

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

## Special Session on

### “Solid State Transformer for Modern Power Grid”

#### Organized by

Principal Organizer: **Marco Liserre** (ml@tf.uni-kiel.de)  
Chair, Power Electronics, Kiel University, Germany

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## Call for Papers

### Theme:

Conventional low frequency transformer (LFT) is not suitable for modern power grid network. There is need of integration of various renewable energy sources, electric vehicles and smart grid components apart from several other non-linear DC/AC loads in modern grid. Due to the advancements in power electronic switching technology, wide band devices permit the power converters to operate at very high switching frequencies. It eventually increases the power density of the system. This technology advancement results in development of Solid-State Transformer (SST) or Power Electronic Transformer (PET). Smart Transformer (ST) is an SST with grid management functionalities. SST is having main features of increased power density, increased efficiency, bidirectional power flow controllability, power quality improvement, availability of DC/AC ports at various voltage and power level and compatible with smart grid components. These features enable SST to be used for traction system, space application, grid-grid integration, DC/AC microgrid, electric vehicle charging infrastructure, induction heating, industrial power supplies, motor drives and integration of renewable energy sources etc. Apart from these features, ST suffers from challenges like high cost, reliability and protection etc. Authors are invited to contribute their original research in the area of SST, PET and ST to address various inherent issues in it.

**Topics of interest include, but are not limited to** (*in the area of SST, PET, and ST*):

1. Configurations, topologies, architectures and control strategies of SST/PET/ST
2. Design optimization of various components of SST/PET/ST
3. Recent advancements in power semiconductor technology for SST/PET/ST
4. Implementation for various Low-power and High-power applications
5. Magnetic component design

6. Integration in radial, meshed and hybrid grids
7. Protection strategy in various low, medium and high voltage applications
8. Impact of integration of SST, PET and ST on grid
9. Feasibility analysis of SST, PET and ST for modern grid integration

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

### Sponsoring IES Technical Committees

- Technical Committee on Power Electronics (TCPE): Resonant and Soft Switching Converter Subcommittee

### Deadlines:

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

### Reviewers:

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## Biographies of Organizers:



**Marco Liserre** (S'00-M'02-SM'07-F'13) received the MSc and PhD degree in Electrical Engineering from the Bari Polytechnic, respectively in 1998 and 2002. He has been Associate Professor at Bari Polytechnic and from 2012 Professor in reliable power electronics at Aalborg University (Denmark). From 2013 he is Full Professor and he holds the Chair of Power Electronics at Kiel University (Germany). He has published 500 technical papers (1/3 of them in international peer-reviewed journals) and a book. These works have received more than 35000 citations. Marco Liserre is listed in ISI Thomson report "The world's most influential scientific minds" from 2014. He has been awarded with an ERC Consolidator Grant for the project "The Highly Efficient And Reliable smart Transformer (HEART), a new Heart for the Electric Distribution System". He is member of IAS, PELS, PES and IES. He has been serving all these societies in different capacities. He has received the IES 2009 Early Career Award, the IES 2011 Anthony J. Hornfeck Service Award, the 2014 Dr. Bimal Bose Energy Systems Award, the 2011 Industrial Electronics Magazine best paper award and the Third Prize paper award by the Industrial Power Converter Committee at ECCE 2012, 2012, 2017 IEEE PELS Sustainable Energy Systems Technical Achievement Award and the 2018 IEEE-IES Mittelmann Achievement Award.



