PIRM - Automated Battery Characterization

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Client: Solar Car
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Project Overview

- Best performance with matched batteries
- PrISUm Solar Car currently does not have an efficient way of characterizing batteries on a battery pack scale.
    - Currently the procedure is to measure the open circuit voltage of each battery and group them based on that measurement.
- Process is time consuming on large scale (1000 or more batteries)
- We will design and build an automated lithium battery characterizer

Current Status

Hardware:

- Completed design of following circuits:
  - Charging (mostly)
  - Load
  - Measurement
  - Microcontroller
- Model Overall Thermal Dissipation Requirements

Software:

- Flask app setup and running
  - Including database
  - HTML and CSS for frontend
- Microcontroller communication libraries being written

Semester Goals

- Have Revision 1 Hardware
- Completed Embedded Code
- Enclosure Designed
- Test Hardware
- Test Hardware and Software interaction
- Communicate between modules and app

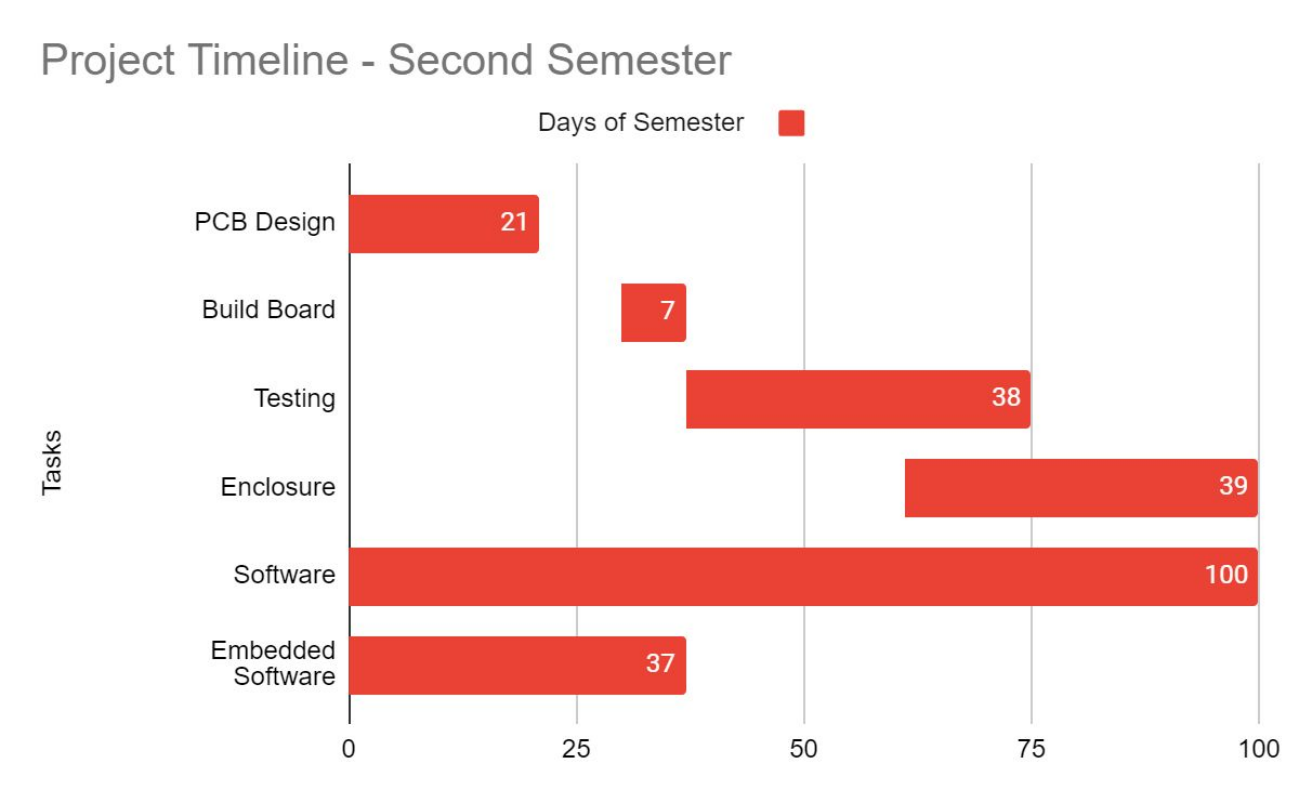
Technical Challenges

- Measurement Accuracy
  - To have valid results, the voltage and current measurements will need to be accurate.
  - Main driver of the requirement is the internal resistance measurement, requiring μV level measurement accuracy.
- Unsupervised Operation
- Thermal Management
  - Full charge and discharge cycles will dissipate a lot of heat. This will need to be modeled so that proper heat sinking and cooling measures can be taken during design process.
- Bus Load
  - Uses multiple buses, I^2C and CAN, and needs to balance the load of both buses

Next Steps

- Hardware
  - Schematic finalization
  - BOM Organization and streamlining
  - Start PCB layout
- Software
  - Embedded Library Creation
  - Communicate between modules and app
- Enclosure Design

Timeline


Project Timeline - Second Semester
Days of Semester
Tasks
PCB Design
21
Build Board
7
Testing
38
Enclosure
39
Software
100
Embedded Software
37
0
25
50
75
100