

MIT App Inventor Codi Bot

User Manual



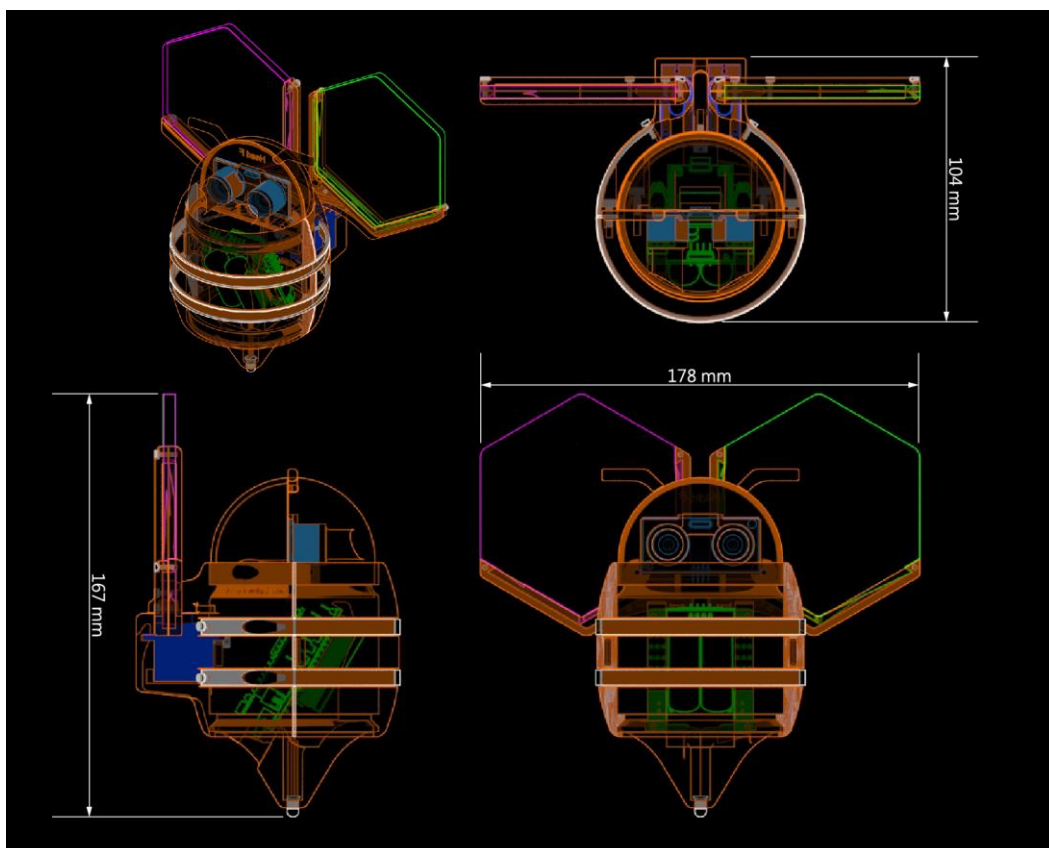
Introduction

MIT App Inventor Codi Bot is an educational kit of IoT. It has adorable appearance and can be interacted with App Inventor through Bluetooth communication. We've provided tutorials to show you how to interact with Codi Bot various functions, including:

- [Standalone demo](#)
- [LED](#)
- [Wing \(servo\)](#)
- [Sound](#)
- [Complete Codi Bot app](#)

Specification

- Dimension: **178 x 104 x 167** (W, L,H in mm)
- LinkIt 7697 power supply: 5V adaptor or powrbank with USB connector. PC USB port.
- Robot shield power supply: 5V adaptor or powerbank with USB connector. PC USB port. All components can function normally only when the shield is powered on (switch left).

