

Remote Controlled Greenhouse

– Assembly Instructions

Packout Assembly

Mounting Transformer

- Hold up transformer to approximately the middle top of the backside of the packout and mark where to drill holes.



Mounting Transformer

- Grab your 1/8 “ drill bit and drill through the packout.
- Grab your #6-32 bolt, washer and nut and secure the transformer to the packout.



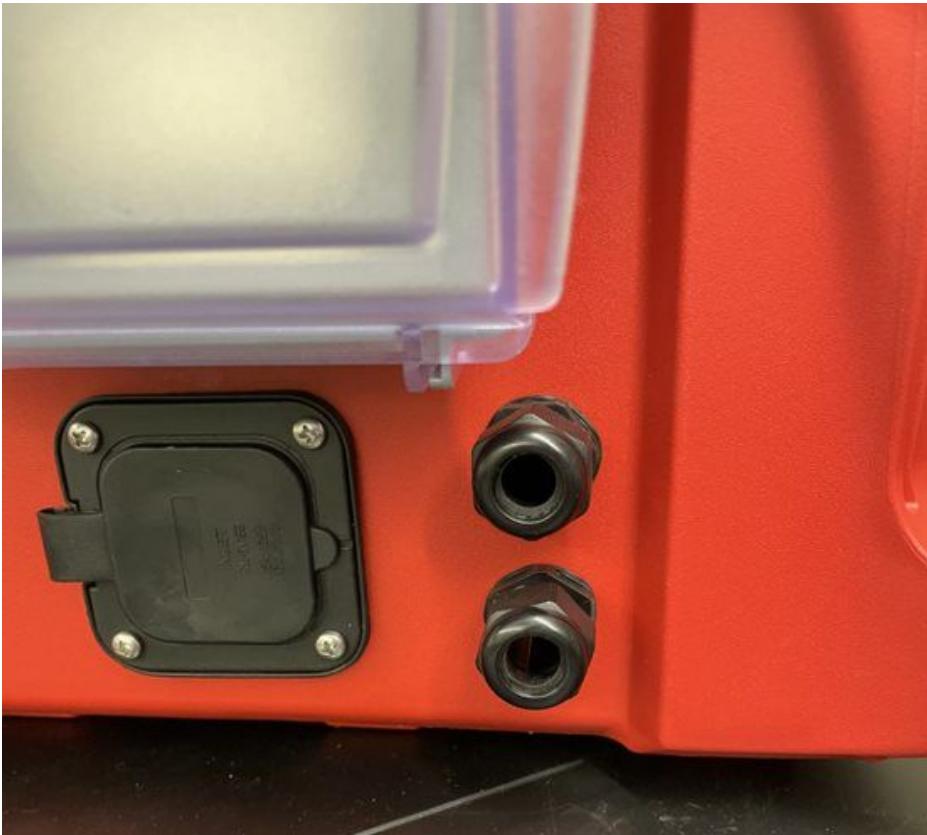
Grommets

- Measure 1-1/2 inches and 3 inches from the bottom of the packout towards the backside.
- Drill a 7/8 hole at the measured marks with your stepper drill bit.
- Do this on both sides of the packout



Grommets

- Insert and tighten $\frac{1}{2}$ "NPT grommets everywhere.



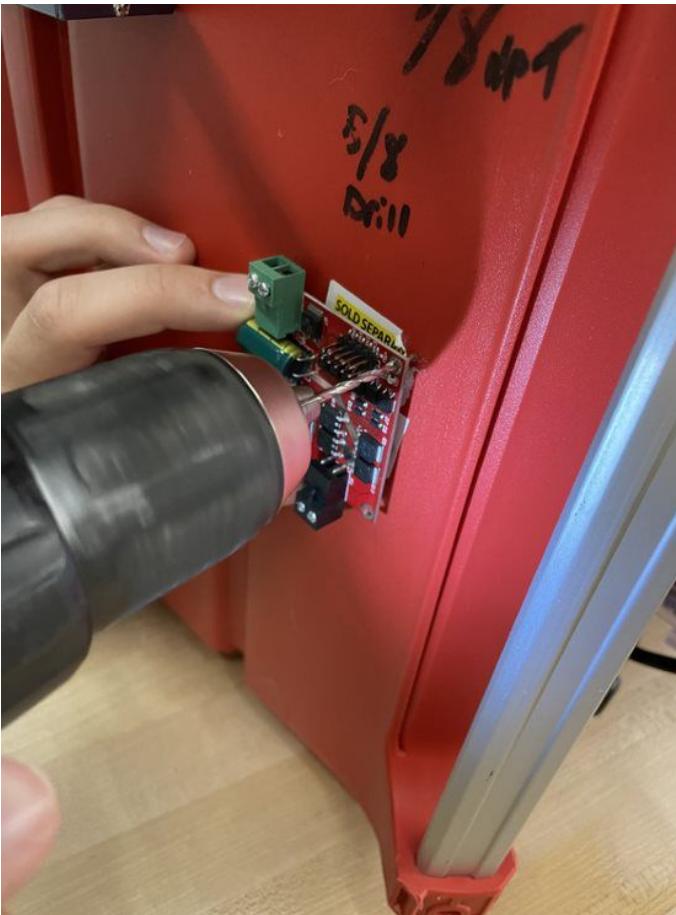
Power supply

- Drill a 5/8 hole a few inches away from the transformer to allow for the wire to bend enough to go in the grommet.
- Insert a 3/8 NPT and secure.



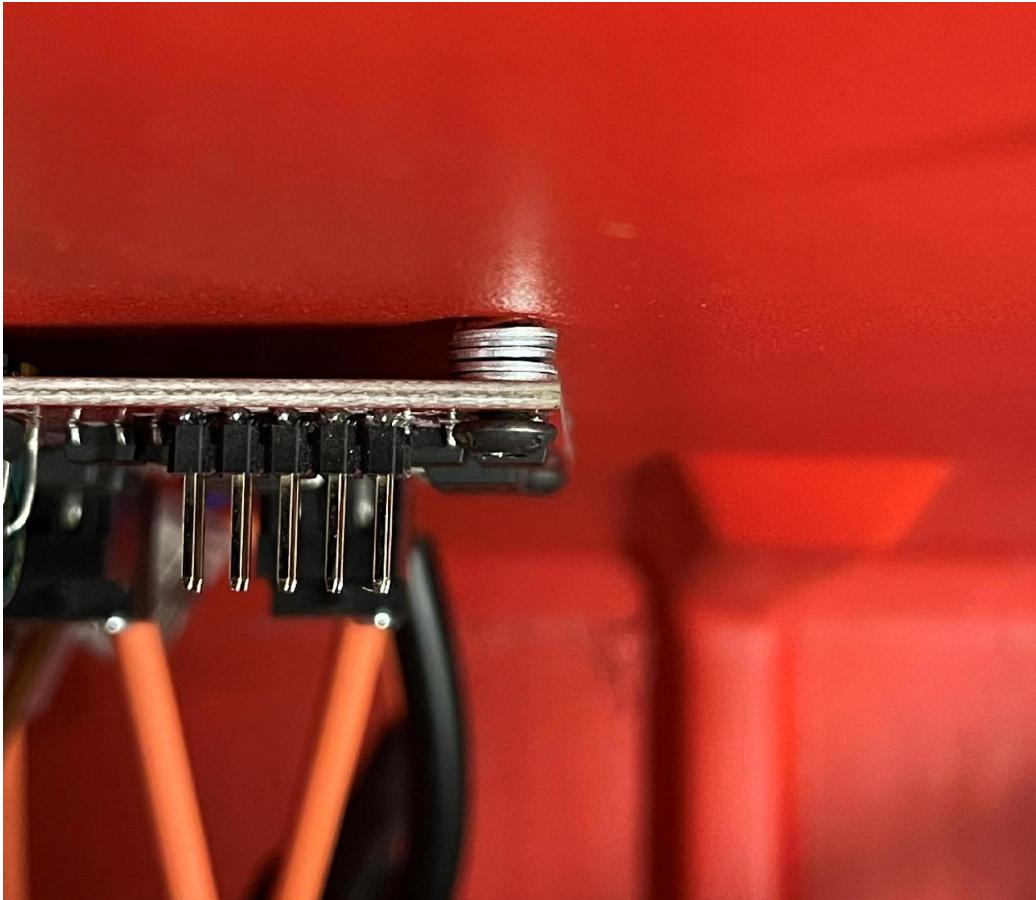
Motor Driver Reply

Drill pilot holes on the outside of the packout for the relay driver.(easier than drilling on the inside)



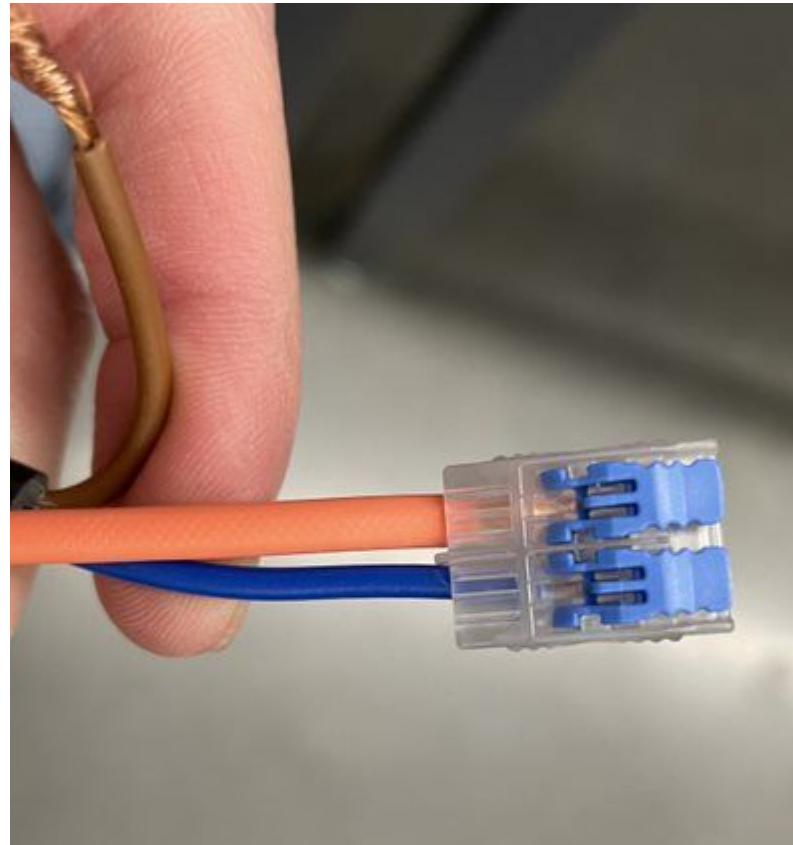
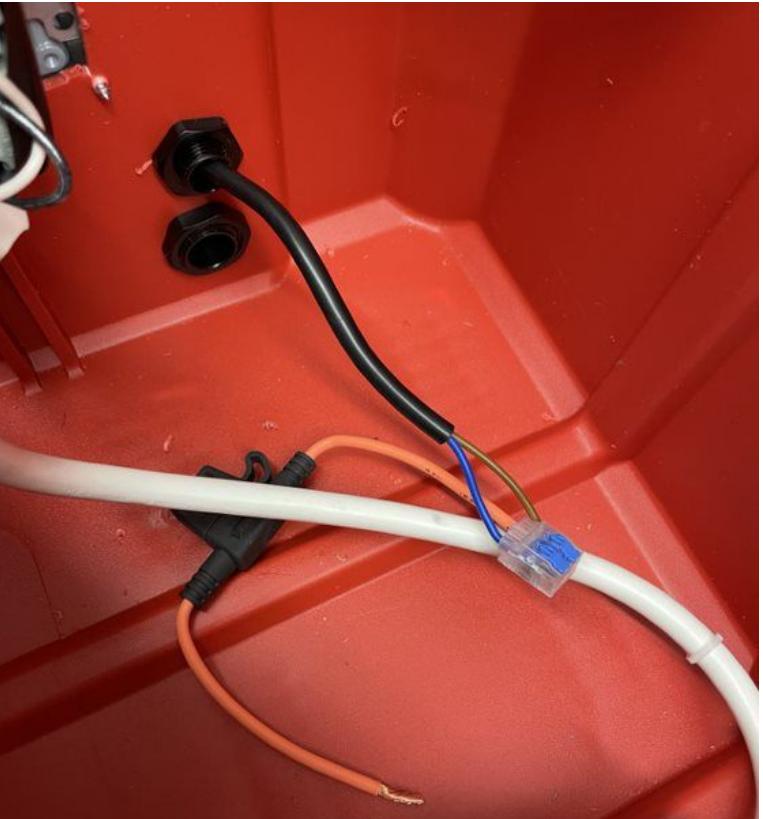
Motor Driver Reply

