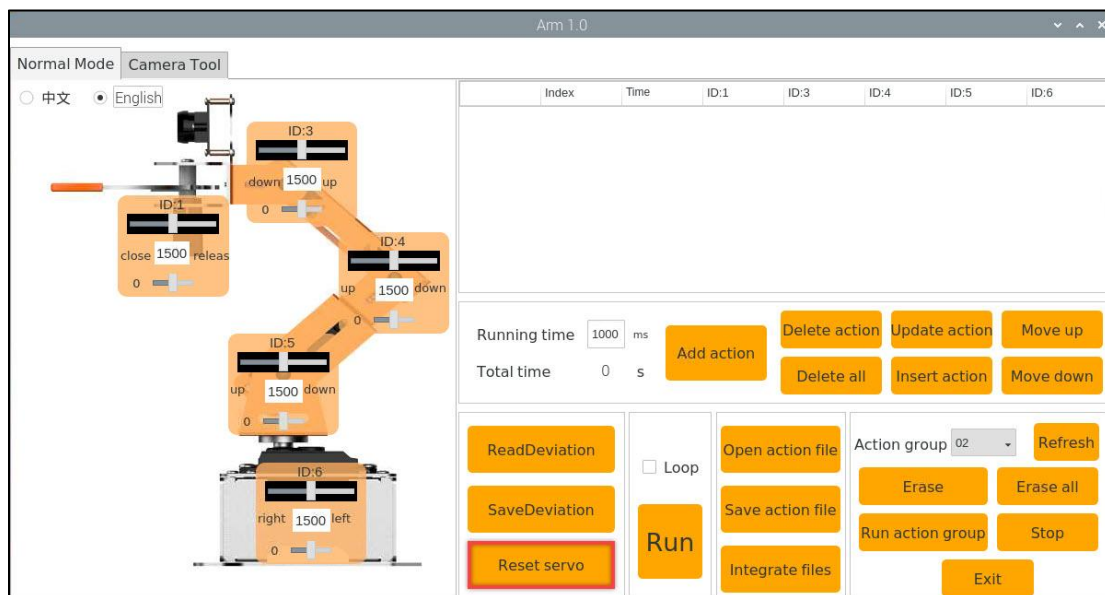# Lesson 3 Deviation Adjustment
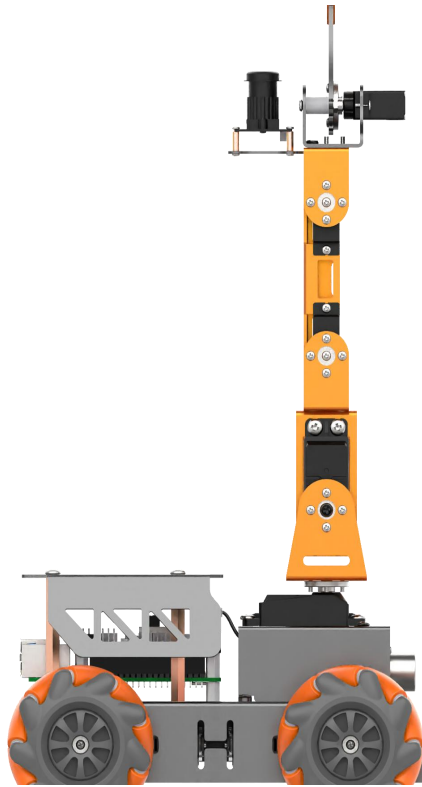
1. Whether the deviation needs to be adjusted

The robotic arm may generate a certain deviation after assembling and you can check it by the following steps:

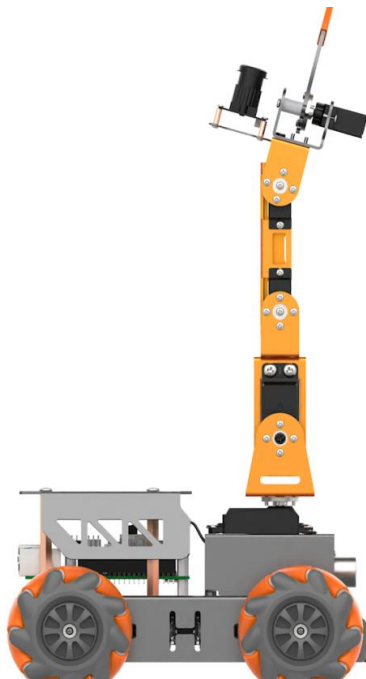1) Connect MasterPi through VNC. Then click on system desktop and open PC software.

