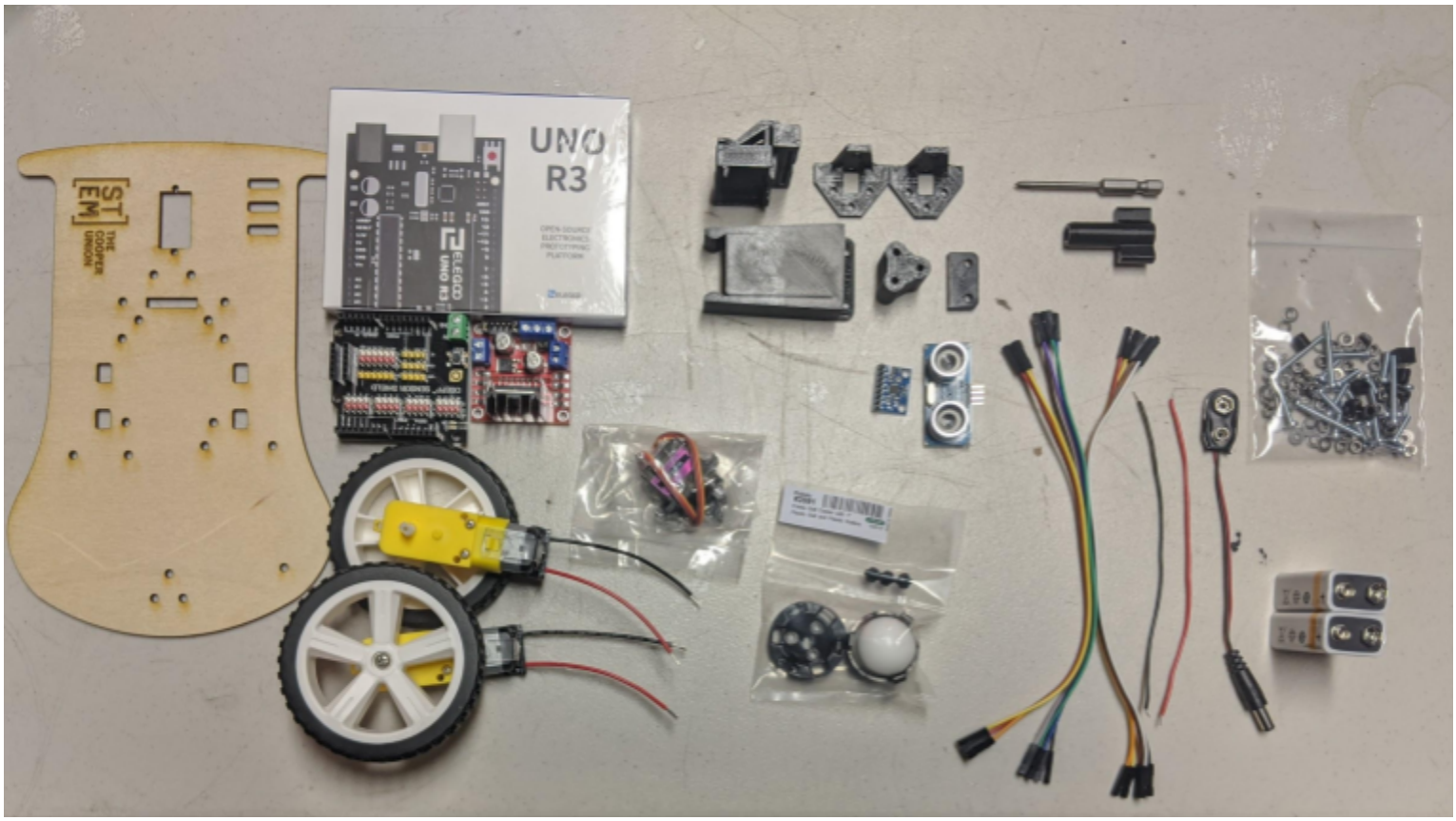
Assembly Procedure

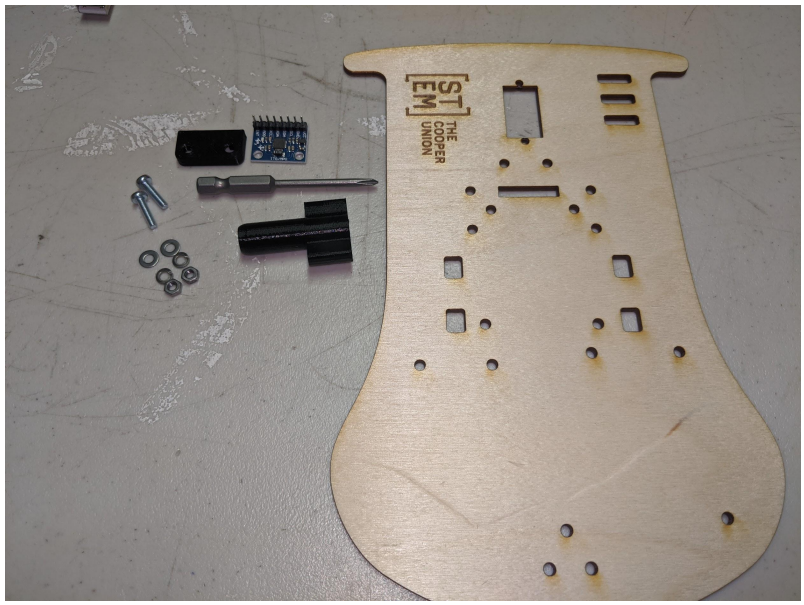


1. Helpful tips before beginning

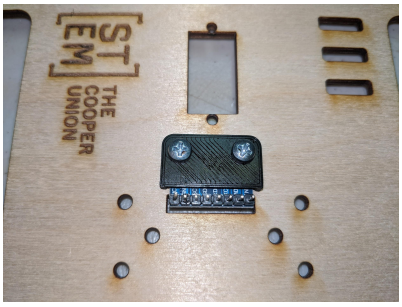
a. Washer, lock washer, nut
b. short medium long length
c. If a hole (particularly of a 3D printed part) is too tight for the screw to slide through, insert the screwdriver through the whole to loosen it
d. finger tighten first
e. get all the screws of a particular part on first, and then tighten all of them

2. MPU6050 attachment

a. Retrieve:
    i. MPU6050
    ii. MPU6050 Cover
    iii. 2x M3x12mm
    iv. 2x M3 Nut
    v. 2x M3 Lock Washer
    vi. 2x M3 Washer
    vii. Frame
    viii. 3mm Hex Nut Key
        1.



b. Fasten MPU6050 and Cover onto frame as shown

i. Note about fastening, the order of washers goes Washer, Lock Washer, then Nut **(THIS GOES FOR ALL FASTENERS, remember this for later)**
ii. Second Note: Finger tighten nut first, then use 3mm Key to tighten. Remember that this key is plastic, so do not use too much force as you may strip the plastic key.
iii. PINS POINT UP AND DO NOT GO THROUGH ROBOT
iv. (insert pics)
v.  

3. Ball Caster Attachment

a. Retrieve:
   i. Ball Caster bag
   ii. Ball Caster Spacer
   iii. 3mm Hex key
   iv. Phillips Head driver
   v. 3x M3x30mm
   vi. 3x M3 Nut
   vii. 3x M3 Washer
b. Remove from ball Caster bag the part with 3 holes in it
   i. Attach to frame with spacer as shown
   ii. Note: NO LOCK WASHERS HERE
   iii. Note: the side the logo is on in the picture

1.  

c. Remove 3 mini rollers from bag and place into ball caster housing.
d. Place ball on top of rollers
e. Snap final part of housing around ball

