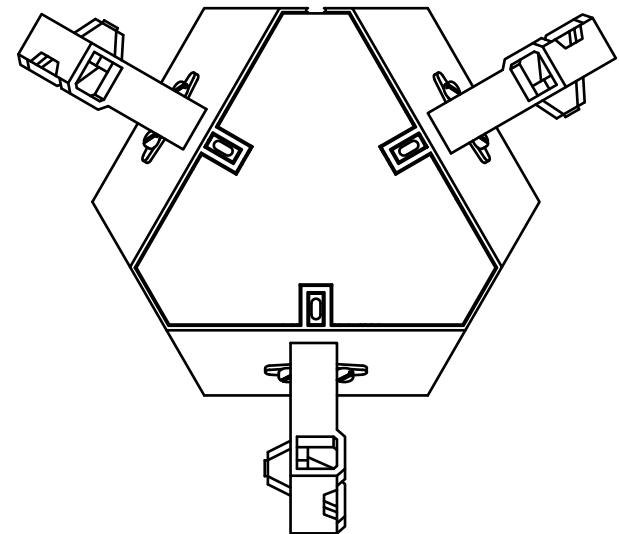
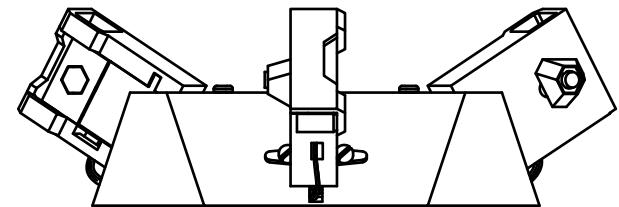


C H A R L O T T E

- 
- 1 Intro
 - 2 Tools Needed
 - 3 Parts Needed
 - 4 Assembly
-

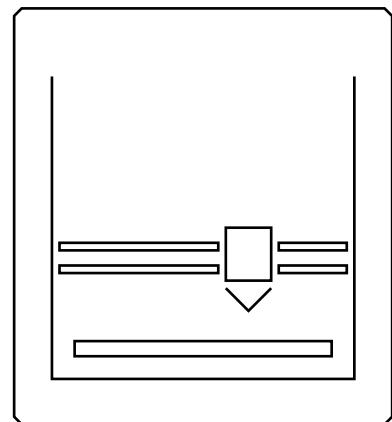
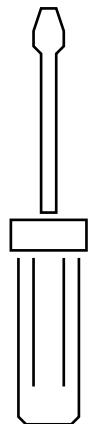
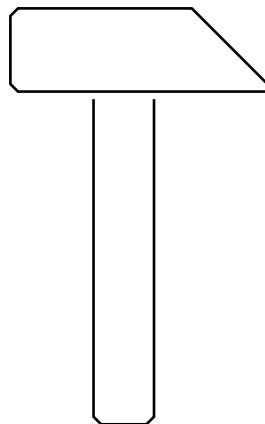
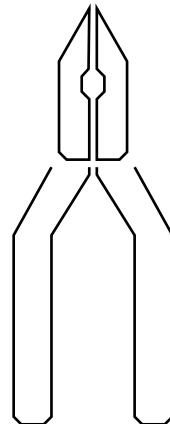
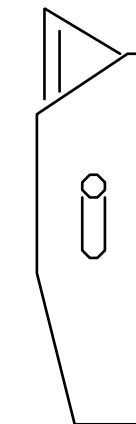
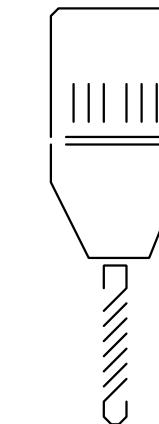
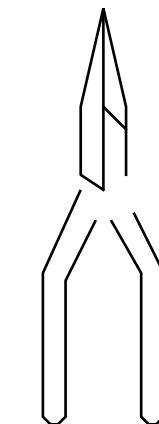
What is Charlotte?

Charlotte is an interactive drawing robot that senses the light in its environment and reacts dynamically to it according to the changes.



You Will Need:

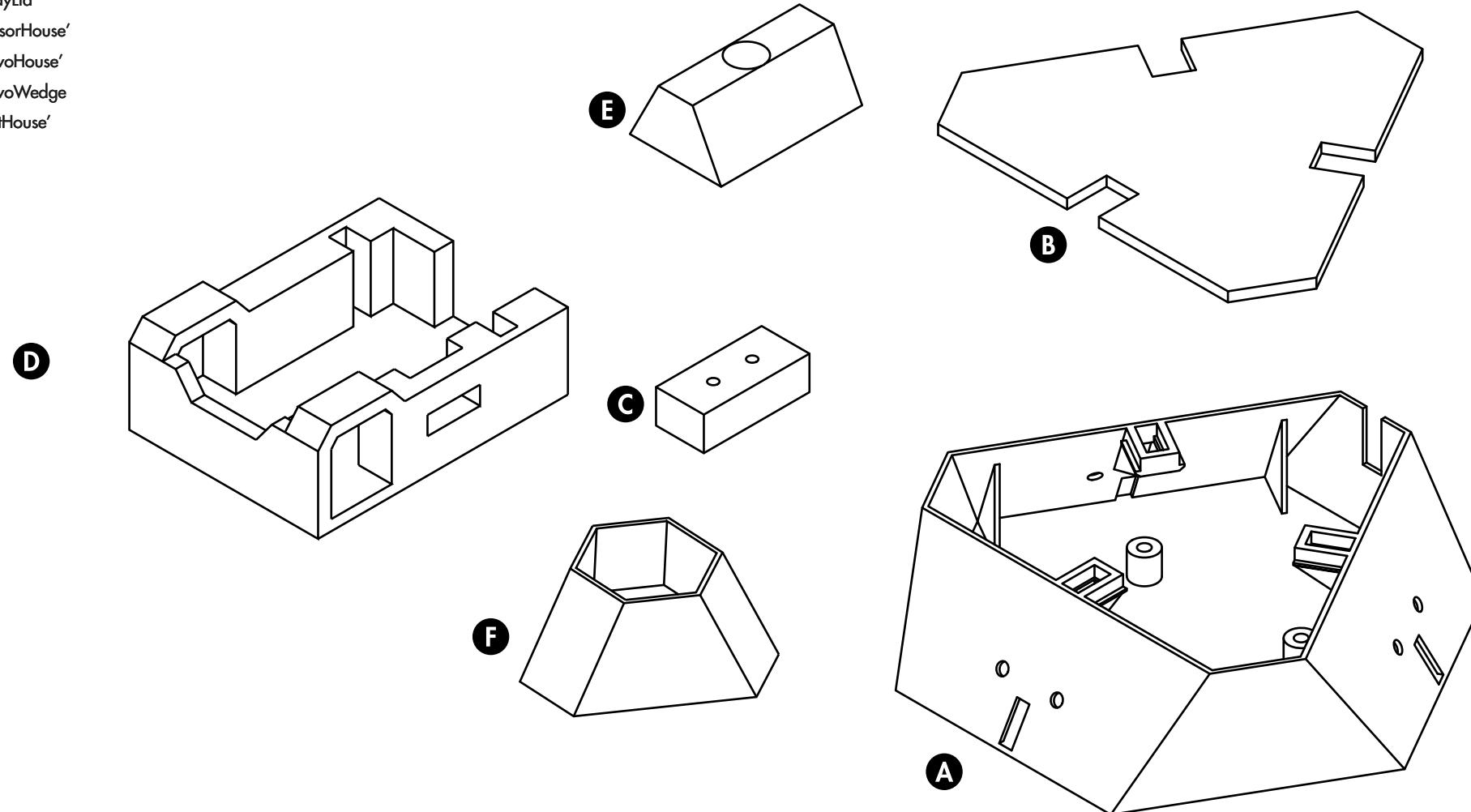
- | | |
|-------------------|------------------------|
| A 3D Printer | G Drill |
| B Screw Driver | H Lounge tongue Pliers |
| C Hammer | I Wire |
| D Wire Cutters | J Solder |
| E Soldiering Iron | K Shrink Wrap |
| F Wire Cutters | |

**A****B****C****D****E****F****G****H**

3D Printed Parts/Laser Cut

All parts have been designed to be 3D printable, but parts C and D can also be Laser Cut if you have access to one.

