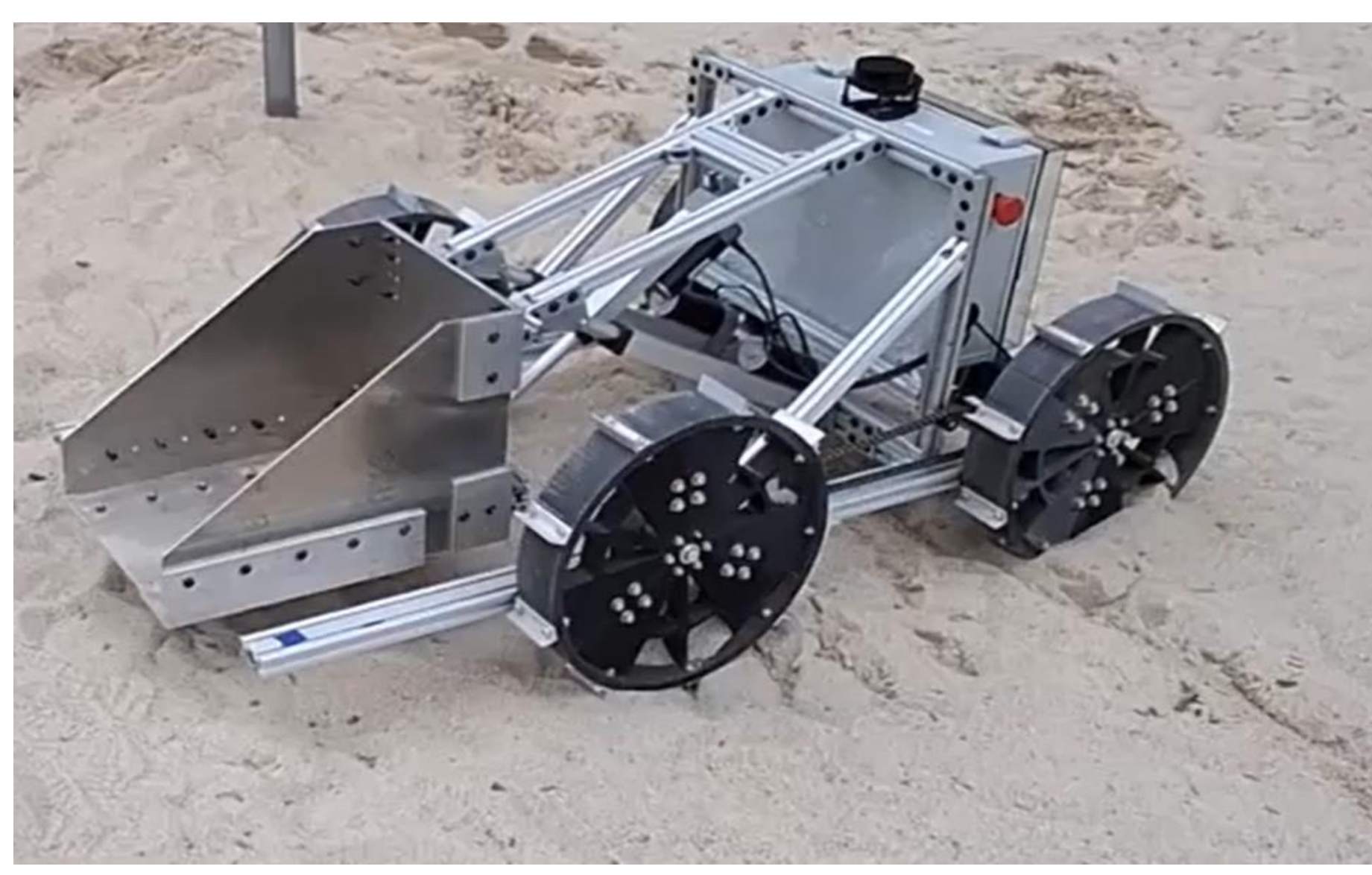


# Motivations

This project is in cooperation with Drexel Robotics in the **NASA Lunabotics Competition**. Our key motivation is developing an integrated STM32-based PCB combining a Battery Management System (BMS) with a high-speed CAN motor control interface. This allows for better consolidation of robot electronics with upgraded functionality.



