Solar Car Power Distribution Control Board - Amalia Dungey

Team Members

- Amalia Dungey (adungey2)

Abstract

This semester I will design and build a new revision of the Illini Solar Car team's power distribution control board. This board handles signals from other board on the CAN bus and turns on and off power paths to the high voltage (HV) bus. This system must be stable and robust in a vibration-heavy environment and for hours at a time. The current version is built around an Arduino-Nano-like microcontroller interface board using the LPC1549. I will evaluate whether or not the LPC1549 is the best MCU in NXP’s catalog for this project and then overhaul the hardware design of the current board. The new board will be easier to debug while inside its space on the solar car, meaning there will be clear test points for specific power paths and more distinct LEDs for quick troubleshooting. The current board has intermittent connection issues, so I will use stronger connectors that are still relatively easy to work with, such as the Molex KK series connectors instead of MTA connectors.

The firmware for the board will process CAN messages from the driver control boards as well as the battery management system and run a state machine which intelligently and efficiently controls the high voltage bus. For example, the update PDS should turn off the battery input path but allow battery discharge while the temperature is above the maximum rated charge temperature of the batteries.

Project Goals

First Demonstration:

For the first demo I will have debugged the main hardware and software problems on the existing board and update the hardware with breadboard or PCB "patches", after designing the schematic.

Second Demonstration:

For the second demo I will have the PCB layout design reviewed and ordered, as well as all necessary components, and a nearly completed firmware rewrite.

Final Demonstration:

The final demo will have the full system running on the bench, with CAN inputs from Microchip's CAN Bus Analyzer or a similar tool, and the same contactors as the solar car's system. If possible it will also be installed on the solar car Argo.

Tentative Schedule

(6 hours out of these determined on week-to-week basis)

Monday 2-5pm
Thursday 7-8pm
Friday 2-4pm, 6-7pm

Final Report and Project Files
No files shared here yet.