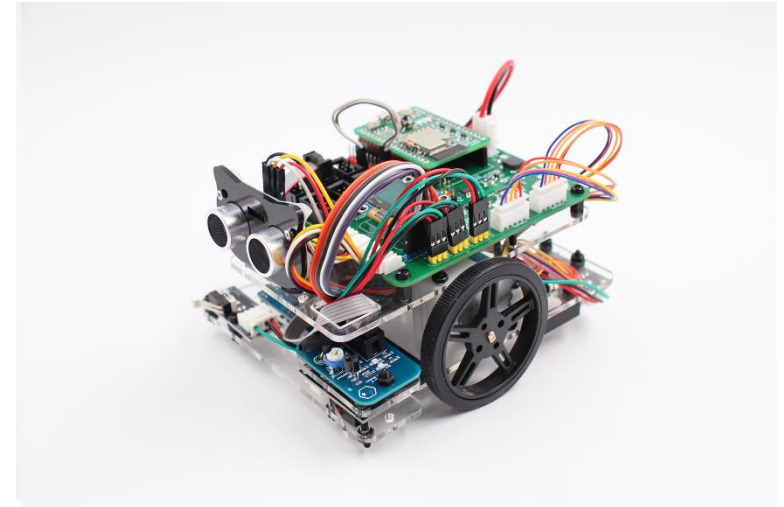


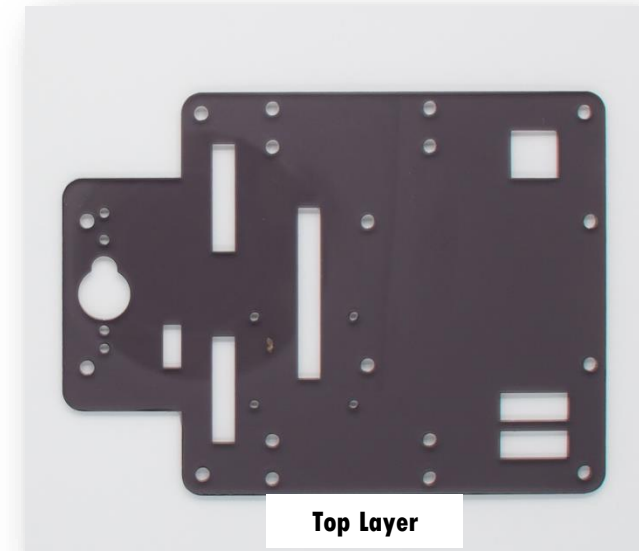
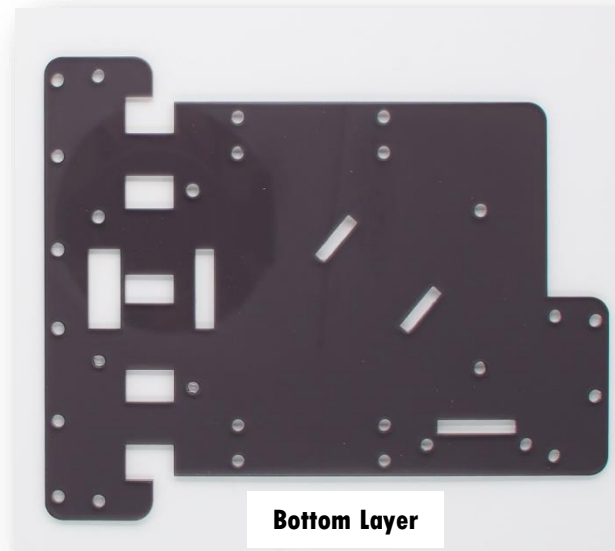
0

Preparation

- Let's get the following items ready:
 - 1) 2 x PLA Motor Mount & Metal Screws
 - 2) 2 x Wheel Set
 - 3) 2 x Stepper Motor
 - 4) 3 x End Stop Switch & Wires
 - 5) 1 x 5-Channel Line Sensor & Wires
 - 6) 1 x Ultrasonic Sensor
 - 7) 1 x IR Sensor
 - 8) 1 x 6pin Flat Ribbon Cable (short)
 - 9) 1 x Grove to Female Dupont Jumper Cable
 - 10) Top and Bottom Acrylic Set
 - 11) 8 bags of Screw
 - i. Pack A
 - ii. Pack B
 - iii. Ultrasonic
 - iv. Base
 - v. Power
 - vi. Motor
 - vii. ToF
 - viii. Extras
 - 12) Zip ties



360 view: <https://youtu.be/WTXHzbzV7Ps>



1

Bottom Layer

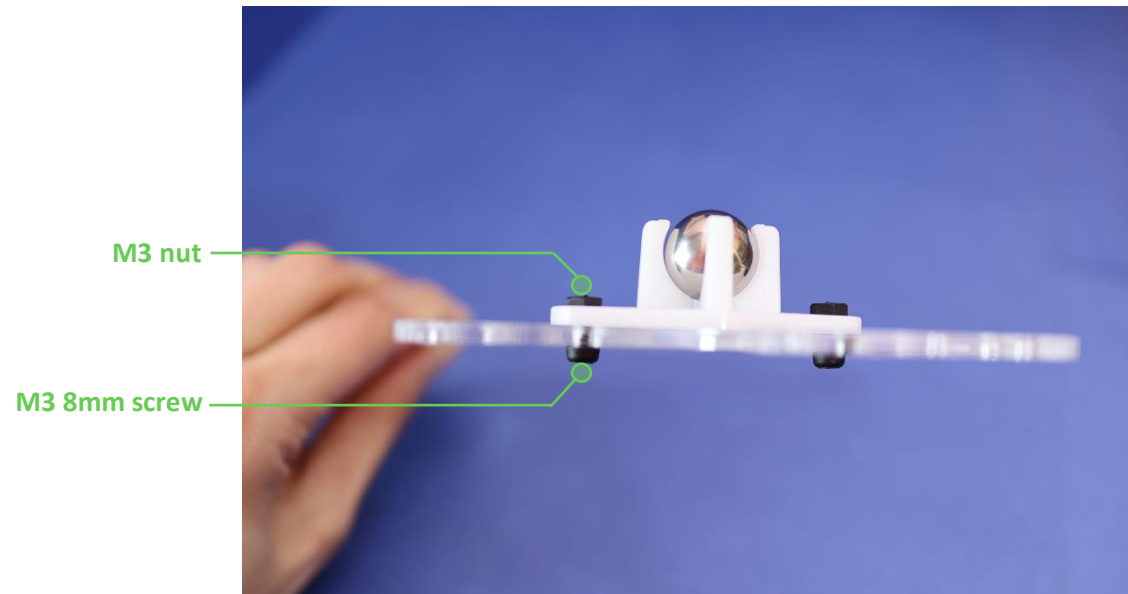
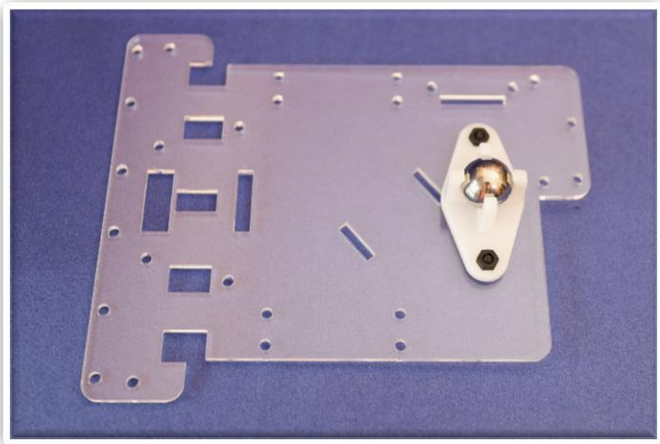
We will use **Pack "A"** in this step. Check if your pack has the following items:

- 1 x Castor wheel
- 1 x 3D printed part (Module B)
- 1 x Blue tac (Module B)
- 2 x M3 15mm screw (Module B)
- 4 x M3 12mm screw
- 4 x M3 8mm screw
- 4 x M3 round spacer
- 8 x M3 nut
- 2 x M3 nut (Module B)

(Please safe keep all the parts in grey color, they will be used for color sensor later in Module B.)

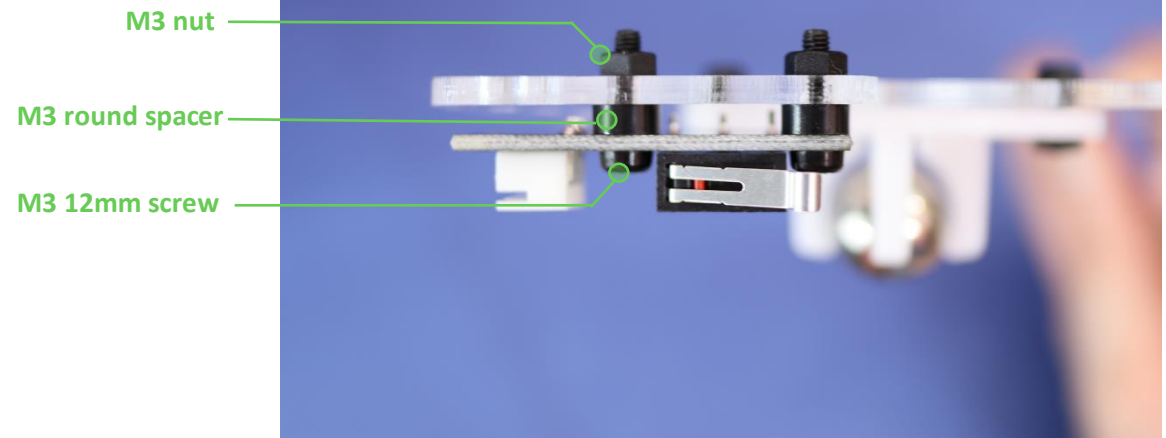
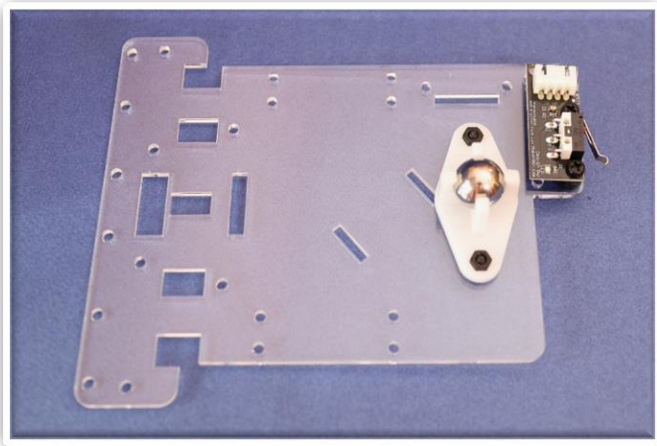
a. Castor Wheel **(cautious: Pay attention to the orientation of the acrylic)**

- 1 x Bottom layer acrylic (remove the protective film)
- 1 x Castor wheel
- 2 x M3 8mm screw
- 2 x M3 nut



b. End Stop Switch #1

- 1 x End stop switch
- 2 x M3 12mm screw
- 2 x M3 nut
- 2 x M3 round spacer



TIPS

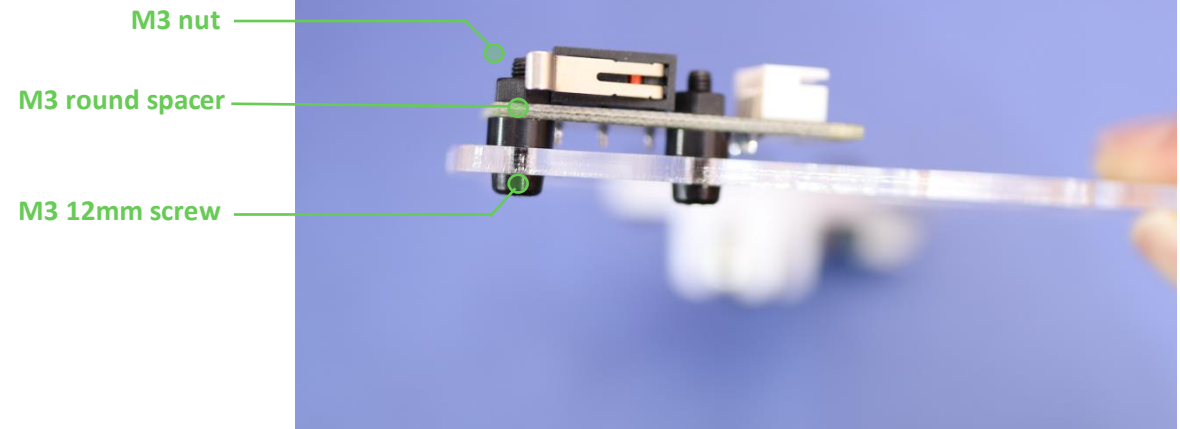
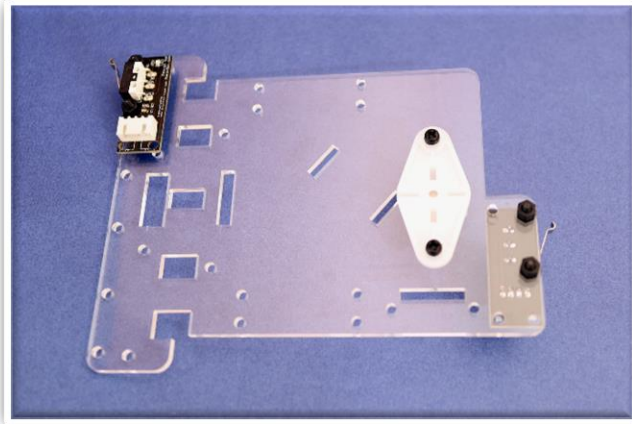


How to install a screw and a nut easily?

