47th Annual Conference of the IEEE Industrial Electronics

Society

IEEE Industrial Electronics Conference, IECON 2021.
Toronto, Canada, 20-23 October 2021

IECON 2021 Special Session Proposal

Title of the Special Session: Multilevel Converters: Topologies, Control strategies and

Protection

Description of the topic:

Multilevel Converters (MLC), for instance neutral point clamped, flying capacitor, cascaded H-bridge or modular multilevel converters, have several advantages like low voltage stress across the switches, low harmonic distortion and less EMI problems especially when they are used in high voltage and high-power applications. Considering the rapidly growing applications and vast research undergoing in this research area, this special session mainly focuses on new multilevel converter topologies, control strategies and protection of the multilevel inverters.

The specific topics of this special session include, but not limited to:

- Novel multilevel converter topologies aiming at reducing device count.
- Carrier and non-carrier based modulation and control schemes for improved power quality of grid currents.
- Multilevel converter performance evaluation under various disturbances.
- Fault detection, fault localization and post-fault restoration schemes for multilevel converter systems.
- Fault tolerant control schemes for multilevel converters.

Names of special session organizers:

- *Organizer 1: Prof. Josep Pou, Nanyang Technological University, Singapore.*
- *Organizer 2: Sreekanth Thamballa, University of Minnesota, USA.*
- *Organizer 3: Naga Brahmendra Gorla, Nanyang Technological University, Singapore.*
- *Organizer 4: Satish Naik Banavath, Indian Institute of Technology Dharwad, India.*
- *Organizer 5: Abhijit Kshirsagar, Indian Institute of Technology Dharwad, India.*
- *Organizer 6: Siddavatam Ravi Prakash Reddy, University of Houston, TX, USA.*
- *Organizer 7: Glen G Farivar, Nanyang Technological University, Singapore.*

Short biography of the organizers:

Dr. Josep Pou
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Josep Pou (Fellow, IEEE) received the B.S., M.S., and Ph.D. degrees in electrical engineering from the Technical University of Catalonia (UPC)-Barcelona Tech, in 1989, 1996, and 2002, respectively. In 1990, he joined the faculty of UPC as an Assistant Professor, where he became an Associate Professor in 1993. From February 2013 to August 2016, he was a Professor with the University of New South Wales (UNSW), Sydney, Australia. He is currently a Professor with the Nanyang Technological University (NTU), Singapore, where he is Program Director of Power Electronics at the Energy Research Institute at NTU (ERI@N) and co-Director of the Rolls-Royce at NTU Corporate Lab.

	Electronics Systems, Virginia Tech, Blacksburg. From January 2012 to January 2013, he was a Visiting Professor at the Australian Energy Research Institute, UNSW, Sydney. He has authored more than 340 published technical papers and has been involved in several industrial projects and educational programs in the fields of power electronics and systems. His research interests include modulation and control of power converters, multilevel converters, renewable energy, energy storage, power quality, HVdc transmission systems, and more-electrical aircraft and vessels. He is currently Associate Editor of the IEEE Journal of Emerging and Selected Topics in Power Electronics. He was co-Editor-in-Chief and Associate Editor of the IEEE Transactions on Industrial Electronics. He received the 2018 IEEE Bimal Bose Award for Industrial Electronics Applications in Energy Systems.
 **Dr. Sreekanth Thamballa** **e-mail:** tsreekan@umn.edu	**Dr. Sreekanth Thamballa (S'13-M'18)** received the Bachelor's degree in electrical engineering from Acharya Nagarjuna University, Guntur, India, in 2010, the Master's degree in power electronics and drives from the National Institute of Technology, Tiruchirapalli, India, in 2013 and the Ph.D degree in electrical engineering from the Indian Institute of Technology Madras, Chennai, India. Currently, he is working as a postdoctoral associate at University of Minnesota, USA. His research interests include single-stage inverters design and control, topologies and control schemes for multilevel inverters in renewable energy systems and electric vehicles.
 **Dr. Naga Brahmendra Gorla** **e-mail:** naga@u.nus.edu	**Dr. Naga Brahmendra Gorla (S'15-M'19)** received the B.Tech. degree in electrical and electronics engineering from Acharya Nagarjuna University, India, in 2010, the M.S. degree (by research) in electrical engineering from the Indian Institute of Technology Madras, India, in 2013, and the Ph.D. degree in electrical engineering from the National University of Singapore, Singapore, in 2019. Since April 2019, he has been a Research Fellow with the Sembcorp-NUS Corporate Laboratory, National University of Singapore, Singapore. His research interests include power quality improvements in grid-connected inverters and rectifiers, fault detection and localization in multilevel and multiphase converters, and fault tolerance and resilience in grid-connected systems.