2) Click "Reset servo" on the PC software interface.

3) If the robotic arm is straight up, there is no need to adjust the deviation. As the figure shown below:

The deviation needs to be adjusted if the following two situations occur.

2. The causes of deviation

The deviation usually is caused in the following situations:

1) When the servo is in the initial position, the angle of the servo main shaft is rotated during installing the servo horn, resulting in angular deviation generating in initial position.

(The default servo angle is in the middle position before delivery.)

2) The angle of the main shaft is not rotated when installing the servo horn, but if there is a small deviation in the direction or angle of the brackets fixed on the servo during installing the brackets, which also cause a slight deviation.

It should be noted that if the deviation is not adjusted, it may limit the robot movement, thus affecting some sports effects.

In addition, the deviation value within 100 (an angle of 30°) is in the normal adjustable range. If the value is larger than 100, it can not be adjusted by software. The main shaft screw of the servo with large deviation needs to be removed and rotated to the vertical position and then installed again.

## 3. The standard of deviation adjustment

After powering on the robotic arm, it will reset to the original position. At this time, the servo brackets needs to be parallel, that is, the screws in the vertical direction of the bracket where the servos are located should be in the same straight line.
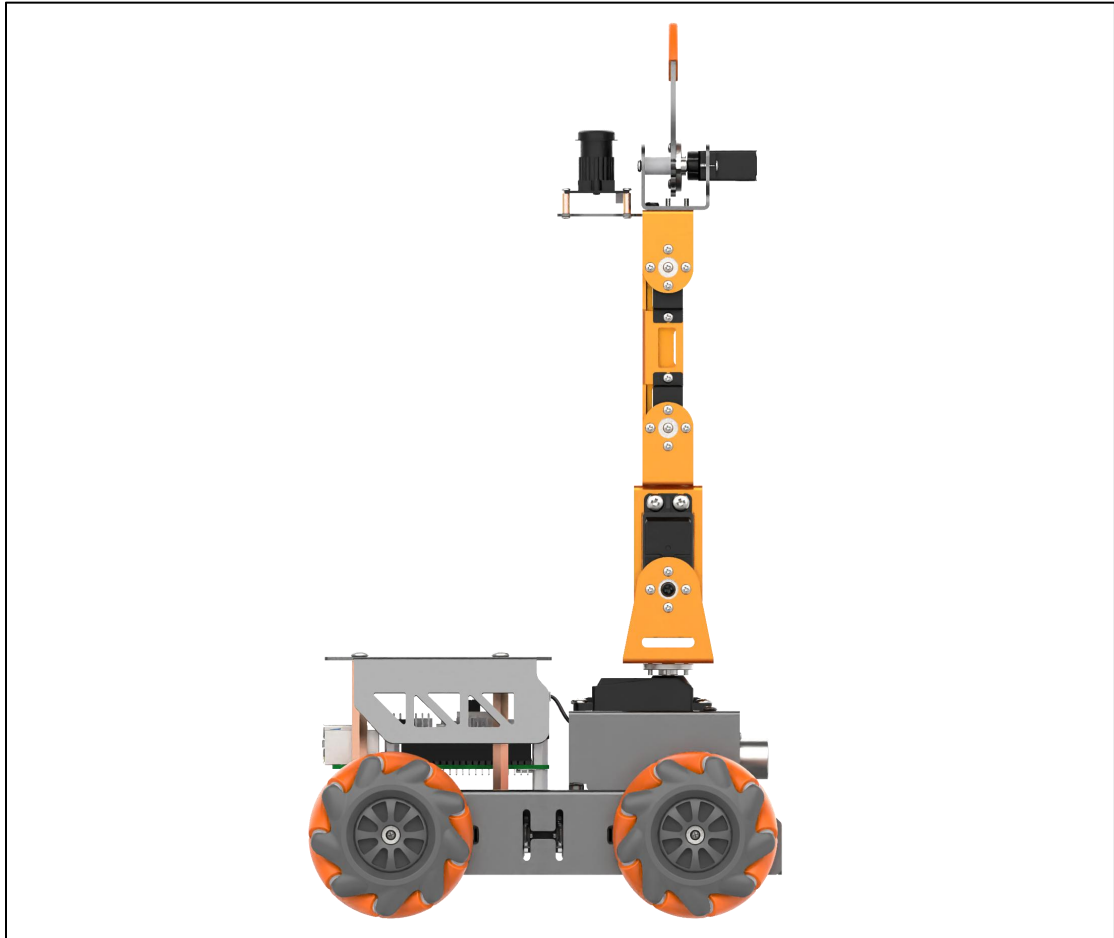
① The U shape bracket of No.6 servo should be parallel to the bracket of ultrasonic sensor.
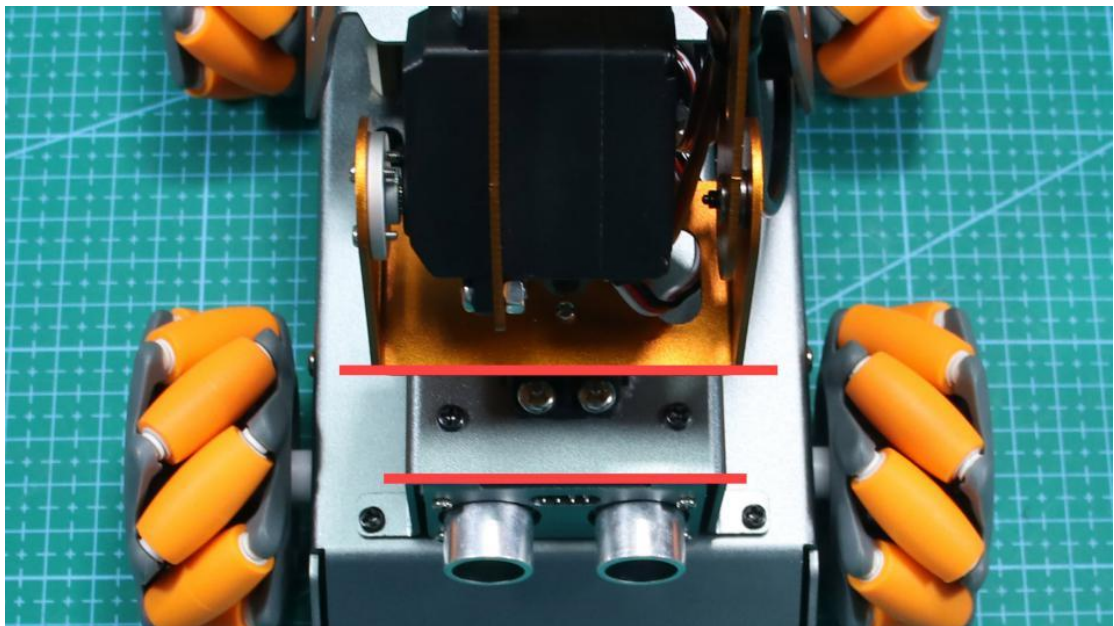
② The position of screws on gripper is a "+" shape after back to the initial position, as the figure shown below:
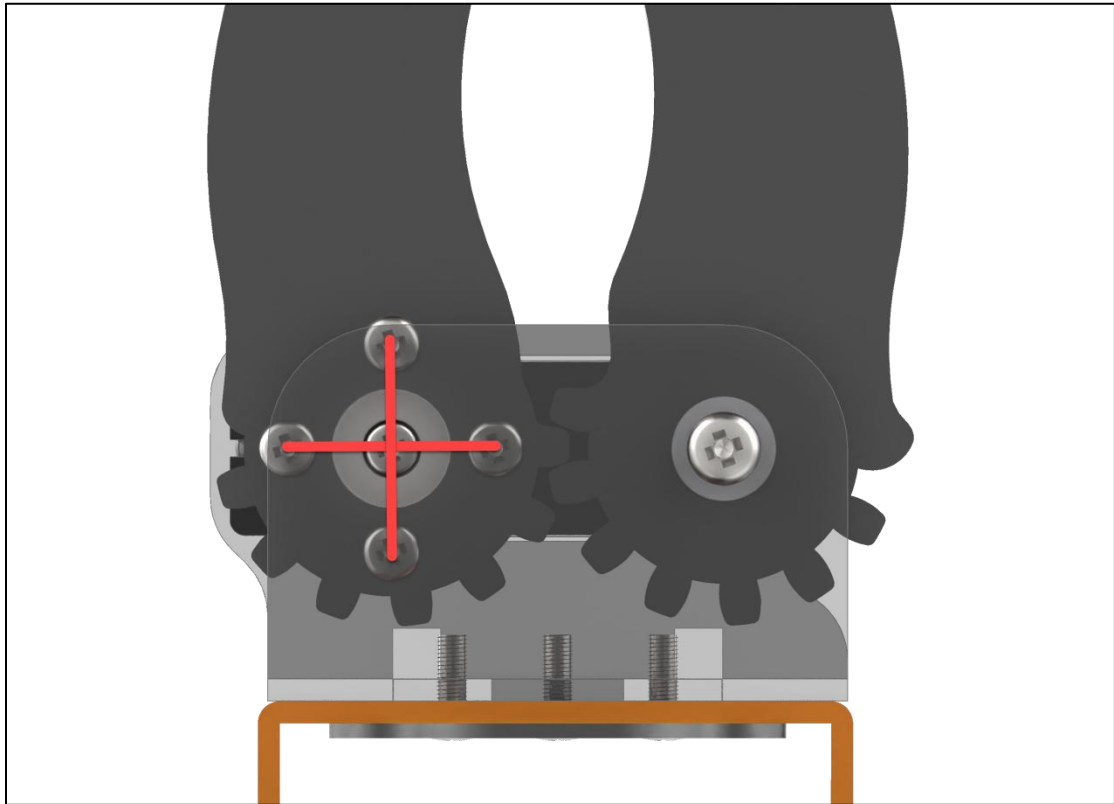