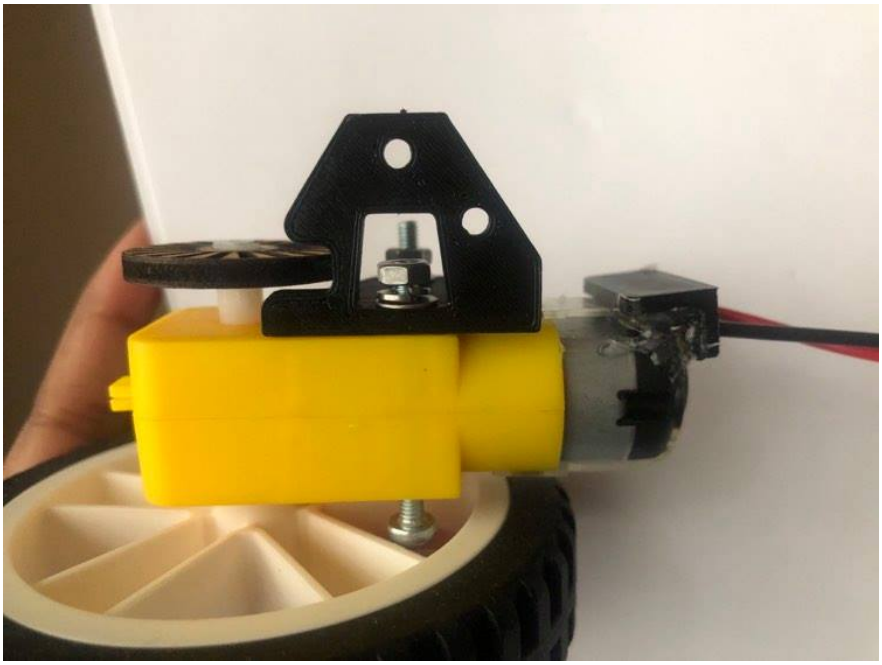
i. 

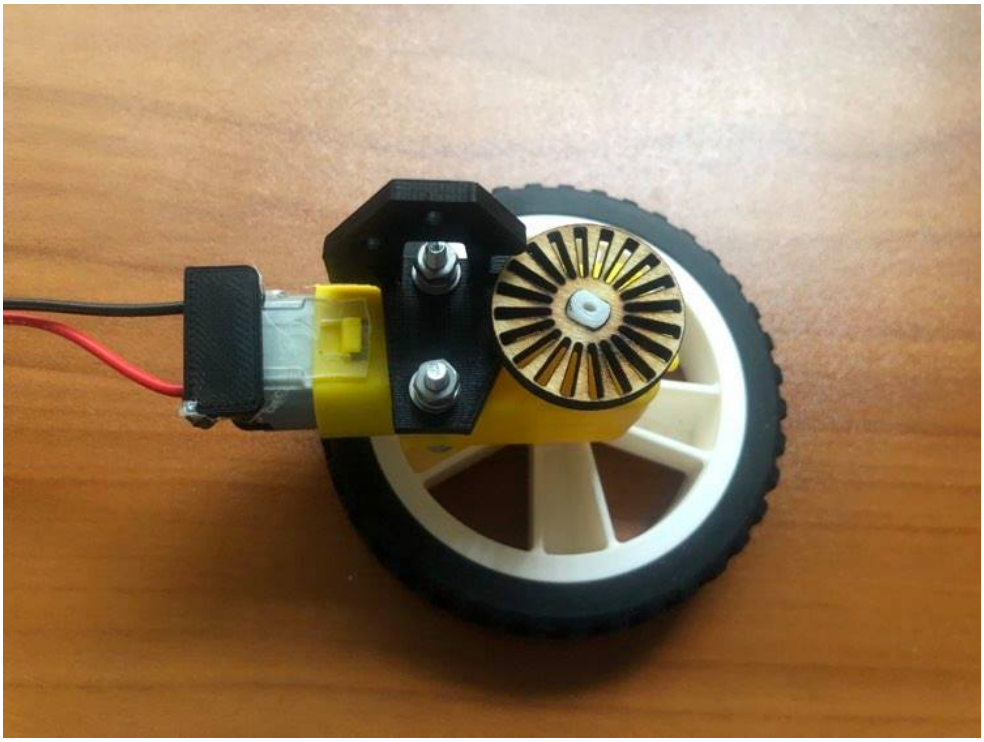
4. Motor Mounting

a. Retrieve:
    i. 2x Motors
    ii. 2x Motor Mounts
    iii. 4x M3-30mm
    iv. 4x M3-12mm
    v. 10x M3 Nuts
    vi. 10x M3 Lock Washers
    vii. 10x M3 Washers
    viii. 2x Encoder/Optical Interrupt Sensors

b. Mount Motor Mount to Motor

i. It can be tricky to get the washer and lock washer onto the fastener that is enclosed, be patient you'll get it.

