Lesson 4 Deviation Adjustment

Please do not skip this section, otherwise, it will affect the following deviation adjustment. This section will involve Python editor and PC software respectively. Do not open these two software as the same time to avoid occupying the serial port to cause failure connection.

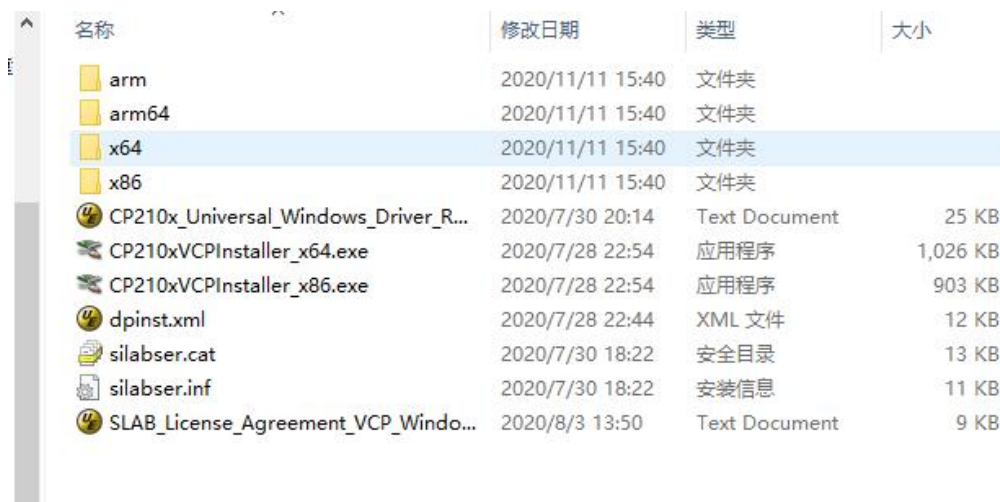## 1. Getting Ready-Burn underlying program

1.1 Driver Download

1) Firstly, connect the robot to your computer with USB cable.

Select the correct driver file according to windows operating system:

Windows System Version	Driver File
10	the installation pack is under the same directory
XP,Vista,7,8	the installation pack is under the same director.

2) After extracting the corresponding file, open the folder as the figure shown below:

3) Check if your operating system is 64-bit or 32-bit

Right click "My computer" and select "Property" to check the version of your operating system.
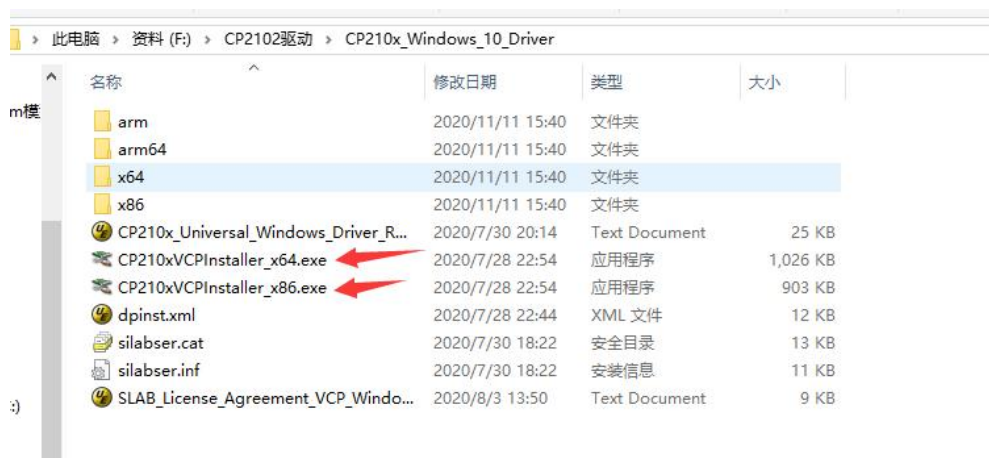
Win10 System

Win7 System

4) Select corresponding driver version to install according to 64 or 32 bit system.

If your operating system is 64 bit, please click "CP210xVCPInstaller_x64.exe" to install.

