

ICIT 2023 Special Session Proposal

Title of the Proposal: “Advanced Power Electronic Converters for Integrating Low-Carbon Technologies with the Power Grid”

Organizer 1: Mohamed Dahidah, Newcastle University, UK



Mohamed Dahidah currently is a Senior Lecturer (Associate Professor) in power electronics, Deputy Editor-in-Chief of IET Power Electronics journal and Senior Member of IEEE. Dr Dahidah is an expert in the field of advanced power electronic converters and their applications for transportation and renewable energy integration. He is the recipient of many prestigious awards, including the 2019 IET Outstanding Deputy Editor-in-Chief Award and the Girling Watson Fellowship award, Australia. Dr Dahidah has published over 90 journal and conference papers and attracted nearly £2 millions from research and PhD scholarships funding from major funding bodies. Currently, he is leading projects on power electronics applications to renewable energy integration and electrified transport with findings being published in high standards IEEE Transactions publications.

Organizer 2: Akshay Rathore, Singapore Institute of Technology, Singapore



Akshay Kumar Rathore (IEEE Fellow) is a Professor (Engineering) at Singapore Institute of Technology, Singapore. He received his Master of Technology degree in electrical machines and drives from the Indian Institute of Technology (BHU) Varanasi, India, in 2003, and the Ph.D. degree in power electronics from the University of Victoria, British Columbia, Canada in 2008. He received the Gold Medal for securing the highest academic standing in his Master’s degree among all electrical engineering specializations. He had two subsequent postdoctoral research appointments with the University of Wuppertal, Germany, and the University of Illinois at Chicago, USA. From November 2010 to February 2016, he served as an Assistant Professor at the Department of Electrical and Computer Engineering, National University of Singapore. From March

2016-Dec 2021, he served as an Associate

Professor at the Department of Electrical and Computer Engineering, Concordia University, Montreal, Canada where he was listed in the Provost Circle of Distinction in 2021.

Dr. Rathore is a recipient of the 2013 IEEE IAS Andrew W. Smith Outstanding Young Member Achievement Award, 2014 Isao Takahashi Power Electronics Award, 2017 IEEE IES David Irwin Early Career Award, 2020 IEEE IAS Outstanding Area Chair Award, 2020 IEEE Bimal Bose Award for Industrial Electronics Applications in Energy Systems and 2021 Nagamori Award. He published about 280 research papers in international journals and conferences, including 94 IEEE TRANSACTIONS. His research is mainly focused on the current-fed converters and multilevel inverters.

Technical Outline of the Session and Topics

The ambitious transition to emission-free energy systems necessitates large integration of renewable energy sources (e.g. photovoltaic, wind) and low-carbon loads (e.g. electric vehicles, heat pumps, data centres) with the electricity power grid. This leads to an ever-complicated electricity network with mix of both AC and DC generation and loads. Power electronic converters are the game-changer technology that supports coexistence of both AC and DC solutions to improve the efficiency and resilience of the future energy systems.

However, high-penetration of power electronics-based systems into power grid leads to more issues and challenges, such as performance depreciation, reliability, increased power quality deterioration, stability issues and reduced efficiency.

In recent years, there have been huge interest in developing novel converter topologies and control strategies, promoted by the exponential growth in switching devices and high-performing controllers, to unlock the full potentiality of power electronic in integrating, both renewable energy resources and other low-carbon loads with the power grid.

This special section is therefore aimed at attracting the latest innovation and cutting-edge research in this field, creating a platform to the researchers from academia and industry for discussing technological challenges and exchanging ideas related to the role of power electronic converters in accelerating smooth transition to zero-emission energy systems.

Topics of interest include, but are not limited to:

- Power converters for renewable resources integrations such as: PV, Wind, Tidal, etc...
- Modular power converters for energy-storage and fuel cells integration with the grid.
- Modelling and control of grid-following and grid-forming converters.
- Advanced control schemes for the distributed generation power converters.
- Power converter topologies and control for microgrids
- Novel converter topologies and modulation techniques for V2G and G2V operations
- Power converters for AC and DC charging, including front-end AC-to-DC rectifiers.