Motor Servoing

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Video

https://www.youtube.com/watch?v=hvMPkrTU4mk

Github

http://github.com/johnmrushing/ece370servo

Writeup

The Raspberry Pi (SBC) was connected through its UART pins to the Feather's RX/TX pins. A script was written to read user input to the Pi and write relevant data to the Feather.

The Feather reads user input and converts this, absolutely, to a desired rotation count on the encoder wheel. The error between the desired angle and the actual angle is calculated and run through a PID controller, which then determines the velocity function fed to the motor controller.

As the error shrinks, the requisite motor velocity shrinks proportionally. If the motor overshoots the desired angle, the error flips and drives the motor in the opposite direction.

Test Setup

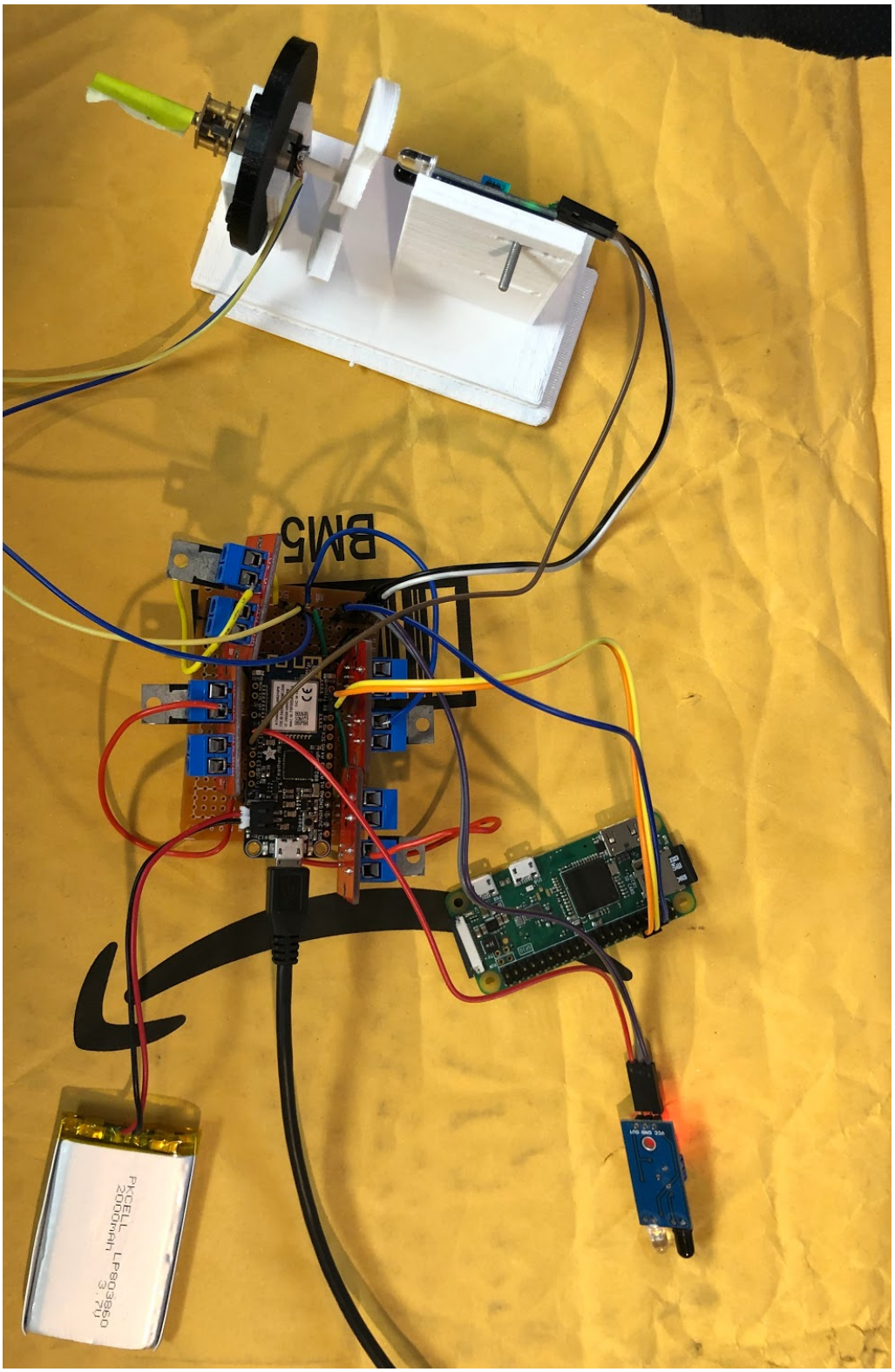

Figure 1 - Test setup

Schematic

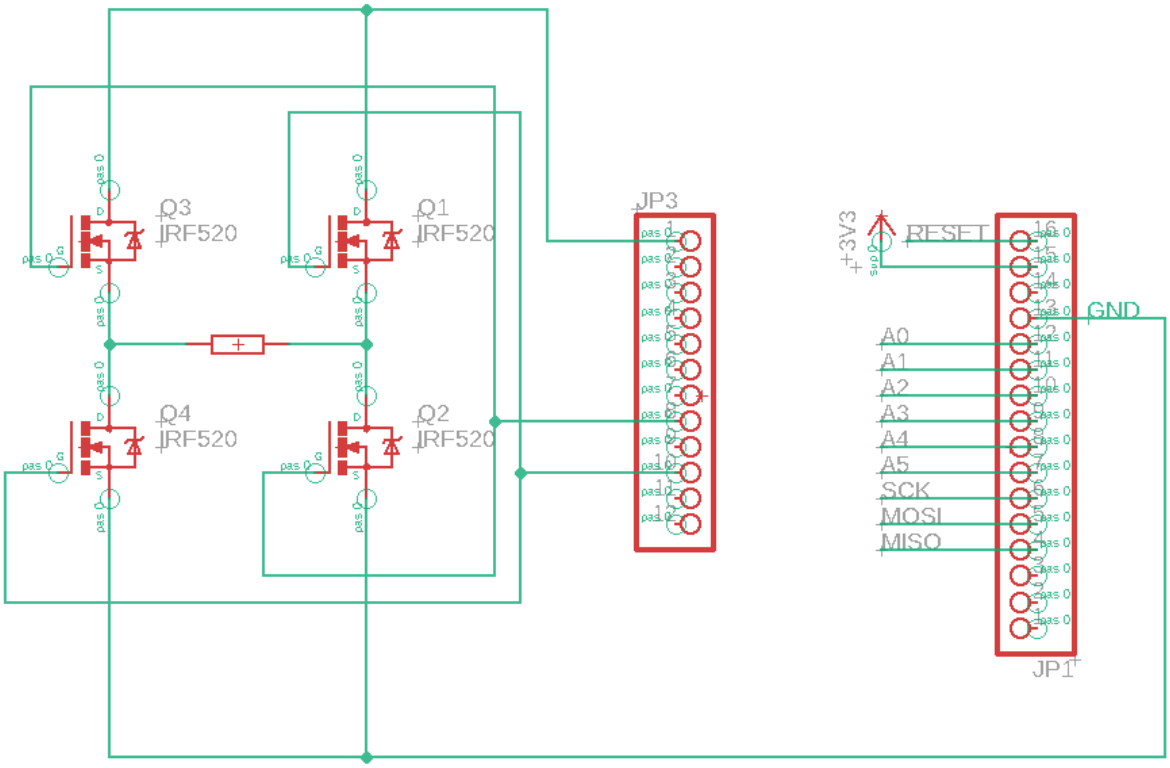

Figure 2 - Test setup schematic to H Bridge and Motor

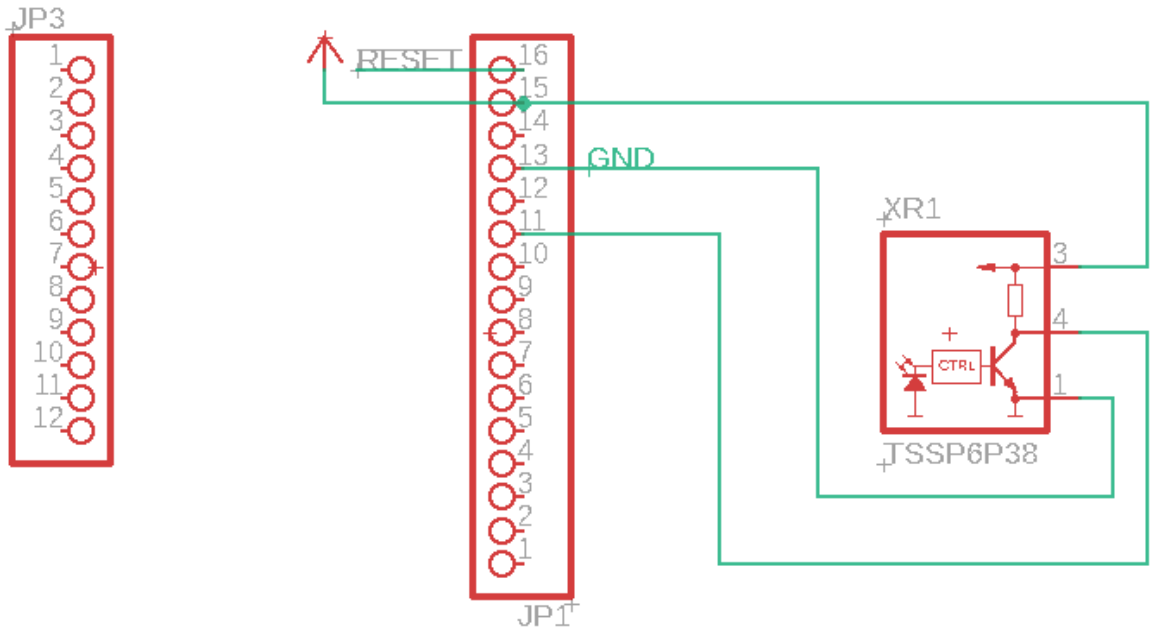

Figure 3 - Test setup schematic to IR Sensors

Pseudocode

```
begin Serial @9600bd

__IR_interrupt {
      increment number of ticks
      interpret this number as a present angle
}

loop forever {
      if serial.available
            read serial data
            parse as an float for desired angle
            pass to PID function
}

PID function {
      determine error given present angle and desired angle
      set velocity to go in that direction proportional to error
}

velocity function {
      interpret direction of travel
      interpret pwm dutycycle
      deactivate undesired direction
      activate desired direction at dutycycle
}
```