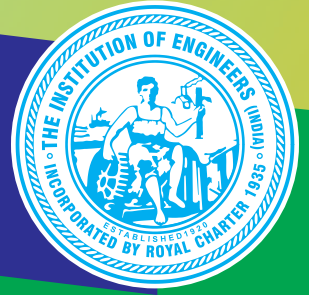


# IEI EPITOME



Volume 9 | Issue 1 | January 2024

*A Century of Service to the Nation*

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### DISCLAIMER

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### Editor

**Maj Gen (Dr) MJS Syali**, VSM (Retd)  
*Secretary & Director General*

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Mr P Barik, Ms P Nath, Ms N Sikdar, Mr S K Mishra

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# Notification for IEI R&D Grant-in-Aid

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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.

Every year, the Institution invites applications for funding industry-oriented 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 IEI. 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/FIE	Not Mandatory
2. UG (BE/BTech/ Equivalent)	'Student Member' (SMIE)	AMIE/MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA/NAAC Accreditation or valid NIRF Rank
3. PG (ME/MTech/ Equivalent)	AMIE/MIE/FIE	MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA/NAAC Accreditation or valid NIRF Rank
4. PhD	AMIE/MIE/FIE	MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA/NAAC Accreditation or valid NIRF Rank

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

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

Kindly go through the guidelines (visit link: <https://www.ieindia.org/webui/IEI-Activities.aspx#RnD-Initiative>) before filling up the application.

# Members in the News

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## Dr Srinivasa Rao Pundru, FIE

Assistant Professor

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**Dr Srinivasa Rao Pundru** obtained the **Certificate of Recognition** for outstanding contribution as a **Distinguished Speaker** of the presentation entitled “**Synthesis of a Three-Degree of Freedom Spatial Parallel Manipulator**” organized by **Peers Alley Media, Vancouver BC, Canada** in **Global Congress** at Virtual Event-Advanced Satellite Communications 2023 held on 16 November, 2023.



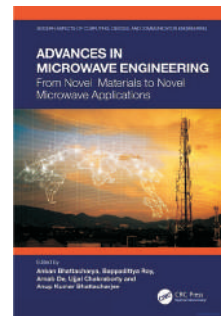
## Dr Ankan Bhattacharya, MIE

Associate Professor and Head

Department of Electronics and Communications Engineering, Hooghly Engineering & Technology College, Hooghly, West Bengal

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**Dr Ankan Bhattacharya** is one of the **Editor** of the book titled ‘**Advances in Microwave Engineering | From Novel Materials to Novel Microwave Applications**’ on the subject of Computer Science, Engineering & Technology, published dated 21 November 2023 by CRC Press, Boca Raton, Taylor & Francis Group with eBook ISBN: 9781003459880.



## Dr Venushree Suryakant Khanke, AMIE

Assistant Professor

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**Dr Venushree Suryakant Khanke** was declared eligible for **Award of Degree of Doctor of Philosophy (PhD)** in Civil Engineering on the thesis entitled “**Static and Dynamic Analysis of Functionally Graded Skew Sandwich Plates with Geometric Imperfections**” by Shivaji University, Kolhapur on 19 August 2023.

*announcement*

## Know-Your-Member (KYM)

The Institution of Engineers (India) is **updating the database of all its Corporate Members** along with their achievements for which a Know-Your-Member (KYM) form has been introduced.

