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SMART GRIDS: AN ARTIFICIAL INTELLIGENCE PERSPECTIVE

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ABSTRACT

Artificial Intelligence (AI) as an enabling intelligent systems technology is playing a more and more important role in today's industry and society. Smart Grids (SGs) as a typical Cyber-Physical System represent electric networks that can intelligently integrate the actions of all users (e.g. generators and prosumers) in order to efficiently deliver sustainable, economic and secure electricity supplies. The recent fast advances in AI have provided a powerful methodology for SG to deal with demand for deeper control, increased cross connectivity, embedded generation, smart metering and using wires as carriers for information transmission. On the other hand, SGs present technical challenges that AI needs to address.

In this talk, we will first discuss some recent developments in both AI and SG and then examine potential issues associated with interplay and integration between them to bring out the best of both fields. We will also touch on potential new thinking paradigms beyond AI to deal with complexity arising from these systems, speculating potential methodologies inspired by the Nature as future smart technologies. Several real-world cases, including some of our own research projects, will be used as case studies. Finally, we will lay out the potential issues and challenges for future developments.