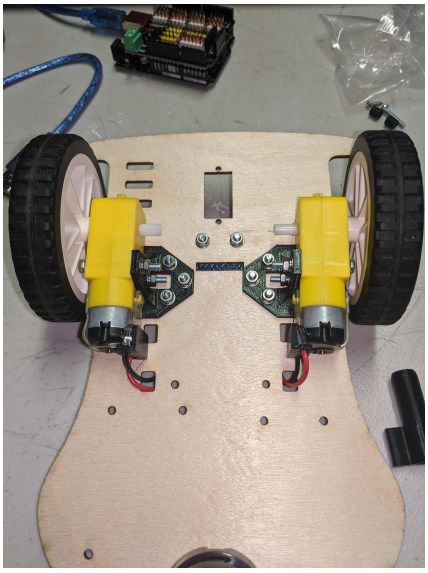
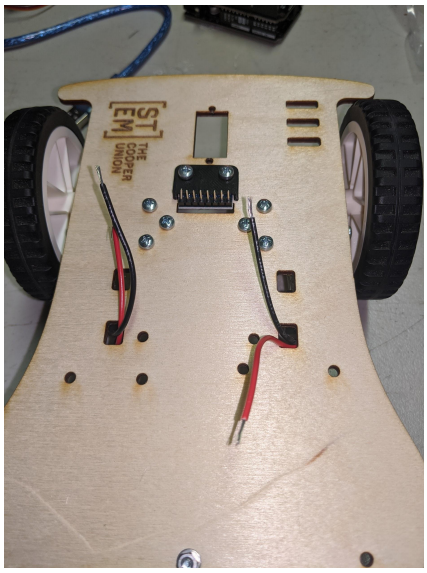




ii. Note that the direction of each motor mount is important, take a look at the picture to see the difference.

iii. 

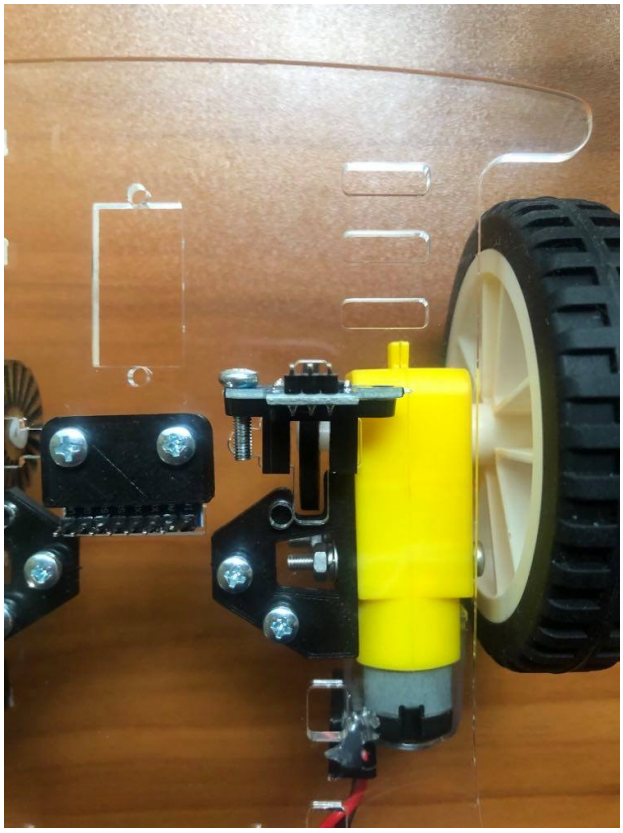
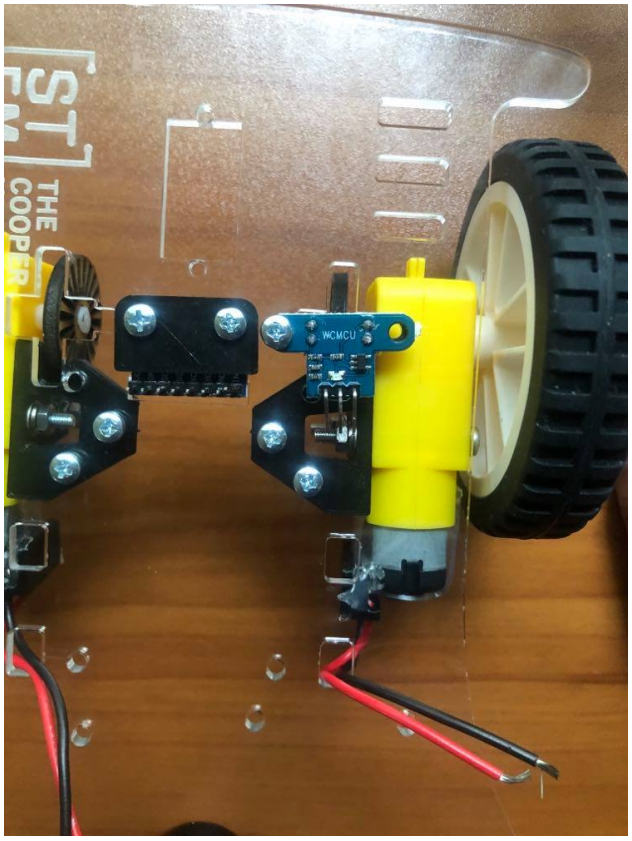
c. Mount Motor assemblies to Frame and pass wires through rectangular hole to top side of Frame

