photocatalyst, Antibacterial activity, Cyclic voltammetry*

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Title of Paper: **Breast Cancer Segmentation Recognition Using Explored DCT-DWT based Compression**

Recent Patents on Engineering, Publisher: Bentham Science , Volume 15, Number 1, Issue 6, 2021

DOI *:https://doi.org/10.2174/1872212115666201230091919*

Co-authors: *Akhilendra Yadav & Brij Mohan Singh*

Abstract: *Because of the unpredictable structure of the breast and low quality of clinical pictures, a precise discovering, position, and characterization of disease is as yet a difficult issue for specialists and analysts. The lady in each edge of the globe is influenced by the most widely recognized danger of breast cancer disease which has fruitful determination and treatment whenever identified by early suggestive stages that may just as prior as conceivable by precognition, without a doubt explicit sort of breast cancer malignant growth before being dealt with. Segmentation and order of disease are still achievements either from breast cancer ultrasound (BUS) or by breast cancer MRI computer-aided diagnosis. The conclusion procedure of disease infection is time taking which required storage capacity limit in PC. A large number of MRI pictures assembled per understanding and an enormous assortment for each wiped out individual required huge space for capacity just as a wide transmission transfer speed for PC framework and again additionally for transmission over the web. We endeavored to reason in our current investigation to start a finding procedure utilizing PC helped examination framework with an objective of location just as the order of malignant growth advancement organizes in breast cancer without any difficulty. With the goal that genuine cases would be created novel outcomes and improved endurance rates.*

Keywords: *Breast Cancer, Image Denoising, Discrete Cosine Transformation, Discrete Wavelet Transformation, Segmentation, fusion techniques*

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Title of Paper: **Identification of Psychological Factors Associated with Car Ownership Decisions of Young Adults: Case Study of Jodhpur City, India**

Asian Transport Studies, Publisher: Elsevier Ltd on behalf of Eastern Asia Society for Transportation Studies, Volume 7, 2021

DOI: *https://doi.org/10.1016/j.eastsj.2021.100037*

Co-authors: *S K Singh & Kanak Jodha*

Abstract: *In the context of a developing country, not many studies have attempted to examine the attitudinal factors that influence the car ownership decisions of young adults. The present study aims to identify the pertinent psychological factors and their effects, along with demographic variables, upon car ownership decisions. The study used 813 individuals' responses to employ a principal component analysis and subsequent binary logit model to determine the future car ownership decisions. The major findings show that the individuals who are status seekers, image-conscious, passionate for cars, obsessed with cars, and influenced by peers/external factors are more likely to buy a car in the near future. However, those who are conscious about paying high taxes, environmental sustainability and traffic problems are less likely to buy a car in the near future. The results of this study can help transport planners and policymakers to develop and implement transport policies that could potentially discourage the use and ownership of cars in order to develop sustainable mobility patterns in the future.*

Keywords: *Car ownership decisions, Developing countries, Principal component analysis, Binary logit model.*

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Title of Paper: **Improving Soil Fertility and Nutrient Dynamics with Leachate Attributes from Sewage Sludge by Impoundment and Co-composting**

CLEAN Soil Air Water, Volume 48, Issue 12, December 2020

DOI *:https://doi.org/10.1080/09715010.2021.1896391*

Co-authors:*Vasudevan, M , Natarajan, N , & Suneeth Kumar, S M*

Abstract: *Co-composting offers a sustainable solution for community level sewage treatment plants (STP) by producing nutrient-optimized compost. Soils in such treatment vicinity are susceptible for receiving significant quantity of wastewater, capable of causing a radical shift in soil structure and nutrient dynamics. Samples of sludge-leachate impounded soil (SLIS) and low fertile soil are collected to select the proportioning of sludge-derived composts (SDC). A series of batch experiments are conducted by mixing pre-determined quantity of SDC with field soils on weight basis to identify the best proportioning combination. Based on the in-vessel aerobic cocomposting experiments with reuse of generated leachate (at a rate of 1.0 per week), SDC exhibits good nutrient stability in terms of carbon-nitrogen ratio (8–11) with effective moisture augmentation from leachate (45%–74%) under non-isothermal conditions (between 46±2°C and 32±4°C) within 45 days of incubation. Significant nitrogen transformation is exhibited in SLIS samples due to the temporal variations in sludge decomposition as verified through leaching column experiments. Approximately 30% of nutrient (carbon and nitrogen) leaching is prevented due to the improved moisture retention capacity in presence of compost. An empirical correlation has been derived between various analytical measures of organic matter depicting enhanced decomposition stages of sludge in soil amendments.*

Keywords: *Co-compost, Laboratory column, Leachate quality, Organic amendment, Sewage sludge, Soil nutrient dynamics*

PUBLICATION by Members

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Title of Paper: **Effectiveness and Thermal Performance Analysis of Copper Nanofluids Flow In a U-Bend Double-Pipe Heat Exchanger**

Heat Transfer Research, Volume 52, Issue 1, 2021, pp 31-59, ISSN Print:1064-2285, ISSN Online:2162-6561