You can use a finger (or a Hex head Screwdriver) to hold the nut while the other hand tightening the screw.

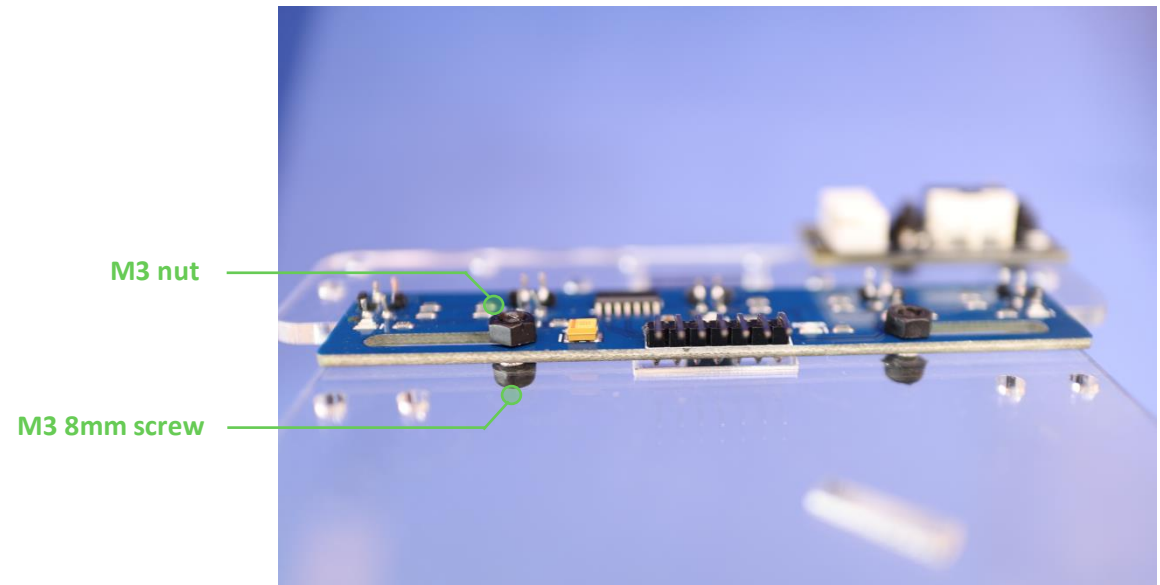
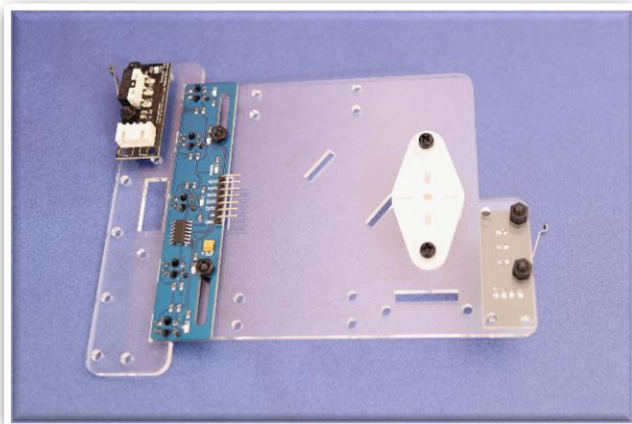
c. End Stop Switch #2 (cautious: This step is on the reverse side of the acrylic)

- 1 x End stop switch
- 2 x M3 12mm screw
- 2 x M3 nut
- 2 x M3 round spacer



d. 5-Channel Line Sensor

- 1 x 5-Channel line sensor
- 2 x M3 8mm screw
- 2 x M3 nut



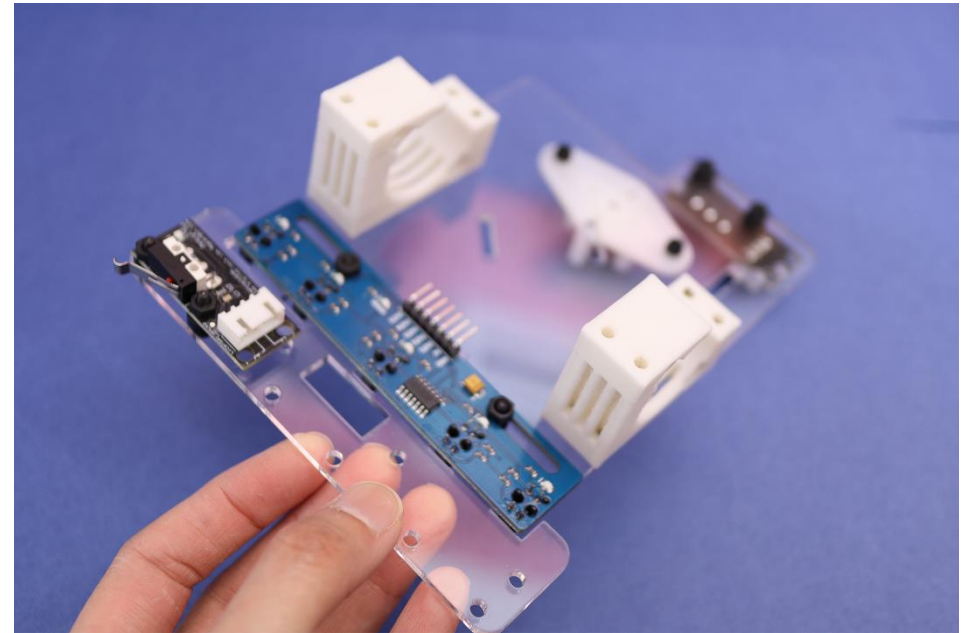
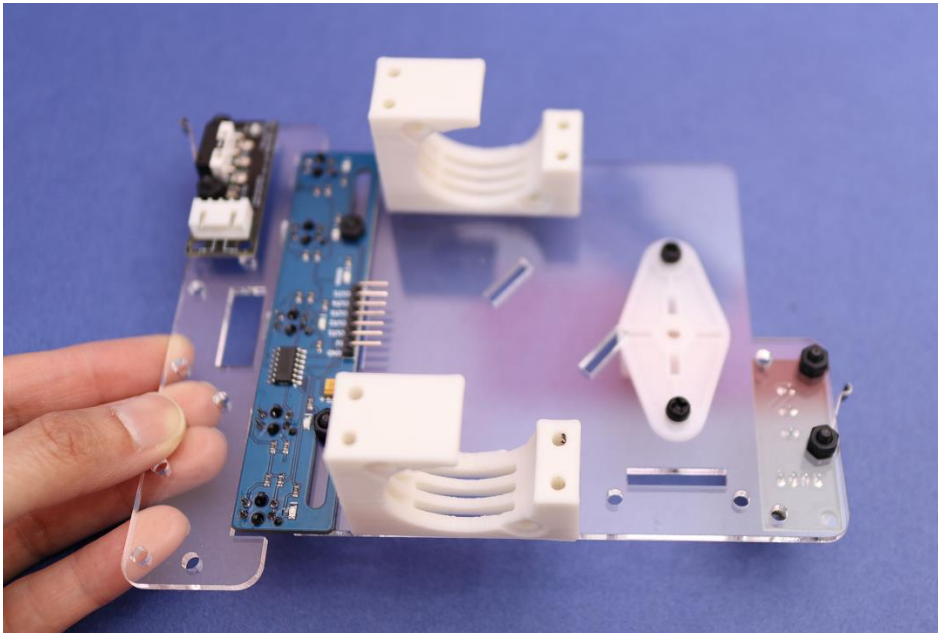
2

Installing the Motor Mounts on the Acrylic

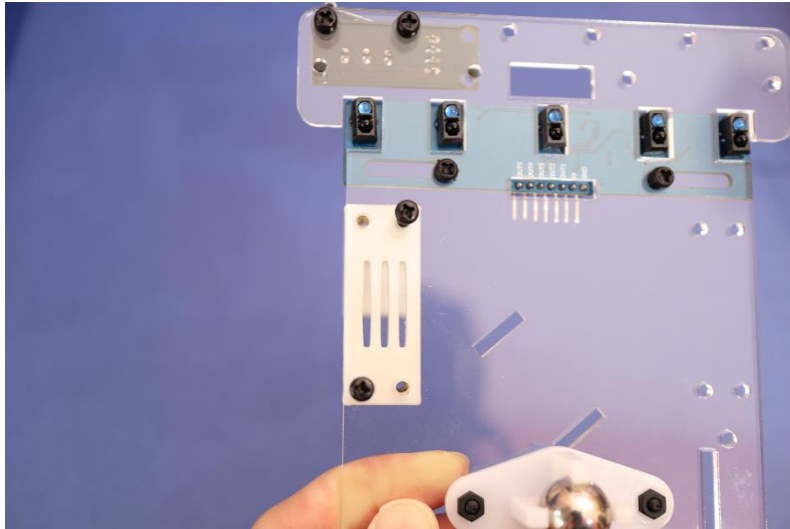
What you need:

- 2 x PLA motor mount
- 8 x Stainless steel M3 45mm screw

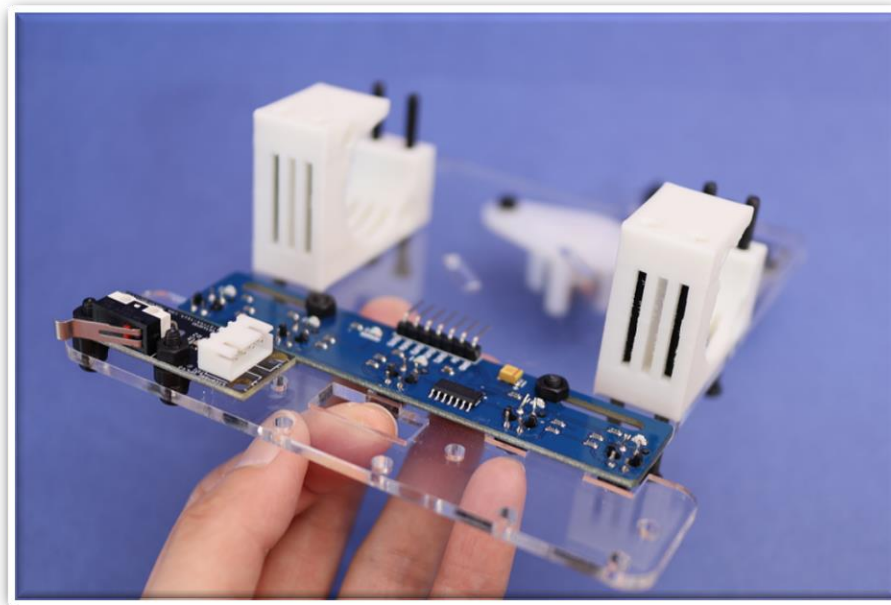
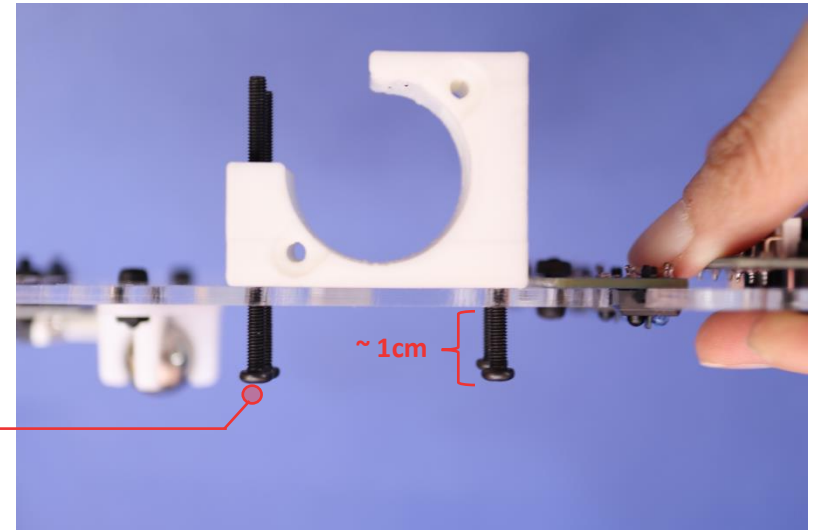
a. **Align the motor mounts as illustrated below** (cautious: Pay attention to the orientation of the mount)



b. Install the screws from the bottom (in a **diagonal** pattern)

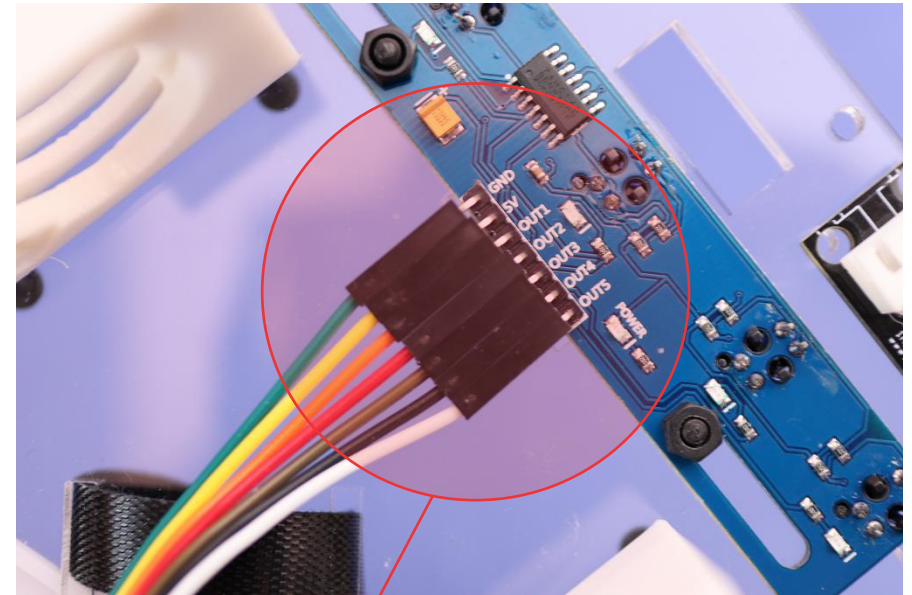
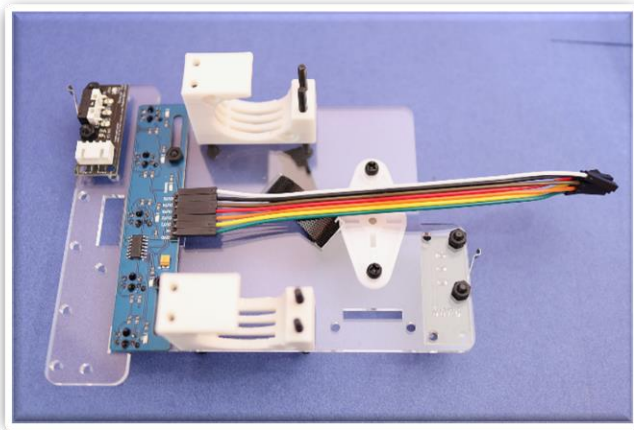


Do not screw all the way in, leave about 1cm outside.



3

Connecting the Line Sensor Wire & Jotting Down the Pinouts



Write down or take a picture of the pinouts.

Example:

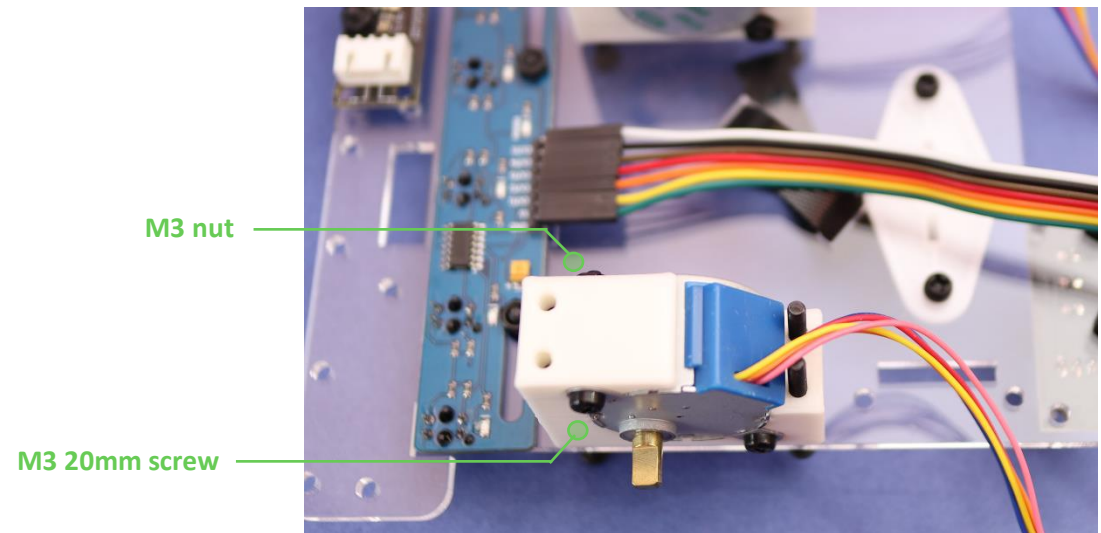
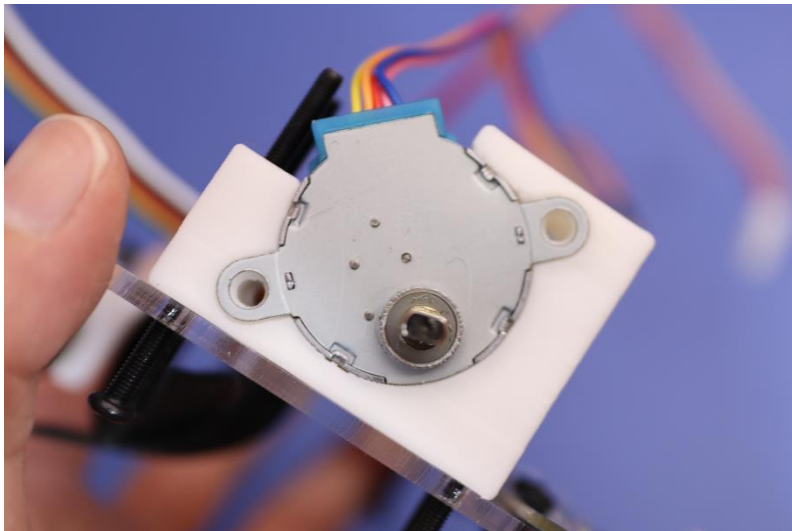
- Green : GND
- Yellow : 5
- Orange : OUT1
- Red : OUT2
- Brown : OUT3
- Black : OUT4
- White : OUT5

4

Installing the Motors

What you need:

- **Pack "Motor"**
 - 4 x M3 20mm screw
 - 4 x M3 nut
 - 8 x Metal M3 nut (Place the metal nuts aside, we will use them later)



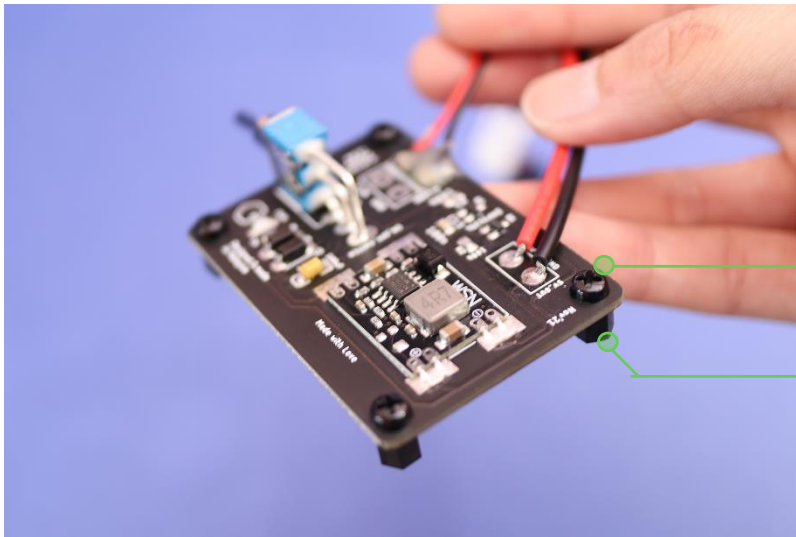
5

Top Layer – Power Board

What you need:

- **Pack “Power”**
 - 4 x M3 4mm screw
 - 4 x M3 6mm screw
 - 4 x M3 7mm standoff
 - 1 x Velcro strap
- 1 x Top layer acrylic (remove the protective film)
- 1 x Power Board

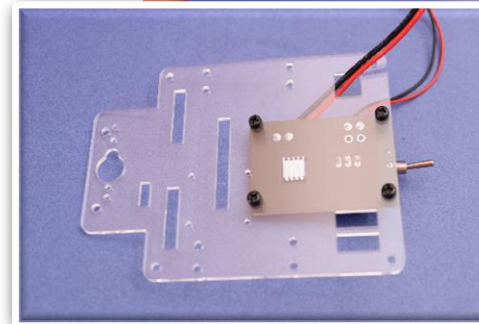
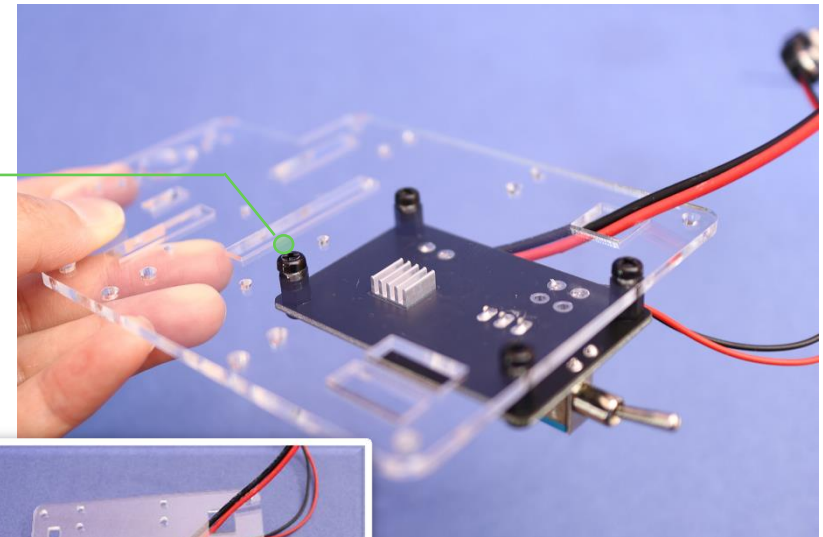
a. Install the power board on the top layer acrylic



