

Technical Volume

39th



Indian Engineering Congress

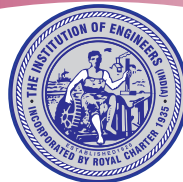
December 20-22, 2024

Venue:
Novotel Kolkata Hotel & Residences

Theme

Irresistible India .
a Global Engineering Powerhouse

Organised by



The Institution of Engineers (India)

8 Gokhale Road, Kolkata

Hosted by
West Bengal State Centre





CONTENT

Biomedical Science & Technology: AI /ML in Biomedical Research & Technology

81_IEC64426	FelAug, WaterAug: Superpixel-Based Medical Image Augmentation Methods for Improving Accuracy and Reducing False Predictions in Dermatological Image Classifications Subhendu Sinha Chaudhuri, Bhaskar Mazumder, Sheli Sinha Chaudhuri & Sudip Das	3
206_IEC44754	Prediction of Post Operative Complications from Pre and Peri Operative Statistics using Artificial Neural Network Shobhit Das & Riya Manna	8
221_IEC56641	Machine Learning-Driven Scaffold Design: Advancing Tissue Engineering with Stem Cells Lilly Sheeba S, Aalia Syed, Aparnaa S & Pooja Da	14
251_IEC22776	Lung Cancer Detection using Deep Learning Imama Ajmi & Abhishek Das	18
292_IEC18634	Revolutionizing Healthcare: Unleashing AI and ML for Next-Gen Disease Detection Haimanti Chakraborty & Keya De Mukhopadhyay	25
303_IEC7939	Medical Applications of Graph Convolutional Networks using Electronic Health Records: A Survey Garrik A Hoyt & Noyonica Chatterjee	28
304_IEC88727	Investigation of Time-Frequency Features for the Detection of Epileptic Seizures through Machine Learning Approaches Gowtham Reddy N, Debashree Guha & Manjunatha Mahadevappa	34
337_IEC5959	Mind Controlled Bionic Arm with Sense of Touch Dhruva Shaw, Arittrabha Sengupta, Bhavya Choudhary, Jay Baswaraj Khaple & G Raam Dheep	38
338_IEC12385	Silent Speech Recognition using Cascaded Classifier with sEMG Measurements from Facial Muscles Gobinath Kaliyaperumal, Sarva Kiruthika, Karthick P A & Ramakrishnan S	43
340_IEC12280	Structural Connectivity Analysis in ASD: A DTI-based Machine Learning Classification Ravi Ratnaik, Anshita Singh & Jac Fredo Agastinose Ronickom	50
341_IEC50769	Identification of Optimal Features for EEG-based Authentication in Response to Emotional State Chetan Rakshe, Christy Bobby Thomas, Mohanavelu Kalathe, Sreeraj V S, Venkat Subramaniam, Deepesh Kumar & Jac Fredo Agastinose Ronickom	54
360_IEC71472	Revolutionizing Cancer Drug Development with Artificial Intelligence: Navigating Patent and Licensing Challenges Keya De Mukhopadhyay, Abhisikta Basu & Ankita Roy	58

Biomedical Science & Technology: Biomaterials, Tissue Engineering, and Regenerative Medicine

42_IEC32451	Study on Structure and Properties of Bioactive Bioceramic Biomaterial Obtained from Marine Shell Species Magallana Cuttackensis Subhasis Nath, Rajib Gupta, Sampurna Mukherjee, Debdut Roy, Adnan Hossain, Soumya Mukherjee, Sourav Debnath, Sujana Krishna Samanta & Akshay Kumar Pramanick	63
147_IEC29315	Wound Healing with the Controlled Degradation of Biomaterial Joanna Rai, Khemraj Deshmukh & Arindam Bit	69
311_IEC95743	Degradable Microcarriers and their Role in Stem Cell Expansion and Hard Tissue Organoid Development Pratik Talukder, Titiksha Singh & Titli Debnath	74
358_IEC24648	Electrophoretic Deposition of Alumina- Zirconia - CNT Composite Coating for Improved Tribological and Corrosion Properties of Magnesium Alloys Renu Kumari, Sumit Kumar, Alok Kumar Das, Anand Mohan Murmu & Kumari Kanchan	76



Biomedical Science & Technology: Biomedical Imaging-Sensing and Instrumentation

18_IEC82925	Cancer Detection by Integrated Optic Devices: A Digital Signal Processing Approach Sabita Brata Dey	81
173_IEC50993	Graphene FET Biochips on PCB for Exosome based Early Screening of Cancerous Cells Piyali Mukherjee, Shalini Dasgupta, Ananya Barui & Chirasree RoyChaudhuri	86
177_IEC5681	A Comprehensive Review of Sensors in Medical Application Santosh Jotiram Jagatap, Ashok Jetawat, Jayshree Jetawat & Saurabh Mehta	91
209_IEC3920	Microwave Imaging: Using Gradient Method and Biconjugate Gradient Methods for Breast Cancer Detection Moutusi Mondal & Manka Agarwal	93
229_IEC34826	An IoT-based Smart Health Monitoring Wheelchair System for Physically Challenged People Souptik Roy, Shreya Nag & Sudipta Ghosh	98
322_IEC2424	Container Filling System for Radioactive Materials Indranil Nandi, Chadi Baida, Dominic Siewko & Dinesh Kumar Sarwal	103
346_IEC99079	Leveraging Force-Sensing Technology for Personalized LBP Care: A Scoping Review Jayanta Chakraborty & Sugato Ghosh	107
347_IEC85073	The use of Thermal Test, Electric Pulp Test and use of Modified Pulse Oximeter for Assessment of Pulpal Status of Permanenet Mature Teeth Paromita Mazumdar, Sugato Ghosh, Sagnik Bhattacharya & Anirban Pandit	112

Biomedical Science & Technology: Genomics, Bioinformatics, and Synthetic Biology

87_IEC2144	Phase Response Synchronization using Fractional Kuramoto and Repressilator Models Anurag Kumar Dwivedi, Chandramouli Bhattacharya, Abhilash Patel & Bishakh Bhattacharya	117
376_	Farming the Future: Revolutionizing Agriculture with Gene Editing to Tackle Food Insecurity Keya De Mukhopadhyay	120

Biomedical Science & Technology: Interdisciplinary Biomedical Research

160_IEC59332	Potential Mechanisms of Selected Intracellular Metabolites on HEWL Aggregation: Insights from Endpoint Assays, Aggregation Kinetics and Computational Studies Debanjan Kundu & Vikash Kumar Dubey	125
239_IEC96327	Facial EMG based Approach for Investigating the Activation of Zygomaticus Major during the Articulation of Malayalam Phonemes Alfiya Parveen P C, Remya R Nair & Venugopal G	130
305_IEC44147	Bidirectional Gated Recurrent Unit based Recurrent Neural Network for the Real-Time Prediction of Epileptic Seizure Stroke Amol Satsangi, Anant Singhal, Gufran Ahmad & Mustafa Sameer	135
317_IEC70450	A Numerical Investigation of Thermal Transport for Magnetic Fluid Hyperthermia in Breast Tissue with Lobular Carcinoma Pratik Roy, Nirmalendu Biswas & Ranjan Ganguly	150
326_IEC32863	Interaction Dynamics of Pristine and Pt-decorated ZnO Nanosheet during Cytosine Adsorption: A Robust Electro-Chemical Analysis of Biosensor Indranil Maity, Subhradeep Hazra & Snehadri Bhaumik	155

Biomedical Science & Technology: Microbiology, Virology, and Evidence-based Medicine