DOI: *10.1615/HeatTransRes.2020034397*

Co-authors: *L Syam Sundar, Solomon Mesfin & Antonio C.M.Sousa*

Abstract: *An experimental analysis is made to measure the heat transfer, friction factor, thermal performance, and effectiveness of Cu/water nanofluids flow in a double-pipe U-bend heat exchanger. The metallic Cu nanoparticles are synthesized using chemical reduction method characterized with XRD technique. The stable Cu nanofluids were prepared by dispersing synthesized Cu nanoparticles in distilled water and then used for thermophysical properties and heat transfer evaluations. The experiments were conducted in the Reynolds number range from 3000 to 30,000 and in the particle volume concentrations of 0.1% and 0.3%. With the increase of particle volume concentrations and Reynolds number, the Nusselt number is enhanced. The increase of Nusselt number is of the order of 21.73% at particle volume concentration of 0.3% at a Reynolds number of 30,000 over water data. With the addition of Cu nanoparticles to the distilled water obviously the friction factor penalty is there. This penalty friction factor is of the order of 1.141-fold over water data. The number of transfer units and effectiveness are directly proportional to the Reynolds number and volume concentrations. With the increase of volume concentrations and Reynolds number, the number of transfer units and are increased. The experimental data is fitted based on the least-square method to obtain useful correlations.*

Keywords: *Heat transfer, Friction factor, Effectiveness, Turbulent flow, Nanofluids, Enhancement*

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Title of Paper: **Frequency excursion mitigation strategy using a novel COA optimised fuzzy controller in wind integrated power systems**

IET Renewable Power Generation, IET Journals, The Institution of Engineering and Technology, Volume 14, Number 19, pp 4071–4085, First published: 21 January 2021

DOI : *https://ietresearch.onlinelibrary.wiley.com/doi/epdf/10.1049/iet-rpg.2020.0882*

Co-authors: *M Sharma, S Dhundhara & S Prakash*

Abstract: *The uncertain demeanour from wind generators and loads adversely affect the grid operational stability. Various control approaches have been explored to remedy the system uncertainties while maintaining generation and load demand balance. This study proposes a fuzzy-based proportional–fractional integral–derivative with filter controller to sustain frequency stability in wind integrated power systems having different configurations. The controller parameters have been tuned using a recently developed coyote optimisation algorithm (COA). The proposed control approach is executed and validated on three distinct configurations of two-area power systems. All test models are integrated with a doubly fed induction generator (DFIG) type wind turbine units (WTUs). Different case scenarios have been considered to analyse the efficacy of the proposed control strategy in the presence of WTU. Furthermore, the impact of inertial support delivered by the DFIG-WTU and higher penetration of wind energy in the power system has been studied. The analysis reveals that the control scheme in coordination with WTU support reduces the stress on a wind turbine during the inertial control scheme and maintains the grid frequency stability under unexpected load disturbances. Stability and robustness analysis are also conducted to verify the validity of the introduced control approach.*

Keywords: *DFIG-WTU, Coyote optimisation algorithm (COA), Automatic generation control, Two-area power system, FPIλDF controller*

PUBLICATION by Members

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Title of Paper: **Assessing Impact of Smart Brake Blending to Improve Active Safety Control by Using Simulink**

Applied Engineering Letters Volume 6, Number 1, pp 29-38, 2021 e-ISSN: 2466-4847

DOI: *https://doi.org/10.18485/aeletters.2021.6.1.4*

Co-author *: H P Khairnar*

Abstract: *Not just emissions issues, but also rising fuel costs for traditional cars is attracting individuals to make use of electric vehicles. Despite various benefits, such as pollution-free, noise-free, smooth driving, there may be a new likelihood of problems resulting from the quiet service of electric cars (EVs) which difficult to hear for pedestrians as well as wear particles coming out from disc brake are still unresolved issue from atmospheric state. In view of this, Authors have designed an intelligent braking system to address such issues. The aim of the proposed work is to construct an intelligent model of braking system that can incorporate contactless blending braking along with safety controls to prevent any collision. A state flow algorithm along with obstacle detection has been introduced to achieve desired braking action from proposed model. The results obtained from simulation study are consistent relative to previous researchers' findings. The new scheme has to be aiming to mitigate concerns over injuries and enhancing environmental conditions. The main contribution of the present study is the novel design of braking system test rig with the application of artificial intelligence to improve active safety control of vehicles.*

Keywords: *Electric vehicles, Contactless Brakes, State Flow Strategy, Road Safety*

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Title of Paper: **E-Glass/Phenolic Matrix/APP Laminate as a Potential Candidate for Battery Casing of E-Vehicle – Experimental Investigations**

Materials Research Express, Volume 4, Issue 8, Published : 28 April 2021, IOP Publishing Ltd, ISSN: 2053-1591