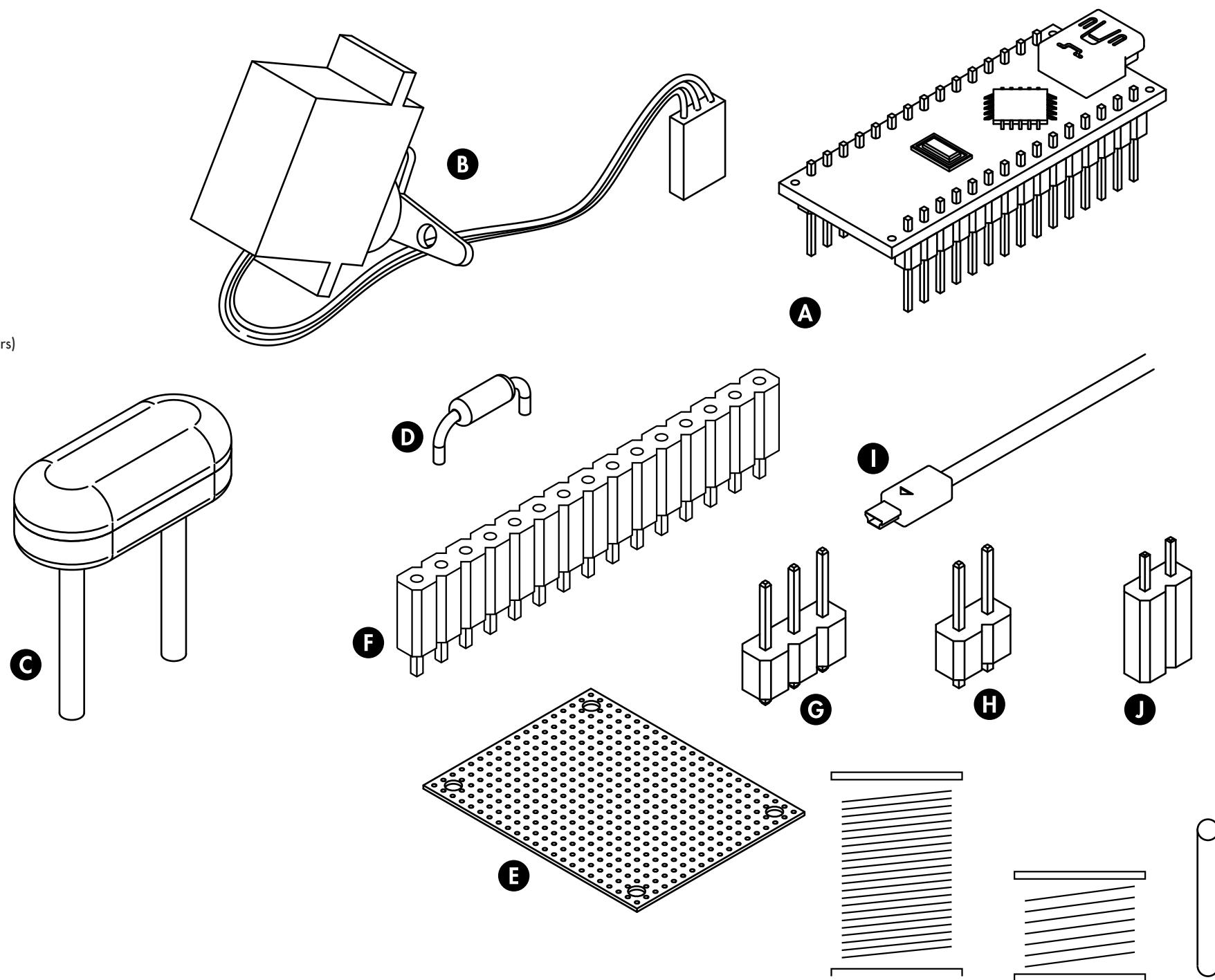
x1 A 'mainBody'
x1 B 'bodyLid'
x3 C 'sensorHouse'
x3 D 'servoHouse'
x3 E 'servoWedge'
x3 F 'boltHouse'



PARTS

Electronic Parts

| | | |
|-----|---|--------------------------------|
| x1 | A | Ardunio Nano |
| x3 | B | SG90 Servo |
| x3 | C | Photoresistor |
| x3 | D | Resistor |
| x1 | E | Bread Board |
| x2 | F | *12 Female Pins |
| x3 | G | *3 Female Pins |
| x3 | H | *2 Male Pins |
| N/A | I | Wires (Red, Black, +3 colours) |
| N/A | J | Shrink Wrap |
| x1 | | Extra Long USB mini Cable |
| x1 | | 5V USB Plug |



