**1. Data Collection and ECM Modelling:**

* **Data Collection**: Mechanical simulations will be completed by Thanush and Rahin, we will focus on collecting the Electrical data in real time. This would involve analysing Electrical data like Voltage, Current etc at pack/cell level at different points in the battery.
* **ECM**: Using software like MATLAB or Excel, We will model the Equivalent Circuit only using the Electrical data collected and can graph and interpret the data from the simulations to better understand their behaviour, identify faults points, and evaluate their electrical performance.(If required we will also work on electrochemical modelling with support from your side)

**2. Design Optimization**

* **Algorithm-Based Optimization**: Using MATLAB, We will work on basic algorithmic design optimizations for modelling from the automated data collected in real time. By setting up and adjusting parameters for different configurations, We will simulate different parameters could impact performance. So we can streamline the design process and select configurations more efficiently.

**3. Electrical and Thermal Theory Contributions**

* **Thermal and Electrical Interaction**: Our team will focus on the theoretical interaction between the thermal and electrical performance of the battery pack. For instance, understanding how different temperatures impact battery efficiency and longevity could contribute to better system-level insights. We will also try to integrate those data into a single model to analyse the overall performance.
* **Circuit Analysis for Battery Management**: Assist with theoretical analyses related to the Thermal Management System, specifically how temperature affects battery charging, discharging, and overall health. This would help ensure that cooling configurations align with system requirements.

**4**.**Hardware Development**

* **In-Loop Testing:** We will focus on software, Hardware and processor In-loop testing and integrate them with using MATLAB and help with hardware optimization and improvement for later integration into hardware if required.