DOI *: https://doi.org/10.1088/2053-1591/abf8e5*

Co-authors:*R Sasikumar & Elango Natarajan*

Abstract:*The prime purpose of the current research is to investigate the influence of Intumescent flame retardant (IFR)-Ammonium polyphosphate (APP) on the mechanical properties of Phenolic resin/EGlass hybrid configurations and suitability of hybrid configuration for battery casing in E-vehicle. Varying weight fractions viz. 2, 4, 6, 8, 10 wt% of APP were used to fabricate -Phenolic resin/E-Glass/ APP polymer composites. Tensile, flexural, low velocity impact, and quasi static indentation tests were conducted and analyzed. Among the developed hybrid configurations 6 wt% APP filled laminate shows the better tensile and flexural properties than other configurations. It is understood from low velocity Izod impact test, falling weight impact test and quasi static indentation tests that APP filled hybrid configurations have more energy absorption. 6 wt% APP filled laminate has high deformation in elastic phase and low deformation in plastic phase. Morphology and fracture mechanism of polymer laminates are also presented and discussed. It is concluded from the investigations that E-Glass/Phenolic matrix/APP laminate is found as a potential candidate for battery casings of E-vehicle.*

Keywords: *E-Glass fiber, Phenolic matrix, Hybrid composite, Fire retardant additive, E-Vehicle battery, Ammonium polyphosphate, Low velocity impact tests*

PUBLICATION by Members

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Title of Paper: **Leaky Wave-Guide Based Dielectric Resonator Antenna for Millimeter-Wave Applications**

Transactions on Electrical and Electronic Materials, Materials Science, Published Online: 15 September 2020, Published Issue June 2021, Online ISSN 2092-7592, Print ISSN 1229-7607

DOI: *10.1007/s42341-020-00240-w*

Co-authors: *Sovan Mohanty & Baibaswata Mohapatra*

Abstract: *In this paper, a leaky wave antenna based on the parallel non-radiative dielectric guide (NRD) has been proposed. This novel design uses two parallel dielectric strip waveguides having a dielectric constant of 2.2 are placed over a substrate of the dielectric constant of 2.55 and both are separated by a ground plane. The upper structure is bounded by deflating conducting strip having distance less than λ0/2. The leakage from this antenna is in the form of surface wave concentrated more in the broadside direction rather than usual endfire or off broadside direction. It has been observed the proposed radiating structure has radiation efficiency of 82%, the peak gain of 5.94 dB with narrow impedance bandwidth, and the resonating frequency at 13.59 GHz, 13.43 GHz, and 13.93 GHz. A comparative analysis is made by increasing the height of the dielectric strip to increase the number of modes. This leaky-wave structure based on a non-radiative dielectric (NRD) guide can be a suitable candidate for the device to device (D2D) communication in the millimeter-wave band.*

Keywords: *Dielectric resonator antenna, Non-radiating dielectric guide, Leaky wave antenna*

Er Anil Kumar Rao, MIE

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Title of Paper: **Heat Transfer of a Tapered Fin Heat Sink under Natural Convection**

Materialstoday: Proceedings, Elsevier Ltd, Published Online: 12 March 2021

DOI *:https://doi.org/10.1016/j.matpr.2021.02.565*

Co-author:*Vandana Somkuwar*

Abstract: *Extended surface plays a major role in heat transfer for several heat generating devices the waste heat is dissipated to ambient by heat sink in electronic components and fins in internal combustion engines, in present study 3 configurations of tapered fin heat sink is proposed with 9 cases of heating power the computational model was created in ANSYS Fluent and analyzed with different heating power to predict heat transfer characteristics of tapered fin heat sink with taper angle of 1°, 2°and 3° with heating power of 5, 10, 20, 30, 40, 50, 60, 70W, the 2° tapered fin heat sink exhibits maximum heat transfer coefficient with low thermal resistance compared to other configurations of tapered fin heat sinks (TFHSs) under natural convection condition.*

Keywords: *Heat transfer coefficient, Thermal resistance, Straight fin heat sink (Normal heat sink), Tapered Fin heat sink, Aluminium 6063*

PUBLICATION by Members

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Title of Paper: **Investigating Process Parameters of Abrasive Water Jet Machine using EN31**

Materials and Manufacturing Processes, Taylor & Francis, Published online: 25 April 2021

DOI: *https://doi.org/10.1080/10426914.2021.1914849*

Co-author *: Sukhdeep S Dhami*

Abstract: *This document explains the machining of EN31 steel using an Abrasive Water Jet Machine. The work is aimed at investigating the role of Pressure, Abrasive Mass Flow Rate, Traverse Speed, and Standoff Distance on; Machining Time, Surface Roughness, and Hardness, followed by the optimization of these responses. Taguchi approach and Analysis of Variance are practiced to investigate the effecting features of the process parameters, regarding the responses. A regression model is also developed for efficient study. The experimental optimal data and the responses are calculated through the machining process, while the predicted optimal data is calculated through the various factorial effects plots for signal to noise ratios (SNRs). At the predicted optimal data, the responses are calculated. The validation test confirms the predicted responses and hence the acceptability of the specified model. The experiment reveals the various levels of the particular parameters in the optimization of Machining Time, Surface Roughness, and Hardness. Also, the major and minor contribution of the different parameters is investigated.*

