

Robot assemble guide

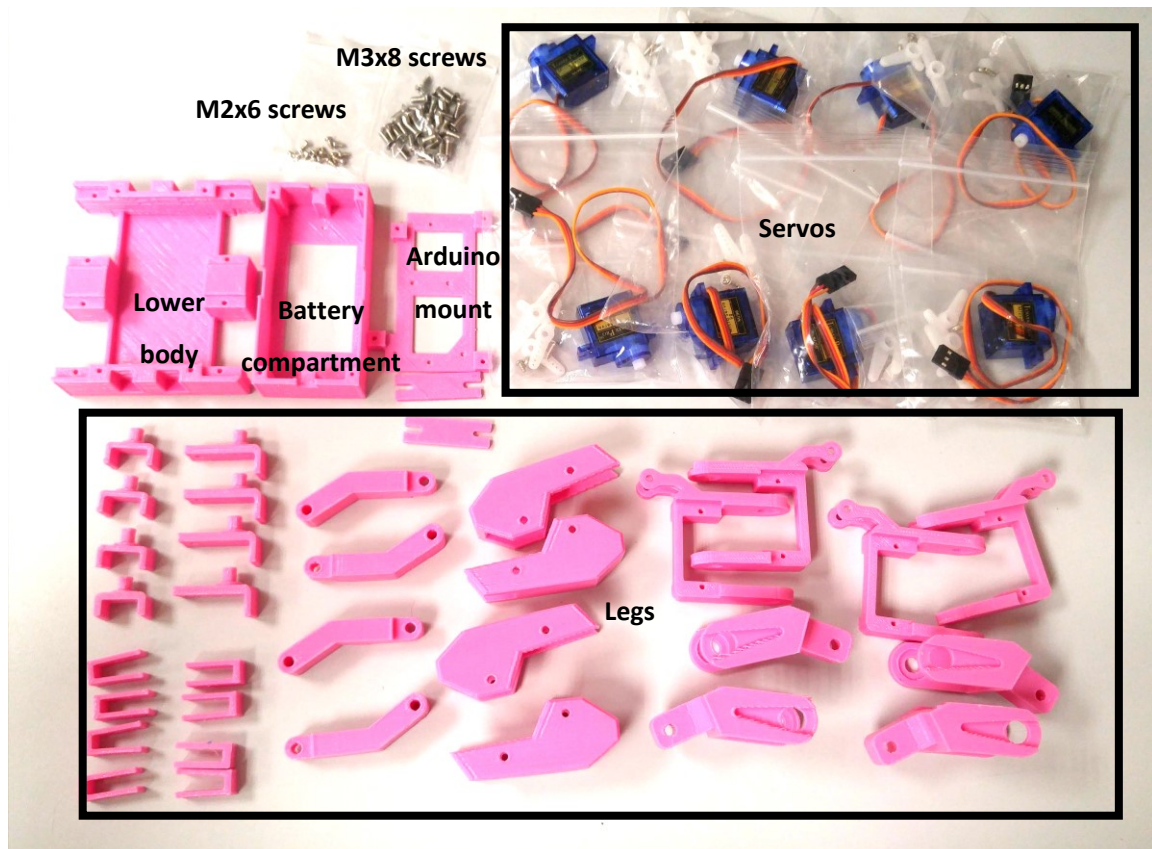
Introduction

This guide is available at <https://goo.gl/vXnVpF>.

The robot is designed by MakerLab, Department of Computer Science, HKU. (<http://makerlab.cs.hku.hk>) Information can be found in their website. More information of the robot can be found in the related Thingiverse page at <http://www.thingiverse.com/thing:1596784>.

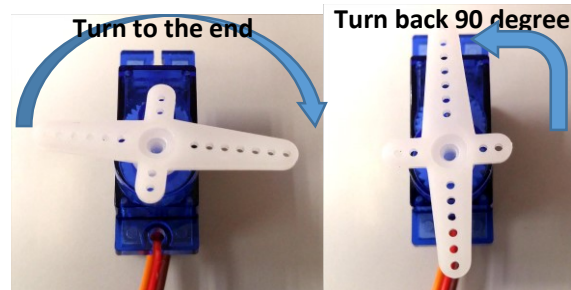
Step 1. Identifying parts

1.1 Check if you have received all parts as shown below.



Step 2. Adjusting the servos

- 2.1 Unpack the servos.
- 2.2 Use one of the tool to turn the servo to one of the end, this set the servo at 0 or 180 degree.
- 2.3 Turn it backward so that the servo is set at 90 degree.