If your operating system is 32 bit, please click "CP210xVCPInstaller_x86.exe" to install.

5) Install driver

Install according to the prompted steps, as the figure shown below.

CP210x USB to UART Bridge Driver Installer

许可协议

要继续，请接受以下许可协议。要阅读全部协议，请使用滚动条或按 Page Down 键。

> LICENSE AGREEMENT
> SILICON LABS VCP DRIVER
> IMPORTANT: READ CAREFULLY BEFORE AGREEING TO TERMS
>
> THIS PRODUCT CONTAINS THE SILICON LABS VCP DRIVER AND
> INSTALLER PROGRAMS AND OTHER THIRD PARTY
> SOFTWARE.TOGETHER THESE PRODUCTS ARE REFERRED TO AS THE
> "LICENSED SOFTWARE". USE OF THE LICENSED SOFTWARE IS
> SUBJECT TO THE TERMS OF THIS LICENSE AGREEMENT.

○ 我接受这个协议(A)
○ 我不接受这个协议(D)

[另存为(S)] [打印(P)]

[< 上一步(B)] [下一步(N) >] [取消]

Device Driver Installation Wizard

Completing the Device Driver Installation Wizard

The drivers were successfully installed on this computer.

You can now connect your device to this computer. If your device came with instructions, please read them first.

Driver Name	Status
✔ Silicon Laboratories Inc. ...	Ready to use

[< Back] [Finish] [Cancel]

6) Check whether the device can be identified in device manager.

Right click "My computer" and select "Properties". Click "device manger" to check the device port number.
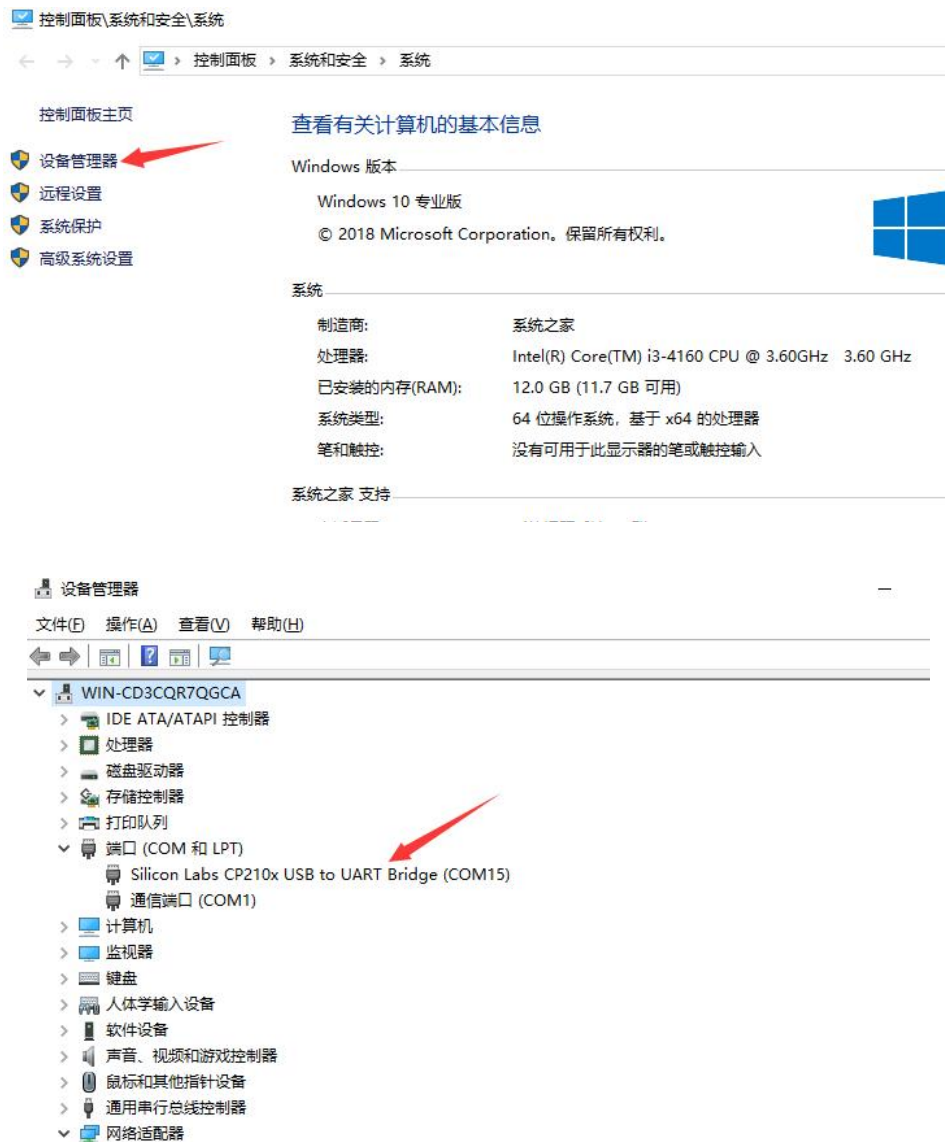
The device pointed by the red arrow means that the driver has been installed successfully. "COM15" is the serial port number of the device and different computer may have different result. If the device cannot be checked, please reinstall the driver or restart your computer.

