Kyle Mackenzie

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Technical Skills

Software	Controls	Electrical	Mechanical
Python, C/C++	SOC Estimation	Altium	OnShape
MATLAB, Simulink	Torque Vectoring	Soldering	Lathe & Mill
Linux	Thermal Modelling	Fourier Analysis	Waterjet & Laser Cutting

Education

University of British Columbia — Vancouver, BC
Engineering Physics — *Sep. 2020 - May 2025 (Expected Graduation Date)*

Relevant Experience

Battery Controls Systems Co-op — September 2023 – Present
Corvus Energy — *Richmond, BC*

- Developed a thermal model in Simulink of the precharge circuit of a 1MWh energy storage system.
- Validated UKF (Unscented Kalman Filter) used in SOC (State of Charge) estimation algorithm.
- Collected battery cell cycling data for SIL (software in the loop) testing of SOC algorithm.
- Developed coulomb-counting algorithm to validate SOC algorithm and track SOH (state of health) of cells.
- Wrote automated test scripts in Python for the HIL (hardware in the loop) BMS test bench.
- Developed a PCB to emulate temperature sensors to extend test coverage for a battery cell test bench.

Lead Drive Controls Firmware Developer — Sep. 2022 – Present
UBC Formula Electric FSAE Design Team — *Vancouver, BC*

- Researched vehicle control algorithms and designed a custom torque vectoring motor control algorithm, increasing cornering speed and decreasing lap times by 10%.
- Implemented torque vectoring algorithm in C code on an STM32 microcontroller.
- Led a team of Test Engineers to complete track setup, data collection, and safety marshalling during testing and validation of the torque vectoring algortihm's performance.

Research Assistant — May 2023 – Aug. 2023
Cognitive Neuroscience of Schizophrenia Lab, BC Children's Hospital — *Vancouver, BC*

- Optimized a MATLAB implementation of CPCA, a regressive dimension-reduction algorithm, to handle GB of brain fMRI data, measuring brain activation and classifying functional brain networks.
- Developed MATLAB report generation script to display and analyze results of algorithm.

Full-Stack Developer Co-op — Jan. 2022 – Apr. 2022
ICBC — *Vancouver, BC*

- Developed web form data entry automation scripts, saving the company 10h / month.
- Developed prototype for automation of web form data entry using python-based libraries alternatively to the previously used internal tool, proving development time could be reduced by 50%.

Technical Projects

Uni-wheeled Robot Drive Controls | *5-person Capstone project - MATLAB, Simulink* — Sept. 2023 – Present

- Derived equations of motion using Lagrangian mechanics to model the dynamics of a uni-wheeled robot.
- Developed 3D simulation environment to facilitate SIL (software in the loop) testing of control algorithms.

Autonomous Wheeled Robot | *4 person project - C/C++, OnShape* — May 2021 – Aug. 2021

- Designed the chassis, H-Bridge PCBs, and firmware for a wheeled robot to autonomously navigate a course to pick up items autonomously.
- Fabricated robot using sheet metal parts, laser-cut hardboard, and 3D-printed components.
- Assembled, soldered, and tested custom PCBs for power distribution and drive control.