Full "lunabot" for NASA Lunabotics

## Battery Management and Motor Control Interface for Drexel Robotics

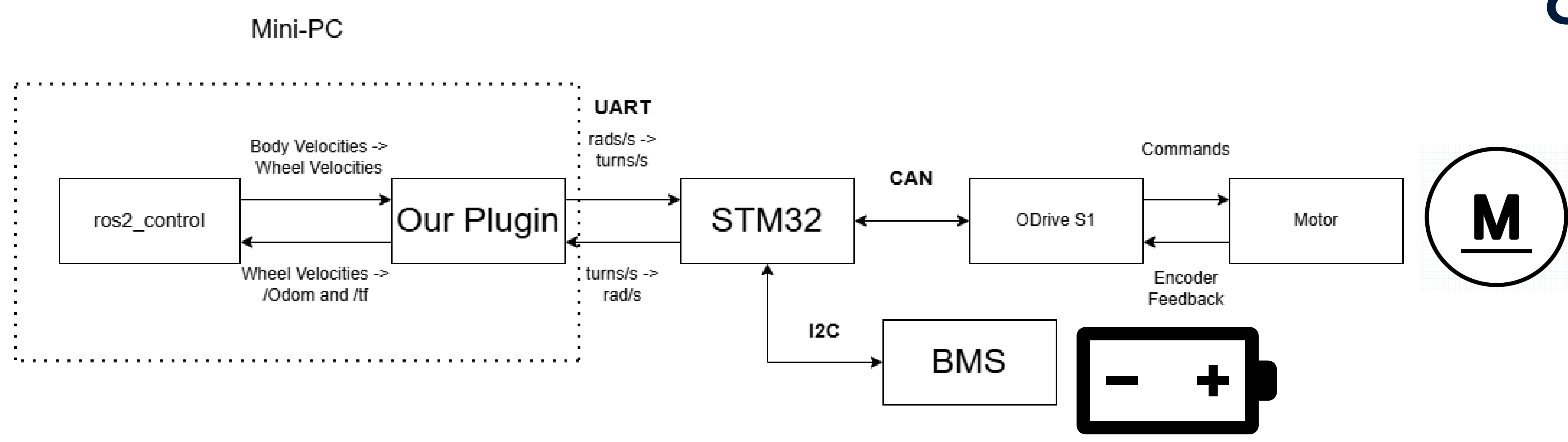
Team #23  
Azmain Yousuf, Donovan Dolan, Jason Filbert, Kiitan Fawole  
Advisor: Dr. Arvin Ebrahimkhanlou

An all-in-one solution PCB with compact form factor, integrating with the existing robot system