PARTS

Nuts, Bolts & Washers

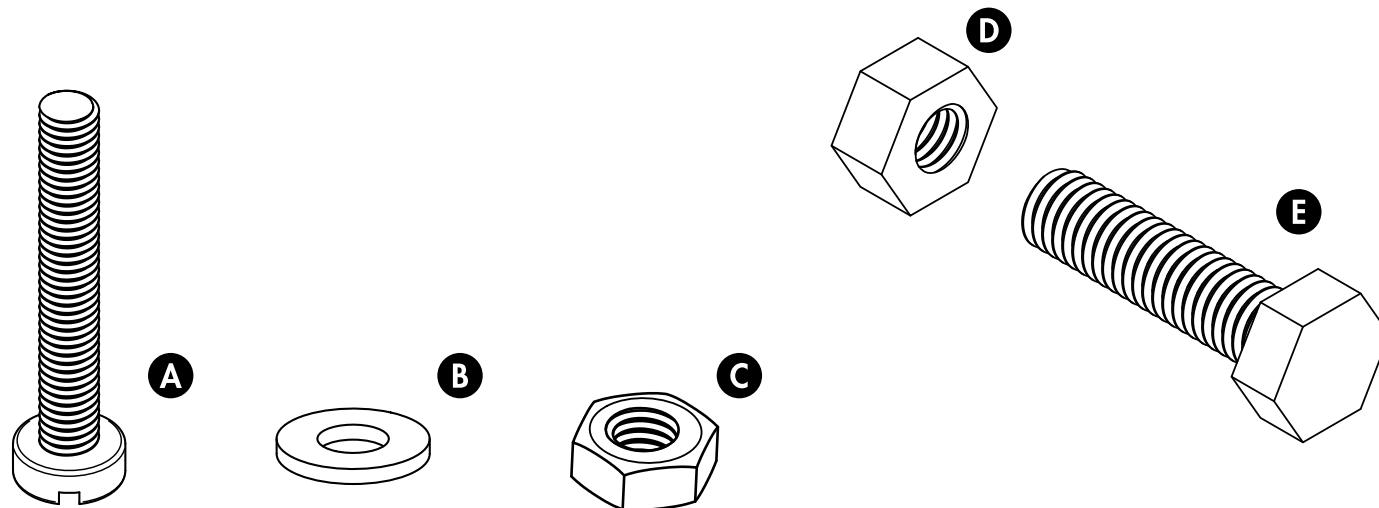
x10 **A** 3mm x 10mm bolts

x6 **B** 3mm Washers

x6 **C** 3mm Nuts

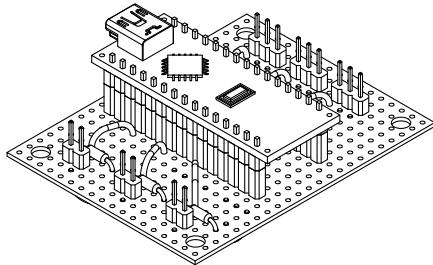
x6 **D** 5mm bolts

x6 **E** 5mm x 20 bolts



SECTION 1

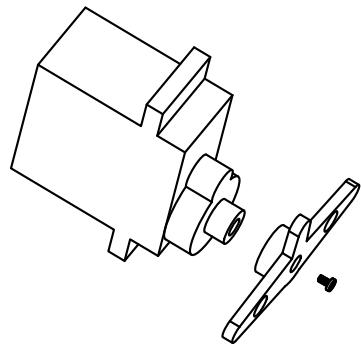
Bread Board



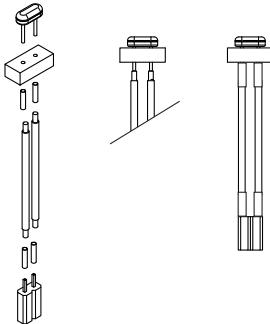
Assemble
Electronics Board

SECTION 2

Calibrate



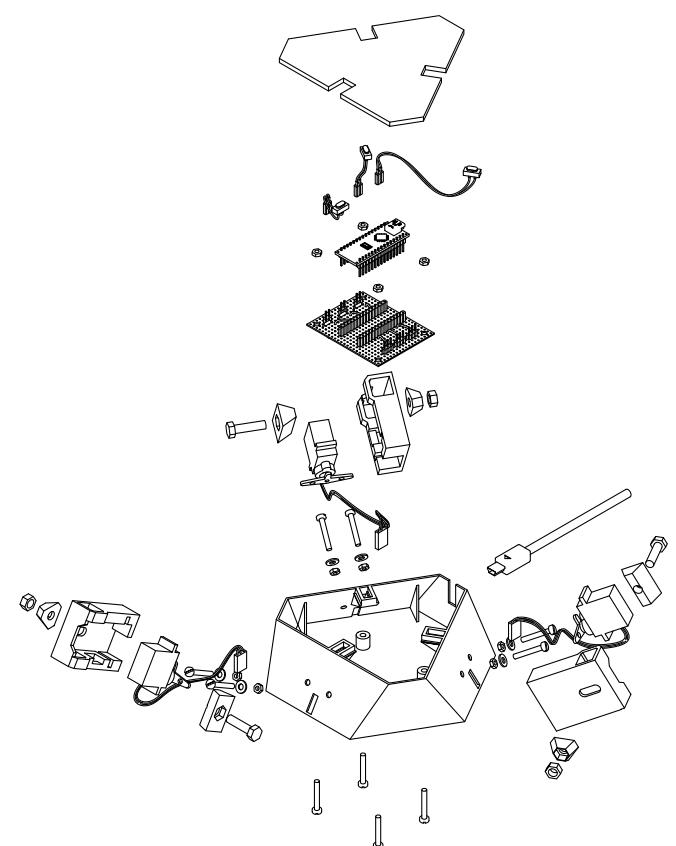
Calibrate & Secure Servos



Create Senros

SECTION 3

Assemble



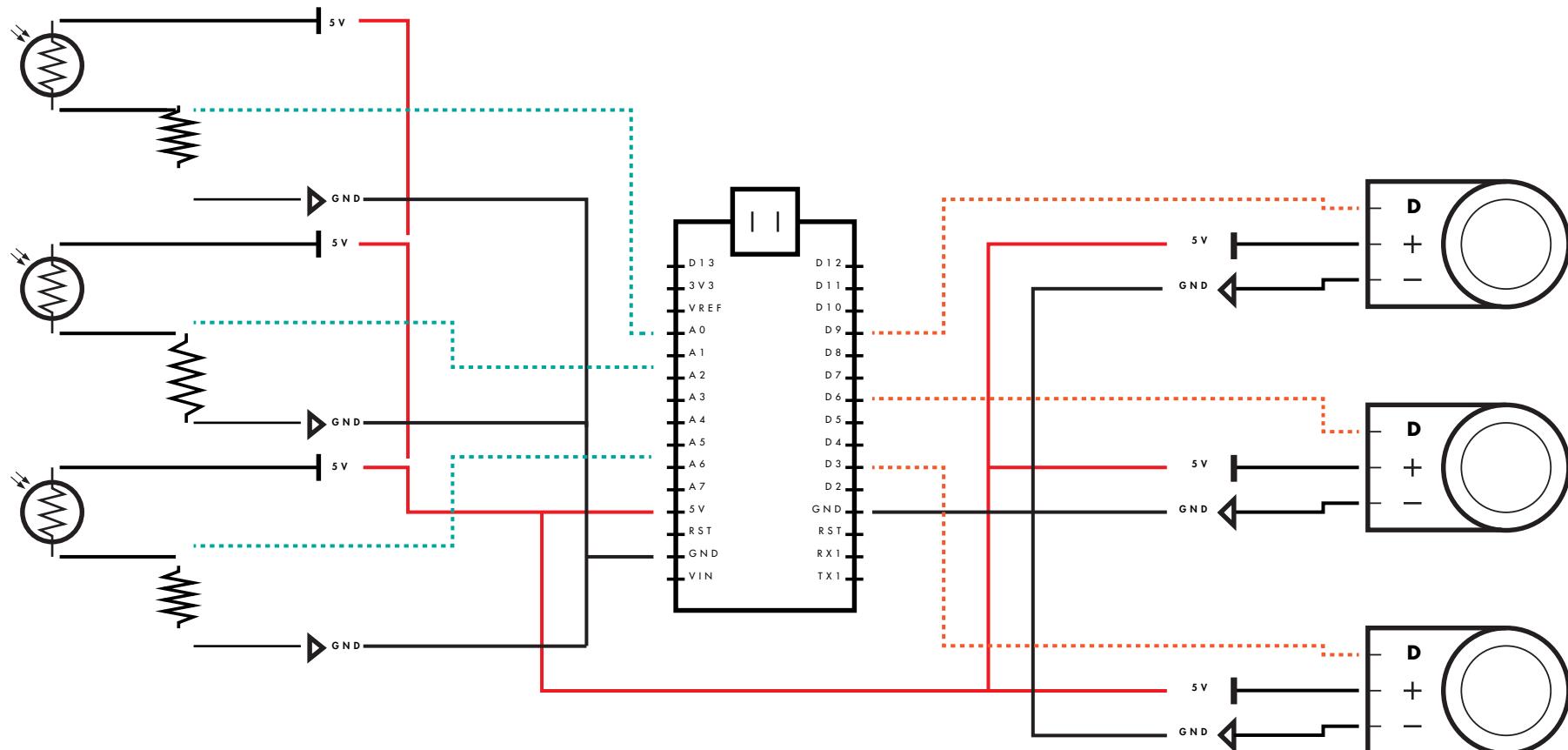
Assemble Prefabricated
& Pre-Made Parts

Schematic

You are now going to assemble the bread board. You are going to do it by hand! This is the schematic, it might look complicated but, the step by step instructions will help you get a working robot in no time.

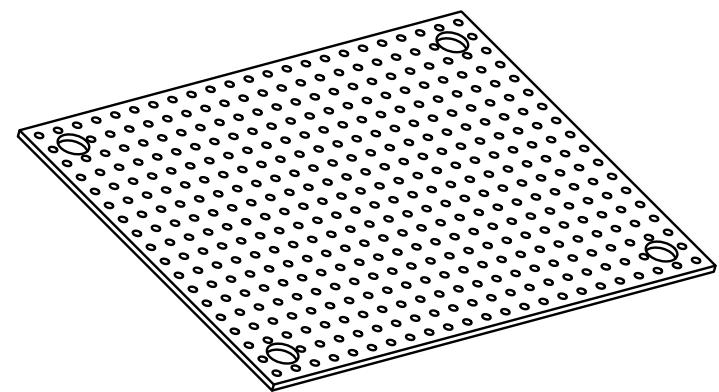
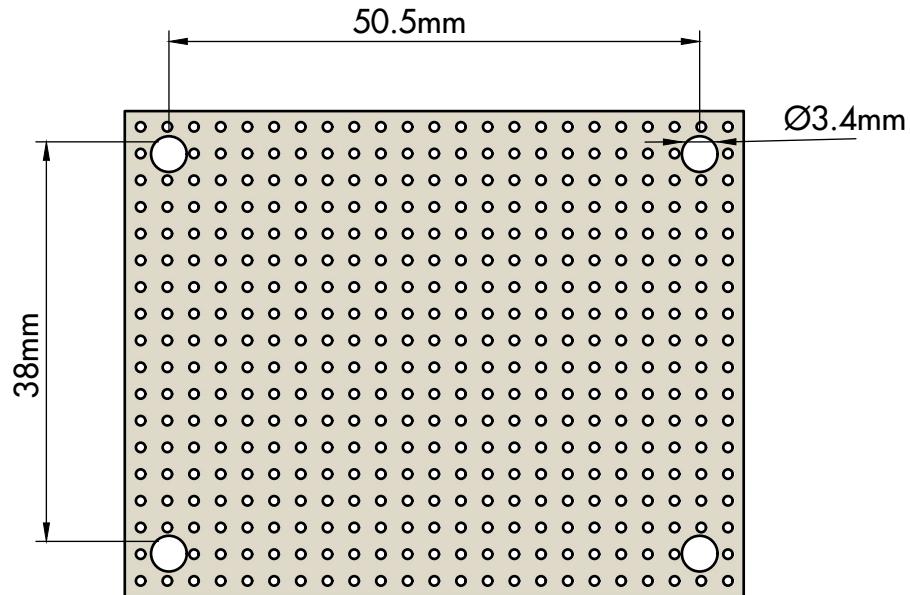
Key

- Digital
- Analog
- - Power
- Ground



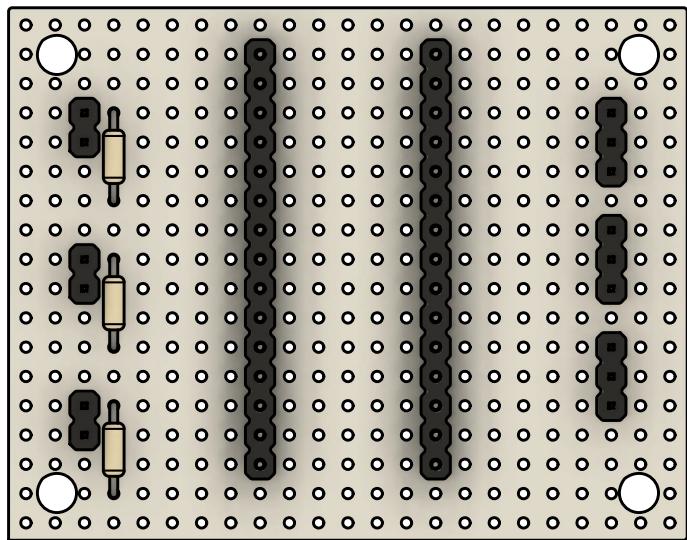
Bread Board

The first step is to prepair the bread board. You will need to cut the bread board down to size then drill the wholes in the corners. An additional step would be to sand the corners. Make sure your bread board has 23 by 18 wholes available.