**Pradyumn Chaturvedi** (IEEE M'11 - SM'17) received the Ph.D. degree from the National Institute of Technology, Bhopal, India in 2010. He is currently working as an Assistant Professor with the Department of Electrical Engineering, Visvesvaraya National Institute of Technology, Nagpur, India. He has published more than 80 research papers in international/national refereed journals and refereed international/national conferences and co-authored two books. He has completed three sponsored research projects in the area of multilevel inverter application for renewable energy harvesting and currently working on DST-SERB Core Research Grant sponsored project on "Solid State Transformer for Off-Grid Rural Electrification". Two International Collaborative Projects are ongoing with him; One research project under India-Taiwan International Joint Research Program to develop Solid State Transformer for Low Voltage Distribution Network; and other International Consortium Project under India-EU Horizon 2020 Program on Integrated Local Energy Systems is also ongoing with him. Dr Chaturvedi is Associate Editor, IEEE IES Industrial Electronics Technology News, ITeN; and Chairperson, Resonant and Soft Switching Converter Subcommittee, IEEE IES Technical Committee of Power Electronics. He is also the Founder Chairperson, IEEE Bombay Section Joint Chapter of PELS-IES. Dr Chaturvedi has successfully organized Special Sessions in reputed IEEE conferences in India and abroad. His research interests include Solid State Transformer, Improved Power Factor Converter, Reduced Device Count Multilevel Converters, Renewable Energy Harvesting, Reliability in Power Electronics, Fault-Tolerant Converters, Dual Active Bridge DC-DC Converter etc.



**Dmitri Vinnikov** (IEEE M'07, SM'11) received the Dipl. Eng., M.Sc., and Dr. Sc. techn. degrees in electrical engineering from Tallinn University of Technology, Tallinn, Estonia, in 1999, 2001, and 2005, respectively. He is currently the Head of the Power Electronics Group, Department of Electrical Power Engineering and Mechatronics, Tallinn University of Technology (Estonia). He is the Head of R&D and co-founder of Ubik Solutions LLC - Estonian start-up company dedicated to innovative & smart power electronics for renewable energy systems. Moreover, he is one of the founders and leading researchers of ZEBE – Estonian Centre of Excellence for zero energy and resource efficient smart buildings and districts. He has authored or coauthored two books, five monographs and one book chapter as well as more than 300 published papers on power converter design and development and is the holder of numerous patents and utility models in this field. His research interests include applied design of power electronic converters and control systems, renewable energy conversion systems (photovoltaic and wind), impedance-source power converters, and implementation of wide bandgap power semiconductors. D. Vinnikov is a Chair of the IEEE Estonia Section.



**Rongwu Zhu** (S'12-M'15) received the Ph.D. degree in energy technology from Department of Energy Technology, Aalborg University, Aalborg, Denmark, in 2015. From 2011-2012, he was a guest researcher with Aalborg University, from 2016-2020 he was a Senior Researcher with Chair of power electronics, at Christian-Albrechts-University of Kiel (Germany), and he is currently a full professor at Harbin Institute of Technology (shenzhen), China. He has authored and co-authored around 100 technical papers (over 1/3 of them in international peer-reviewed journals/magazine), and 6 patents. His research interests include renewable power generation system, operation and control of electric grid with high penetration of renewables, reliability and resilience improvement of power electronics dominated grid. He served as a

Guest Associate Editor of the IEEE Journal of Emerging and Selected Topics in Power Electronics on “Smart Solid State Transformer for AC/DC Hybrid Power Grids”, Guest Editor-in-Chief of the CSEE Journal of Power and Energy Systems on the “Operation and Control Technology of Distribution Network with High Penetration of Power Electronics”, guest Editor-in-Chief of the CSEE on the “Operation and Control Technology of Distribution Network with High Penetration of Power Electronics” (Chinese), guest Editor-in-Chief of Power System Technology on the “active protection technology of the advanced power electronics devices under grid faults in Smart Grid” (Chinese), Editor of the International Transactions on Electrical Energy System, Technical Committee Chair and Member for several International Conferences, and organizer of more than 10 special session at the international conferences (e.g., IECON, ECCE).



**Siba Kumar Patro** (S'18) received the B.Tech. degree in electrical engineering from the Veer Surendra Sai University of Technology, Burla, India, in 2014. He is currently working toward the M.Tech.- Ph.D. dual degree in electrical engineering in the Indian Institute of Technology Bombay (IIT Bombay), Mumbai, India. In 2017, he joined the Visvesvaraya National Institute of Technology (VNIT), Nagpur, India, where he is currently working as a Trainee Teacher with the Department of Electrical Engineering. His research interests include power electronic converters for HVDC and FACTS applications, grid integration of renewable energy sources, and multilevel converters.