- Place 4 3m washers between the relay driver and the inside of the packout.
- Secure with 3mm bolts and nuts



Wire connectors

- Insert the motor wires through the top grommets on the sides.
- Connect the fuse holder and blue wire with the snap connectors



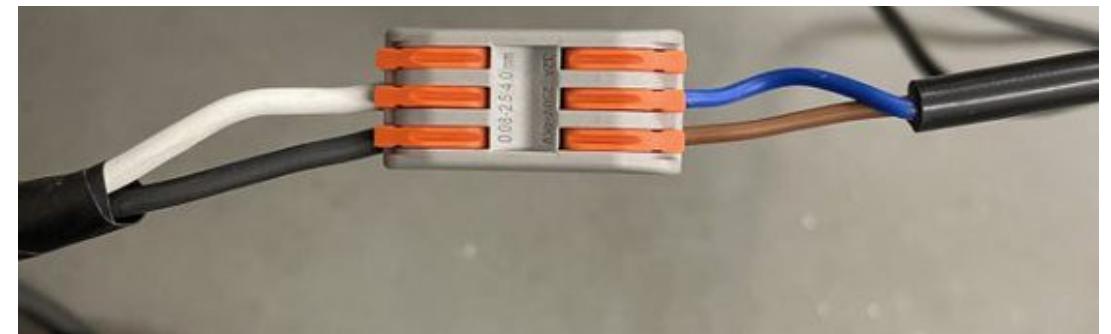
Extending motor wire

- Extend the motor wire by striping the 3 wire 14 gauge cord
- Strip the outside coating about 4 inch long
- Strip the black and white coating about a quarter of an inch.
- Run the wire into the packout and then bend the green wire and tape it out of the way



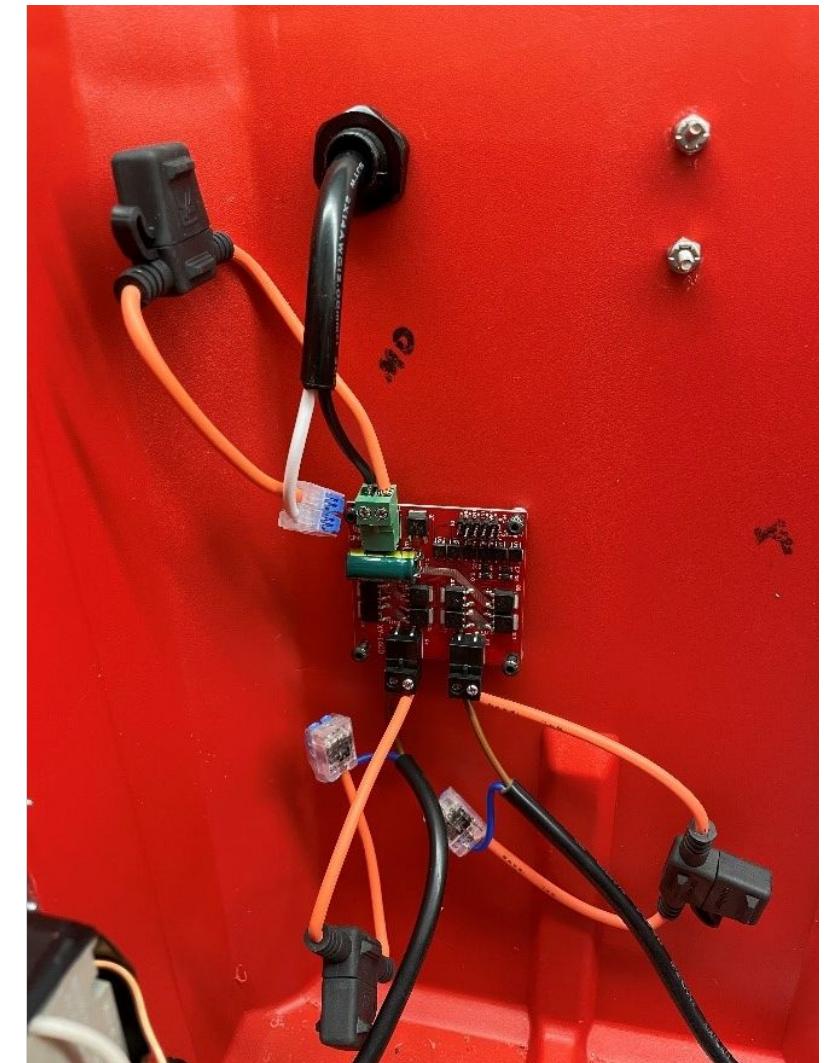
Connecting extended wire to motor.

- Connect the white wire to the blue wire in the snap connector
- Connect the black wire to the brown wire in the snap connector
- Fuse wire holder will connect to the white wire then.(look on wire connecting slide to continue)



Wire connectors

- Insert the transformer wire through the grommet
- Connect the fuse holder and the white wire with a snap connector.
- Place the white Color of the transformer in the positive slot of the relay driver and the black wire of the transformer in the negative slot.
- Place the brown/black wire of the motor in the left slot of the relay driver and the blue/white/fuse wire of the motor in the right slot of both p3 and p4 outs.

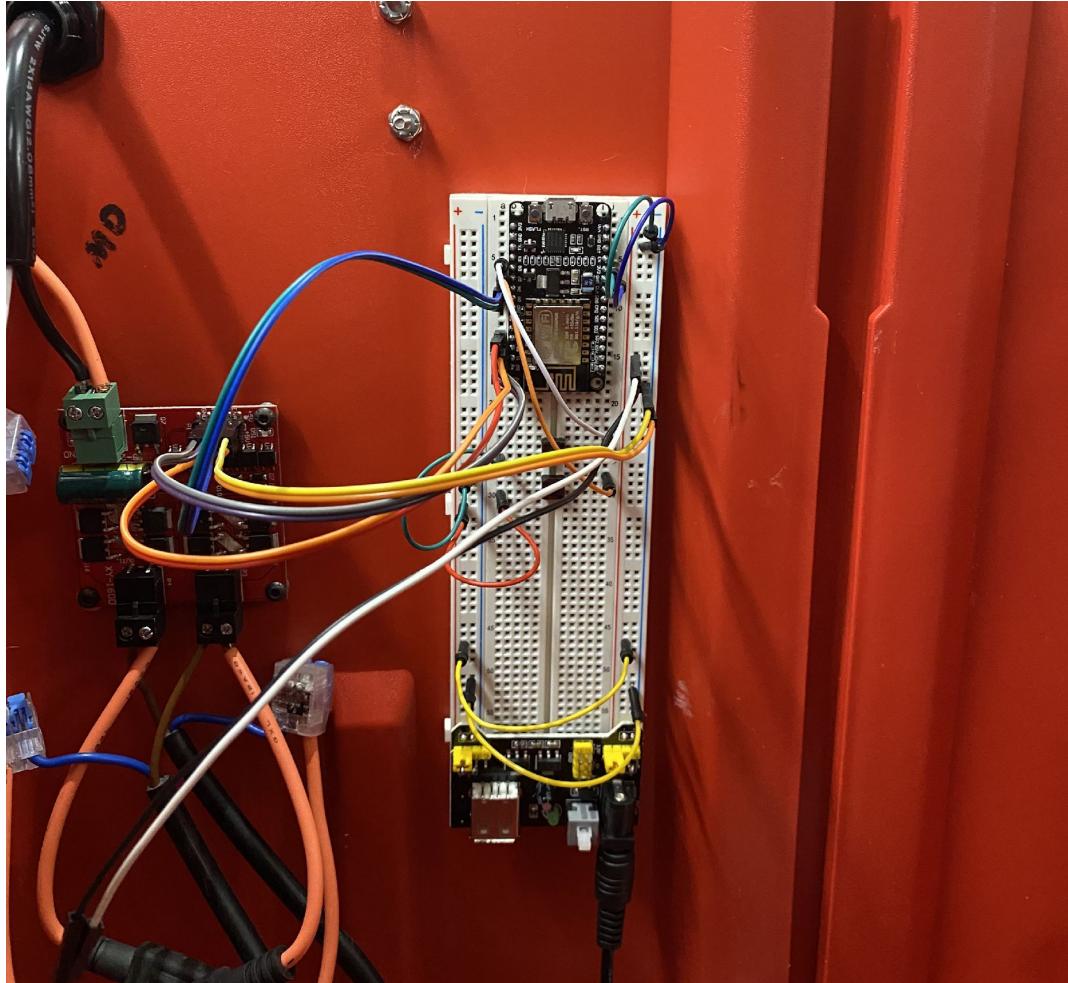


Power Strip

- Place Velcro command strips on the back of the power strip and on the bottom of the pack out on the ridge in the middle.