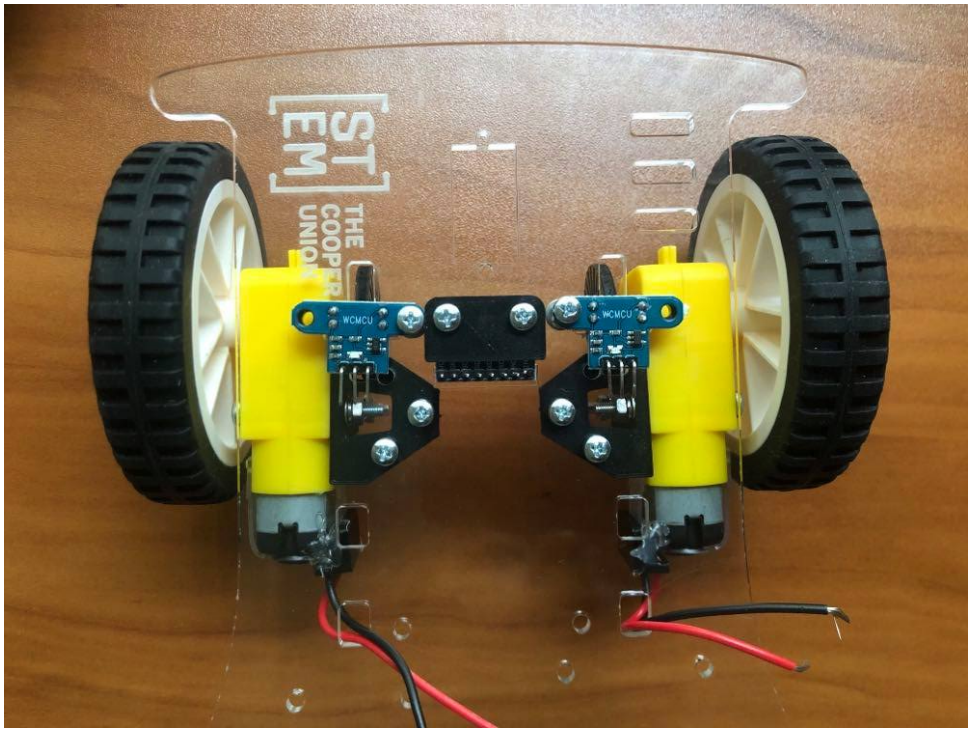
i. 


