

LETTER OF TRANSMITTAL

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March 26, 2020

John Schlichther, Program Coordinator
SCC Electronics Engineering Technology
2000 Talbot Rd
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Dear Mr. Schlichther and Mr. Watson,

I am writing with the project report titled "Control System for an Electric Motorcycle" enclosed. This project gained approval on October 3, 2019, from John Schlichther, and was completed on March 25, 2020, as it completed final preparation for submission. This report focuses on the milestones of progress throughout the project, as well as mostly focusing on program and electrical design. This project is still going to undergo further improvement and development, as it undergoes active use, but as of submission, its current condition is considered 'final' in this report.

Sincerely,
Cole Fuerth
SCC Electronics Engineering Technology, EET 617

Control System for an Electric Motorcycle

EET 617 Progress Report

March 26, 2020

Cole Fuerth

DECLARATION

I hereby declare that the project work entitled "Control System for an Electric Motorcycle" submitted to St. Clair College of Applied Arts and Technology, is a record of an original work done by me under the guidance of Mr. John Schlichther, Professor of Electronics Engineering Technology, St. Clair College of Applied Arts and Technology, and this project work is submitted in the partial fulfillment of the requirements for the award of the diploma of Electronics Engineering Technology – Industrial Automation. The results embodied in this thesis have not been submitted to any other College or Institute for the award of any degree or diploma.

A handwritten signature in cursive script, reading "Cole Fuerth", positioned above a horizontal line.

Cole Fuerth

March 26, 2020

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ACKNOWLEDGEMENTS

There are a few key people that were important in the design and fabrication of this project.

First, my friend Scott MacKay, who was around for the entire mechanical build of the project; he did most of the cutting and shaping of aluminum and steel, and all of the steel welding. The panels would not have turned out as well as they did without his help, and he was around for many, many hours during build.

My father, Brian Fuerth, welded the rear fender, and cut the front panels where the headlights and charging circuits are. He took an interest in the mechanical construction, and he will be helping with construction of the drive system of the bike, including motor and controller mounts, and a chassis for batteries.

Al Repmann is another individual who helped, he did most of the aluminum welding with his spool welder and some Tig welding.

Marko Jovonovic and John Schlichther were some individuals I consulted on opamp design, which were issues I would not have been able to efficiently tackle myself.

ABSTRACT

The EET Capstone project, “Control System for an Electric Motorcycle”, is a project designed to control a fully electric motorcycle, with lithium-ion cells, a charging circuit, an electric motor/controller, and safety and monitoring systems using an Atmega 2560 processor. This system uses amplifiers, optocouplers, relay boards, voltage converters, an EV controller, lithium balancing circuits, and several more systems to create a ‘smart’ system for monitoring the status of the system. Both the user via the physical killswitch, or the processor, with a relay killswitch, will be able to disconnect the battery from the EV controller. Individual monitoring systems on-board include:

- Current monitoring of a 12V supply
- Current monitoring of total draw from battery, up to 150A
- Monitoring of individual cell voltages, each cell is 4S lithium, and 4 of those in series
- Monitoring of total current draw from the battery in mAh
- Monitoring of the front wheel speed
- Monitoring of the total battery voltage
- Monitoring and recreation of the throttle value