Purpose

The Battery Management System (BMS) will be incorporated into a low to mid-tier drone, which will allow the drone to have a more precise reading of its battery health and state of cell charge. NFC will be used to check battery health in-use and in storage.

Project Scope / Objective

- Developed for the HoverGames challenges
- Emphasizes safety and security measures
- Project will ensure the safety of the battery cells and efficient charge cycles
- Near Field Communication to Verify Batteries
- Create state of health and state of charge algorithms

Challenges

- Manage Power Dissipation Between 3-volts and 5-volts
- Algorithms for state of charge and health
- Verifying NFC functionality
- Safe testing procedure designs
- Testing system in flight mode
- FAA and FCC regulations

Team Members

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Test Plans

- Test the efficiency of battery cell drainage so individual 5-volts cell doesn’t go below 3-volts
- Create a hardware-in-a-loop program to test state values of software mode of operations
- Put battery cell in near short circuit to test current drainage for 2-volts
- Encode NFC NTag5 for battery authentication and state of cell health
- Test Can Bus by measuring DC resistance and voltage at the transceivers

Potential Error Cases

<table>
<thead>
<tr>
<th>Hardware Error Cases</th>
<th>How to Handle Error Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery verification</td>
<td>Certify that the battery is genuine – if the battery is not genuine software will send an invalid flag</td>
</tr>
<tr>
<td>Microcontroller unit (S32K118EVB)</td>
<td>Ensure MCU is being powered correctly via SBC</td>
</tr>
<tr>
<td>Battery controller board (MC33772B)</td>
<td>Validate input power to the battery controller</td>
</tr>
<tr>
<td>Near-field communication (NFC)</td>
<td>Use NFC application to troubleshoot connectivity</td>
</tr>
<tr>
<td>System basis chip (SBC - UJA1169)</td>
<td>Check CAN pins, power input to chip</td>
</tr>
</tbody>
</table>

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