Background and Objective:

11/8/20 Objective: to get 4 motors spinning. Upon some contemplation, I have decided that 4 motors are unnecessary for our project; however, I had already started my attempt to get 4 motors spinning with what I had, I finished it.

11/10/20 Objective: Build a prototype chassis to mount motors/wheels.

11/11/20 Objective: Get precise motor spin control.

Requirements:

Requirement	Description
11/8/20: 4 motors spinning	Using the MCP23017 GPIO extender, connect the Raspberry Pi to 2 TB6612FNG Motor Drivers, then from each motor driver to 2 spinning motors. (Partial Failure, Partial Success)
11/10/20: Attach wheels, get some semblance of a chassis	Attach wheels to motor, build a makeshift chassis to keep the motors mounted (success)
11/11/20: Try to control forward, backwards, turning left, turning right.	Experiment with the Python code (still the one found online at this point) and try to get movement forwards, backwards, turning left, and turning right. (partial failure, partial success)

Issues and Solutions While Testing:

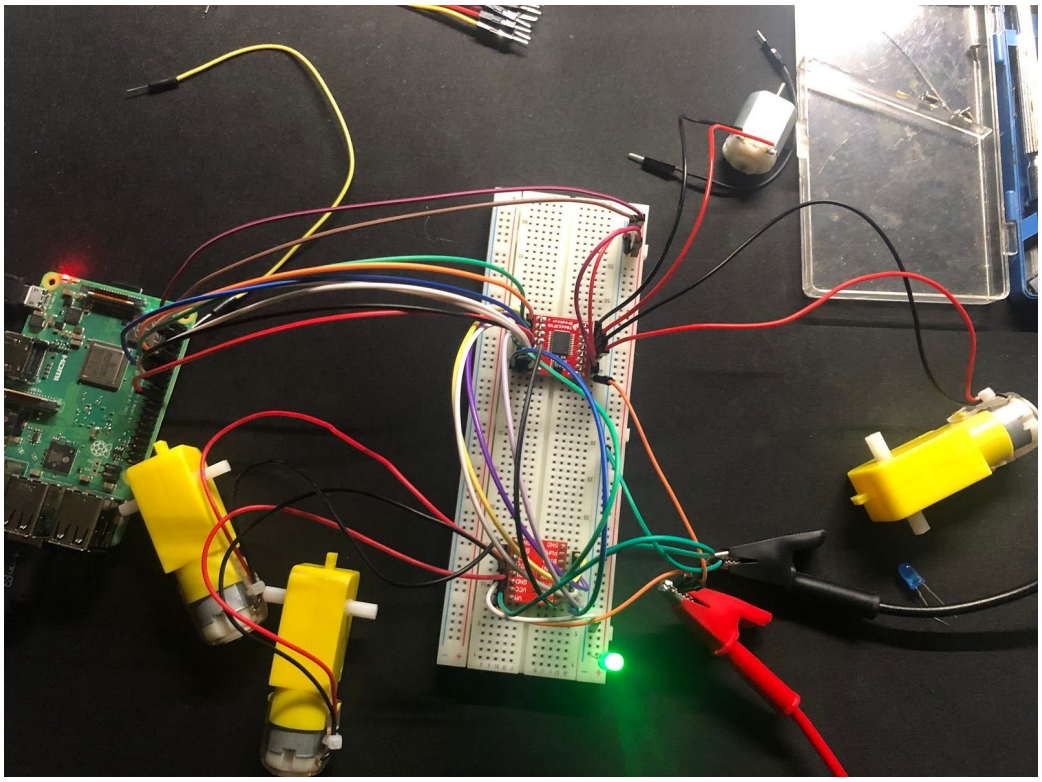
1. Using the Raspberry Pi with a monitor proved to be time consuming--Set up VNC.
2. Setting up the Pi-GPIO Extender-2 Motor Controller-4 Motors system did not work--In my mind, I had imagined that i could “extend” the GPIO ports of the Raspberry Pi, and thus be able to connect 2 or more motor drivers to the GPIO extender. This was not the case. I am still uncertain whether or not what I had in mind is possible or not, but what I ended up doing (for the sake of getting 4 motors spinning) was to use the same setup I used to get 2 motors spinning (using just one motor driver), and used male-male jumper wires to mirror the connections from the GPIO to the first motor driver to the second motor driver.
    a. The 2 motors connected to the first motor driver spun normally.
    b. The 2 motors connected to the second motor driver did not spin normally. I am assuming it is a lack of power (I was only using 1 external voltage source), or there is loss when I mirror the current. I swapped around the motors to make