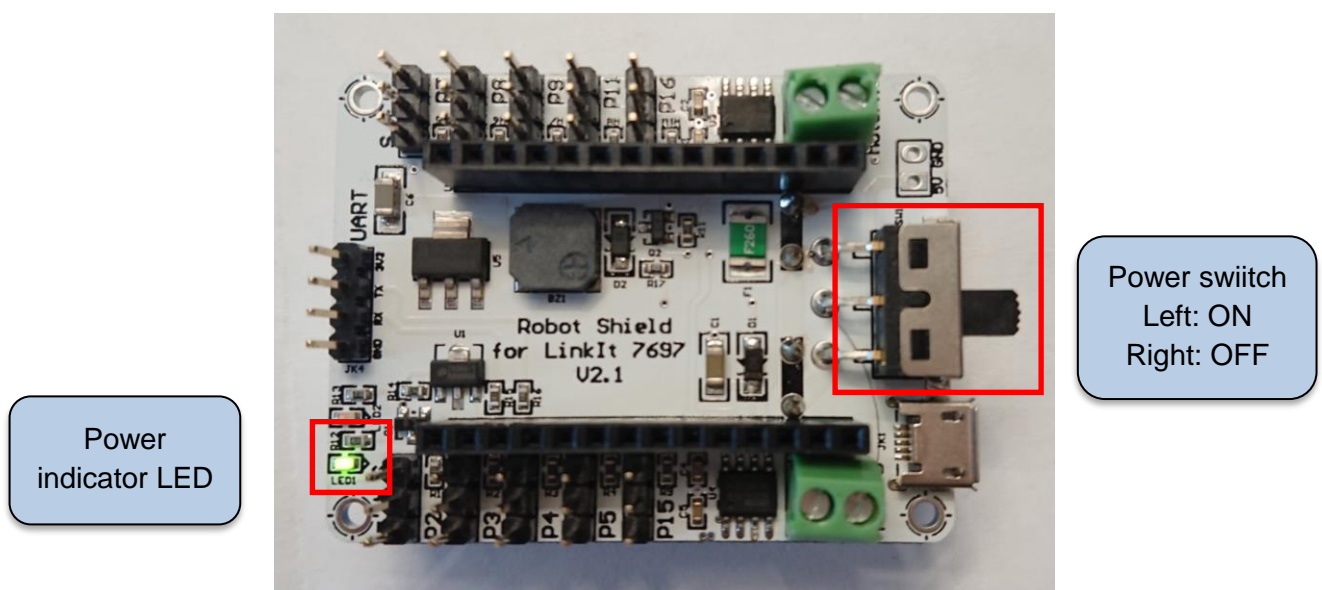


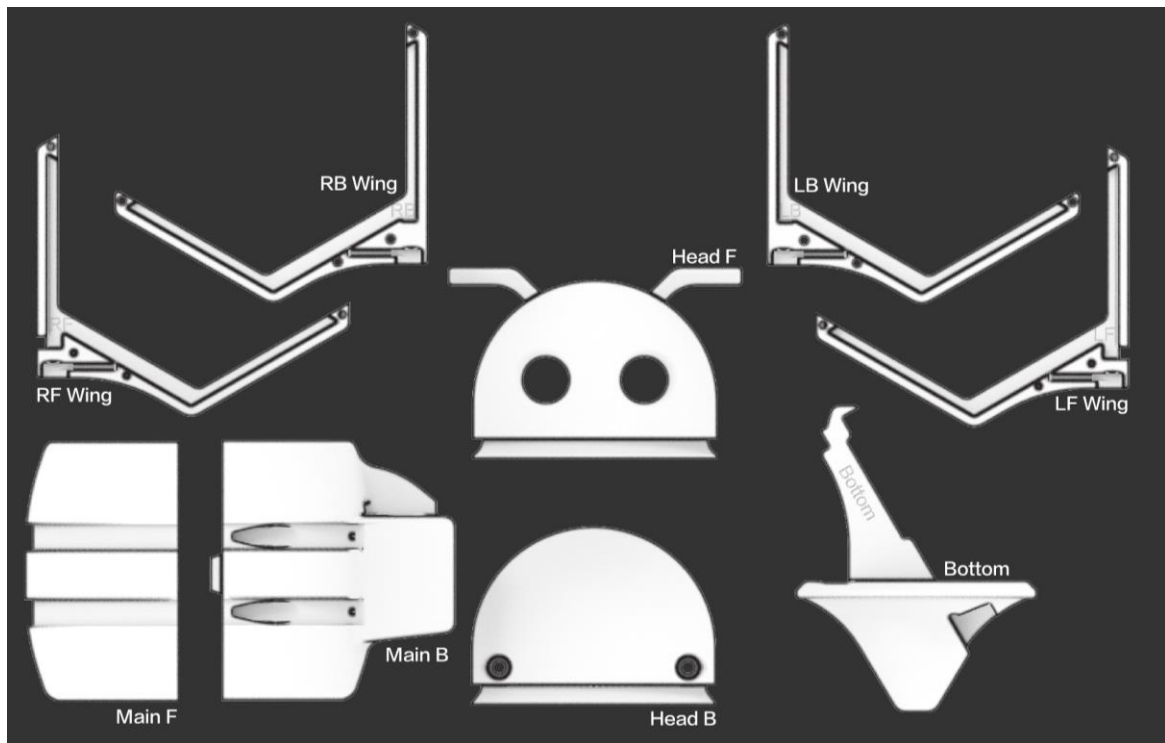
Hardware

Parts list ([purchase link](#))

Each set shall includes parts listed below:

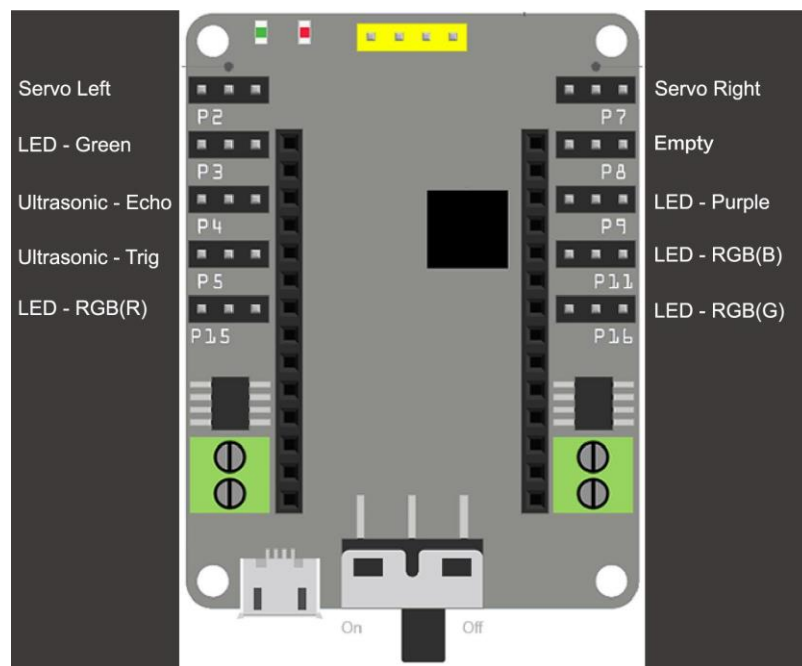
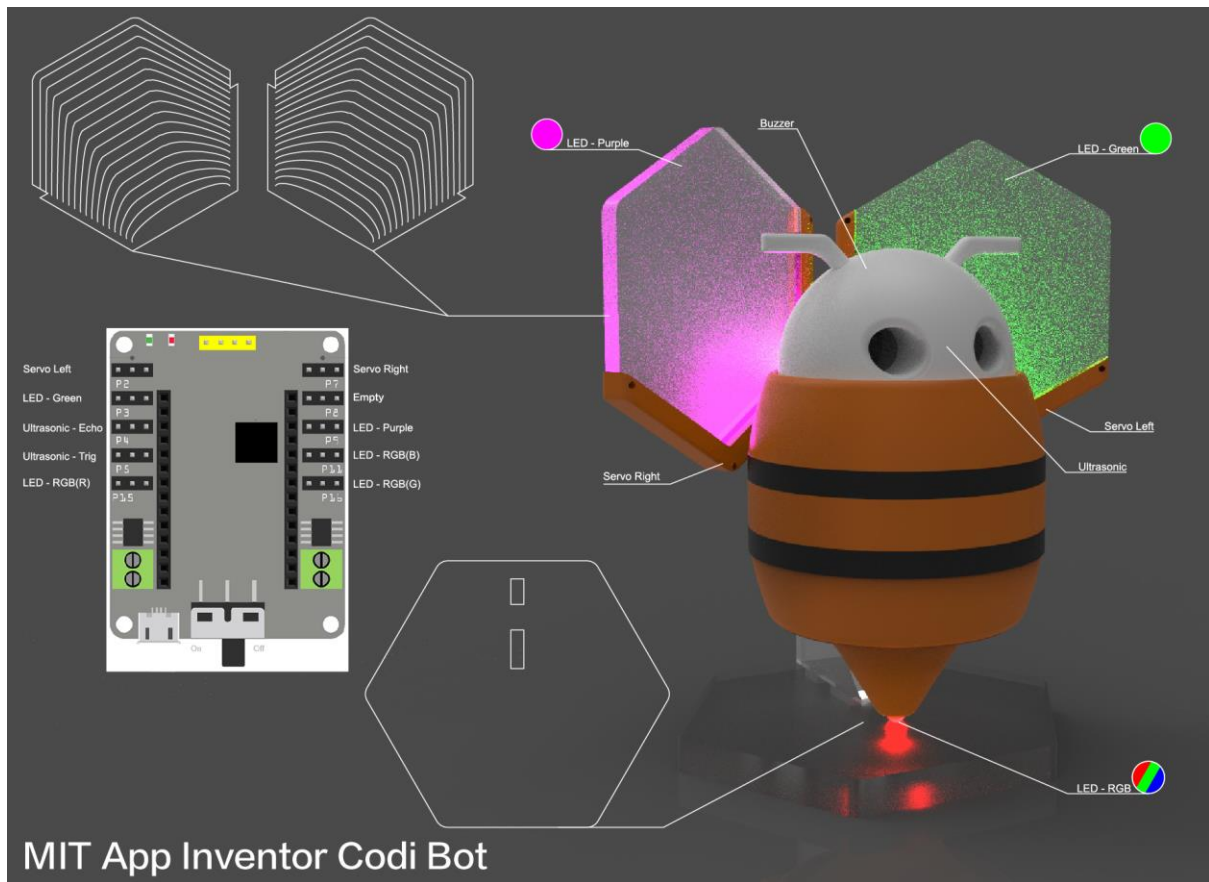
1. [LinkIt 7697 MCU board](#), 1
2. [RobotShield extension board](#), 1 (with an onboard buzzer)
3. RGB LED (common cathode), 1
4. **LED stripe green** (left wing), 1
5. **LED stripe purple** (right wing), 1
6. Ultrasonic sensor(HC-SR04), 1
7. female-female jump wires, 10
8. mini servo (SG90), 2
9. screw
 - a. M3x8, 7pcs
 - b. M2x12, 2pcs
 - c. M2x6, 12pcs
10. Acrylic (base, wings), 2 pieces.
11. Cow leather (stripes and body cushions), 4 pieces.
12. 3D printed parts(Main F, Main B, Head F, Head B, Bottom, Wing RF, Wing RB, Wing LF, Wing LB), 9 pieces.