4. Adjustment Method

4.1 Small Deviation Adjustment

The small deviation means that value is less than 100 (deviation angle is less than 30°). This lesson takes adjusting No.3 servo as an example. ("Servo reset" operation has been performed)
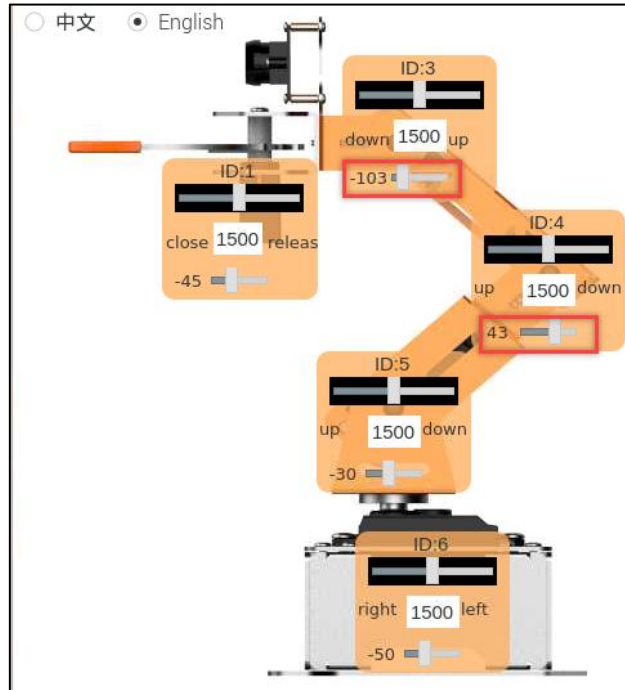
1) Observe the posture of the each servo. It can be seen that No.3 and No.4 servos need to be adjusted.

