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Special Session on

Advanced Power Electronics and Control Strategies for Efficient Integration of Renewables in Microgrids

Dr. Veerpratap Meena, National Institute of Technology, Jamshedpur, India (vmeena1@ee.iitr.ac.in)

Dr. Surya Prakash, National Institute of Technology, Jamshedpur, India (suryaprakash.ee@nitjsr.ac.in)

Technical Outline of the Session and Topics:

Power converters are critical components in microgrid technology, enabling advancements in renewable energy integration, energy storage, transportation electrification, and computational systems. This Special Issue delves into the complexities of power converters, examining their types, control mechanisms, benefits, challenges, and applications—from consumer devices to industrial infrastructure. Focusing on microgrids, the issue explores various converter topologies and control strategies, integrating emerging wide-bandgap semiconductors and intelligent algorithms. Of particular interest are the diverse converter topologies utilized in microgrids, such as DC/DC converters, single-phase DC/AC converters, and three-phase three-wire and four-wire DC/AC converters. This exploration also emphasizes advanced control techniques, including genetic algorithms, artificial neural networks (ANNs), and other computational intelligence approaches.

Through detailed analysis, the trade-offs between converter efficiency, power density, and cost are evaluated to identify optimal design solutions for microgrid applications. The issue highlights the transformative role of advanced power electronics and controls in enhancing the efficiency and reliability of renewable energy integration within microgrids. This Special Issue invites original research articles focusing on power converters, control strategies, and their applications for efficient renewable energy integration in microgrids. We welcome your valuable contributions to advance the field of power electronics, intelligent controls, and their impact on microgrid technology.

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

- High-resolution signal processing and sensing techniques for early fault detection
- Advanced Power Electronics for Integration of Renewable.
- Hybrid Multilevel-, Switched capacitor-, Z Source- based Converters, etc.
- Bi-Directional Converter Power Flow in Microgrids.
- Design, Control, and Integration with Renewable Energy Sources in Microgrid.
- Advanced Control Strategies for Inverter-Based Microgrids.
- Advanced Energy Storage through power converter for Microgrids.
- Resilient Design of Power Converters for Harsh Environmental Conditions.
- Efficiency and Reliability of Power Converter.
- Fault Tolerant and protection of Power Converter.
- Power Electronics system for u-inverter, E Vehicle Charging, V2G and G2V.
- High-Frequency Converters- topology, control, and application.

- Microgrids space applications, including satellites and spacecraft.
- Small-scale renewable energies and storage for microgrids.
- Any other related topic.

Submission of papers: deadline follows the deadline for the regular papers. All the instructions for paper submission are included in the conference website: <https://ias-am.ieee.org/2025/>