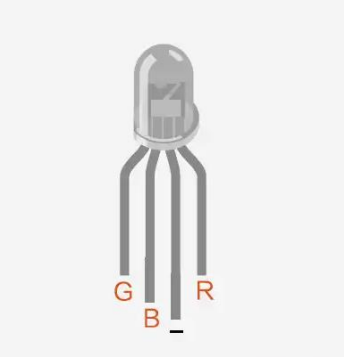
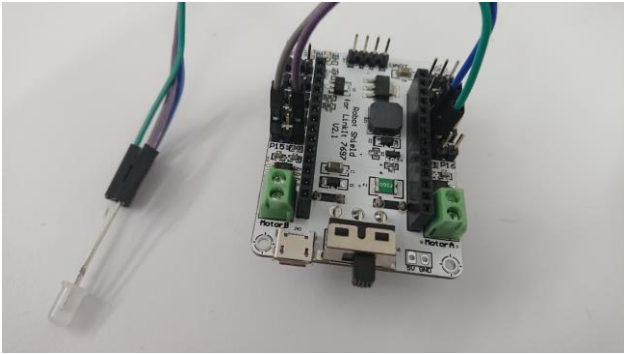


Pin mapping

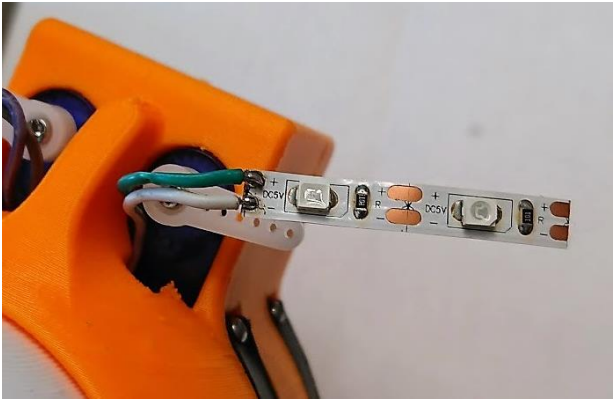
This section will guide you connect each component pin to the corresponding Robot Shield pin. Please ensure you connect all of them accordingly or your Codi bot may not function normally.



RGB LED (base)

RGB LED	Robot shield	 
R	P15	
G	P16	
B	P11	
GND (longest pin)	- of P11/P15/P16 port (any one)	

LED green (left wing)

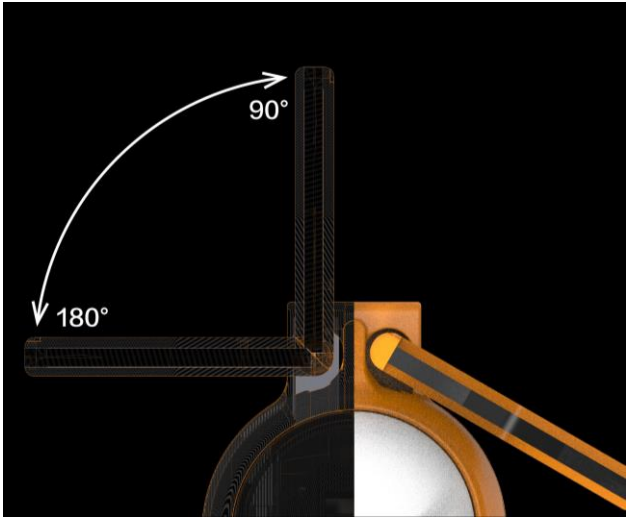
LED green (right wing)	Robot shield	
+	P3	
-	- of P3 port	

LED purple (right wing)

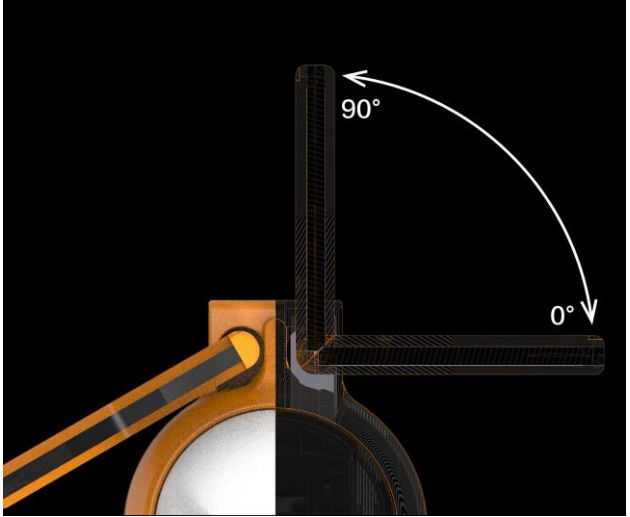
LED purple (left wing)	Robot shield	
+	+ of P9 port	

-	P9	
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Right Servo

Right Servo	Robot shield	Outward: servo position 180 degree Backward: servo position 90 degree
Signal	P7	
Power	+ of P7 port	
GND	- of P7 port	

Left Wing Servo motor

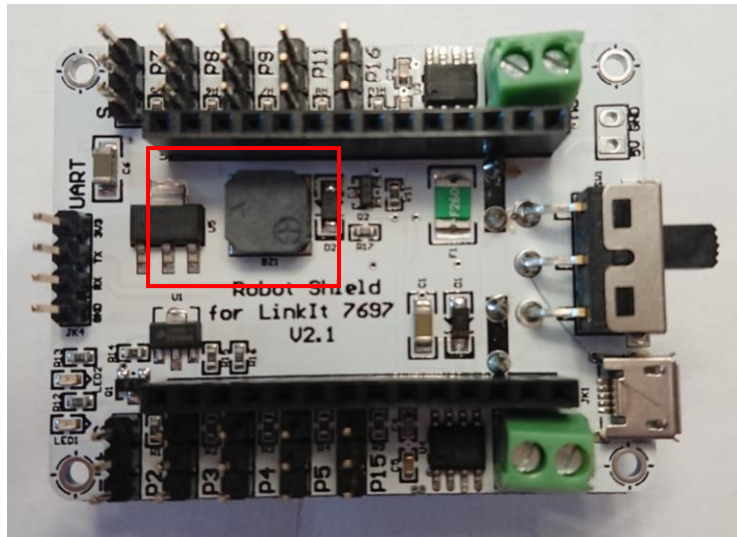
Left Servo	Robot shield	Outward: servo position 0 degree Backward: servo position 90 degree
Signal	P2	
Power	+ of P2 port	
GND	- of P2 port	

Ultrasonic sensor

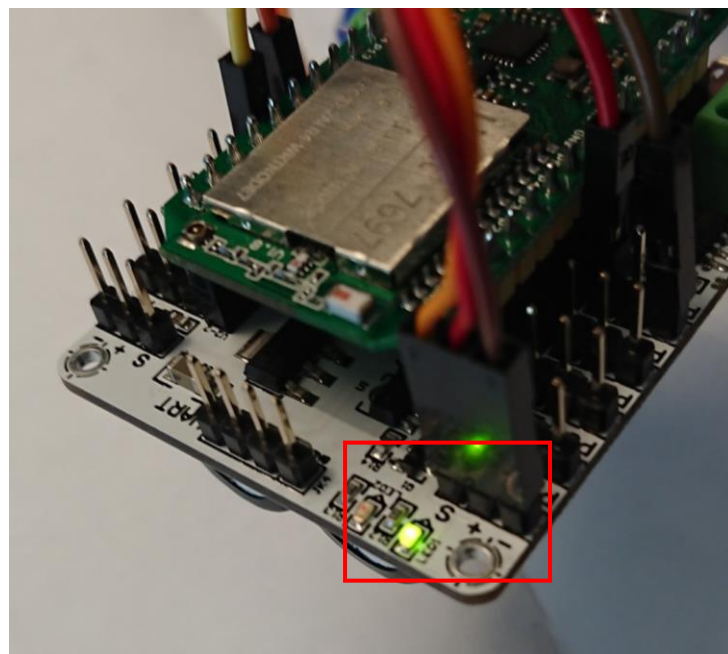
Ultrasonic sensor	Robot shield	
Echo	P4	
Trig	P5	
Vcc	+ of P4/P5 port	
GND	- of P4/P5 port	