Keywords: *AWJM, EN31, Taguchi, S/N ratio, ANOVA, Optimization*

Title of Paper: **Multi-Response Optimization of Parameters using GRA for Abrasive Water Jet Machining of EN31 Steel**

Materials Today: Proceedings, Elsevier Ltd, Published Online 21 May 2021

DOI: *https://doi.org/10.1016/j.matpr.2021.05.053*

Co-author *: Sukhdeep S Dhami*

Abstract: *A wide variety of materials are used in the automobile industry that includes casting tools, dies, studs, nuts & bolts, bearings, and punches, etc. These require high hardenability, great toughness, more strength, and good resistance to thermal shocks. Among various grades of steel, the EN31 fulfills all these qualities efficiently. But, due to its high hardness and strength, conventional machining of EN31 is not economical. Among various non-conventional machining processes, abrasive water jet machining is employed when there is a necessity for high surface finishing & fast cutting. This paper includes the machining of EN31 steel with an Abrasive Water Jet Machine. In this work, Pressure, Abrasive Mass Flow Rate, Standoff Distance & Traverse Speed (Quality) are considered as parameters, and hence their effects on the responses like Machining Time, Surface Roughness & Hardness are studied. With Grey Relational Analysis, all the selected parameters are optimized for; minimum machining time, minimum surface roughness & maximum hardness. The approach is used to obtain Grey Relational Grade (GRG) and hence the optimal solution is obtained.*

Keywords: *AWJM, EN31, GRA, ANOVA, Optimization*

Title of Paper: **Spectroscopy Analysis and Confirmation of EN31 Steel**

Journal of University of Shanghai for Science and Technology, Volume 23, Issue 2, February 2021, pp 304-306, ISSN:1007-6735

DOI: *http://doi.org/10.51201/Jusst12620*

Co-author *: Sukhdeep S Dhami*

Abstract: *The spectroscopy process involves a large number of technique s in the analysis of a material. The spectroscopy test results involve the various quantitative elements that belong to the composition of the material. The determination of the composition of material helps in getting the exact results during the experiments. The experiment's primary focus is to select the weakly bound metal ions and study these ions' mass in spectroscopy. The elements like carbon and chromium are the secondary targets so that the material can be confirmed by analyzing the exact composition of the ingredients. The observations obtained from this study will play an essential role in finding the authentic material.*

Keywords: *EN31, Elements, Spectrometer, Wavelength, Composition*

PUBLICATION by Members

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Title of Paper: **Implementation Analysis of Solid Waste Management in Ludhiana City of Punjab**

Environmental Challanges, Elsevier B.V., Volume 2, January 2021

DOI: *https://doi.org/10.1016/j.envc.2021.100023*

Co-authors *: Puneet Pal Singh Cheema & Sukhwinder Pal Singh*

Abstract: *The uphill task of managing solid waste has influenced the Ludhiana city of Punjab. To investigate the current scenario and to carry out the implementation analysis of solid waste management (SWM) in the city, the present study was undertaken. This study focusses on analysing the factors that are responsible for hindering successful policy implementation of SWM in the city. For research purposes, a mixed methodology of quantitative and qualitative analysis was adopted to collect primary and secondary data from various sources. Structured Questionnaires were framed for household survey in the city in accordance with the variables of the study. Discussions and interviews were held with selected officers of municipal solid waste departments of the city. This research found out various financial, human resource, political and logistical constraints affecting the successful implementation of SWM program in the city. The data was analysed using importance performance analysis in order to evaluate the factors that need to be addressed to improve the solid waste management in the city. At the implementation stage of solid waste management, administrative constraints such as lack of modern technology and equipments, insufficient land for dumping and disposal and lack of integrated solid waste management (ISWM) program provide hindrances to the successful implementation. Based on the analysis, the study proposes various policy recommendations in terms of administrative challenges to improve SWM in the city.*

Keywords: *Solid waste management, Disposal, Implementation, ISWM, Importance performance analysis*

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Title of Paper: **Innovative Design and Implementation of Jet Cooling of Large UPS Powered Systems in Nuclear Power Plant**

IEEE Transactions on Industrial Electronics, Volume 68, Issue 5, May 2021, pp 3813-3819, Print ISSN: 0278-0046, Electronic ISSN: 1557-9948

DOI: *https://doi.org/10.1109/TIE.2020.2985005*

Co-authors *: P Sivakumar & K Balachandran*

Abstract: *In this article, it is imperative that an efficient and reliable cooling system is used for the large Uninterrupted Power Supply (UPS) panel in Nuclear Power Plant. While the UPS system can tolerate relatively high temperatures, it is advisable to keep the temperature at 25°C or below in the room where the UPS is housed. A rule of thumb is that for every 10°C increase in operating temperature, the expected life of the UPS components would be reduced in half. So it is absolutely necessary to maintain the temperature within the limits prescribed by the designer. The aim of this article is to devise a vastly improved cooling system by streamlining the cool air flow and targeting the hotspots of the UPS components which are particularly vulnerable to damage from high temperature. First, a computational model of the whole setup was made and then, computational fluid dynamics (fluent) technique was used to perform fluid flow and heat transfer analysis of this setup, which showed a dramatic performance increase in the heat exchange process and reduced the effective size of the UPS cabin and cost.*

