International Conference on
Sustainable Energy Technologies and Computational Intelligence
(SETCOM 2025)
Department of Electrical Engineering, SoET
Pandit Deendayal Energy University (PDEU), Gandhinagar, Gujarat, India |

February 21 – 23, 2025

SETCOM 2025 Special Sessions on

"Intelligent Microgrids: AI, Machine Learning, and Data Science Solutions for Energy Management and Stability"

Aims & Scope of the Session:

Intelligent Microgrids: AI, Machine Learning, and Data Science Solutions for Energy Management and Stability" highlights the transformative role of advanced technologies in modernizing microgrids. Microgrids, which are localized energy systems, integrate distributed generation sources such as solar and wind along with energy storage systems to support stable and reliable power supply. However, due to their complex nature, traditional control and management methods are often insufficient to handle dynamic changes in load, generation, and fault conditions. This title emphasizes how Artificial Intelligence (AI), Machine Learning (ML), and Data Science can address these challenges by enabling more efficient, adaptive, and resilient operations. AI algorithms can optimize energy management, automate demand response, and ensure economic dispatch, while ML models are capable of forecasting renewable energy outputs, predicting load patterns, and detecting faults in real-time. Data Science, on the other hand, leverages big data analytics to analyze vast amounts of operational data, enabling predictive maintenance, advanced protection schemes, and enhanced cyber security This session will provide an effective forum to disseminate new technology and share the expertise among researchers, scientists and engineers in the recent development of microgid, This special session deals with different topologies of microgrids and will cover a wide range of topics related to microgrid.

Topics of interest include, but are not limited to:

- Modeling, operation and control of microgrid
- Optimal Energy Management
- Microgrid Stability and Security Enhancement
- Energy Storage Management
- Control and stability analysis of renewable integrated Microgrid
- Energy management system and optimization
- Microgrid Resilience Analysis using Data Science
- Power quality issues and solutions in microgrid
- AI-Based Energy Storage and Microgrid Sizing Optimization
- AI-Enhanced Microgrid Planning and Design Optimization

Special Session Organizers:

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Special Session Organizers :

	**Dr. Sarat Chandra Nayak** presently working as a Professor in the Department of Computer Science and Engineering at GITAM, Hyderabad. He worked as a Post-Doctoral Fellow at Yonsei University, South Korea with Brain Korea (BK21) fellowship. He obtained Ph.D. in CSE from VSSUT, India and M.Tech. in CSE from Utkal University, Bhubaneswar, India. His research interests are AI/ML, data mining, and soft computing. He has more than 90 publications in reputed international journals and conferences. He has 16 years of experience in teaching and research.
	**Pratap Sekhar Puhan** (SM'22) received his BE in Electrical Engineering from Utkal University, Odisha in 2001. He received his ME in Power System from Bengal Engineering and Science University (IIEST) Shibpur, West Bengal, India, in 2010 and completed his PhD in Electrical Engineering from Utkal University, Odisha, India in 2015. He is working as a Professor with the Department of Electrical and Electronics Engineering at Sreenidhi Institute of Science and Technology, Hyderabad, India. He has 20 years of experience in teaching and research. He has published more than 50 papers in reputed journal His main research interests include power quality, distributed generation, estimation of signal and systems etc