1.2 Device Connection

Step 1: Connect the adapter to robotic arm and switch on the robotic arm.

Step 2: Connect the USB port of ESP32 controller to your computer with micro-USB, and then open Python editor.
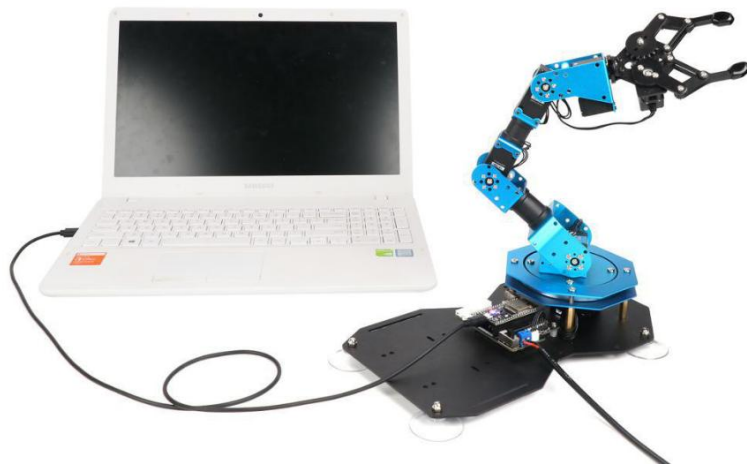
Step 3:Click icon to connect device. (If fail to connect, please refer to the tutorial in "5.Appendix->FAQ")

Step 4: After the connection is completed, icon turns green and the prompt appear in the lower right corner of terminal, as the figure shown below:

```
>>>
Port:COM15 Board:esp32,connect successfully!
>>>
```

When your computer is connected to multiple devices and device fails to connect, you can go to"Control panel-> Device manger" to view the port number of ESP32. The port with the word of CH340 is your device. (Take COM4 for example, and the specific port is subject to actual situation.)