202_IEC34121	Evaluation of Lactic Acid Bacteria from Chilli and Capsicum Stalks (Calyx) as a Starter Culture for Curd (Dahi) Preparation Dristi Majumdar, Perumalla Pavan Kumar, Tathagata Choudhuri & Soumya Sasmal	163
--------------	---	-----



315_IEC95247	Wastewater Testing for Surveillance of Covid-19 Outbreaks at a Ward Level: Emerging Insights from Bangalore City in India Paramita Basu, Varsha Shridhar, Poorva Huilgol, Ramakrishna Prasad, Noyonica Chatterjee, Angela Chaudhuri	166
356_IEC9568	Analysis of Viral Proteins from Common Viruses of West Bengal using Bioinformatics Tools Sonali Paul, Camellia Mazumder, Ujaan Chatterjee, Souvik Hazra, Aratrika Ghosh & Susmita Mukherjee	172
365_IEC93161	Natural Synergy: Neem and Honey as a Biocompatible Oral Irrigant for Enhanced Dental Care Sampreeti Chatterjee, Rohan Murmu, Anubrata Bit & Keya De Mukhopadhyay	175

Biomedical Science & Technology: Neural and Rehabilitation Engineering/Technology

179_IEC54384	Need for Wearables in Generating EHRs for Physical Rehabilitation Sector, Pheeze® — A Case Study Harshavardni K P, Mythreyi Kondapi, Vijay Bathina & Suresh Susurla	181
302_IEC81438	Determining the Efficacy of using EEG Signals in Post-Stroke Rehabilitation Engineering Applications through a Pilot Study Eashita Chowdhury, Manjunatha Mahadevappa & Cheruvu Siva Kumar	186

Chemicals & Hydrocarbons: Gas Processing

236_IEC44090	Achieving Flowability for Enhancing Crude Oil Recovery using PIPESIM Software Progyan Hazarika & Dhrubajyoti Neog	193
--------------	---	-----

Chemicals & Hydrocarbons: Hydrogen Economy and Circular Economy

290_IEC23561	Green Hydrogen: Engineering and Safety Challenges Madhu G	201
--------------	---	-----

Chemicals & Hydrocarbons: Net Zero, Sustainability

162_IEC83477	Droplet Dynamics: A New Frontier in Energy Harvesting Paras & Sudipto Chakraborty	207
195_IEC75237	Amine Functionalized Activated Carbon Sourced from Wood Dust for CO₂ Capture Saswata Chakraborty, Ranadip Saha & Sudeshna Saha	211

Chemicals & Hydrocarbons: Polymer and Nano Materials

333_IEC54788	Integration of Advanced Multi-material Fibres in Electronic and Smart Textiles Sayantika Debnath & Sankar Roy Maulik	217
--------------	--	-----

Chemicals & Hydrocarbons: Speciality Chemicals

94_IEC30297	Turning Art into Design: Creating a Surface with a Discharging Effect Prateek Sarkar & Sankar Roy Maulik	225
-------------	--	-----

Chemicals & Hydrocarbons: Waste Management & Pollution Abatement

172_IEC77699	Preparation of Activated Carbon-Alginate Beads for Adsorption of Methylene Blue Shreya Khan, Sudeshna Saha & Sujata Sardar	231
--------------	--	-----



192_IEC48857	Effectiveness Study of Banana Peel Biochar (BPB) towards Adsorption of Fluoride Present in the Solution Joyashree Goswami, Priyabrata Mondal, Pankaj Kumar Roy & Papita Das	235
198_IEC9777	A Critical Review on Biological Remediation of Per- and Polyfluoroalkyl Substances Debojit Sarkar & Sudeshna Saha	238
204_IEC72985	Facile Low Temperature Fabrication of B-TiO₂ using Sol-Gel Method Mousom Roy & Sudeshna Saha	242
207_IEC64320	Preparation of Activated Biochar doped Polyvinyl Alcohol (PVA) Aerogel and its Application in Wastewater Treatment Subhasis Ghosh & Papita Das	245
210_IEC35362	Sustainable Solutions: Efficacy of Catalyst-Induced Co-Pyrolyzed Jute-PET Char in Congo Red Dye Removal from Wastewater Sayan Mukherjee & Papita Das	249
211_IEC57058	Extraction of Silica from Sugarcane Bagasse and its Application in PVA Aerogel Preparation for Dye Removal from Water Solution Ashmita Samanta & Papita Das	253
216_IEC61578	Waste Leaf Biomass to Activated Carbon: A Sustainable Strategy for the Removal of Cationic Dye from Wastewater Poushali Chakraborty, Drisha Roy & Papita Das	257

Environment & Sustainability: Air Pollution and Control

320_IEC49345	Phytoremediation Technique for Reducing Air Pollution in Indoor Environments Shrija Madhu, Kilari Jyothi & N Leelavathy	265
--------------	---	-----

Environment & Sustainability: Climate Change — Mitigation and Adaptation

189_IEC89545	Impact of Metrological Parameters on Tea Yield in Assam (India) Chiranjit Bhowmik, Paritosh Bhattacharya, Umesh Mishra & J K Mani	271
374_XXXXXXXX	Dam Safety Act-2021 — Dam Rehabilitation & Improvement Project (DRIP of Govt. of India): Practical Issues Related to Implementation Satyabrata Banerjee	272

Environment & Sustainability: Environmental Pollution and Management

45_IEC51255	Novel Approaches: Shipborne Oil Slick Detection and Mitigation Gutturthi Sohita, Vedika Gaur & Sunil Kumar P G	279
56_IEC19323	Decarbonizing the Maritime Industry: The Way Ahead Aleena Babu, Aswani Anil & Sunil Kumar P G	282
93_IEC96796	Exploration and Optimisation of Eco-Friendly Dyeing with Natural Indigo Ritwick Halder, Prashanta Pal & Sankar Roy Maulik	285
130_IEC73909	Sound Absorbing Textiles – A Review of Accomplishing Quiet Comfort Ragini Mukherjee & Sankar Roy Maulik	288
201_IEC29747	An Investigation on Quantity of Domestic Wastes Generated from Packed Utilities Govindasami S, Anwer Rihaan H, Dharanidharan S, Srinivasan M & Prathesh Kumar S	291
272_IEC48090	Utilization of a Biochar Synthesized from Rice Straw and Modified by a Hummer's Method for the Purpose of Removing Carbamazepine from its Aqueous Solution: Batch Study and Fixed Bed Study Sandipan Bhattacharya & Papita Dasa	295
282_IEC98328	Ship Operation for Net Zero Emission Sadhan Kumar Sarkar	300
329_IEC74956	Effluent Discharge from Metal & Metallurgical Industries – Environmental Impact and Control Mary Sarker & Pradipta Dutta	306



351_IEC53107	The Recycling Gap: Assessing India's E-Waste Management Infrastructure Spandan Ghosh, Satyajit Chaudhuri, Abhisek Roy & Anupam Debsarkar	308
377_IEC318	Wreck Removal of MV Green Opal Gautam Sen	312

Environment & Sustainability: Natural Disaster Mitigation

104_IEC99914	Fractal Dimension and Earthquake Frequency Magnitude Distribution in West Patna Fault, Bihar Sumit Narayan Chowdhuri	317
171_IEC68944	Remote Sensing based Disaster Management Pradipta Chakraborty, Shubhrangshu Ghosh, Syed Mujibul Islam & Abhishek Roy Choudhury	318