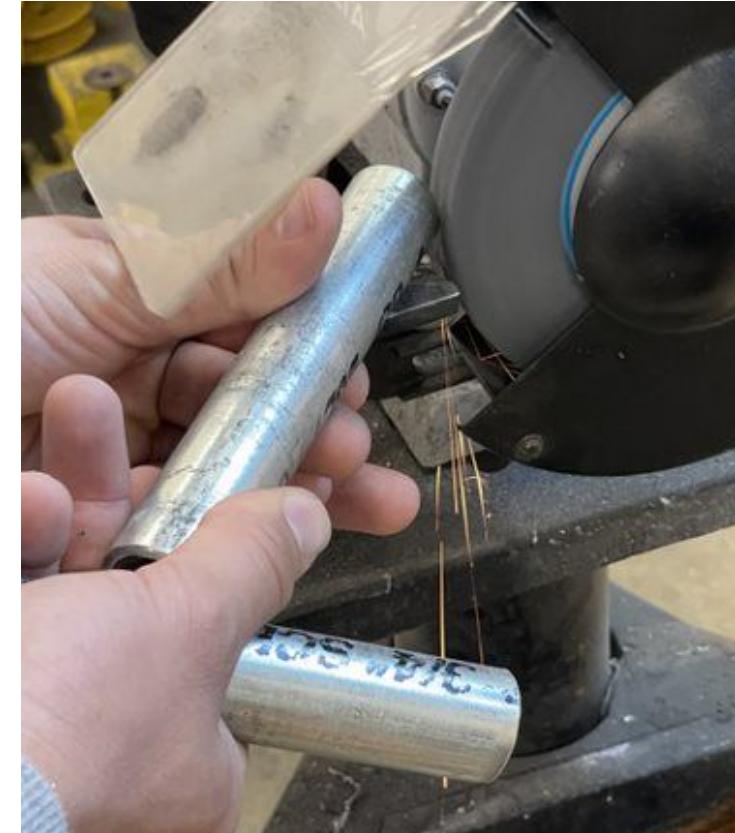


Mounting Arduino to Packout



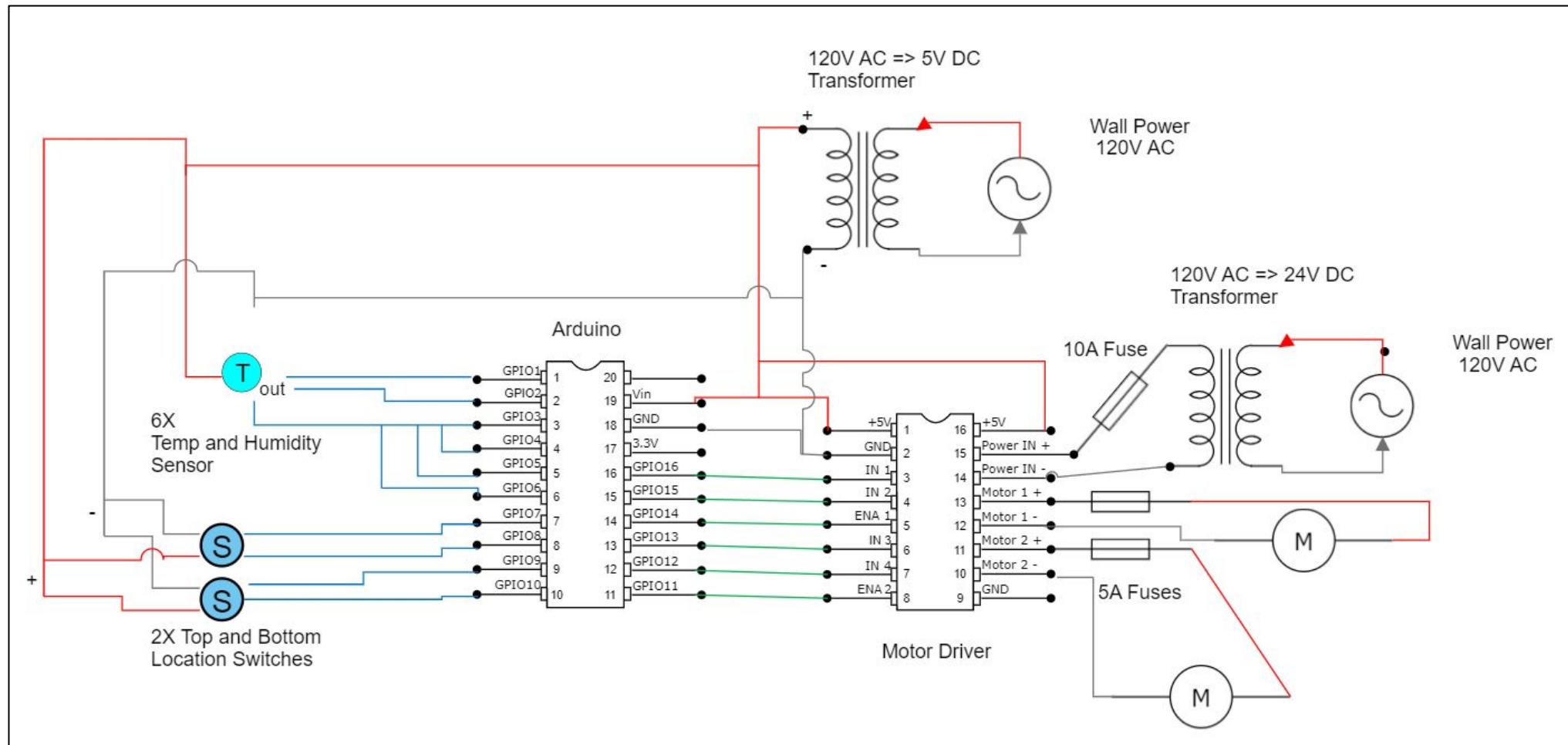
Pipe cutting

- Cut the $\frac{3}{4}$ " diameter pipe to the desired length for the creeper to travel on. (Recommended around 6 feet, but may be different size depending on greenhouse set up)
- Cut the excess $\frac{3}{4}$ " pipe again for the connector piece between the motor coupler and curtain rod.(recommend cut of 5 inches and you can go down from there if you want less space between the curtain rod and your motor coupler.

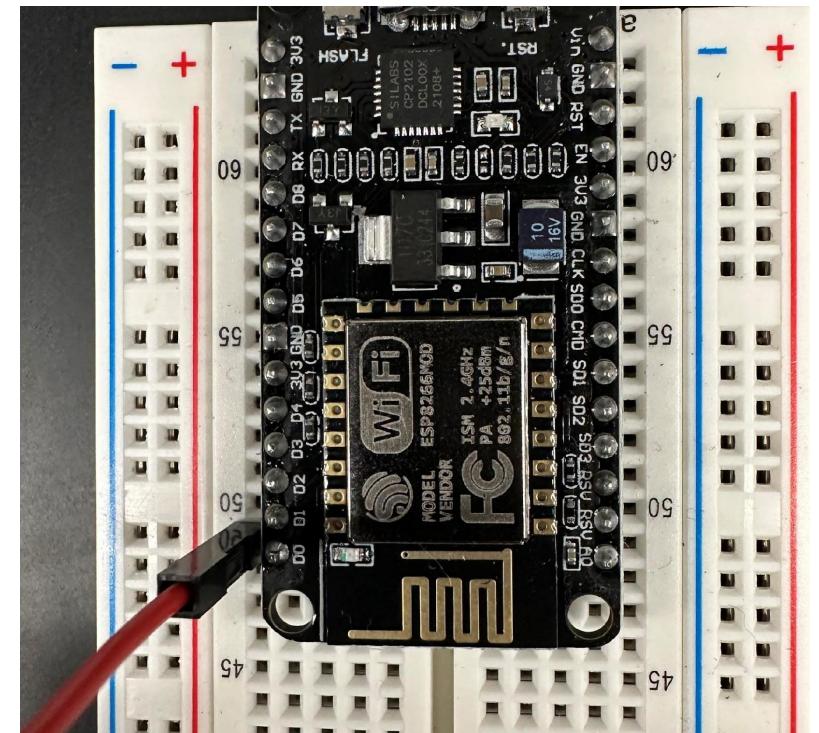
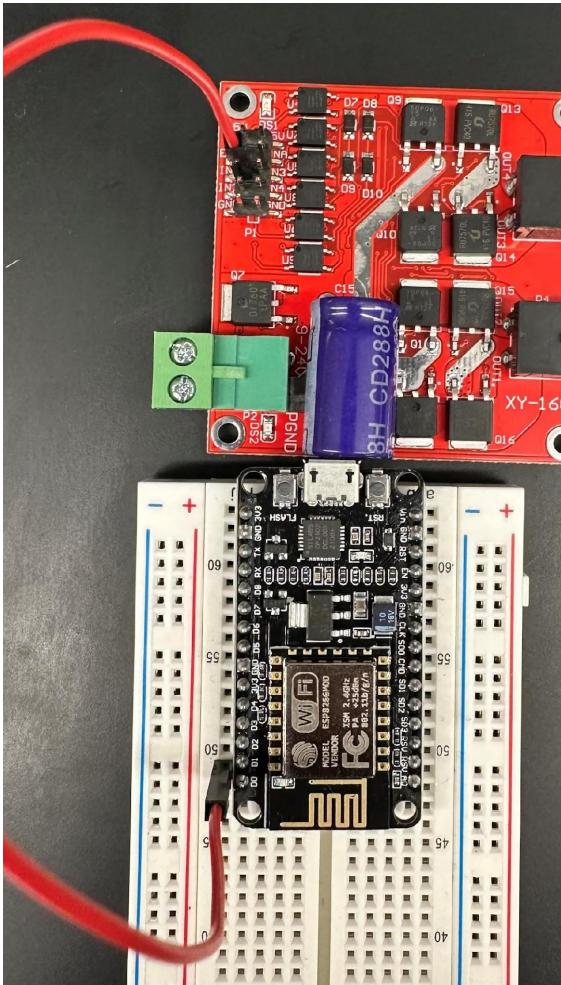
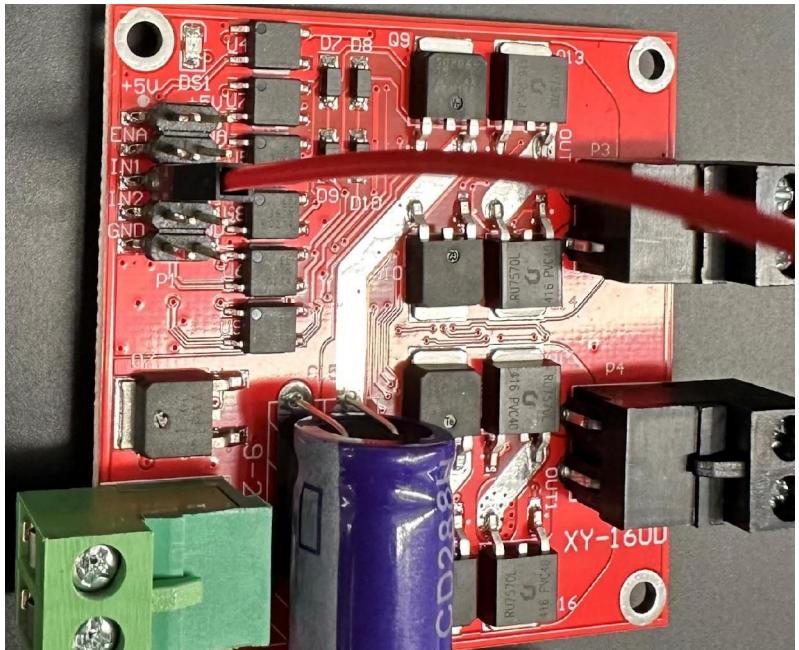


Arduino Wiring and Operation

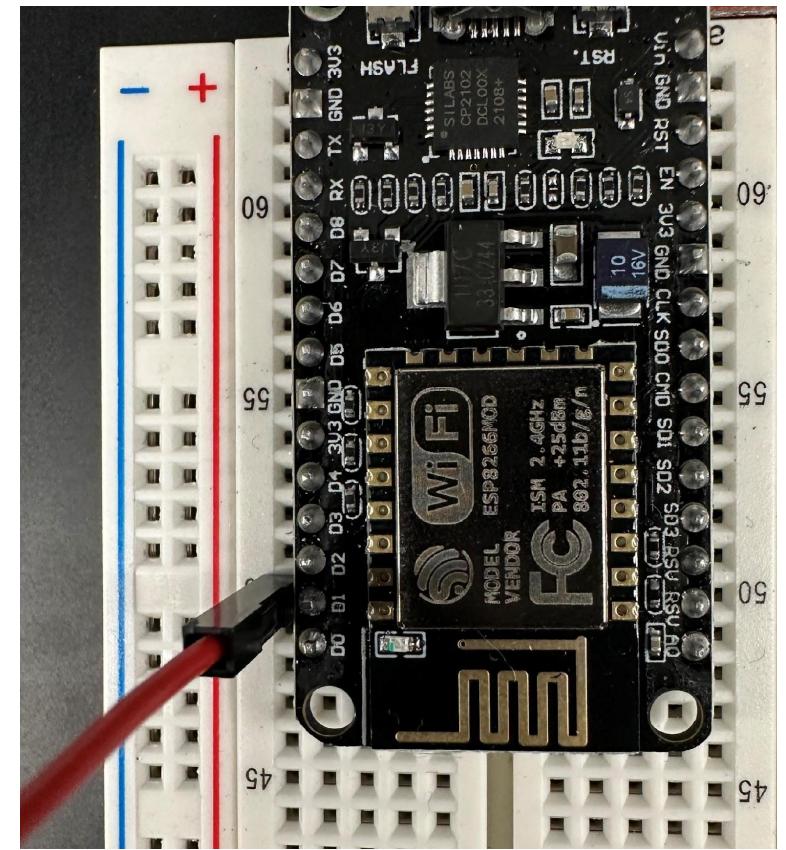
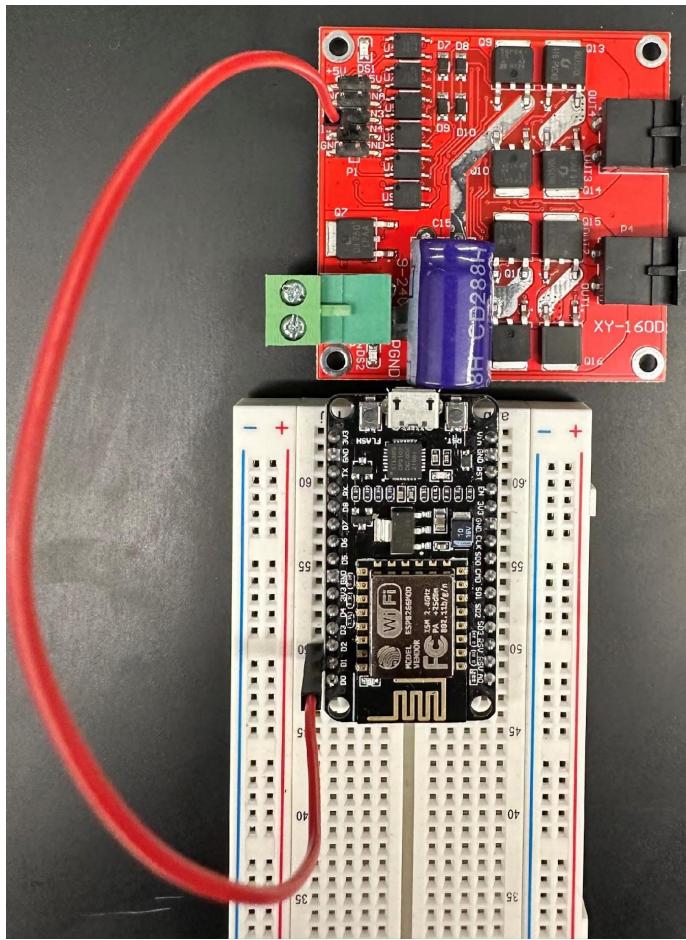
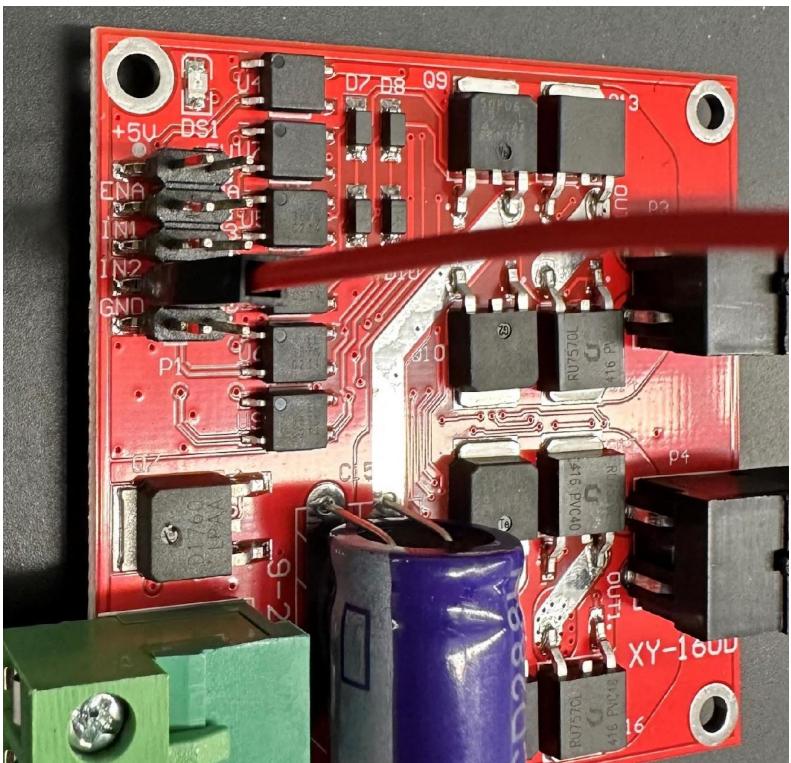
Wiring diagram