Keywords: *Heat, Jet cooling, Optimizing, Temperature measurement, Transformer winding, Uninterrupted power supply (UPS)*

PUBLICATION by Members

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Title of Paper: **Influence of In-situ Induction Heated Friction Stir Welding on Tensile, Microhardness, Corrosion Resistance and Microstructural Properties of Martensitic Steel**

Engineering Research Express, Volume 3, Number 2, 13 May 2021

DOI: *https://doi.org/10.1088/2631-8695/abfe1d*

Co-author *: S Gopi*

Abstract: *Induction Heated Friction Stir Welding (IH-FSW) was conducted using two varying parameters and two fixed parameters. The microstructure evaluation shows that the nugget zone's grain size is smaller while comparing with the parent metal. Due to dynamic recrystallization during the induction heated friction stir welding, well-equiaxed grains were found in the nugget zone. The microhardness test reveals that the welded region have improved hardness than the parent metal; the high hardness was attained in the heat-affected zone. The 3 h and 24 h of weight-loss corrosion test methods were conducted using the coefficient of 0.5 M H2SO4, showing that the stir zone's corrosion resistance is better than the parent material. The given parameter combinations obtain the best results, tool rotation of 1250 rpm, welding speed of 45 mm min^{-1}, shoulder penetration of 0.50 mm and induction heat input of 441.8 °C at 50 W.*

Keywords: *Induction heating, Friction stir welding, Stainless steel, Microstructure, Corrosion*

Er Amar Kumar Das, MIE

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Title of Paper: **Thermal Balancing and Exergetic Performance Evaluation of a Compression Ignition Engine Fuelled with Waste Plastic Pyrolytic Oil and Different Fuel Additives**

Energy, Elsevier Ltd. , Volume 229, 15 August 2021

DOI: *https://doi.org/10.1016/j.energy.2021.120629*

Co-authors *: Dulari Hansdah & Achyut Kumar Panda*

Abstract: *This study aims at evaluating the heat energy and exergy values of waste plastic oil (WPO) blended diesel mixed with different fractions of fuel additives (ethanol as oxygenated fuel additive and nano grapheme as nano additive) with a view to establish the thermal balancing of a diesel engine analytically taking experimental data and comparing with neat diesel oil. The research engine used was a four stroke, constant speed, stationary, direct injected, single cylinder, water-cooled compression ignition engine tested at different loading conditions. The thermal balance was prepared in respect of work output, heat loss in cooling, heat loss in exhaust gas, heat loss in lubrication and additional unaccounted heat losses in order to measure the efficiency of the engine in agreement with thermodynamics energy principles. Three test fuels with same plastic oil and different fuel additives concentration (comprising of 80% Diesel þ20%WPO, 60% Diesel þ 20%WPO þ20% Ethanol and 80%Diesel þ20% WPO þ100 ppm nano graphene) are prepared for the engine test. The addition of ethanol in WPO blended diesel fuel mixture contributes marginal increase in brake thermal efficiency, decrease in brake specific fuel consumption, higher exhaust gas temperature and lower exergetic efficiency as compared to that of diesel. Nano graphene added to WPO blended diesel enhanced its energy along with exergy efficiency values as compared to other fuel mixtures under higher operating load conditions. Fuel exergy for this fuel was increased by 18.57% in comparison to diesel at highest load. However, Exergy destruction and exhaust exergy were decreased by 34.97% and 14.03% respectively in comparison to diesel at highest load. Moreover, exergetic efficiency was enhanced by 18.9% than diesel at maximum load condition.*

Keywords: *Waste plastic oil, Four stroke diesel engine, Nano graphene, Ethanol, Exergetic performance*

PUBLICATION by Members

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Title of Paper: **A Survey on Machine Learning Algorithms for Cardiovascular Diseases Prediction**

The International Journal of Innovative Research in Engineering & Multidisciplinary Physical Sciences (IJIRMPS), Volume 9, Issue 2, March-April 2021, pp 45-48, ISSN: 2349-7300

DOI: *https://doi.org/10.5281/zenodo.4740277*

Co-authors *: K Ruba Soundar, M Piramu & K Murugesan*

Abstract: *Heart is the most important part in all living organisms. Cardiovascular diseases or heart related diseases are at its peak in today's world. Cardiovascular diseases prediction in a living being is a critical challenge analysis in the medical field. Machine learning algorithms are used in effective decision making, perfection and correctness because of little fatigue problem. In this work a survey has been done among various machine learning algorithms such as SVM, Decision Tree, KNearest Neighbor (KNN), Artificial Neural Networks (ANN) and Random Forest with linear model to predict out of this heart disease. In performance level 92% is achieved through Support Vector Machine prediction model for heart diseases. Support Vector Machine method aims at finding large amount of feature by applying machine learning algorithm to improve the accuracy in the prediction of cardiovascular diseases.*