2) Click "Read deviation" and then click "OK" in the pops-up prompt window.
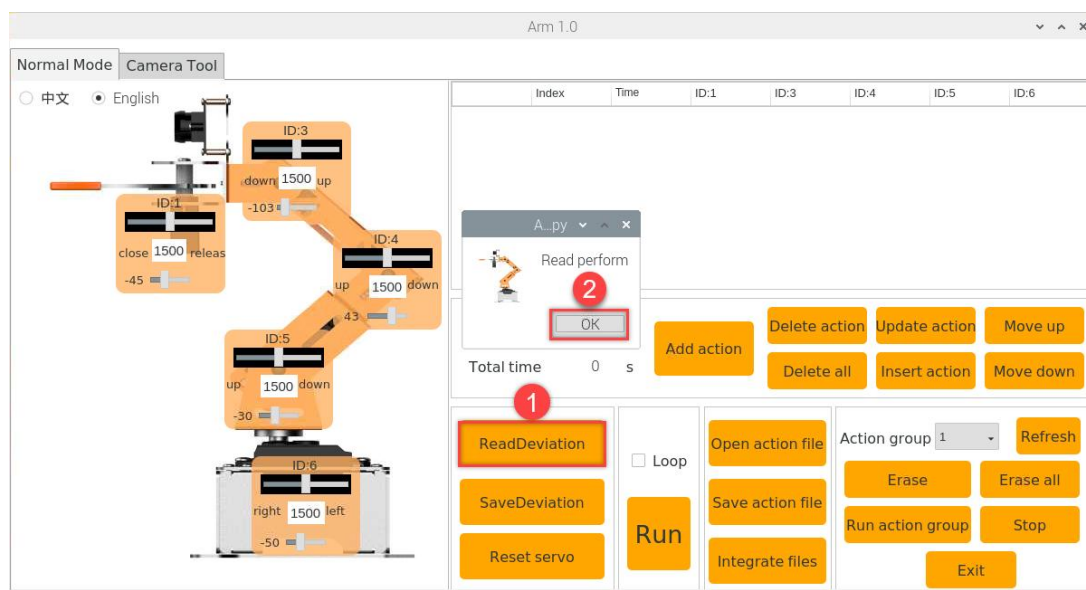
3) Click the small slider bar under the ID3 servo and ID4 servos to make all servos in the same straight line.

Left-click multiple times to adjust the slider accurately.

4) After the adjustment is complete, click "save deviation" and "OK" to save the deviation into the controller.

5) Click "reset servo" again and observe whether the deviation adjustment of the robotic arm is consistent with the standard explained in "3. the standard of deviation adjustment". If yes, it means the deviation has been adjusted successfully. If not, return to step 1 and then follow the steps to make fine adjustment.

## 4.2 Large Deviation Adjustment

Large deviation means that the value is larger that 100 (the deviation angle is larger than 30°). This lesson takes the following figure as example to adjust. (The "Reset servo" operation has been performed)
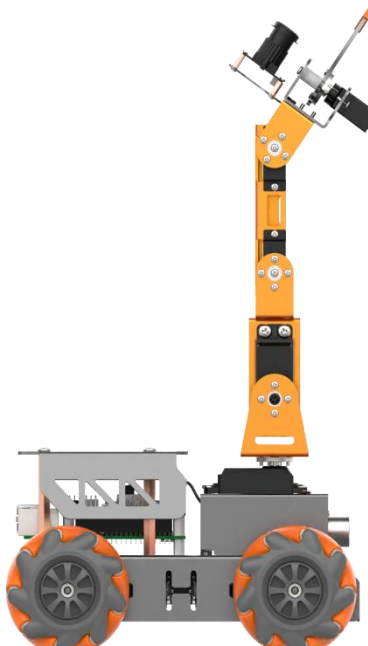
Step 1: Observe the posture of the each servo. It can be seen that No.3 servo has large deviation, so it needs to be reinstalled.

Step 2: Remove the screw on No.3 servo main shaft and the opposite black rivet, then take the metal servo horn off.