At this time, return to Python editor, and click "connect" button on menu bar, and then select ESP32 port manually. In addition, if COM1 appears, do not select it. (COM1 port is generally a system communication port.)
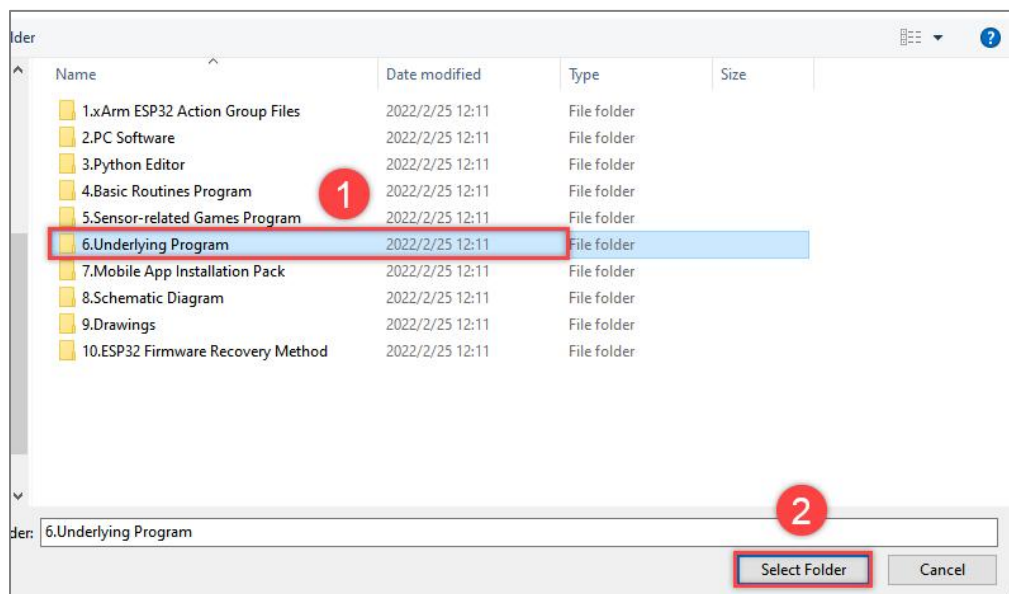
1.3 Underlying Program Burning

Step 1: When import file to local project for the first time, left-click "local project", and then folder option list pops up.
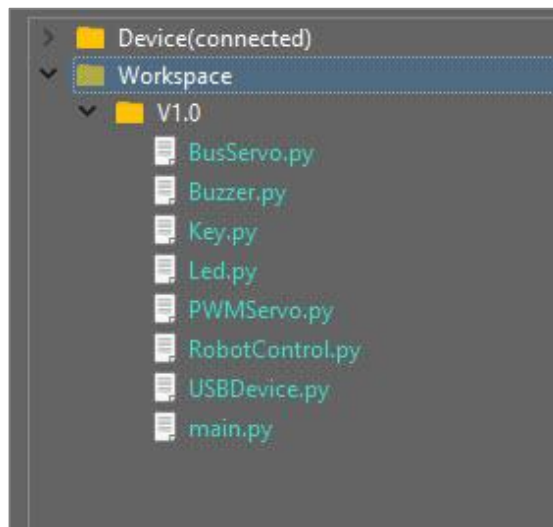(Right click"Workspace-> change workspace" directly in following operation)
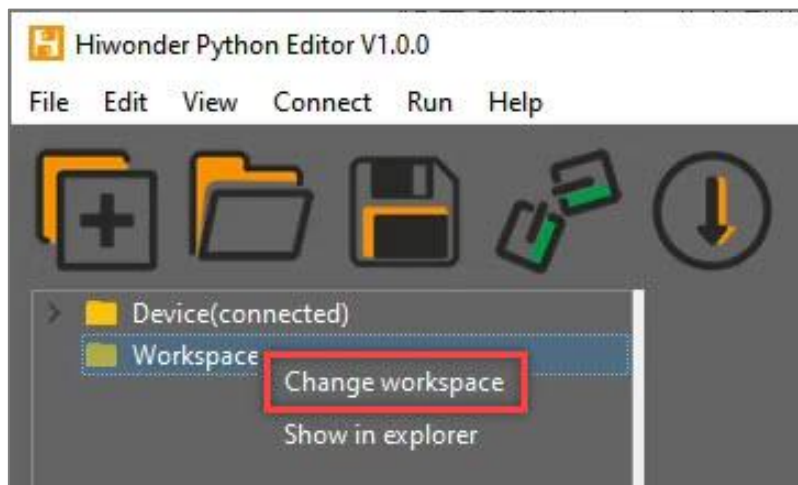
Step 2: Find "Robotic arm underlying program" in "5.Appendix". In the pop-up window,select folder and then click "select".

Step 3: After selecting, all the files are automatically added to local project. Click ">" icon in the left side of "local project" to unfold the folder.