Environment & Sustainability: River Rejuvenation

80_IEC8422	Water Quality Index and Sediment Analysis in the Lower Basin of the River Hooghly Bitasta Ghosh & Gupinath Bhandari	325
280_IEC99195	Antibiotic Detection in River Water by Electric Field Enhanced Graphene Electrochemical Sensor Usha Rani Dash, Piyali Mukherjee, Sharbadab Kundu & Chirasree RoyChaudhuri	329

Environment & Sustainability: Sustainable Development and Smart Cities

67_IEC76553	Soil Slope Stability using MSW Inceneration Ash Malathi N, Harsha Vardhan C H, Poulesh J & Tejaswi N	337
125_IEC53884	Structural Conservation Work of Rumi Gate, Lucknow — an Overview Pankaj Kumar Tiwari, Aftab Hussain & Govind Pandey	342
238_IEC9009	Pathways to Sustainability for Higher Education Institutions: NIRF induced SDGs Vijayan Sundarave, Satheesh Kumar Gopal & Julie Charles	346
241_IEC29740	Circular Economy of Water: Production to Reuse for Sustainability Ravi Prakash Suthar	352
244_IEC1595	Smart Precision Irrigation System: Matrix-Driven Capacitive Sensing Optimization with Machine Learning Lilly Sheeba S, Preethi Parameswari S, R S Jayasuriya & K Logasri	353
269_IEC41020	Water Harvesting from Air Conditioners: A Green Approach Somdeep Chakraborty, Kaberi Majumdar, Manish Pal, & Pankaj Kumar Roy	358
316_IEC67101	Transport Sustainability in Extreme Weather Conditions: An Indian Perspective Nilay Mallick, Pritam Saha & Sudip Kumar Roy	360

Environment & Sustainability: Sustainable Industrial Processing and Green Technologies

23_IEC80660	Bio Treatment of Jute for Sustainable Scouring: An Alternative Approach Sambhu Nath Chattopadhyay, Kartick K Samanta, Deb Prasad Ray & Santanu Basak	367
38_IEC4270	Fragrance Finishing on Textiles through Microencapsulation Sujata Roop & Sankar Roy Maulik	371
48_IEC97495	Study of Compressive Strength of Concrete Modified with Pulverized Water Hyacinth Arya Chakraborty, Heleena Sengupta & Suman Pandey	376
69_IEC45750	The Promise of Syzygium Aromaticum (Clove Oil) in Developing Antimicrobial and Green Textiles Abhijit Mukherjee	381
95_IEC91468	Diversified use of Water Hyacinth Soumili Pal & Sankar Roy Maulik	385
110_IEC38742	The Functional Aspects of Natural Dyes used in Traditional Textiles Silpinwita Das & Sankar Roy Maulik	388



116_IEC79003	Exploration of Resist Technique with Natural Dyes Sangya Ghosal & Sankar Roy Maulik	390
178_IEC87726	Improving Power Plant Efficiency through Carbon Capture and Utilization: CO₂ Capture in a Rotating Packed Bed Pilot Plant of One TPD Capacity Sukanta Kumar Dash	393
208_IEC4195	Leveraging AI and Continuous Improvement for Zero Defects and Sustainability in the Automotive Naba Kumar Das, Satnam Singh & Anmol Bhatia	399
278_IEC59702	The Selection of Optimal Biocomposite by Utilizing a Multi-Criteria Decision-Making Technique Pavan M, Surabhi Mahajan, L Ammayappan, Nageshkumar T & Sandhya Ravi	403
308_IEC11665	Standardization of Sustainable Surface Modification Protocol of Nonwoven Jute Fabric with Dry Heat Treatment for the Development of Biocomposite Products L Ammayappan, K K Samanta, S Bhowmick, D P Ray, S Chakraborty & D B Shakyawar	407

Environment & Sustainability: Waste Management and Circular Economy

25_IEC55364	A Small-Scale Pilot Project on Vermicompost Enriched with STP Sludge: An Opportunity to Recycle the Organic Waste into Organic Fertilizer G Khankari, D V Rajan, D K Singh & R Kumar	413
34_IEC46195	Just Transition of NTPC Badarpur Power Plant — a Leap towards Sustainable Future Jeetandra Kumar Chaudhary	419
89_IEC85694	Packaging Box for Transport of Fruits and Vegetables from Jute Stick Particle Board Sanchita Biswas Murmu, Laxmi Kanta Nayak, Ammayappan Lakhmanan & Haokhothang Baite	431
102_IEC26914	Eco-friendly Handmade Paper from Jute Komal Shaw & Sankar Roy Maulik	432
133_IEC70372	Sustainable Textiles through Natural Dyes – a Shift from Fast to Slow Tithi Mitra & Sankar Roy Maulik	436
205_IEC55108	Cradle-to-Gate Life Cycle Assessment of Perlite Based Composite Plaster Developed with Upcycled Material Neeraj Jain, Payal Bakshi, Aakriti & Soumitra Maiti	438
297_IEC77354	Waste Management and Circular Economy B Basu	444
318_IEC429	Smart Waste Management: A Community-Driven Revenue Generation Model for Small Townships Pallavi V Kharat & Akansha S Chavan	449

Information & Communication Technology: 5G/6G Communication

152_IEC74748	Design and Analysis of Compact Antenna for 5G Advanced MM Wave Bands for V2X Wireless Telemetry Applications Arun Raj & Durbadal Mandal	453
188_IEC36941	Selection of a Suitable Filter to Reduce ISI and Improve BER for 5G Links Sabyasachi Chatterjee & Prabir Banerjee	458
217_IEC56673	Far Field Radiation Pattern Synthesis of Elliptical Antenna Array for 5G and 6G Communication Systems Satish Kumar, Gopi Ram, Durbadal Mandal & Rajib Kar	462
291_IEC91281	Empowering Bharat's Digital Future through 5G Ecosystem and Bharat 6G Alliance (B6GA) Initiative — A Collaborative Approach Labh Singh	466



Information & Communication Technology: Computer Architecture

- 228_IEC55293 **Bridging Technology and Tradition: Mobile Apps in the Preservation of the Irular Language**
Abhinav Gosain, Anshuman Mishra, Uma Devi & Arul Dayanand 471

Information & Communication Technology: Cyber Security

- 129_IEC43639 **Enhancing Healthcare Security and Efficiency through Blockchain and Fully Homomorphic Encryption**
Ronita Adhikari, Sayanty Chatterjee, Ujjwal Kumar Kamila & Sayantani Chakraborty 475
- 265_IEC2721 **Phishing Detection using Machine Learning Algorithm**
Rachel Evelyn R, Keerthana S, Isha Devi K & Devadhashiny S P 476

Information & Communication Technology: Digital Transformation (AI/ML, Bigdata, IoT, IIoT, Analytics, Cloud Computing, Digital Twin, Robotics, Industry 4.0/5.0)