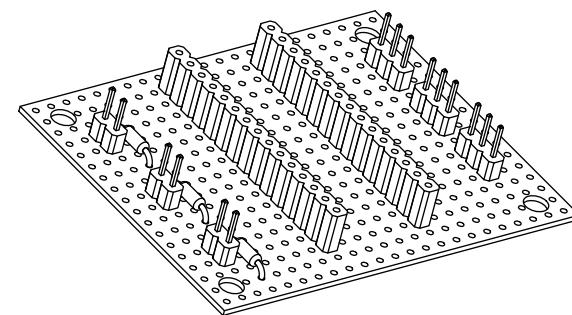


Pins and Resistors

In this step you will need to precisely lay the components into the board into the right position because they are the foundations of the design. You can go ahead and solder the parts into the board.

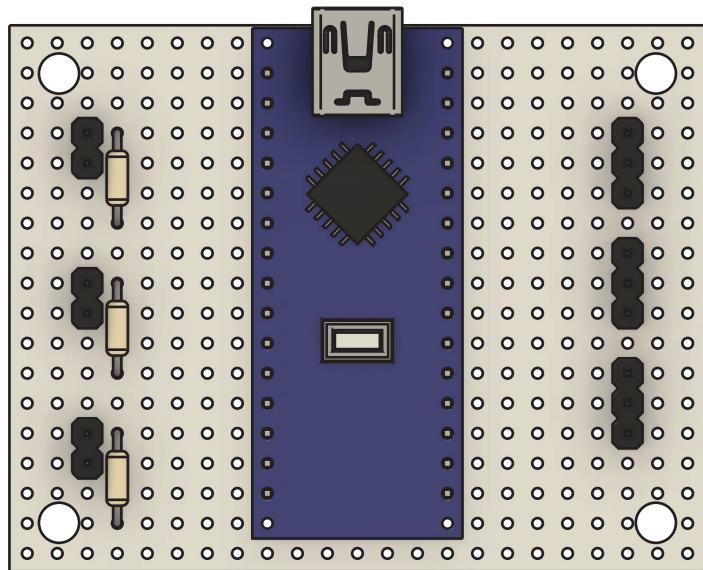


top

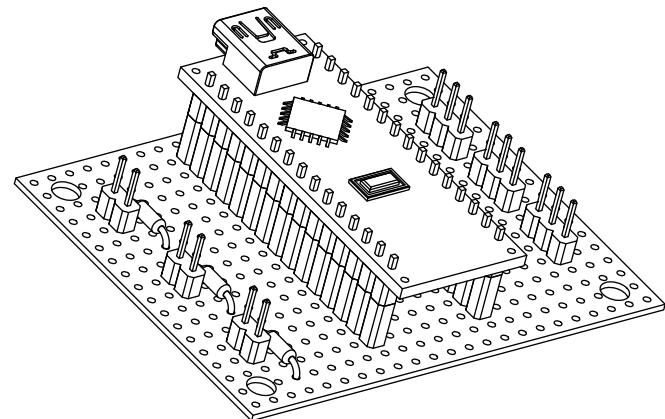


Ardunio

Now slot the Ardunio Nano into the female pins. Putting the Ardunio will help you match the digital and analog pins correctly.

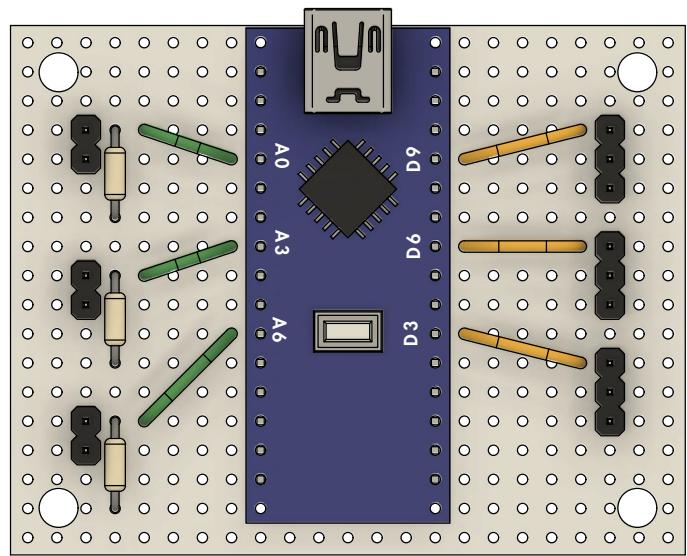
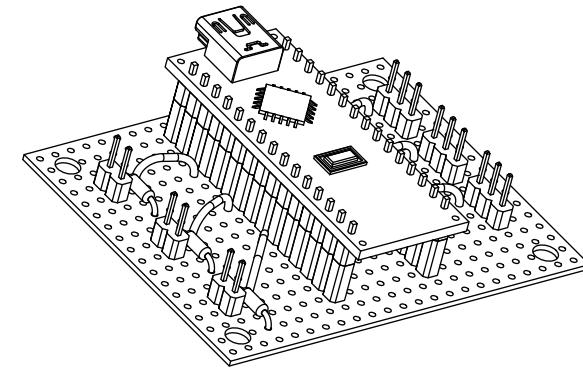


top

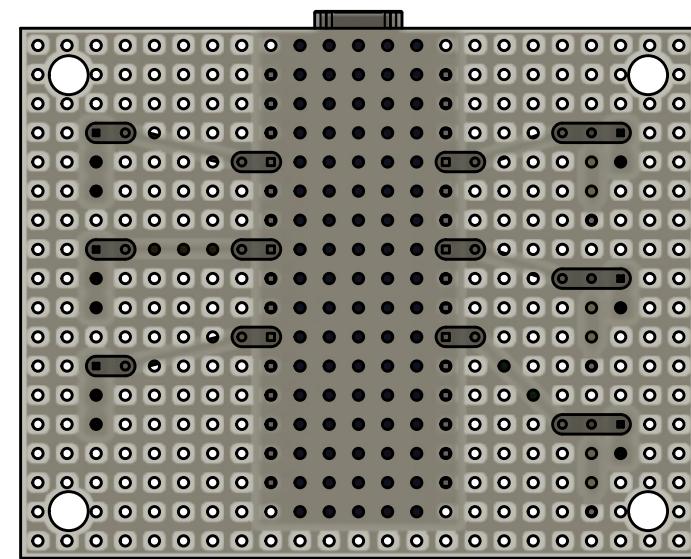


1.4 Top Wires

Now, solder in the digital and analog wires in. Make sure that you couple the digital pins D3, D6 and D9 and analog pins A0, A3 and A6 for they will be referenced specifically in the code that you upload later.



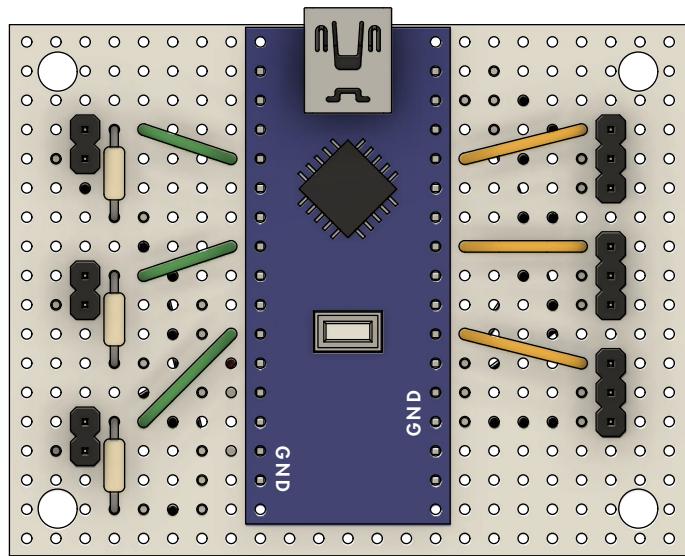
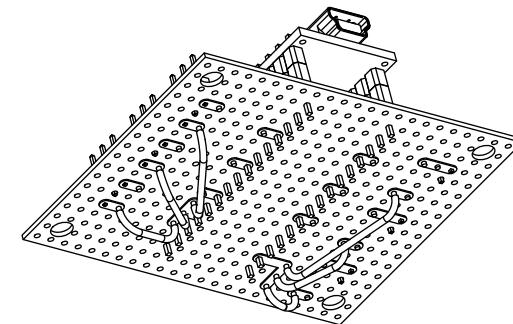
top



