Model–Based Design Curriculum: Supervisory Control & Fault Diagnosis

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Course Details

Description

The Model-Based Design Curriculum is a series of self-paced learning modules aimed at developing a basic understanding of Model-Based Design within the context of hybrid electric vehicles. In this course, Model-Based Design is defined as a method for developing mathematical models for physical systems and controllers in complex systems such as a vehicle powertrain. The intent of this course is to build understanding of complex systems through the development of basic models that can be modified to incorporate more complex behaviors. Supervisory Control & Fault Diagnosis is the third course in the series. It introduces the use of models for developing propulsive torque control and generator/engine control, describes supervisory control for battery state-of-charge regulation, and also discusses methods for fault diagnosis.

The content of this course is designed for sophomore or higher college engineering students. The models developed in this module are built using MATLAB and Simulink release 2012b.

Prerequisites

- This course assumes a basic understanding of MATLAB and Simulink.

Original Course Documents

Source file URL (Includes lecture and demo videos)

Course Contents

Lesson 1: Introduction

- Lecture Slides

Lesson 2: Propulsive Torque Control

- Lecture Slides

Lesson 3: Generator/Engine Control

- Lecture Slides
- Demo: Optimization
  - best.mat
  - efficiency.mat
  - engine.mat
  - generator.mat
  - Map_gen_eff.mat
  - P_elec.mat
  - P_max_eff.mat
  - Series_optimization.m

Lesson 4: State-of-Charge (SOC) Regulation

- Lecture Slides
- Demo: Thermostatic Control of SOC
  - Initialize.mat
  - Thermostatic.m
  - SOC_thermostatic.slx
- Demo: PID Control of SOC
  - Initialize.mat
  - PID.m
  - SOC_PID.slx
- Demo: Feed-Forward Control of SOC
  - Initialize.mat
  - FF.m
  - SOC_FF.slx
- Demo: PID + Feed-Forward Control of SOC

Initialize.mat
- PIDandFF.m
- SOC_PIDandFF.slx

Lesson 5: Fault Diagnosis

- Lecture Slides

Lesson 6: Overview of the Control Design Process

- Lecture Slides

Links

- EcoCAR2 Website
- EcoCAR3 Website
- EcoCAR2 Team at The Ohio State University

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