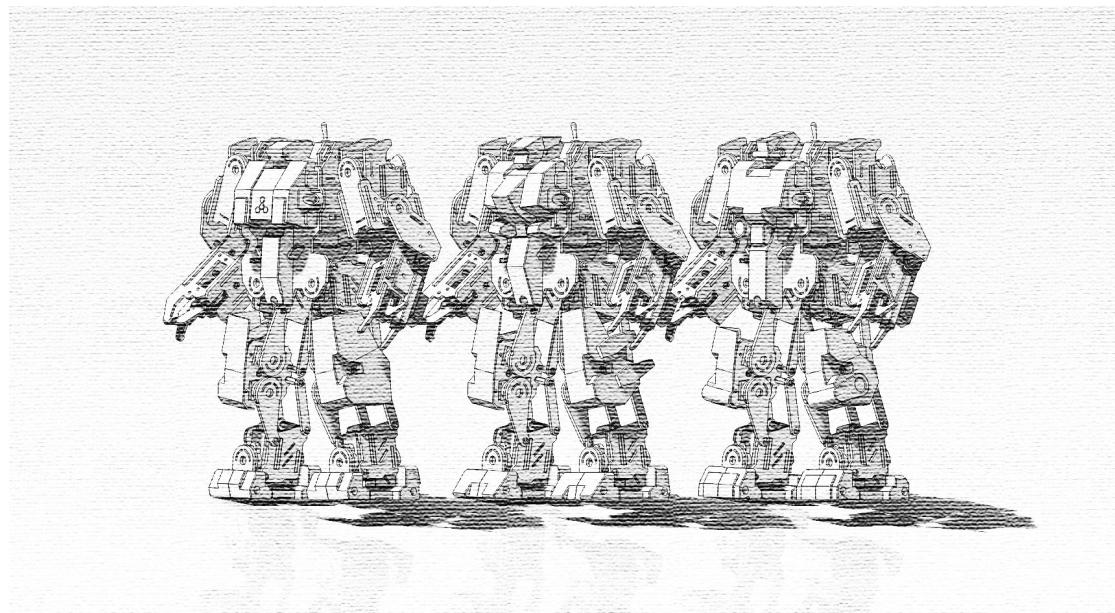




Ai.Frame4.4.0 Apollo Quick Start



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Cautions:

- Apollo is not a normal toy, do not leave it with children under 13
- The Acrylic parts are crisp, do not dropping, clashing
- Do not force the joints to turn when Apollo is powered on
- Go through this quick start carefully before get started with Apollo
- Change the robot when battery is low
- Make sure the power is off when you do not want to play with it

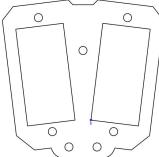
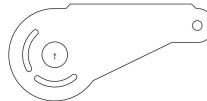
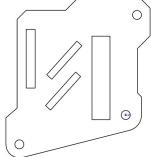
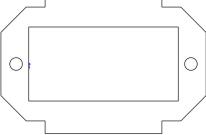
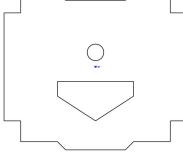
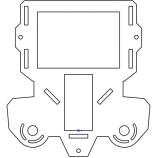
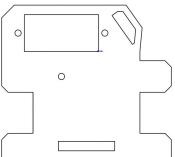
Ai.Frame4.4.0 Apollo:

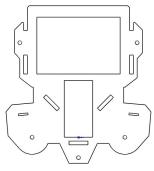
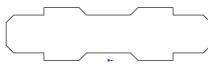
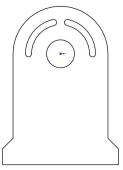
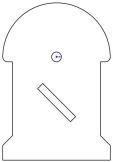
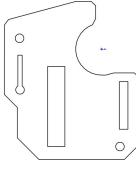
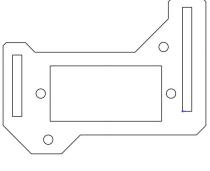
Apollo is an open source self-assembly humanoid robot, contains laser cutting Acrylic parts and 3D-printing parts, and has 3 options for its armor: Type A, type B and type C. It uses 2mm Acrylic board to do laser cutting for the frame parts and ABS material for 3D-printing parts.

Feathers:

- 16 DOF for 14 micro metal gear servos and 2 mini plastic gear servos
- Open source and upgrade-able hardware and software
- Acrylic and ABS material body
- Height: 22cm
- Weight: 485g
- Control and program via Bluetooth module or USB interface

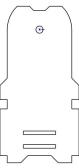
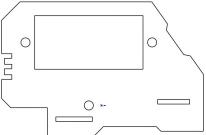
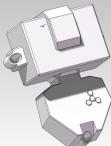
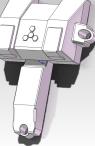
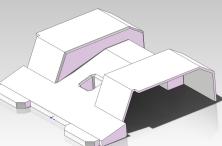
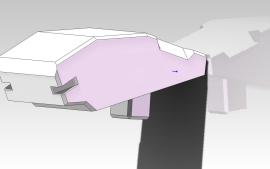
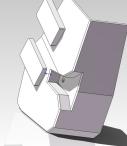
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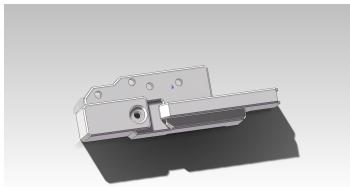
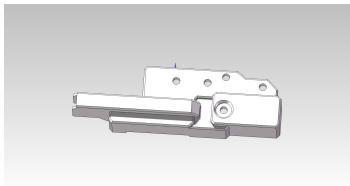
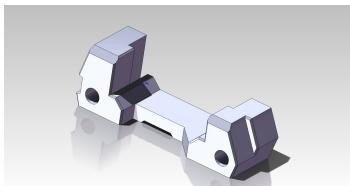
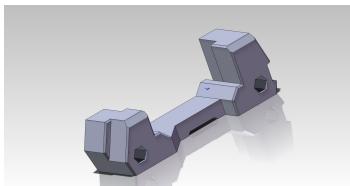
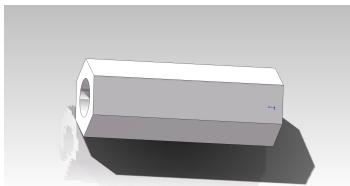
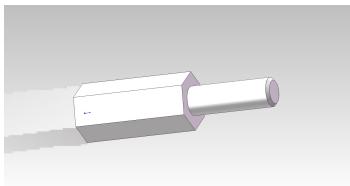
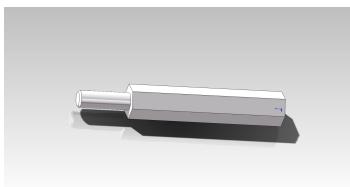
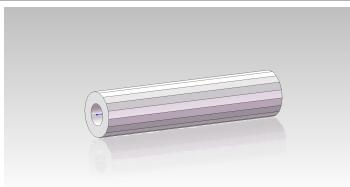
| name | view | quality | note |
|--------|---|---------|------|
| XF-5-2 |  | 4 | |
| XF-5-3 |  | 4 | |
| XF-5-4 |  | 8 | |
| XF-5-5 |  | 8 | |
| XF-5-6 |  | 12 | |
| XF-5-7 |  | 4 | |
| XF-5-8 |  | 1 | |
| XF-5-9 |  | 2 | |

| | | | |
|-----------|---|---|--|
| XF-5-10 |  | 1 | |
| XF-5-11 |  | 3 | |
| XF-5-13 |  | 2 | |
| XF-5-13-2 |  | 2 | |
| XF-5-20 |  | 2 | |
| XF-5-21 |  | 2 | |
| XF-5-21-2 |  | 2 | |
| XF-5-22 |  | 2 | |



| | | | |
|-----------|--|----|--|
| XF-5-22-2 | | 2 | |
| XF-5-23-2 | | 2 | |
| XF-5-23-3 | | 2 | |
| XF-5-23 | | 2 | |
| XF-5-24 | | 4 | |
| XF-5-25 | | 2 | |
| XF-5-27 | | 16 | |
| XF-5-28 | | 2 | |

| | | | |
|----------|---|---|--|
| XF-5-29 |  | 2 | |
| XF-5-30 |  | 2 | |
| XF-5-A11 |  | 1 | |
| XF-5-A12 |  | 1 | |
| XF-5-A13 |  | 1 | |
| XF-5-A14 |  | 1 | |
| XF-5-A15 |  | 1 | |
| XF-5-A16 |  | 1 | |

| | | | |
|-------------------|---|----|--|
| XF-5-A18 |  | 1 | |
| XF-5-A19 |  | 1 | |
| XF-5-A171 |  | 2 | |
| XF-5-A172 |  | 2 | |
| Nylon rod m2*10 |  | 10 | |
| Nylon rod m2*8+6 |  | 6 | |
| Nylon rod m2*18+6 |  | 16 | |
| Metal rod m2*18 |  | 4 | |



| | | | |
|--------------------------------------|---|----|---|
| Metal rod m2*34 | A long, thin, cylindrical metal rod with a small hole near one end. | 3 | |
| Nylon screw m2*8 | A white plastic screw with a black hex head and a black cylindrical body. | 28 | Only used on the axles and rotation joints |
| Metal nut m2 | A silver metal hex nut. | 74 | |
| Metal screw with pad and spring m2*8 | Two metal screws with small metal pads attached to their heads. | 88 | Used to connect parts and servos |
| White metal screw m2*8 | A cluster of white metal screws arranged in a circular pattern on a blue background. | 2 | Used to attach the mini servo pads to mini servos |
| Black metal screw m1.4*8 | A single black metal screw with a Phillips head. | 16 | Used to attach servo pads and parts together with XF-5-27 |
| Servo pad | A circular metal plate with several holes around its perimeter and a central mounting hole. | 14 | |



| | | | |
|-------------------------------------|--|----|--|
| Mini servo pad | | 2 | |
| Micro metal gear servo | | 14 | |
| Mini plastic gear servo | | 2 | |
| Power Rhythm 32 servo control board | | 1 | User guide: https://github.com/AiFrame/Power_Rhythm_32/tree/master/Guide |
| Bluetooth module | | 1 | User guide: https://github.com/AiFrame/Bluetooth_module/tree/master/Guide |
| Power board | | 1 | |
| Battery | | 1 | |



| | | | |
|----------------------|--|---|--|
| Joystick 1 Bluetooth | | 1 | Manual: https://github.com/AiFrame/Joystick/tree/master/Manual |
| Battery charger | | 1 | |
| Micro USB cable | | 1 | |

Assemble:

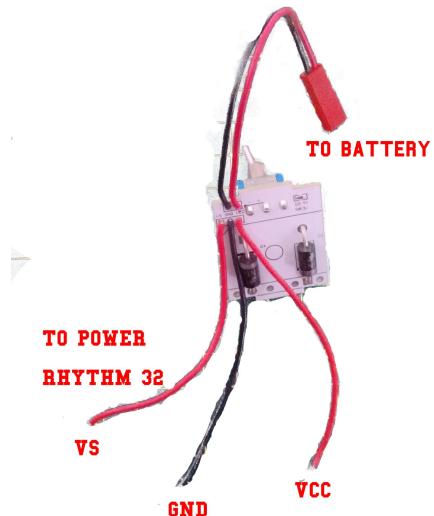
We have made a video showing how to assemble a complete Apollo, here is the Youtube video link:

<https://www.youtube.com/watch?v=almeWtCxFCc>

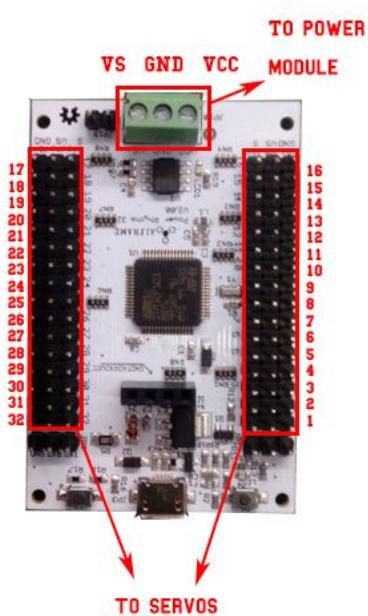
Please pay attention, assembling a new version Apollo is a bit difference: In the video, the plastic screws is used on the axle and rotational joints, and the metal screws is used to attach parts together. And at the 1:58, the upper plastic rod needs to be replaced with the brass one as well as the upper one at 2:50, 4 plastic rods (18 + 6 mm) need to be replaced with brass ones (18 mm) without thread. Also the three longest (34mm) plastic rod needs to be replaced with brass ones too. **The black metal screws (m1.4*8) do not needed to be assembled.**

Electronics Connection:

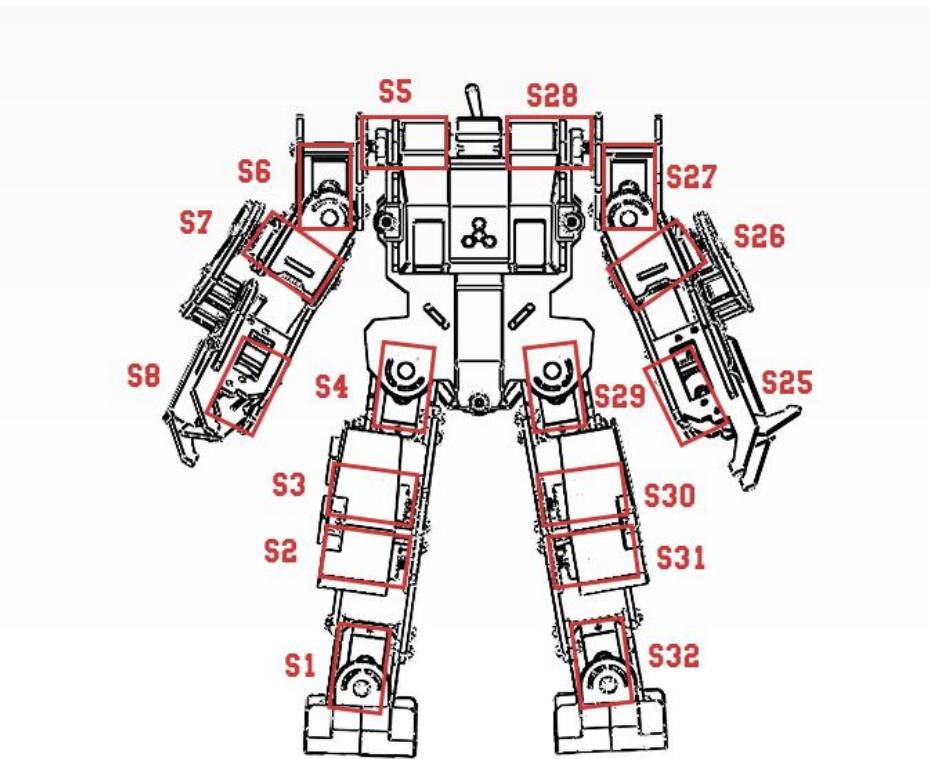
- Power board



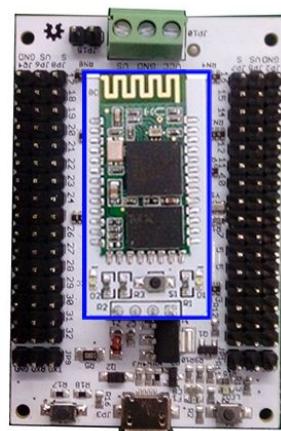
- Power Rhythm 32



- Servos

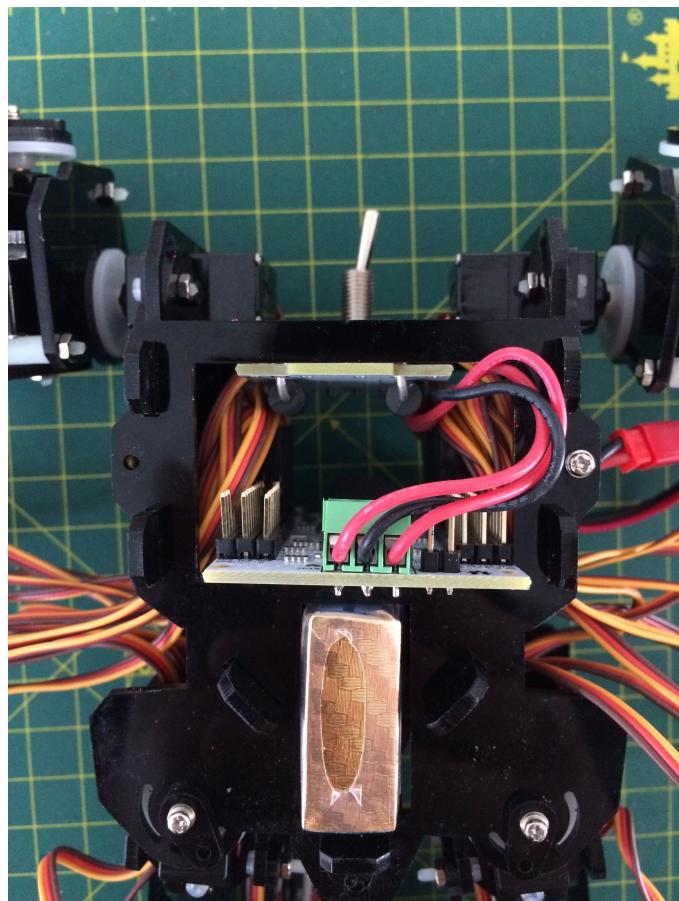


- Bluetooth module

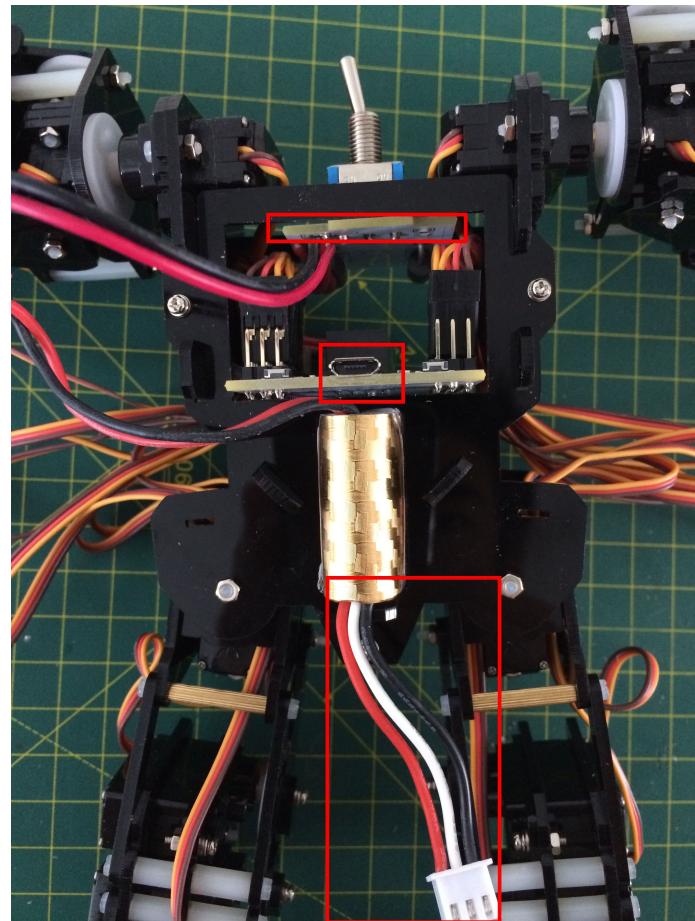


Place The Battery And Boards:

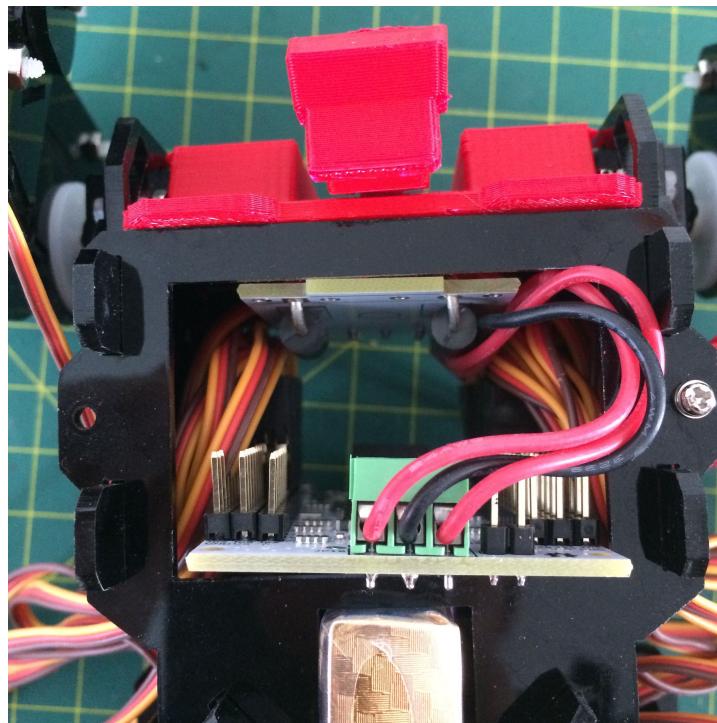
- Place the battery and boards as shown below. Make sure that the USB port is on the back side, and the charging cable is on the lower side.
Front view



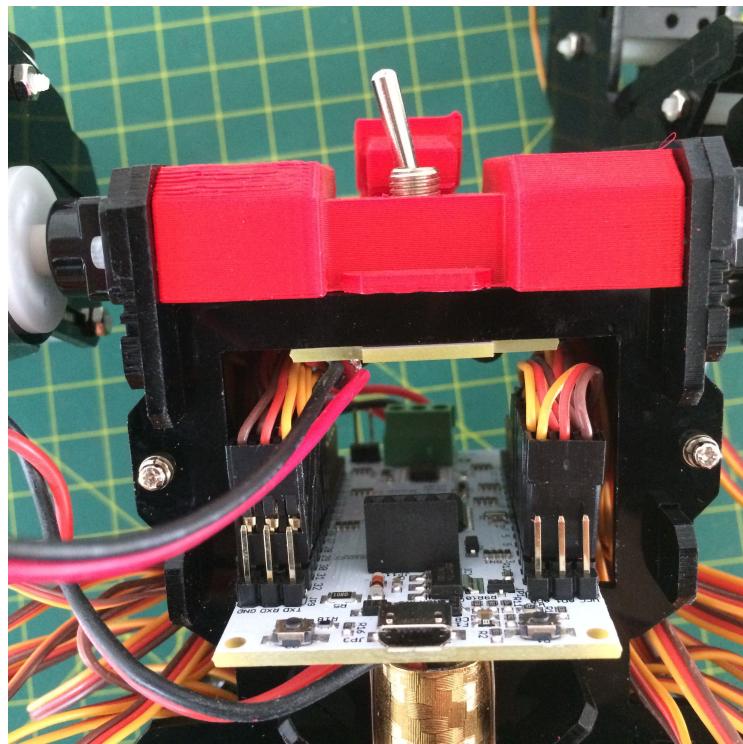
Back view:



- Assemble the upper armor, the switch must goes through it
- Front view:



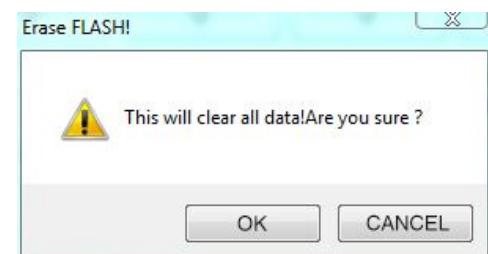
Back view:



Initialize Apollo:

- Initialize Power Rhythm32:
 1. Install the drivers for Power Rhythm 32 (see how to install the drivers: https://github.com/AiFrame/Power_Rhythm_32/tree/master/Guide)
 2. Get Connected With Servo Rhythm Controller (see how to use the software: https://github.com/AiFrame/Servo_Rhythm_Controller/tree/master/Manual)
 - a. **Make sure the robot is powered off**, plug Power Rhythm 32 to your computer via USB cable
 - b. Wait for Windows to recognize it
 - c. Open Servo Rhythm Controller
 - d. Select the right COM port number in the list box,

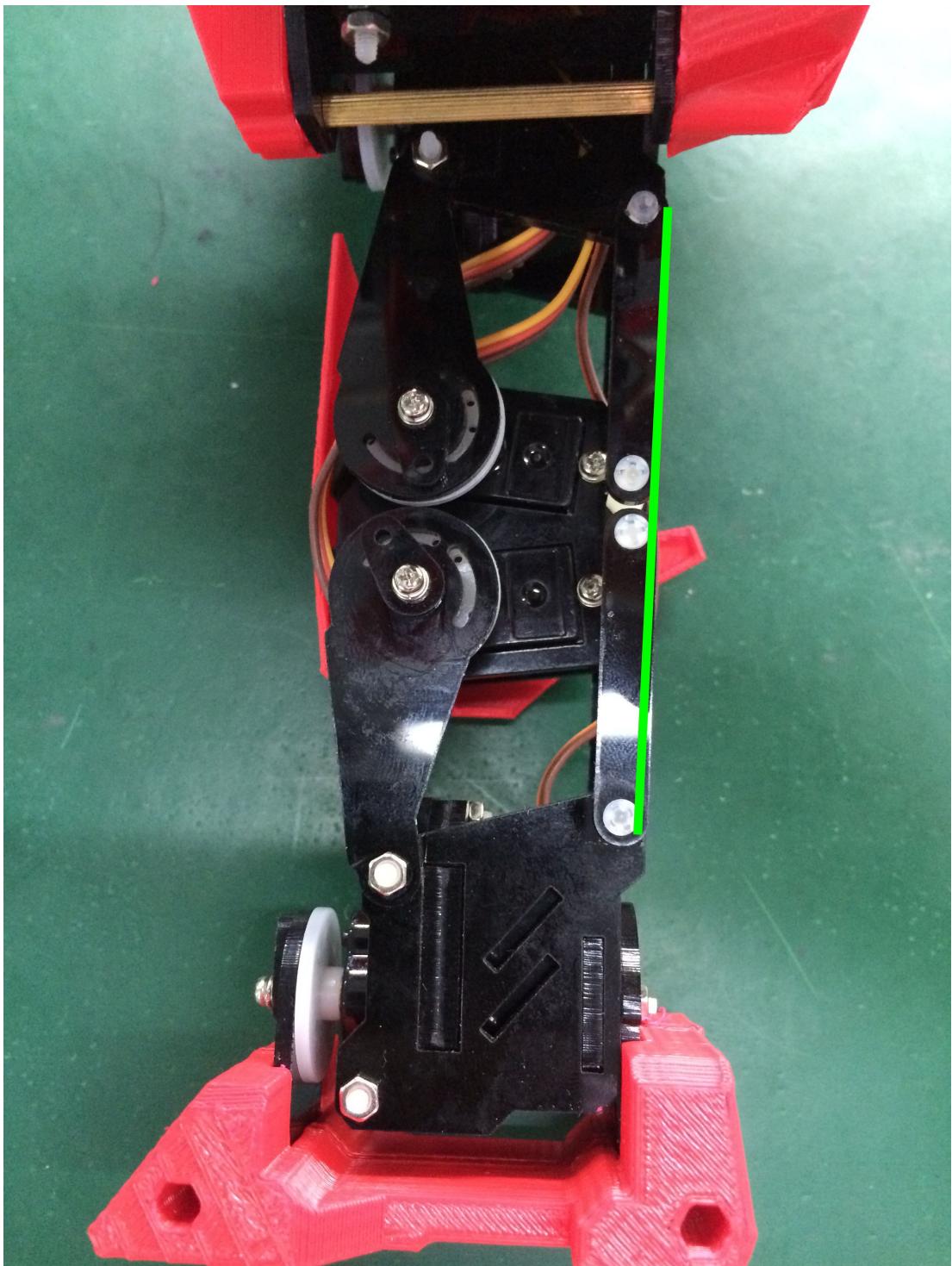
click on the "OPEN" button to connect the Power Rhythm 32. If you don't know the COM port number you are using, just try from COM1, COM2 etc... Do not change any other configurations.
 3. Click the "ERASE FLASH" button, click the "OK" button on the popping up message box
 4. Click "OK" when finish erasing flash, this will set the flash data at the initial state

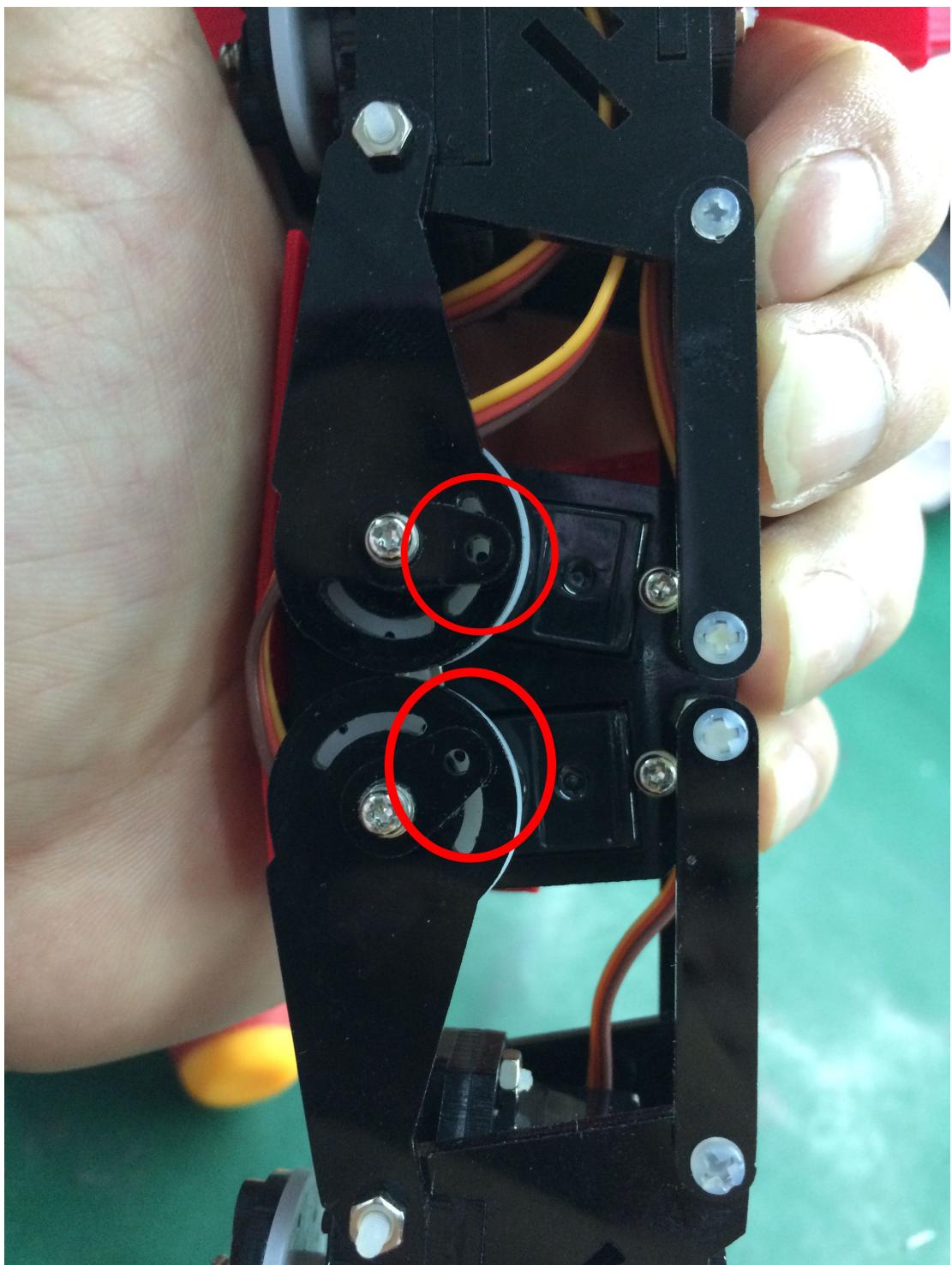




5. Click "CENTER ALL" button
 6. Click "STANDBY" button set the signal output at the initial state, when finish click "OK", **click "EXIT" and disconnect Power Rhythm 32 from PC**
- Initialize the joints:
 1. Power on the robot, when you hear the noise and the servos stop turning, go to the next step
 2. Adjust the joints to the positions shown in the pictures below, rotate the XF-5-27 parts to get the hole overlapped with one on the servo pads, then screw on and tighten the **black metal screws (m1.4*8)**

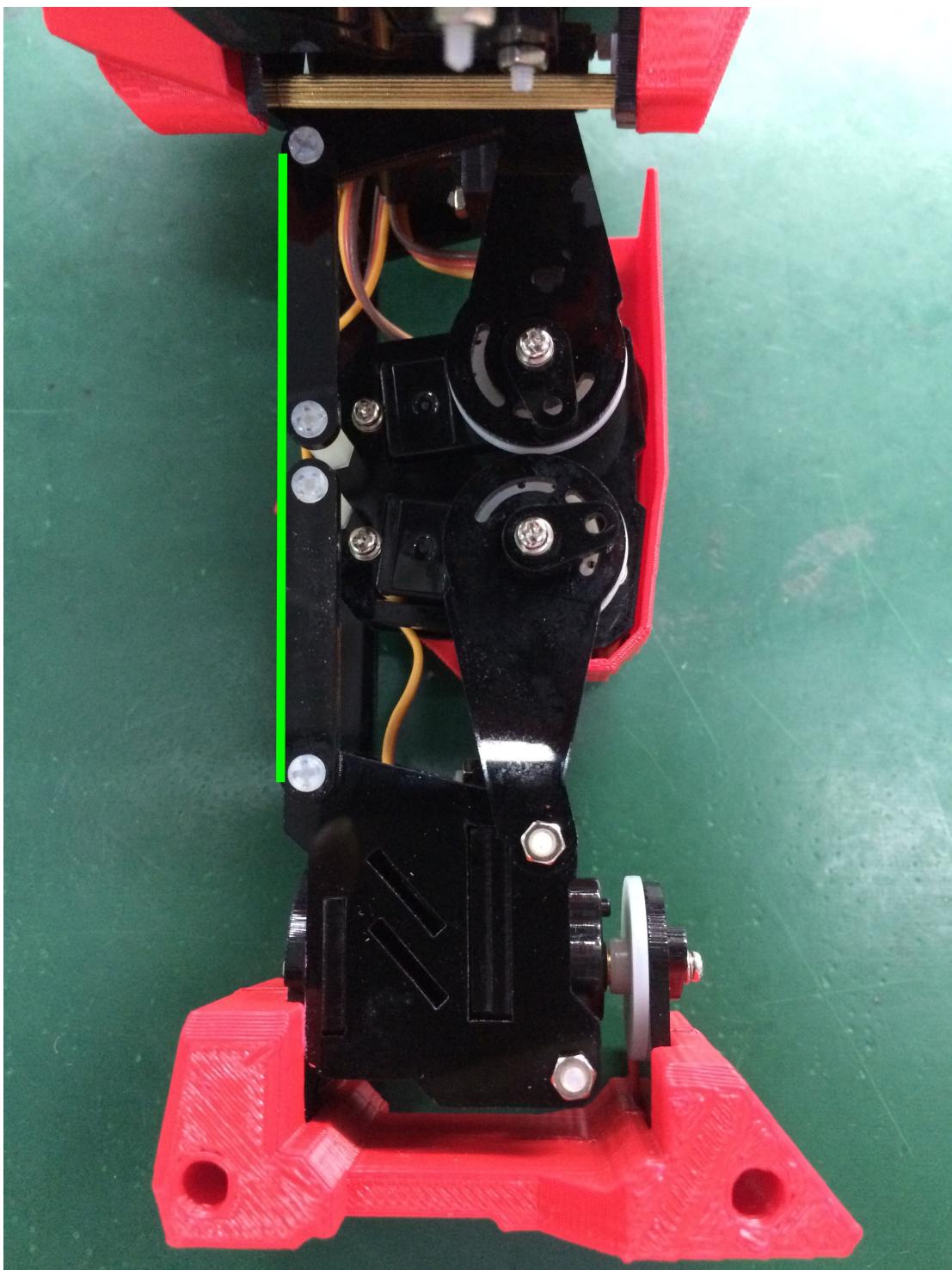
Left leg:

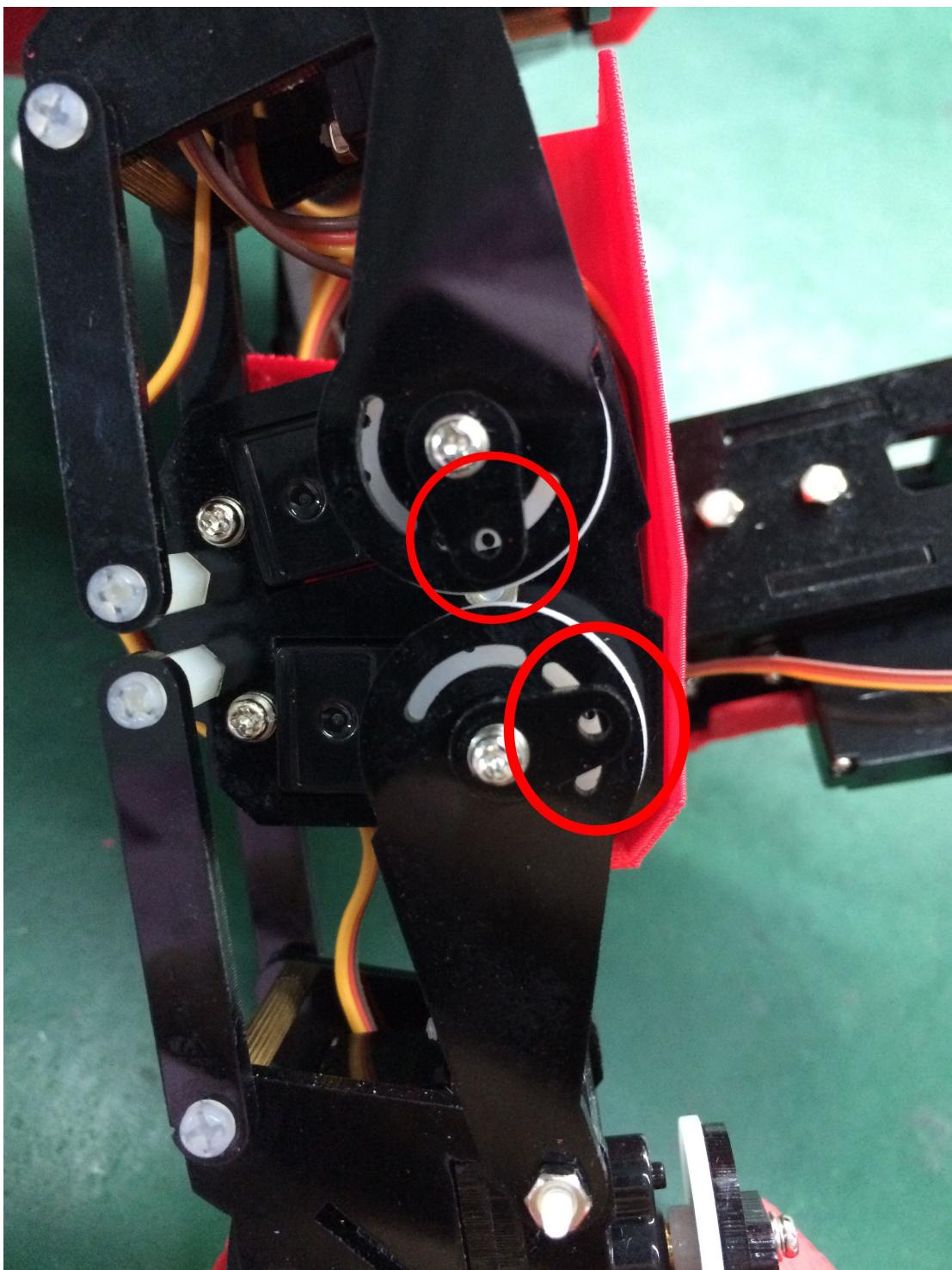


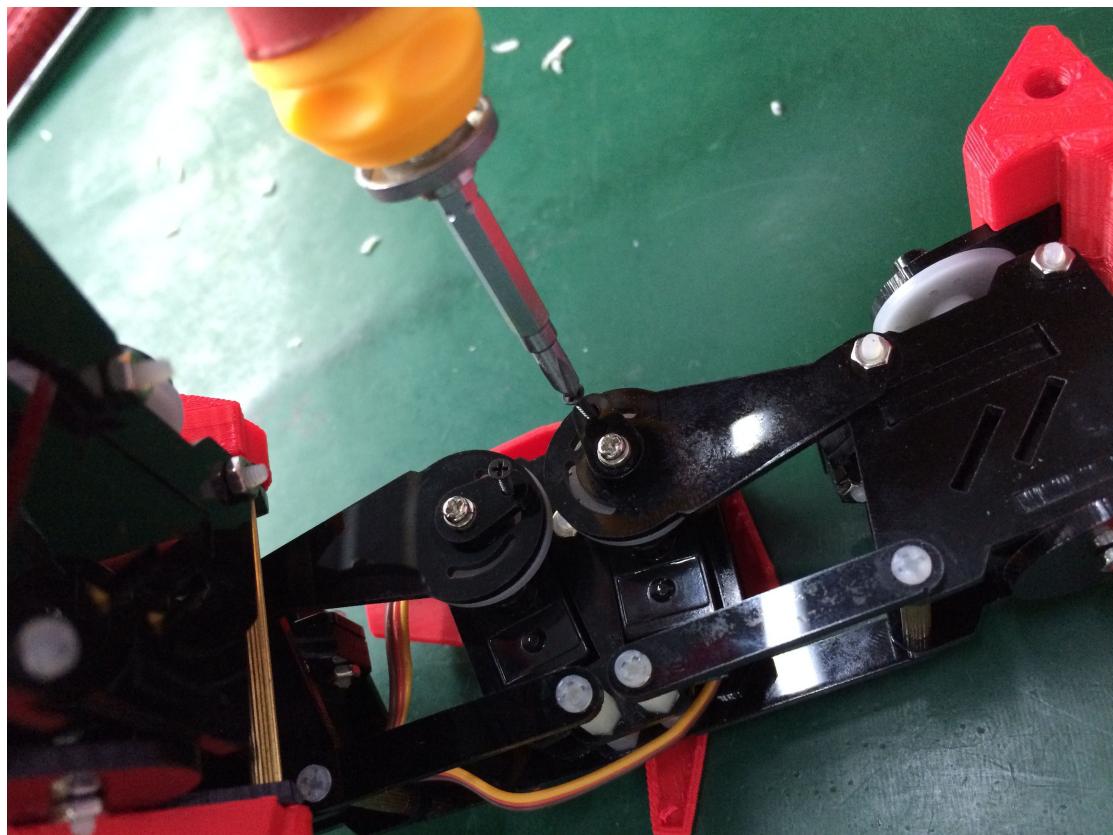




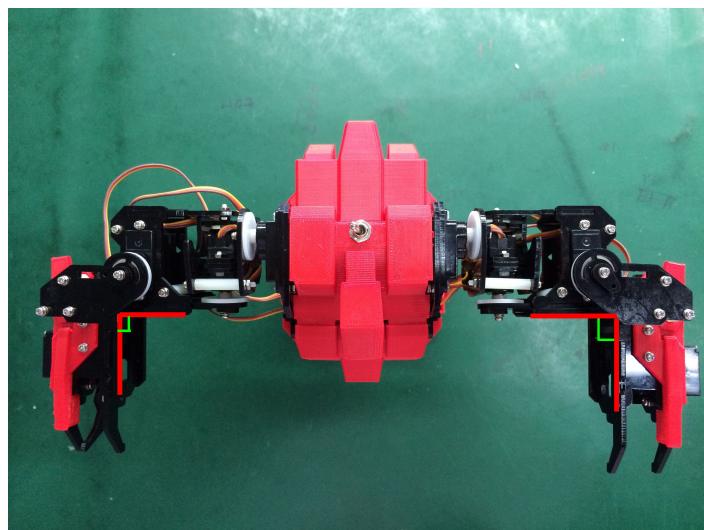
Right leg:



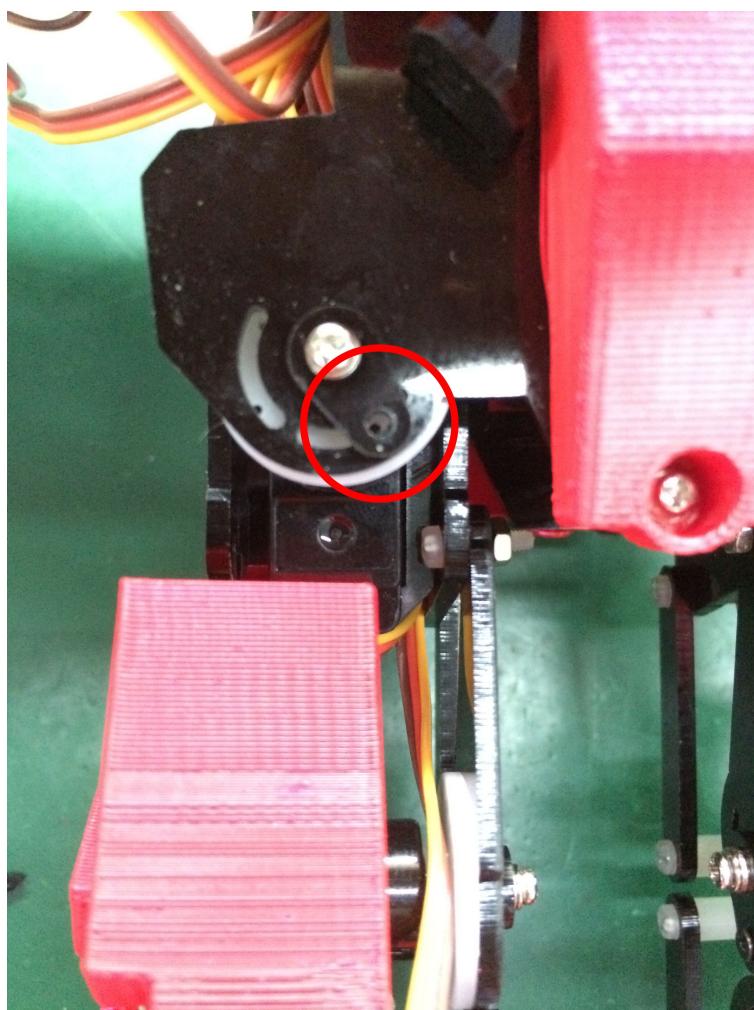
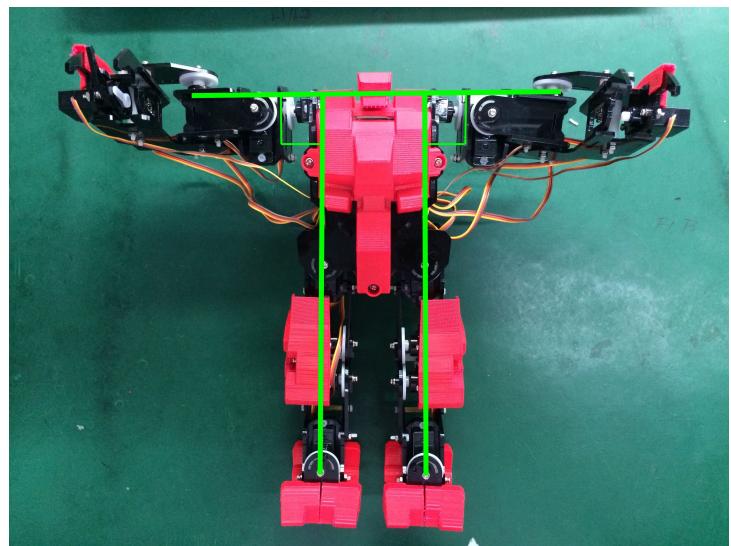


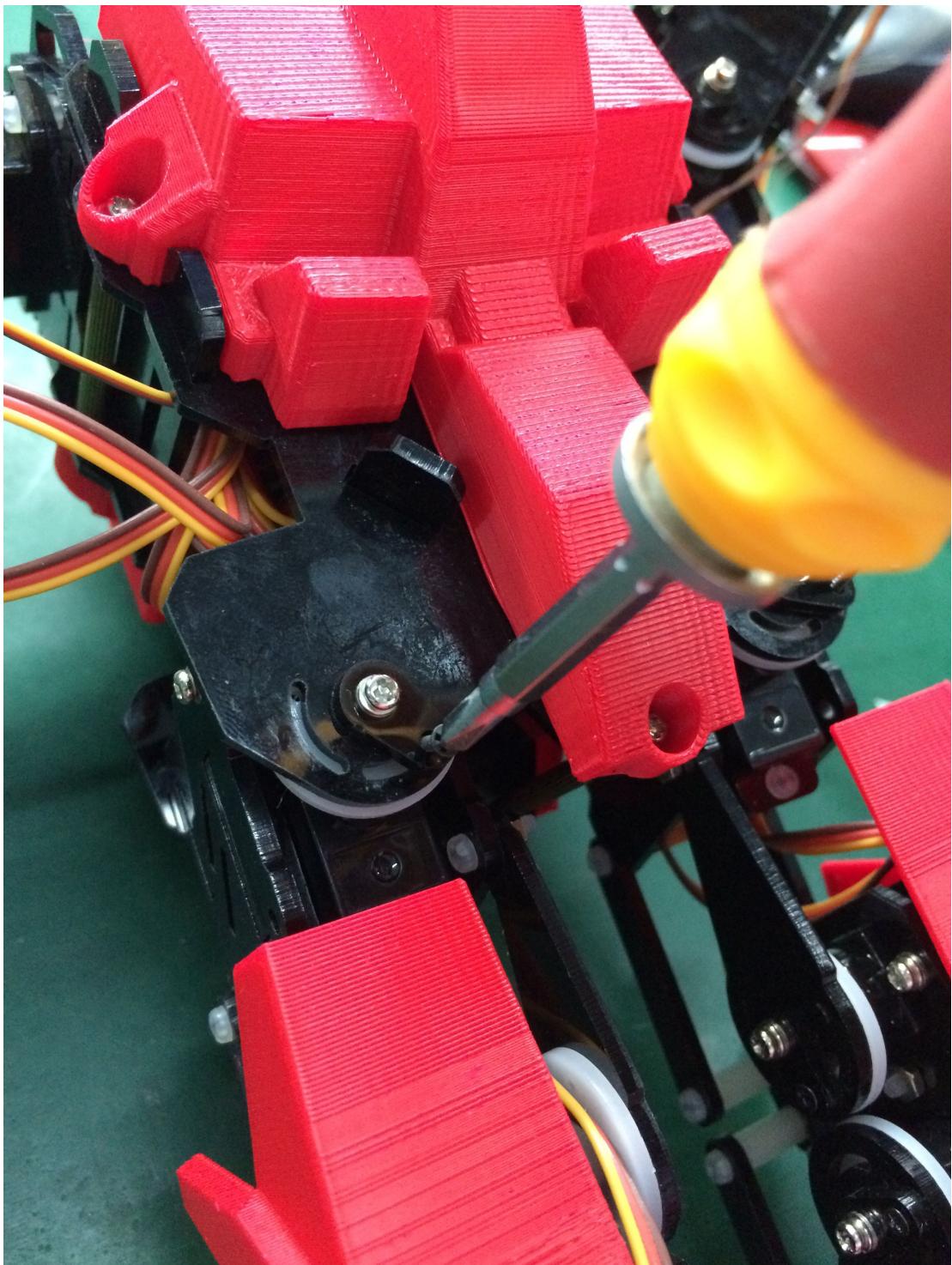


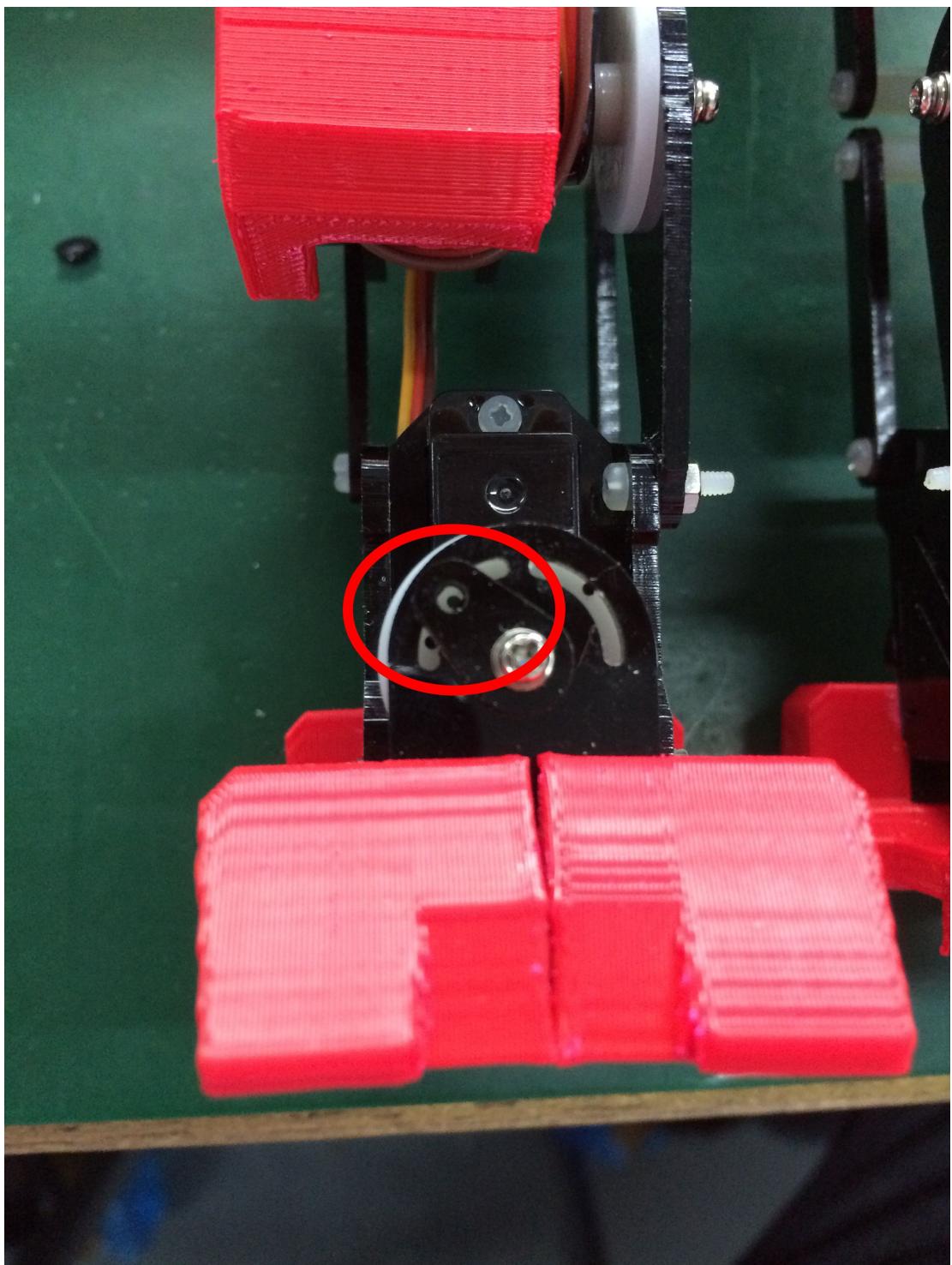
Top view:

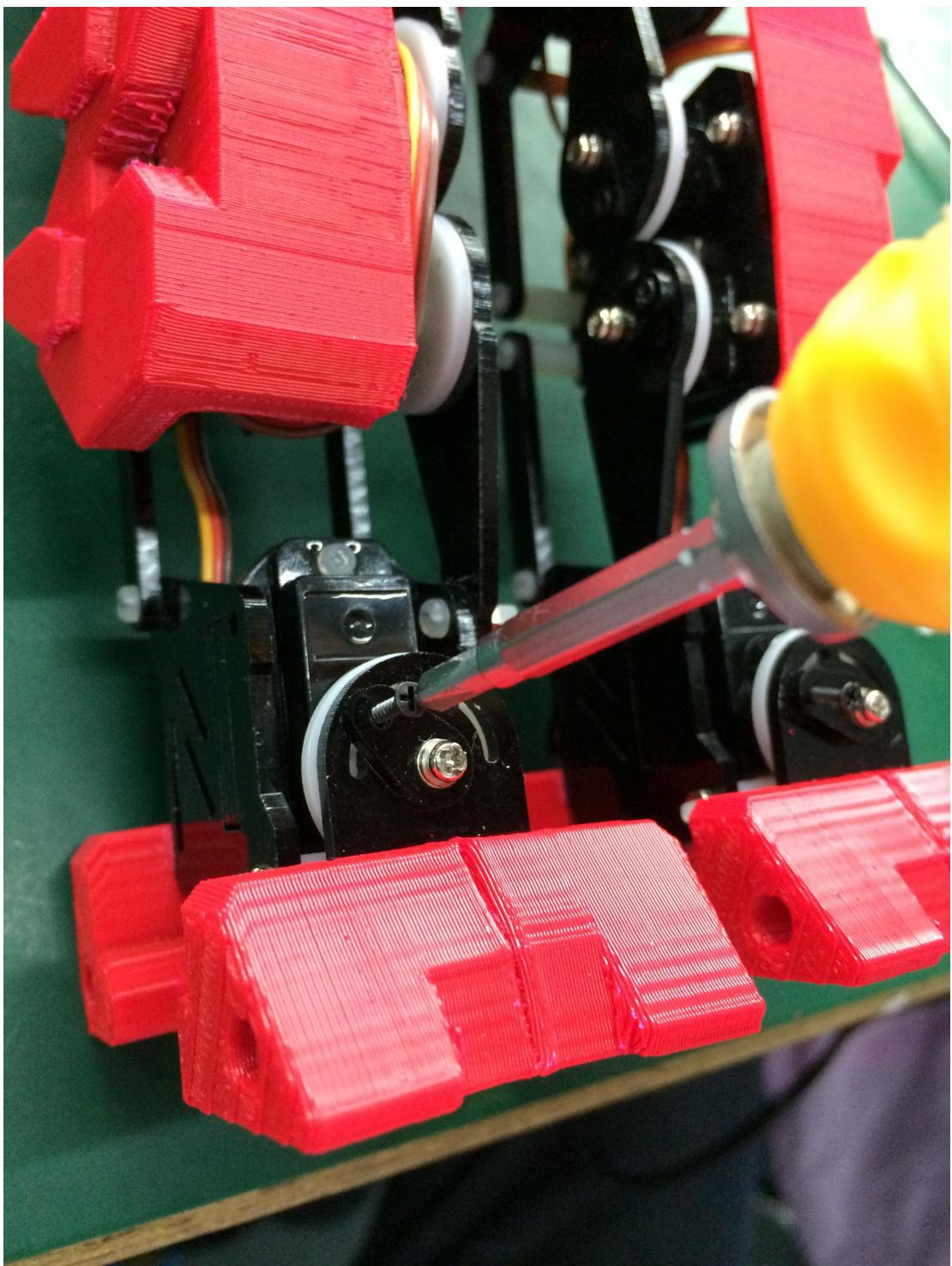


Front View:

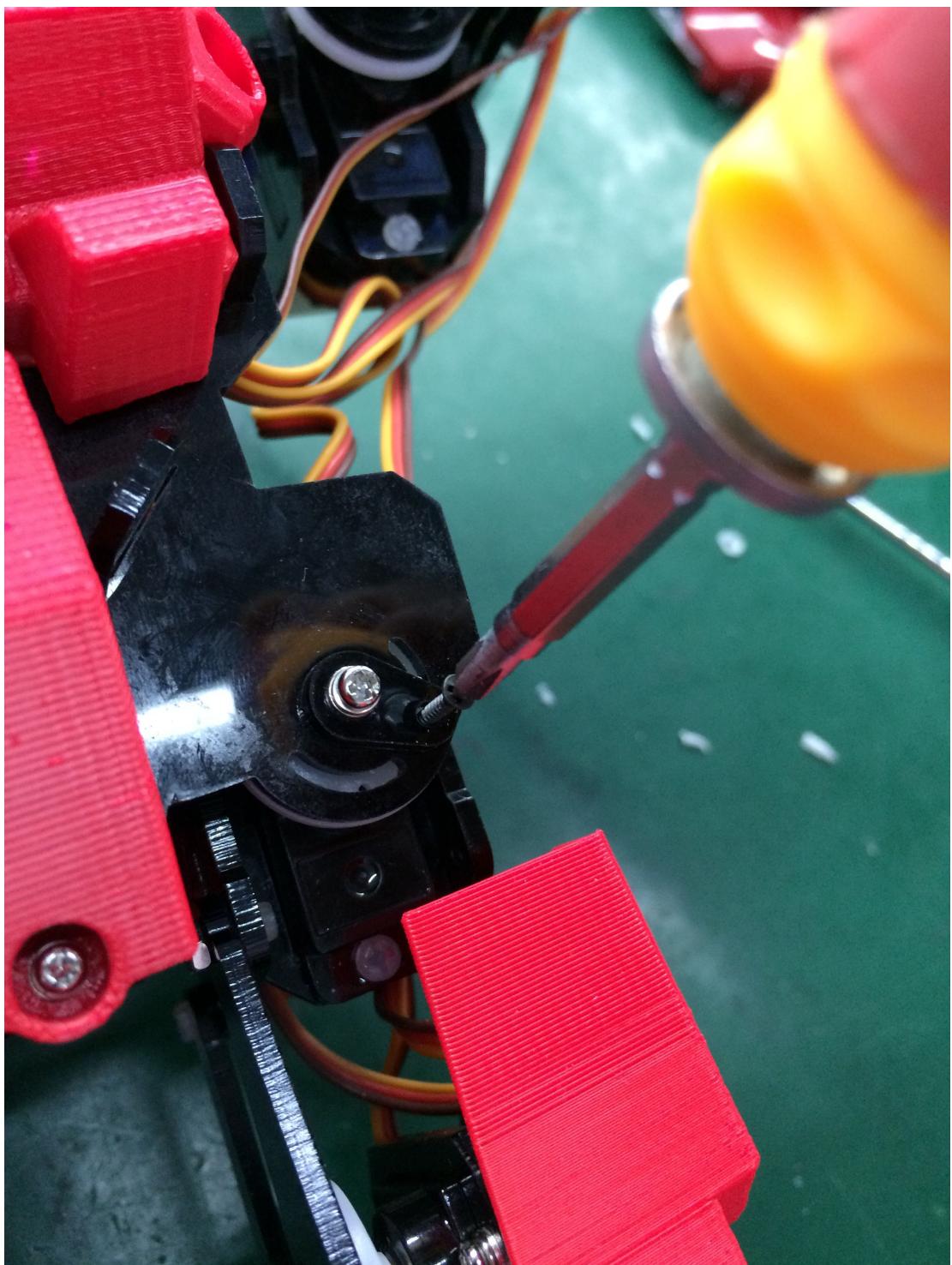


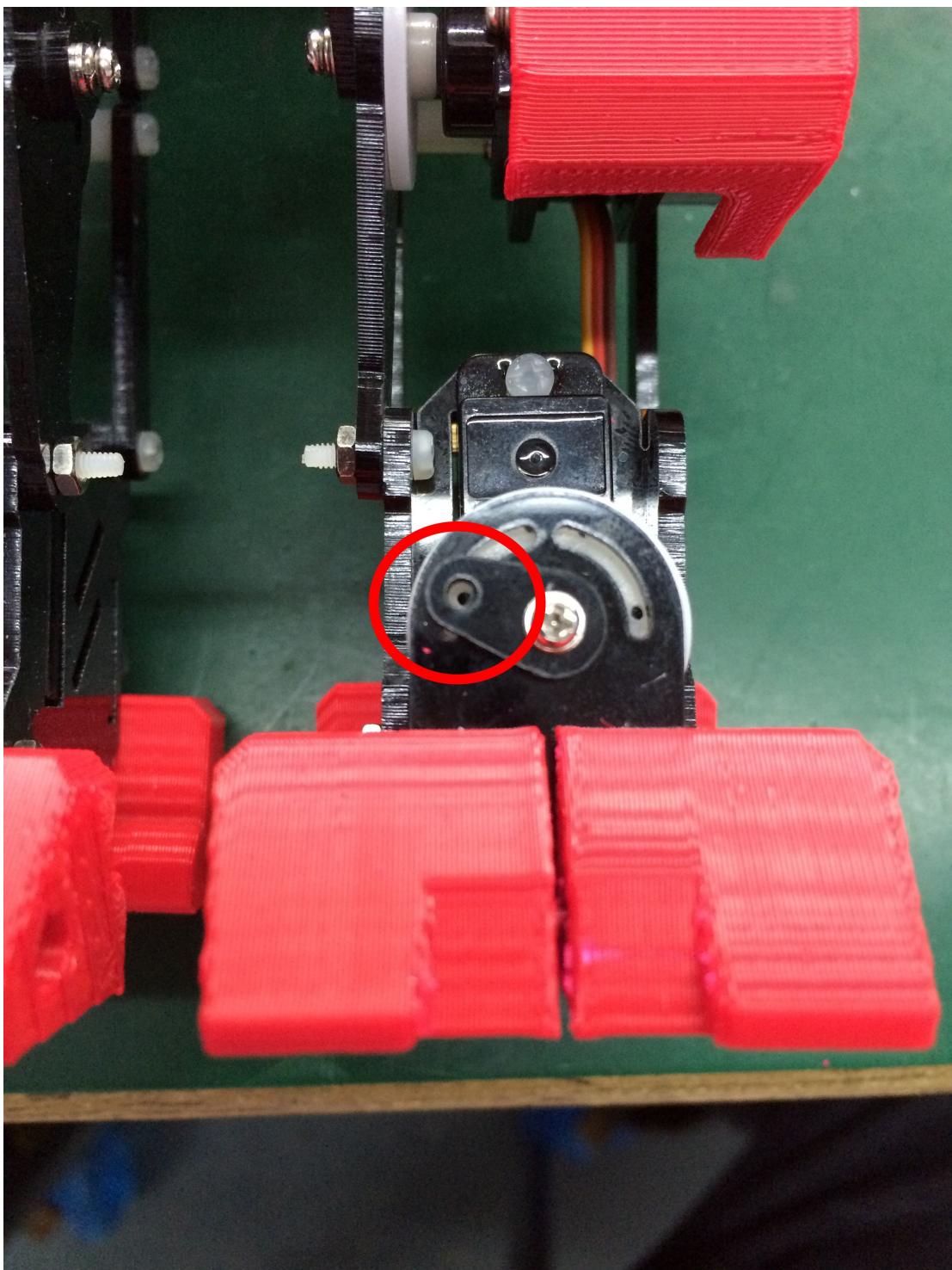


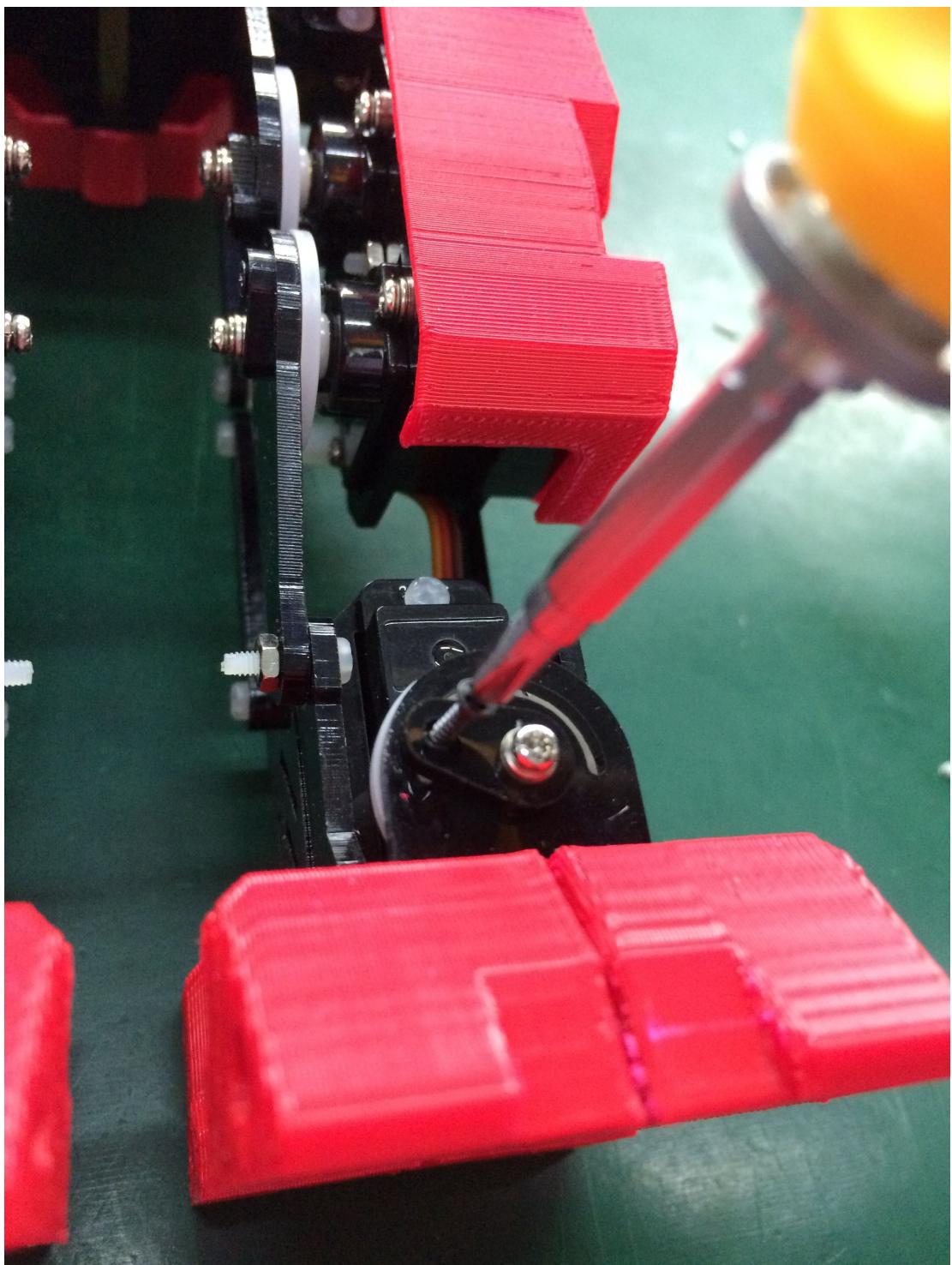




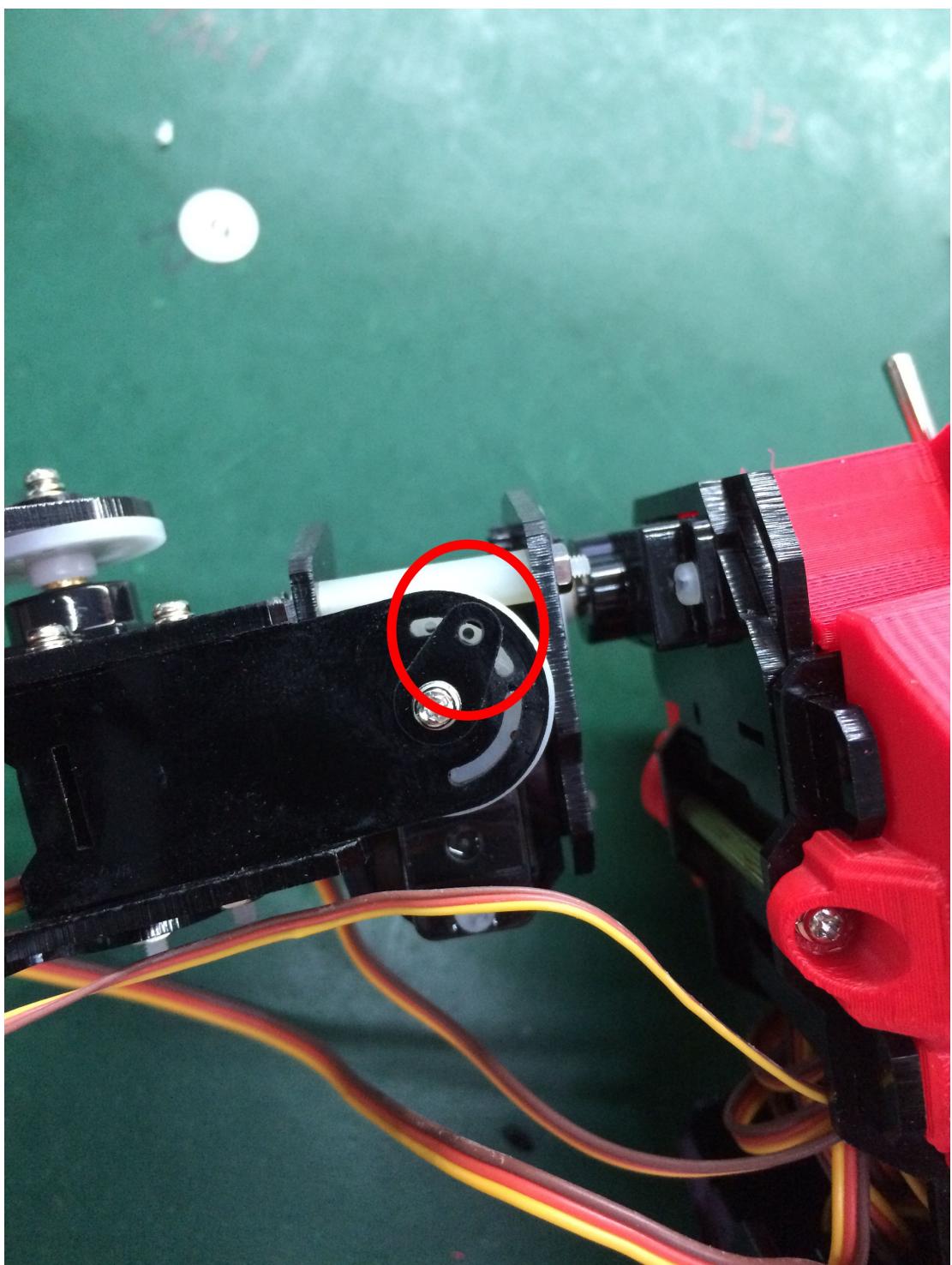


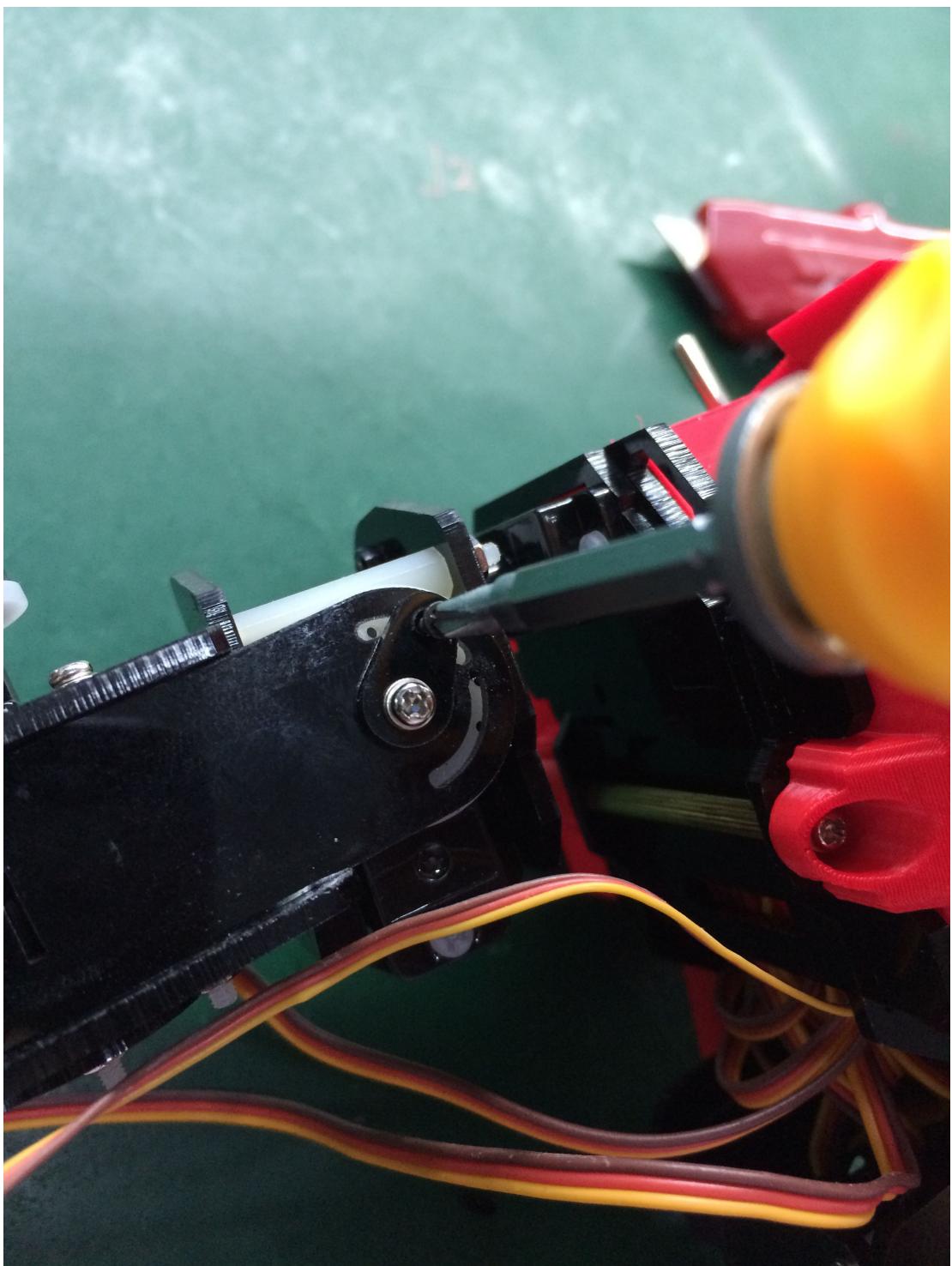


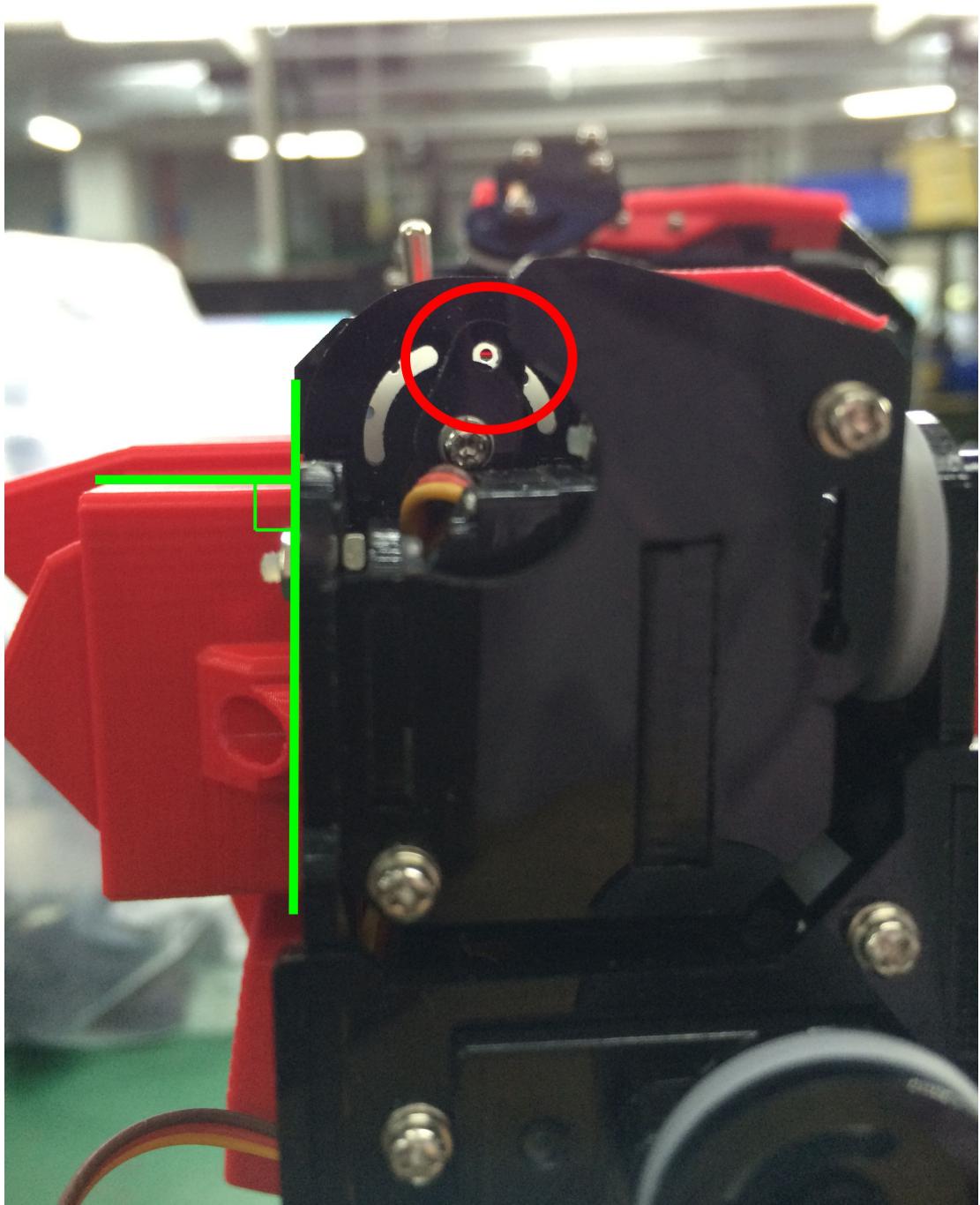


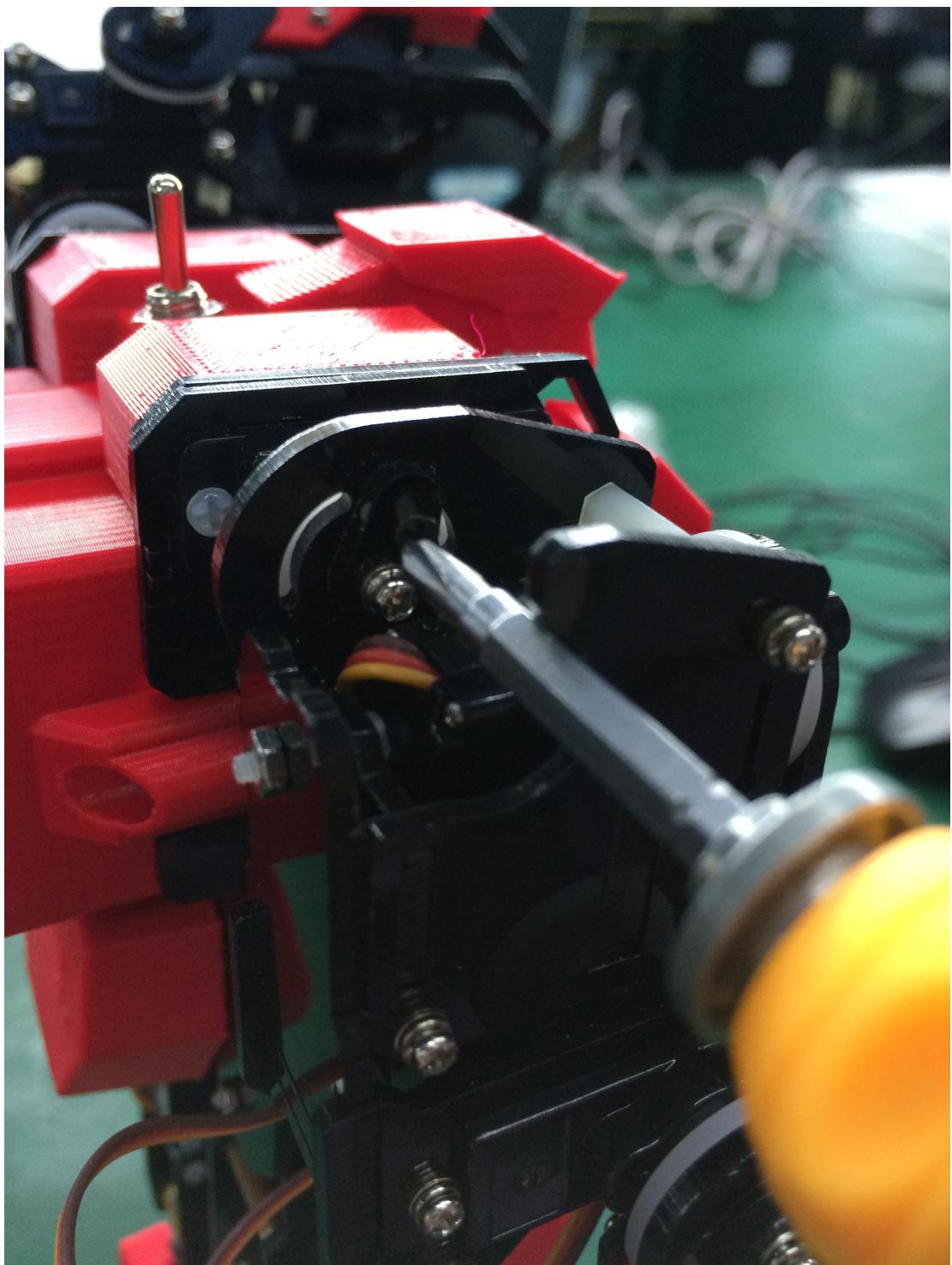


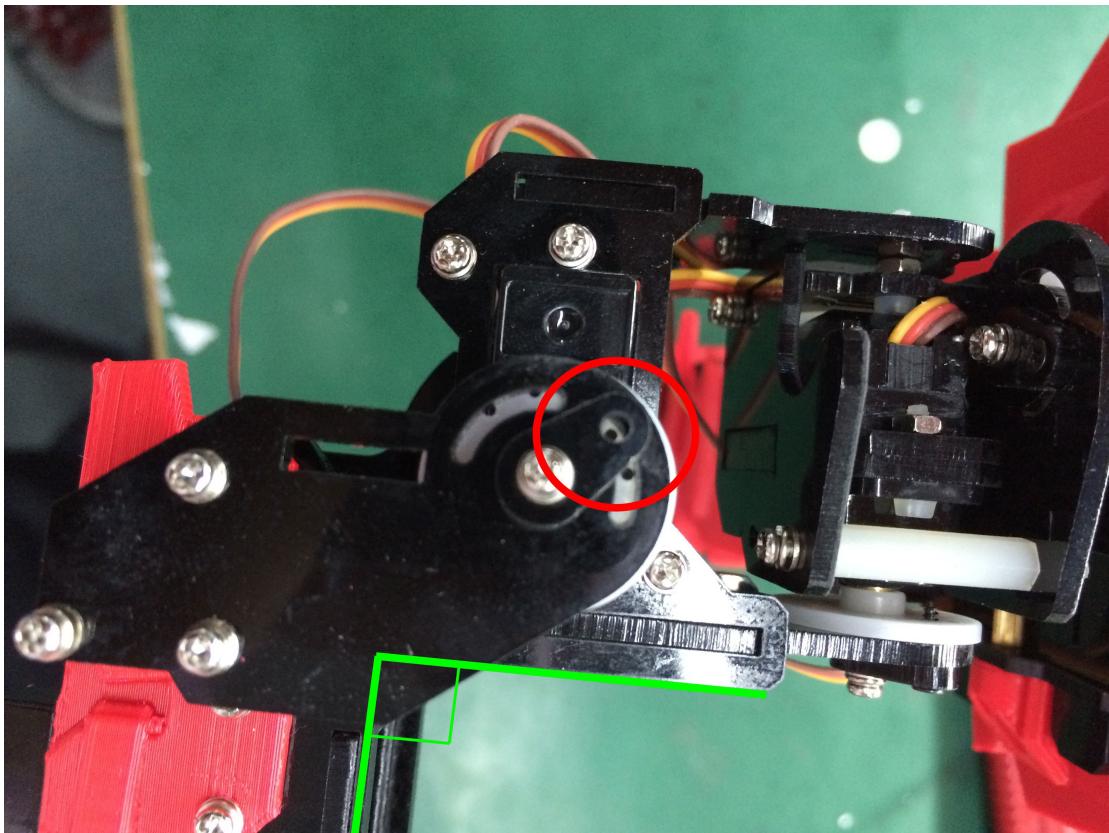
Left hand:







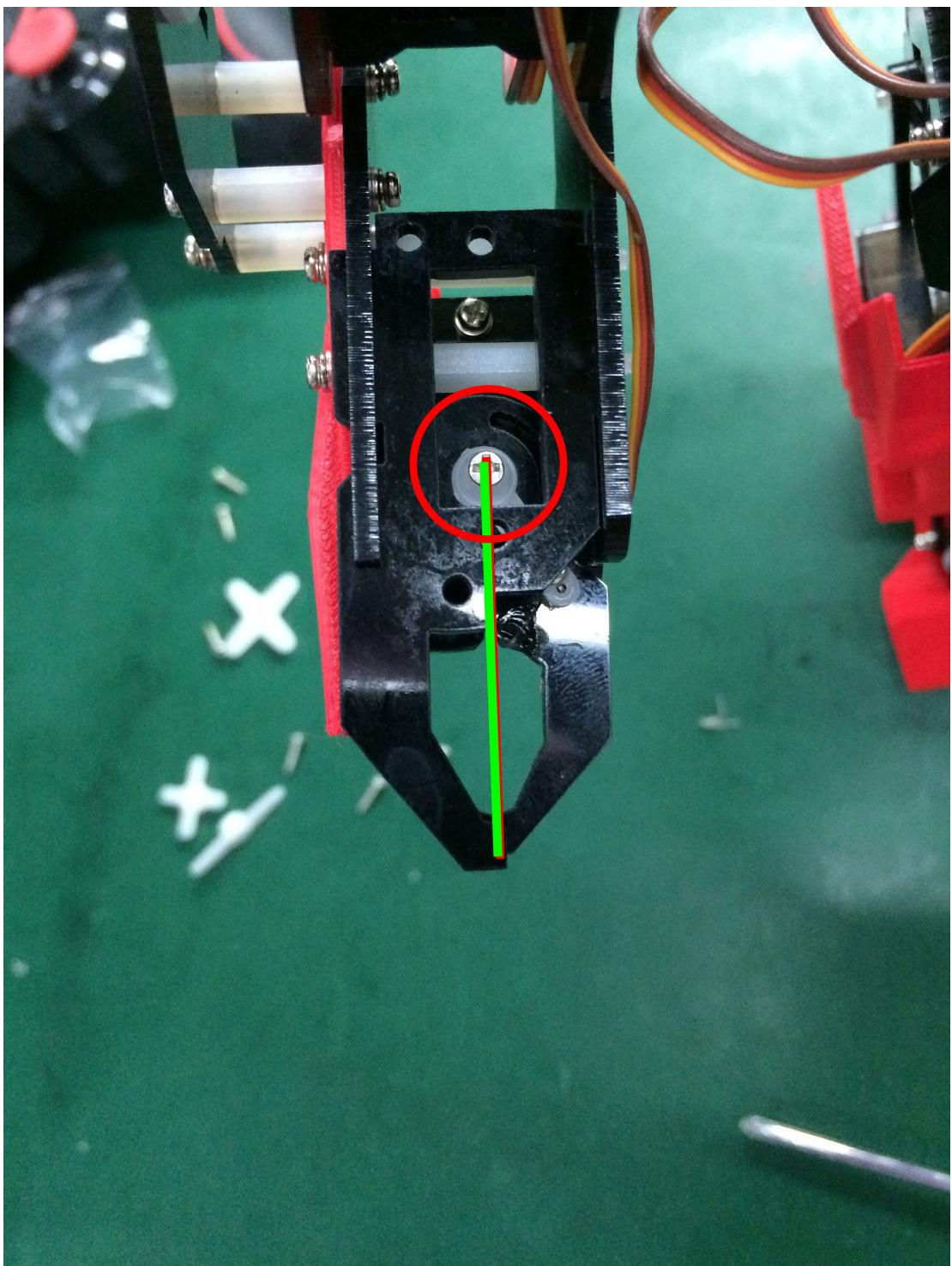




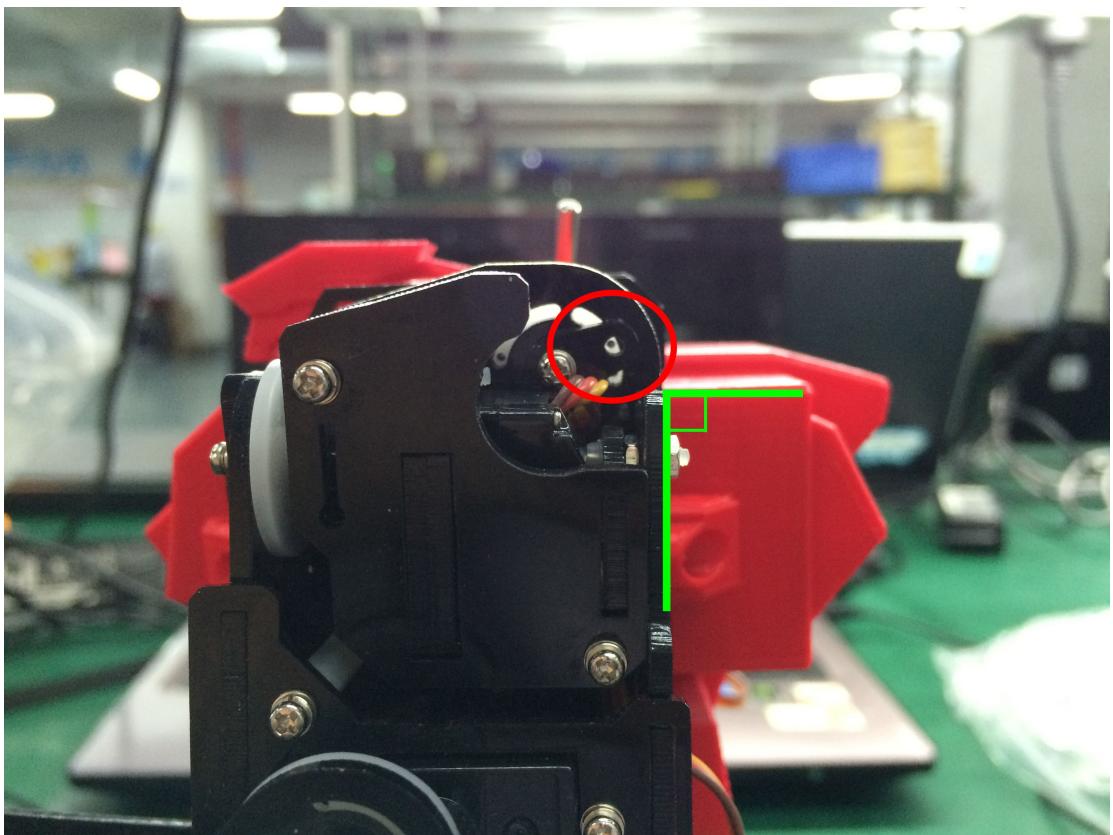
Use the black metal screws (m1.4*8) in the picture below:

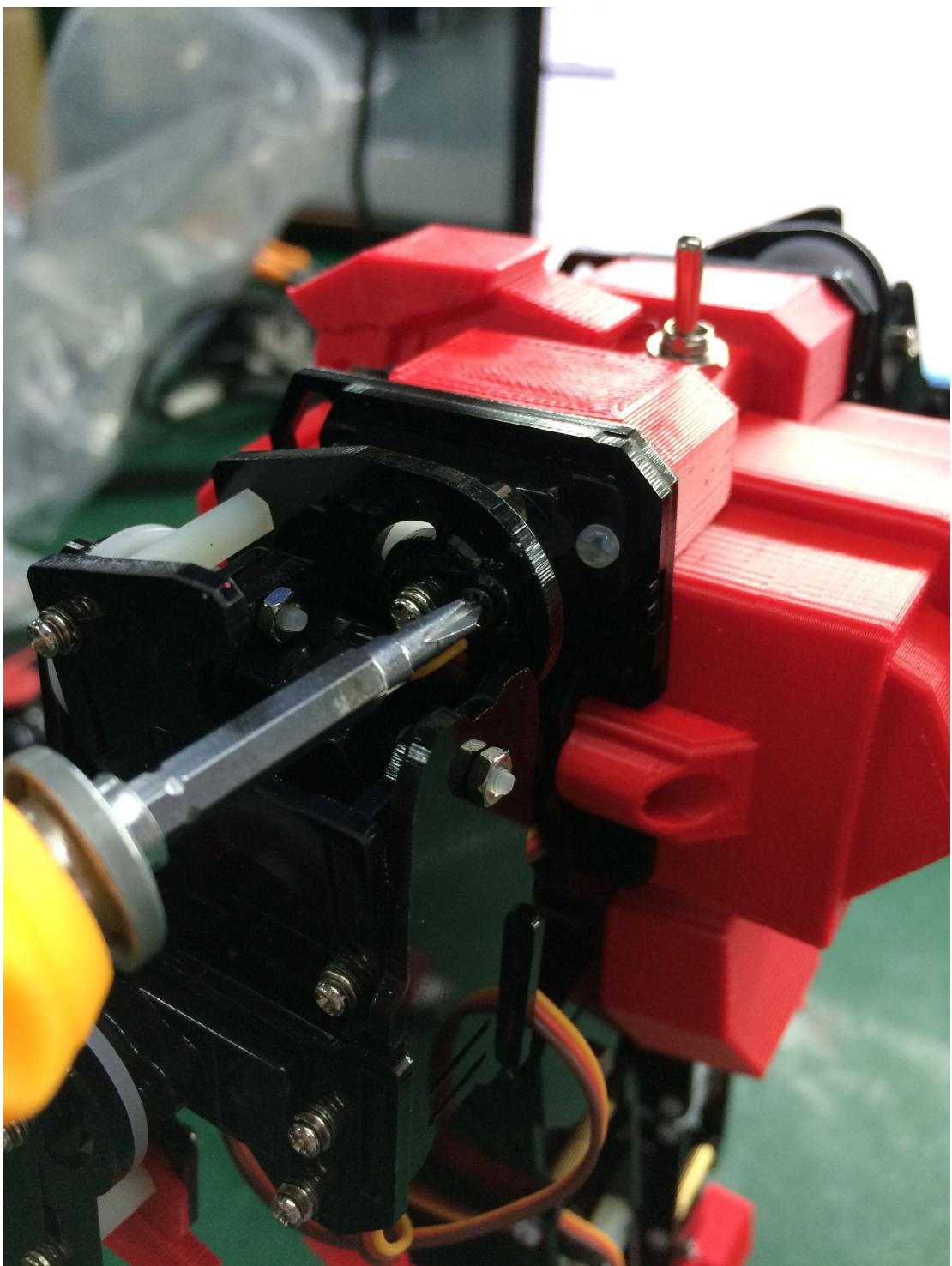


Use the white metal screws m2*8 in the picture below:

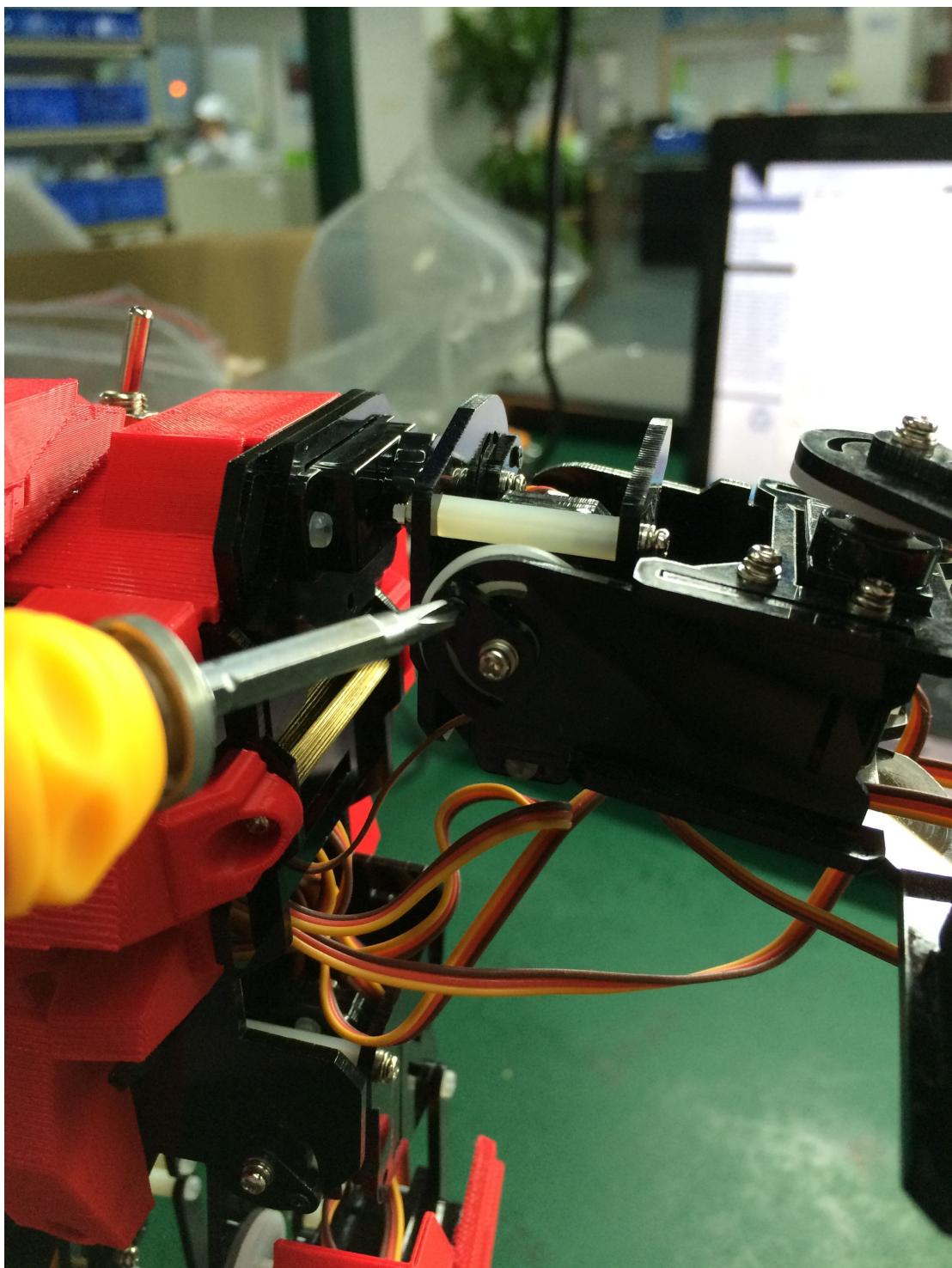


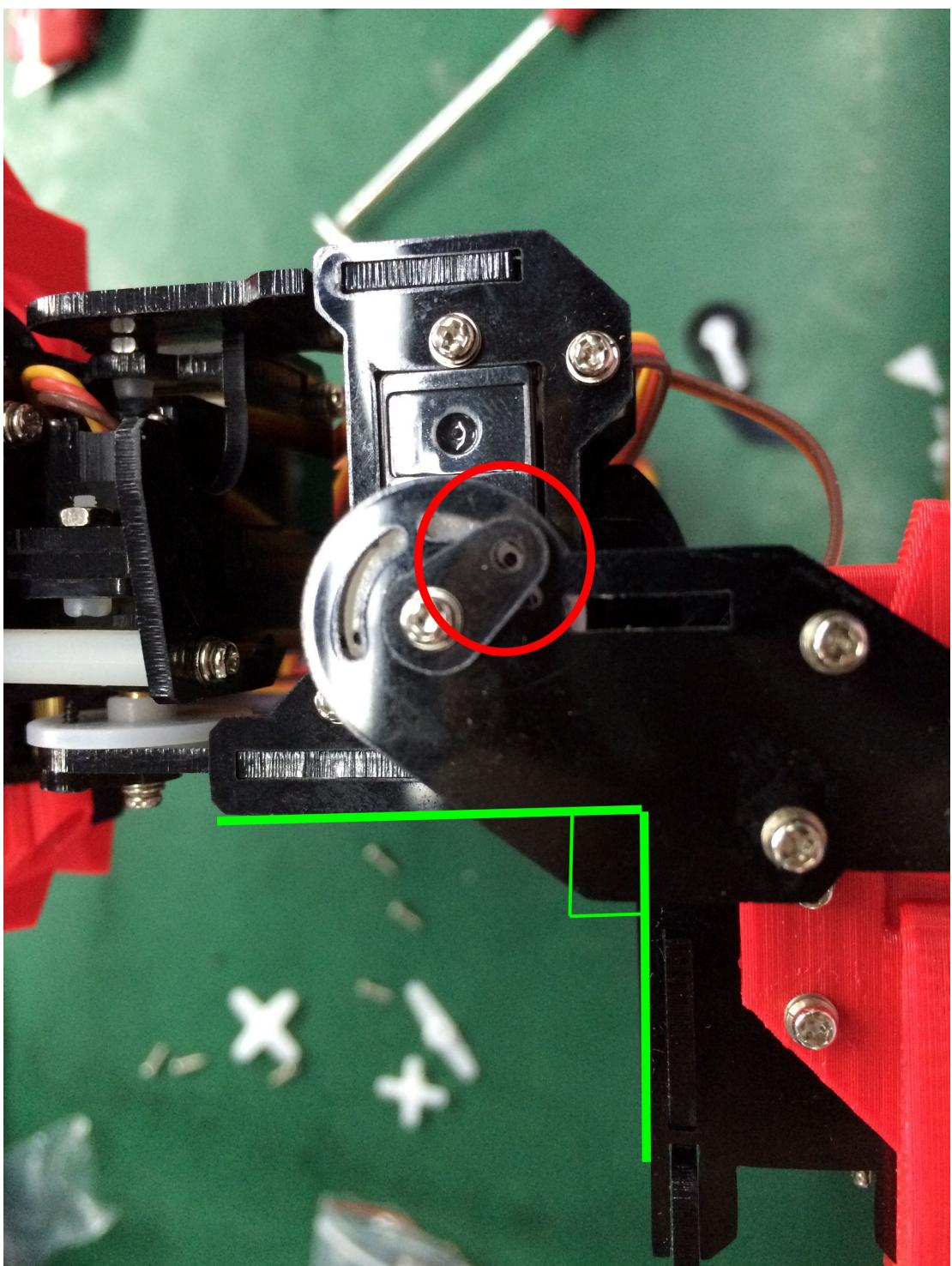
Right hand:

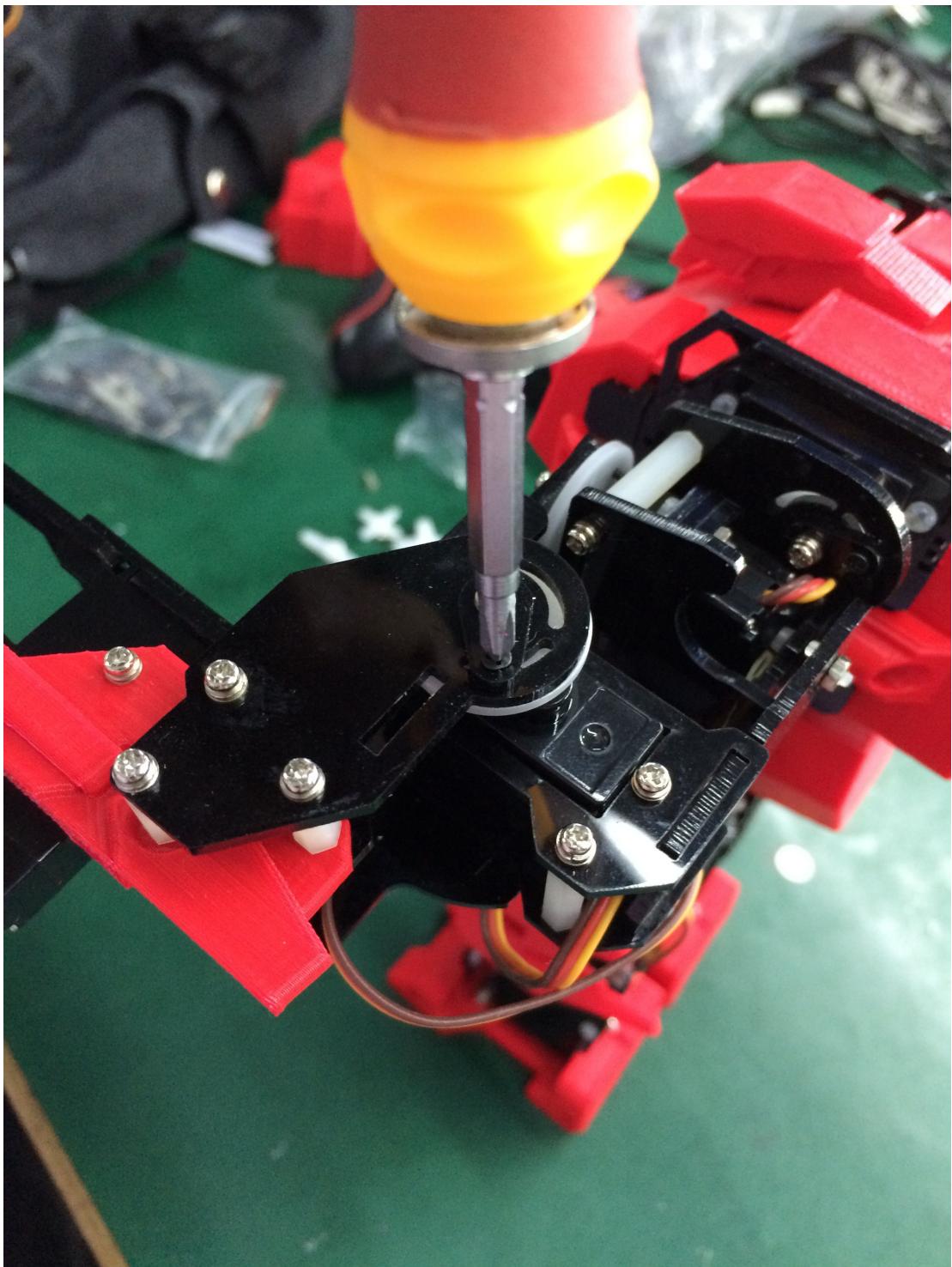








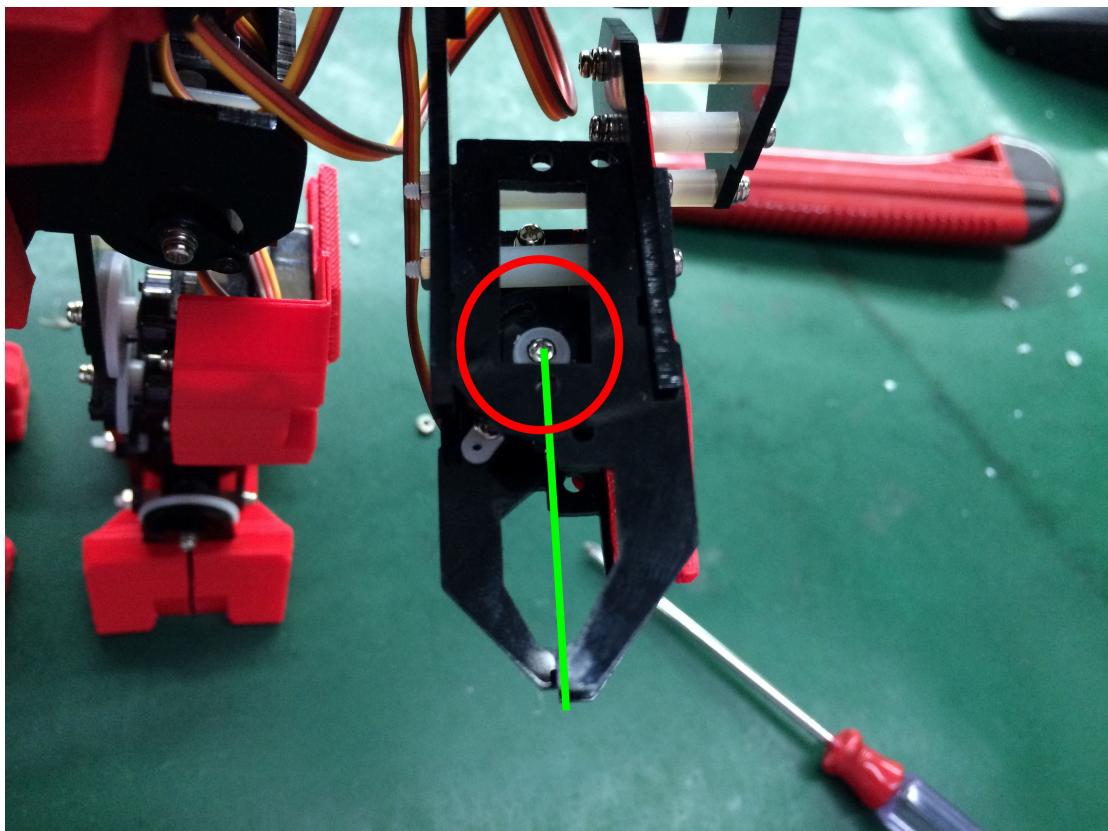




Use the black metal screws (m1.4*8) in the picture below:



Use the white metal screws m2*8 in the picture below:



Power off when all the steps are done

Import the commands:

- **Make sure the robot is powered off**, connect it to the PC via USB cable
- Open Servo Rhythm Controller, click “OPEN” button to open the COM port of Power Rhythm 32 (see how to use the software: https://github.com/AiFrame/Servo_Rhythm_Controller/tree/master/Manual)
- Import the “0STANDBY.txt” files, click “STANDBY” button to set up the standby position, change the value in edit box “TIME (MS)” to set up the time for robot getting back to standby position
- Import the NO.1 - 24 “.TXT” files one by one in order, click “DOWNLOAD” button to save the commands to the flash in robot, click “CLEAR” button before next importing

Controlling With Joystick:

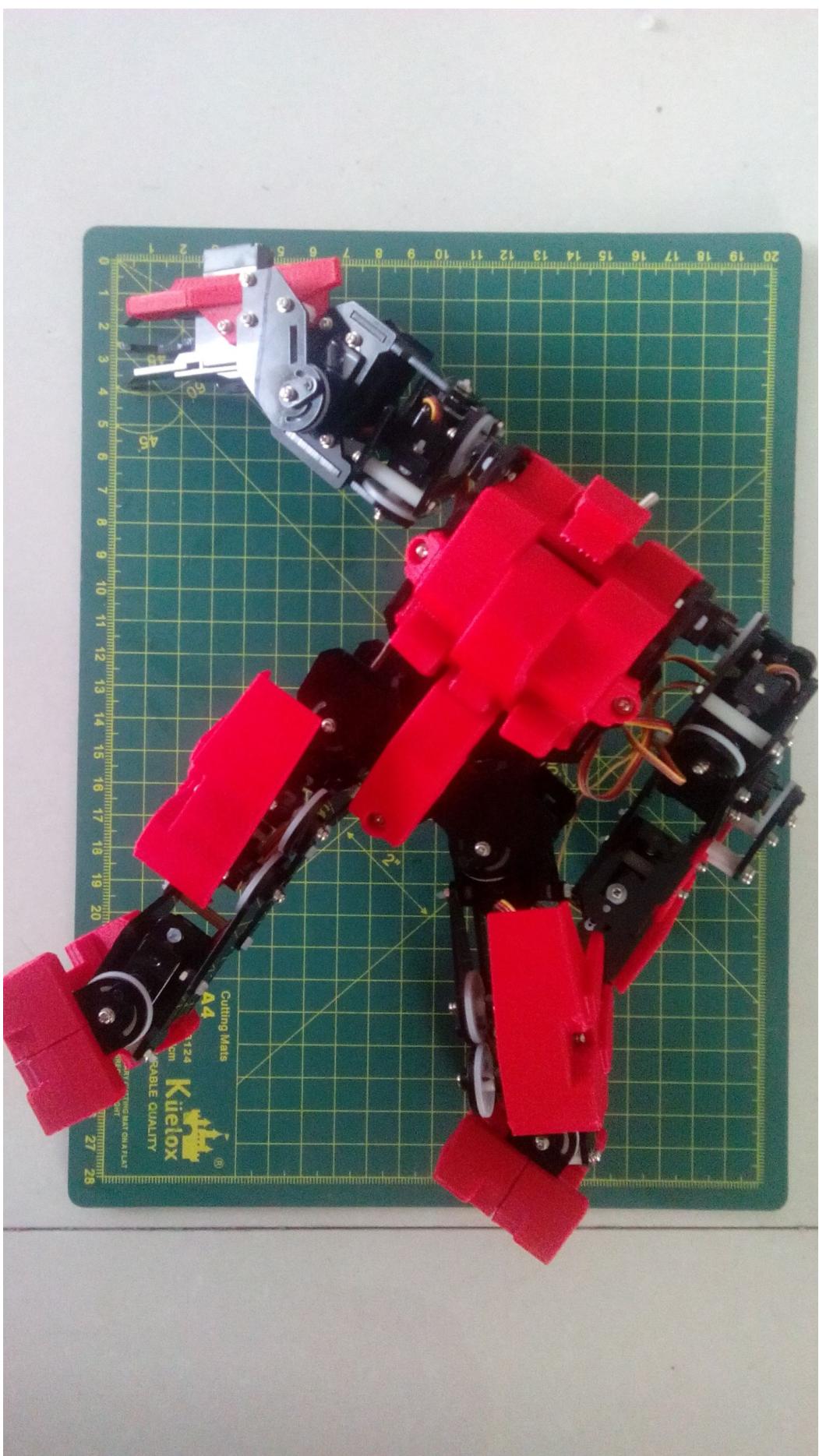
- Power on the Joystick and the robot at the same time, wait about 10 seconds for auto setup and connection via Bluetooth.
- Press and hold the key(s) to control the movement of the robot. When release all the buttons, robot gets back to the standby position.
- Key functions:
 1. PAD UP: Walk forward.



2. PAD DOWN: Walk backward.
 3. PAD LEFT: Walk towards left.
 4. PAD RIGHT: Walk towards right.
 5. PAD UP & PAD LEFT: Walk left front
 6. PAD UP & PAD RIGHT: Walk right front
 7. PAD DOWN & PAD LEFT: Walk left back
 8. PAD DOWN & PAD RIGHT: Walk right back
 9. BUTTON TRIANGLE: Salute
 10. BUTTON FORK: Squat
 11. BUTTON SQUARE: Play a sword
 12. BUTTON CIRCLE: Fire the rubber gun once
 13. BUTTON FORK & PAD LEFT: Squat to left
 14. BOTTOM FORK & PAD RIGHT: Squat to right
 15. BUTTON FORK & BUTTON SQUARE: Hit back
 16. BUTTON TRIANGLE & BUTTON CIRCLE: Hit front
 17. SELECTE: Get up when back to the ground
 18. START: Get up when face to the ground
 19. L1: Turn left
 20. R1: Turn right
 21. L2: Hit left
 22. R2: Hit right
 23. L1 & L2: Left hit in fast move
 24. R1 & R2: Right hit in fast move
 25. L3: After pressed and holden, push and drag in the LX, LY, RX and RY directions to control the left hand
 26. R3: After pressed and holden, push and drag in the LX, LY, RX and RY directions to control the right hand
 27. L3 & R3: After pressed and holden, push and drag in the LX, LY, RX and RY directions to control the both hands
- See how to use the joystick :
- <https://github.com/AiFrame/Joystick/tree/master/Manual>

Battery low

When you get a vision of this, please power off the robot and charge the battery in time.

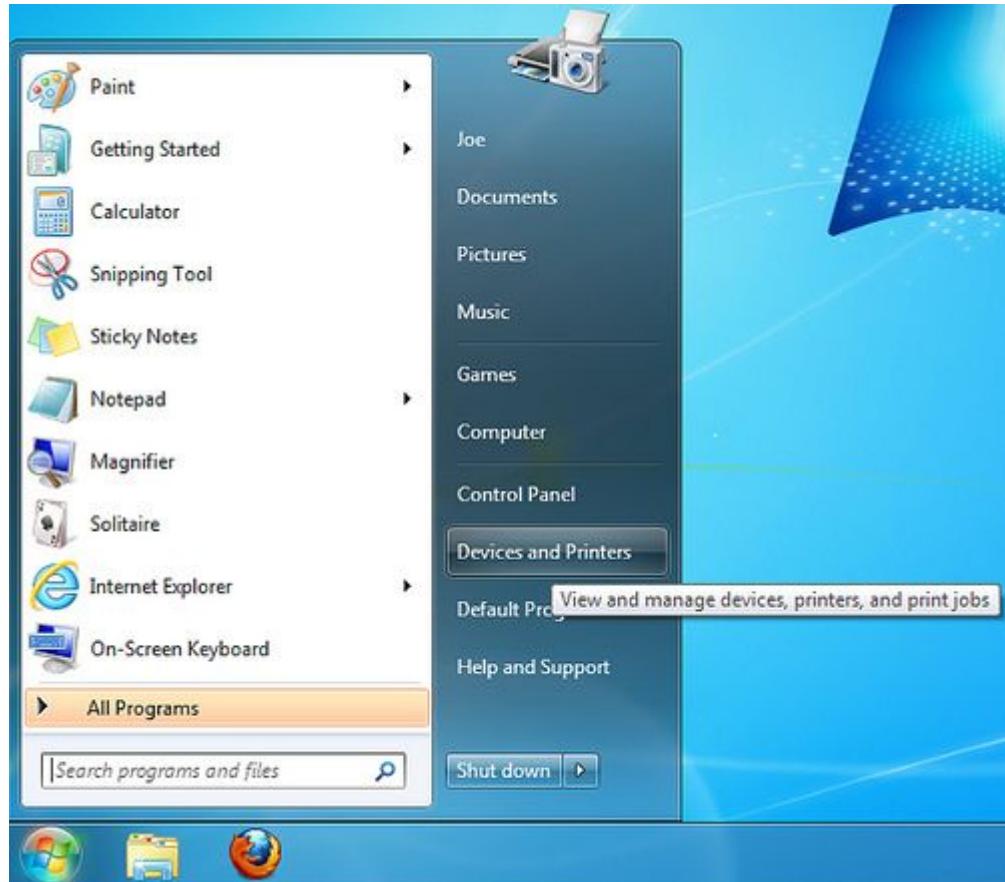




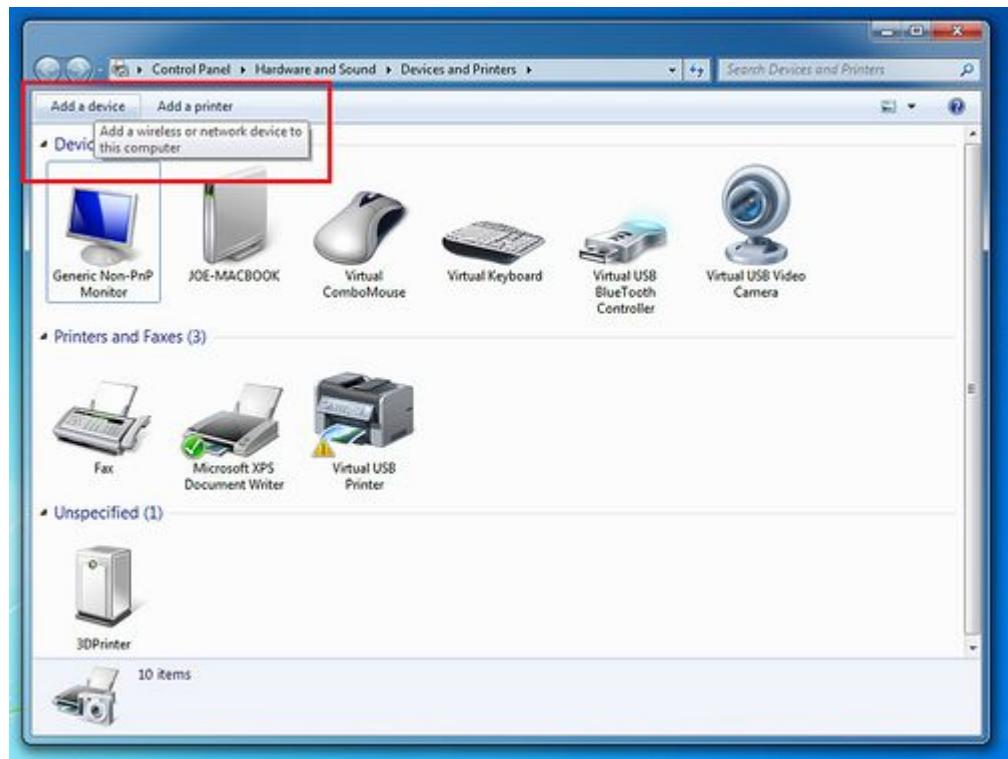
Connecting your Bluetooth 2.1 Module with Windows 7

This tutorial is how to add the Apollo serial bluetooth module to a Windows 7 computer.

Now on the computer, go to the start menu, and then click on Devices and Printers:

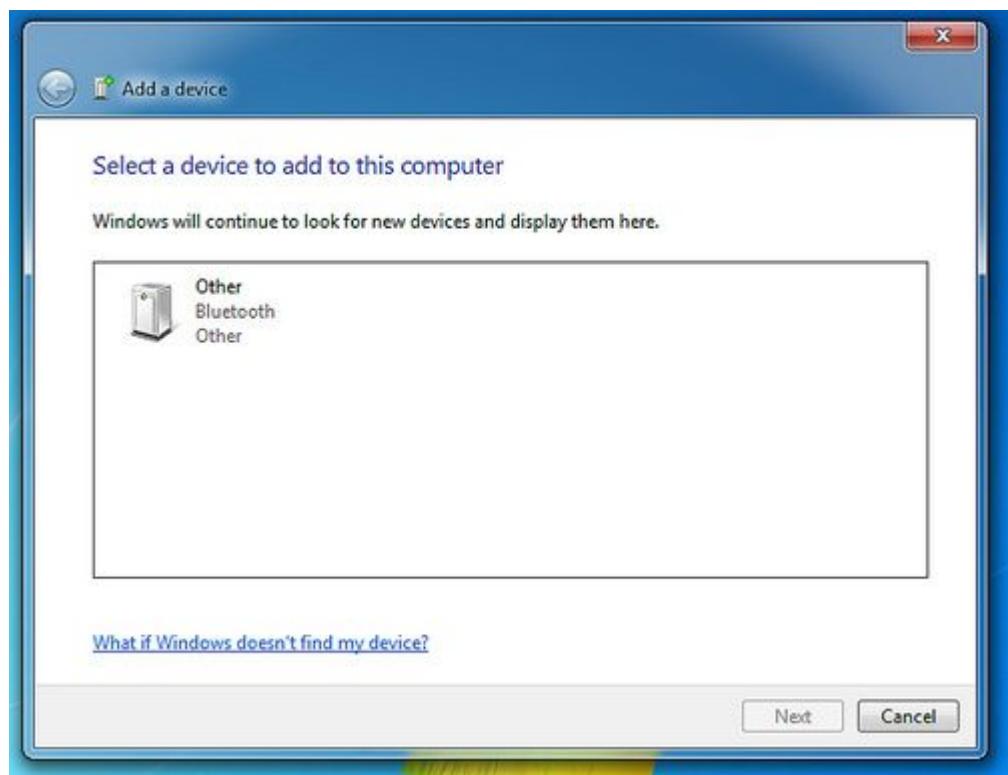


From the new window that opens, click "Add a Device":



If you have a bluetooth receiver installed on your computer, and the bluetooth module is on and flashing, you should see the device pop up now. Depending on how long your computer has seen the device, and had to talk to it, you will see one of these devices:

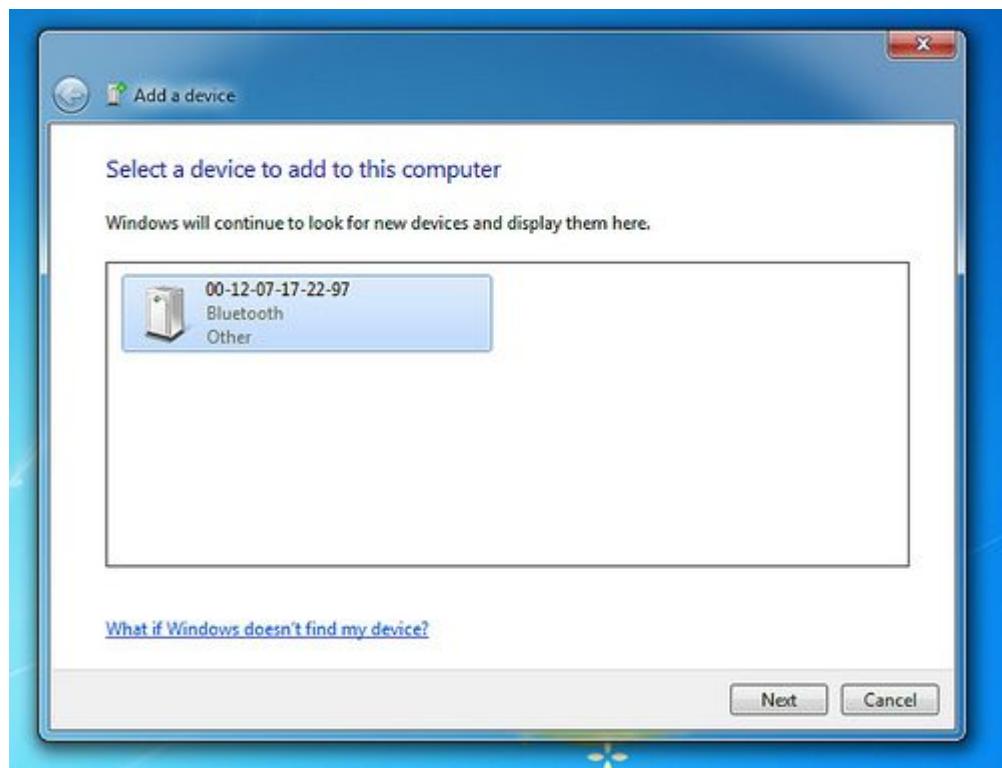
When it first sees it:



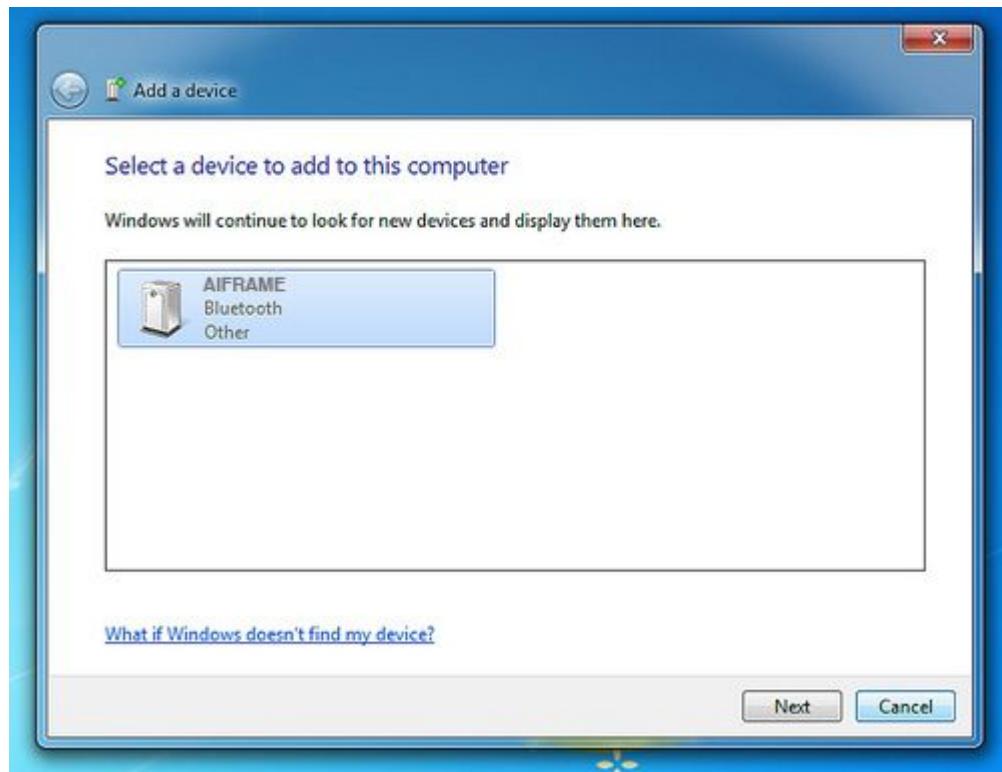
After it starts to identify it (these characters will be in a similar pattern, but different for



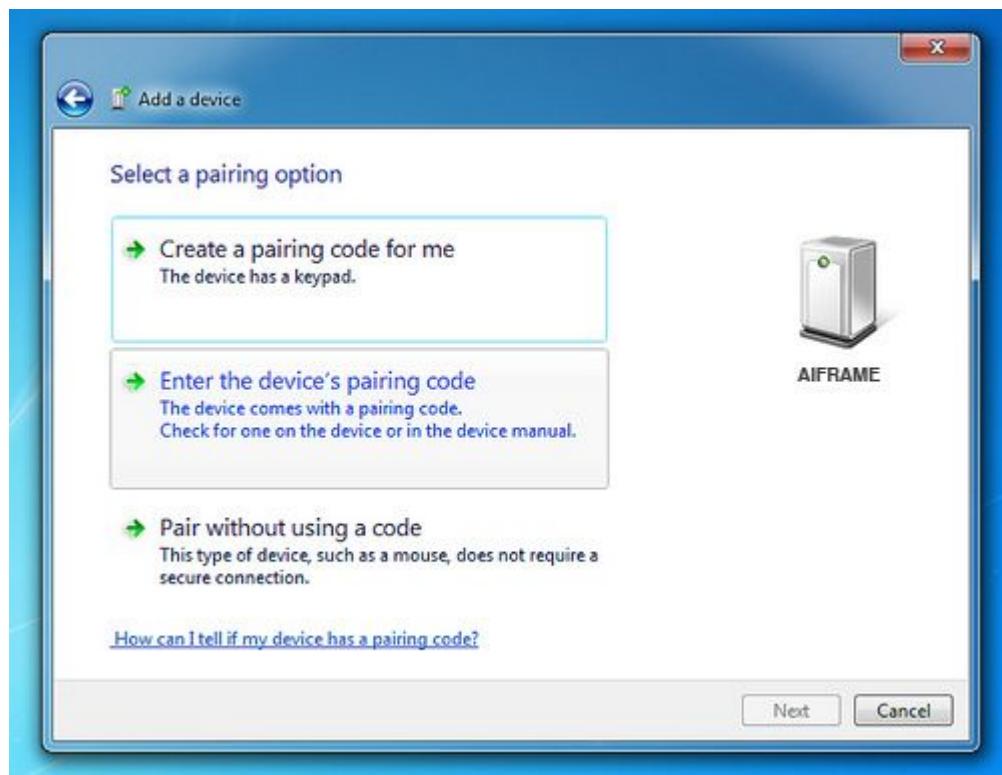
your device):



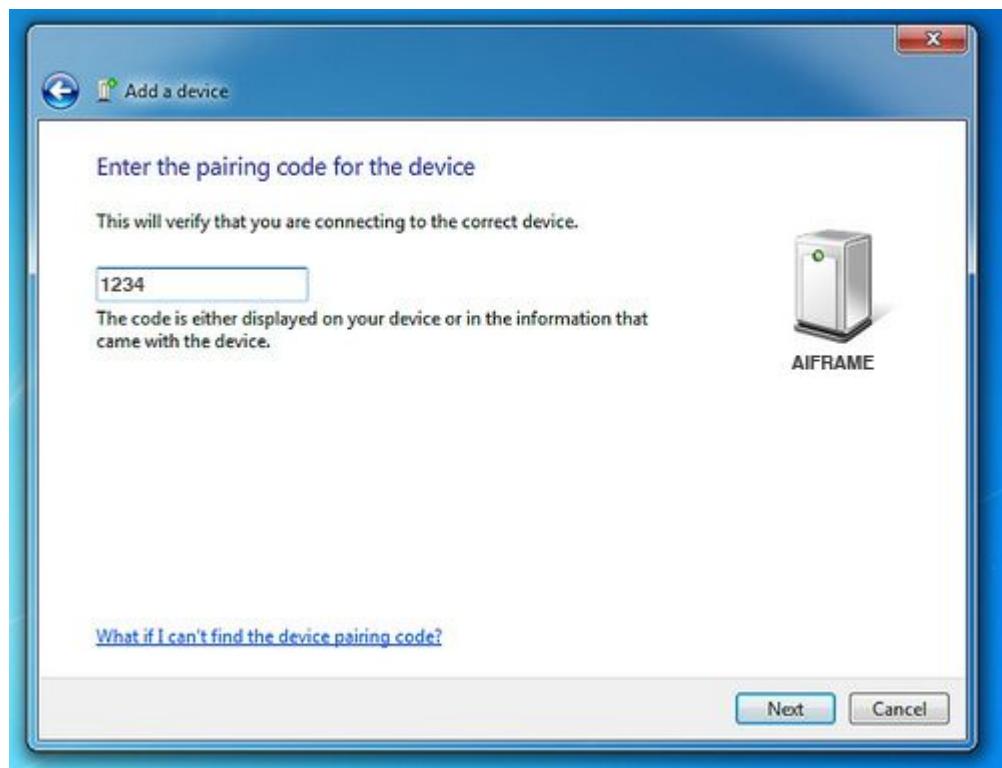
And finally it will recognize its broadcasting name 'AIFRAME':



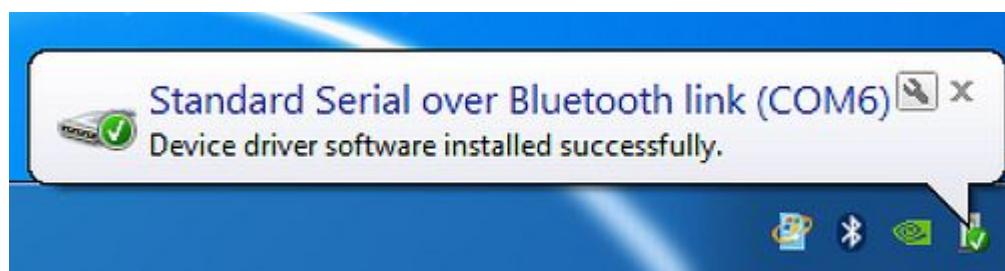
Once you see the device, select it and click next. You will then see this page:



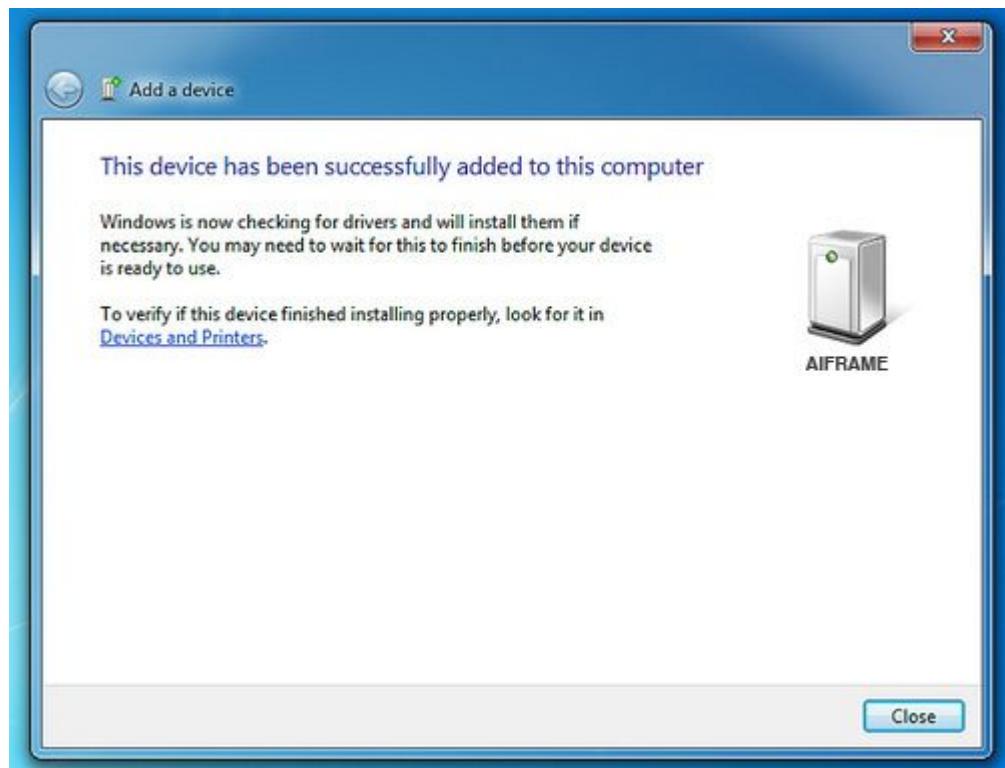
Select 'Enter the device's pairing code' and then click next, you will then see a screen to enter the pin number, enter '1234':



Click next once you've entered the pairing code. Windows will then install the devices for the module. Windows should automatically find and install these drivers for you:

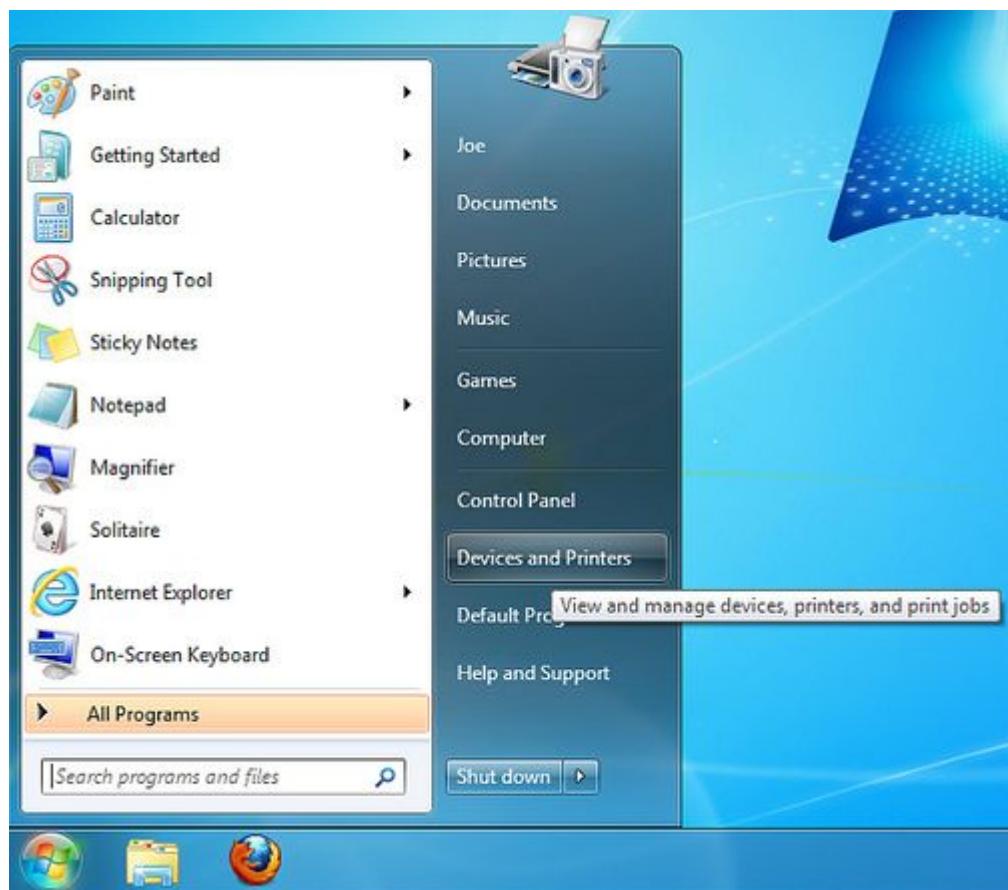


Then you will see the device installed screen:

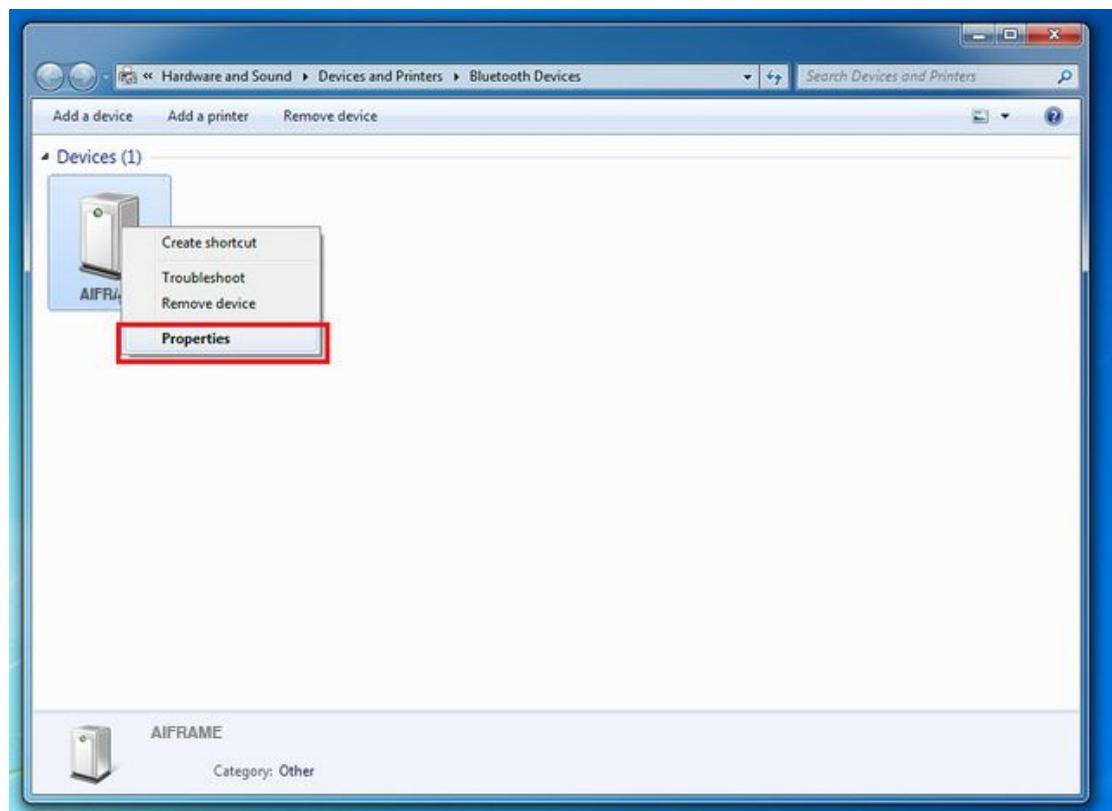


Success! Your module is now installed. If you're using it with a Power Rhythm 32 board, you can now unplug the USB cable and use it wireless.

If you want to find out what COM port the device is now on (useful for connecting to it with a terminal), then you can go back to the Devices and Printers window:



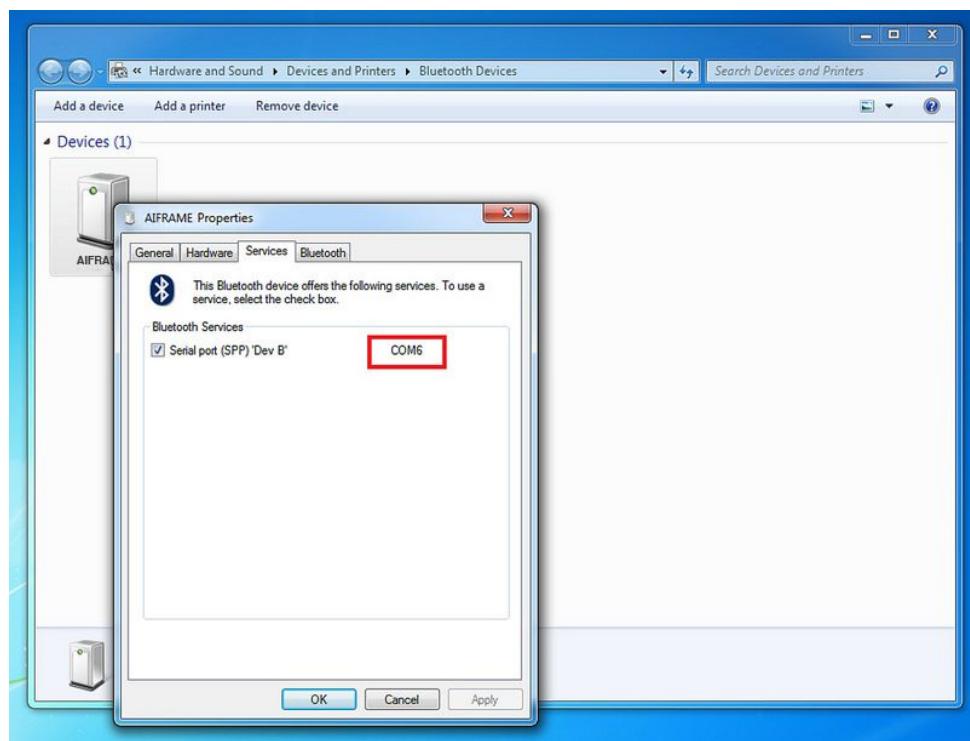
Right-click on the device, then select "Properties":



You should now be able to see the com port under the "Services" menu. In this case,



the port is COM6:



Software download: https://github.com/AiFrame/Servo_Rhythm_Controller

Web site: <http://aiframe.me>

Email: support@aiframe.me

Forum: <http://forum.aiframe.me>