Keywords: *Heart Disease classification, Support Vector Machine, Decision Tree, K-Nearest Neighbor, Artificial Neural Networks, Random Forest*

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Title of Paper: **Development of Remote Controlled Smart Appliance for Medical Support and Assistance-COVID-19 (MEDiMATE)**

Young Members Technical Conference 2020: Conference Proceedings, Technical paper, Session 3, The Institution of Engineers, Sri Lanka, First Edition October 2020, ISBN 978-955-9119-09-8, pp 101-107

Link: *https://m.box.com/shared_item/https%3A%2F%2Fapp.box.com%2Fs%2Fo4i10idbq4wigs710e0cncorjshg7knd*

Abstract: *At the beginning of the year 2020, COVID-19 created International Public Emergency and caused a worldwide outbreak. The Social Distancing became the effective solution as an important remedial action to be adopted against the impact of coronavirus on mankind. This paper depicts the design and implementation of control methodologies for specific Remote Controlled Smart Appliance for Medical Support and Assistance (Medimate), which is abundant in combating with the pandemic of COVID-19. These appliances reduce the risk of spreading the corona virus to the hospital staff from the COVID-19 infected patients. This appliance significantly reduces the risk of infectious disease transmission to frontline healthcare professionals by making it possible to visual inspection, triage, evaluation, monitoring, and treating patients being at a safer distance from patients. Also, this facilitates transfer foods and goods to locations near to the patients which indirectly save the cost of personnel protective kits (PPE) to be worn by healthcare workers. The contribution of the medical and engineering come together to aid the healthcare system, healthcare workers and society to cater the COVID-19 situation*

Keywords: *Covid-19, Safety, Social Distancing, Remote Control*

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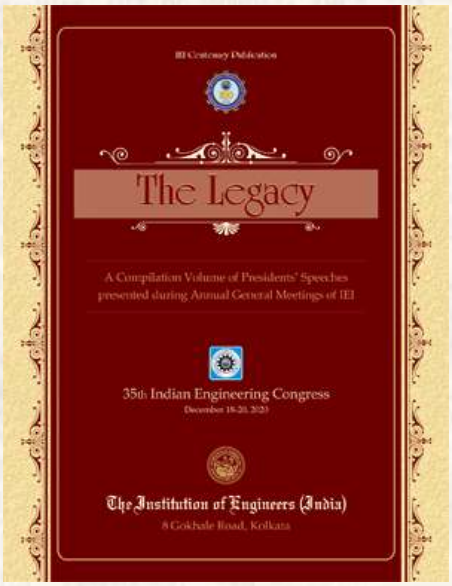

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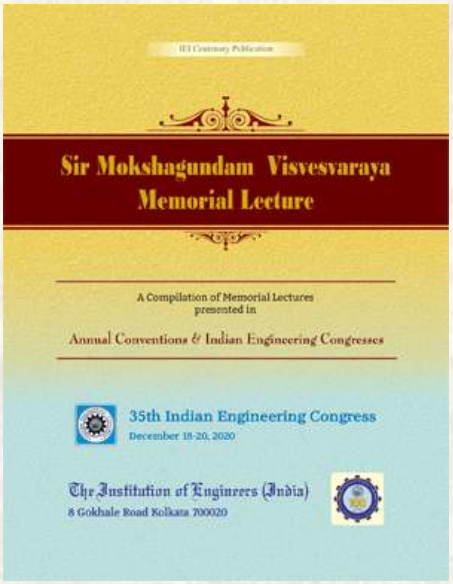

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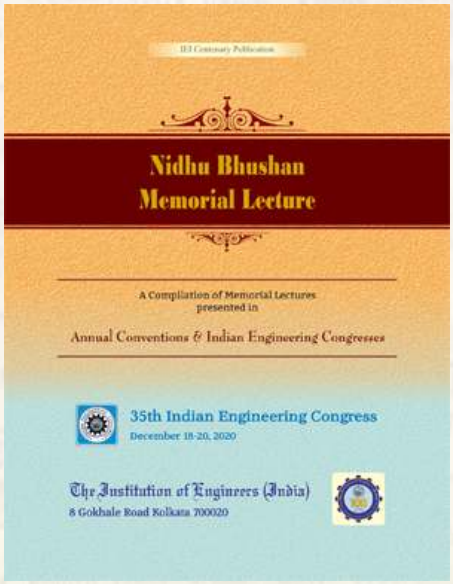