Every Corporate Member is requested to kindly fill up the form and forward it along with the self-attested copy of photo ID proof to the address given below:-

**The Director (Membership)**

The Institution of Engineers (India), 8 Gokhale Road, Kolkata 700020

Email: [datamemb@ieindia.org](mailto:datamemb@ieindia.org)

The form can be accessed & downloaded at :

[https://www.ieindia.org/WebUI/ajax/Downloads/WebUI\\_PDF/HIGHLIGHTS\\_DOCUMENT-3332.pdf](https://www.ieindia.org/WebUI/ajax/Downloads/WebUI_PDF/HIGHLIGHTS_DOCUMENT-3332.pdf)

# Publication by Members

Volume 9 | Issue 1 | January 2024



**Prof Dr Vijayan Gurumurthy Iyer, FIE**

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**Title of Paper: Total Quality Management (TQM) as a Prerequisite for Improving the Competitiveness in Waste Management and Waste Reprocessing Micro, Small and Medium Enterprises to Achieve Business Excellence**

Environmental Monitoring, Four Dimensions Publishing Group, 2(1), 2023, pp 1-10, ISSN (online): 2771-988X

DOI: <https://doi.org/10.55571/em.2023026>

**Abstract:** Total Quality Management (TQM) can be defined as a quality management approach centered on quality, based on the participation of all its members and aiming at long term success through customer satisfaction and benefits to all members of the organization and society. Strategic environmental assessment (SEA) process can be broadly defined as a study of the impacts of a proposed project, plan, project, policy or legislative action on the environment and sustainability. In this research, SEA process has been aimed in order to incorporate environmental and sustainability factors in to waste and waste reprocessing project planning and decision making (WPDM) and Climate impact assessment (CIA) process such as project formulation and appraisal of Indo-Matsushita midget electrode (battery carbon rod) plant in 1979 at Tada, sustainable bridge, road and sanitation structure, green building, nuclear power plant, cotton roller ginning plant and concrete that included policies, programs, plans and legislative actions. Sustainable WM & WRM development is a kind of development that meets the needs of the present without compromising the ability and efficacy of future generations to meet their own needs. Environmental Impact Assessment (EIA) process can be defined as the systematic study of the potential impacts (effects) of proposed projects, plans, programs, policies or legislative actions relative to the physical/chemical, biological, cultural, and socioeconomic components of the total environmental product life cycle. The primary purpose of the EIA process is to encourage the consideration of the environment in Organization's WPDM process and to arrive at actions that are environmentally compatible. WPDM process should include the integrated consideration of technical or engineering, economic, environmental, safety, and health, social and sustainability factors in order to achieve business excellence. Prior to the National Environmental Policy Act (NEPA) process in 1970 in the USA, technical and economic factors dominance the World's Waste Management and Waste Reprocessing Management (WM & WRM) projects. The objective of the study is to conceptualize SEA process for the WM & WRM sector on the basis of fifteen number of sustainable detailed project reports (DPRs) submitted by the extension learners of Diploma in Entrepreneurship and Business Management (DEBM) course conducted by the Entrepreneurship Development Institute of India (The EDI of India) during the research year (RY) 1999 to 2023 under the author's chancellorship. The design of the study is cross sectional. Environmental Health Impact Assessment (EHIA) process has been conducted for nuclear power plant to consider the safety and health impacts in order to mitigate psychological health loading on workers and nearby residents. Social Impact Assessment (SIA) process can be defined as the systematic identification and evaluation of the potential social impacts (effects) of proposed projects, plans, programs, or legislative actions such that social consideration is encouraged in WPDM process and to arrive at actions that are socially compatible with reference to a sustainable sanitation project. SEA process concerns to environment and sustainability effects in WPDM process and arrive at proposed projects, plans, programs, and legislative actions that are compatible with respect to environment and sustainability issues. International EIA process required multi-disciplinary approach that has been conducted very early stage of Japanese Matsushita carbon rod project in 1982 for strategic environmental assessment. The paper highlights SEA process conducted for certain projects that based on operation and process approach and associated studies for sustainable development. WM & WRM engineering product and process environmental life cycle analysis (LCA) has been conducted for identifying and measuring the impact of civil engineering industrial products on the environment and sustain efficacy by means of mass and energy balance methods. LCA considers the activities related to raw materials, transformation, ancillary materials, equipment, method, market, man power, production, use, disposal and ancillary equipment. As far as waste management and reprocessing management safety is concerned personal protective equipment and materials (PPEMs) that include garments, clothing, gloves, safety shoes, hard hats, safety glasses, shields, respirators, full aprons, safety belts, and other safety items which have to be used by an individual. Such equipment is important for personal protection and for safety. It is the manager's and supervisor's responsibility to ensure that they are used. The enactment of worker's compensation law and occupational disease law shall increase materially the cost of insurance to industry. The increased cost and the certainty with which it is applied will put a premium on accident-prevention work. This cost can be materially reduced by the installation of safety devices. WM & WRM experience has shown that approximately 80% of all the WM & WRM industrial accidents are preventable. EIA and EHIA processes have been conducted for a nuclear power plant to consider the safety and health impacts in order to mitigate psychological health loading on workers and nearby residents. SEA system is a potentially useful element of good environmental management and sustainable development; however, as currently practiced in WM & WRM industries, it is far from perfection. Emphasis should be given in WM & WRM industries on maintaining economic viability of the operation, while in turn taking care to preserve the ecological and social sustainability of the country. International EIA process required multidisciplinary approach that has been conducted very early stage of Indo-Matsushita Midget electrode projecting 1982 at Tada for economic, ecological and social sustainability.