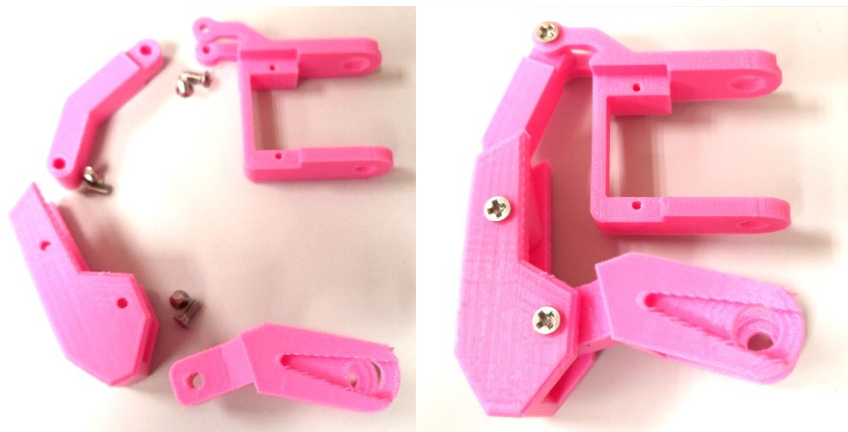
- 2.4 You can refer to this video for a demo: <https://youtu.be/U68hKXbxvIY>

Step 3. Assembling the legs (the first servo)

- 3.1 Identify two types of legs, build one leg at a time.



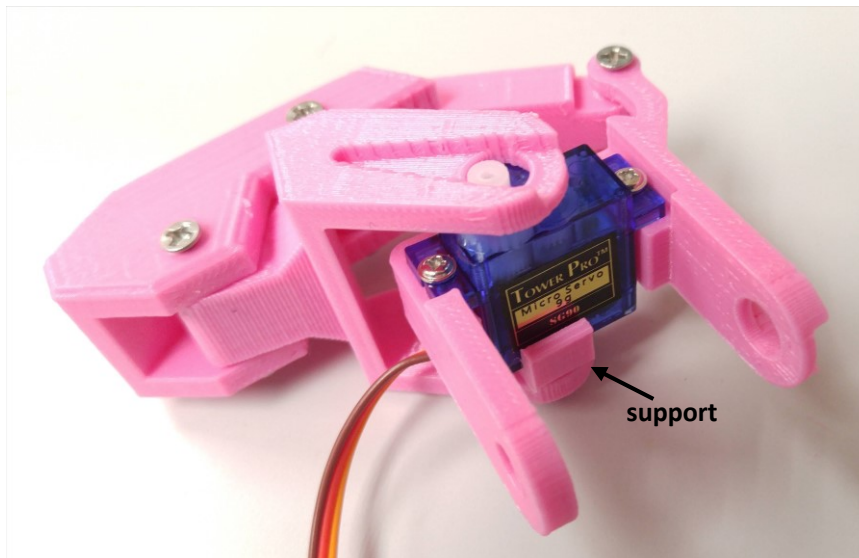
- 3.2 Connect the 4 pieces with six M3x8 screws.



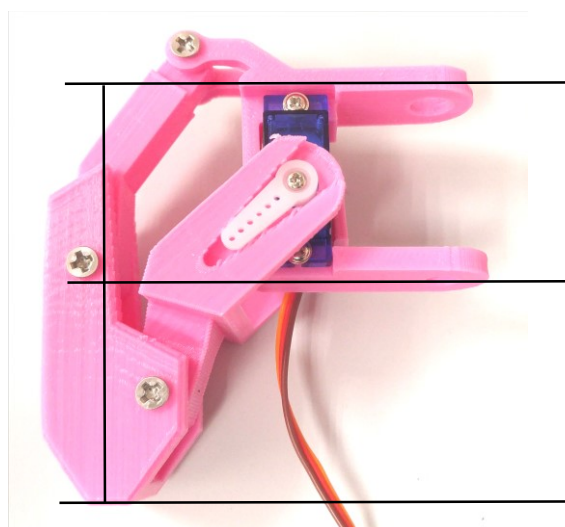
- 3.3 Fix a servo on the leg using the longer screws provided with the servo. Let's call it servo B of the leg.