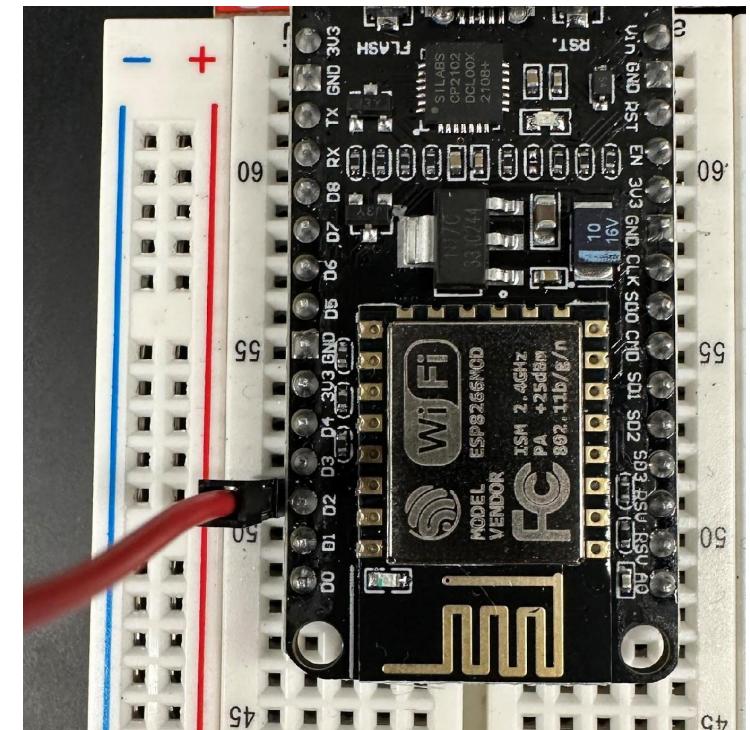
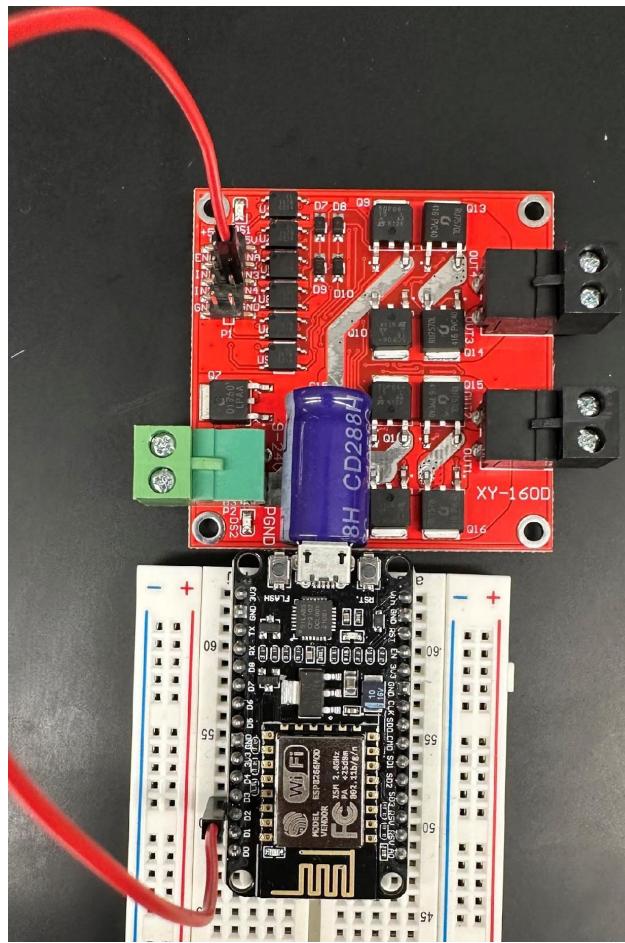
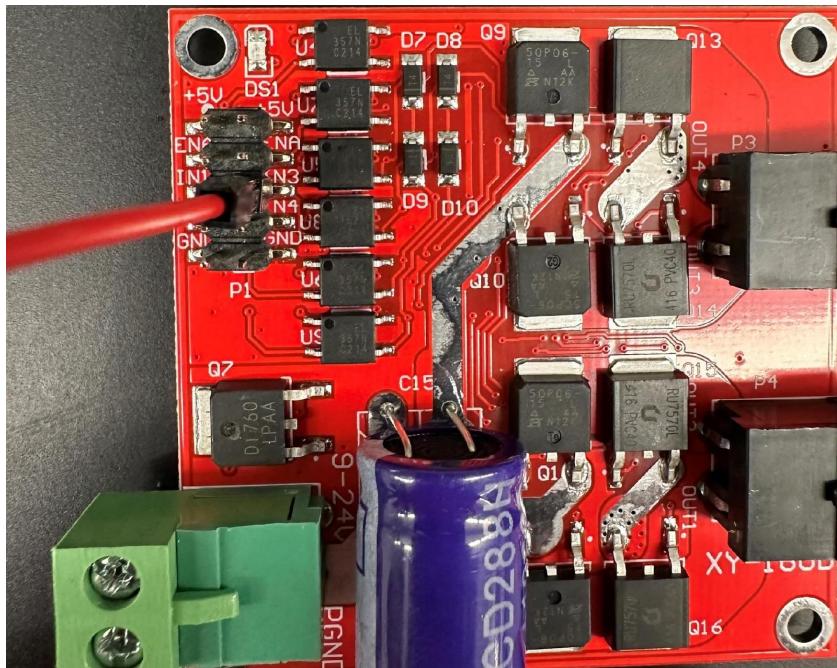
Pin D0 to IN1



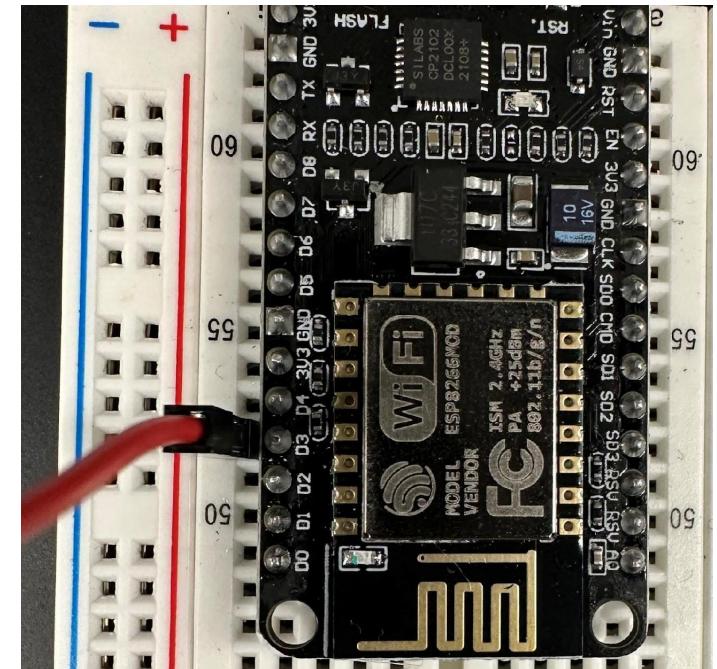
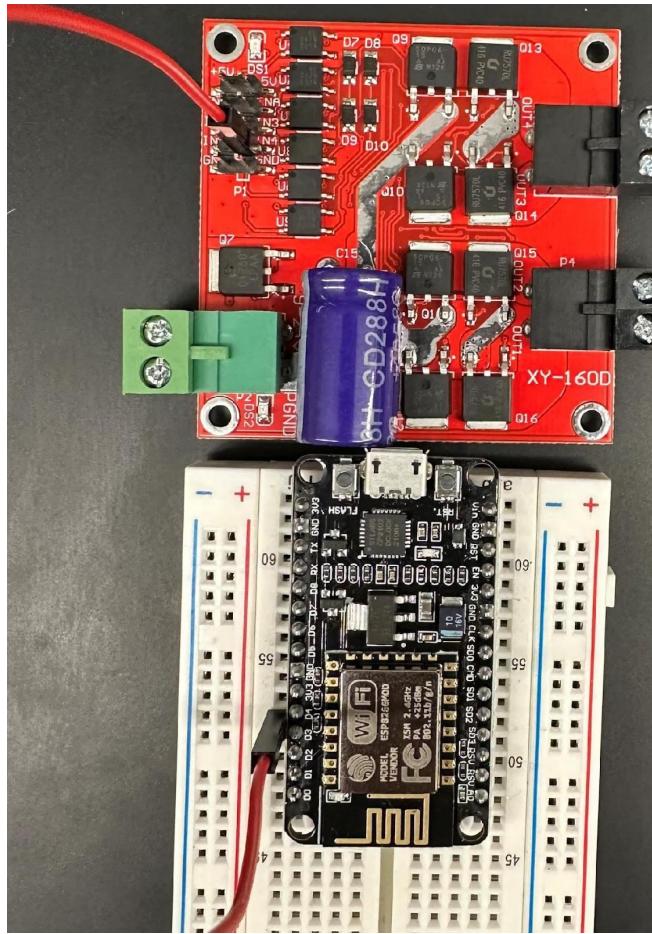
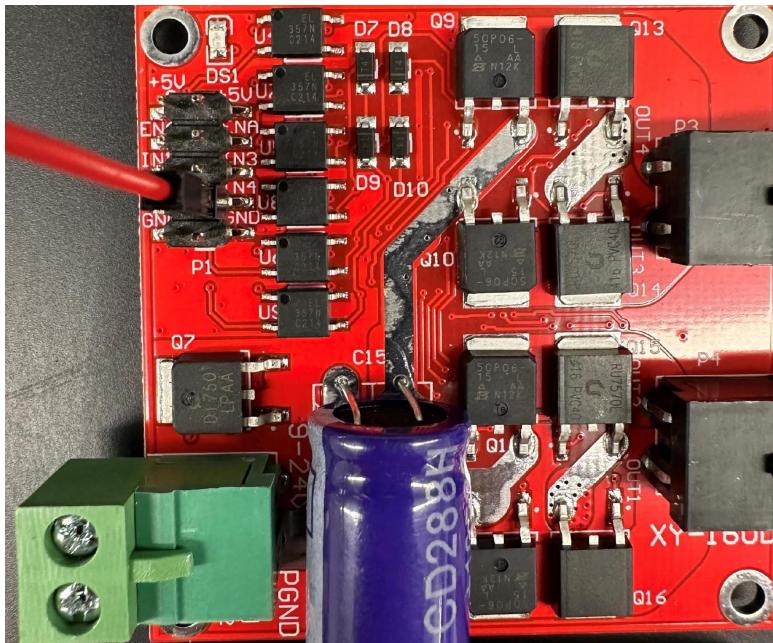
Pin D1 to IN2