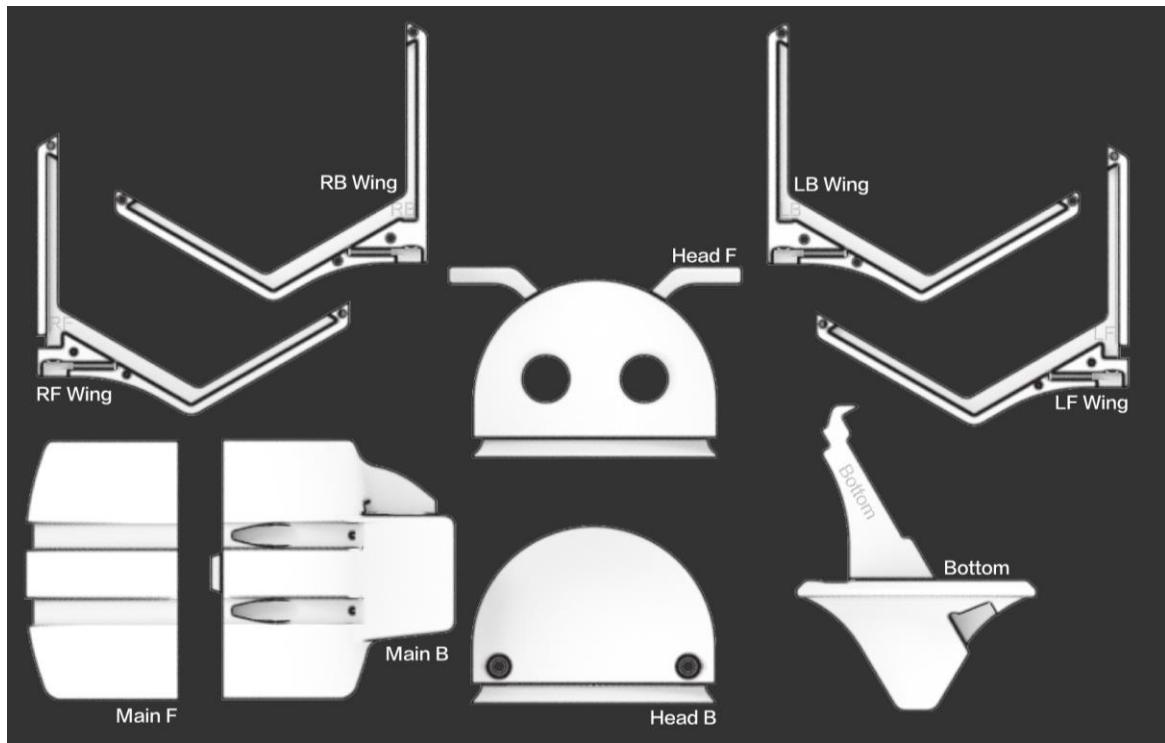
Buzzer

Robotshield has an onboard buzzer connected to P14, we can use this pin to make sounds.



Note: each 3-pin port of RobotShield has labeled with **S** (signal), **+** (Positive) and **-** (Negative/GND). For each component's power supply, connect component's +/- terminals to corresponding +/- pins, which is within the same port of the signal pin.





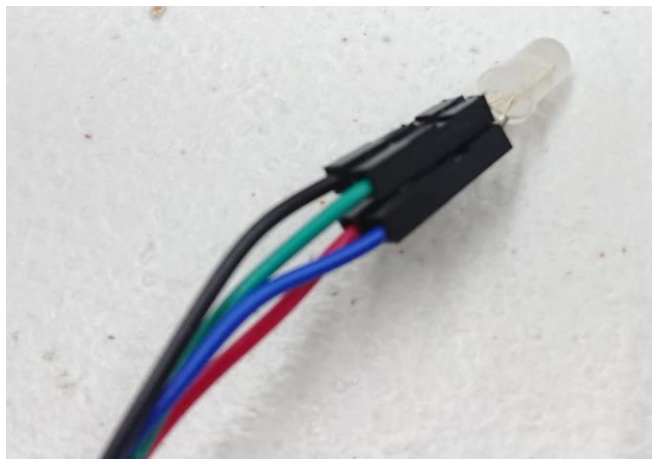
How to assemble

Step1:

Connect RGB LED pins with wires

parts:

- RGB LED, 1
- wire, 4
- 3DP-Bottom



Step2:

Assemble LinkIt 7697 with Robot Shield

parts:

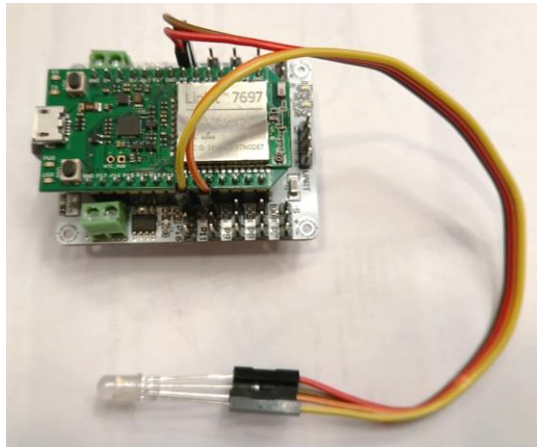
- LinkIt 7697 board, 1
- Robot Shield, 1

**Step3:**

Connect RGB LED pins to corresponding pins of Robot Shield. (refer to [Pin Mapping](#) section).

parts:

- Step1
- Step2

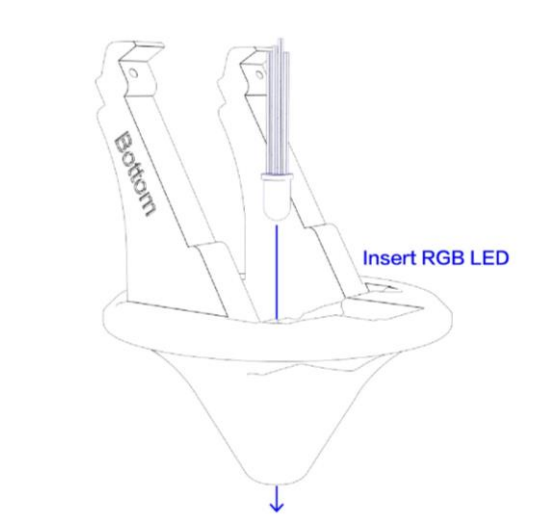
**Step4:**

Secure RGB LED in the hole of 3DP-Bottom.

parts:

- Step3
- 3DP-Bottom

❖ Glue for better secure
❖ Cut LED pins shorter if necessary



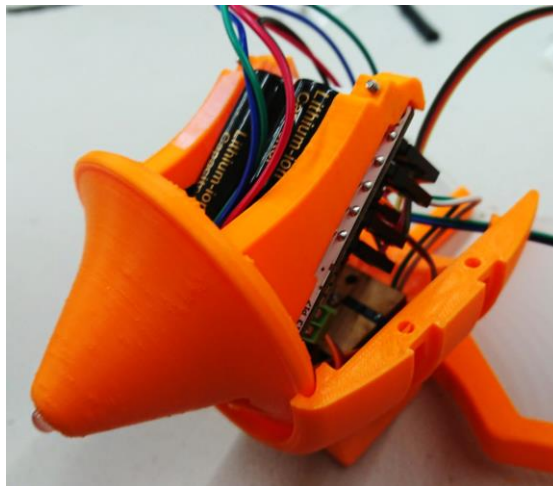
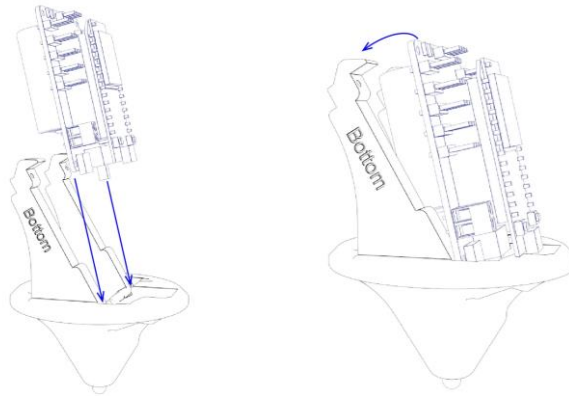
Step5:

Secure Link7697 and Robot Shield on 3DP-Bottom.

parts:

- Step1-4

❖ Remove 3DP supporting structure if necessary.