5. Encoder Time

a. Retrieve:
   i. Optical Interrupt sensors
   ii. 2x M3x12mm
   iii. 2x M3 Nut
   iv. 2x M3 Lock Washer
   v. 2x M3 Washer

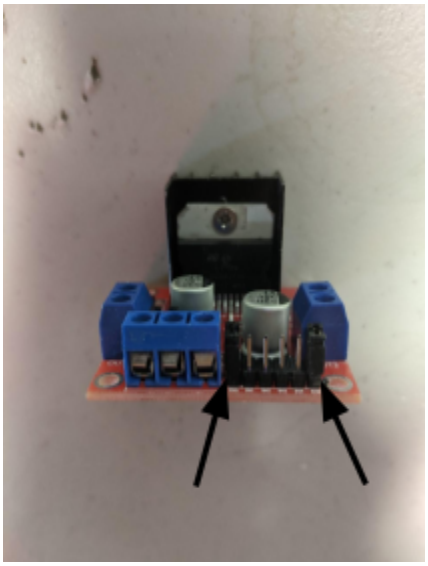
b. Place encoder onto robot like shown. Make sure wires point toward the back of the robot

c.  

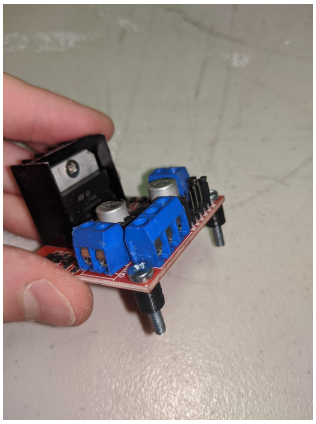
d. 

6. Motor Controller Mounting and Power Wire routing

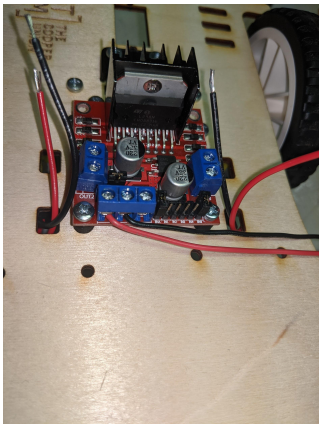
a. Retrieve:
   i. Motor Controller
   ii. 2x M3x16mm
   iii. 2x M3 Nut
   iv. 2x M3 Lock Washer
   v. 2x M3 Washer
   vi. 2x M3 plastic spacer
   vii. Red and Black Solid Core Wire
b. Remove Jumpers from motor controller (These are connected to the ENA, and ENB pins)

i. 

c. Pass M3 Fasteners through two holes shown and push plastic spacers onto fasteners. If plastic spacers do not want to cooperate, rotate them like a nut and they will move.

i. 

d. Attach motor controller to frame

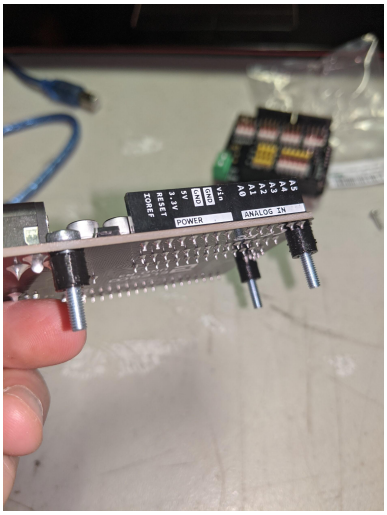
i. 