**Keywords:** Education; Embed; Environment; Industry; Management; Waste; Sustainability



**Prof Sadhan Mahapatra, FIE**

Professor

Department of Energy, Tezpur University, Tezpur, Assam, Guwahati

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**Title of Paper: Performance Analysis of MW-scale Grid Connected Rooftop and Ground-mounted Solar Power Plants Installed in Assam, India**

Energy for Sustainable Development, Elsevier, 76, 2023, Online ISSN: 2352-4669; Print ISSN: 0973-0826

DOI: <https://doi.org/10.1016/j.esd.2023.101309>

Co-authors: Debarshi Das, Sarangapani Saikia, Swarna Jyoti Saharia

**Abstract:** Solar energy-based electricity generation has become an essential component of sustainable development and meeting the growing demand for energy. A study is conducted to compare the performance of rooftop and ground-mounted solar power plants installed in Assam, India. The study found that ground-mounted plants generated an average of 3.41 kWh per kWp of energy per day, while rooftop plants generated 2.89 kWh per kWp. The study also observed that rooftop solar power plants had non-operating days due to inverter faults, grid failures, and poor weather conditions, which were 1.1 and 0.95 days, respectively. The capacity factors were 14.2 % and 11.4 %, while the performance ratios were 77.8 % and 70.1 % for ground-mounted and rooftop plants, respectively. The average system efficiency of ground-mounted plants and rooftop plants is  $12.59 \pm 0.26$  % and  $11.88 \pm 0.11$  %, respectively. The study used the Weibull distribution function to describe the daily normalized energy generation frequency curve, which revealed a peak probability of 0.38 at a daily normalized energy generation of 2.9 kWh per kWp for rooftop plant and 0.34 at a daily normalized energy generation of 3.4 kWh per kWp for ground-mounted plant. The installation of a solar power plant has resulted in an average reduction of Rs. 43.7 lakhs per year in the University's electricity bill. This study demonstrates the successful operation of rooftop solar power plants, which not only reduces the electricity expenses of organizations but also has a positive impact on sustainability.

**Keywords:** Solar Power Plant; Normalized Energy Generation; Performance Ratio; Capacity Utilization Factor; Weibull Distribution

**Title of Paper: Bioethanol, Internal Combustion Engines and the Development of Zero-Waste Biorefineries: An Approach towards Sustainable Motor Spirit**

