

Design Review

Temperature Sensor Software

Summary

The goal of this project is to write code to check the temperature of the solar car's batteries, and shut the system down when overheating to prevent a fire.

Background

The solar car has a 32 cell battery pack. Each battery pack has an individual temperature sensor, transmitting a current with higher voltage indicating higher temperature and lower voltage indicating lower voltage. These currents will be amplified, and fed into a ADC (analog to digital convertor). This will all be managed by Francis, and will be a black box to the software side. The software will only see if each cell is overheated or not, and not what each individual temperature is. The software interact with the ADC through SPI.

Using an Arduino Due we will write code that checks the temperature of the cells and instantly shut the car down if any cells are overheated.

Design

For maintainability, constants (time between checks, number of batteries, etc etc) will be defined to be easily changed for future use.

The code will first initialize the SPI based on specifications of the ADC.

After initialization, the code will loop at a certain user set frequency so there can be a chosen balance between use of processing power and safety. Once the time elapsed since the code was last run has surpassed the user specified time between runs, the loop will run again.

There is a Boolean array with a cell for each battery cell where true means overheated, and false means acceptable temperature. In each loop, the code checks each battery cell, and writes true or false into the matrix. After all checking is done, then the code checks the matrix for any true values, and shuts down the car if there are any true values. Then, the code waits until the time to the next loop has come, and repeats this process indefinitely.