- 3.4 Place the U-shape support at the lower part of the leg, and clamp it onto the servo.



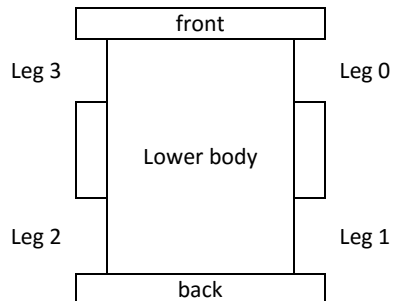
- 3.5 Adjust the leg into position as shown in the picture, put on the cap and fix it with the remaining screw provided with the servo.



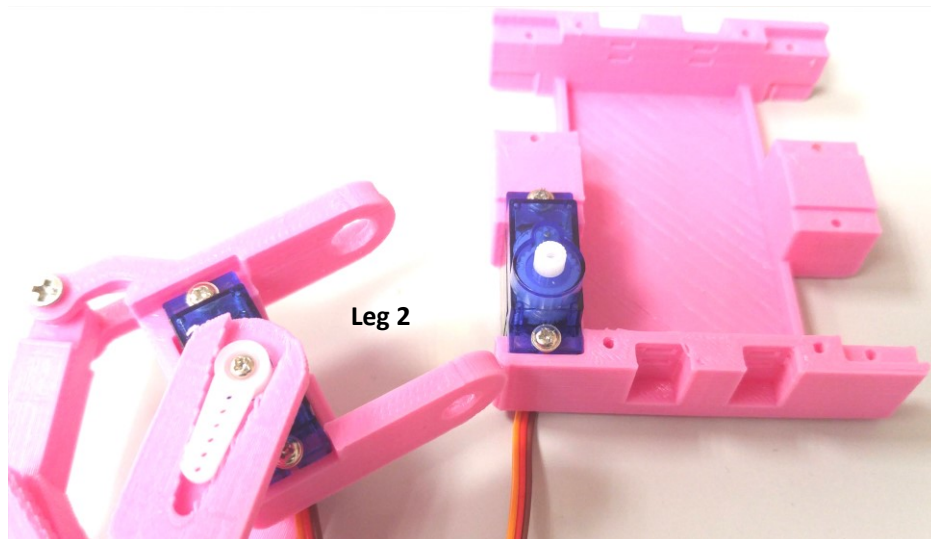
- 3.6 Try if the servo allows full motion of the leg (up and down). If not, you may have to adjust the servo again.
- 3.7 Repeat the process for the other legs.

Step 4. Assembling the legs to the lower body (the second servo)

