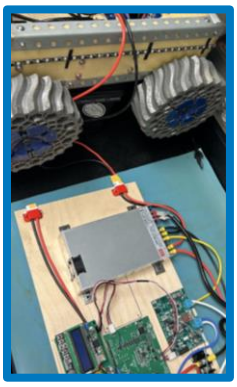
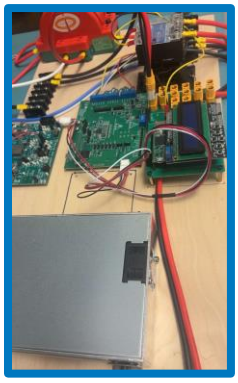
BHWS Abstract for Video

The Battery Health and Wellness System (BHWS) serves as a custom solution to increase the safety and usability of the LiPo battery integration with the ASTRA rover, a competition vehicle developed by the Space Hardware Club. While Lithium Polymer batteries provide high energy discharge capabilities, they can pose safety issues, particularly when used over long time frames if not managed properly. The BHW system addresses these issues by directly monitoring battery and cell activity, supporting balancing and charging of the ASTRA battery solution. In addition, BHW aims to provide functionality designed to protect the battery from excess use by providing alternate power sources during testing and implementing automatic switches in case of excess discharging. This, along with an easily interactable interface, aims to extend the life of the LiPos and allow ASTRA team members to better manage their batteries.

System Overview

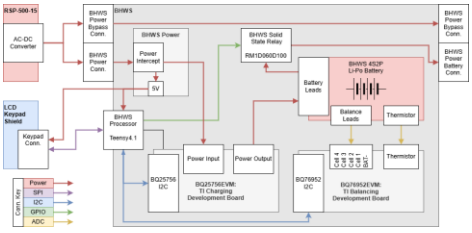
The Space Hardware Club (SHC) on campus utilizes a LiPo battery to provide power to its rover for the University Rover Challenge. The current implementation is unoptimized for their use-case, resulting in minor safety hazards and inconvenience for operators. The topic of this senior design team was to design an enclosed battery charging and monitoring system, tailored directly for the rover and implementing some quality of life features.





System Goals

1. Charge and balance ASTRA rover's battery using the standard US outlet (120VAC)
2. Develop a user interface to show the status of battery cells and display maintenance messages
3. Design a power-disconnect switch to preserve battery health
4. Provide a power bypass option using wall power to provide a low-power programming mode



The Battery Health & Wellness System Team

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