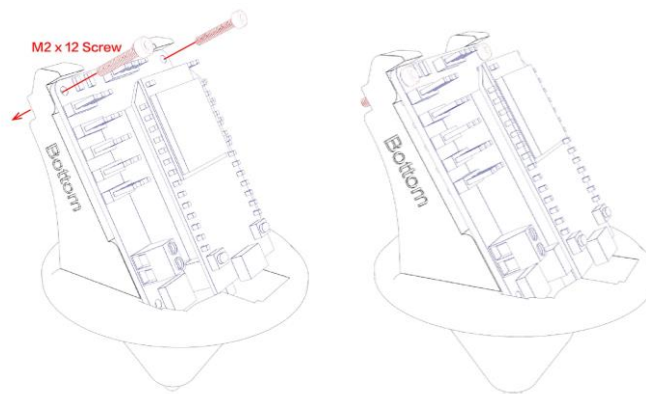
**Step6 (core):**

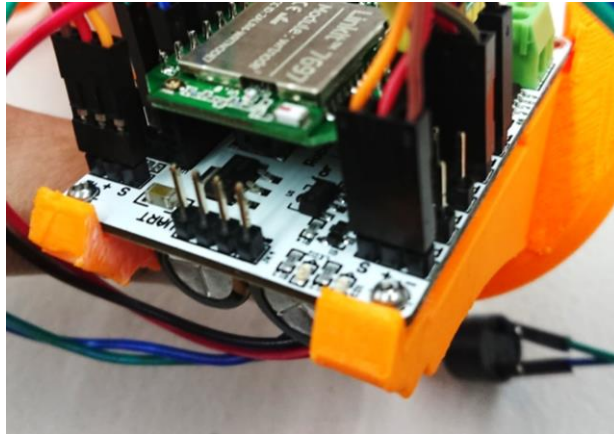
Secure with M2x12 screws.

parts:

- M2x12 screw, 2

❖ 3DP part may be broken if you screw too hard



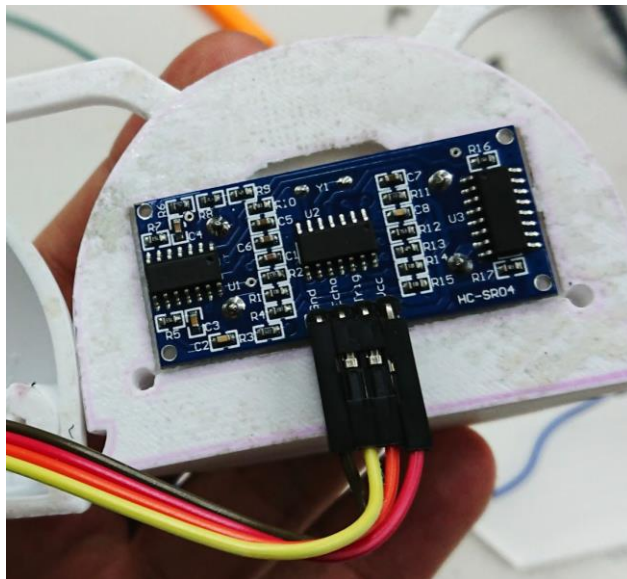


Step7:

Connect wires on SR-04 pins and insert ultrasonic sensor into **3DP-Head F**.

parts:

- HC-SR04 ultrasonic sensor, 1
- 3DP-HeadF, 1



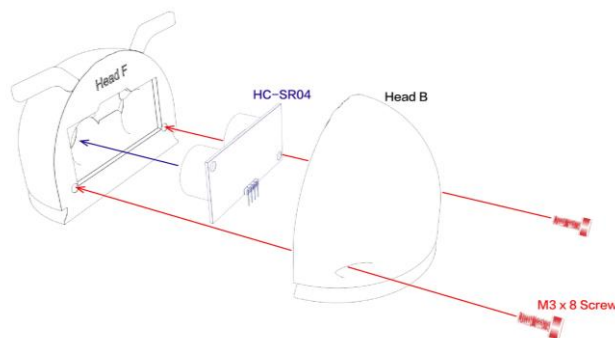
Step8 (head):

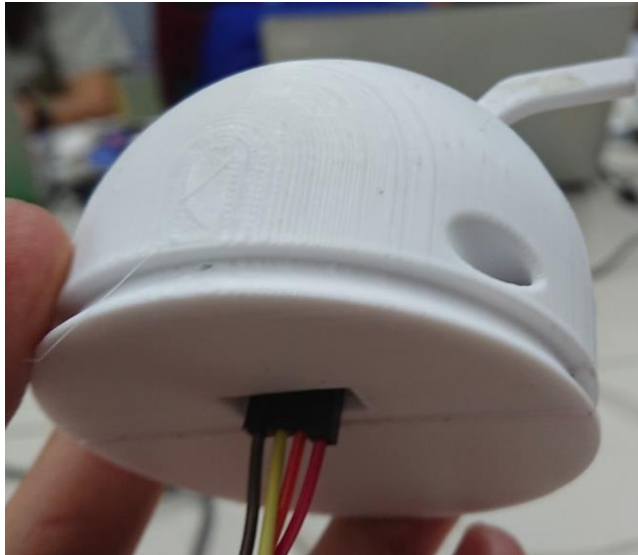
Secure Step7 and **3DP-Head F** with M3x8 screws.

parts:

- 3DP-HeadB
- M3x8 screw, 2

❖ Remove 3DP supporting structure inside if necessary.





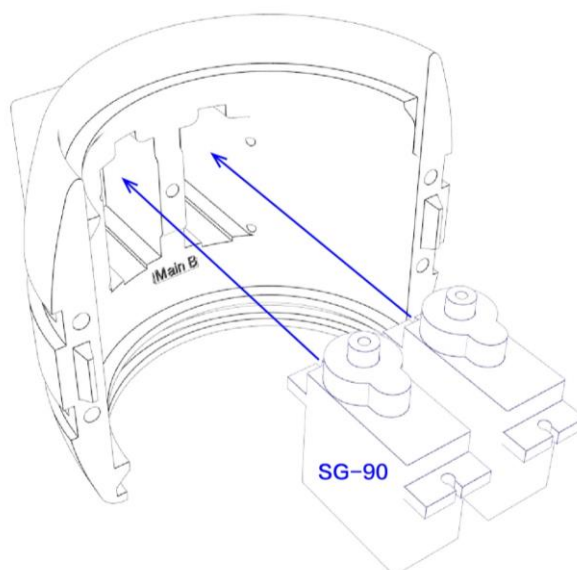
Step9:

Insert 2 SG-90 servos into holes of **3DP-Main B**. Make sure servo wires are at the bottom of the servos.

parts:

- SG-90 servo, 2
- 3DP-MainB

❖ Remove 3DP supporting structure inside if necessary.