RSC Sustainability, Royal Society of Chemistry, 1(5), 2023, ISSN 2753-8125

DOI: <https://doi.org/10.1039/D3SU00080J>

Co-authors: Shaswat Barua, Debojeet Sahu, Firdous Sultana, Swagata Baruah

**Abstract:** Nature is a huge reservoir of energy, aiding the proliferation of life on Earth. However, recently, the human race has understood the importance of conserving the energy sources that are available in nature and prone to depletion. Lately, it has been well understood that either the use of fossil fuels should be restricted or the potential of other energy sources should be explored. In this context, the concept of biofuel has emerged, which in its neat form or as a blend with petroleum products can achieve the above-mentioned goals. In this review, we depict the potential of bioethanol as a future transportation fuel. Furthermore, the compatibility, advantages, and shortcomings of bioethanol as a fuel for internal combustion engines are also discussed. Studies revealed that blending ethanol in petrol or Motor Spirit (MS) improves important engine features such as octane number (up to 5–10%), compression ratio (up to 2%), combustion efficiency (up to 30%), and engine torque (up to 8%). The use of biofuel is also considered significantly beneficial to the environment in terms of the emission of greenhouse gases. This aspect of bioethanol is also briefly presented in this review. The possibility of the large-scale production of bioethanol has attracted global interest, and consequently, the concept of a 'biorefinery' has been proposed recently. The development of biorefineries with a 'zero-waste' approach is an important aspect for the future global energy demand as well as the environment. The overall goal of this review is to analyze the potential of bioethanol as a sustainable Motor Spirit in the near future.

**Keywords:** Bioethanol; Zero-Waste Biorefinery; Internal Combustion Engine; Sustainable Motor Spirit; Sustainability

# Publication by Members

Volume 9 | Issue 1 | January 2024



**Dr Balachander K, MIE**

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**Title of Paper: Black Widow Optimization for Power System Load Frequency Control: A Comparative Study**

International Journal of Electrical and Electronics Research, Forex Publication, 11 (4), October 2023, pp 973-978, e-ISSN: 2347-470X

**DOI:** <https://doi.org/10.37391/ijeer.110414>

**Co-authors:** A Jasmine Gnanamalar, V Thiagarajan & R Saranya

**Abstract:** This research paper mainly engrossed on developing a suitable novel tuning methodology named Black Widow Optimization (BWO) Algorithm for power system optimization problems. Load Frequency Control (LFC) and Automatic Voltage Regulator (AVR), two of the most important control systems in the power system arena, are employed as test systems to assess the efficiency of the suggested BWO approach. Various analyses, such as transient analysis, are employed to evaluate the efficiency of the suggested BWO approach in LFC and AVR systems. robustness analysis and convergence analysis. The significant performance measures of test system such as output power of each generating unit, maximum peak, settling time, steady state error, rise time and voltage/frequency deviations of the frequency and voltage responses are considered for the comparison purposes. The comparative analysis clearly demonstrates that the proposed novel tuning methodology provides better transient performances subjected to Step Load Perturbations (SLP), Variable Load Perturbations (VLP), and robustness performances under a wide range of load and parameter changes ranging from -50% to +50%. The convergence analysis of BWO algorithm also performed in LFC and AVR test systems and results better convergence characteristics with minimal convergence time as well as least fitness value is obtained with the BWO algorithm.

**Keywords:** Automatic Voltage Regulator (AVR); Black Widow Optimization Algorithm (BWO); Load Frequency Control (LFC); Integral Controller (I); Proportional Integral Derivative controller (PID); Single-area Multi-Source LFC System

**Title of Paper: Modelling and Analysis of a Renewable Energy System at Various Altitudes**

Current Science, 125 (10), November 2023, pp 1088-1092, ISSN 0011-3891

**URL:** <https://www.currentscience.ac.in/Volumes/125/10/1088.pdf>

**Co-author:** Amudha Alagarsamy

**Abstract:** The study proposes a hybrid renewable energy system in India that combines solar and wind energy conversion. The system is designed to meet user load demands at specific locations, reducing electricity usage. The system is optimized using various sizing components, including climatological data, load profile, PV array parameters, wind parameters and battery parameters. The hybrid optimization model for electric renewables is used to design, analyse and optimize the system. The performance of each module, inverter, and battery is examined, considering factors such as energy production, consumption, emissions, initial cost, operating cost, net present cost, and energy cost.