- 12_IEC00012A **Role of Machine Learning Analytics to Secure Financial Fraud Operations**
Vivek Soni 483
- 50_IEC65760 **Optimizing Indian Agriculture with AI and IOT Selecting Mutation for Crop Optimization**
Tatiraju V Rajanikanth & P Sreenivasa Rao 484
- 55_IEC60336 **Application of Convolution Neural Network to Classify Thermal Tomographic Images for Heating Assessment**
Chayan Kumar Basak, Seshu Kumar Damarla & Palash Kumar Kundu 488
- 58_IEC22427 **Business Growth with AI/ML**
S Adharsh Narayana & S Saai Vishwanath 493
- 74_IEC74268 **Exploration of Relative Permittivity as a Marker For Moisture Content in Bamboo Samples**
Subhadeep Basu, Supriya Gain, Amit Swain, Arijit Sinharay, Chirabrata Bhaumik & Tapas Chakravarty 497
- 88_IEC89694 **Quantum Speedup of Machine Learning Algorithms**
Prateek Khanna 503
- 103_IEC43935 **Revolutionizing Healthcare: A Comprehensive Survey on Large Language Models**
Shillpi Mishra, Anup Kumar Barman & Apurbalal Senapati 506
- 113_IEC96381 **A Systematic Review and Experimental Analysis of AR Based Simulator used for Maritime Training**
Mahesh Patil, Sanjeet Kanungo, Aniruddh Achary & Shivali A Wagle 511
- 124_IEC35197 **Development of an IoT based Simplex Wireless Communication Protocol for Smart Lighting Control**
Shaheen Wasif & Parthasarathi Satvaya 515
- 135_IEC29928 **Comprehensive Survey on Blockchain-Based Identity and Access Management Systems in Mobile Networks**
Pratap Nair, Ashok Jetawat, Jayshree Jetawat & Renuka Deshpande 520
- 151_IEC54034 **Wireless IoT-Based Soil Health Monitoring System by using Soil NPK Sensor for Crop Yield Optimization**
Sanjeev Kumar, Kaushal Kumar & Manodipan Sahoo 523
- 153_IEC69 **Leveraging AI and Digital Twin Technology to Shape the Future of 6G Wireless Communication Networks**
Arun Raj & Durbadal Mandal 530
- 155_IEC62341 **Electricity Power Defense Mechanism**
T Dhanalakshmi, Keerthi Vasani S J, Marshall R & Mohammed Kaif A 535



164_IEC44093	Robust Deep Learning Model for Plant Disease Identification and Management with Crop-Specific Precision	
	Lilly Sheeba S, Om Shree Gyanraj, Narmatha Sri D, Rameeza Yasmeen S & Keerthana S	540
169_XXXXXXX	Investigating the FSO Communication Way using Articulate Optical Sources in Visible Wavelength under Simulated Rainy Condition	
	Tanajit Manna, Shibabrata Mukherjee & Parthasarathi Satvaya	545
174_IEC73247	Gen AI-Powered Distributed Asset Health Monitoring, Data Ops & Chat Interface	
	Avishek Das	556
181_IEC36267	Facial-recognition based Secured Cloud Voting System using Transfer Learning	
	Roneeta Purkayastha & Abhishek Roy	562
196_IEC44417	A Comprehensive Approach for Enhancing Mental Well-Being through the Application of Restorative Frequencies	
	Swati Chowdhuri, Trisha Paul & Sheli Sinha Chaudhuri	567
214_IEC77249	Effects of Frequency and Mass Variations on QCM Response by Eco-Friendly Green Synthesis of Silver Nanoparticles Derived from Murraya Koenigii Leaf Extract	
	Subhojit Malik, Amrik Basak, Subhajit Roy & Prolay Sharma	574
215_IEC44546	Estimation of Chilli Growth Parameters: Monitoring Length and Width in Field Conditions with Low-Cost, Portable IoT-based Device	
	Subhojit Malik, Foyjun De, Ganga Roy & Prolay Sharma	578
219_IEC66194	Enhancing Human behavior Analysis in Digital Systems through Domain Adaptation in Facial Emotion Recognition	
	Saiyed Umer	583
223_IEC98532	A Compact and Non-Invasive Photoacoustic Sensor with AI for Volume Solids Measurement of Paints	
	Abhijeet Gorey, Pathikrit Gupta, Rajat Das, Chirabrata Bhaumik & Tapas Chakravarty	590
224_IEC62614	Computerized Verification Analysis for Digitally Printed Receipts	
	Biswajit Halder, Debjani Chakraborty, Chirajeet Sarkar & Sourav Banik	594
243_IEC27886	Development of Smart Helmet for Safety of Underground Mine Workers	
	Sanjeev Kumar, Kaushal Kumar & Manodipan Sahoo	599
248_IEC27842	Meijering Filter Based Approach for the Identification of Papaya Seed Adulterants in Black Pepper	
	Writi Mitra Sarkar & Prolay Sharma	605
252_IEC80967	Current Trends and Technological Features of E-Textile, Smart Garments and Intelligent Apparels: An Overview	
	Arghajyoti Dasbairagi, Sayoni Nath & Anirban Dutta	609
258_IEC72068	A Novel Lightweight Cryptographic Protocol for Smart Home IoT Security using CoAP	
	Subhashini R & Jyothi D G	615
262_IEC61857	Enhancing Security in User Authentication: A Hybrid Approach using Biometric and Behavioral Analysis	
	Preethi Parameswari S, Subiksha T, Aarthe S & Harini M	620
264_IEC45716	Machine Learning — Child Exploitation and Abuse	
	Faritha Begum M, Akalya N, Dhanushpriya T & Valli A	625
270_IEC85725	Towards Sustainable Aquaculture: Real-Time Detection of Freshwater Fish Species in the Indian Subcontinent	
	Mohammad Hatif Osmani, Kyamelia Roy, Tapan Kumar Pal & Sheli Sinha Chaudhuri	632
274_IEC15719	Plasmonic Metamaterial Sensor for Nanoplastic Detection	
	Subhasri Chatterjee, Anish Datta, Soma Bandyopadhyay & Tapas Chakravarty	638
295_IEC27843	Application of NLP in Job Search in Social Media (Analysis, Comparison, and Prediction of Job Search in LinkedIn & Indeed Site)	
	Debanshi Deb, Suparna Pal, Maitrayee Chakraborty, Sibom Indra, Alok Kumar Shrivastav & Sudip Kumar Das	641
298_IEC23490	Novel Data Imputation Technique for Mental Health Prediction	
	Md Iqbal, Aritra Bag & Abhishek Das	648



323_IEC7296	XceptionNet: A Truly Exceptional Deep Learning Network for Brain Tumor Characterization Mostafijur Rahman & Ayatullah Faruk Mollah	655
325_IEC17124	Applications of Textural Features and PCA on Facial Recognition after Medical Alterations Tridib Maiti, Arunava Chakraborty, Debabrata Das, Subhra Pratim Nath, Samit Biswas & Aniruddha Dey	659
327_IEC74465	Hand Gesture Recognition for Deaf-Mute: Insights from RGB and RGB-D Driven Deep Networks Taniya Sahana & Ayatullah Faruk Mollah	665
332_IEC78768	Cave Mapping using Unmanned Remote Controlled Vehicle Arpita Santra, Sourav Mahapatra, Udit Ranjan Bairy, Prakash Roy, Aryan Roy & Soumyajit Basak	670
367_IEC21843	Generation of a Personal AI ChatBot using the Concepts of Natural Language Processing Rachel Evelyn R, Manas S, Sathiyarayanan G & Giridharan P	674
369_IEC31857	A Robust Deep Learning Framework for Validation of Reduplicated Multiword Expressions in Digital Bengali Texts Subrata Pan	679

Information & Communication Technology: Microwave, Millimeter Wave and THz Communication

100_IEC59986	A Novel Design of Metasurface Flat Antenna Modules for Low-Profile VSAT Mobile Terminal Applications Soumya Chakravarty, Tapas Chakravarty & Arpan Pal	683
106_IEC70946	Minkowski Fractal Shaped Reconfigurable Intelligent Surface Design with Bi-Directional Beam-Tilt Performance Amartya Banerjee, Vedula Kiran Bharadwaj & Rowdra Ghatak	687
199_IEC53942	Design and Characterization Studies of Terahertz Antenna for Sustainable Health Arpita Santra, Maitreyi Ray Kanjilal & Moumita Mukherjee	691
237_IEC32225	Design of MIMO DRA with Isolation Strips and Metallic Rod for Enhanced Performance in Microwave Applications Akshit Kadiyan, Jaskirat Kaur, Deepak Kumar Sharma, Pinku Ranjan, Rakesh Chaudhary, Arun Kumar Singh & Gourab Das	697