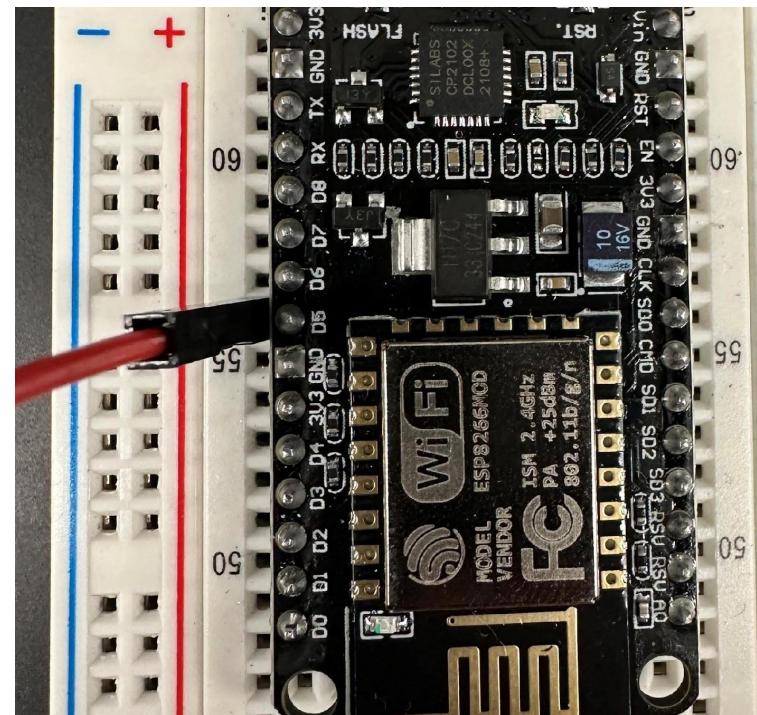
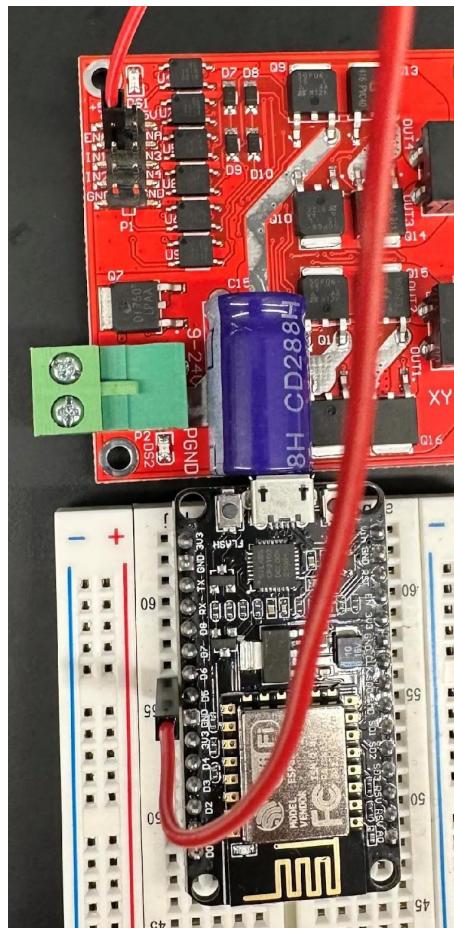
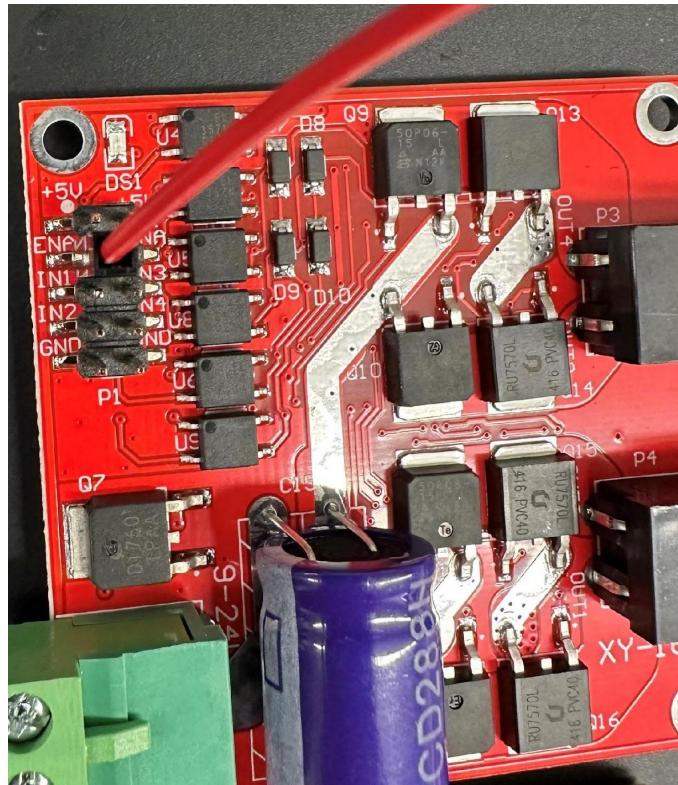
Pin D2 to IN3



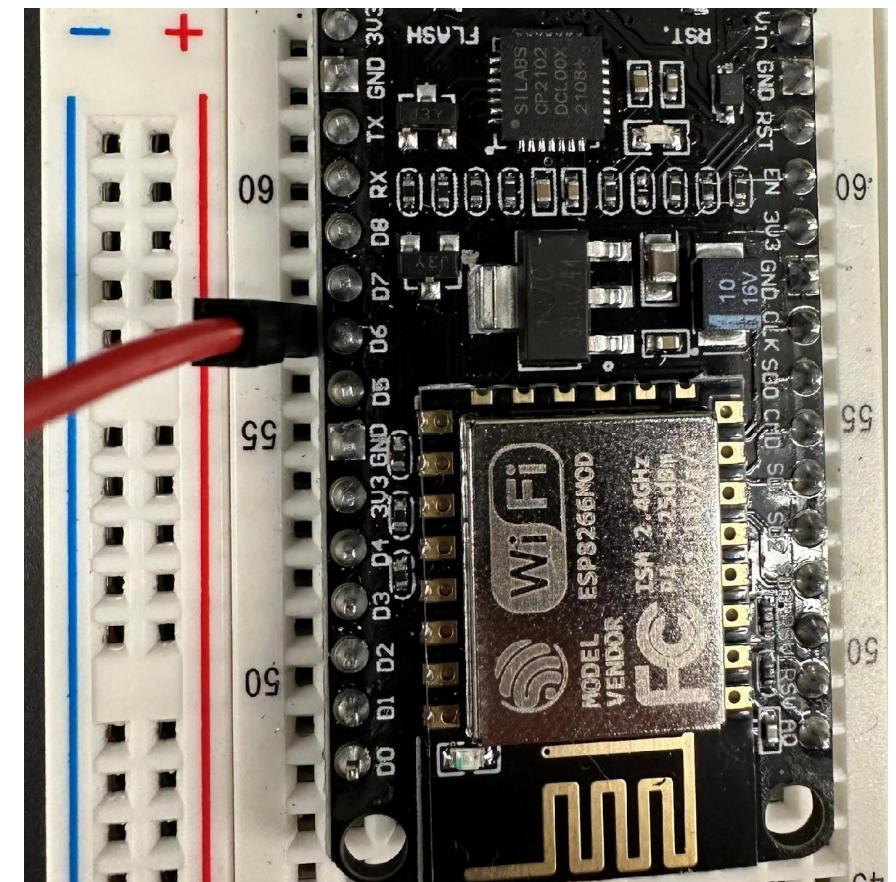
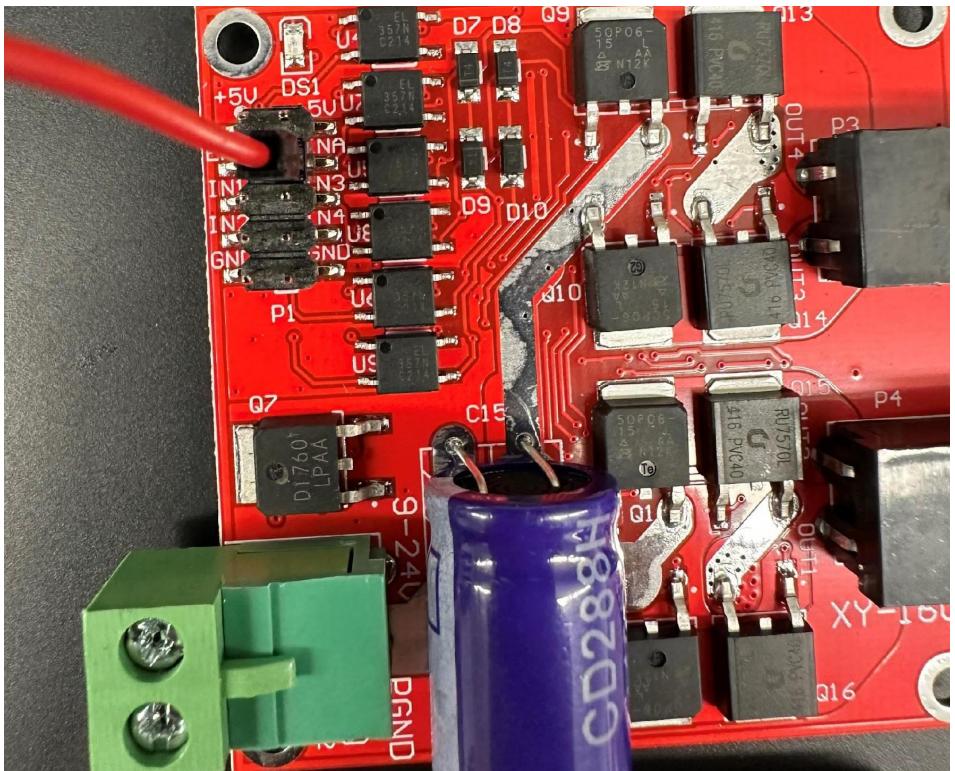
Pin D3 to IN4



