Special Session Proposal VII

Special Session Basic Information:

专栏题目 **Session Title**	中文：人工智能在智慧能源与交通系统中的应用 英文：Artificial Intelligence for Smart Energy and Transportation Systems

专栏介绍和征稿主题
Introduction and topics

中文：分布式能源（DERs）和电动汽车（EVs）的广泛集成，对城市配电网的安全经济运行提出了新的挑战。电动汽车充电负荷主要发生在夜间，增加了电网的峰值需求。实施电价机制或激励机制以鼓励非高峰时段充电，可显著缓解电网的运行和规划压力。此外，车辆到电网（V2G）技术可为电网提供多种辅助服务，例如削峰和频率调节。同时，电动汽车充电负荷表现出明显的时空分布特征，因为用户可以选择不同地点的充电站。充电决策受到多种因素的影响，包括电价、用户出行模式以及道路交通状况。准确预测大规模电动汽车充电负荷的时空分布，模拟电动汽车与电网的协调运行，并探索人工智能在交通-电力融合系统中的应用，对于提升配电网安全性和经济性至关重要。然而，仍存在重大挑战。由于涉及电动汽车出行数据、充电负荷数据和用户移动模式的隐私问题，导致数据稀缺。此外，交通网络和电网的拓扑数据通常缺乏实时更新。获取这些数据并采用数据驱动方法来预测电动汽车充电负荷，仍然是一项极具挑战性的任务。因此，本专题小组计划探讨交通大数据在智慧能源和智能交通系统中的应用。征稿主题包括但不限于：

- 交通控制与管理；
- 移动互联网、出行互联网与物联网；
- 车辆到电网（V2G）；
- 可再生能源；
- 能源与交通系统社会经济分析；
- 智慧能源与智能出行大数据；
- 智慧能源与智能出行优化；
- 智慧能源与交通融合的网络架构；
- 深度学习与人工智能；

英文： The widespread integration of distributed energy resources (DERs) and electric vehicles (EVs) presents new challenges to the secure and economic operation of urban distribution grids. EV charging loads predominantly occur at night, increasing peak grid demand. Implementing tariffs or incentive mechanisms to encourage off-peak charging could significantly alleviate operational and planning pressures on the grid. Furthermore, vehicle-to-grid (V2G) technology offers various ancillary services to the grid, such as peak shaving and frequency regulation.

Additionally, EV charging loads exhibit distinct spatiotemporal distribution characteristics, as users can choose charging stations at different locations. Charging decisions are influenced by multiple factors, including electricity prices, user travel patterns, and road traffic conditions.

Accurately predicting the spatiotemporal distribution of large-scale EV charging loads, simulating the coordinated operation of EVs and the grid, and exploring the application of artificial intelligence in integrated transportation and power systems are crucial for enhancing distribution grid security and economic efficiency.

However, significant challenges exist. Data scarcity arises from privacy concerns surrounding EV travel data, charging load data, and user mobility patterns. Furthermore, the topological data of both transportation networks and power grids often lack real-time updates. Acquiring this data and employing data-driven approaches to forecast EV charging loads remains a highly challenging task. Therefore, this panel plan to explore the application of transportation big data in smart power and transportation systems. Topics of interest for publication include, but are not limited to:

Autonomous and cooperative vehicle systems;

Traffic control and management;
Mobile Internet, mobility Internet, and Internet of Things;
Vehicle-to-grid;
Renewable energy;
Social economics for energy and vehicle platforms;
Big data for smart energy and mobility;
Optimization for smart energy and mobility;
Network architecture for smart energy and mobility integration;
Deep learning and artificial intelligence;

Special Session Chair(s):

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Organizer's Brief Biography

中文：广西大学电气工程学院助理教授、硕士生导师，清华大学博士后，加州大学伯克利分校访学学者。主持省部级项目 2 项，发表 1 作/通讯论文 17 篇，研究方向包括电力系统优化与规划、V2G 等。

英文：He is currently an Assistant Professor with the School of Electrical Engineering, Guangxi University, Nanning, China. He is currently a Postdoc with Department of Electrical Engineering, Tsinghua University, China. He was a Visiting Scholar in University of California, Berkeley, from 2019 to 2020. His research interests include power system planning and operation, and V2G.

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Organizer's Brief Biography

中文：2015 年于武汉大学获得电气工程学士学位，2020 年于浙江大学获得电气工程博士学位。目前，为广西大学电气工程学院助理教授、硕士生导师。主持省部级项目 1 项，发表 1 作/通讯论文 15 篇，研究方向包括电动汽车管理、综合能源协同、电力市场交易。

英文：Received the B.E. degree from *Wuhan University*, Wuhan, China, in 2015, and the Ph.D. degree from *Zhejiang University*, Hangzhou, China, in 1991, all in electrical engineering. He is currently an Assistant Professor with the School of Electrical Engineering, *Guangxi University*, Nanning, China. His research interests include the electric vehicle management, integrated energy coordination, and electricity market transactions.