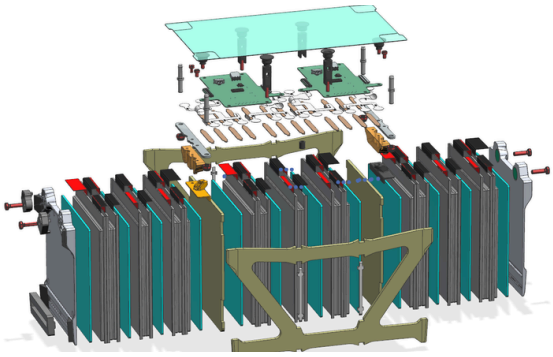
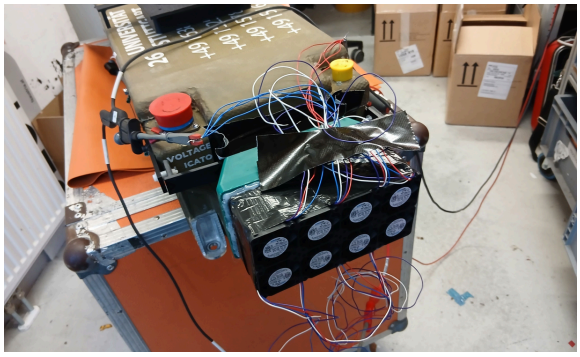


SUGGESTED TOPIC FOR SCIENTIFIC WORK

Mechanical and Electrical Characterization of Lithium-Ion Pouch Cells





The performance of a high-voltage accumulator depends on the electrical and mechanical behaviour of its cells. In a Formula Student car, pouch cells experience dynamic currents, changing temperatures and expansion during operation and ageing, affecting the battery module's design and compression. The objective is to experimentally characterise the lithium-ion pouch cells used in our HV accumulator. Mechanical tests may include cell swelling and compression behaviour, while electrical tests may cover capacity, OCV, pulse and internal resistance measurements at different states of charge and temperatures. The data will support battery model development, particularly state-of-charge (SOC) estimation, which may be validated using dynamic current profiles. The topic is merely a suggestion and must be finalised with the institute.

Tasks:

- Develop and conduct mechanical and electrical pouch cell tests
- Analyze cell behavior under varying SOC, temperature, load, preload and aging
- Evaluate capacity, OCV, internal resistance and voltage response
- Develop a state-of-charge estimation algorithm
- Derive parameters for BMS and accumulator design

Requirements:

- Basic knowledge of battery technology and electrical engineering
- Interest in testing, data analysis and BMS
- MATLAB/Python skills
- Experience in SOC estimation or testing is a plus
- Willingness to join the Rennteam