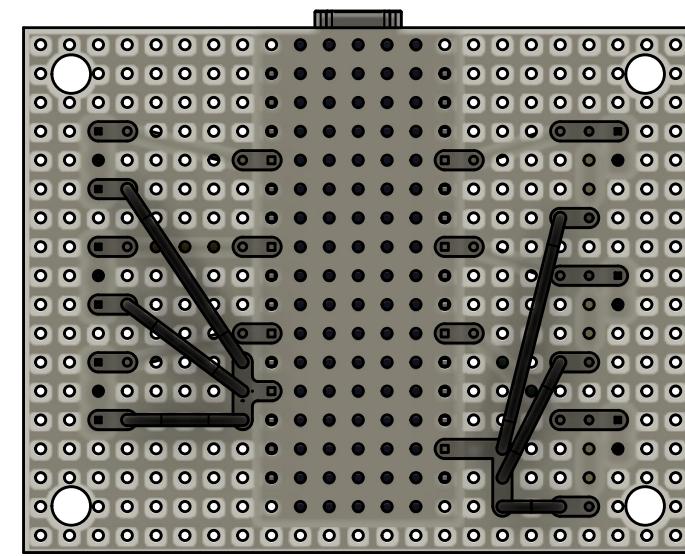
bottom

1.5 Connect Ground

Now it is time to solder in the digital and analog wires in order to connect the sensors and servos to the Arduino.



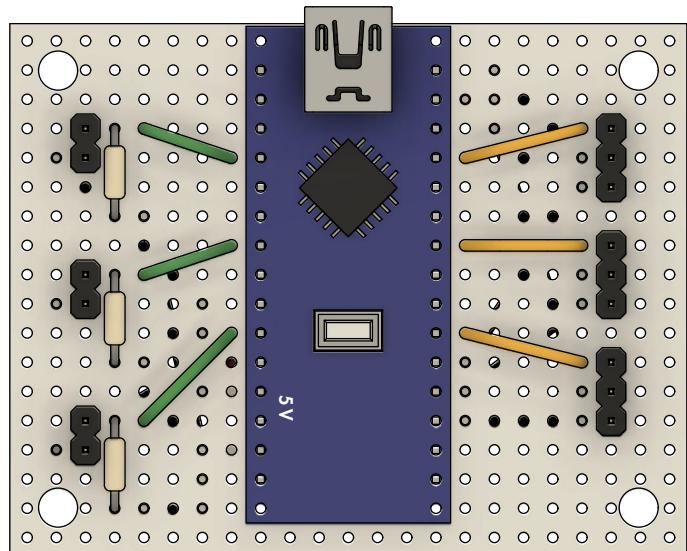
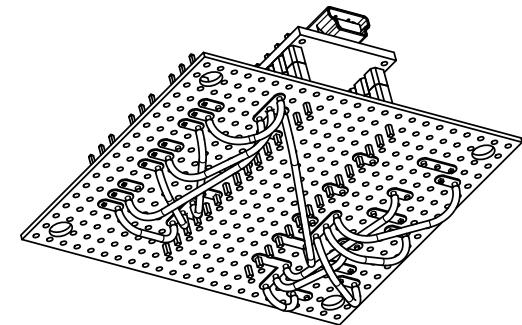
top



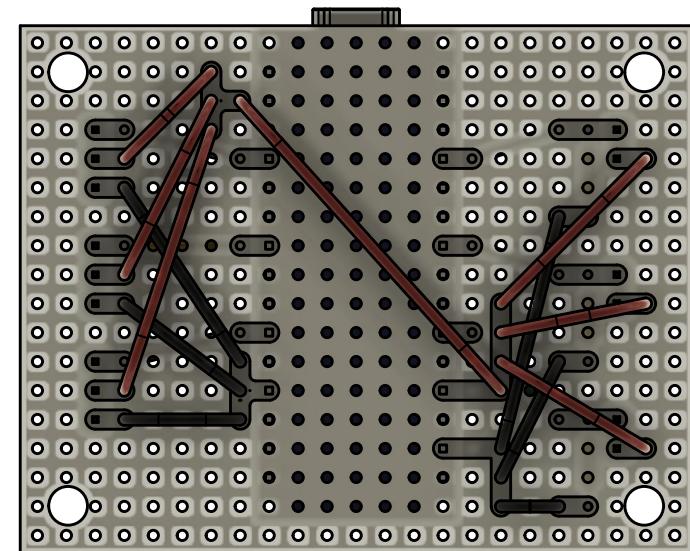
bottom

1.6 Connect Power

After connecting ground, it is time to connect the power. Because there is only one 5v out pin, it is necessary to use a wire as to bridge the connection with a wire so that both sides have power.



top



bottom

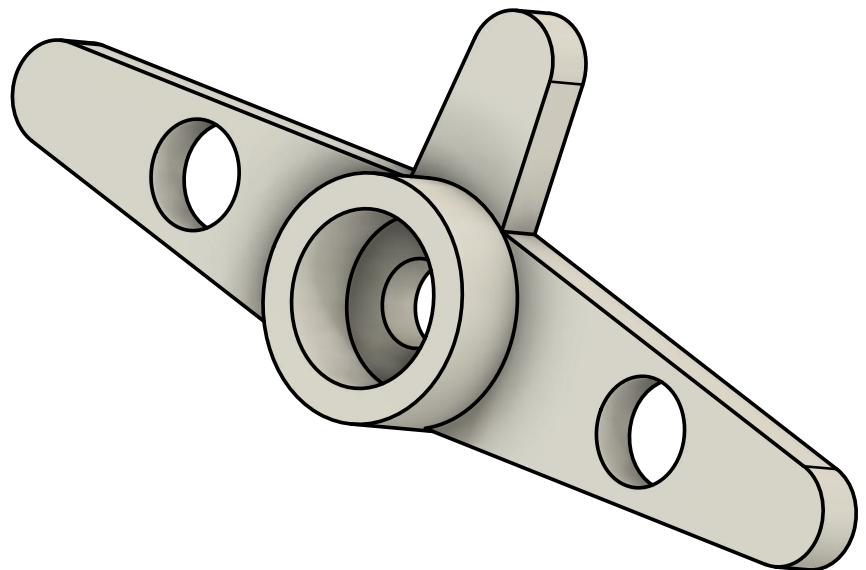
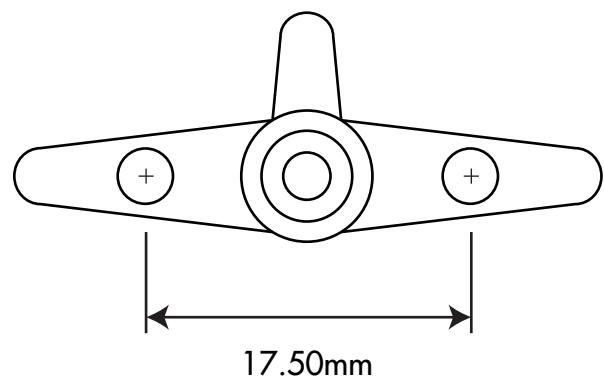
2.1 Servo Drill

Drill two wholes into the *****, exactly 7.5 mm apart from eachother. Use a 3mm drill peice. Use the plastic dots on the **** as reference