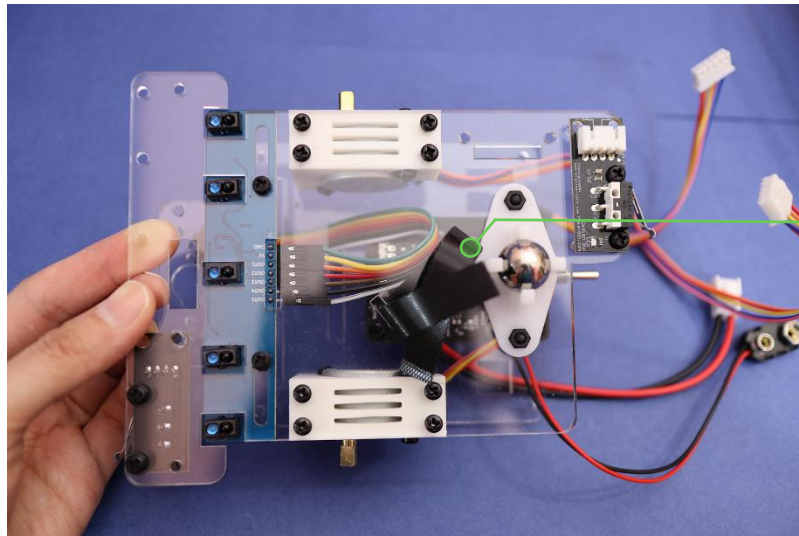
M3 6mm screw

M3 4mm screw

M3 7mm standoff



b. Insert the Velcro strap via the holes at the bottom layer acrylic



Velcro strap

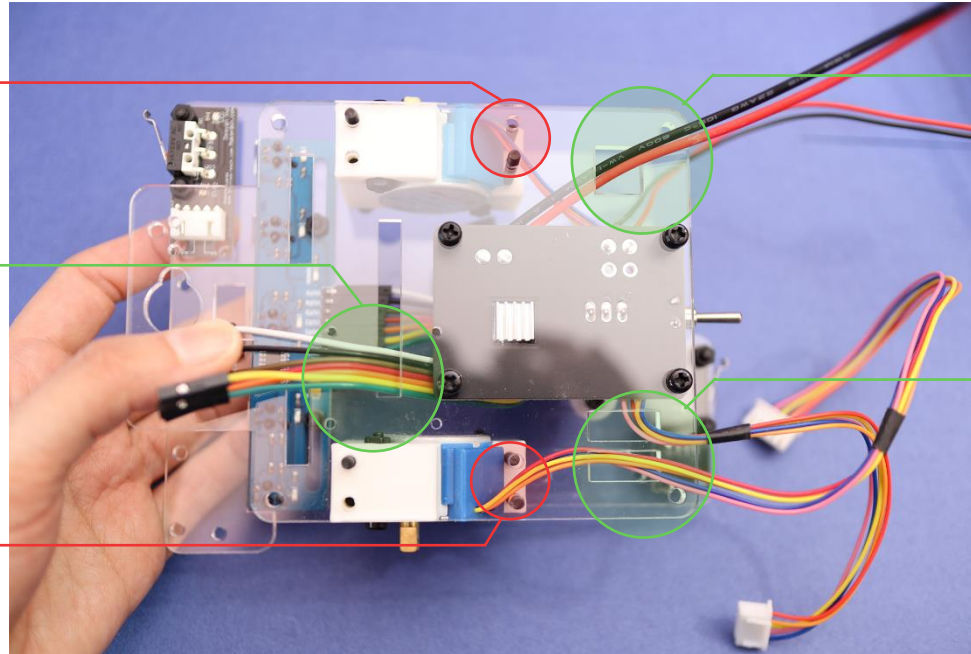
6

Organizing the Wires

a. Place the motor wire in between the screws

c. Pass the line sensor wire through the hole at Top Layer Acrylic

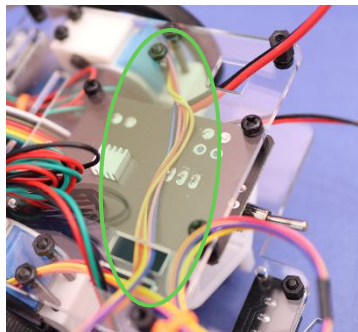
b. Place the motor wire in between the screws



d. Pass the power board wire through the hole at Top Layer Acrylic

e. Pass the motor wires through the holes at Top Layer Acrylic.

TIPS



If you'd like the wire to be more organized, you can pass the wire from the furthest motor through the gap between the power board & acrylic (before passing it through the hole at the Top Layer Acrylic).

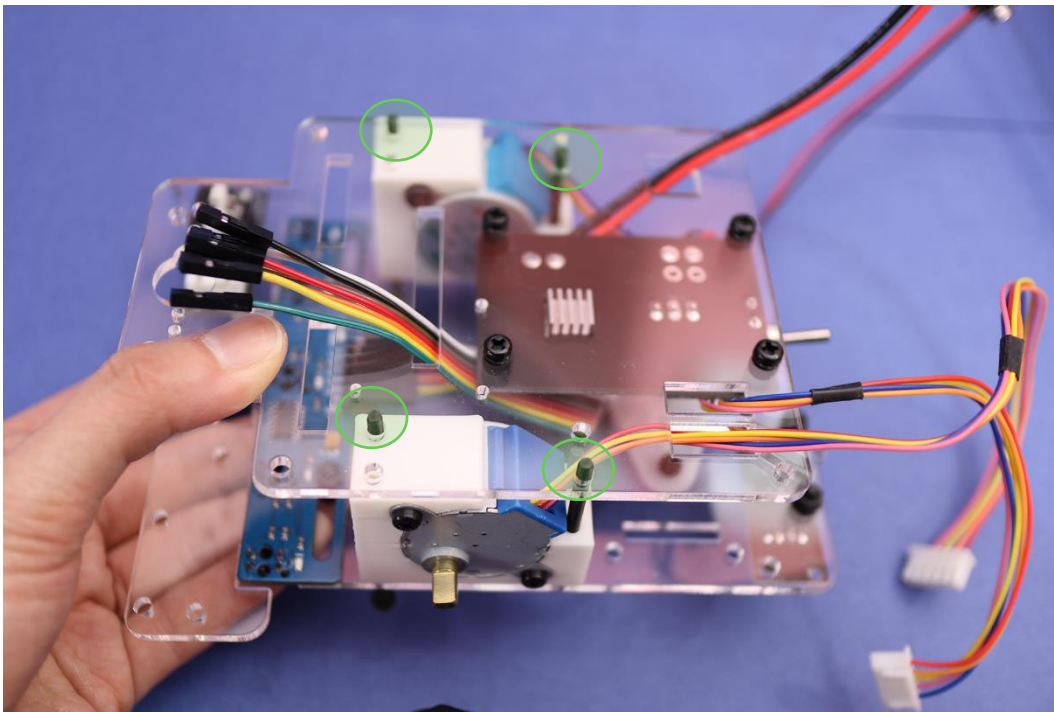
7

Installing Top Layer Acrylic on the Motor Mount

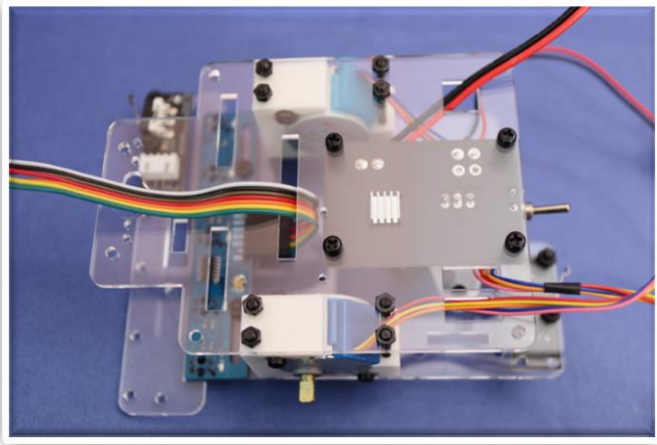
What you need:

- 8 x Metal M3 nut from **Pack "Motor"** earlier.

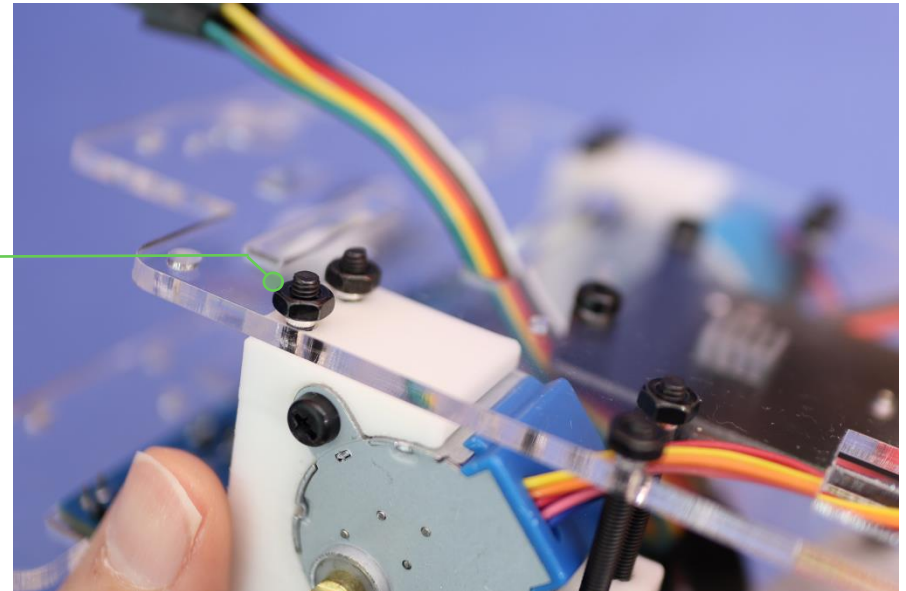
a. Tighten 2 Screws at diagonal opposite position (for each motor)



b. Tighten the remaining screws & insert the metal nuts



Metal M3 nut



8

Installing the Ultrasonic Sensor

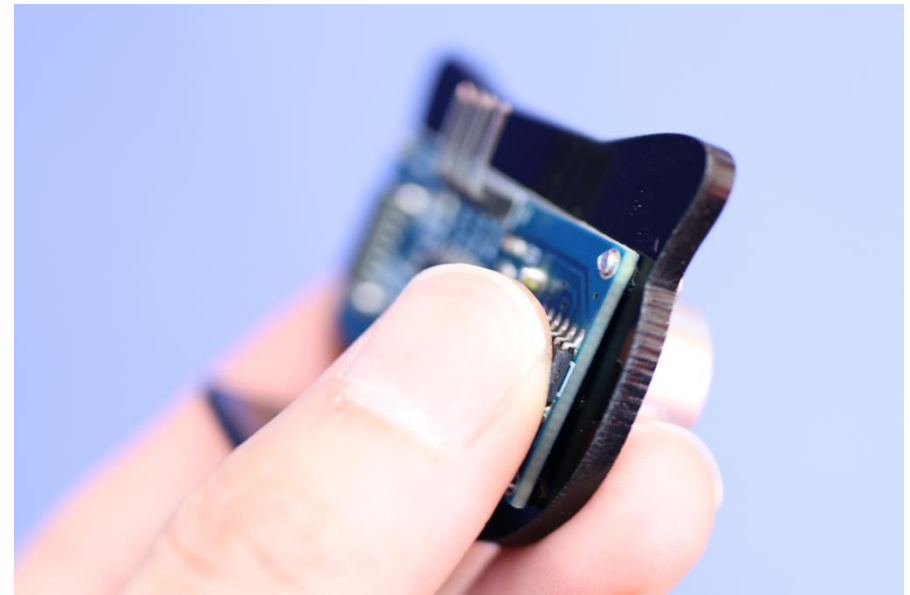
What you need:

- **Pack "Ultrasonic"**
 - 2 x Metal M2 6mm screw
 - 2 x M2 8mm screw
 - 2 x M2 nut
 - 1 x Acrylic stand (remove the protective film)

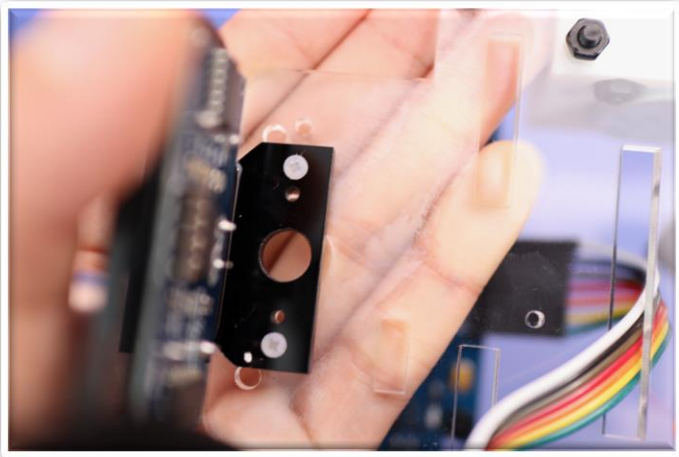
a. Mount the ultrasonic sensor to the acrylic



Metal M2 6mm screw

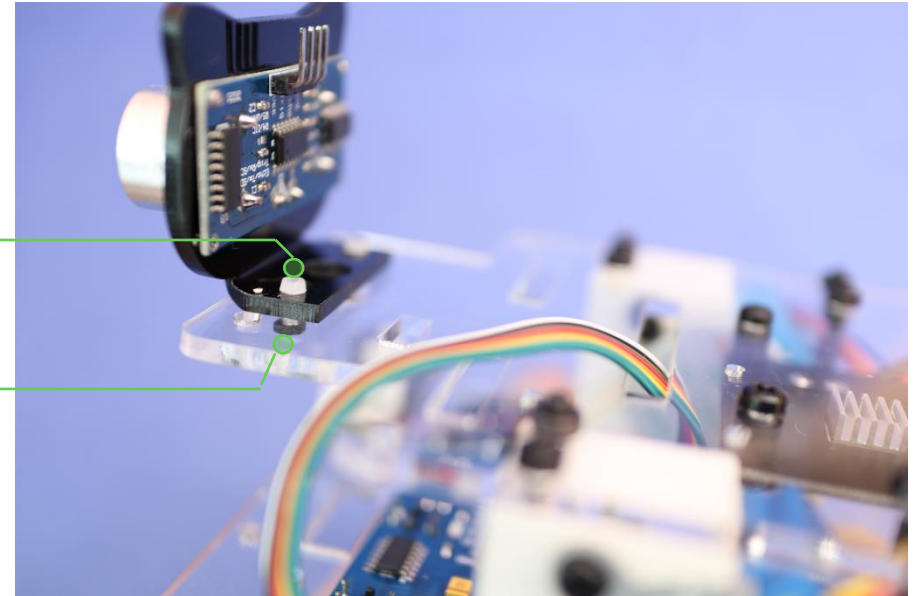


b. Mount the ultrasonic to the top layer acrylic

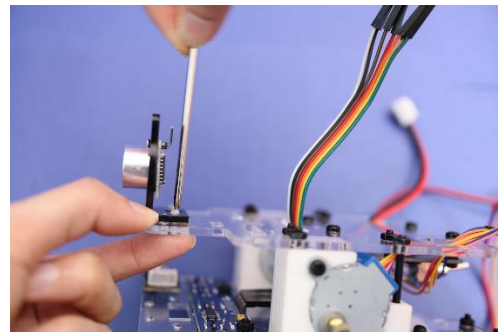


M2 8mm screw

M2 nut



TIPS

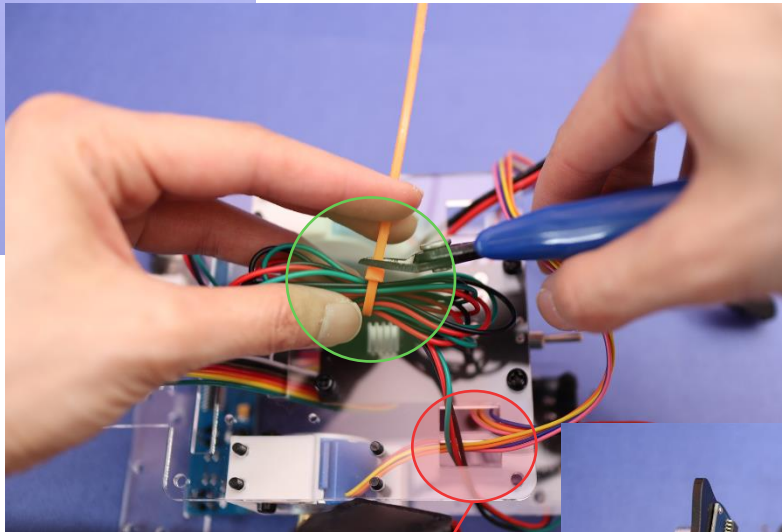
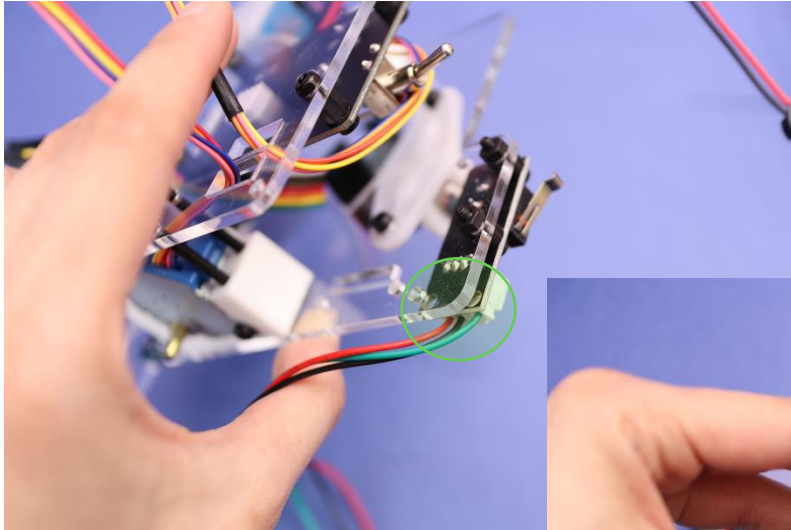


How to install tiny screw and nut easily?

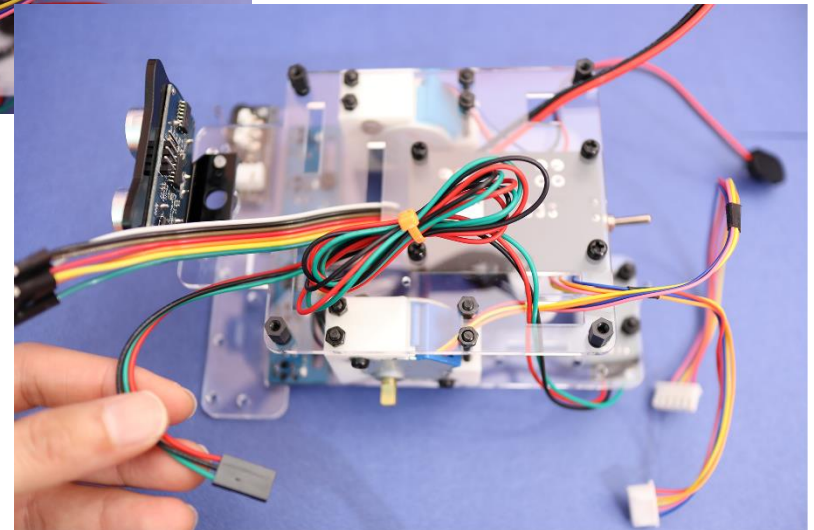
You can use a finger to hold the nut at the bottom while the other hand tightening the screw from the top.

9

Connecting & Tidying the Wire for End-Stop Switch #1



Passing the wire through the
hole at Top Layer Acrylic



WARNING



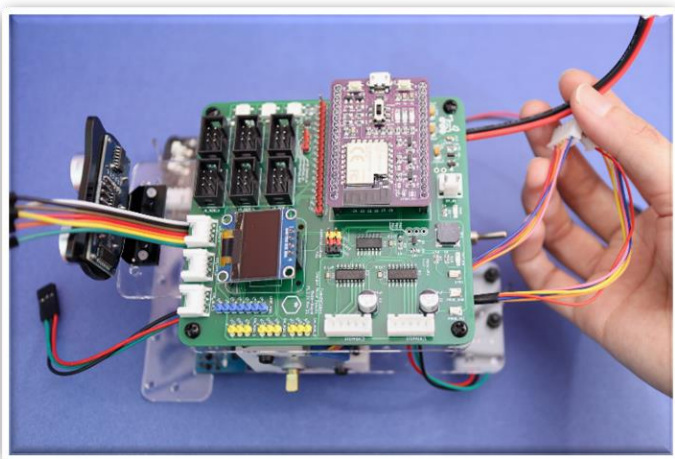
Be careful when using
a scissor / cutting plier,
do not cut the wire
(or your finger)

10

Installing the Base Board

What you need:

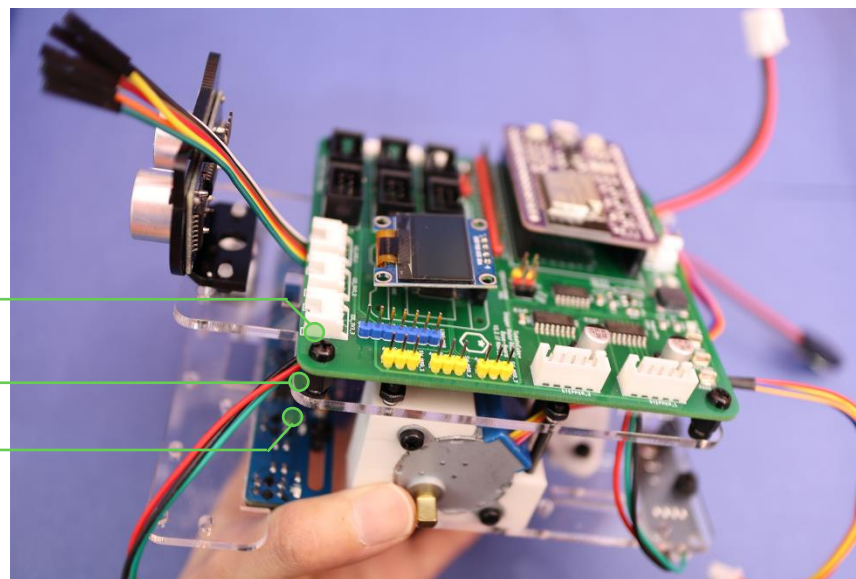
- **Pack "Base"**
 - 4 x M3 4mm screw
 - 4 x M3 6mm screw
 - 4 x M3 7mm standoff
- 1 x Base Board