Step 4: Press "Shift" to select all the files, and then right-click "download".
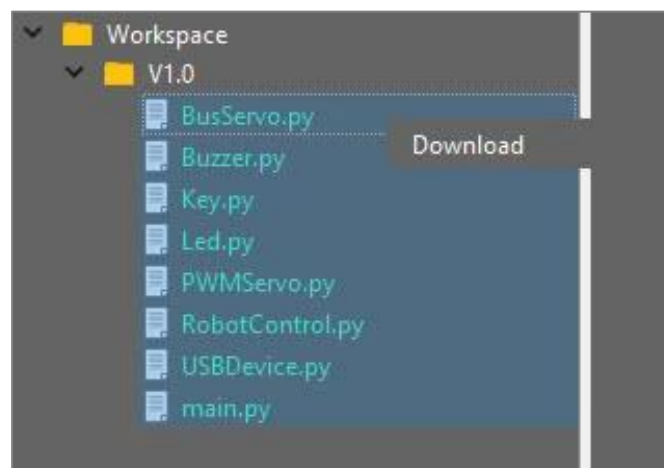
Step 5: When "Download complete" of all the files prompts, it means all the files are downloaded.

Note：If one of files fails to download, you can right click that file to download again.

Regarding more Python editor instructions, please refer to the tutorial in

"4. Advanced Lesson-> Python Editor Learning".

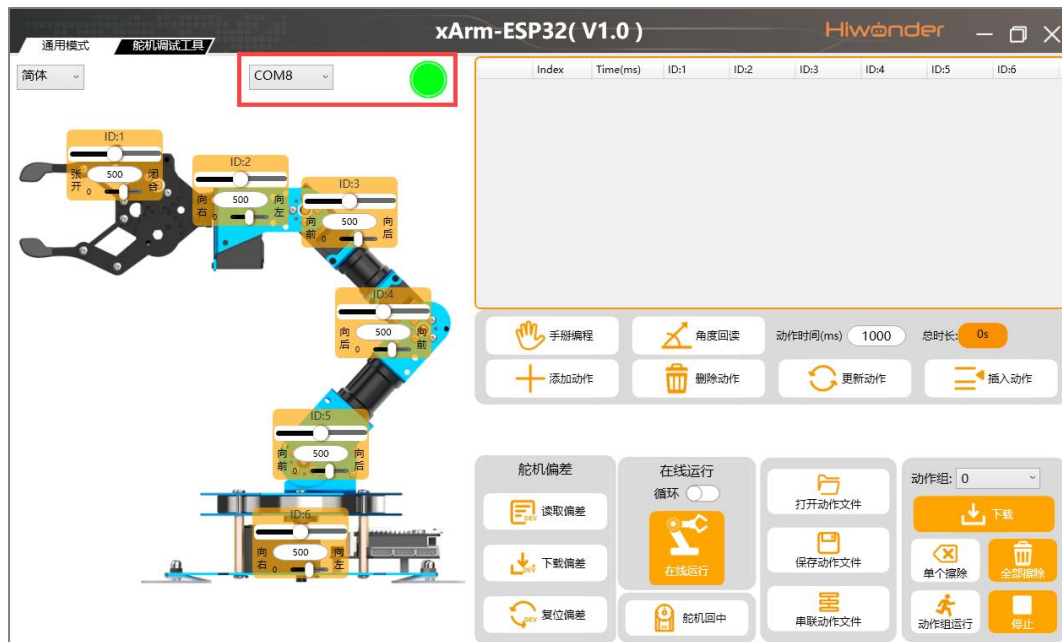## 2. Whether the deviation needs to be adjusted

The robotic arm may have a small deviation after assembly. Please check it through the following steps to decided whether to adjust the deviation.

Step 1: Find PC software in "5. Appendix" and double click to open it.