**Keywords:** Altitude; Hybrid Optimization Model; Photovoltaic Panels; Solar and Wind Energy



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**Title of Paper: Statistical Modelling of the Blast Design Parameters Influencing Ground Vibrations in a Limestone Quarry using Design-Expert**

Arabian Journal of Geosciences, Springer, 16(10), October 2023, Electronic ISSN 1866-7538, Print ISSN 1866-7511

DOI: <https://doi.org/10.1007/s12517-023-11665-x>

**Co-author:** Arvind Kumar Mishra

**Abstract:** Mining and construction sites experience ecological consequences, such as ground vibrations and fly rock, owing to blasting activities. Apart from the traditional techniques, it is critical to determine the design parameters of a blast which influence the ground vibrations, created by the blasting activities, and to mitigate the effects of ground vibrations as an end result. A unique validation tool developed on statistically designed response surface methodology (RSM) has been suggested for determining the rate of influence of blast design parameters on the ground vibrations with a case study of a limestone mine. Design-Expert software has been used to assess the intended statistically designed model. The novelty of this research study is to design the ANOVA model constructed by the Response Surface Methodology (RSM) using the 'Design-Expert 11.0' and it was validated using the field values. Consequently, the Response Surface 3D Model Graph has been constructed to determine the significant influencing parameters associated with ground vibrations (PPV). Further, about 45 numbers of blasting events were investigated and the effects of four blast design factors on the ground vibrations, namely, decking length, inter-hole delay, inter-row delay and stemming length, were monitored accordingly. Besides, the measurements of peck particle velocity (PPV) as a vibration identifier and their effect on the growth of back-break were measured in each blasting event. The following two significant parameters, such as (i) the root mean square error (RMSE) and (ii) coefficient of multiple correlation ( $R^2$ ), were studied to find out the efficacy of the suggested models. Linking the values predicted by the models, it had been established that the decking length and delay between the holes (inter-hole delay, ms) are significantly contributing to ground vibrations when compared to the delay between rows (inter-row delay and stemming length respectively) which are found to be moderate contributors of ground vibrations.

**Keywords:** Blasting; Ground Vibration; Back-Break; Decking Length; Inter-Hole Delay; Inter-Row Delay; Stemming Length; Response Surface Methodology; Design-Expert

announcement

## Elevate your status as a Certified Professional Engineers (PE) and International Professional Engineers (IntPE)

### Professional Engineers (PE) Certification by IEI

#### Eligibility Requirement

To attain the Professional Engineers (PE) certification through the Institution of Engineers (IEI), you must meet the following eligibility criteria:

1. Hold a BE/BTech or equivalent degree recognized by a Statutory Authority or the Government of India.
2. Have accumulated five years or more of professional experience.
3. Be a member of a recognized professional engineering institution or association.
4. Maintain a satisfactory level of Continued Professional Development (CPD).

Please visit the following link :

[https://www.ieindia.org/webui/IEI\\_PE\\_Certification.aspx](https://www.ieindia.org/webui/IEI_PE_Certification.aspx)

### International Professional Engineers (IntPE) Certification by IEI

#### Eligibility Requirement

To be eligible for IntPE Certification by IEI, candidates must meet the following criteria:

1. Hold a BE/BTech or equivalent degree recognized by the Statutory Authority or the Government of India.
2. Possess seven years or more of professional experience.
3. Have a minimum of two years of professional experience in a significant engineering activity.
4. Be a member of a recognized professional engineering institution or association.
5. Maintain a satisfactory level of Continued Professional Development (CPD).