Information & Communication Technology: Optical Fiber Communication

149_IEC98331	Fiber Bragg Grating Sensor for Precise Monitoring of Healthcare Parameters Santosh Jotiram Jagatap, Ashok Jetawat, Jayshree Jetawat & Saurabh Mehta	705
--------------	---	-----

Information & Communication Technology: Quantum Computing- Quantum Sensing, Quantum Security, Quantum Communication

65_IEC48667	The Convergence of Quantum Computing and AI in Defense: Shaping the Future of Global Security Siddarth Laxminarayanan	711
294_IEC8235	Quantum Algorithms and Computational Advantages for Fintech Safety Bhavana Narain & Sanjay Kumar	714

Information & Communication Technology: VLSI

300_IEC68259	Comparative Analysis of Intercalation Doped MLG NR-based On-chip Inductor Santasri Giri Tunga, Subhajit Das, Sandip Bhattacharya & Hafizur Rahaman	721
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Infrastructure: Application of AI & ML and Computational Techniques for Infrastructural Systems

52_IEC49542	BARF — A Web-based/Terminal Application for Multi-Objective Optimization of Pinned and Rigid Building Frames using Evolutionary Algorithms Akhilesh S V	729
212_IEC32392	Automated Arc Welder's PPE Object Detection System using YOLOv8 Large Model Sarvesh Terkar, Sakshi Indolia, Aditya Kasar & Divyang Jadav	737
253_IEC67358	Higher Order Accurate Finite Difference Method for Solving Level Set Equation for Moving Interface Problems Arindam Sarkar, Rajendra K Ray & HVR Mittal	741
257_IEC62315	Exploring Flow Patterns around Bluff Bodies using Physics-Informed Neural Networks Biswanath Barman & Rajendra K. Ray	744

Infrastructure: Disaster Resilient Infrastructural Systems

218_IEC57391	Unique Steel Concrete Composite for Most Demanding Civil Engineering Applications in Infrastructural System Pathik Debmallik & Pramit Debmallik	751
266_IEC2817	Seismic Behaviour Assessment of Conventional and Hybrid Reinforced Concrete Buildings M Mothilal, G Srinath & K Gopi Krishna	755
277_IEC43305	Removal of Chloride from Wastewater using Anion Exchange Resin: Fixed Bed Column Study Soumitra Maiti, Parul Prajapati & Neeraj Jain	760

Infrastructure: Health Monitoring and Retrofitting of Infrastructural Systems

32_IEC22319	Health and Performance Monitoring for Reducing Infrastructural Downtime: Intelligent & Predictive Maintenance with Retrofittable Onboard Diagnostic and Remote Monitoring Systems Arup Mukherjee & Sanjoy Chakrabarty	767
120_IEC67763	Dynamic Behaviour and Numerical Analysis of a Supportive Transportation Infrastructure: A Case Study A Narayana Rao & K M L Rao	772
121_IEC36045	Numerical Analysis of Existing Bridge Infrastructure Dr A Narayana Rao	783
176_IEC88585	Retrofitting of Structural Members with Post-Tensioned CFRP Strips Vivek Kumar Singh, Arnab Sur, Swati Maitra & Prabal Kumar Roy	784
220_IEC39417	New Technique for Evaluating Concrete Strength through Non-Destructive Testing Mangesh Daji Kevadkar & Ganesh A Hinge	789
263_IEC90596	Inclinometer-based Health Monitoring and Digital Twin Development for Simply Supported Beam Subjected to Point Load Prathamesh Mahesh Varma	793
378_	Non-Linear Comparative Study of Retrofit Schemes for a Real-Life Vertically Misaligned RCC Over Head Reservoir Based on Seismic Vulnerability Assessment Devjit Acharjee	797
379_	Experimental Study of RCC T-Girder under Fatigue Loading Adopting Ambient Vibration Technique Tuhin Sen	802



Infrastructure: Planning and Design of Infrastructural Systems

51_IEC65812	Addressing Systemic Challenges in the Construction Industry: Pathways to Sustainable Improvement Acharyulu N R & Prasad K V	809
60_IEC22309	Design of Transfer Beam for Torsion & It's Analysis in Different Seismic Zones Aditya Jaiswal	815
62_IEC95497	Design Concept, Optimisation Opportunities and Challenges of an Underground Station Supporting a Flyover and Ramp Chiranjib Sarkar & Manab Kumar Sinha	819
105_IEC56565	Development of Infra-structure for Measurement of Needle butt-Cam Interactive Force inside Knitting Zone of Double Jersey Knitting Machine Sadhan Chandra Ray	820
108_IEC1133	Lift Irrigation —Re-Engineering of Irrigation Projects in the State of Telangana M K Sinha	824
112_IEC19999	Project Execution Marvel in Refinery, Petrochemical, Fertilizer, and Similar Chemical Plants — Leverage Modularization Pranabesh R Das	829

Infrastructure: Safety and Reliability of Infrastructural Systems

20_IEC50391	An Assessment of the High Mast Poles' Reliability with Corrosion Contemplated Ashish Patil & Makarand Kulkarni	839
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Infrastructure: Special Infrastructural System and New Technologies

36_IEC91205	Evaluating the Structural Integrity of Gabion Walls under Repeated Lateral Loads using Alternative Infill Materials Rohith Jain, G S Suresh & Gourav K	847
86_IEC68132_	Self-Healing Nano Additives for Augmenting the Durability and Sustainability of Cement Composites Mainak Ghosal & Arun Kumar Chakraborty	851
119_IEC61765	Autocross — an Automated Transit Shuttle System for Decoupling Pedestrians and Road Traffic Satheesh Kumar Gopal, Vijayan Sundaravel & Julie Charles	855
134_IEC55890	Manufacturing of Indigenous Tribal Bi-Component Fibres for Technical Textile Sector Subhankar Maity, Mukesh Kumar Singh, Deepak Mishra, Amandeep Singh & J Ramkumar	860
231_IEC78856	Border Security Lighting: Comparison and Implementation of Different Types of Photometric Distribution Ankit Ghosh & Parthasarathi Satvaya	867

Infrastructure: Sustainable Material for Infrastructural Systems

46_IEC75597	Investigation on Behavior of Concrete Modified with Water Hyacinth Fiber Tanusri Dutta, Suman Pandey & Heleena Sengupta	875
84_IEC8644	Measuring Bitumen Consistency: A Journey through Penetration, Viscosity and Performance Grades Asit Ghosh & Pritam Saha	880
90_IEC38416	Advancements in Sustainable Concrete Technologies and the Role of Graphene Oxide in Self-Compacting Concrete Mohammed Shakeeb Ulla Khan & Vijaya G S	885
101_IEC82835	Review of Nanomaterials in the Civil Engineering Infrastructures Girish Chandra Gandhi, Payal Mehta & Ankit Sodha	891