Note: Do not forcefully move the bracket to avoid bracket deformation.
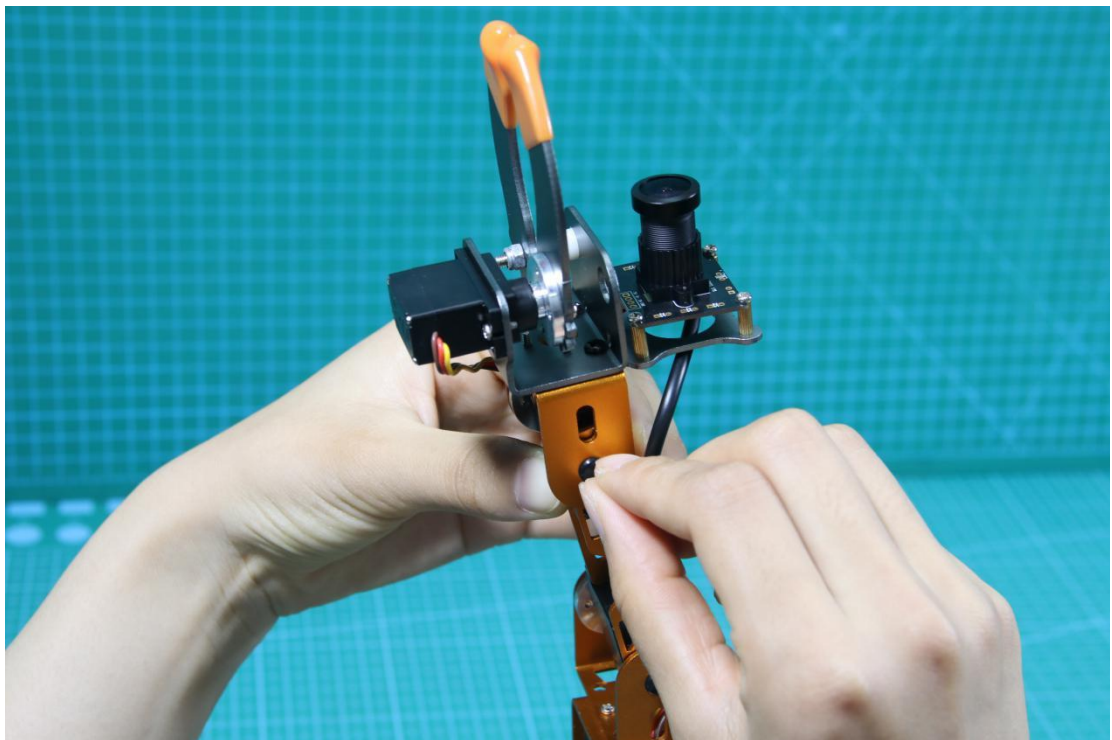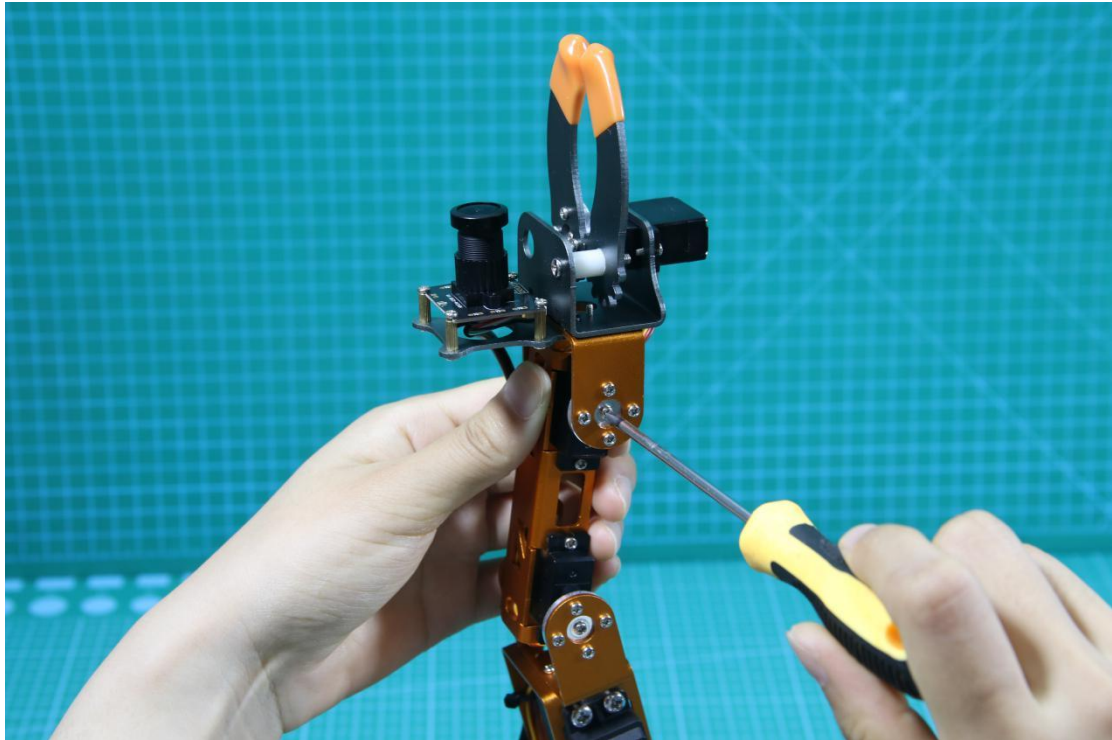
Step 3: Turn on Raspberry Pi expansion board to power up servos, then servo will return to the initial position automatically.