Please visit the following link :

[https://www.ieindia.org/webui/IEI\\_IntPE\\_Certification.aspx](https://www.ieindia.org/webui/IEI_IntPE_Certification.aspx)

The eligible candidate can submit application in the prescribed format to: The PE Cell, The Institution of Engineers (India), 8 Gokhale Road, Kolkata 700020  
For any query and assistance, please send email to: [pe@ieindia.org](mailto:pe@ieindia.org)

# Publication by Members

Volume 9 | Issue 1 | January 2024



**Er Harish Kumar Khyani, MIE**

Research Scholar

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**Title of Paper: Thermal Modeling of Photovoltaic Panel for Cell Temperature and Power Output Predictions under Outdoor Climatic Conditions of Jodhpur**

Journal of Electrical and Computer Engineering, December 2023, ISSN: 2090-0155 (Online), ISSN: 2090-0147 (Print)

DOI: <https://doi.org/10.1155/2023/5973076>

**Co-authors:** Jayashri Vajpai, Rajendra Karwa & Mahendra Bhadu

**Abstract:** The rise in the temperature severely affects photovoltaic cell efficiency and hence its power output. Moreover, it also causes the development of thermal stresses that may reduce their life span. Thus, there is a need of an accurate estimate of the cell working temperature. In this paper, a detailed thermal model based on various heat transfer modes involved and their governing equations has been presented to estimate the cell temperature of a PV module using MATLAB software under different climatic and solar insolation conditions. In order to validate the presented model, an experimental set up has been built and operated under actual outdoor conditions of Jodhpur, a city in Thar desert of Rajasthan. For the peak summer month of June, the predicted glass cover outer surface temperature has been found to be within 0.2-4.5°C of experimentally measured values and the back sheet temperature is found to be within 0.5-5.5°C. The predicted and measured power outputs have been found to be within 0.85-1.2 W while the efficiency values are within 0.17-0.38%. For the early summer month of April, the variations are 0.13-4.1°C, 0.2-4.1°C, 0.44-1.65 W and 0.1-0.5% for glass cover temperature, back sheet temperature, power output and efficiency, respectively. Thus, the predictions of the developed thermal model have exhibited a good agreement with the experimental results. The maximum glass cover temperatures recorded are 60°C and 65.5°C when the ambient temperatures were 35°C and 42°C near the noon for the early summer and peak summer day experiments, respectively. The presented model can be used to generate year-round cell temperature data for the known environmental data of a location, which can help in selection or development of appropriate cooling technology at the planning stage of the installation of a solar PV plant.

**Keywords:** Solar Energy; Photovoltaic Cell; Cell Temperature; Efficiency; Power Output; Thermal Model; MATLAB

announcement

## 2024 ICE Awards: Recognizing Excellence in Global Civil Engineering

We are pleased to inform you that the Institution of Civil Engineers (ICE) has opened nominations for the 2024 ICE Awards.

These awards celebrate exceptional contributions to civil engineering globally. The ICE Annual Awards recognize both outstanding civil engineering achievements and contribution to the profession and ICE. This award aligns with ICE's decarbonisation commitment and is awarded to a civil engineer who's made an outstanding contribution to civil engineering who had prime responsibility for an outstanding contribution to civil engineering outside the UK. This year the award will specifically seek to recognize a civil engineer who has had prime responsibility for an outstanding project or initiative that has contributed to decarbonising civil engineering outside the UK.

### Key Details:

**Nomination Deadline:** 13 February 2024

**Awards Ceremony:** October 2024, One Great George Street, London

### How to Nominate:

Visit ICE Awards (<https://www.ice.org.uk/careers-learning/develop-your-career/awards-and-competitions/ice-awards>) for nomination details and forms.

### Contact:

For inquiries, reach out to **Ms Katie Momber**, ICE Climate Community Manager, at [katie.momber@ice.org.uk](mailto:katie.momber@ice.org.uk) or [knowledge@ice.org.uk](mailto:knowledge@ice.org.uk).

We appreciate your attention to this matter and look forward to your active participation in recognizing and celebrating outstanding contributions to the field of civil engineering.





