Special Session 30: AI-powered Decision-making in Distribution Systems: Prediction, Optimization, and Large Language Models

Session Organizers:

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Brief Description of the Session Thematic:

Breakthroughs in advanced AI technologies—including control, optimization, and large language models—are revolutionizing intelligent decision-making in distributed energy systems. These systems face challenges such as high penetration and the inherent uncertainties of distributed renewables, electric vehicles, and energy storage. This session aims to bring together researchers, practitioners, and policymakers to explore how AI is addressing decision-making challenges in distributed energy systems, fostering innovation and resilience in a rapidly evolving energy landscape.

Topics and Keywords:

The session will focus on a wide range of AI-powered applications and challenges in distributed energy systems, including but not limited to:

1. Integration of distributed energy resources
2. Machine learning and reinforcement learning applications
3. AI-powered operation of distributed energy systems
4. Retail electricity markets and the emergence of energy prosumers
5. Data-driven approaches in distribution networks
6. Applications of large language models in energy analytics
7. Artificial intelligence and machine learning for smart grids
8. Control theory in grid modernization
9. Smart city and smart grid innovations
10. Data analytics for energy efficiency

Keywords: Distribution systems; Reinforcement learning; Large language model; Artificial intelligence; Machine learning; Optimization; Control theory; Distributed energy resources; Smart grids; Smart city; Data analytics; Energy efficiency; Power system reliability; Intelligent systems; Grid modernization