

**Special Session 15**  
**Machine Learning and its applications to Power Systems**

**Session Chair:**

*Xuan Liu*, Hunan University, xliu@hnu.edu.cn

**Session Co-Chair:**

*Liang Che*, Hunan University, lche@hawk.iit.edu

**Scope of the Session:**

The power system is a prime example of the Fourth Industrial Revolution as it undergoes transformation and fast evolving technologies, and becomes more complex than ever before. The development of smart grid and the integration of sustainable and renewable energy solutions require new technologies for realizing optimal system operations and demand/supply management. Machine Learning techniques and computational intelligence are powerful tools for integrating information, analysing data, and using the resulting insights to improve decision making. This provides powerful tools for the smart transition of the energy sector to a clean energy future.

Machine Learning technologies will enable distributed intelligence and automation at all levels of the energy systems. This includes analysing real-time data for enabling on-the-spot decisions and optimizing the production, consumption and flows of energy according to the resources and network constraints. In addition, the rapidly evolving Big Data technologies will provide new insights into advanced and efficient management and complex treatments of data, which will help utilities to better understand the customer behaviour, consumption and demand.

This special session will bring together researchers and developers from academia, industry and governmental sectors to share and exchange novel ideas, explore the inherent challenges in developing machine learning and data analytics technologies for future electrical and energy systems, and combine their knowledge and intellectual potential for the benefit of the industry and society.

Topics for the session include, but are not limited to:

- Smart cities and smart grid
- Smart home, smart mobility and smart community
- Machine Learning and business strategy
- Statistical models for Machine Learning
- Iterative approaches for learning from complex data
- Machine Learning and computational intelligence methods in renewable energy
- IoT technologies and wireless sensor networks for smart cities
- Data analytics and Machine Learning techniques.
- Condition monitoring and fault diagnostics of digitized energy systems
- Smart energetic management and electrical efficiency, micro grid and decentralized energy