

Annual Conference of the IEEE Industrial Electronics Society (IECON 2021)

Special Session on

“Modeling, Control and Design of Propulsion Drive for EVs”

Organized by

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Call for Papers

The drive train is the main part of any electric vehicle (EV) which requires a suitable control technique for the smooth operation of the vehicle at optimized efficiency. The permanent magnet synchronous motor (PMSM) and Brushless DC (BLDC) drives have been given lots of attention for variable speed drive (VSD) systems because of various advantages such as high efficiency, high power factor, high torque to current ratio, large power to weight ratio and robustness. Recent advancements in control techniques and power electronics ensure the use of PMSM and BLDC drives in applications demanding a fast dynamic response.

It is well known that inverter-based drive systems are very prone to different modes of failure that occur at the front-end rectifier or at the power inverter as well as in control subsystems. The objective of this proposal is to address the various key points that are associated with inverter-based drive systems such as control scheme for PMSM and BLDC drives, sensor reduction techniques, Torque ripple reduction technique and Fault-tolerant operation, power quality issues, application of wide bandgap semiconductor devices and artificial intelligence techniques for efficient operation.

Topics of interest include, but are not limited to:

- Modeling, control analysis, and design of propulsion inverters
- Novel PWM Techniques for power electronics control
- Advanced drive and control techniques for propulsion motors
- Control scheme for PMSM and BLDC drives

- Torque ripple reduction technique and control of AC drive
- Fault-tolerant operation in AC motor drives
- Power quality issues and standards: an industry update
- Application of artificial intelligence techniques for efficient operation
- Application of wide bandgap semiconductor i.e. GaN and SiC devices
- Real-time monitoring, identifying, and rectifying faults in the motor drive system.
- Modular converters for EV applications
- Thermal modelling of converters
- Highly efficient motor control operation
- Hybrid vehicle propulsion system
- Battery operated converters for drives

Submissions Procedure: All the instructions for paper submission are included in the conference website: <https://attend.ieee.org/iecon-2021/>

Deadlines:

Full paper submission: June 25, 2021
Paper acceptance notification: July 30, 2021
Camera-ready paper submission: Aug. 27, 2021

Organizers:

¹**Dr. Kundan Kumar** (Member-13, Senior Member-21, IEEE) was born in Godda, India, in 1984. He received the M. Tech. degree in electrical engineering from the National Institute of Technology at Jamshedpur, Jamshedpur, India, in 2010, and the Ph.D. degree in electrical engineering from the University of Padua, Padua, Italy, in 2010 and 2016, respectively. He is currently an Assistant Professor with the Department of Electrical Engineering, National Institute of Technology, Manipur, Imphal, India. His research interests include electric vehicles and its charging infrastructures, application of wide band gap semiconductor devices, and isolated dc-dc converters.



Dr. Kumar is also a member of the Institution of Engineers, India. He was the recipient of Silver Medal for securing the first position during his M. Tech. course and Best Presentation Recognition award at IECON, Japan in 2015. He is also a Reviewer of the IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, the IEEE TRANSACTIONS ON POWER ELECTRONICS, the IEEE TRANSACTIONS ON TRANSPORTATION ELECTRIFICATION, and the IEEE JOURNAL OF EMERGING AND SELECTED TOPICS IN POWER ELECTRONICS. He has chaired and co-chaired several technical sessions in reputed IEEE International Conferences.

²**Dr. A Rakesh Kumar** (M'14–SM'21, IEEE) completed his Bachelors in Engineering with a honors in "Electrical and Electronics Engineering" from Anna University, Chennai, India in 2011 and Masters in Engineering in "Power Electronics and Drives" from Anna University, Chennai, India in 2013. He worked as Assistant Professor with the Department of EEE, Rajalakshmi Engineering College, Chennai, India from 2013 to 2015. He then went on to join for a full time PhD with the School of Electrical Engineering (SELECT), Vellore Institute of Technology (VIT) from 2015 to 2019. He was also serving as Teaching cum Research Assistant from 2015 to 2019 with the same. Currently, he is a Post-Doctoral Fellow with the Nano and Micro grid lab, Department of EEE, National Institute of Technology, Tiruchirappalli, India.