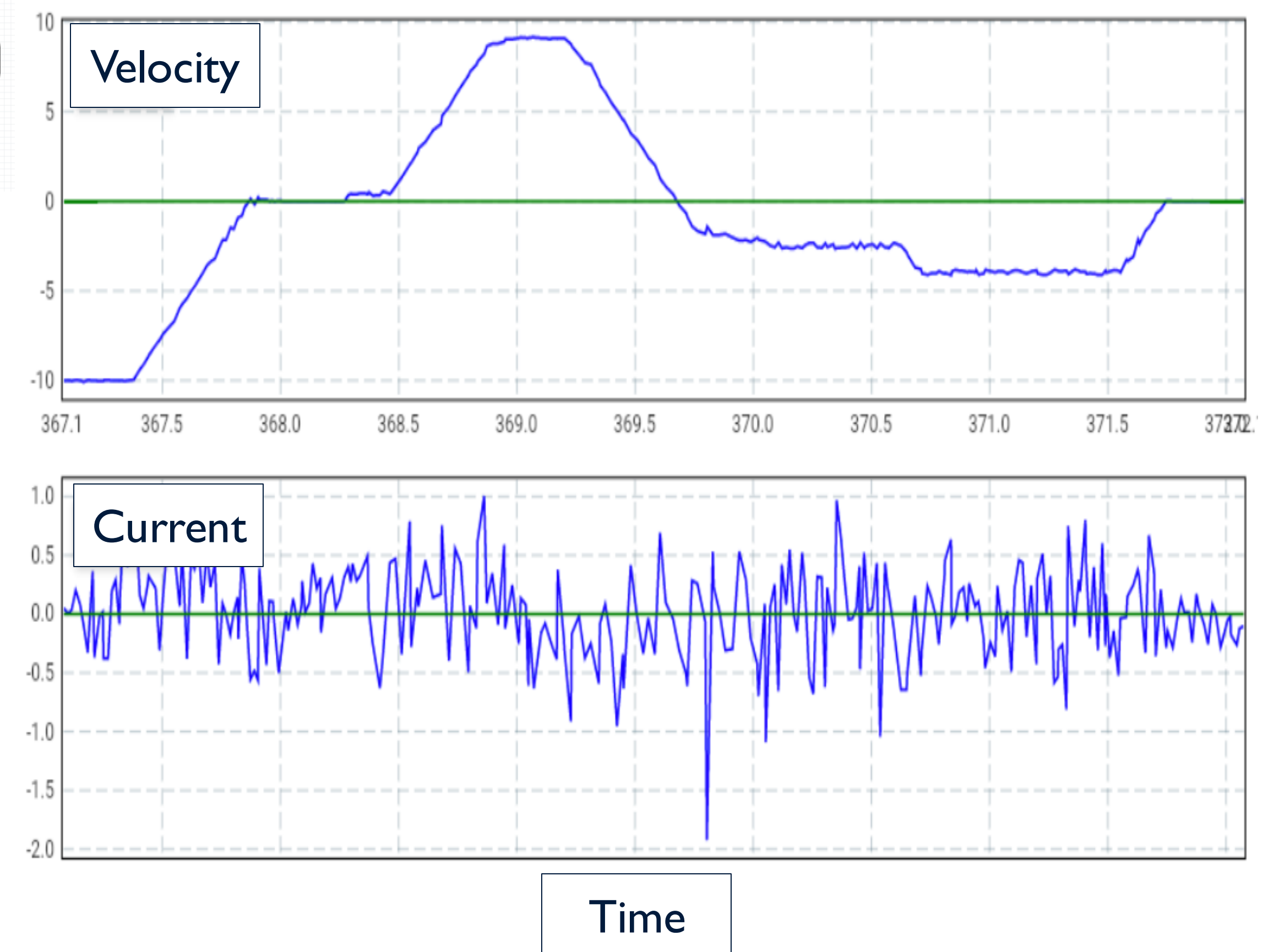
# Methods

LTSpice was used for electrical modelling of key power electronics, breadboards and eval boards for prototyping, and Kicad is used for PCB design.