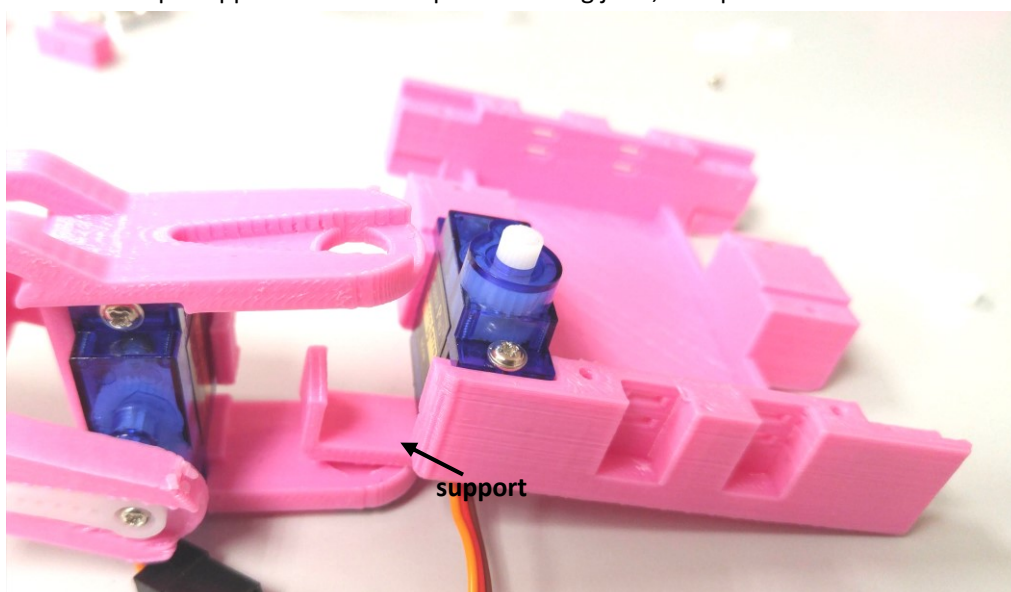
4.1 Identify the positions of the two types of legs on the lower body.



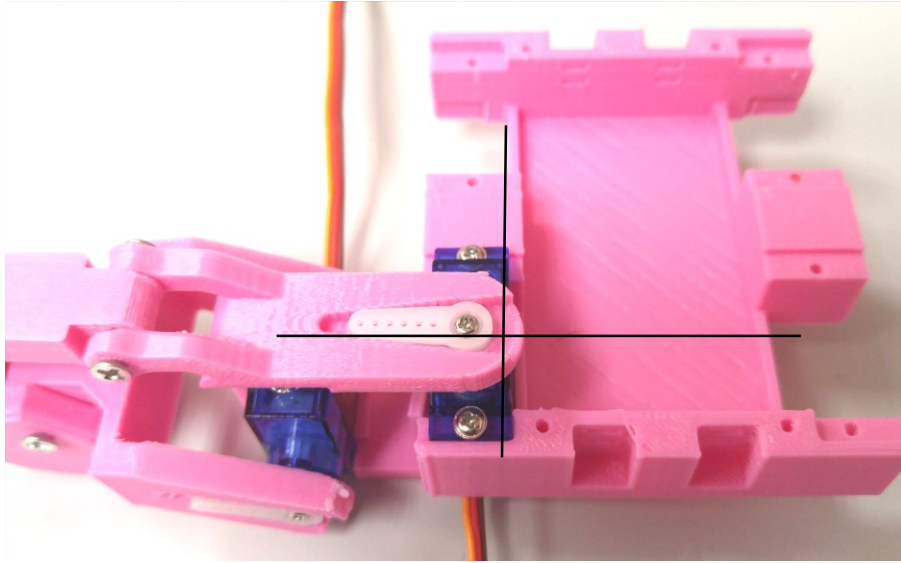
4.2 Fix a servo at the corresponding position. Let's call it servo A of the leg.



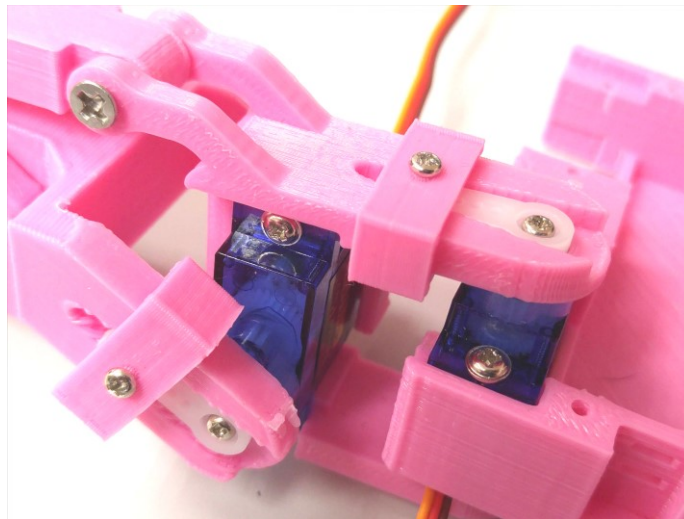
4.3 Place the L-shape support at the lower part of the leg joint, clamp it onto the servo.