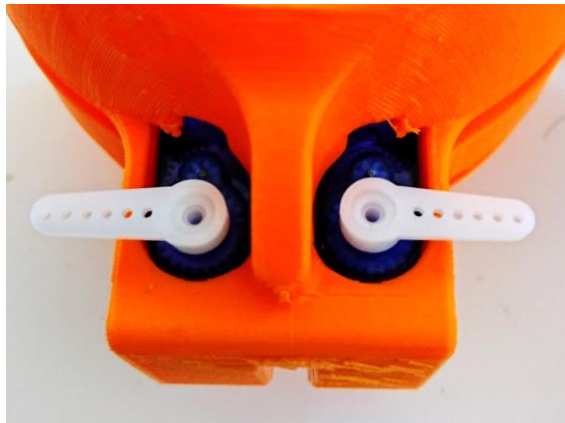
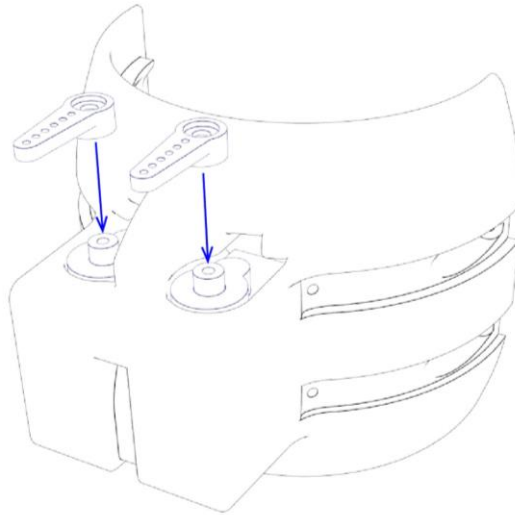


Step10:

Rotate the left servo to the leftmost position. Rotate the right servo to the rightmost position. Then secure servo and servo horn with its screw.

parts:

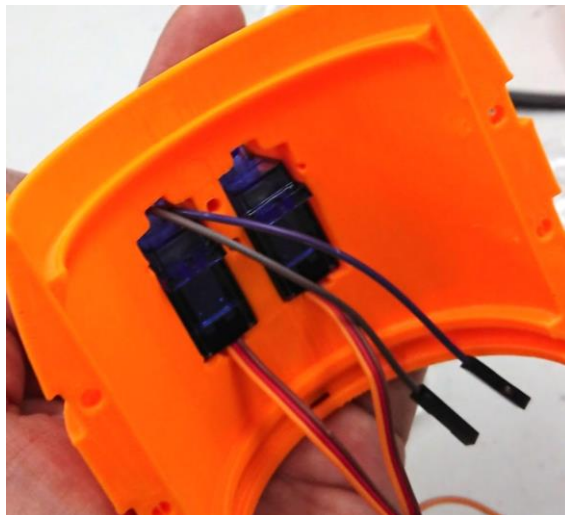
- Step9
- servo horn, 2

**Step11:**

Pass wires of two LED stripes through corresponding holes we've just put in servos in Step10. Make sure the LED **green** stripe is in the left hole and LED **purple** stripe is in the right hole.

parts:

- Step10
- LED stripe **green**, 1
- LED stripe **purple**, 1

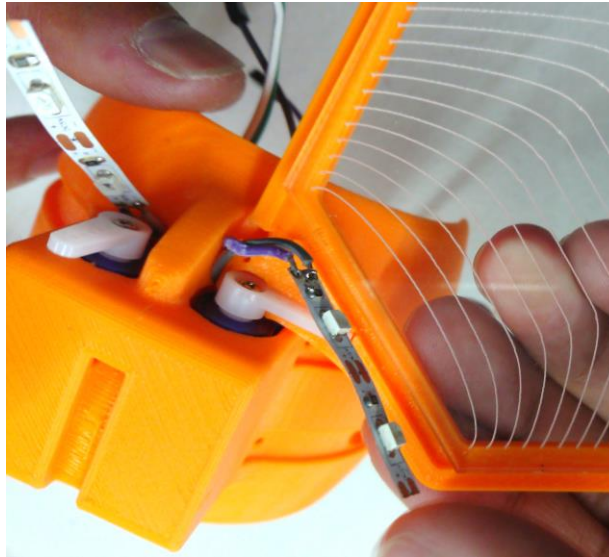


Step12:

Put two LED stripes into grooves of 3DP-LF and 3DP-RF. Then assemble two acrylic wings pieces.

parts:

- Step11
- 3DP-LF (left wing)
- 3DP-RF (right wing)
- Acrylic wing, 2
- M2 x 6 screw, 8

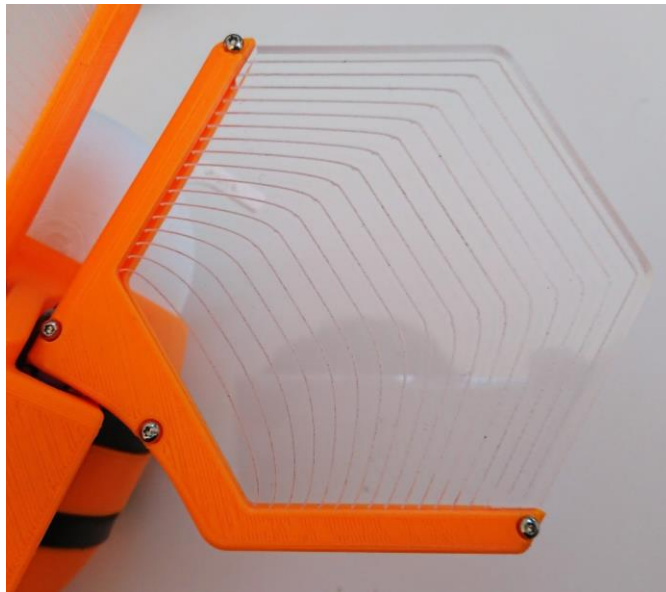
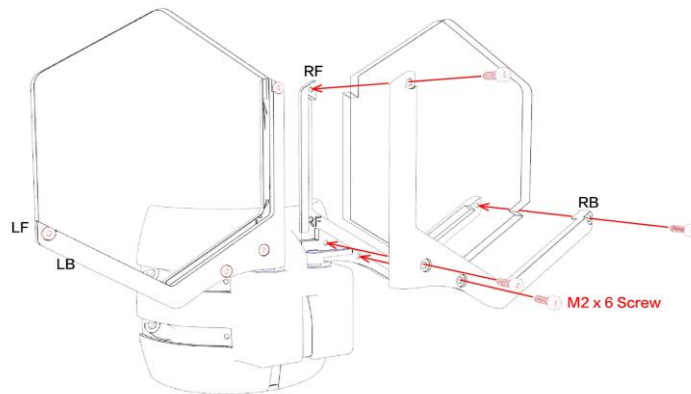
**Step13:**

Secure the right wing(step12) and 3DP-RB with 4 M2 x 6 screws. Do the same thing for the left wing.

parts:

- Step12
- 3DP-LB (left wing)
- 3DP-RB (right wing)
- M2 x 6 screw, 8

❖3DP part may be broken if you screw too hard.