117_IEC30711	Ground Improvement by Admixture using Banana Fiber: Experimental Study Subhadeep Mondal, Labani Nandi, Sudip Basack, Joyanta Maity & Subha Sankar Chowdhury	897
141_IEC47603	A Review on Seismic Performance of Smart Structures and Bridges with Shape Memory Alloy Reinforcements N Meenalochani, Ankit Sodha & Payal Mehta	902
307_IEC43265	Overview of using Construction & Demolition Waste in Hot Mix Asphalt Setu Shubham & Sudip Kumar Roy	905

Infrastructure: Transportation Infrastructure

41_IEC6554	Traffic Signal Optimization and Synchronization using PTV Vissim Malathi N, Poulesh J, Tejaswi T, Gopi Sai Ch & Mahitha A	913
49_IEC71570	The Scenario of Advanced Aviation Manufacturing and Maintenance in India for Deployment throughout the Subcontinent: Opportunities, Threats and Strategic Outlook Antariksha Sarkar & Arnab Banerjee	918
96_IEC25991	Can Indigenous Driving Simulators Surpass the Limits of Automated Simulation Trials? Ayan Kumar Naskar & Pritam Saha	923
138_IEC31743	Erection of Two Stage Cantilever Concourse and Platform Pier Arm for Elevated Metro Stations Anshul Agrawal	928
175_IEC1445	Evaluation of Dowel Joints using Ground Penetrating Rader — A Case Study on a Highway Stretch Arnab Sur & Swati Maitra	932
314_IEC1506	Evaluating the Performance of Cell-Filled Concrete Pavement using Non-Destructive Testing Techniques Pritam Saha, Sandip Chakraborty & Sudip Kumar Roy	936
349_IEC98772	Construction of Whitetopping and its Performance in Early Years — a Case Study in India Dhritee Diksha Baroowa & Swati Maitra	940
362_IEC63043	Autonomous Vehicle in India: Navigating Technological Potential and Regulatory Hurdles Shambhu Prasad Chakrabarty & Ankita Roy	945

Metals & Minerals: Automation in Mining Operation

357_IEC16056	Evaluation of Social Hazard, Psychological Conditions, and Innovation in Automated Mining Operations Goutam Roy, Biswajit Banik, Aman Ahamed Mokami, Subarna Sardar, Rajarshi Chakraborty, Tanbir Islam & Rakesh Sikder	951
--------------	---	-----

Metals & Minerals: High Performance Structural Materials for Mobility Applications

35_IEC14509	An Efficient Method to Enhance the Life of “Sprocket (Ground Engaging Tools)” in Hydraulic Excavators by Adding “Boron” as a Micro-alloying Element Arup Mukherjee, Manoj Kumar Barik, Vipul Kumar & Sandeep Mishra	959
68_IEC82798	Mitigating Failures in 309S Stainless Steel Furnace Component: Causes and Solutions Pradip Sahana	965
281_IEC69270	Modeling and Simulation Studies on TIG Welding of Gas Turbine Combustion Liner Sub-Assemblies A Manjunath, Srinivasulu K, Vinoth & Sivasankari R	966
299_IEC82979	Case Study of FEM Analysis of Spreader Beam (Lifting of Beam) Rahul Kumar Singh & Shashwata Das	970



372_IEC81891	Prediction of Lankford Constant from the Composition and Processing Parameters of High-Strength DP Steel using Machine Learning Avijit Pal, Rajan Verma, Pritam Mandal, Prabhat Dash, Snehanishu Pal & Manojit Ghosh	971
373_IEC45597	Structure-Property Correlation of a Novel Quenched and Partitioned (Q&P) Steel Shibam Mishra, Indrajit Dey & Swarup Kumar Ghosh	975

Metals & Minerals: Integrated Computational Materials Engineering (ICME)

363_IEC27948	Molecular Dynamics Study on Bending Creep Characteristics of BaPd₂ Crystal using Developed Embedded-Atom Method Potential of Palladium-Barium Alloy Sankhasubhra Mukhopadhyay & Snehanishu Pal	983
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Metals & Minerals: Materials for Energy, Sensors and other Electronics Applications

17_IEC14477	Synthesis and Characterization of Delafossite CuAlO₂ by Sol-Gel Process Soumya Mukherjee	987
150_IEC57684	Phase Analysis, Dielectric, PL and Microhardness of CuAlO₂ by Ball Milling Process Apurba Sarkar, Soumya Mukherjee & Nandan Pakhira	991

Metals & Minerals: Mineral Beneficiation and Waste Management

31_IEC13634	A Brief Glimpse on the Development of Aluminium Matrix based Composites using Wastes by Powder Metallurgy Route Dibyendu Mondal, Soumya Mukherjee & Manojit Ghosh	999
132_IEC57282	Dry Beneficiation of Coal by DE-XRT SBS Technology Ashim Kumar Mukherjee	1003

Metals & Minerals: Multifunctional Materials

354_IEC74200	Emerging New Technologies in Metal Forming of Aluminium Alloys Lal Bihari Singh	1011
--------------	---	------

Metals & Minerals: Sustainability in Mining

59_IEC75739	Sustainability in Mining through Cradle to Cradle Approach P Venkatesan	1017
240_IEC32253	Analysing the Behaviour of PVC Concrete Props through Laboratory Investigation & Numerical Modelling Shatadru Kundu & Sreenivasa Rao Islavath	1020
276_IEC69870	Study on Hot Hole Blasting for High-Temperature Mining Environments: Techniques, Challenges, Mitigation Strategies and Environmental Impacts Nabyendu Neogi, Praveen Ranjan, Subhajit Halder, Sanjay Kumar Singh, Satender Kumar & Kumar Ritesh	1025
328_IEC56	Renewable Energy and Carbon Footprint Reduction in Mining — A Study on Electrification and Sustainable Practices Maitreya Ranjit & N C Dey	1031

Power & Energy: Advanced Fossil-Fuel Technologies

249_IEC29128	Experimental Validation of Palm Biodiesel and Mexicana Biodiesel for Hybrid Biodiesel Testing Ankita Kailas Patil & Jayant Hemchandra Bhangale	1037
--------------	--	------

**Power & Energy: Applications of AI and ICT**

- 78_IEC3083 **Fault Diagnosis of Induction Motors using Variational Mode Decomposition (VMD) and Artificial Neural Network (ANN)**
G Das & P Purkait 1045
- 361_IEC98767 **DWT-based Feature Extraction and Machine Learning based Bus Fault Diagnosis in Ring Type Power Distribution Network**
Surajit Chatopadhyay, Sudip Murmu, Ananya Bhattacharya & Saumili Mondal 1050

Power & Energy: Condition Monitoring and Retrofitting

- 29_IEC33007 **A Brief Glimpse on the Design and Performance Analysis of Induction Furnaces**
Sourav Basu, SouravDebnath & Soumya Mukherjee 1061
- 370_IEC28795 **Fault Diagnosis and Adaptive Reconfiguration of BLDC Motor Drive**
Balaji & Muthu Selvan N B 1066

