**Hybrid Battery Pack Test #3 Preliminary Design Report**

**EC464 Team #23**

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*Hybrid Battery Pack Schematic*

Expounding upon the expected successful results from the first two hybrid battery pack safety tests, the third test in this series employs two Lithium-ion batteries and three LiFePo4 batteries in parallel. Adjustments will be made accordingly to the resistive load in order to gain a comprehensive picture of the safety bounds relative to an intermittent resistive demand, hence making the resistor variable accordingly. **A schematic of the third test can be found below**; this was drawn using KiCad EDA – a free, open-source software commonly used for electronics design and PCB design. Increasing from the first two tests, in this test, a 7A fuse will be added in series with the adjustable resistive load accordingly. This is an expected safety precaution and consequence of scaling up the hybrid battery pack for further test standards. Overtly, for test #3, the team expects to have a circuit configuration with three LiFePo4 batteries in series that are in parallel (3S, 1P) with two Lithium-ion batteries in series (2S, 1P); this configuration has been selected so as to scale up the current to 5 A whilst the voltage is set to 10 V (so 50 W) based on Professor feedback from the IDRs last week. Ultimately, with this test, the team expects that the final product will include 19 LiFePo4 batteries in series (19S, 1P) that are in parallel with 12 Lithium-ion batteries in series and eight in parallel (12S, 8P). On the left side of the schematic below, a VESC motor controller will be used to drive the adjustable resistive load for battery testing.

