Title: **Toward Deploying Dynamic Monitoring and Decision Systems (DyMonDS) for Sustainable Electric Energy Systems in China**

Duration: 1/14-Ongoing

Sponsor: Carnegie Mellon CIRC

Contributing Faculty: Marija Ilic(CMU), Orkun Karabasoglu (SYSU)

Contributing Students: Jonathan Donadee

Description:
The goal of this work is to demonstrate the potential of the DyMonDS framework to reduce the environmental impact of electricity generation, delivery, and use. We hope to collect real world data, specifically for the island of Hainan, and demonstrate the real world potential of the DyMonDS framework. The proposed work will also develop an intelligent decision making framework and software for internet connected PHEV chargers. This system can be referred to as DyMonDS for EVs. A new approach to modeling stochastic individual or group driver behavior will be demonstrated. Driver behavior can be sensed by smart chargers, enabling us to build a driving behavior model without any effort from the end-users. We will collect data on multiple drivers and leverage the full data set to overcome data sparsity and optimize each individual's charging strategy. The Markov decision problem (MDP) framework and cloud computing will be used to optimize the actions of Internet connected PHEV chargers that have minimal local computing power. The proposed MDP framework will enable the optimization of charging decisions under stochastic driver behavior. A new method will be introduced to construct energy demand bid functions, so that market mechanisms can be used to match price responsive demand with supply. A cyber-physical system will be designed which increases the sustainability of transportation and the electric grid and satisfies end user-needs with no direct end-user input. Once we have developed this DyMonDS system for EVs, we plan on demonstrating the benefits of using DyMonDS in the context of Hainan.