Power & Energy: Distributed Generation, Micro-Grid and Smart Grid

- 39_IEC81174 **3-E Analysis of the Vapour Absorption Refrigeration System with Micro-Steam Turbine Integration: An Efforts towards Energy Conservation in the Thermal Power Plants**
G Khankari, D V Rajan, S H Choudhury & R Kumar 1069
- 99_IEC28601 **Economic Dispatch of a Hybrid Solar-Wind-Biomass based Microgrid using Novel Nilgiri Tahr Optimization**
Supratim Gupta & Prithwiraj Purkait 1075
- 115_IEC64210 **Techno-Economic Optimization for Overall Sustainability of Decentralized Hybrid Energy System using Machine-Learning Based Forecasting of Load and Weather Data**
Risav Dutta, Sayan Das, Barun Mondal & Sudipta De 1081
- 148_IEC97686 **Prosumer Power Exchange with Battery Energy Storage Systems Integration in India**
Amith Vijayan 1087
- 163_IEC93256 **Real-Time Performance Monitoring of a Grid-Connected Microgrid with PMSM-based Wind Energy Conversion System**
Sujoy Ranjan Nath, Rishov Sarkar, Biuhai Chatterjee & Prithwiraj Purkait 1092
- 193_IEC49191 **An Economical Micro Grid Architecture for Single-phase to Three Phase Power Governance System**
Maitrayee Chakrabarty, Debodyuti Upadhaya, Gargi Roy, Pratik Kumar Baidya, Arpita Majumder, Raju Basak & Rakesh Das 1098
- 309_IEC23823 **Modelling and Impact Assessment of Renewable-based Bidirectional Power Flow on the Performance of Distribution Transformers**
Moumita Pramanik, Konika Das Bhattacharya, Chandan Kumar Chanda & Raju Basak 1103
- 324_IEC37567 **3-Phase Fault Detection using Neural Network by Wavelet Transform on PV-Biomass based Grid Connected Microgrid System**
Shouvik Mondal & Arindam Kumar Sil 1108
- 336_IEC34711 **Transforming the Indian Renewable Energy Rural Microgrid with the Synergy of Block Chain Analytics**
Abhishek Kumar 1113

Power & Energy: Electrical Machines and Drives

- 364_IEC27406 **Maxwell Analysis of an Induction Motor during Inter Phase Short Circuit Fault using Ansys**
Surajit Chatopadhyay, Goutam Kumar Ghorai, Rajeev Kumar, Suvajit Ghosh, Aditya Narayan Banerjee, Lisa Coomer, Aritra Chattopadhyay, Debopoma Kar Ray & Tamal Ray 1121



Power & Energy: Energy Policy, Economics and Sustainability

43_IEC81446	Transitioning to a Low-Carbon Economy in India: Policy Framework and Economic Outcomes P Mahendra Kumar	1133
47_IEC67114	Energy Scenario in India K Sridharan & V Ramanathan	1137
136_IEC69850	Energy Policy, Economics and Sustainability for India: Challenges Ahead and their Mitigation Measures Raj Kumar Mukherjee	1141
227_IEC29273	Integration of Virtual Power Plants for a New Generation Smart Grid in Electricity Market Dipu Mistry, Binoy Krishna Biswas, Maitrayee Chakrabarty, Bishaljit Paul, Raju Basak & Chandan Kumar Chanda	1147
230_IEC70431	Uncertainty Realization through Stochastic Scheduling through Energy and Reserve Markets Susovan Dutta, Bishaljit Paul, Barnali Kundu, Raju Basak & Chandan Kumar Chanda	1149
321_IEC1404	Projecting or Estimating Nodal Congestion Price and IMO Pay by Ada-Boost for of a Restructured Electrical Market Writwik Balow, Dipu Srkar & Raju Basak	1150

Power & Energy: Energy Storage Technologies

126_IEC52277	Pump Hydro Storage Project (PSP) — Energy Storage Technologies Manhar K Jadav & Rajkumar Jayswal	1161
137_IEC92829	Prospective Prioritization of Strategies for Sustainable Development of Storage Industry of India by Integrating SWOT-Hesitant Fuzzy MCDM Method Sayam Das, Risav Dutta & Sudipta De	1164
222_IEC59788	Enhance Current Boosting for MHTG using TP4056 Module and make it Application Suitable Rajbansi S Kognole, Ganesh A Hinge & Amol B Ranadive	1170
313_IEC57991	Optimizing Heat Transfer in PCM-Based Thermal Energy Storage Systems Dipankar Paul & Nirmalendu Biswas	1174

Power & Energy: Frontier Technologies in Mobility

187_IEC20145	Design Innovations and Performance Optimization in Tilting Pad Journal Bearings: A Review Bharat Bharat Namdev Kharad, Rajendrakumar Giridharilal Tated & Jayant Hemchandra Bhangale	1183
--------------	--	------

Power & Energy: Power System Stability, Reliability and Flexibility

21_IEC75354	Power System Flexibility – a Key Enabler for the Energy Transition S Dharmalingam	1191
40_IEC52519	Analysis and Risk Assessment of Fault Induced Delayed Voltage Recovery Events and its Interplay with Load Nature Alok Pratap Singh, Rajib Sutradhar, Chandan Mallick & Bilash Achari	1195
131_IEC5848	Retrofitment of SEALGUARD ASSEMBLY in WAGON TIPPLER for Reliable Operation of Movable Side Beam in Wagon Tippler: A Case Study of NTPC KUDGI Himanshu Kumar	1203
156_IEC39801	A Comparative Study of Various FACTS Devices used in Modern Power Systems for Efficient and Reliable Power Transmission Titas Bhaumik, Tanaya Datta Das & Dharmadas Mandal	1204



168_IEC67924	An Effective Configuration Approach by Reverse Delete Algorithm based on Graph Theory Antara Kundu, Maitrayee Chakrabarty, Kajal Kharati, Harsh Kumar Shaw, Dipu Sarkar, Raju Basak & Rakessh Das	1207
286_IEC88714	Modern Concept and Analysis of Power System Stability Improvement by State Estimation and Soft Computing Technique Suparna Pal, Alok Kumar Srivastav & Maitrayee Chakrabarty	1213
352_IEC33670	Enhancing Power System Stability, Reliability, and Flexibility: A Comprehensive Approach to Future-Proofing the Grid Muthu Selvan N B & M Balaji	1225

Power & Energy: Renewable Energy Technologies

33_IEC20606	Hybrid Battery Trolley for Reducing Down-Time: Innovative Solution by Augmenting Renewable Energy based Charging Feature Arup Mukherjee	1229
76_IEC2946	Renewable Energy Sources with Special Effort on Hydropower for Sustainable Development Jnan Ranjan Pal	1232
79_IEC13616	Installation and Experimentation of a Vertical Axis Wind Turbine for Domestic Purpose Satyabrata Podder, Sudip Basack & Arka Dasgupta	1236
97_IEC4687	PV based Security Lighting System of 3 Wheeled Electric Vehicles for Rural Transportation Dhrubajyoti Banerjee, Parthasarathi Satvaya & Bidrohi Bhattacharjee	1239
139_IEC32699	Solar Thermal Energy Storage: Emerging Techniques and Technologies Asoke Kumar Paul	1245
140_IEC58244	Performance, Emission and Combustion Characteristics of a Variable Compression Ratio Diesel Engine Fueled with Hibiscus Cocos Nucifera Biodiesel Alapati Babji, Govada Rambabu, E Nirmala Devi & Yarrapragada KSS Rao	1248
146_IEC21277	Advancements in Photovoltaic Technology: Next-Generation Materials and Applications — a Review Rajyasree Chakrabarty & Swarnendu Bhattacharya	1257
154_IEC59419	Utilization of Solar Energy and its Potential for Various uses in the Indian Context: A Comprehensive Literature Review Debraj Dutta & Swarnendu Bhattacharya	1261
158_IEC42401	Design of Interleaved Buck-Boost Converter for Green Energy Application Sucharita Pal, Aditya Kumar Majee, Biplab Bhowmick & Dola Sinha	1265
165_IEC27011	Experimental Investigations on a Grid-Connected Microgrid with DFIG-based Wind Generator Sujoy Ranjan Nath, Golam Kibria, Arjun Paramanik, Sahanur Alam, Rajorshi Adhikary & Prithwiraj Purkait	1269
166_IEC41721	Suboptimal Robust PD Controller Design of Stewart Platform Manipulator based Dual Axis Solar Tracker System with Semi-Isotropic Tool Center Point Biswajit Halder & Mayukh Nath Mishra	1275
203_IEC69302	A Productive Optimization Strategy for the Relay Coordination Issue Maitrayee Chakrabarty, Alok Kumar Srivastav, Suparna Pal, Sudipta Chakraborty, Raju Basak & Rakessh Das	1281
235_IEC72043	Model Development and Analysis of a Greenhouse Air-Conditioning System Coupled with a Desiccant-Coated Heat Exchanger and a Dew Point Indirect Evaporative Cooler Bibhas Nayak & Aritra Ganguly	1286
296_IEC83032	Waves & Tides — God's Gift for Power Generation Kirit B Trivedi	1291
330_IEC70796	Optimizing Mesh Geometry and Orientation for Fog Harvesting in Cooling Towers Dibyendu Maji, Arkadeep Datta, Amitava Datta & Ranjan Ganguly	1294
331_IEC35695	Quantum Dot Solar Cell: Device Modelling and Efficiency Enhancement using CdTe Quantum Dots Indranil Maity, Arighna Bhattacharjee & Arijit Mondal	1299



