The 46th Annual Conference of the IEEE Industrial Electronics Society

October 18-21, 2020, Marina Bay Sands Expo and Convention Centre Singapore

Special Session on

"Design and Coordinated Operation of Next-Generation Inverters in Power Systems with High Renewable Penetration Levels"

Organized by

- **Yi Tang,**
  Nanyang Technological University, Singapore
  email: yitang@ntu.edu.sg

- **Feng Gao,**
  Shandong University, China
  email: fgao@sdu.edu.cn

- **Jingyang Fang,**
  Duke University, USA
  email: jingyang.fang@duke.edu

- **Xiaoqiang Li,**
  China University of Mining and Technology, China
  email: xqlcumt@163.com

- **Shuli Wen,**
  Nanyang Technological University, Singapore
  email: wenshuli2010@126.com

Call for Papers

Driven by the desire of reducing carbon footprint and meeting the ever-challenging energy demand, modern power systems witness a global energy transition from fossil fuels to renewable energies, such as solar and wind. Most renewable energy sources require power electronics, e.g., solar inverters, to feed into the grid. As such, with the evolving of modern power systems, grid-tied inverters progressively replace synchronous generators (SGs) and take on the responsibility of grid regulation. However, state-of-the-art inverters only follow grid voltages and track their maximum power points. Therefore, such inverters cannot form the grid alone. Moreover, unlike SGs, inverters feature no massive rotational parts, and hence no inertia, making modern power systems vulnerable to frequency disturbances and cascading failures. In addition, as fast-responding inverters are distributed across a large geographical area, the coordination and optimization of them pose new challenges and opportunities.

Topics of the Session:

This technical session aims to address the design and control challenges of next-generation inverters in modern power systems, laying the foundation for future power systems with 100% renewable energies.

Topics of interest include, but are not limited to:

- Design of grid-tied power conversion systems with grid-forming capabilities
- Modeling of grid-forming and grid-following inverters
- Fault-ride-through and current-limitation techniques of grid-forming inverters
- Design of inverters with virtual inertia
- Energy storage techniques for inertia emulation
- Design of adaptive virtual inertia
- Energy policy and market design of virtual inertia
- Development of smart inverters with multiple grid-supportive functions
- Virtual synchronous machine (VSM) control of inverters
- Advanced digital control of inverters
- Weak grid-induced stability issues and mitigation approaches
- Converter-level and system-level stability analysis
- Synchronization among multiple inverters
- Distributed control of multiple inverters
- System-level control and optimization of 100% power-electronic-coupled power systems
- Grid codes and standards on next-generation inverters