M3 4mm screw

M3 7mm standoff

M3 6mm screw



11

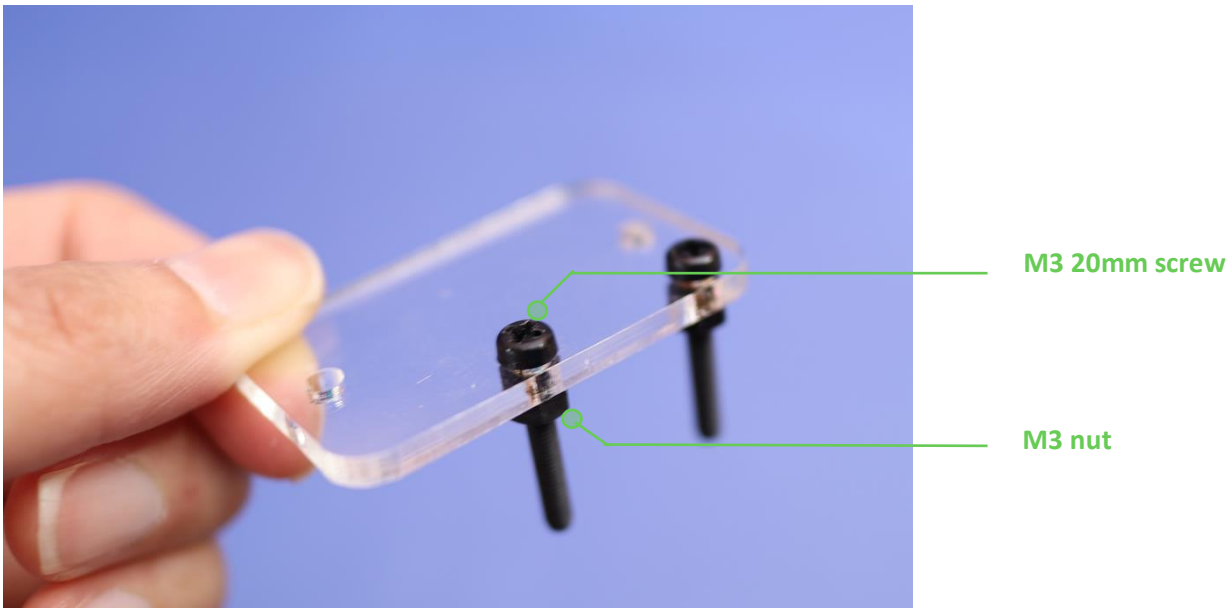
Installing the Double-decked sensors

What you need:

- **Pack "B"**
 - 2 x M3 20mm screw
 - 2 x M3 12mm screw
 - 2 x M3 round spacer
 - 6 x M3 nut
 - 1 x small acrylic (remove the protective film)
- 1 x End-stop switch
- 1 x IR sensor

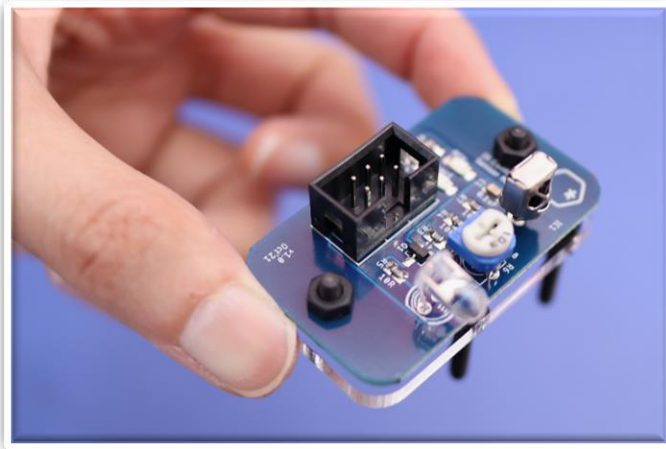
a. Install the screws & nuts on the small acrylic

- 2 x M3 20mm screw
- 2 x M3 nut
- 1 x acrylic



b. Install the IR sensor

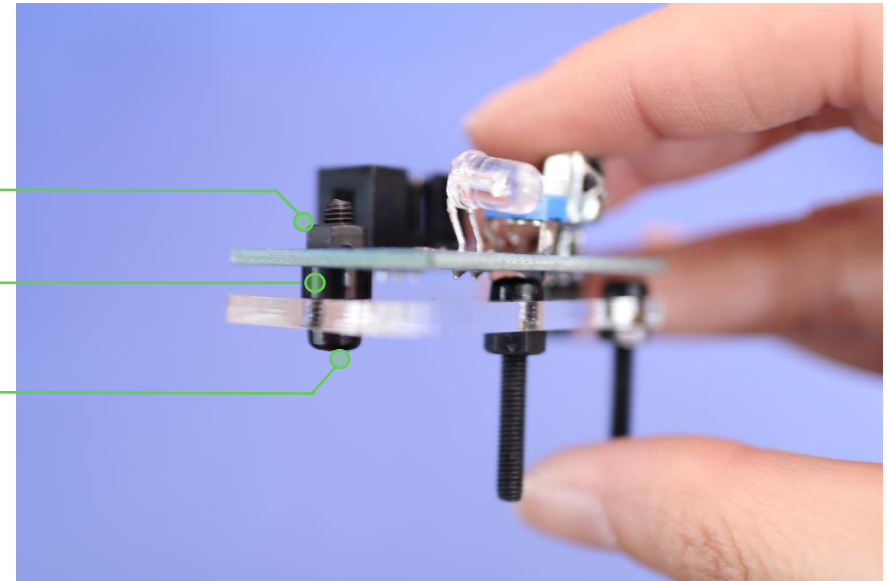
- 2 x M3 12mm screw
- 2 x M3 round spacer
- 2 x M3 nut
- 1 x IR sensor



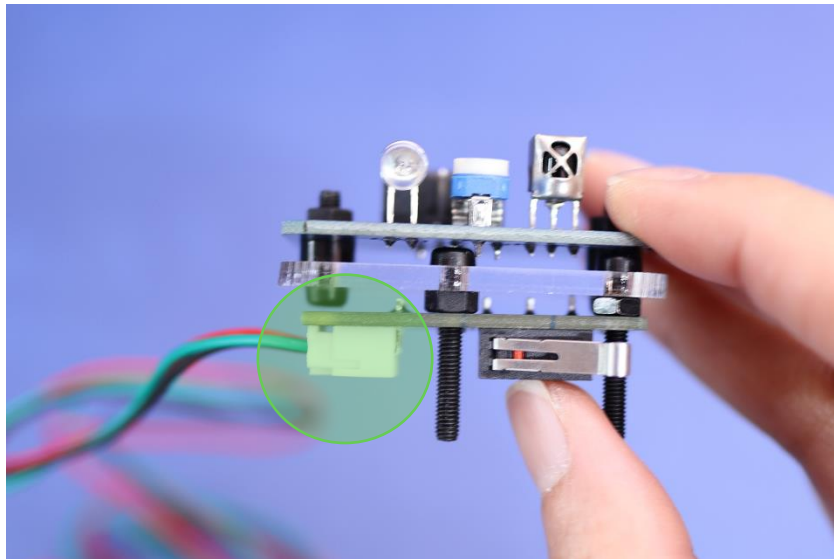
M3 nut

M3 round spacer

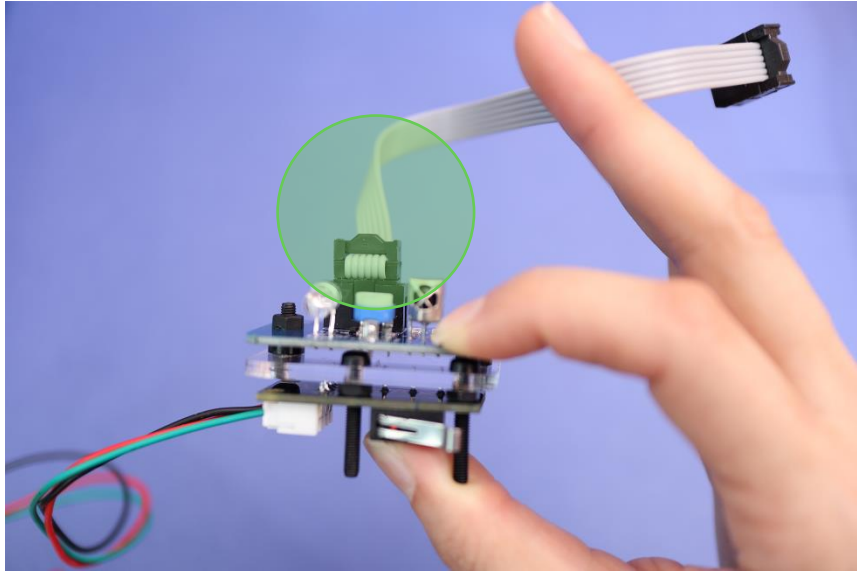
M3 12mm screw



c. Insert the end-stop switch & Plug in the wire

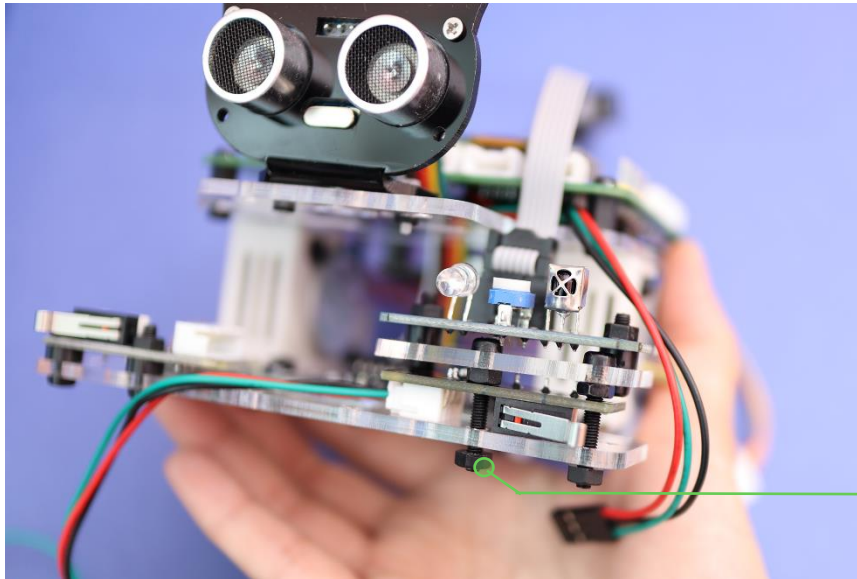


d. Plug in the 6pin flat ribbon cable



e. Install the double-decked sensor at the Bottom Layer Acrylic

- 2 x M3 nut

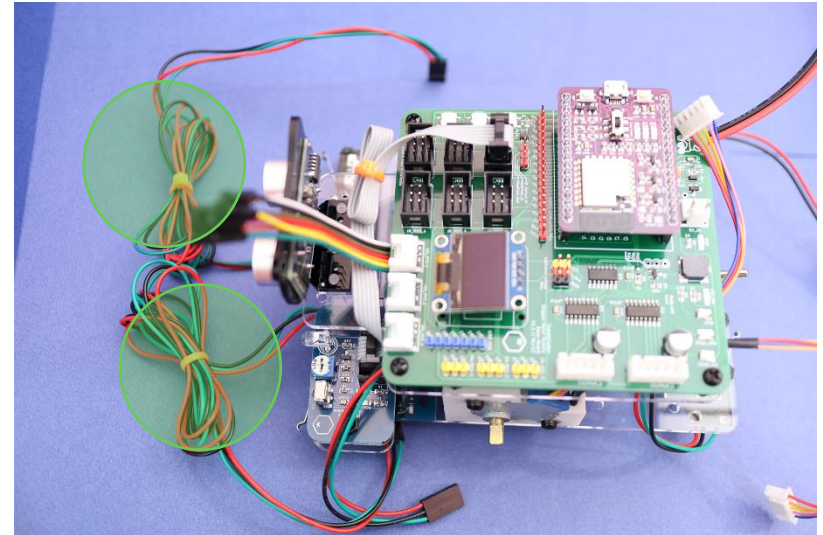
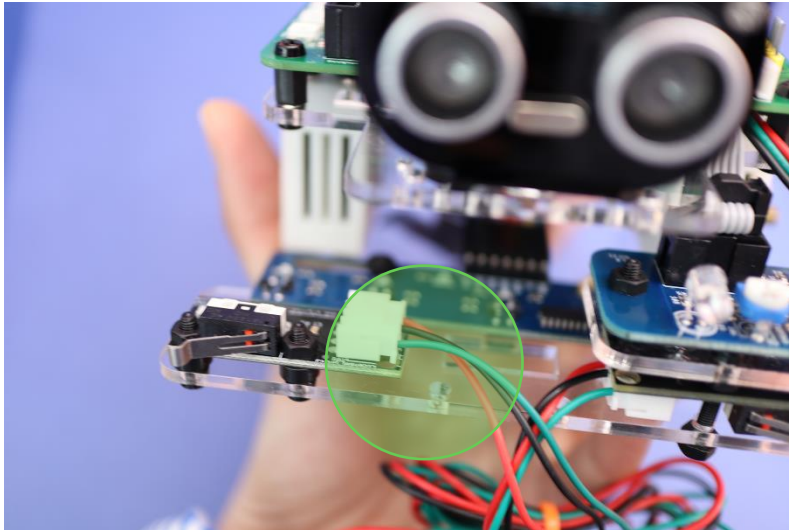