sure that it wasn't an issue with the motors, but any 2 motors connected to the first motor driver performed as expected, and the other 2 did not.

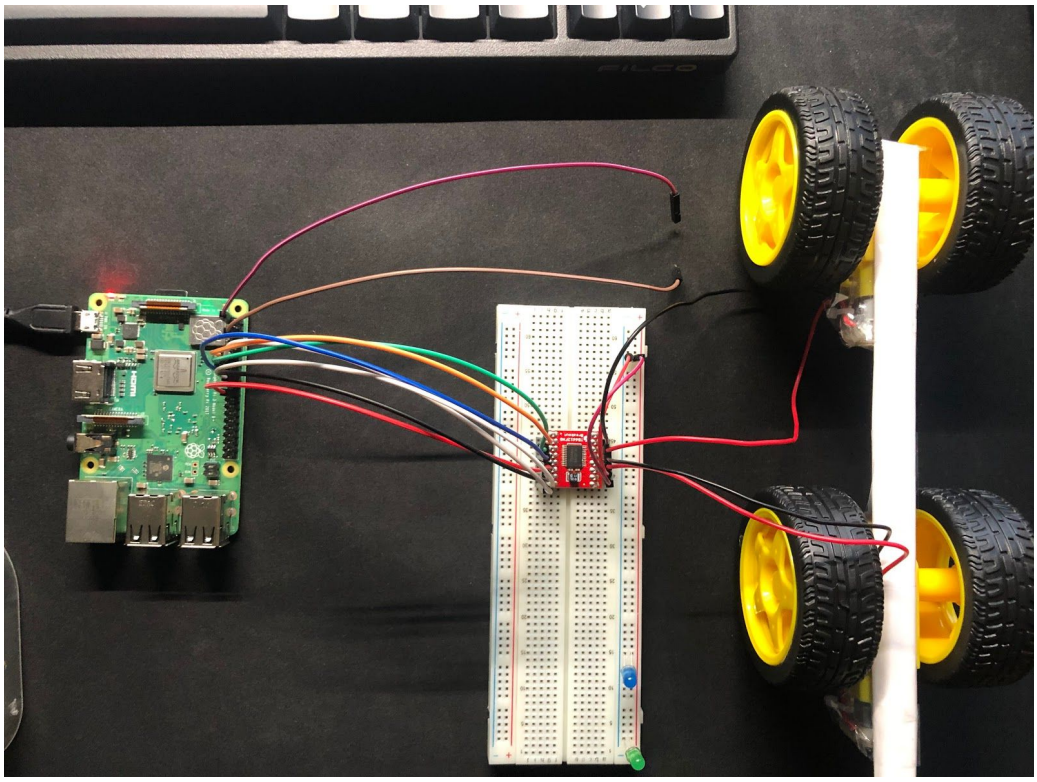
3. Could get the "rover" to go forward and backwards, but could not get it to turn--the way I set up the "rover", I have one motor for the two front wheels and one motor for the two back wheels. My next step is likely to go from this setup to a front-wheel drive (one motor to power the front axle, one motor to turn the front axle(?)). I could also set it up so that each side (left, right) has one motor, and I could turn by having one side's motor spin forward and the other side's motor spin backwards.

System Picture:

11/8/20: 4 Motors



11/10/20: Wheels and Chassis (Wooden Chopstick)



Questions:

- How can we use a GPIO extender (if possible) once we put all of what we're working on together?
- Will we be able to connect (and power) all of our components to one Raspberry Pi?
- Stepper motor suggestions?
- Suggestions for how a good layout for motors and wheels?