 **Dr. Satish Naik Banavath** **e-mail:** satish@iitdh.ac.in	**Dr. B. Satish Naik (S'14 M'18 SM'21**) received the B.Tech. degree in electrical and electronics engineering from Acharya Nagarjuna University, Guntur, India, in 2010, the M.E. degree in electrical engineering from the Indian Institute of Science, Bengaluru, India, in 2012 and the Ph.D. degree in the Interdisciplinary Centre for Energy Research from Indian Institute of Science Bangalore, India in 2018. From 2012 to 2014, he was with the Defence Research and Development Organization, Ministry of Defence, Government of India, Bengaluru. Currently, he is working as an assistant professor at Indian Institute of Technology Dharwad, India. His current research interests include multilevel power converters, motor drives, DC circuit breakers and power converters for renewable energy conversion and power quality.
 **Dr. Abhijit Kshirsagar** **e-mail:**kabhijit@iitdh.ac.in	**Dr. Abhijit Kshirsagar** received his M. Tech and Ph.D. from the Dept. of Electronic Systems Engineering (DESE), Indian Institute of Science, Bangalore in 2010 and 2016 respectively. From 2016 to 2019, he was a Postdoctoral Associate in Prof. Ned Mohan's Lab at the University of Minnesota, Minneapolis, carrying out research on modular converters for utility scale renewables, developing and teaching undergraduate and graduate courses, and conducting outreach programs. Since June 2019, he was a ORAU-ASTRO Post-doctoral Research Fellow at the National Transportation Research Centre, Oak Ridge National Lab, Knoxville, Tennessee, USA where he conducted research on extremely fast EV charging schemes for medium- and heavy- duty electric vehicles. Since Jan 2020 is an Assistant Professor at the Indian institute of Technology, Dharwad, India. His research interests include multi-level and modular converters for grid-connected applications, and converters for renewable energy applications.
 **Dr. Siddavatam Ravi Prakash Reddy** **e-mail:** rsiddava@central.uh.edu	**Dr. Siddavatam Ravi Prakash Reddy** received the Bachelors of Technology degree in Electrical and Electronics Engineering from the National Institute of Technology Calicut, India, in 2015. He received his M.Sc.(Engg.) and Ph.D degrees from the Department of Electronic Systems Engineering, Indian Institute of Science Bangalore, India, in 2020. Currently he is working as a Postdoctoral Fellow at the Electrical and Computer Engineering department, University of Houston, Texas, USA. His research interests include high performance control, self-commissioning and parameter adaptation of induction motor drives, high gain DC-DC converters, circuit breakers and multilevel converters.

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Dr. Glen G. Farivar (SM') received the B.Sc. degree in electrical engineering from Nooshirvani Institute of Technology, Babol, Iran, in 2008, the M.Sc degree in power electronics from the University of Tehran, Tehran, Iran in 2011, and PhD in electrical engineering from the University of NSW Australia, Sydney, Australia in 2016. He is currently working as a post-doctoral research fellow at the Energy Research Institute, Nanyang Technological Institute (ERI@N), Singapore. His research interests include renewable energy systems, high power convertors, energy storage, FACTS devices, and hybrid electric vehicles.