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Keynote Lecture

Presenter Name

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Title of Keynote Presentation

Smart Energy for Applications in Smart Cities

Abstract:

Smart energy is the process of adopting intelligent devices such as smart sensors for increasing energy efficiency. It focuses on large-scale sustainable renewable energy sources that promote greater eco-friendliness while reducing costs and increasing reliability. To accommodate for ever-increasing data, the application of smart devices to human lifestyles and services, secure computer systems that meet the needs of smart cities are essential. This includes new architecture, concepts, algorithms in machine learning and artificial intelligence. Smart energy networks require fast and intelligent decisions, which will only be possible with the help of intelligent and complex computer systems. Urban energy networks are becoming increasingly linked and integrated. This is crucial for cities aiming to achieve energy efficiency and environmental sustainability.

In addition to this, there are ongoing advances in renewables and energy storage systems, along with innovative information, communication and control technologies. Thus, there are opportunities and challenges emerging in the design, planning, and operation of more distributed energy system architectures with significant amount of local energy consumptions. The enabling technologies

and methodologies aimed at addressing complex challenges include decentralized computing, self-organizing sensor networks, proactive control, and holistic computing frameworks.

There are various challenges facing on power system operation and planning due to increased penetration of many new technologies of diversified properties. On one hand, system operators and many other participants have to deal with increased uncertainties and risks involved in daily operation and planning activities. On the other hand, applications of many new metering and measurement devices, capable of closely monitoring and sensing grid operation in real-time, result in over whelming amount of measurement data of high precision and resolution. By far, how to make the best use of the massive data remains quite a challenging task facing power system researchers and practitioners. The availability of the high-quality data could potentially facilitate risk hedging and decision making in system operation and planning, of which the prerequisite calls for innovative informatics approaches that are intelligent, data driven, and capable of handling various complex problems.

This keynote covers few important topics ‘derived’ from smart energy such as transportation, health, and standards development. To achieve net-zero emissions by 2050/2060, preserve biodiversity and mitigate global warming, people need to have a better and more sustainable world. Smart energy will play a key role in a carbon-neutral society. Major environmental, economic and technological challenges such as climate change, economic restructuring, pressure on public finances, digitalization of the retail and entertainment industries, and growth of urban and ageing populations have generated huge interest for cities to be run differently and smartly. Some current international research and development activities will be reported, and future directions will be discussed.

About the Speaker

Loi Lei Lai is University Distinguished Professor, Guangdong University of Technology, Guangzhou China. He was Pao Yue Kong Chair Professor with Zhejiang University, Hangzhou China, and Chair of Electrical Engineering with City, University of London. His current research areas are in smart cities and smart energy. He was awarded an IEEE Third Millennium Medal, the IEEE Power and Energy Society (IEEE/PES) UKRI Power Chapter Outstanding Engineer Award in 2000, a special award from City, University of London in 2005 and is its honorary graduate, the IEEE/PES Energy Development and Power Generation Committee Prize Paper in 2006 and 2009, IEEE Systems, Man, and Cybernetics Society (IEEE/SMCS) Outstanding Contribution Award in 2013 and 2014, Most Active Technical Committee Award in 2016, and his research team received a Best Paper Award in the IEEE International Smart Cities Conference in 2020 and the 2022 Meritorious Service Award from IEEE/SMCS for "meritorious and significant service to IEEE SMC Society technical activities and standards development". He is Editor-in-Chief of the IEEE Smart Cities Newsletter, and Chair of the IEEE/SMCS Standards Committee. He was Director of Research and Development Center, State Grid Energy Research Institute, China; IEEE/SMCS Vice President for Membership and Student Activities; a Fellow Committee Evaluator for the IEEE Industrial Electronics Society and IEEE/PES Lifetime Achievement Award Assessment Committee Member. He is an IET Fellow and IEEE Life Fellow.