He is an active member of IEEE PELS and PES. He is part of the sub committee headed by Prof. Henry Chung on "Power Electronics and Internet of Things" under the umbrella of IEEE Technical Committee (TC 6) on High Performance and Emerging Technologies. He is also a member of IEEE Technical Committee (TC 12) on Energy Access and Off-Grid System. He is also a member of IEEE PELS Educational Videos Committee initiative headed by Prof. Brad Lehman, Prof. Prasad Enjati and chaired by Prof. Katherine Kim. He is responsible for the taking up the initiative of creating a promotional video and credits

video for all the instructional videos from IEEE PELS Educational Videos Committee. His field of interest includes multilevel inverters, inverter modulation techniques, nanogrid and its applications.

³**Dr. Sanjeevikumar Padmanaban** (Member'12–Senior Member'15, IEEE) received a Ph.D. degree in electrical engineering from the University of Bologna, Bologna, Italy 2012. He was an Associate Professor at VIT University from 2012 to 2013. In 2013, he joined the National Institute of Technology, India, as a Faculty Member. In 2014, he was invited as a Visiting Researcher at the Department of Electrical Engineering, Qatar University, Doha, Qatar, funded by the Qatar National Research Foundation (Government of Qatar). He continued his research activities with the Dublin Institute of Technology, Dublin, Ireland, in 2014.



Further, he served as an Associate Professor with the Department of Electrical and Electronics Engineering, University of Johannesburg, Johannesburg, South Africa, from 2016 to 2018. From March 2018 to February 2021, he has been a Faculty Member with the Department of Energy Technology, Aalborg University, Esbjerg, Denmark. Since March 2021, he is with the CTIF Global Capsule (CGC) Laboratory, Department of Business Development and Technology, Aarhus University, Herning, Denmark.

S. Padmanaban has authored over 300 scientific papers and was the recipient of the Best Paper cum Most Excellence Research Paper Award from IET-SEISCON'13, IET-CEAT'16, IEEE-EECSI'19, IEEE-CENCON'19 and five best paper awards from ETAERE'16 sponsored Lecture Notes in Electrical Engineering, Springer book. He is a Fellow of the Institution of Engineers, India, the Institution of Electronics and Telecommunication Engineers, India, and the Institution of Engineering and Technology, U.K. He is an Editor/Associate Editor/Editorial Board for refereed journals, in particular the IEEE SYSTEMS JOURNAL, IEEE Transaction on Industry Applications, IEEE ACCESS, *IET Power Electronics*, *IET Electronics Letters*, and *Wiley-International Transactions on Electrical Energy Systems*, Subject Editorial Board Member—*Energy Sources—Energies Journal*, MDPI, and the Subject Editor for the *IET Renewable Power Generation*, *IET Generation, Transmission and Distribution*, and *FACTS* journal (Canada).

⁴**Dr. Sanjeet Dwivedi** (Fellow IET, UK & Senior Member IEEE). He is working from last decade as senior R&D engineer in Drive Intelligence, Technology research group in Global R&D center of Danfoss Drives A/S, Graasten, Denmark.



He worked as a research associate in power electronics, at the IIT Delhi (2002–06) toward his doctoral research. He was head of the EE department and Dean Academics at Indira Gandhi Engineering College, Sagar, MP, India (2007–08).

Dr. Sanjeet has given invited presentations, and organized and chaired special sessions in several IEEE and European Power Electronics conferences and published books on (i) “Modeling Simulation and Control of Electrical Drives”, from IET Press (UK), (ii) “Modeling and Control of Power Electronics Converter for power quality improvements” from Academic Press, Elsevier UK. He has authored more than 40 research papers in various International and National Journals and conferences and holds four international patents. He is a member of the Study Board of Innovation and Business at South Denmark University and Editorial Board Member of International Journal of Power Electronics, Associate Editor of the IEEE Transaction of Industrial Electronics, Technical Editor of ASME/IEEE Transaction of Mechatronics.

He has bestowed adjunct professorship of Curtin University, Perth for a period of 2016-2018. Dr. Sanjeet was awarded Gold Medal for his Master of Engineering degree at the Indian Institute of Technology Roorkee (1999). He is a recipient of Merit Award from Institution of Engineers (India), IE(I), (2006) for his research publication on permanent magnet machines. He was also awarded with IETE-Bimal Bose Award (2017) for outstanding contributions in power electronics and drives. Dr Sanjeet was awarded with “Danfoss-Man on the Moon Award”, the highest level of Global Innovation award in Danfoss for his innovative product idea by Executive Committee and CEO of Danfoss in 2015.