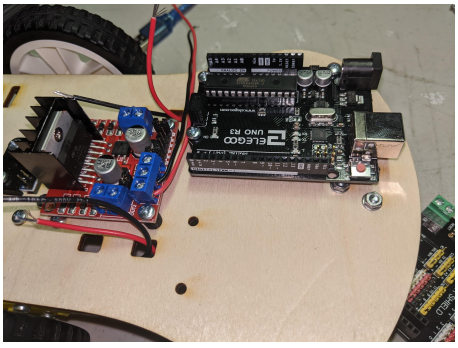
e. Fasten the two solid core wires into proper screw terminals on motor controller

i. Loosen the screw terminals first
ii. Insert the wire into the terminal and tighten screw to hold wire in place
iii. Make sure you use the BLACK wire for the GND terminal
iv. Make sure you use the RED wire for the +12V terminal
v. GND is the center terminal
vi. +12V is the left terminal
vii. Note to bend the wires as shown for later

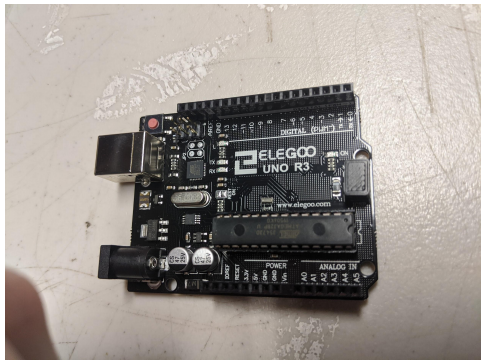
7. Arduino Attachment

a. Retrieve:
   i. Arduino UNO
   ii. 3x M3x16mm
   iii. 3x M3 Nut
   iv. 3x M3 Lock Washer
   v. 3x M3 Washer
   vi. 3x M3 Plastic spacer

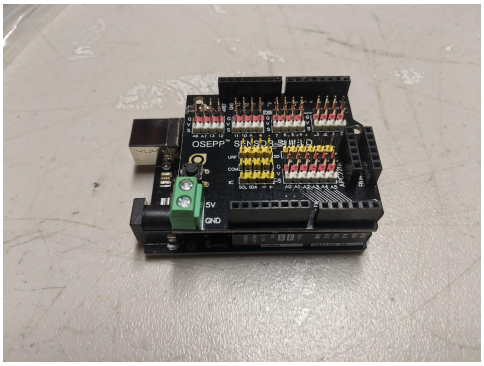
b. Like the motor controller pass the fasteners through the holes and attach plastic spacers as shown
   i. Note: one fastener hole will be empty
   ii. 

c. Fasten Arduino to Frame
   i. 

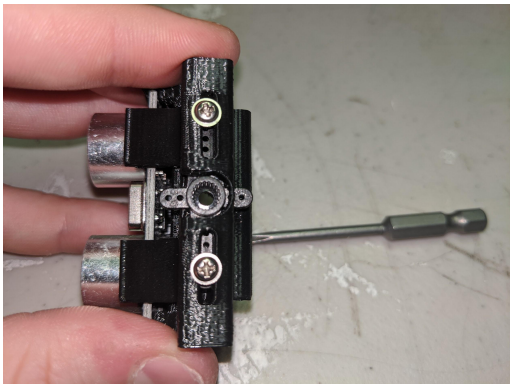
d. Arduino Uno and Sensor Shield prep
   i. Find the ICSP Pin Cover (it's a rectangular, hollow, plastic part)
   ii. Place ICSP Pin cover on arduino

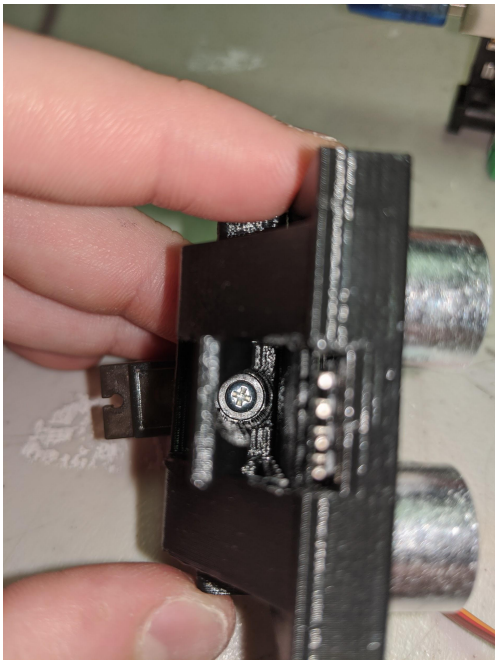
1. 

iii. Retrieve Sensor Shield and attach to UNO

iv. 

