College of Engineering
Electrical and Computer Engineering

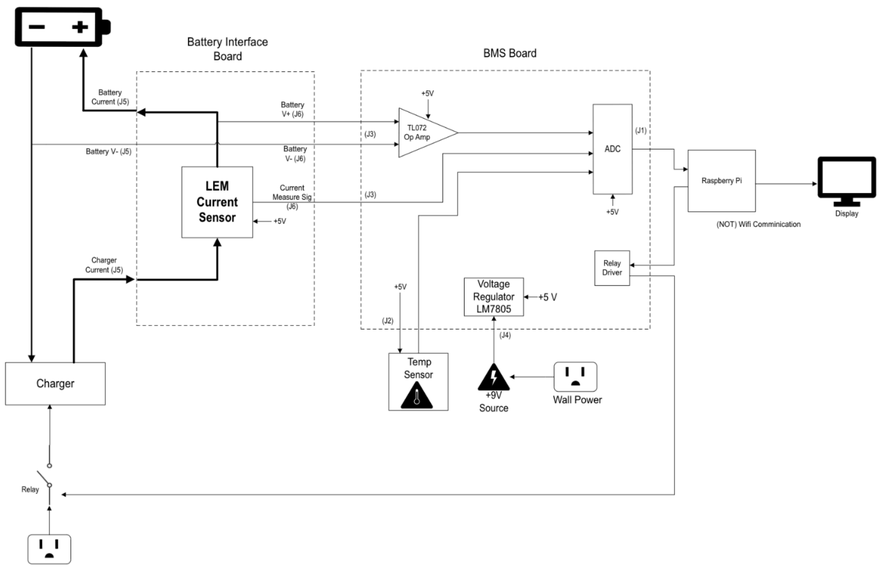
Smart Battery Management System

Electrical and Computer Engineering Project

Overview

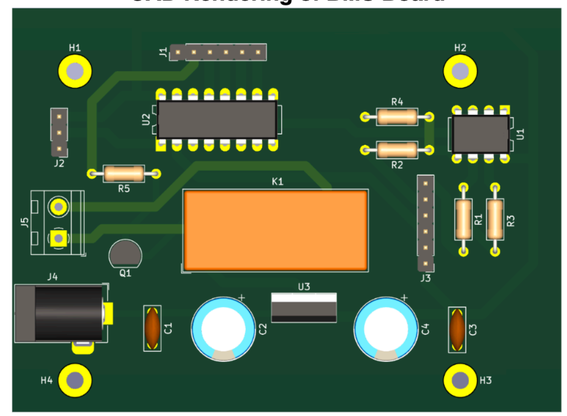
Our smart Battery Management System (BMS) is focused on the real-time safety monitoring and control of a 12 V Lithium-Ion battery. The BMS prioritizes battery protection by determining if the operating conditions for the battery are safe for charging. First, a battery interface and BMS Printed Circuit Board (PCB) processes incoming voltage, current, and temperature data. These values are used to calculcate the state of charge and state of health of the battery. These parameters also input into a Raspberry Pi to decide whether to activate or deactivate a relay. The relay will cut off power from the charger when unsafe operating conditions are detected. In short, the Raspberry Pi makes the decisions, while the charger delivers the power.

Block Diagram - PCB Boards

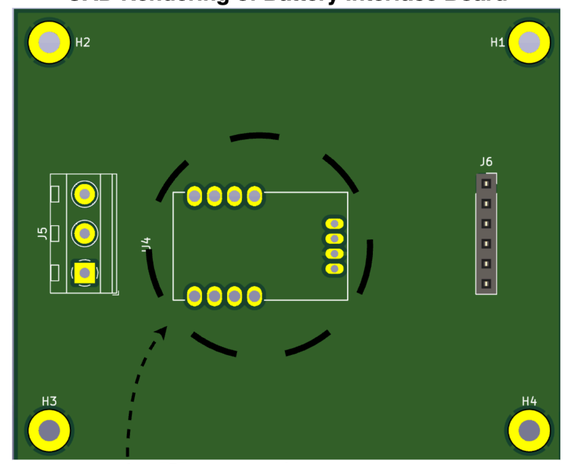


Hardware

CAD Rendering of BMS Board



CAD Rendering of Battery Interface Board



LEM Current Sensor

Meet the Team

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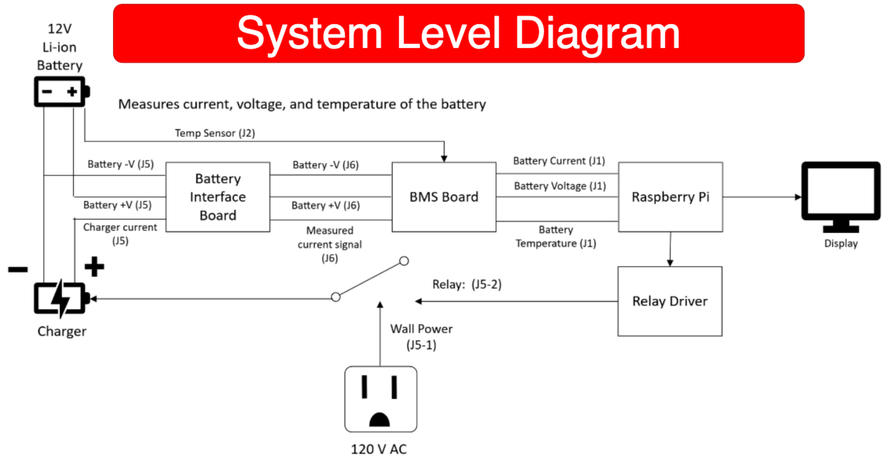
System Level Diagram



Key Components

Developed:

- Battery Interface Interface Board
- Management System Board
- State of Charge Implementation
- State of Health Implementation
- Graphical User Interface

Procured:

- 12V Lithium-Ion Battery
- Raspberry Pi 5 Microprocessor
- LEM NP6 Current Sensor
- TMP36 Temperature Sensor
- MCP3008 ADC

Acknowledgements

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