Kyle Mackenzie

1mackenziekyle@gmail.com | 1mackenziekyle.github.io | github.com/1mackenziekyle | linkedin.com/in/kyle-mackenzie-url

TECHNICAL SKILLS

Software: FreeRTOS, STM32 Firmware, Operating Systems, Python (numpy, pandas, scipy, tensorflow)
Modelling & Controls: Laplace-domain physical system modelling, Simulink, Vehicle Dynamics, BLDC motor controls
Tools/Environments: Git, Docker, Linux, Bash scripting, Data wrangling & automation

RELEVANT EXPERIENCE

Vehicle Dynamics & Controls Team Lead
June 2024 – Present
UBC Formula Electric FSAE Design Team
Vancouver, BC

- Leading the research & design of quad-motor torque vectoring drive algorithm, utilizing state-of-the-art sensor fusion, cornering response design, and four-wheel slip control.
- Building a physics-based dynamics model of the car in MATLAB Simulink to enable SIL testing of controls algorithms, to evaluate stability and performance of the controller, and greatly reduce required on-car testing time.

Reliability Test Engineer Co-op
May 2024 – Present
Corvus Energy
Richmond, BC

- Developed a test plan to isolate a single failure mode for power-path connectors.
- Crimped, bolted, and torqued bolted voltage pickup connections and thermocouples, and connected DAQ system, managing hundreds of cables in a clean manner.
- Operated a 750A cycling station to execute test over the span of multiple months.
- Used python to perform data analysis to characterize reliability of components, and reported findings to multiple executives.

Battery Controls Systems Co-op
Sept. 2023 – Dec. 2023
Corvus Energy
Richmond, BC

- Developed a thermal model in Simulink of the precharge circuit of a 1MWh energy storage system.
- Developed coulomb-counting algorithm to validate SOC algorithm and track SOH (state of health) of cells.
- Collected battery cell cycling data for SIL (software in the loop) testing of SOC algorithm.
- 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.

Drive Controls Firmware Member
Sept. 2022 – June 2024
UBC Formula Electric FSAE Design Team
Vancouver, BC

- Researched vehicle control algorithms and designed, wrote, and deployed a custom torque vectoring algorithm, improving handling and acceleration by 10%.
- Developed a Python API for non-software developers to easily interface with the team's STM32 controllers over UART to facilitate testing of circuit boards.

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.

TECHNICAL PROJECTS

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

- Developed a 100Hz PID controller to run on a Jetson Nano, which communicates with the motor drivers, to successfully balance an inverted pendulum indefinitely, using custom PID, RL, and LQR controllers.

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

- Designed the circuit boards and firmware on a small wheeled robot to autonomously navigate a course.
- Assembled, soldered, and tested custom PCBs for power distribution and control of two brushed DC motors.

EDUCATION

University of British Columbia
Vancouver, BC
Engineering Physics
Sept. 2020 - May 2026