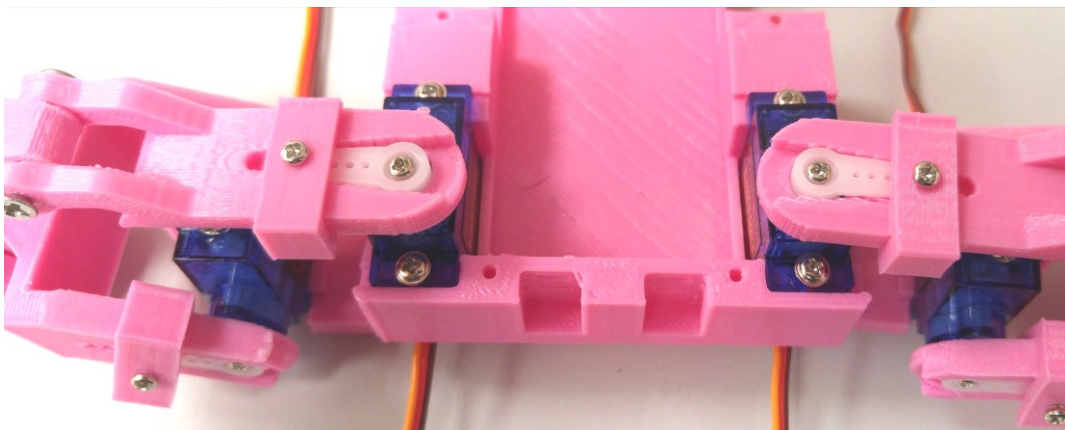
- 4.4 Adjust the leg into position as shown in the picture, put on the cap and fix it with a screw.



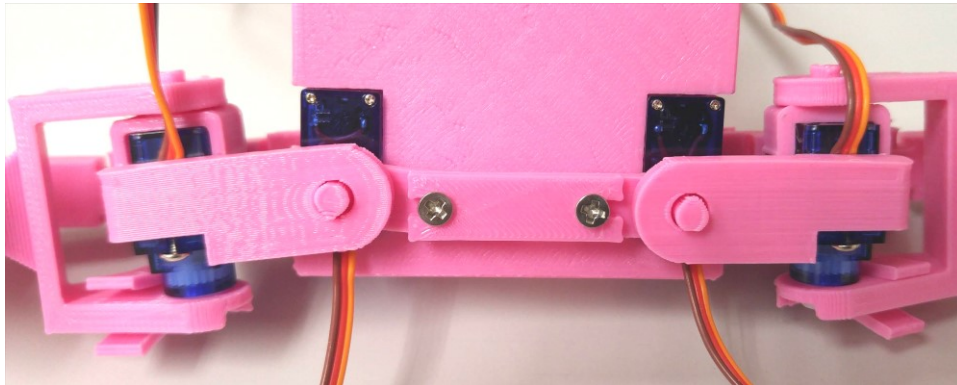
- 4.5 Try if the servo allows full motion of the leg (swinging sideways and forward/backward). If not, you may have to adjust the servo again.
- 4.6 Insert two C-shape clamps over the two caps of the servos. Fix each of them with a M2x6 screw.



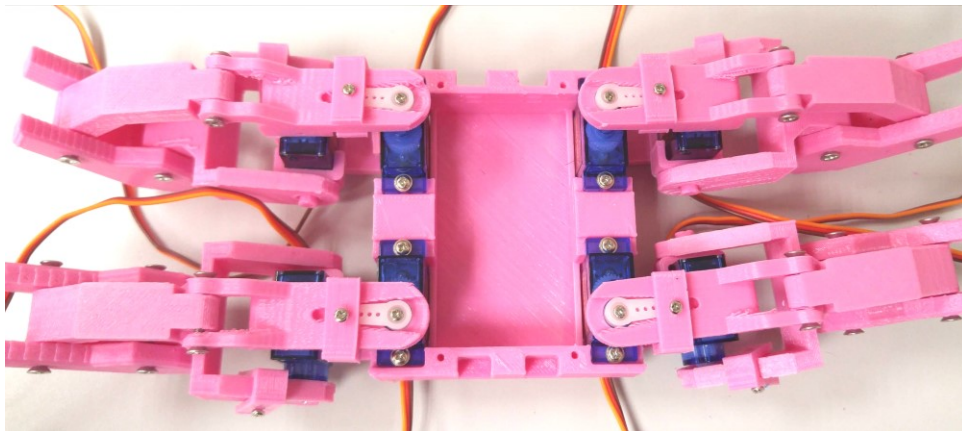
- 4.7 Repeat the process with the leg at the opposite side.