M3 nut

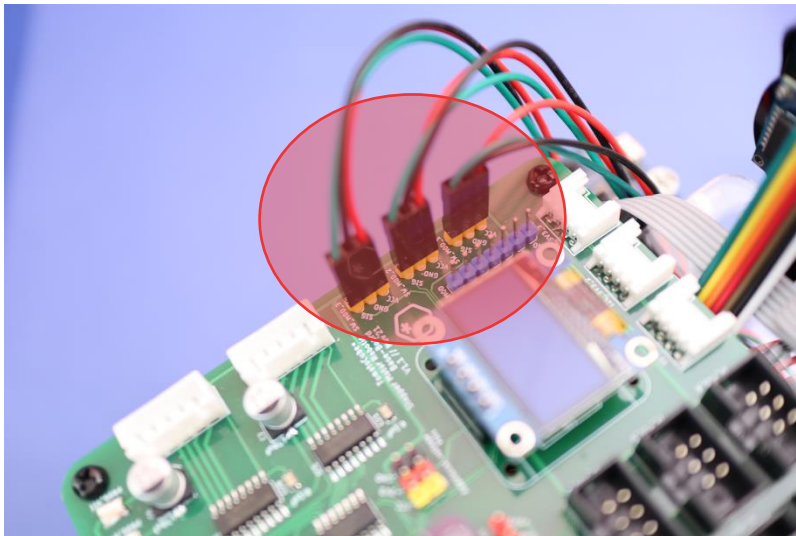
12

Connecting & Tidying the Wires

- a. Plug in the wire for end-stop switch #2 & tidy up all the wires



- b. Plug in the end-stop switch wires to the main board. (cautious: Pay attention to the pinouts & the color of the wires.)

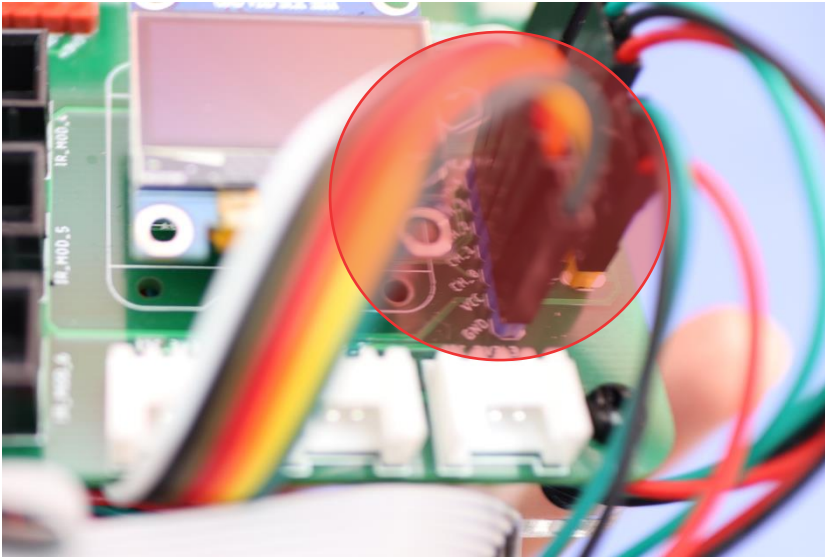


Green Wire: SIG

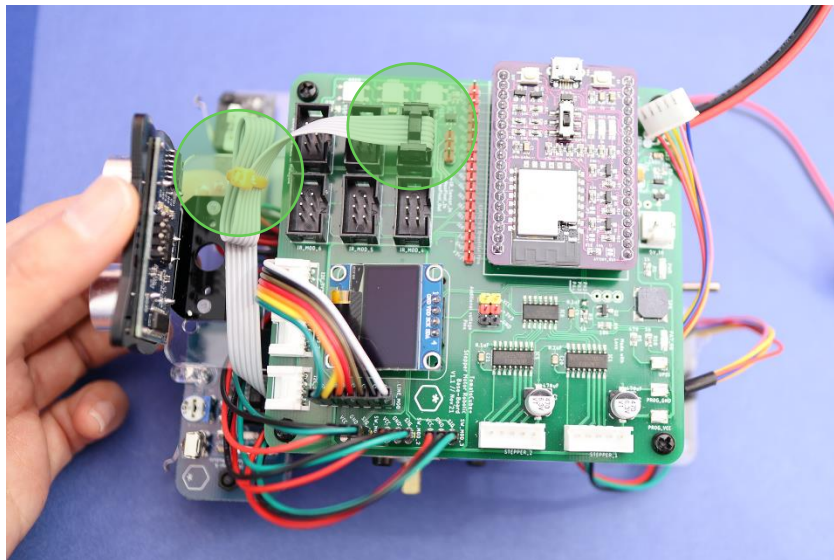
Black Wire: GND

Red Wire: VCC

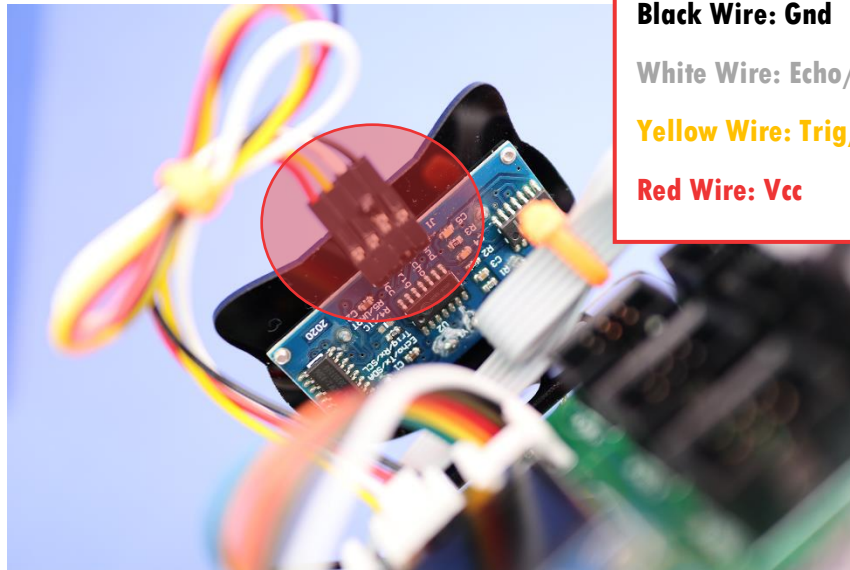
- c. Plug in the line sensor wires to the main board **(cautious: Pay attention on the pinouts & the color of the wires. Refer to your note on step #3.)**



- d. Plug in the IR sensor flat cable to the main board & tidy up the cable.
(You can plug it into any of these six 6-pin shrouded connectors on the main board.)



- e. Plug in the ultrasonic wires to the main board & tidy up the wires (**cautious: Pay attention on the pinouts & the color of the wires**)



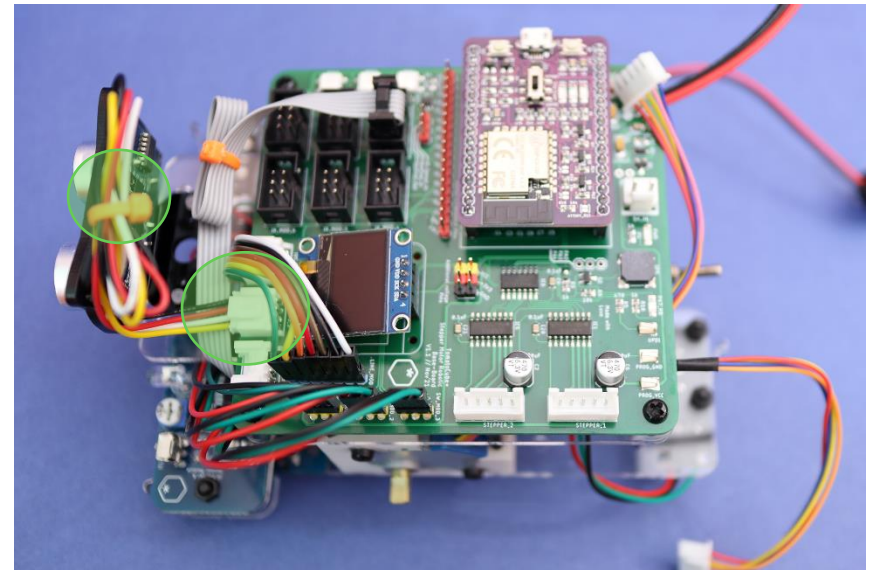
Black Wire: Gnd

White Wire: Echo/SDA

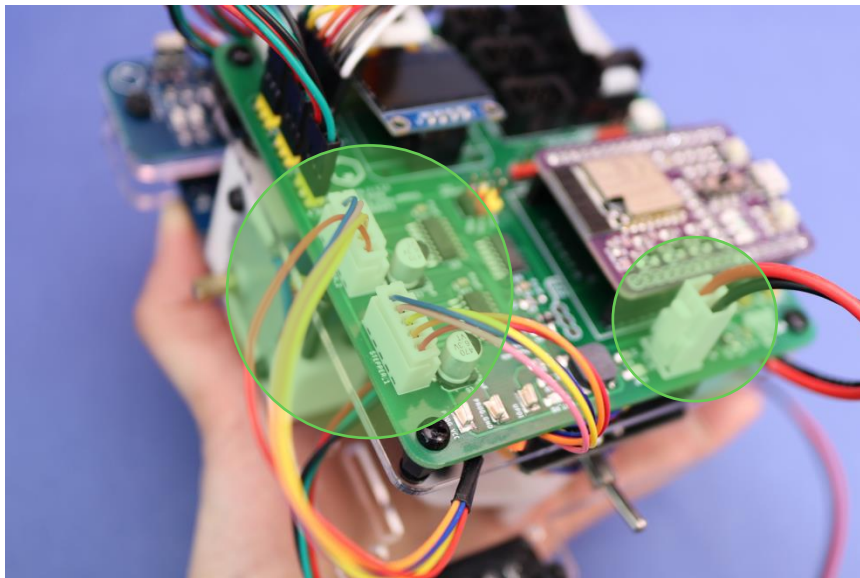
Yellow Wire: Trig/SCL

Red Wire: Vcc

You can plug it into any of these 3 grove connectors on the main board.



