

IECON 2021 Special Session Proposal

**Title of the Proposal: Network-Based Cooperative Intelligence of
Heterogeneous Microgrid Clusters**

**-The name, a photo, a very short bio, contact details and IEEE IES membership of the
Session**

Organizers:

A/ Prof. Jingang Lai RWTH Aachen University, Germany;

Prof. Xiaoqing Lu, Wuhan University, China;

A/ Prof. Chang Yu Wuhan University of Science and Technology, China;

A/ Prof. Minghao Zhou Harbin University of Science and Technology, China;



Jingang Lai (Senior Member, IEEE) received the Ph.D. degree from Department of Automation, Wuhan University, Wuhan, China, in 2016. He was a Joint Ph.D. Student with the School of Electrical and Computer Engineering, RMIT University, Melbourne, VIC, Australia, in 2015. From 2016 to 2019, he was a Research Fellow with the School of Engineering (Prof. Xinghuo Yu's group), RMIT University, Melbourne, VIC, Australia.

He is currently an Assistant Professor and a Humboldt Research Fellow/Research Scientist in E.ON Energy Research Center, RWTH Aachen University, Aachen, Germany. His research interests include distributed intelligence for ac/dc microgrids, distributed renewable energy system applications of multiagent systems, and cyber-physical networked control systems.

He is currently serves as an Editor for IEEE TRANSACTIONS ON SMART GRID and IEEE POWER ENGINEERING LETTERS, and an Associate Editor for IEEE TRANSACTIONS ON INDUSTRY APPLICATIONS, IEEE OPEN JOURNAL OF THE INDUSTRIAL ELECTRONICS SOCIETY, and IET Generation, Transmission, and Distribution. He is also an IEEE IES member, IEEE IAS member and IEEE PES member.

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-Technical Outline of the Session and Topics:

Recent years witnessed the emerging and fast development of network-based cooperative intelligence for heterogeneous microgrid clusters. Benefiting from the latest information technologies, heterogeneous microgrid clusters enable seamless and direct connection between devices such as renewable energy, smart meters, flexible loads, energy storage systems. However, it inevitably poses some technical and theoretical challenges in architecture design, control operation and energy management. In order to address these challenges, it is essential for heterogeneous microgrid clusters to develop new methods by taking into account underlying and advanced techniques such as multi-agent systems, artificial intelligence-based control, big data cloud computing and management, and so on. Thus, this special session focuses on seeking state-of-art advances and original contributions in design and implementation of advanced control and optimization algorithms, and energy management for heterogeneous microgrid clusters.

Topics of interest include, but are not limited to:

- Multi-agent systems-oriented application for heterogeneous microgrid clusters
- Distributed control and optimization in islanded microgrid clusters
- Network-based digital twins of heterogeneous microgrid clusters
- Stochastic time-delays communication mechanisms of microgrid clusters
- The effects of communication constraints on stability of microgrid clusters
- Event-triggered network communication mechanisms of microgrid clusters
- Distributed intelligence theories and technologies for microgrid clusters
- Experimental prototypes, test-laboratories and field trial experiences of artificial intelligence techniques in microgrids security

-IEEE IES Technical Committee Sponsoring the Special Session (if any):