Tutorial 3: Modeling and Optimization of Trip Based Energy Consumption and Charging Management for Connected Automated Electric Vehicles

Wednesday, June 19th, 2019
4:20PM – 5:40PM
Venue: Cornerstone 5

Speaker:
Zonggen Yi - Idaho National Laboratory

Short Biography:
Zonggen Yi is a research scientist with Idaho National Laboratory’s Energy Storage and Advanced Vehicles department. He received his Ph.D. in electrical engineering from University of Notre Dame in USA. He earned his bachelor’s, in automation, and master’s, in control science and engineering, from Tongji University, Shanghai, China. His research is mainly related to the intelligent and electrified transportation systems and also their interactions with future smart grid. His current research includes the energy cost and recharging management for connected and automated electric vehicles, control and optimization of smart charging for electric vehicle fleet integrated to power grid, shared autonomous electric vehicle fleet management, etc. He has strong research interest in designing high efficient data driven methodologies for distributed control and optimization of future electrified autonomous systems.

Summary:
Trip aware energy consumption and charging management for electric vehicles is a key component to ensure sustainability of electrified transportation. The upcoming vehicle communication and autonomous driving technologies will provide opportunities to achieve more intelligent management strategies. This tutorial will introduce the state-to-art technologies that are being designed for optimizing the trip level energy cost and recharging operations of connected automated electric vehicles (CAEVs). The information needs, modeling, control and optimization techniques for optimal trip level energy management will be introduced. Opportunities and benefits from vehicle communication and automation will be discussed. In general, three main sub-topics will be presented in detail: first, advanced EV energy consumption modeling and prediction technologies; second, energy efficient driving technologies, e.g. eco-driving and eco-routing, etc.; third, optimally automatic charging decision making for CAEVs. Following these details, the research challenges, opportunities for co-optimization between the energy consumption and energy recharging of CAEVs will be illustrated in this tutorial.