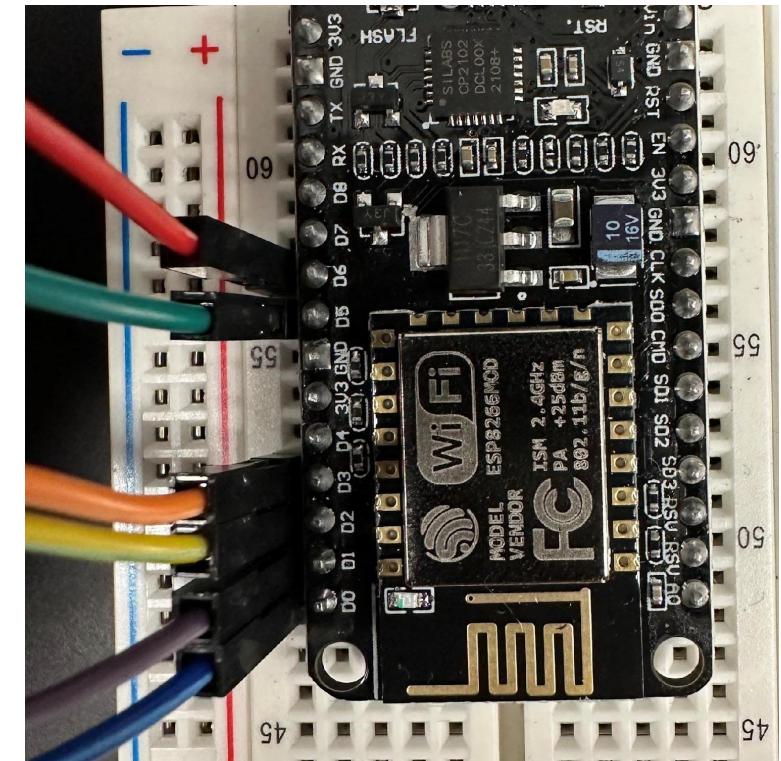
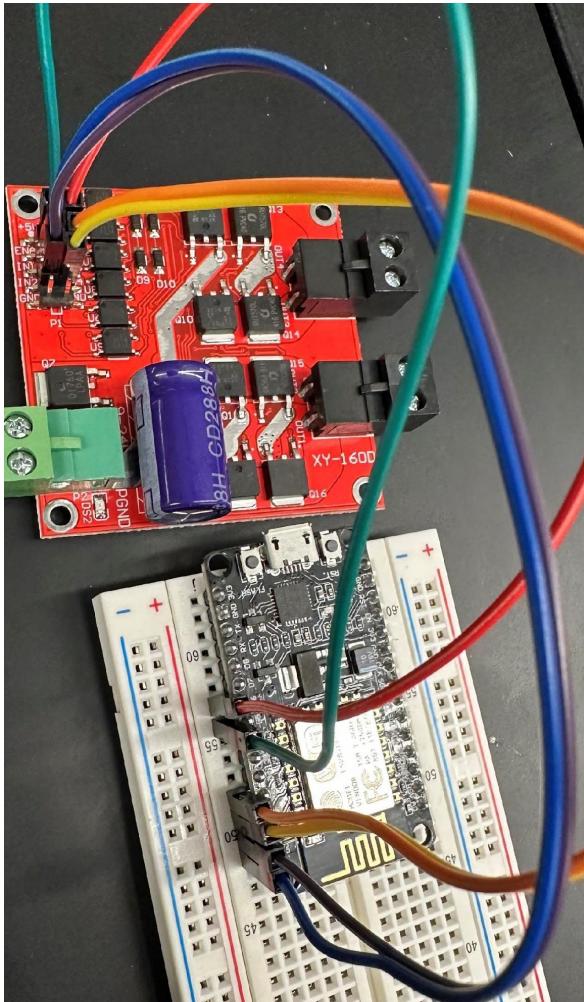
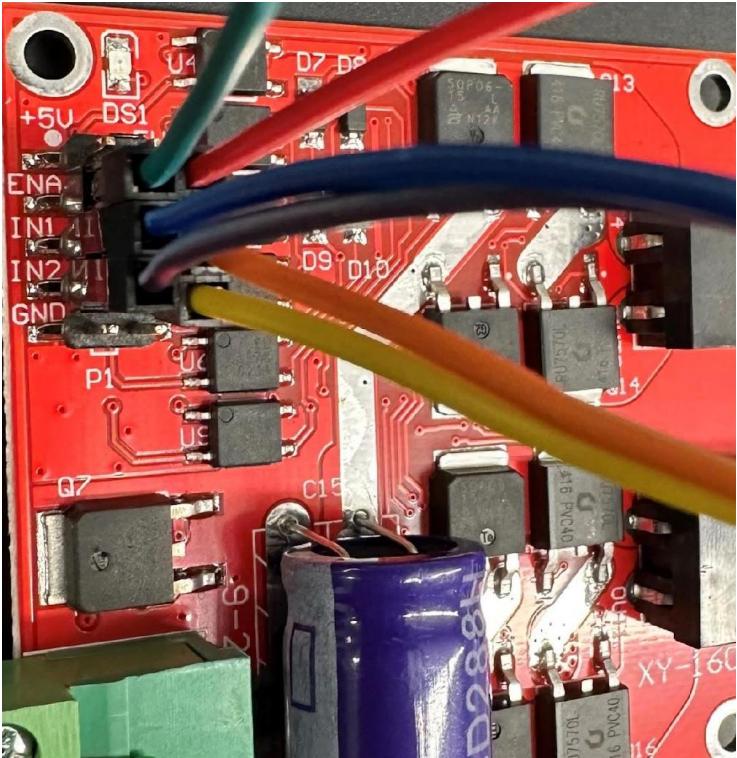
Pin D5 to ENA1 (left side)



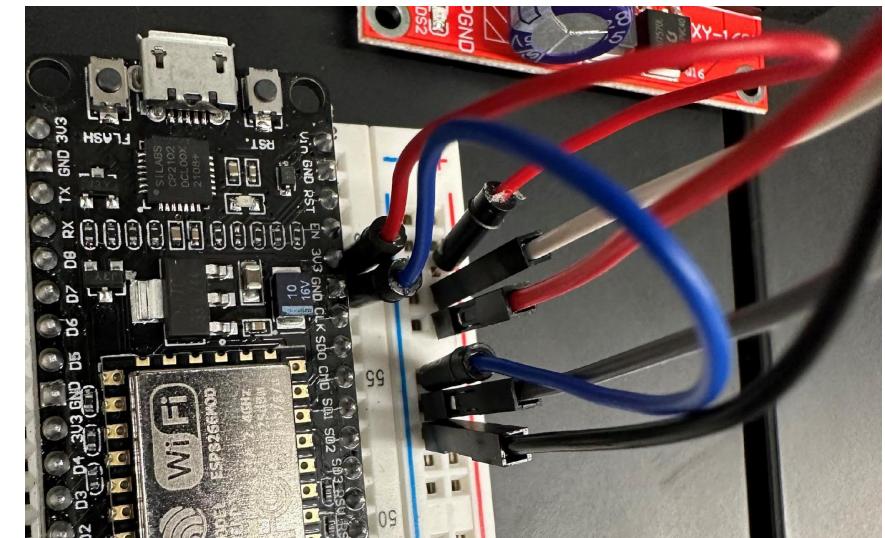
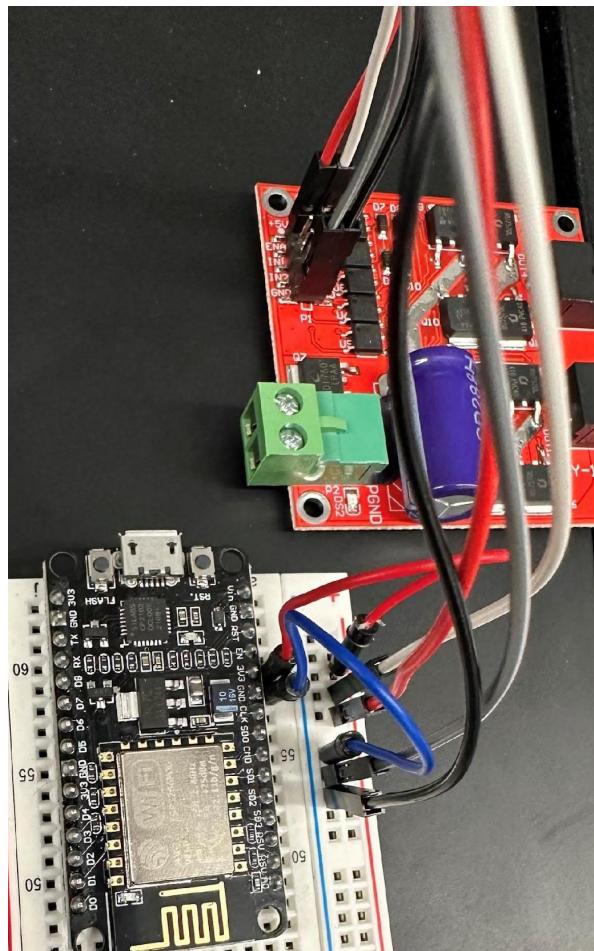
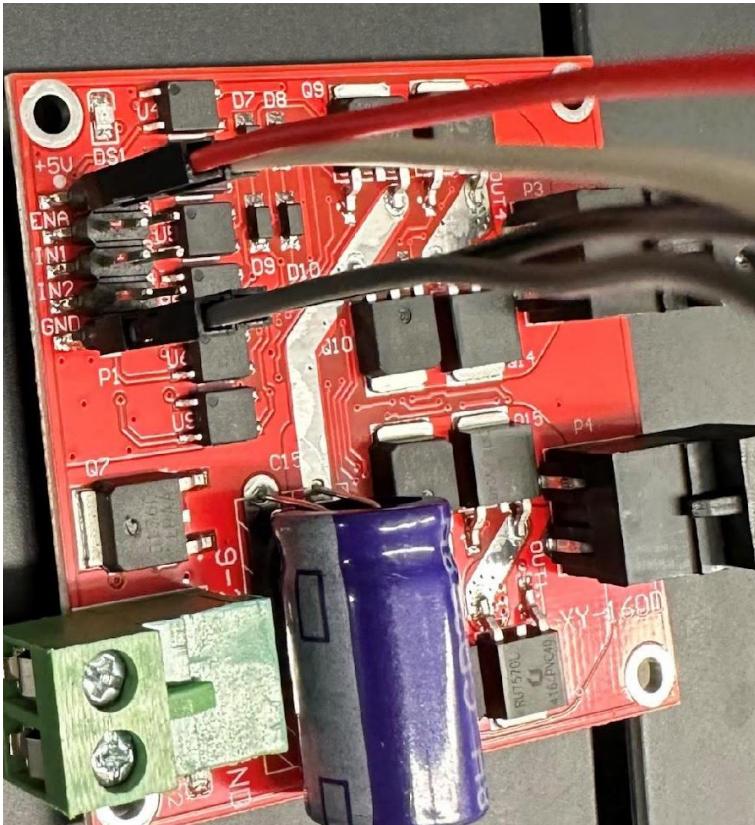
Pin D6 to ENA2 (right side)