Advice

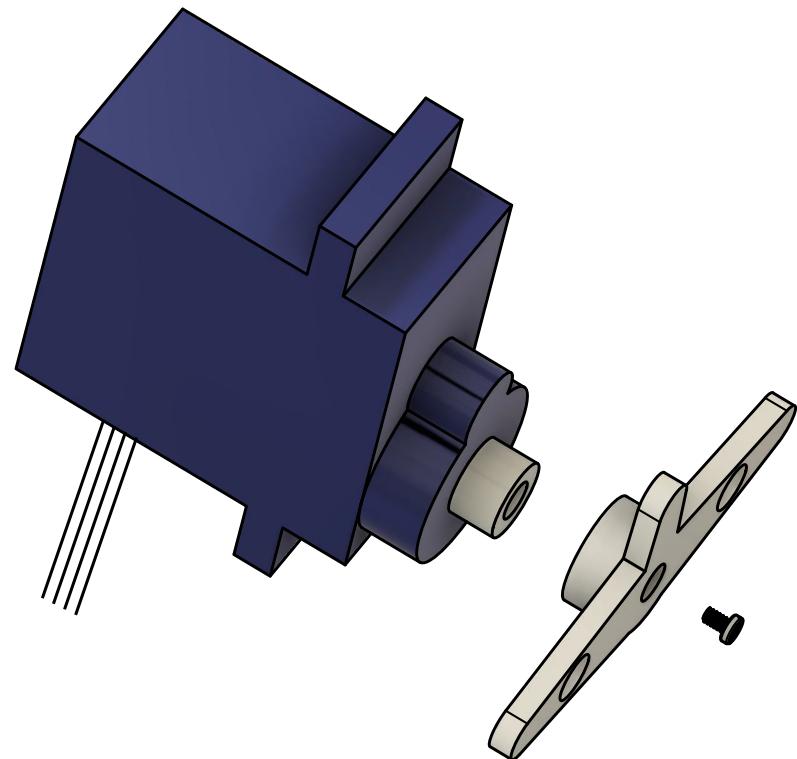
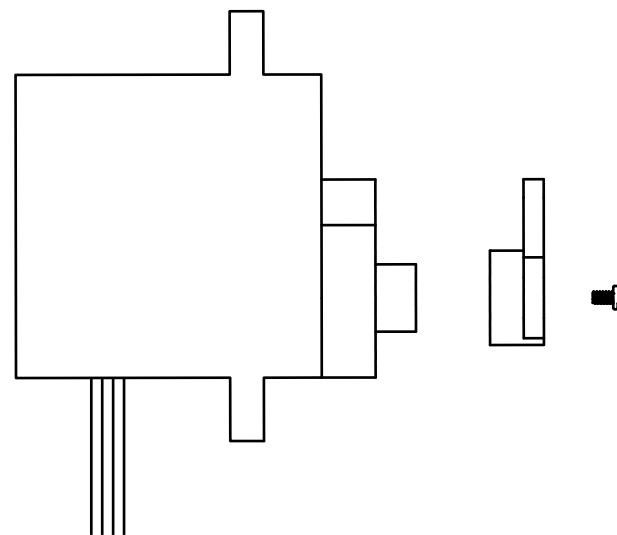
Use double sided tape to stick **** to cardboard/MDF before drilling

Practice drilling on the spare ***** that comes with the SG90



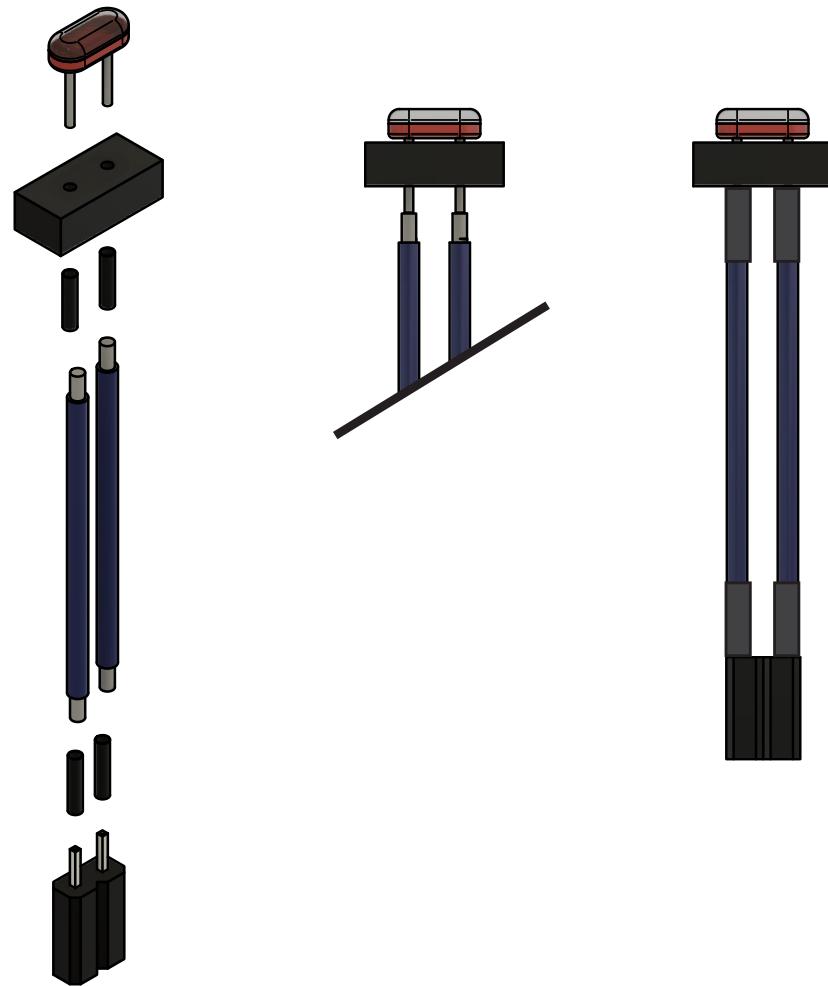
2.2 Calibrate Servos

In order to guarantee that your servos are at exactly 90 degrees, before securing them into position, you will need to upload the **servo calibration code** into the Arduino so that the servo is exactly 90. After you have completed this you can add the screw to secure it in position.



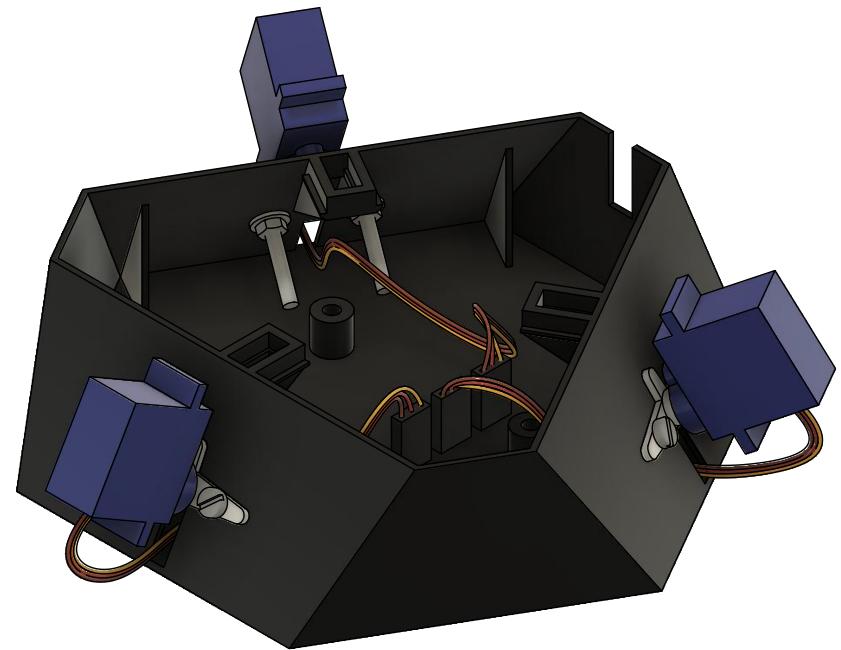
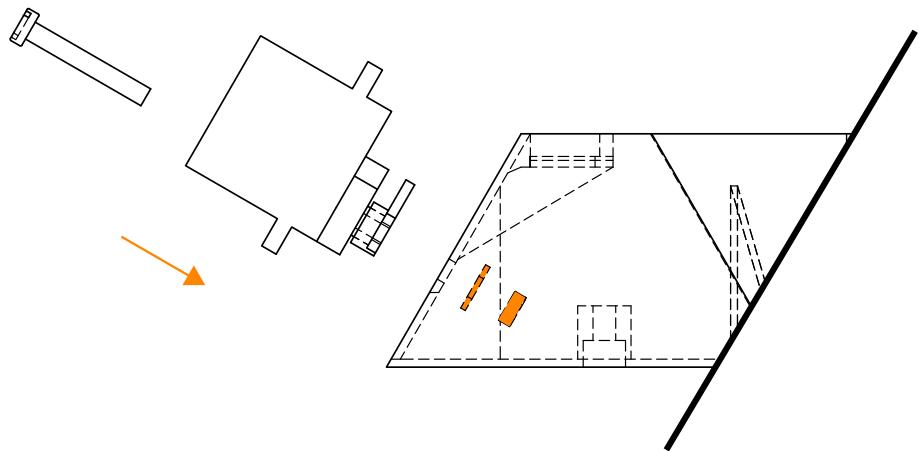
Create Sensors

In order to attach the photoresistors to the body in a secure fashion, a custom solution has been designed. Thread the photoresistor through the printed part then solder it to the wire. Secure it in place by pushing the shrink wrap up into the printed part when you're heating it.



