



NE-IECCE 2026 Special Session (SS-06)

Title of Proposed Session:

Intelligent Protection and Control Strategies for Renewable Dominated Microgrids Under Intermittent Conditions

Technical Outline of the Session

The special session “Intelligent Protection and Control Strategies for Renewable-Dominated Microgrids under Intermittent Conditions” aims to explore emerging artificial intelligence and data driven approaches for enhancing the reliability and resilience of modern microgrids. It focuses on intelligent fault detection, adaptive protection, and coordinated control mechanisms that respond effectively to the fluctuating nature of distributed renewable generation. Key topics include AI-based fault analysis, MPPT/FPPT optimization, converter and inverter control under dynamic irradiance, fault–shading discrimination in diverse PV systems (BIPV, BAPV, FSPV, Agro-PV), and digital twin assisted predictive protection. The session emphasizes developing adaptive, coordinated, and self-healing microgrid architectures for sustainable energy systems.

Topics of Session

The scope of this Special Session includes, but is not limited to, the following topics:

1. AI-Driven Fault Analysis and Adaptive Protection in Renewable-Dominated Microgrids.
2. Intelligent Converter and Inverter Control with AI-Based MPPT/FPPT under Intermittent Conditions.
3. Coordinated Protection–Control Architectures Using Multi-Agent and Data-Driven Intelligence.
4. AI-Based Fault–Shading Discrimination and Control in BIPV, BAPV, FSPV, and Agro-PV Systems.
5. Digital Twin and Predictive Intelligence for Resilient Microgrid Operation.

Special Session Organizers

1. Dr. Biswajit Sahoo
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Biswajit Sahoo received his B. Tech degree in Electrical Engineering from the School of Electrical Sciences, Indian Institute of Technology, Bhubaneswar in 2013. He completed his Ph.D. in 2021 from school of electrical sciences, IIT Bhubaneswar. He worked as Associate Software Developer in UnitedHealth Group, Hyderabad from June 2013 to July 2015. Since 2015, He has carried out his research in the field of power system monitoring, protection which includes the development of wide-area backup protection algorithms, application of synchrophasors to primary and backup fault protection, machine learning applications for enhancing security of protection algorithms and advanced signal processing techniques for fault detection, etc. He is currently working in the area





of Protection and Control of AC, DC and Hybrid AC-DC Microgrid. His research work has led to publication of several research papers in reputed international journals such as IEEE Transaction on Power Delivery, IEEE Access, IEEE Systems Journal and IET Generation, Transmission & Distribution and international conferences. He renders his services voluntarily as a reviewer to Scopus indexed International Journals like IEEE Transactions on Power Delivery, IEEE Systems Journal, IEEE Access, IET Generation, Transmission & Distribution etc. Currently, he is serving as an Assistant Professor in the Department of Electrical Engineering at NIT Silchar.

2. Dr. Debayan Sarkar
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Dr. Debayan Sarkar (Senior Member, IEEE; Member, IET; Associate Member, IE(I); Life Member, SESI) received his B. Tech in Electrical Engineering and M. Tech in Power Systems from the Department of Electrical Engineering, National Institute of Technology Durgapur, India, in 2015 and 2017, respectively. He completed his Ph.D. in Electrical Engineering from the Indian Institute of Technology (Indian School of Mines), Dhanbad, India, in 2023. Dr. Sarkar has authored more than 20 research publications to date. He actively contributes to the academic community by voluntarily serving as a reviewer for numerous reputed SCIE-indexed international journals, including IET Renewable Power Generation, International Journal of Circuit Theory and Applications, International Journal of Numerical Modelling: Electronic Networks, Devices and Fields, Sustainable Energy, Grids and Networks, Solar Energy, Energy and Buildings, Electric Power Components and Systems, Scientific Reports, International Transactions on Electrical Energy Systems, Heliyon, and Measurement and Control. He also reviews for ESCI-indexed journals such as Engineering, Technology and Applied Science Research (ETASR) and Scopus-indexed journals like Bulletin of Electrical Engineering and Informatics (BEEI) and International Journal of Power Electronics and Drive Systems (IJPEDS). To date, Dr. Sarkar has reviewed over 150 manuscripts for several prestigious international journals and conferences published by IEEE, IET, Elsevier, Wiley, Taylor & Francis, Springer Nature, Hindawi, and others. He is currently serving as an Assistant Professor in the Department of Electrical Engineering at the National Institute of Technology Silchar, India.



3. Dr. Susmita Kar
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Dr. Susmita Kar (Member, IEEE) received the M.Tech. degree from the Birla Institute of Technology - Mesra, Ranchi, India, and the Ph.D. degree from School of Electrical Sciences, Indian Institute of Technology Bhubaneswar, Bhubaneswar, India. She is currently an Assistant Professor with the Department of Electrical Engineering, National Institute of Technology, Rourkela, India. Her research interests include microgrid protection, controller design, demand side management and application of signal processing and data-mining in power system problems. She was the recipient of the Power System POSOCO Award 2017 for Ph.D. Thesis.