4.8 Turn over the body and connect the two legs as shown in the picture.



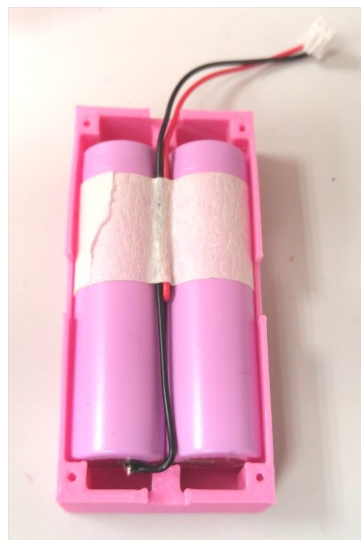
4.9 Repeat the process with the other pairs of legs.



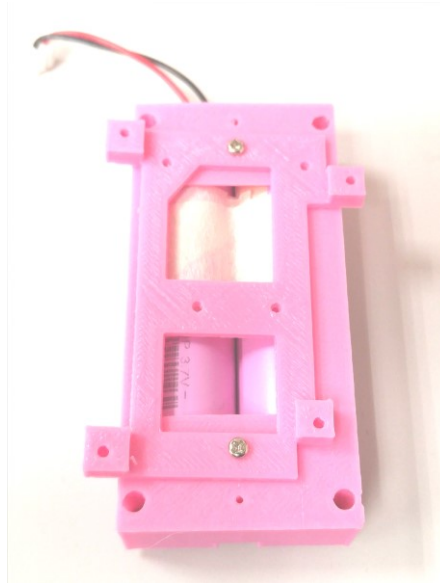
Check point 1: Ask for a checking before you continue. You will be given the battery and the Arduino board.

Step 5. Assembling the upper body, batteries, and Arduino board

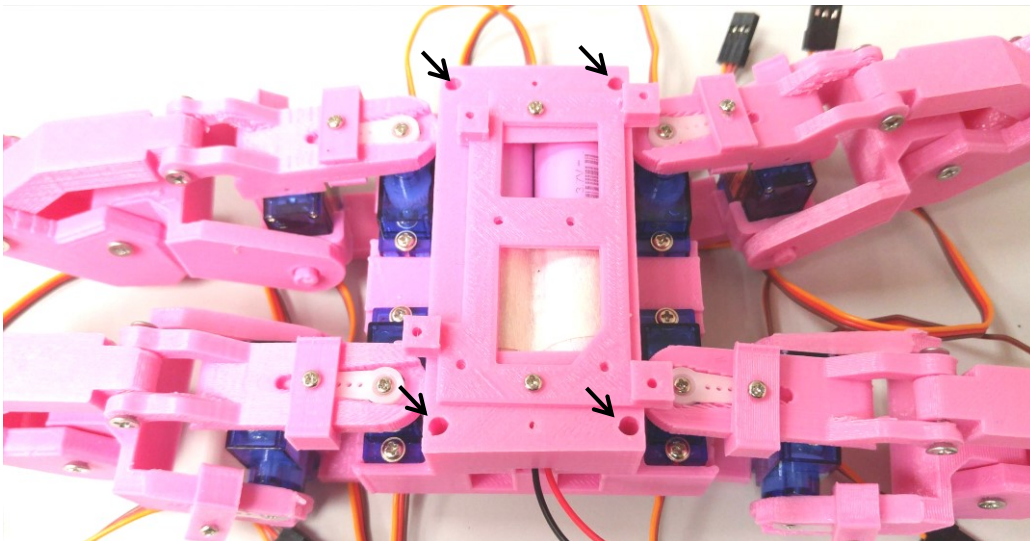
5.1 Insert the battery into the compartment, leaving the cable outside through the hole at one side.