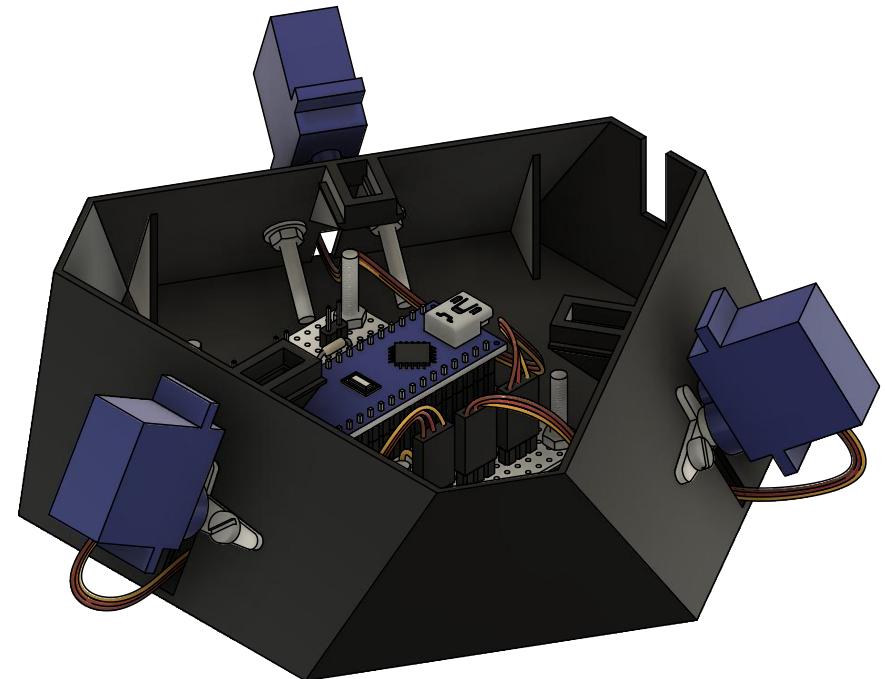
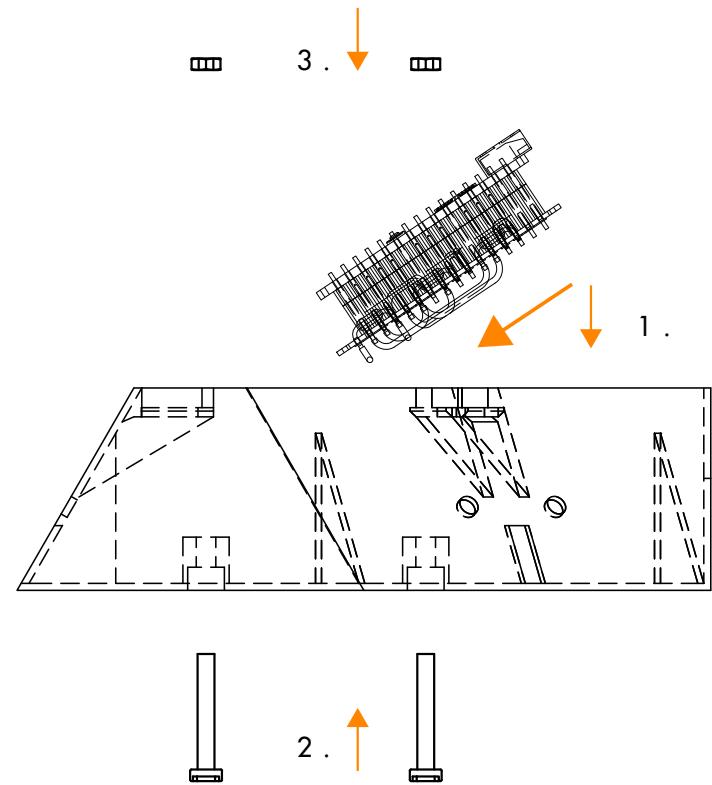
3.1 Attach Servos

Now its time to attatch the servos that have already been assembled to the main body. Repeat this step three times on each side.



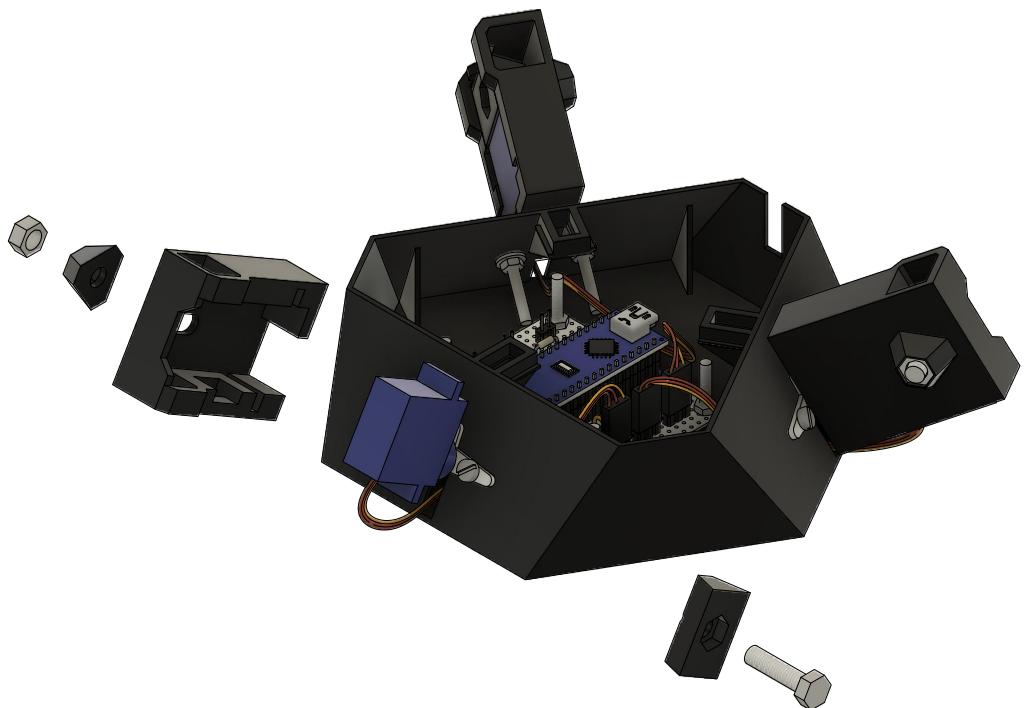
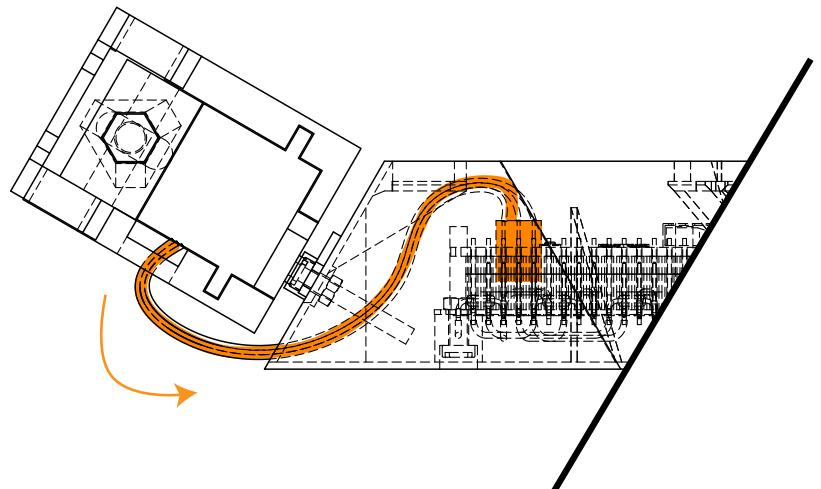
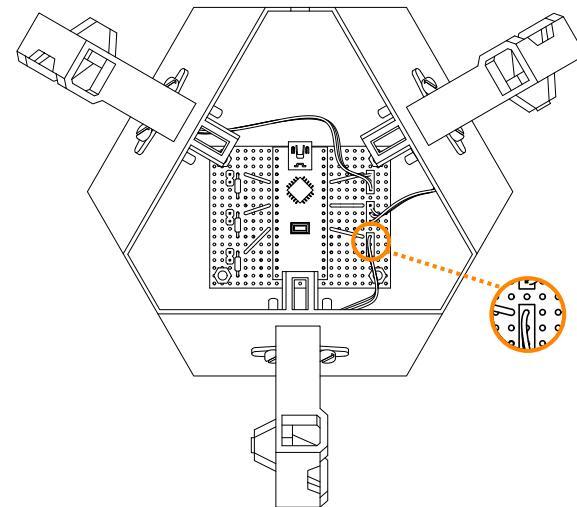
3.2 Insert Arduino

Now it is time to secure the Electronics to the body of the robot. To do this you will need to slide the electronics into the body at a cavity at an angle. After this slide the screws into place.