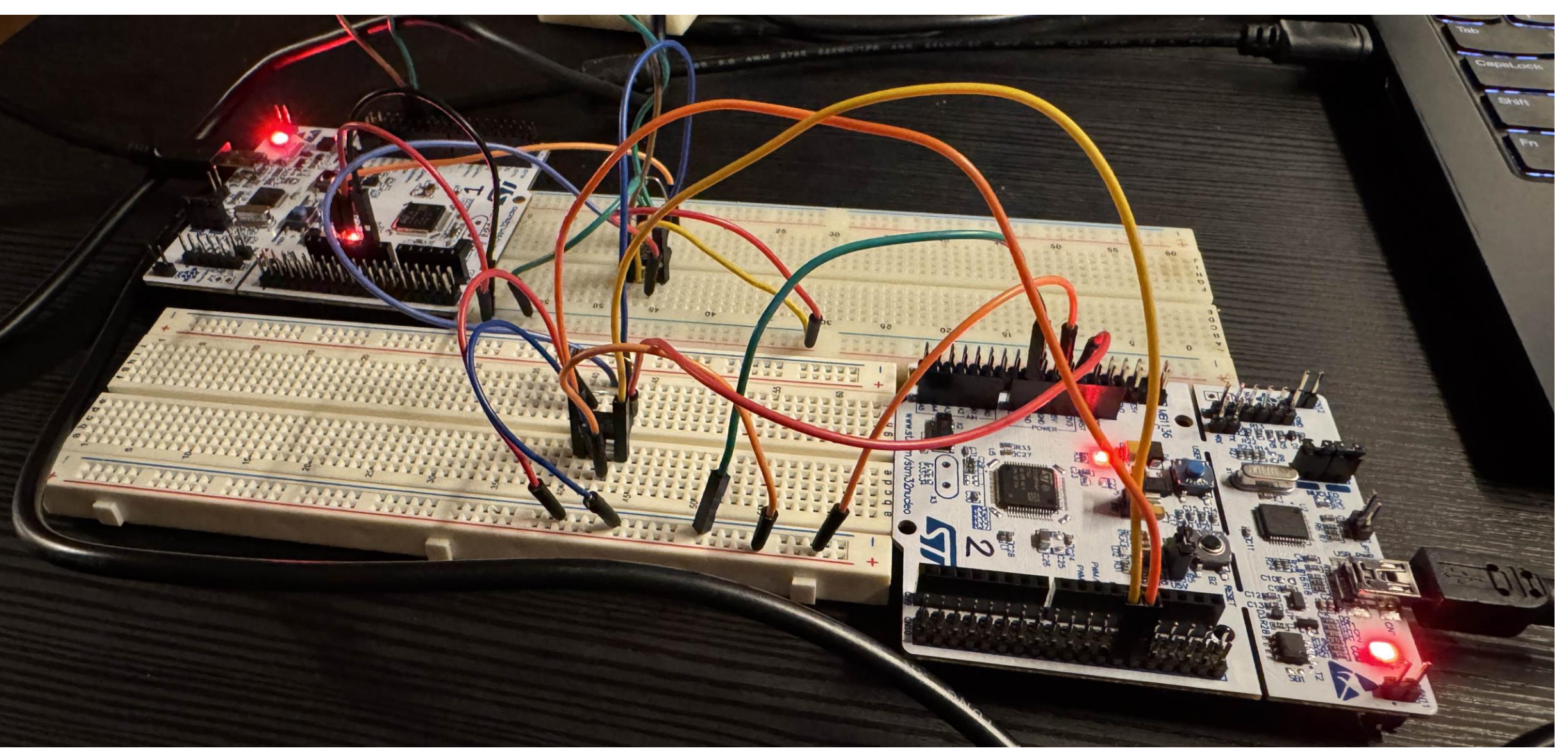
# System Framework



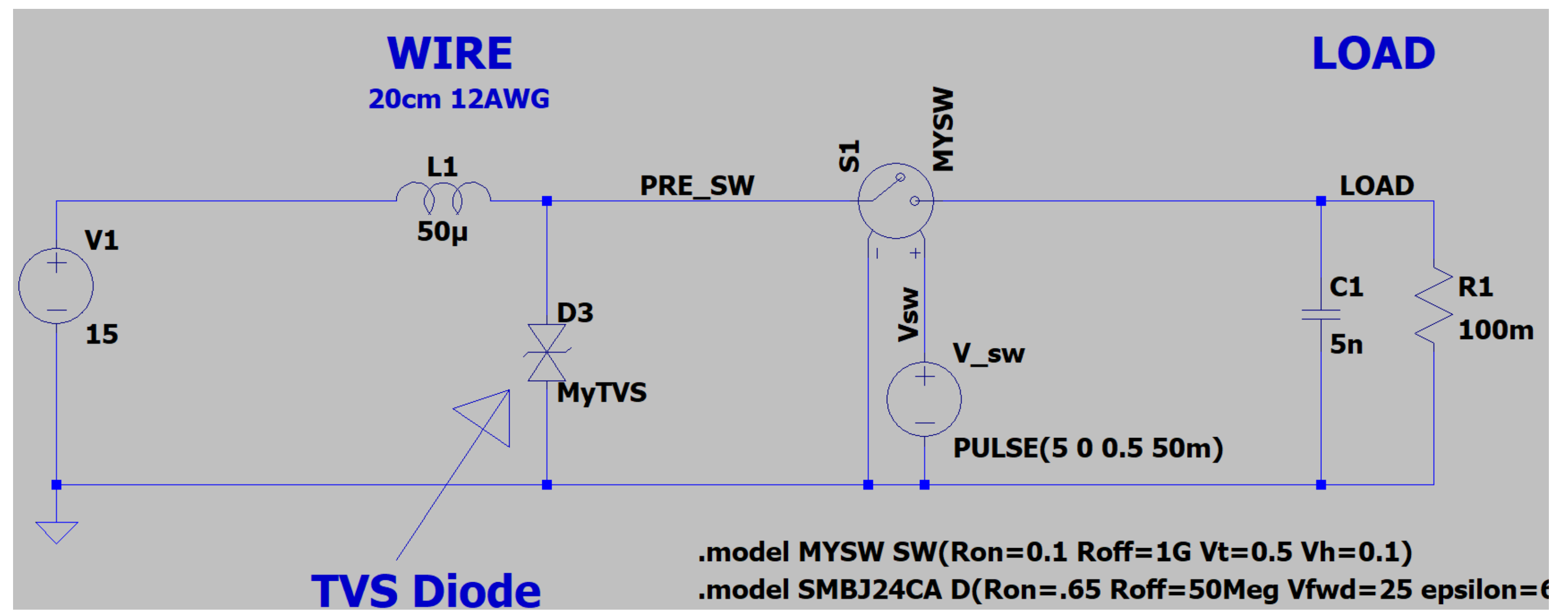
# Motor Calibration



# CAN Communication Testing



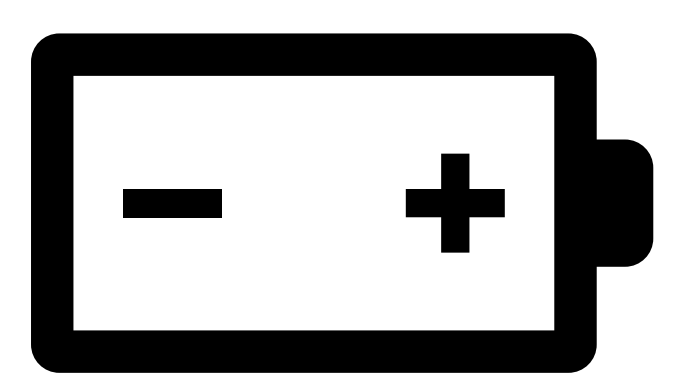
# Battery Power Switching Simulation



The BMS disconnects the battery when the State of Charge (SOC) is too low. High current switching may cause inductive "kickback" voltage spikes. Simulations show our **TVS diodes** clamp the voltage spike from >800V to <50V.

# ModelGuage m5 EZ Fuel Gauge Algorithm

"Fuel gauge" algorithm for BMS from AnalogDevices which estimates LiPo battery State of Charge (SOC) without needing cell characterization data.



# State of Project

All subsystems are functional using breakout boards and have gone through repeated bench-testing. ROS integration is complete providing a front-end. A PCB encapsulating all subsystems is being ordered.