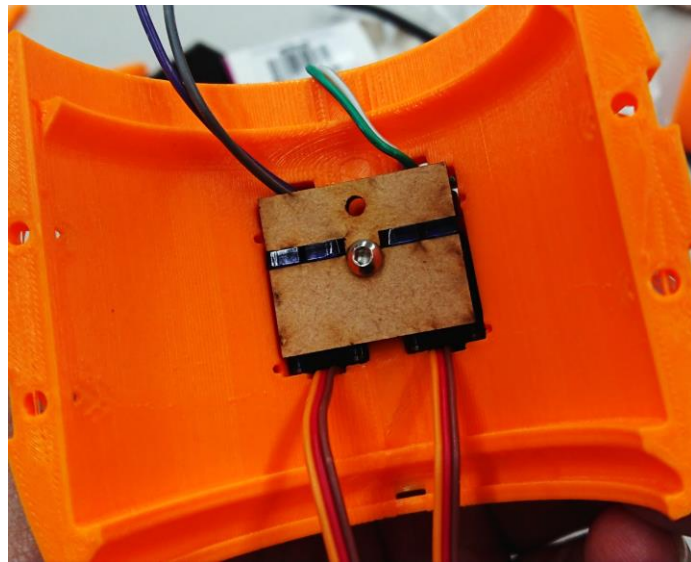
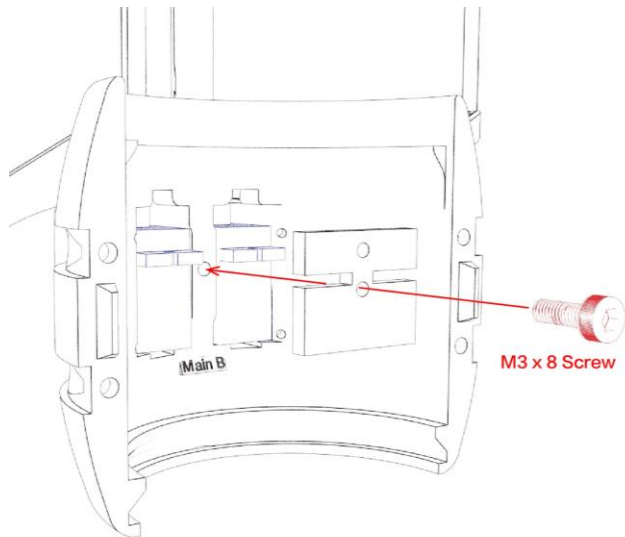
Step14 (body-back):

Secure the spacer on 3DP-Main B with a M3x8 screw.

parts:

- step 13
- spacer, 1
- M3x8 screw, 1

❖ 3DP part may be broken if you screw too hard

**Step15:**

Connect all components' wires to corresponding pins on Robot shield.

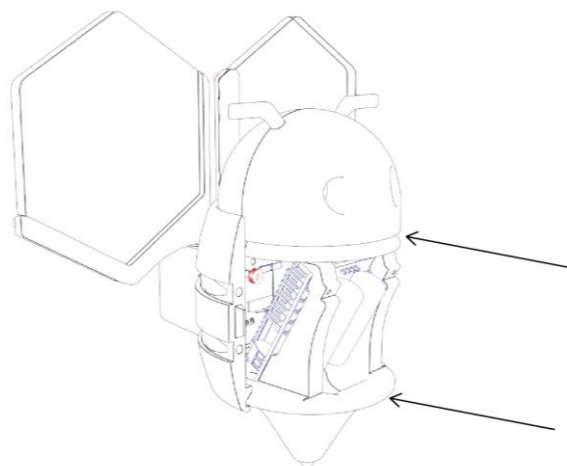
Then assemble head (step8), core (step6) and body-back (step 14) together.

parts:

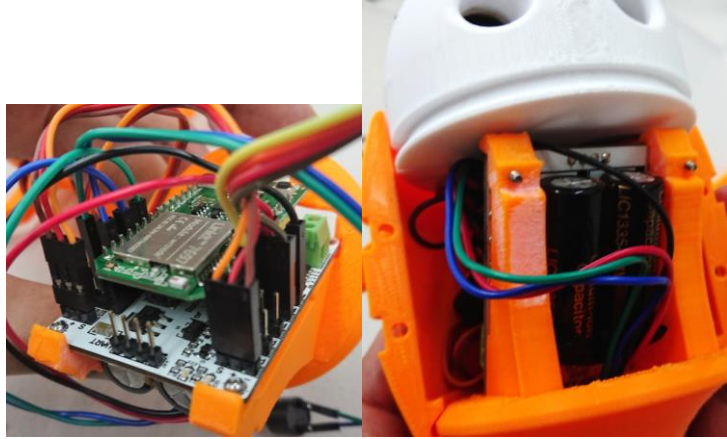
- all above

❖ Make sure all wires are **connect correctly** and not squeezed and not interfered by mechanisms (servos).

❖ You may execute the



[standalone sketch](#) to check everything works correctly.

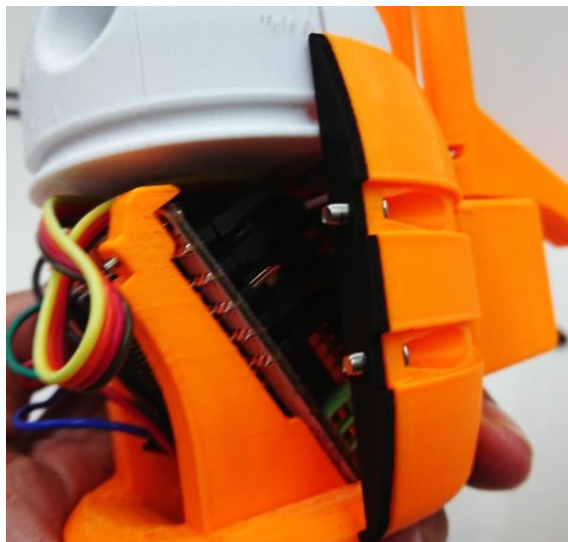
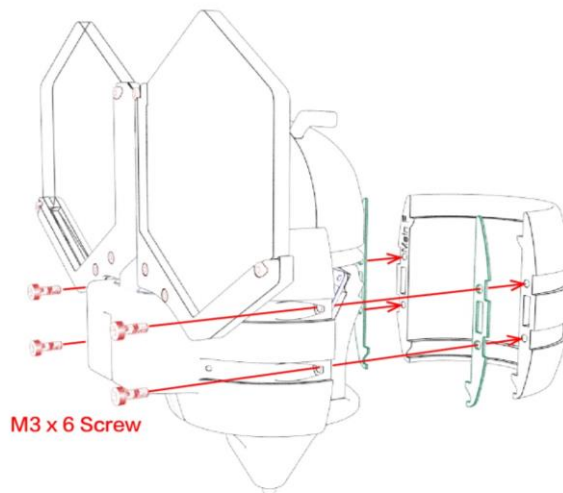


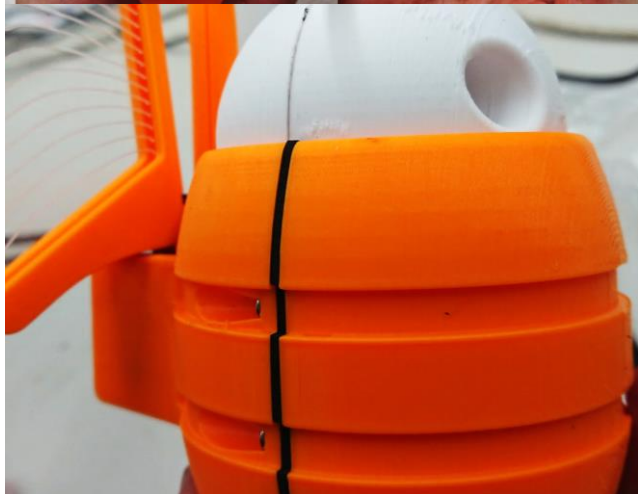
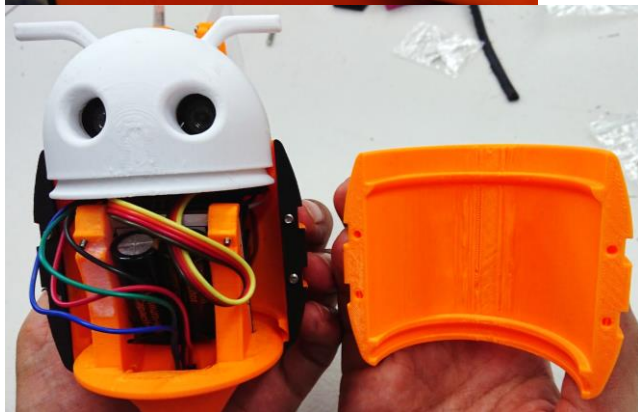
Step16:
Secure back-body, cushions and 3DP Main F with four M3 x 6 screws.