**Er Anand K Joshi, AMIE**  
Research Scholar  
Presidency University, Bangalore, Karnataka  
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**Title of Paper: Computational Analysis of Preheating Cylindrical Lithium-ion Batteries with Fin-assisted Phase Change Material**

International Journal of Modern Physics C, Computational Physics and Physical Computation, August 2023, ISSN (Online): 1793-6586, ISSN (Print): 0129-1831

**DOI:** <https://doi.org/10.1142/S0129183124500475>

**Co-authors:** Pallabi Kakati, Devendra Dandotiya, Prashanth S P, Naveen G Patil & Satyam Panchal

**Abstract:** The existing conventional vehicle transportation landscape in India is grappling with challenges stemming from extensive air pollution, health risks, surging oil prices, limited fossil fuel resources, substantial oil import expenses and energy volatility. To counter these issues, Electric Vehicles (EVs) are progressively replacing internal combustion engines, offering a promising route toward decarbonisation and mitigating climate concerns. EVs rely on electric motors powered by batteries, predominantly Lithium-ion batteries (LIBs), known for their superior attributes such as low self-discharge, high energy density and extended life cycle. Nevertheless, LIB performance is significantly influenced by operating temperatures, with suboptimal conditions leading to decreased efficiency, power loss and faster aging. Addressing this, an effective Battery Thermal Management System (BTMS) becomes crucial to maintain batteries at optimal temperatures, enhancing their efficiency and safety. This study focuses on a computational analysis of passive heating systems employing Fins and Phase Change Materials (PCM) for 18650 Li-ion battery thermal management at low temperatures, with specific attention to battery module analysis. Numerical analysis using ANSYS FLUENT investigates the influence of varying PCM thickness on heat transfer, predicting temperature distribution and discussing its impact on battery output performance.

**Keywords:** Battery Thermal Management System; Electric Vehicle; Fins; Lithium-ion Battery; Phase Change Material; Preheating

announcement

## FEIAP ENGINEER OF THE YEAR AWARD 2024

We are happy to announce that the **Federation of Engineering Institutions of Asia and the Pacific (FEIAP)** has invited nominations for **FEIAP Engineer of the Year Award 2024 from its Member Economies**.

The purpose of the Award is to encourage the engineers both **young** and **veterans** to make great contributions to the engineering within Asia and Pacific region.

**Key Details:**

Nomination Deadline: **29th February 2024**

**How to Nominate:**

**Please use the link** ([https://www.ieindia.org/WebUI/ajax/Downloads/WebUI\\_PDF/Nomination\\_form\\_guide\\_2024.pdf](https://www.ieindia.org/WebUI/ajax/Downloads/WebUI_PDF/Nomination_form_guide_2024.pdf)) for accessing and downloading the nomination form, which is required to be filled by the applicant and endorsed by the Member Economy, in this case IEI, for your kind reference.

**Contact:**

All nominations should be sent to the **FEIAP Secretary- General** ([feiapofficial@gmail.com](mailto:feiapofficial@gmail.com))

**Criteria:** For details please visit <https://feiap.org/engineer-of-the-year-award/>

We appreciate your attention to this matter and look forward to your active participation in the **FEIAP Engineer of the Year Award 2024**.

# Publication by Members

Volume 9 | Issue 1 | January 2024



**Er Anurag, AMIE**

PhD Scholar

Indian Institute of Technology, Mandi, Himachal Pradesh

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**Title of Paper: Recycling of Calcined Low-Grade Limestone Slurry in Producing Low Carbon Cementitious Binder towards Sustainable Environment: ANOVA, Statistical Modeling & Microstructural Performance**

Environmental Development, 47, September 2023, Print ISSN: 2211-4645, Online ISSN: 2211-4653