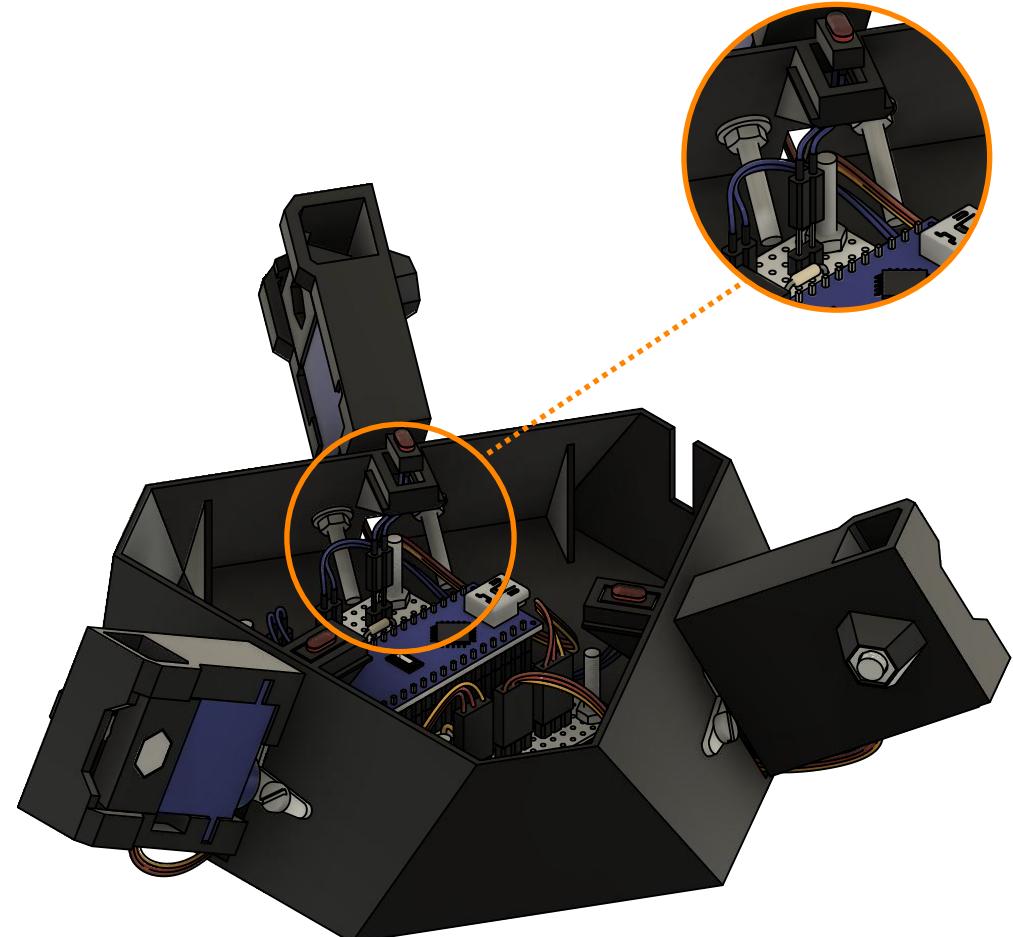
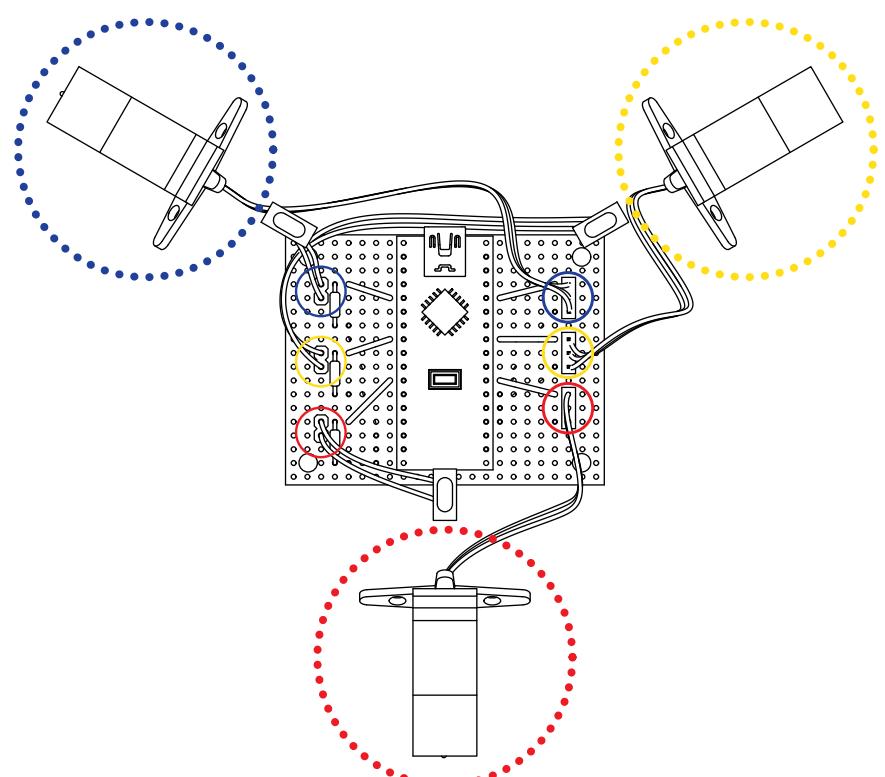
Attach Servo Housing

The first step is to thread the plastic female Pins through the whole in the bottom of the Servo Housing, then through whole on the side of the body of the robot. Then you will be able to plug the servo into its corresponding male pins. **Make sure you marry the digital pin on the servo with the digital pin on the bread board.** After this you will be able to press the Servo housing onto the servo (do not worry if it appears loose because everything will be tightened when the pen is inserted and wedge tightened). Then you can attach the rest of the parts as displayed in the diagram.



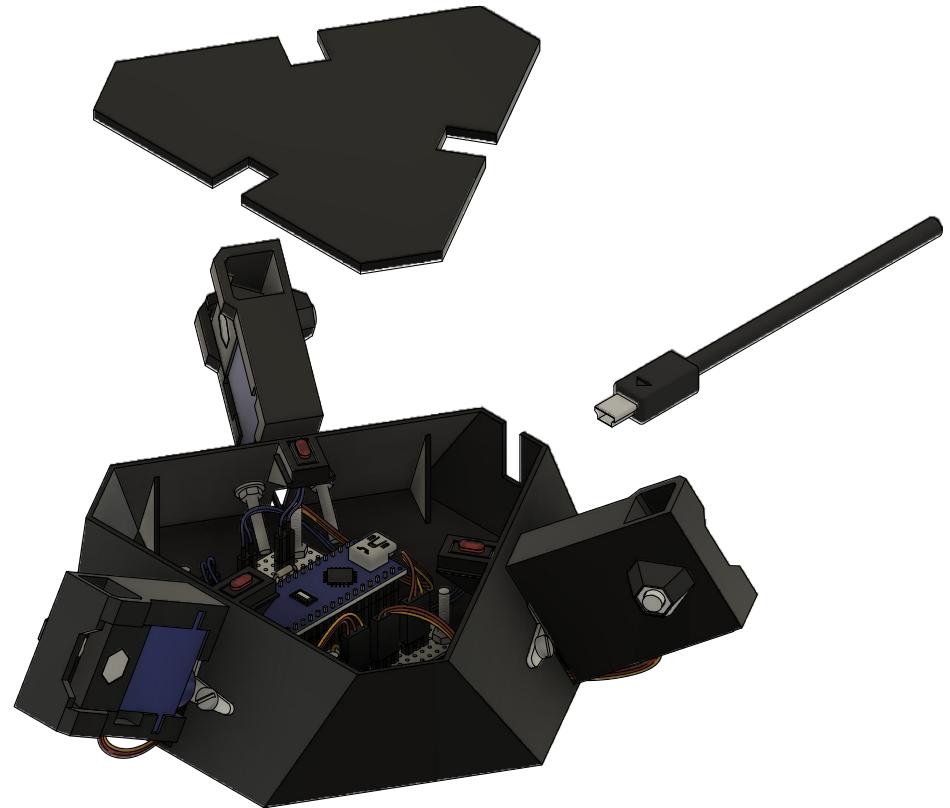
3.4 Insert Sensors

Thread the sensor through the whole all the way through and gently pull the wire through from the other side until the mounted block is in place.



Lid + Power supply

Now it is time to attach the power supply and lid to the robot. The USB mimm cable also doubles up as a power supple and attaches to you computer



Insert Pens + Explore

Now it is time to attach the power supply and lid to the robot. The USB mimm cable also doubles up as a power supple and attaches to you computer