Step 4: To determine whether the large deviation is result from servo damage. Open MasterPi PC software and drag the slider of NO.3 servo, then observe if

the main shaft of No.3 servo rotates. If it rotates, which means the servo is normal.

Step 6: Click "reset servo" to make robotic arm being straight up.

Step 7: Place the metal servo horn on the main shaft as the position shown in the figure below, and then buckle it up.
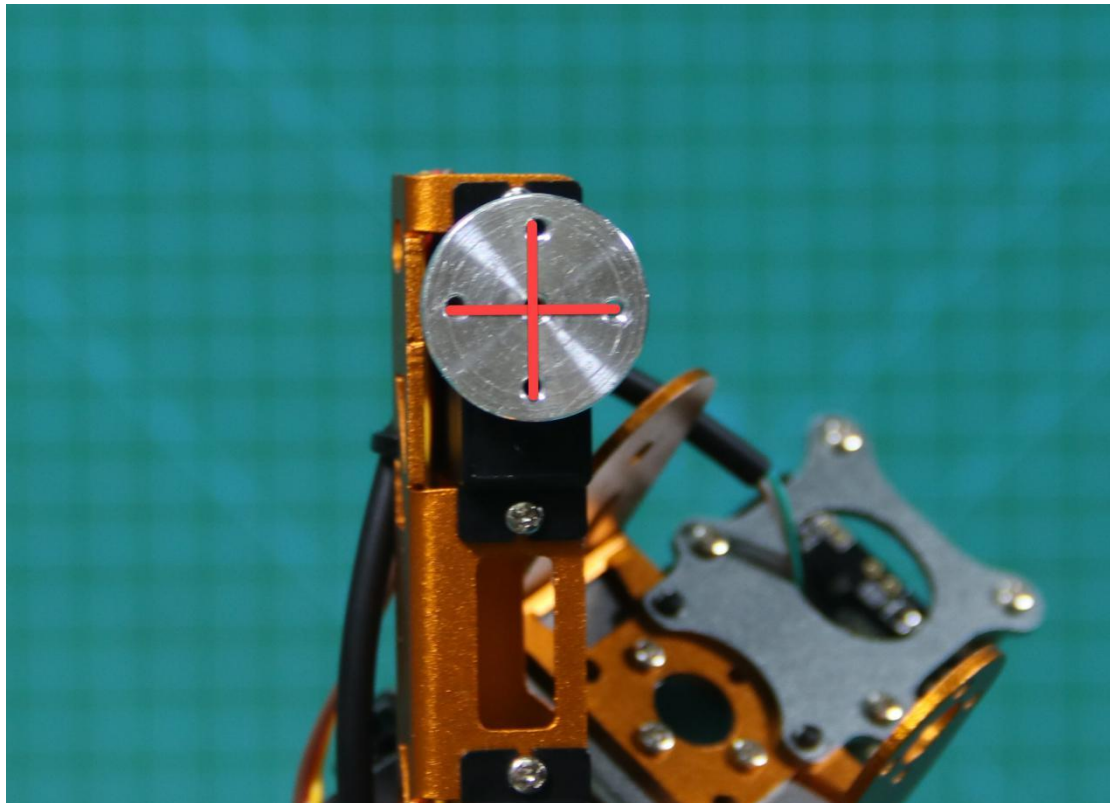
Step 8: Re-install the screws and rivet for fixing the servo horn.

Step 9: Click "reset servo" again and observe whether the deviation adjustment of the robotic arm is consistent with the standard explained in "3. the standard of deviation adjustment". If yes, it means the deviation has been adjusted successfully. If not, please refer to "4.1 small deviation adjustment" to make fine adjustment.