**DOI:** <https://doi.org/10.1016/j.envdev.2023.100910>

**Co-authors:** Rajesh Kumar & Shweta Goyal

**Abstract:** Conventional cement production is a significant contributor to greenhouse gas emissions; consequently, there is a growing interest in developing eco-friendly alternatives. This study focuses on the optimization of low graded calcined limestone to create a new type of cementitious binder that has a lower environmental impact. The research involves several experiments to evaluate the physical and mechanical properties of cementitious binder, including consistency, setting time, compressive strength, flexural strength. Along with this, statistical modeling and parametric optimization was done by Box Behnken Design (BBD) of Response Surface Methodology (RSM). The results suggest that the optimized cementitious binder has comparable properties to the conventional cement and can be used as a sustainable alternative. Results revealed that 28-days compressive strength of 49.25 MPa was achieved with the incorporation of 24% fly ash, 3.36% silica fume, 14% low grade calcined limestone slurry and 13% low grade uncalcined limestone slurry to the mortar. This study provides valuable insights for the development of new and eco-friendly construction materials, which can reduce the environmental impact of the building industry. Life cycle assessment revealed that low clinker composite mortar with low grade calcined and uncalcined limestone slurry reduced the CO<sub>2</sub> emission by 41.39% and cost reduced by 22.80%.

**Keywords:** Low Carbon Cement; Limestone Slurry; Life Cycle Assessment; Waste Recycling; Microstructure

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Sl. No.	Name of the Course	Scheduled Dates
1.	Suspension Bridges and Structural Analysis	05 - 09 Feb 24
2.	Web Application Penetration Testing and Web Security	05 - 07 Feb 24
3.	Weldability of Special Steels and NDE Methods for Engineers	05 - 07 Feb 24
4.	Networking and use of sensors for on farm Irrigation Water Management	05 - 07 Feb 24
5.	Online Monitoring Industrial Emission Effluent (Technical Guidelines and Demonstration)	07 - 09 Feb 24
6.	Optimization of Resources in Limestone & Other Quarries	07 - 09 Feb 24
7.	Cyber Security Issues in Power Sector	07 - 09 Feb 24
8.	Intellectual Property Rights (IPR) - Patent	07 - 09 Feb 24
9.	Kinematics & Dynamics of Robots	12 - 14 Feb 24
10.	Build Dynamic Dashboard in Excel & Power BI (Online)	12 - 16 Feb 24
11.	Latest techniques in Control & Instrumentation in Power Plants and process industries applications	13 - 16 Feb 24
12.	Management of Training for Training & HR Managers at Goa	13 - 15 Feb 24
13.	Climate resilient water supply system design for sustainability	14 - 16 Feb 24
14.	5S for Workplace Excellence	14 - 16 Feb 24
15.	Software used in Civil Engineering Structures (BIM, ETAB, REVIT, HDM-4, TEKLA)	19 - 23 Feb 24
16.	Heat Treatment - Furnaces, Processes and Innovations	19 - 21 Feb 24
17.	Communication and Presentation skills to Succeed in Interviews and Discussions (Communicating Assertively with Confidence)	19 - 21 Feb 24
18.	Structural Safety of Existing Dams - Evaluation and Impacts	19 - 23 Feb 24
19.	Customer Relationship Management- Modernization of Metering, Billing & Collection (MBC) in Distribution Utilities (Online)	20 - 23 Feb 24
20.	Desalination Process - Planning, Design & Operation	21 - 23 Feb 24
21.	Principles & Practices of Sustainable Mining: Corporate Social Responsibility, Social Impact Assessment, Dump Management, Controlled Blasting Techniques, Sewage Treatment, Bio-Medical Waste Management, Conservation and Recycling of Resources, Conversion of Wastes to Resources, Water-Body in Mined out Areas	21 - 23 Feb 24
22.	Internal Auditor Training for AS 9100 Rev D	26 - 28 Feb 24
23.	Training on Cyber Security & Block chain Technology for Engineers, Managers and Scientists at Hampi	26 - 29 Feb 24
24.	Best Practices in O&M and Performance of Optimization of Super Critical Units	27 - 29 Feb 24