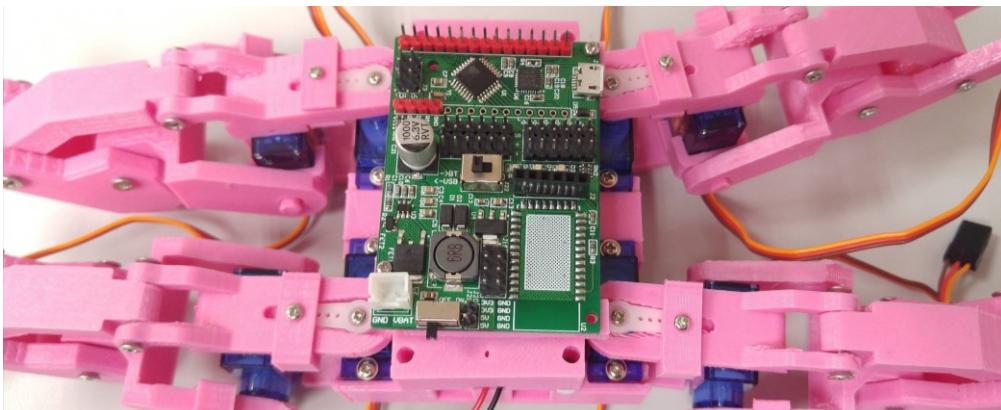
- 5.2 Flip over and place the Arduino board mount on the other side as shown in the picture. Note the orientation of the mount.



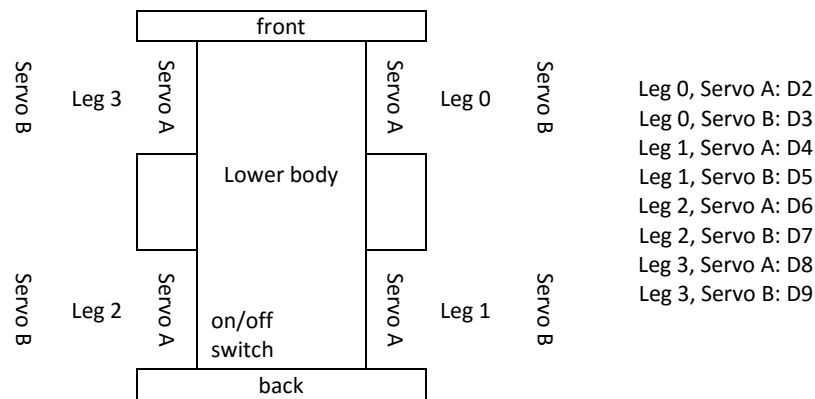
- 5.3 Fix the battery compartment onto the lower body with 4 M2x6 screws. Ask for help if you find it difficult to fix it.



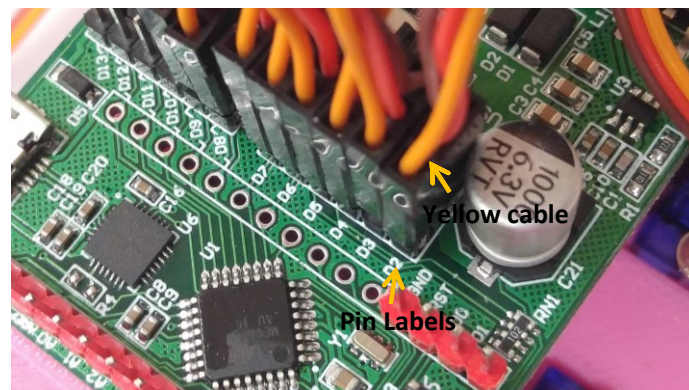
- 5.4 Once you have completed the above steps, fix the Arduino board onto the mount.