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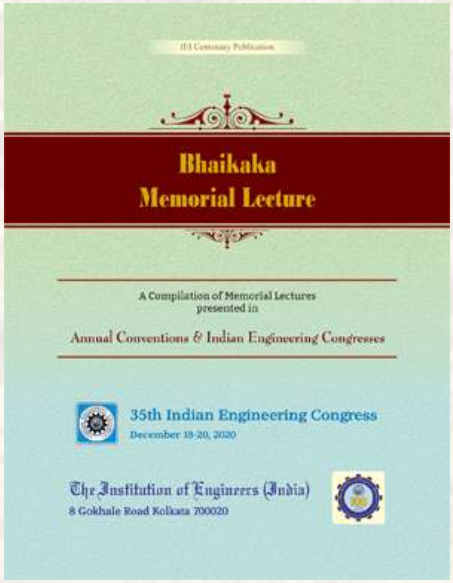

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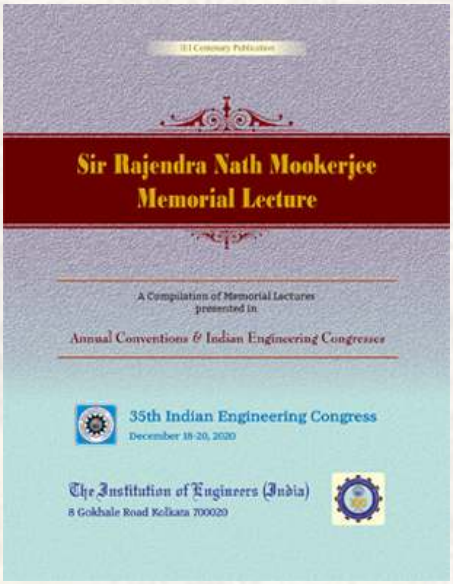

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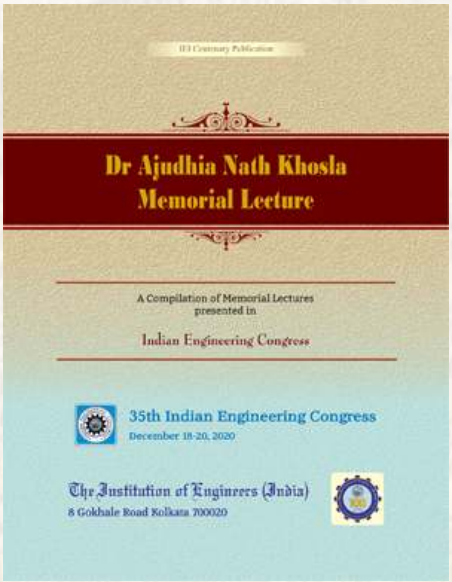

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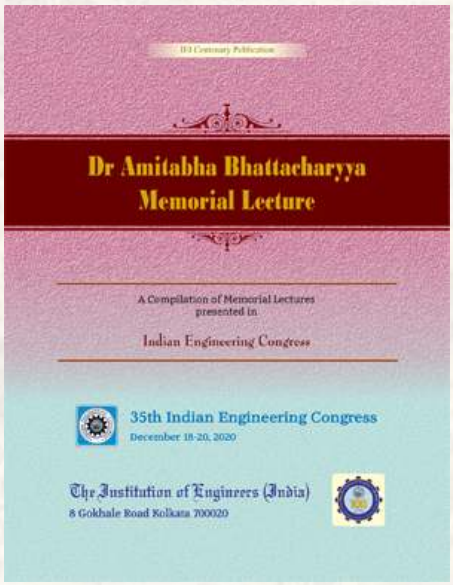

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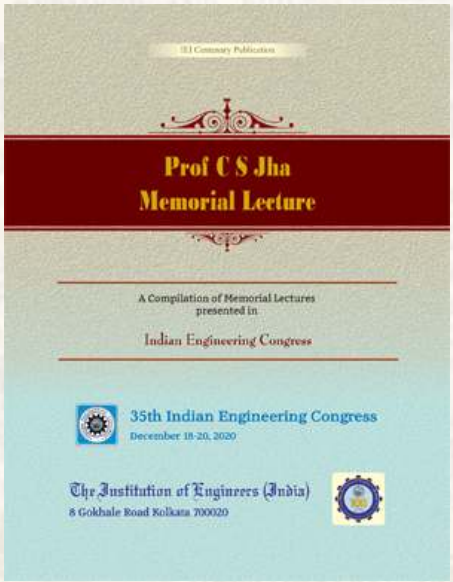

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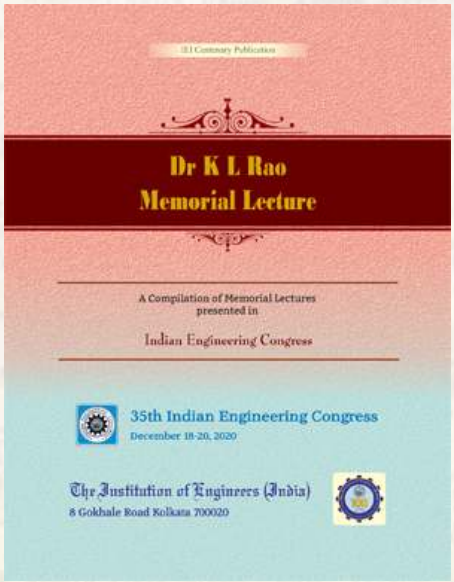

