Guest Editorial
Kun Yang and Yingfei Dong

Recent Advances in Smart Grid

► Kun Yang

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A smart grid is the next-generation electric grid that enables efficient, intelligent, and economical power generation as well as reliable, safe, robust transmission and distribution. It uses modern information and communications technologies, such as advanced sensing, monitoring and processing technology, and high-speed bi-directional communications and networking. In recent years, the smart grid has attracted significant attentions from academics, industry, equipment manufacturers, and service providers. Developing the smart grid has become a global trend due to the immense potential benefits including enhanced reliability and resilience, higher operational efficiency, more efficient energy consumption, and better power quality.

We received strong responses to this call for papers on Recent Advances in Smart Grid from universities, research institutes, and industry. Following a peer-review process, we have selected five papers for inclusion in this special issue.

The first paper, "Theory Study and Application of the BP-ANN Method for Power Grid Short-Term Load Forecasting," aims at improving the accuracy of short-term load forecasting in a power system. To this end, the authors propose a new predictive model using the BP-ANN-based method from a neural network. A theoretical background and numerical results are also given in this paper.

The second paper, "A Solution-Based Analysis of Attack Vectors on Smart Home Systems," first presents a short survey of privacy and security in the broader smart-world context and then analyzes and ranks attack vectors or entry points into a smart home system and propose solutions to remedy or diminish the risk of compromised security or privacy.

In the third paper, "Secure Communication Networks in the Advanced Metering Infrastructure of Smart Grid," the authors propose a security protocol for the advanced metering infrastructure (AMI) with two-way communication in a smart grid. The work proposes a security protocol specifically for the AMI to meet the security requirements.

The methods for efficient network resource management are proposed in the fourth paper, "Reliable Remote Relay Protection in Smart Grid." The authors discuss simple backup solutions in the previous work. They also focus on improving the system reliability by exploring known power system information and minimizing the chances of false trips of important remote relays. Moreover, in order to further improve the system reliability, the authors investigate the peer-to-peer protection approaches to address the single point of failure of centralized control center.

The authors of the final paper, "Experimental Study on Cloud-Computing-Based Electric Power SCADA System," discuss the main issues in applying private cloud architecture to power system control and propose a professional private cloud solution to integrate the electric power SCADA system. In particular, experimental study has been conducted.

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