5.5 Identify the 4 legs and the 8 servos, note their corresponding pins.



5.6 Plug the servos onto the board accordingly. Make sure that the yellow cable is facing towards the pin labels.



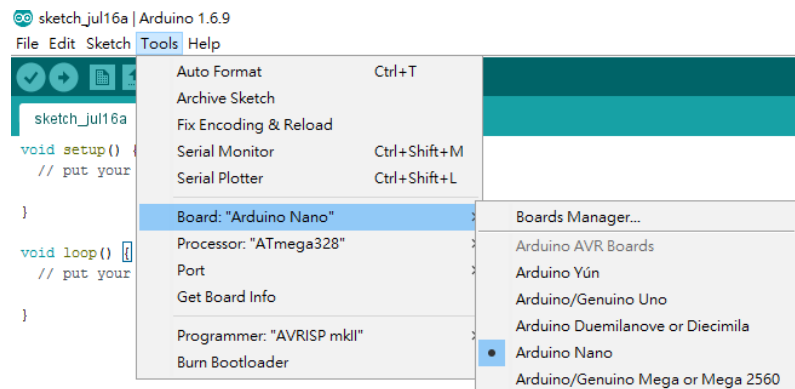
Check point 2: Ask for a checking before you continue. You will be given the USB cable.

Step 6. Installing Arduino IDE, uploading program to robot

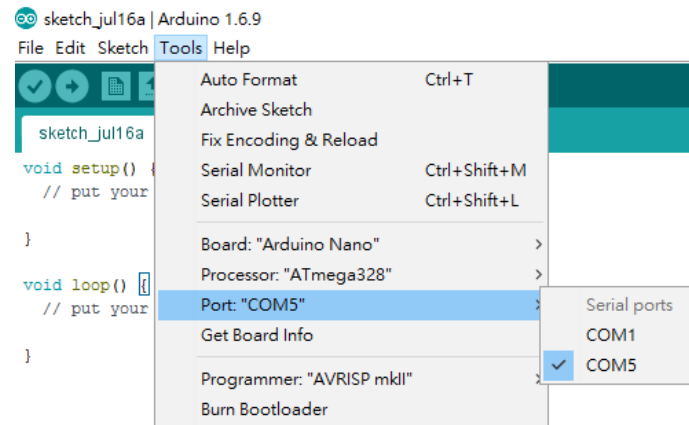
6.1 Download and install Arduino IDE in Arduino website <https://www.arduino.cc/en/Main/Software> .

6.2 Connect the robot to the computer.

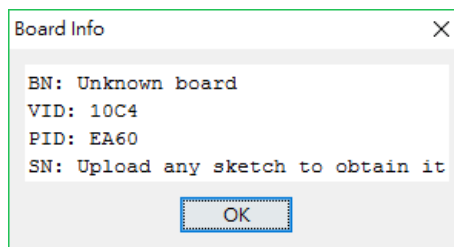
6.3 In the IDE, choose "Arduino Nano" under **Tools** → **Board** menu item.



- 6.4 Under **Tools** → **Port** menu item, you will need to choose the correct port to the robot. Usually this will be the last option.



- 6.5 Choose **Tools** → **Get Board Info** to see some information of the Arduino board. If no info is shown, try another port.



- 6.6 Now, type in the following program. This program will set all servos to 90 degree position, which is our initial position.


```
#include <Servo.h>

#define START_PIN 2


Servo servo[8];

void setup() {
  int i;
  for (i = 0; i < 8; i++) {
    servo[i].attach(i + START_PIN);
    servo[i].write(90);
  }
}

void loop() {
}
```

- 6.7 Click the verify button  to check if the program is valid. You will see some message at the bottom of the application.

```
Done compiling.  
  
Sketch uses 2,496 bytes (8%) of program storage space.  
Global variables use 75 bytes (3%) of dynamic memory, 1
```

- 6.8 If the program is valid, click the upload button  to upload the program to the robot.

```
Done uploading.  
  
Sketch uses 2,496 bytes (8%) of program storage space. M  
Global variables use 75 bytes (3%) of dynamic memory, 1e
```

- 6.9 Disconnect the robot from the computer. Connect the battery to the Arduino board.
6.10 Switch on the robot to see if it moves all legs to initial position.
6.11 Remember to switch the robot off and disconnect the battery once it is done.