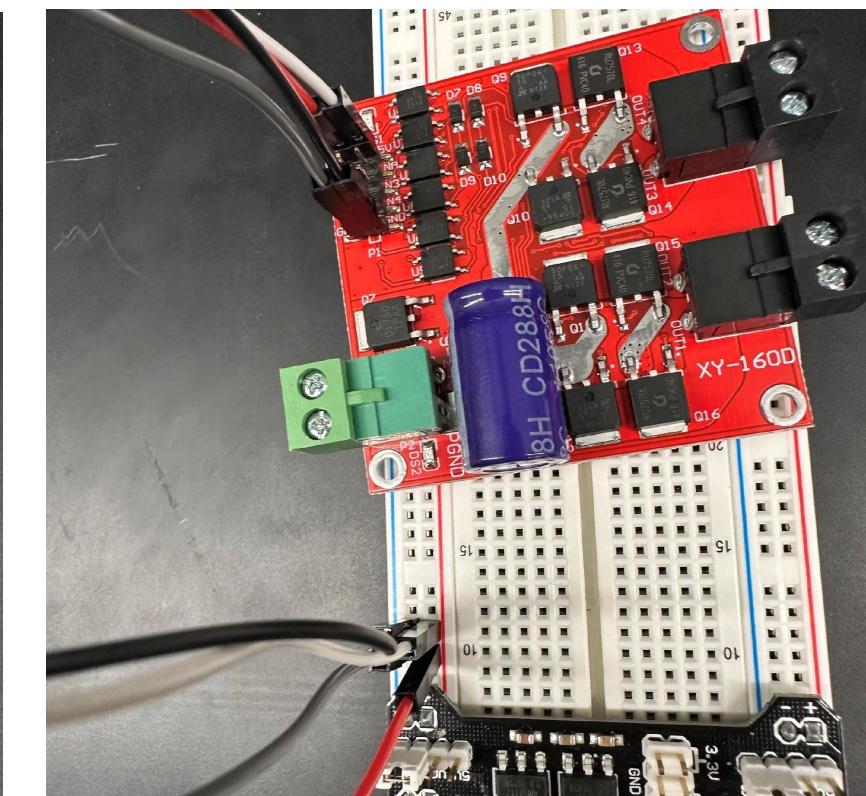
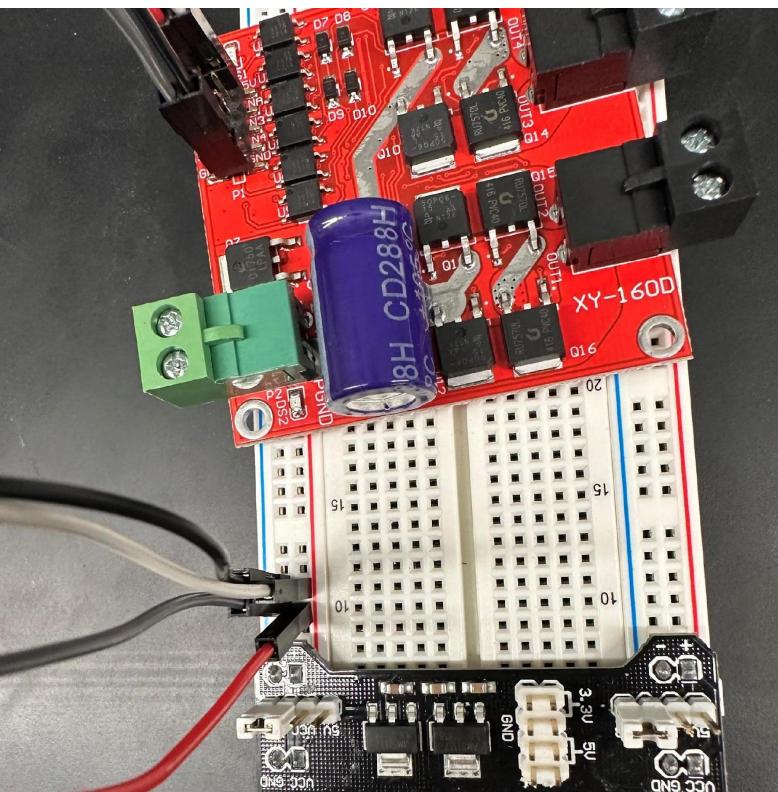
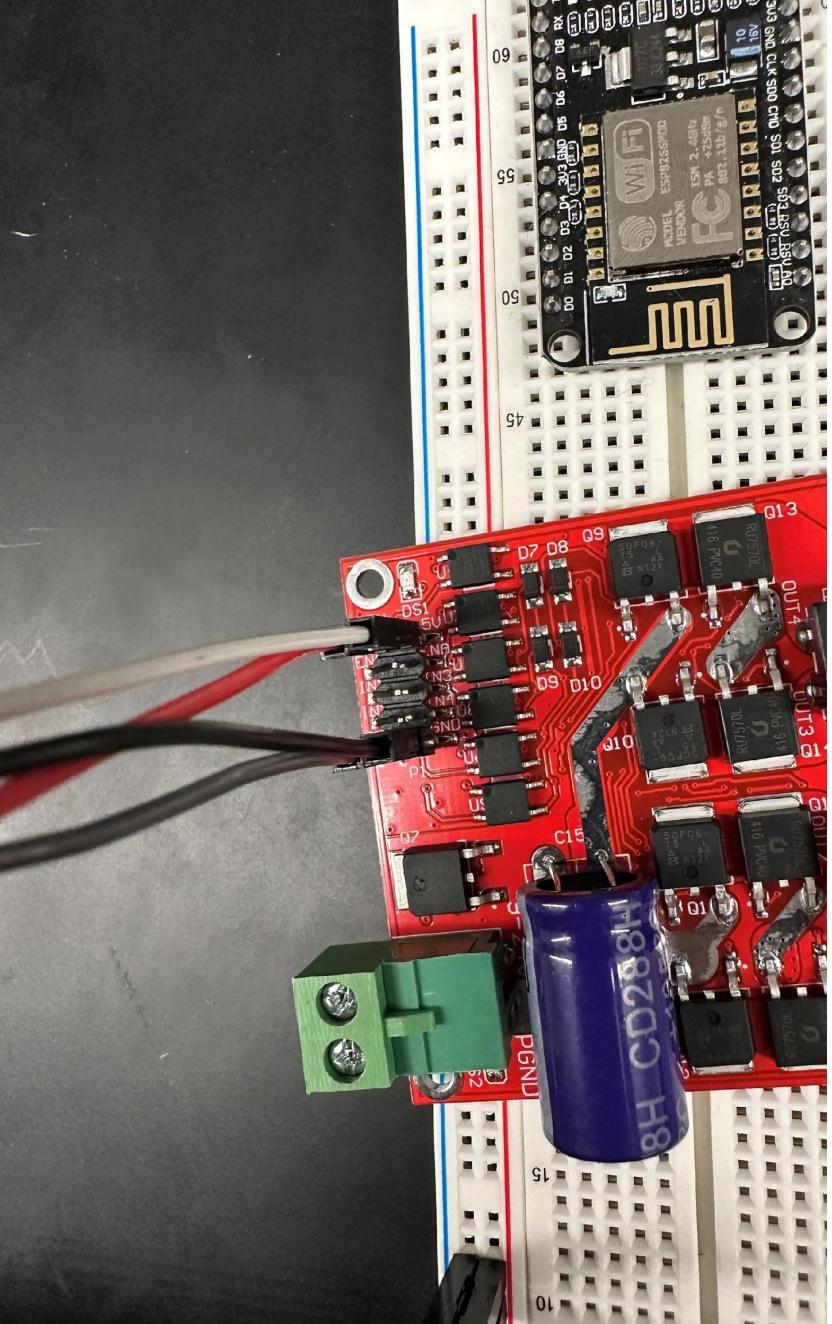
Pin – Motor Driver



Power



Arduino Power Supply Module



Programming the Arduino

Arduino IDE installation and Libraries

- Install Arduino IDE version 1.8.19 from
<https://www.arduino.cc/en/software>
- The provided code relies on some libraries to function correctly. To install the necessary libraries, go to "Sketch" -> "Include Library" -> "Manage Libraries" in the Arduino IDE menu. In the Library Manager, search for and install the following libraries:
 - "DHT sensor library" by Adafruit
 - "WiFi" by Arduino
 - “Firebase Arduino Client Library for ESP8266 and ESP32” by Mobitzt

Configuring the IDE

- Launch Arduino IDE
- In the Arduino IDE, go to the "Tools" menu and select the appropriate board from the "Board" submenu. Choose “NodeMCU 1.0 (ESP-12E Module)
- If you can't find the board, go to “Tools” -> “Board” -> “Board Manager” and install “esp8266” by ESP8266 Community
- In “Tools” -> “Port”, select the port to which your Arduino board is connected

Uploading sketches

- Connect the Arduino to your computer
- Click the upload arrow located in the top left of the IDE
- If the upload fails, make sure the port is correct

Wi-fi Hotspot

- Remove battery from hotspot
 - Hot environments are bad for the batteries
- Plug in provided USB cable to hotspot and power brick
- Plug power brick inside packout



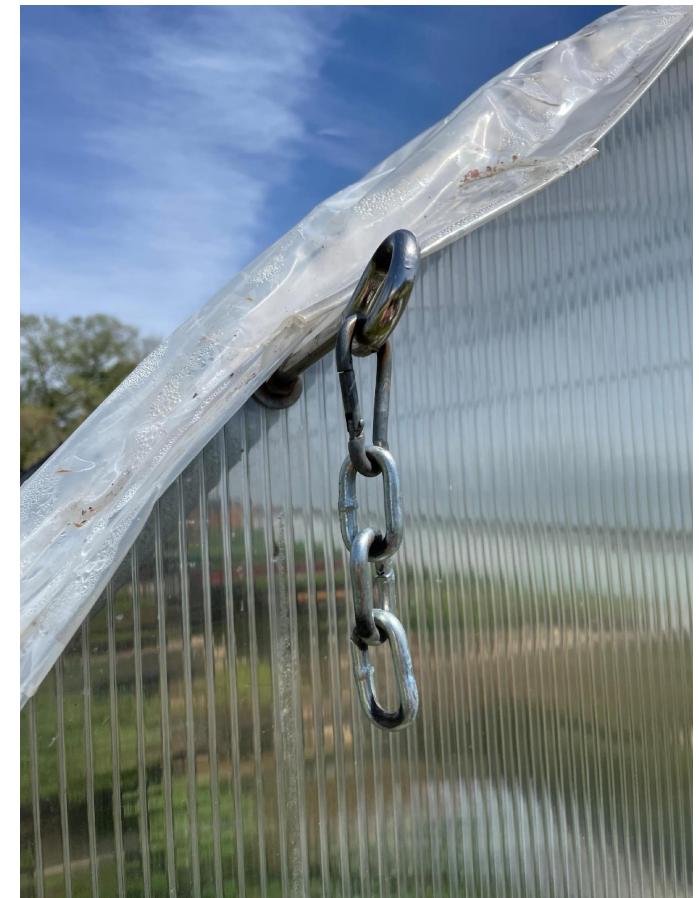
Installation at Greenhouse

Removing Hardware

Remove the hex bolt
connecting the chain to the
curtain rod

A 13mm socket fit

Then remove the old chain
from the carabiner



Removing curtain pole

Remove the old curtain rod from the creeper



Remove hex bolt

Remove the hex bolt and nut connecting the curtain rod to the creeper

11mm socket works



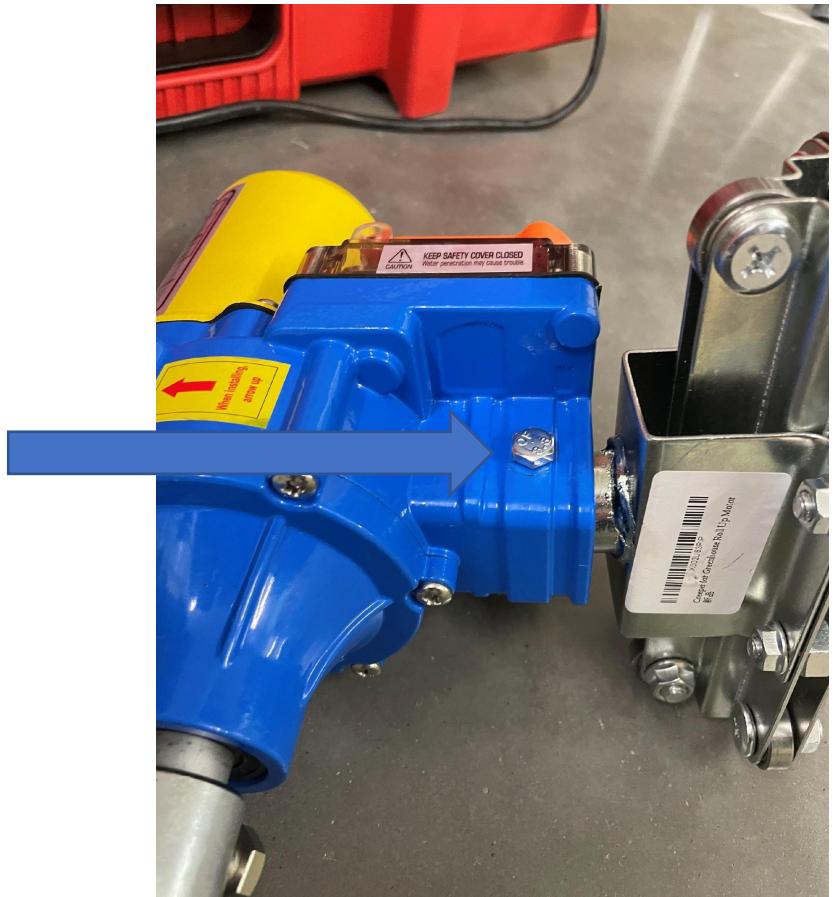
Assembling Motor

Attach the coupler that came with the motor to the motor. Line up the holes and fasten together with the short hex bolt that came in the box



Assembling Motor

- Insert new creeper into motor
- Use the long bolt and nut provided in the motor hardware bag to fasten them together



Assembling Motor

- Coupling adapter
 - Pilot hole of 3/32"
 - Stepped up to 3/16"
 - Actual is 1/4"



