Project Title

Modeling for Battery Management Systems

Supervisor(s) Name(s) and Department affiliation

Le Yi Wang, Electrical and Computer Engineering

Abstract

The students will use some experimental data (that will be provided by the advisor) on some production battery systems to develop models on battery systems and evaluate their accuracy and reliability. They will also learn to estimate the internal states by using some algorithms. Then, they will use Matlab/Simulink to evaluate the quality of their models and estimates in charge/discharge operations.

These topics are typically for Master’s students and PhD students to develop new battery models and new battery management strategies. For undergraduate students, the topics are simplified. They will use their learned knowledge in courses and also some new techniques in this project toward one of the most important topics in electric vehicles and smart grids applications, namely, advanced battery management systems.

The students will use what they have learned in courses on Circuits, Signals and Systems, Control Systems, and Power Electronics and apply them to a design project using real experimental data. They will also learn some useful new methods such as least squares fitting, system identification, and state estimation.

Number of students and background and/or pre-requisites required

As a first attempt on using an advanced topic to train undergraduate students, we will limit to four students who have A or A- in Control Systems I.

Resources Required

Matlab and Simulink
Budget Required

Currently, we have a single battery testing bench, but it is dated and not reliable, and may not be useful. Also, we do not have lab space to accommodate graduate students, let alone undergraduate students. As a result, the project is simulation based.

If an upgrading is required, we will request such a budget and a lab space separately from this design project, and in collaboration with other related projects.