Special Session title

Advanced Network Modeling and Computing Solutions for Electric Mobility Systems

Special Session proposer(s)

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Abstract

The environmental and economic advantages of renewable-energy driven technologies inspire efforts to promote the use of electric vehicles (EVs) in various modes by business owners and individuals. On the other hand, automated EV technology is fast-growing, which can potentially trigger the largest transformation of transportation systems for a long horizon. Yet, the EV adoption rate is affected by many factors, among which, charging infrastructure, embedded battery technology, and affordability are the most significant players. Literature to date has indicated that an effective facility utilization plan considering user-specific constraints can help improve the adoption rate. EV facility utilization and service scheduling, on the other hand, requires the integration of power and transportation systems to ensure sufficient flexibility in the overall energy system and help balance the fluctuations often observed in (renewable) energy sources. Such emerging technological innovations require network modeling and advanced computing techniques to facilitate their design, management, and long-term utilization. The proposed session will seek novel methodological contributions, particularly, on network modeling domain, that focus on wide aspects of the technology, ranging from their operations, embedded charging technology (e.g., plug-in, battery swap, en-route wireless), charging facility logistics to power grid constraints, renewable energy sources and supply chain, and future-oriented infrastructure requirements. The objective is to reach diverse and yet, innovative solutions to help incentivize the use of EVs and support safety and environmental sustainability. The original network modeling and computing breakthroughs will shape the future of transportation systems (with the supporting technological revolutions), which will potentially impact the environment, economy, and security.

Keywords

- Infrastructure for Charging, Communication and Controls
- Electric Vehicles
- Energy Storage and Control Systems

Topics of interest

- Role of network modeling in renewable-energy sourced transportation
- Supply chain logistics of e-mobility fuels
- Computing needs for de-carbonizing heavy-duty transportation
- Understanding energy systems and charging infrastructure
- Electric aviation: advanced network optimization and data analytics
- Automated e-transit services: optimal design and operation

- Understanding network behavior from EV data
- Route choice behavior for EV users
- Automated EV service planning in traffic network
- Advancements in battery technology and the impacts on e-mobility