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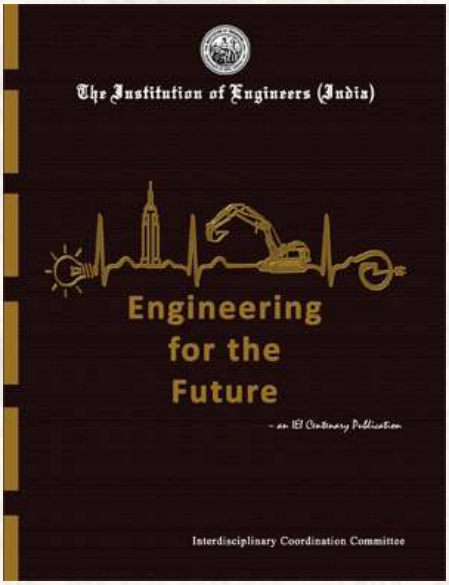

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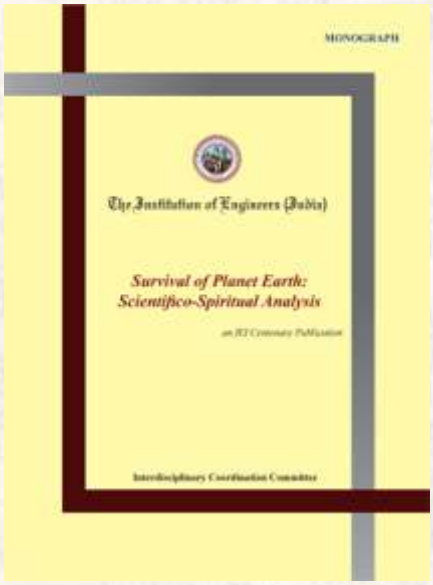

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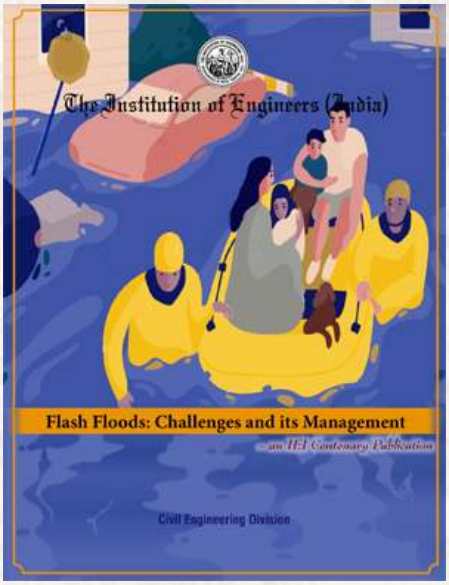

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We would like to thank our erudite members for sharing their professional achievements through the IEI Epitome in the process making the content more inveigling and at the same time inspiring many others to share their accomplishments as well. But, it would be our endeavour to accommodate your success stories in a more structured and comprehensive manner so that it can be referred, traced and retrieved by the entire gamut of professionals who are avid followers of this e-Newsletter. To this end, we would request our Members to send the details of their achievements as per the appended formats only.

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(i)	Prefix (Er/Dr/Prof)	
(ii)	First Name	
(iii)	Middle Name (if any)	
(iv)	Surname (Last Name)	
(v)	Email and Mobile Number	
(vi)	Designation	
(vii)	Organization of affiliation	
(viii)	Membership No (please use the prefix F/M/AM as the case may be)	
(ix)	Title of Paper	
(x)	Name of Journal/Proceeding/Technical Volume	
(xi)	Volume No (Not required for Indian Engineering Congress)	
(xii)	Issue No (Not required for Indian Engineering Congress/Annual Technical Volumes of IEI)	
(xiii)	Theme (Only for Technical Volumes of IEI)	
(xiv)	DOI: (Not required for Indian Engineering Congress/Annual Technical Volumes of IEI)	
(xv)	ISSN	
(xvi)	Date of Publication (Date-Month-Year)	
(xvii)	Co-authors (if any)	
(xviii)	Abstract in full	
(xix)	5/6 Keywords	
(xx)	Supporting Documents/links [which are clearly indicative of the incumbent's achievement(s)]	

 # Publications in local seminar, conference and symposia will not be accounted

(C) FORMAT FOR PUBLICATION(S) BY MEMBERS- BOOKS

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(vi)	Designation	
(vii)	Organization of affiliation	
(viii)	Membership No (please use the prefix F/M/AM as the case may be)	
(ix)	Title of Book/Book Chapter	
(x)	Publisher Details	
(xi)	ISBN	
(xii)	Date of Publication (Date-Month-Year)	
(xiii)	Co-authors (if any)	
(xiv)	About the book (100-150 words)	
(xv)	Supporting Documents (complimentary copies for IEI Headquarters)/links [which are clearly indicative of the incumbent's achievement(s)]	

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