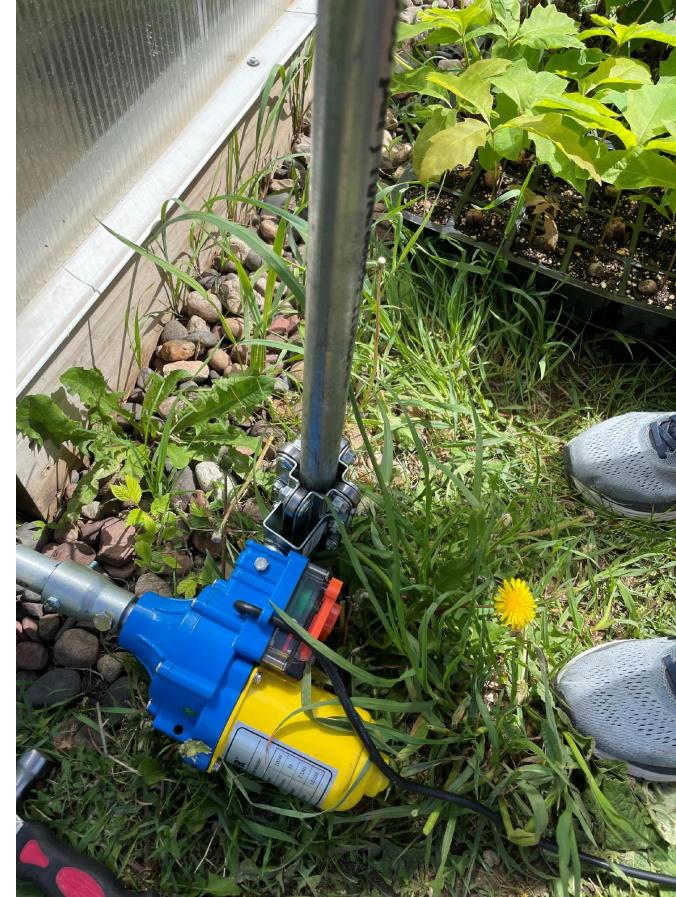
Drilling coupler adapter to curtain rod

- Insert the coupler into the curtain rod
- Drill pilot holes to line up with the existing curtain rod holes
- Drill out hole to fit hardware that was previously there



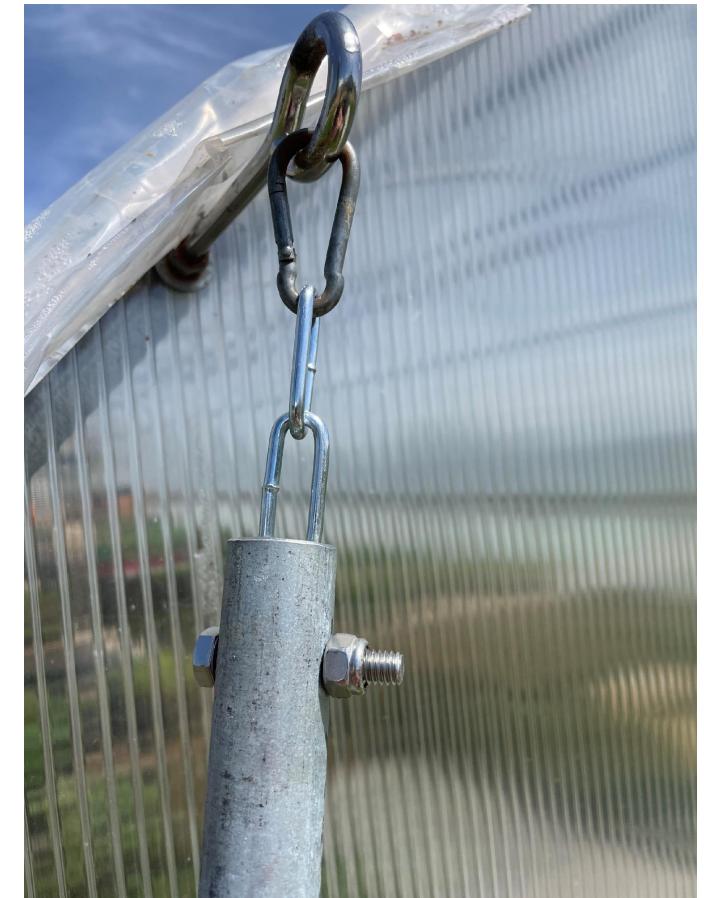
Attaching new rod

- Attach the creeper rod to the motor



Attach to chains

- Drill a thru hole near the top of the creeper pole so that it can attach to the chains and bolt
- Reuse hardware to attach new creeper pole to the new chains



Motor Wiring

Feed motor wire under the curtain to the packout



Mirror setup for other side
of greenhouse

Motor wiring

- Measure wire to go from the Packout, then to feed up and around the front door to the opposite side of the greenhouse where the other motor would go. Add a few feet in length. Cut and Feed wire through the corner like previously done. Strip the wire and then add it to the snap connector. Feed in the motor wires to the other side of the snap connector. Secure the wire going up and around the door with zip ties



Temperature Sensors

Connecting temperature sensors

- Connect the provided female ends to the pins on the sensor
- Wrap in electrical tape
- Insert male end to snap connector



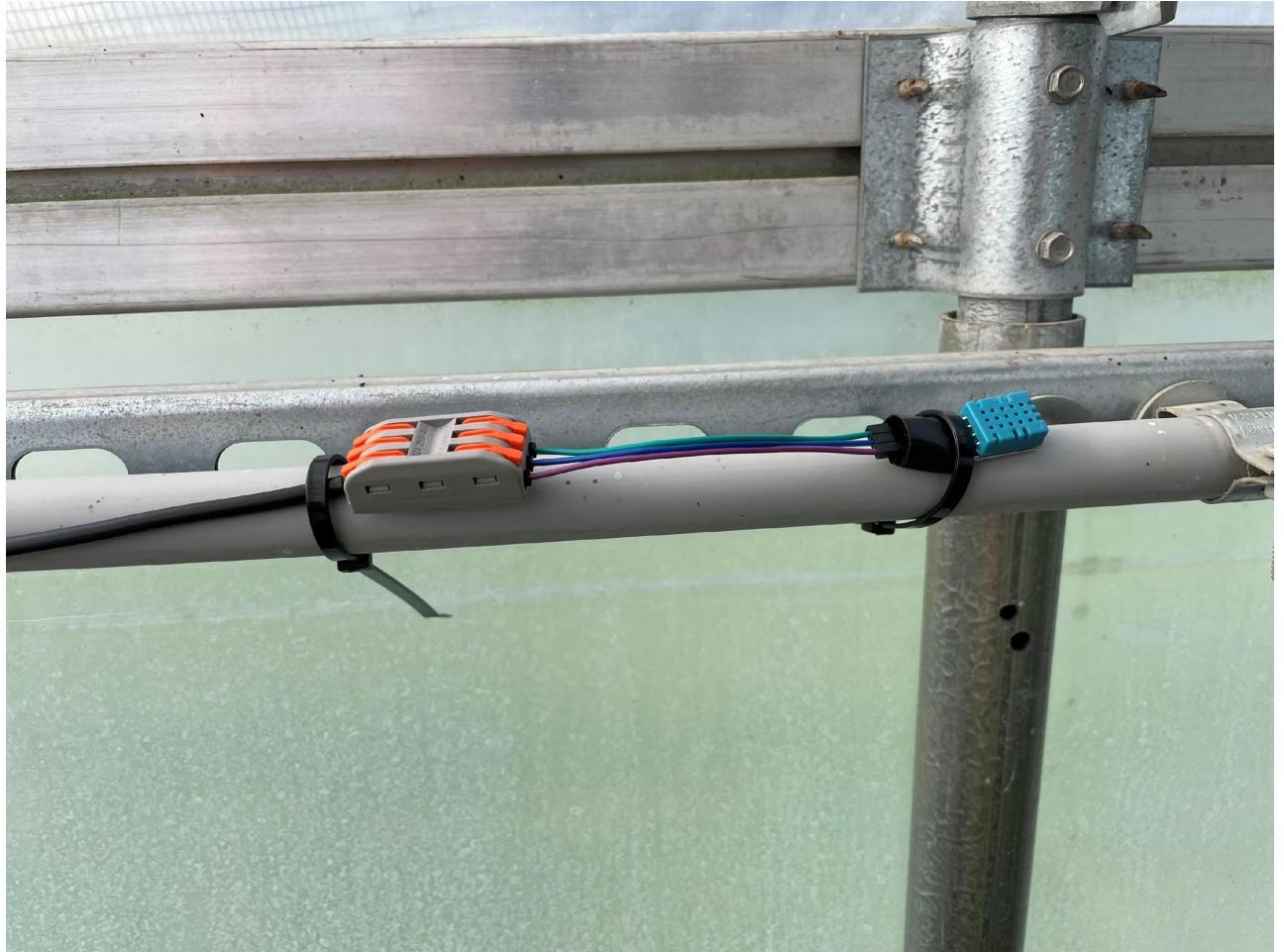
Connecting sensor reel wire

- Strip the reel of wire and connect to snap connector
 - Red=positive
 - Yellow=data
 - Black=



Sensor cable length

- Unroll cable until proper sensor location is determined
- Fasten sensor to electrical pipe via zip ties
- Do **NOT** over tighten zip tie around sensor
- Wire sensor back to the Arduino through the grommets on Packout

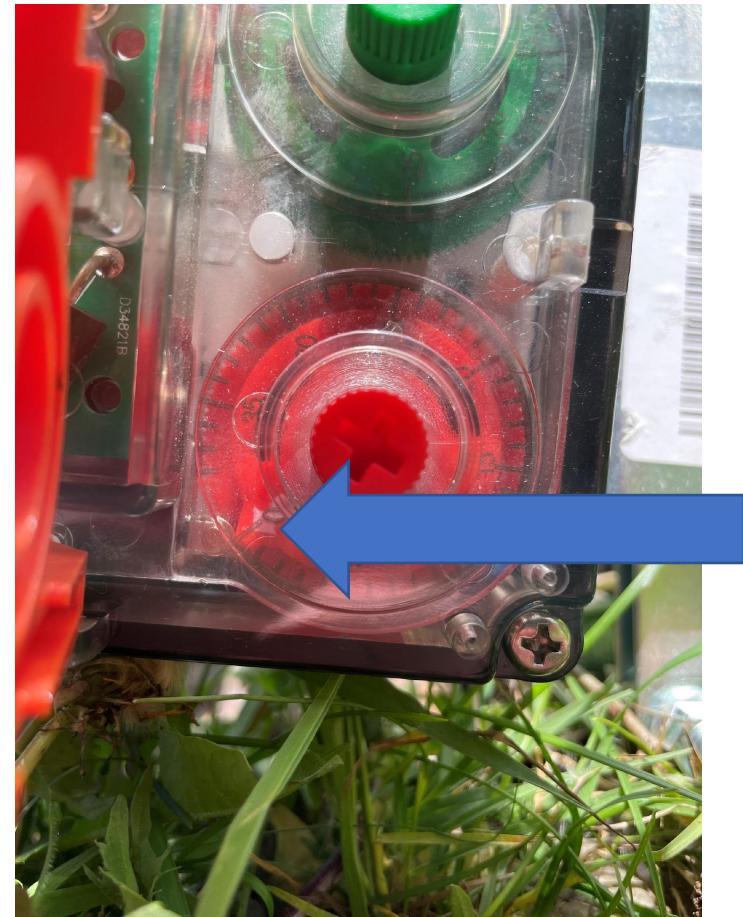


Setting Mechanical Limits on Motors

Lower Limit

- When the motor is in the desired down position, open the orange door on the motor
- Push the red knob in and twist it until the white arrow is at 0
- This sets a mechanical limit to the motor so it does not go down too far

NOTE: AFTER SETTING THE DOWN POSITION TO 0, THE MOTOR WILL BE ABLE TO SPIN DOWN FOR ABOUT ONE ROTATION. IT IS RECOMMENDED TO SET THE 0 POSITION SLIGHTLY BEFORE THE TRUE “DOWN” POSITION



Upper Limit

- When the motor is in the desired up position, open the orange door on the motor
- Push the green knob in and twist it until the white arrow is at 0
- This sets a mechanical limit to the motor so it does not go down too up

NOTE: AFTER SETTING THE UP POSITION TO 0, THE MOTOR WILL BE ABLE TO SPIN DOWN FOR ABOUT ONE ROTATION. IT IS RECOMMENDED TO SET THE 0 POSITION SLIGHTLY BEFORE THE TRUE “UP” POSITION