- f. Plug in the motor wires & power board cable to the main board. (Jot down which side of your motor goes to stepper_1 & stepper_2)

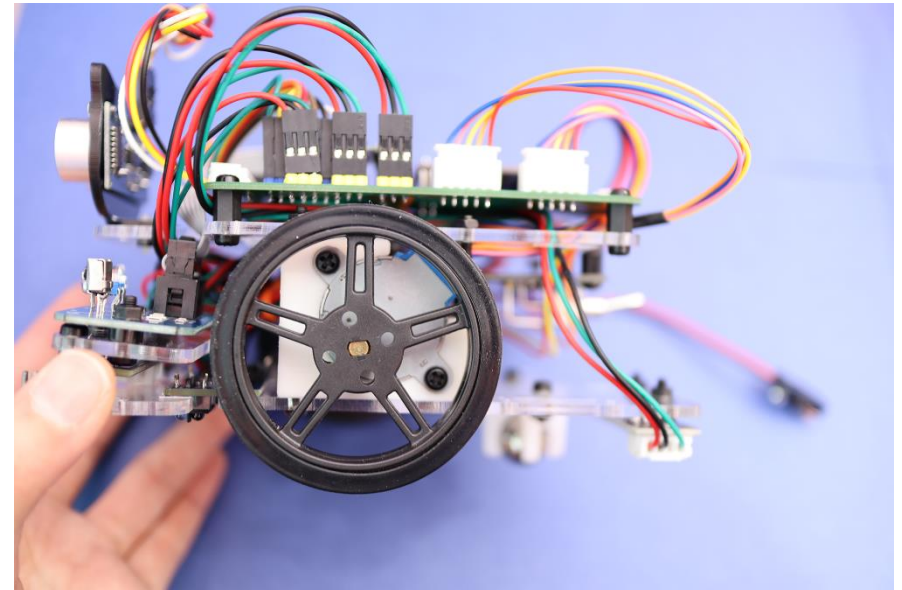


13

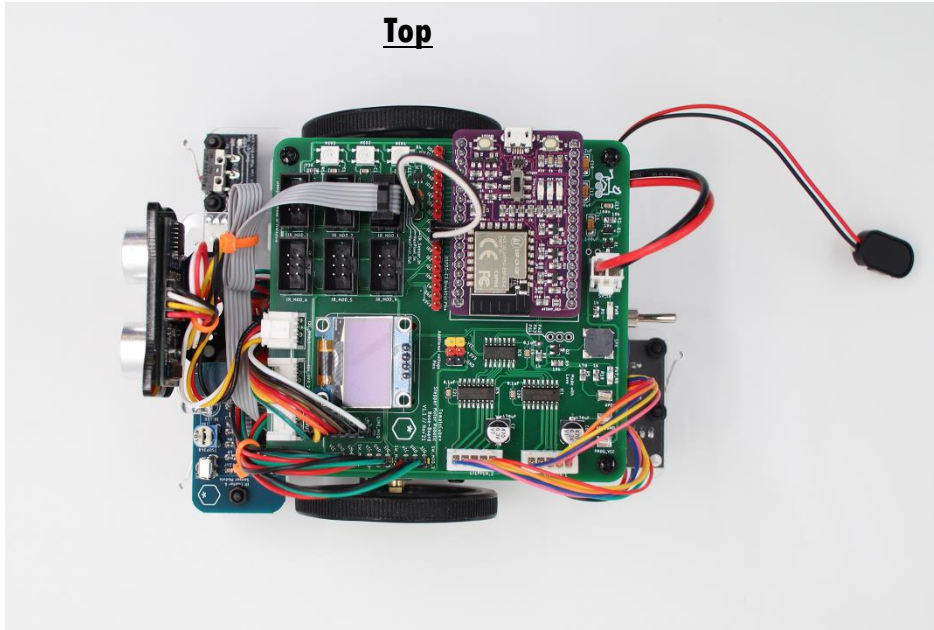
Installing the wheels

What you need:

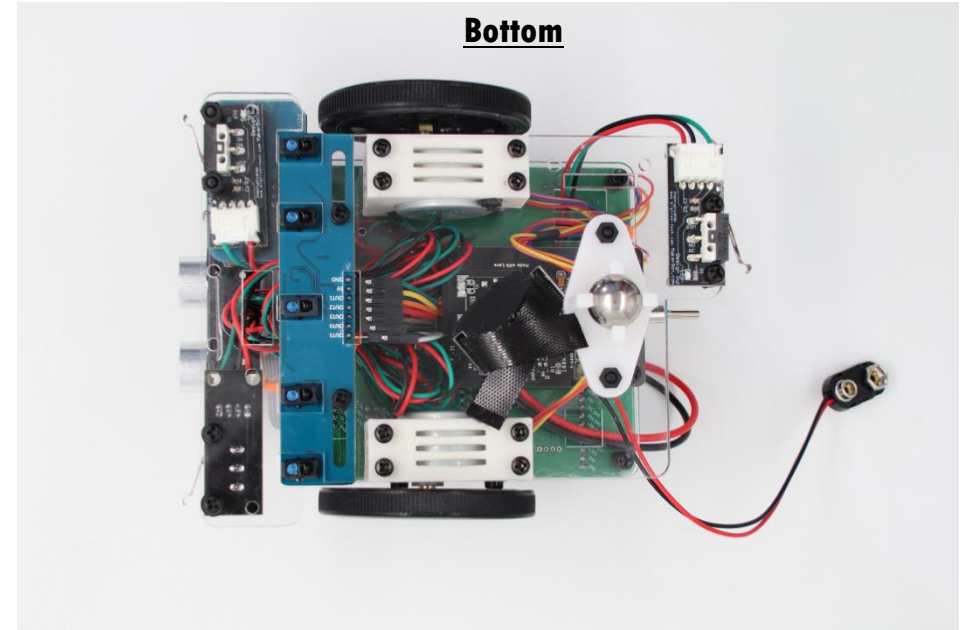
- 2 x Wheel set



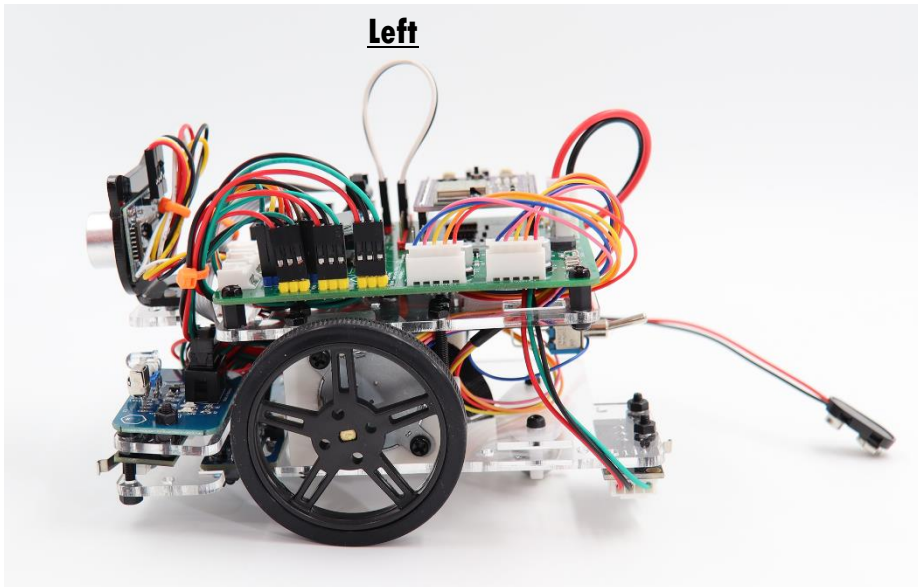
Top



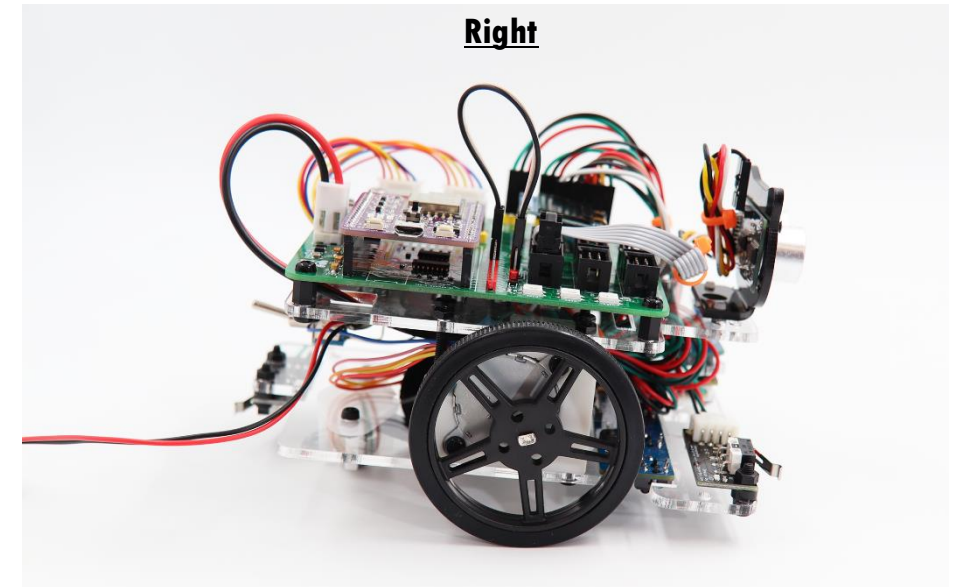
Bottom



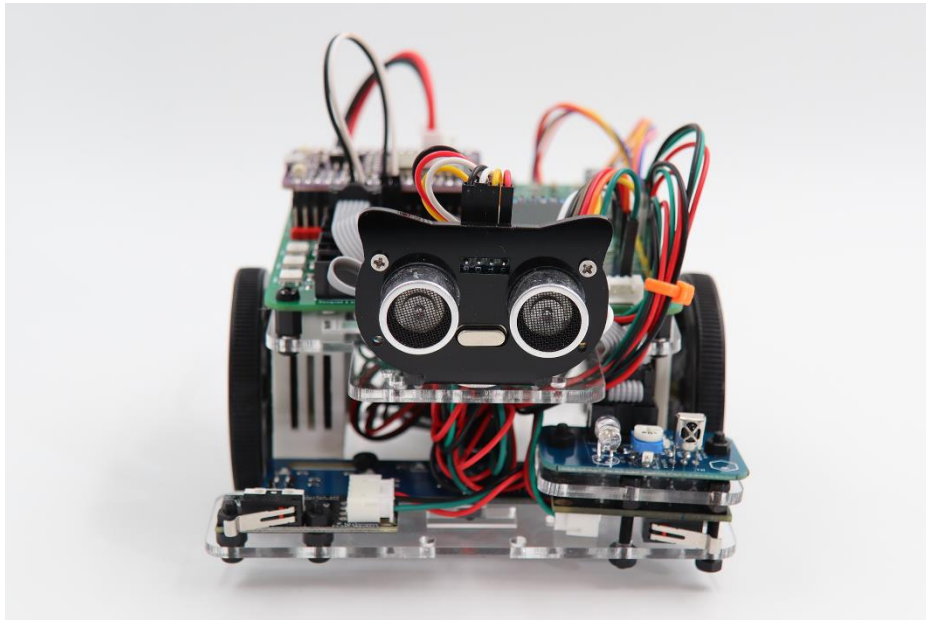
Left



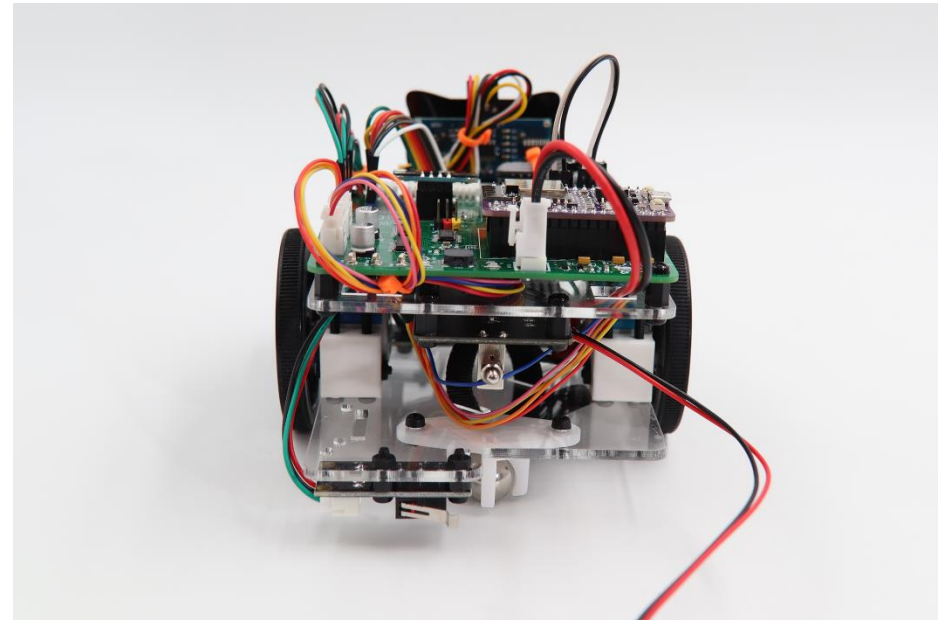
Right



Front



Back



WARNING



Do not plug in the battery until you are told to do so. Failure to follow this instruction might cause damage to the modules & sensors.