334_IEC82704	Enhancing Sparse Geothermal Gradient Data at Regional Geological Scales using Generative Adversarial Networks Anamitra Upadhyay, Rishav Raj, Annesha Dubey, Ayandeep Sarkar, Swattik Das, Debashis Sarkar, Mrityunjay Singh & Dornadula Chandrasekharam	1303
348_IEC25110	Performance Enhancement of Rooftop SPV Power Plant by 3C (Continuous Cleaning and Cooling) Process Indrajit Bose, Sugato Ghosh & Hiranmay Saha	1308
366_IEC83017	Decarbonizing Transportation: The Potential of Solar-Powered EV Charging for a Cleaner Future Madhusree Bhattacharjee, Sugato Ghosh, Saheli Sengupta & Hiranmay Saha	1313

Power & Energy: Smart Energy Utilization Technologies

13_IEC00013A	Adaptive Intensity Control and Fault Detection in Smart Street Lighting Debasmita Paul, Arindam Karmakar, Akash Seth, Abhinandan Jha, Ayindrila Roy & Mitul Ranjan Chakraborty	1321
83_IEC45327	Case Study on Design and Analysis of Electrical Heat Tracing on Tank Roof Nozzle Gantyada Karthik	1327
191_IEC93788	Performance Evaluation of Solar PV and Hybrid PV/T Systems: A Step to Enhance System Efficiency Ahraz Hassan Moon, Asadur Rahman & Inam Ul Haq	1328
259_IEC89821	Numerical Investigation on Employment of Cavities on Sidewalls of the Microchannel Heat Sink and Parametric Study of the Cavities on the Effect of Performances of the Heat Sink Dipak Debbarma, Swapam Bhaumik, Aparesh Datta, Sunita Debbarma & Udayan Majumder	1334
275_IEC35585	Simulation of Bottom Hole Pressure in Managed Pressure Drilling through MATLAB-SIMULINK Sampath Kumar, Kishan Choudhuri & Prasun Chakraborti	1340
310_IEC66507	Low-Cost Self-Cleaning System for Efficiency Enhancement of Onboard Smart Nanogrid in Green Transport Moumita Pramanik, Sudipta Basu Pal, Arnab Das, Hiranmay Samanta, Dipanjan Bose, Konika Das Bhattacharya, Chandan Kumar Chanda & Raju Basak	1347



Revolutionizing Cancer Drug Development with Artificial Intelligence: Navigating Patent and Licensing Challenges

Keya De Mukhopadhyay¹, Abhisikta Basu²✉ & Ankita Roy²

¹ Department of Biotechnology

² IEM's International Institute of Juridical Sciences

Institute of Engineering and Management (IEM), University of Engineering and Management, Kolkata

✉ abhisiktabasulaw@gmail.com

Abstract: Cancer, a global health challenge, presents unique treatment complexities due to its heterogeneous nature, leading to varied patient responses. This paper explores the transformative role of Artificial Intelligence (AI) in revolutionizing cancer drug development, focusing on its applications in drug discovery, target identification, and patient response prediction. AI algorithms, particularly machine learning (ML) and deep learning models, enable the analysis of vast, complex datasets to enhance drug efficacy and toxicity predictions, identifying patterns beyond traditional methodologies. By integrating chemical and gene expression features, AI fosters precision medicine, tailoring therapies to individual profiles. Additionally, computational drug repurposing leverages deep learning to discover new applications for approved drugs, expediting treatment development.

However, the deployment of AI faces challenges, including data diversity, model interpretability, and compliance with regulatory standards. Ethical and legal issues surrounding AI-generated inventions, such as the absence of patent recognition, complicate intellectual property rights. While AI offers promising accuracy in drug interaction predictions, its contributions remain limited to specific stages of drug development. This paper highlights AI's potential to revolutionize cancer therapeutics while addressing its limitations and the need for robust frameworks to maximize its impact.

Keywords: Cancer Drug Development; Artificial Intelligence; Precision medicine; Intellectual Property Rights; Drug Discovery

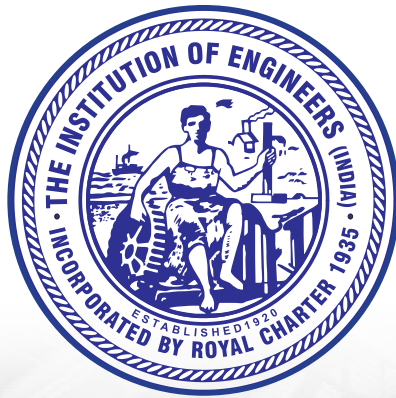
INTRODUCTION

Cancer is an international medical concern. Owing to its great heterogeneity, patients with the same tumour may respond differently to the same medications or surgical techniques, necessitating the development of more precise tumour treatment techniques and patient-specific personalised treatments. To design focused treatment options for patients, it is imperative to have a thorough understanding of the changes that tumours experience, including changes in their genes, proteins, and cancer cell morphologies. Precise therapy of tumours is fundamental.

The era of Artificial Intelligence (AI) is transforming cancer drug development through enhanced efficiency in drug discovery, target identification, and patient response prediction. AI algorithms are capable of analyzing huge datasets and thereby can predict drug efficacy and toxicity. This can improve the drug design process significantly [1,2].

However, the “black box” nature of the AI systems, challenges that are found would include data diversity, model interpretability, and regulatory compliance [3,5]. Moreover, it is very crucial to ensure that AI applications are ethically sound and they have been validated through clinical trials for their successful integration into different cancer research strategies [4,6].

AI enhances drug efficacy and toxicity prediction by leveraging machine learning (ML) algorithms to analyze extensive datasets, identifying patterns that traditional methods may overlook. These algorithms can integrate diverse data types, such as genetic profiles and chemical structures, leading to more accurate predictions of how individual patients will respond to treatments and the potential side effects [7,8]. For instance, deep learning models can predict drug activity based on historical data, while classifiers combining chemical and gene expression features improve the accuracy of toxicity predictions [9,10]. This integration fosters personalized medicine by tailoring therapies to individual patient profiles [11,12].



8 Gokhale Road, Kolkata 700020
Phone: +91 (033) 40106264/248
E-mail: technical@ieindia.org
iei.technical@gmail.com
Website: <https://www.ieindia.org>