

EE/CprE 4910 – sdmay25-26

Status Report 5

3/13/2024 - 4/3/2024

Cost-Effective and Easily Configurable High Voltage Motor Controllers for Automotive Use

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Summary

Basic motor functionality was confirmed, and we were able to spin the motor using our revision 1 boards. Next steps are to correctly incorporate HALL sensor feedback and correct current limiting. Work on the text-based GUI will also begin so we can interact with the motor controller from a computer.

Accomplishments

Pinout for MCU changed

- Janked jumper wires for temporary fix until new board is ordered from Detroit
- Old MCU + pads damaged, new board assembled

Made the motor spin and have correct 6 step generation.

- Drives phases based on motor position derived from HALL sensor
- Phases PWMed correctly to be driven

Pending Issues

Current control algorithms are still a bit confusing and needs to be debugged.

HALL sensor offset needs to be accounted for proper phase transitions

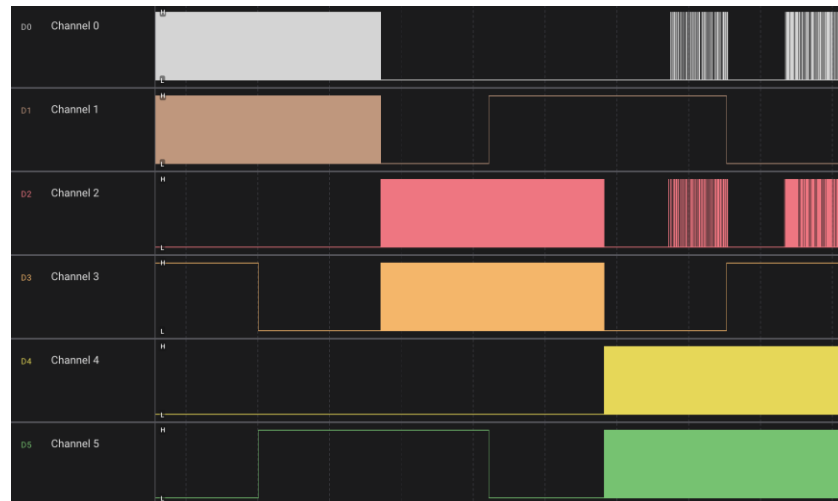
Individual Contributions

Member	Contributions	Period Hours	Cumulative Hours
Gavin Patel	Helped debug software and begun looking at Python script for command line UI	8	88
Bryce Rega	Wrote motor spin tests, gave new jank pinout	10	114
Marek Jablonski	Ran tests, handled high voltage, began V1.2	5	108
Jonah Frosch	Rebuilt board and implemented new janks	14	111
Long Yu	Worked on salvaging initial assembly of rev 1	5	69

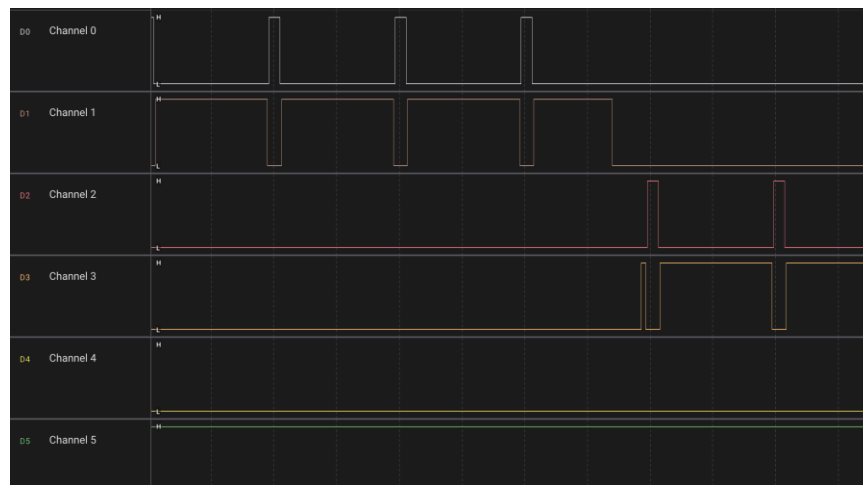
Plans for next reporting period

Develop correct current limiting and correct HALL sensor feedback loop. Also begin working on GUI for motor interaction. Order revised board for a permanent fix for new pinouts

Project Work



This is a capture of the PWM lines driving the phases (including some floating lines) while the motor was spinning. The order of channels are Phase A High, Phase A Low, Phase B High, Phase B Low, Phase C High, Phase C Low. When the lines are "filled" it's PWMing a high phase. When the line is constantly high, it's a low phase being executed. When both lines of a phase are low, the phase is floating.



This zoomed in picture shows the PWM action on a high phase and the transition from Phase A being high to floating and Phase B floating to being high. Phase C is low in this image. The high line has a small duty cycle that is fixed for the purpose of the test. Whenever the high line is low while being PWMed, the low line goes high to charge the bootstrap capacitor so that the high part of the PWM actually does something. They cannot be high at the same time.

Advisor Meeting Summary

No meeting this week due to advisor travel.