7th International Conference on
Energy, Power and Environment

May 09 – May 11, 2025

Venue: National Institute of Technology Meghalaya, Sohra Campus, India

Website: https://nitm.ac.in/icepe2025/

ICEPE 2025 Special Session (SS-02)

Title of the special session

Smart Grids and AI: Powering the Digital Energy Revolution

Aims and scope of the session

Smart grids represent the next stage of evolution in power systems, integrating advanced digital technologies to create more efficient, reliable, and sustainable energy networks. The traditional one-way flow of electricity is replaced by an intelligent, two-way exchange of energy and data between utilities and consumers. This transformation is fueled by the incorporation of Artificial Intelligence (AI), which plays a pivotal role in optimizing grid operations and enabling real-time decision-making.

AI enhances the functionality of smart grids through predictive analytics, demand forecasting, and fault detection. For example, machine learning algorithms analyze vast datasets from smart meters and IoT devices to identify consumption patterns and predict peak demand. This helps utilities optimize energy distribution, reducing costs and minimizing waste. AI-powered tools also detect and respond to anomalies, such as equipment failures or cyberattacks, improving grid resilience and reliability. Furthermore, AI supports the integration of renewable energy by balancing the variability of sources like solar and wind with demand-side management and energy storage systems. Combined with advancements in blockchain and digital communication technologies, smart grids powered by AI are shaping the future of energy systems, driving the transition to a cleaner, smarter, and more sustainable energy landscape.

ICEPE encourages academicians, researchers, and industrialists to submit papers in the special issue: **Smart Grids and AI: Powering the Digital Energy Revolution**. Papers to be submitted in this special issue will be mostly in the applications of AI in smart grids. The articles in the special issues are expected only in the form of research outcomes, but not in the form of review form of work. The format of the articles will be in standard IEEE Conference format starting from abstract to keywords, introduction, methodology, results through conclusions.

The topics of interest encompass (but not limited to)

- Planning and Operation of Active Distribution Networks
- Volt/Var Control of smart grids
- Electric Vehicles
- AI in Energy Management
- AI in Cyber-Security
- Transactive Energy Market
- TSO/DSO Interaction

Special Session Organizers

1. Dr. Sanjib Ganguly, Associate Professor, Electronics and Electrical Engineering, IIT Guwahati, Email Id:- sganguly@iitg.ac.in

Sanjib Ganguly (Senior Member, IEEE) was awarded with the Ph.D degree from the Department of Electrical Engineering, Indian Institute of Technology Kharagpur in 2011. He worked in the Tata Power Company Ltd., as a Sr. officer, electrical maintenance of 2×500 MW thermal power units in Trombay Thermal Power Station, Mumbai from 2006-2007. He worked as the Assistant Professor in NIT Rourkela from 2011-2015, before joining in IIT Guwahati in 2015. He is presently working as Associate Professor in IIT Guwahati. His research interest includes distribution system planning and optimization, multi-objective optimization, power electronics applications to power systems, hybrid energy systems, and evolutionary algorithms. He has published 54 papers in reputed international journals, which include IEEE Transactions, IET, and different Elsevier and Springer journals with 2750 plus citations according to the google scholar, till date. He is enlisted in World's 2% top scientist in the years of 2020-2024 according to the list published by authors of Stanford University.

2. Dr. Arunima Dutta, Assistant Professor, Department of Electrical Engineering, NIT Meghalaya

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Arunima Dutta (Member, IEEE) received the B.E. degree in Electrical Engineering from Jorhat Engineering College, Assam, India, in 2012, and the M.Tech. Degree in Power and Energy systems from the National Institute of Technology Meghalaya, Meghalaya, India, in 2016. She received the doctoral degree from the Department of Electronics and Electrical Engineering, Indian Institute of Technology Guwahati, Guwahati, India in 2022. She is currently working as an Assistant Professor in the Department of Electrical Engineering, NIT Meghalaya, India. Her research interests include power system operation, model predictive based voltage control and energy management, modeling of electric vehicles and power electronics appliances to be utilized in modern distribution systems. Till date, She has published 7 papers in reputed international journals, which include IEEE Transactions, IET, and Elsevier journals with 500 plus citations according to the google scholar.