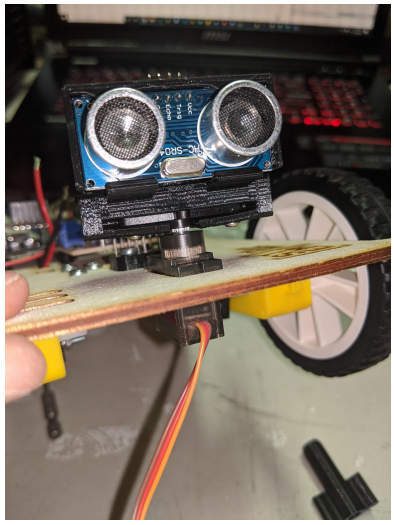
8. HC-SR04 sensor attachment w/ Servo

a. Retreive HC-SR04 and Ultrasonic Distance Sensor Bracket
b. Retrieve mini servo motor bag that contains servo horns and fasteners
c. Take out cross shaped servo horn and push into opening on bracket in proper orientation
    i. 
d. Retrieve the two “self-tapping” screws from the servo bag. (They have the pointed end and are the longer of the two screws in the bag)
e. Drive these screws into the outer-most holes on the servo horn using the phillips screw driver provided (if you have your own screw driver use that one as it may likely be better)
    i. 
f. Retrieve the last small screw in the servo bag, and fasten the servo horn to the servo.

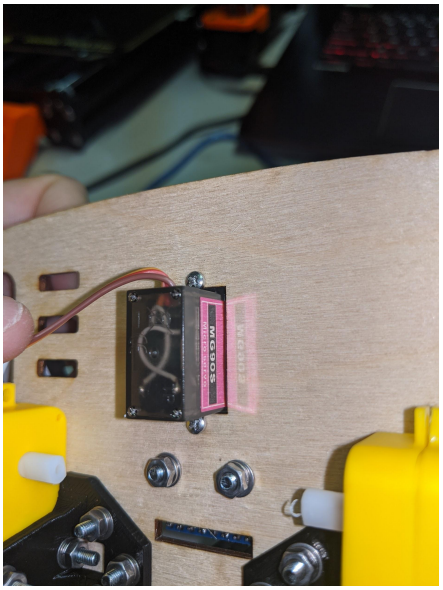
i. 

ii.

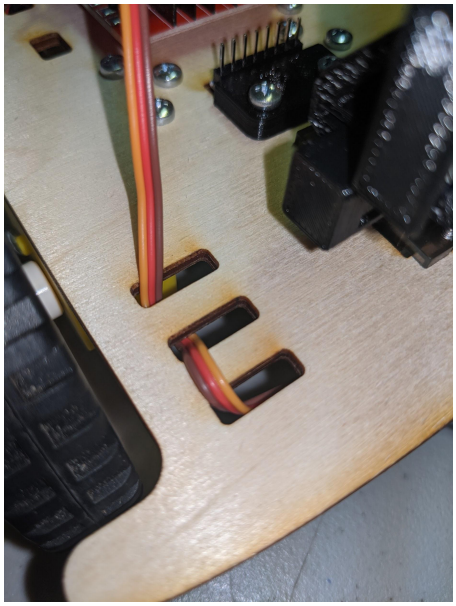
g. Retrieve:
    i. Servo with sensor attached
    ii. 2x M2.2x9.5mm self tapping fastener
        1. This is the fastener with the pointed end in the **fastener bag**

h. Take servo and pass wire through large rectangular hole
    i. Make sure wires are coming out of the servo towards the front of the robot
    1. 

i. Fasten servo to frame
    i. Note: Head of screw will be on bottom of frame
    ii. Note: DO NOT OVER TIGHTEN, THE SCREW WILL EAT THROUGH THE PLASTIC OF THE SERVO AND NOT HOLD IT IN PLACE

iii. 

j. Route servo wire as follows



9. 9V Battery Mount Mounting

a. Retrieve:
   i. 9V Battery Mount
   ii. 2x M3x16mm
   iii. You know the drill
   iv. No spacers here

b. Fasten mount to frame

i.