parts:

- 3DP-Main F
- cow leather (cushion), 2

❖ 3DP part may be broken if you screw too hard



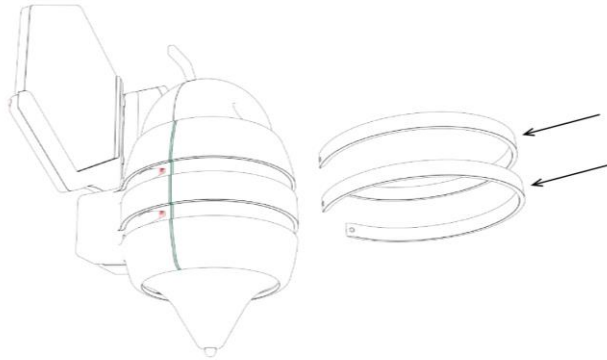


Step17:

Assemble two stripes.

parts:

- step 16
- cow leather(stripes), 2

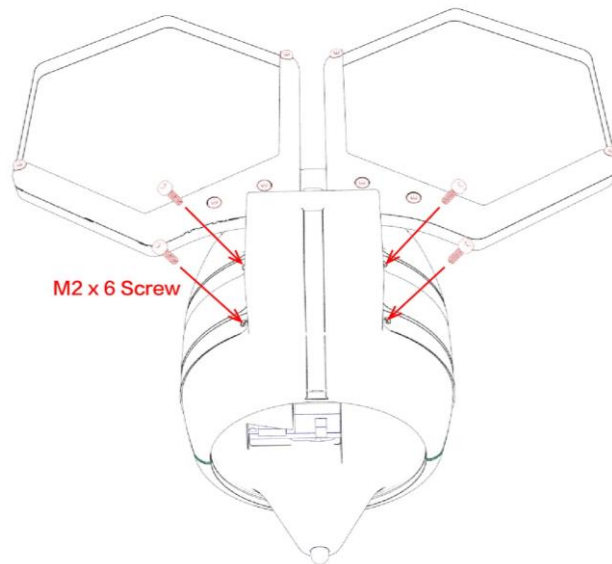
**Step18:**

Secure stripes and Codi Bot with four M2 x 6 screws.

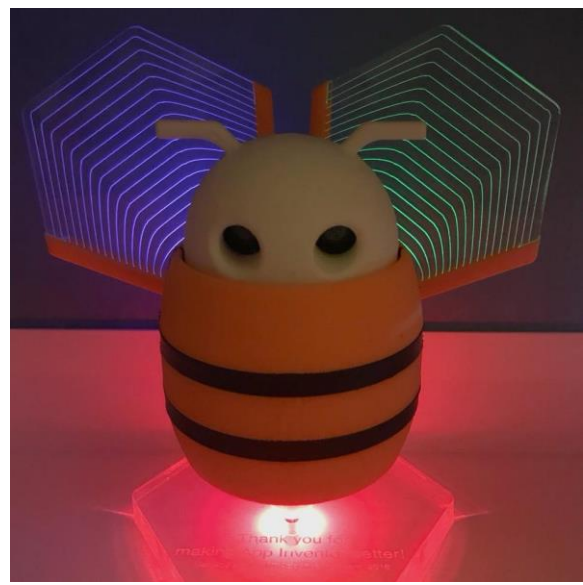
parts:

- step17
- M2 x 6 screw, 4

❖ You may need to stretch leather a bit to screw
❖ 3DP part may be broken if you screw too hard



Finish!



Software

Function list

1. **Standalone demo:** Use [this sketch](#) to check hardware functions correctly. Notice this demo has no interaction with App Inventor ([Video](#)).
 - a. LED (base, wings)
 - b. servo (wings)
 - c. buzzer
 - d. Ultrasonic sensor
2. **Codi Bot LEDs:** Control LEDs by buttons and sliders ([Video](#)).
3. **Codi Bot Wings:** Control wing flapping or move to certain position ([Video](#)).
4. **Codi Bot Sound:** Control Codi Bot to make different kinds of sound ([Video](#)).
5. **Codi Bot:** Combination all previous functions into one app ([Video](#)).

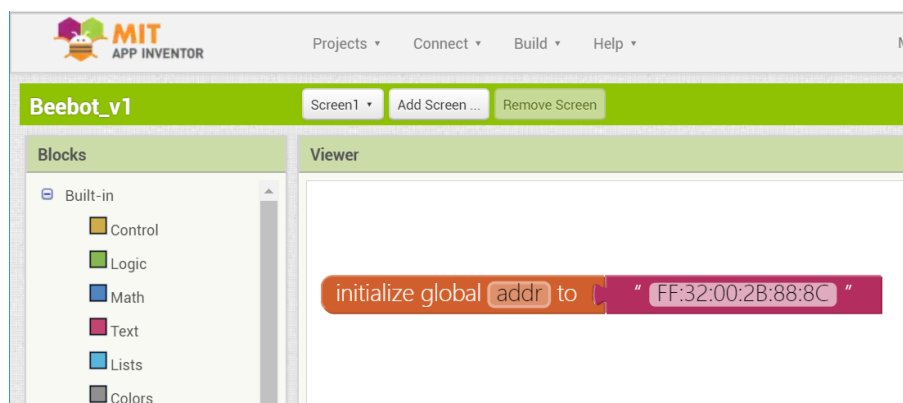
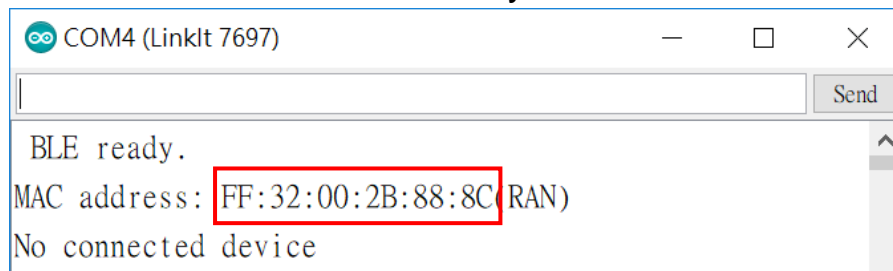
Arduino IDE setup

[Check this document for Arduino IDE and MCU board driver setup](#)

After the environment is ready, connect the MCU board and your PC with a micro-USB cable. Load the source code you like, and click the **Upload** button in Arduino IDE to upload to the MCU board.



- 1. Standalone demo: upload [this sketch](#) and the Codi Bot will flap wings and change LED color randomly. And if you put something in front of Codi Bot, LEDs of both wings will light up and it make sounds by buzzer.
- 2. ~ 4. LinkIt 7697 (Arduino IDE): upload [this sketch](#) and open Arduino IDE's serial monitor, you will see messages like below, the FF:32:00:2B:88:8C is the Bluetooth address of my LinkIt 7697 MCU board, which is different from yours. Therefore You have to replace the **addr** variable of your aia. Otherwise your app cannot connect with the Codi Bot correctly.



FAQ

1. Wings, LEDs are not functioning?
 - a. Check your Robot shield is switched on.
 - b. Robot Shield may run out of power, connect it to your PC/laptop USB port by an USB cable.
 - c. Most problems came from wiring, please always check you've connect all the components correctly. (refer to [pin mapping section of user manual](#)).
2. Can not connect to Codi Bot?
 - a. Check Arduino IDE setup section, make sure you've modify the **addr** variable (.aia) with the Bluetooth address of your LinkIt 7697.