Step 2: Select the port connected.
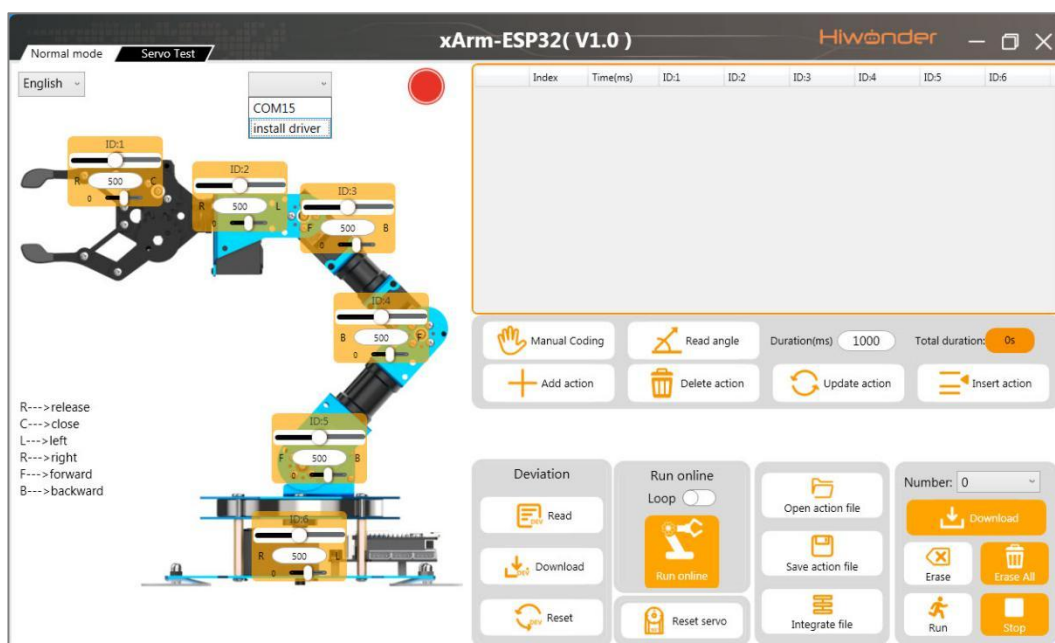
Step 3: When the connection is successful, the icon will change red to green.

Step 4: Click "Reset Servo" button on the PC software. If the robotic arm is facing upwards and the servo main shaft brackets are parallel to each other, there is no need to adjust the deviation. As show below:
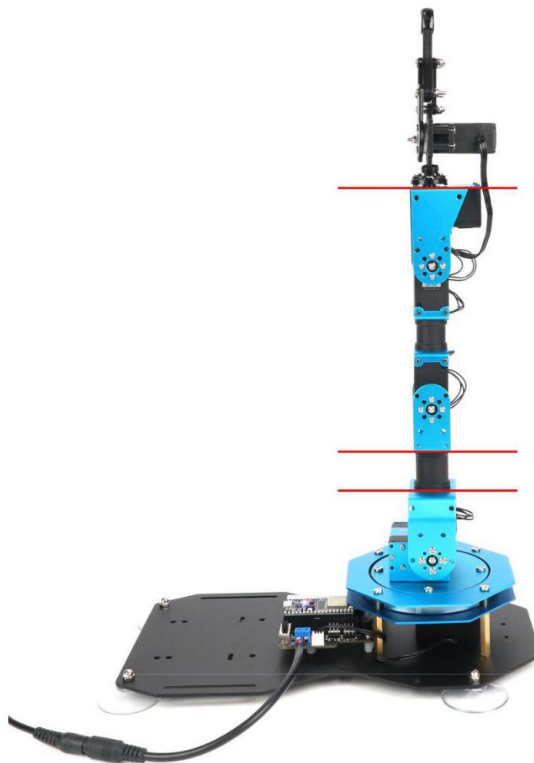
For example, you need to adjust the deviation if the stance as below.

3. Why is there a deviation

The deviation usually cause in the following situations:

1) When the servo is in the middle position, the servo main shaft angle is rotated when the servo horn is installed, resulting in an angular deviation in the initial position.

(The default servo angle is the middle position)

2) When the servo is installed with the servo horn, the main shaft angle is not rotated, but there is a small deviation in the direction or angle of the fixed to the bracket, resulting in a slight deviation.

Note that if the deviation is not adjusted, it maybe cause the robotic arm's movement to be restricted, which will affect some sports effects.

In addition, the deviation value is within 100 (within an angle of 30°), which belongs to the normal adjustable range. If the deviation is large, exceeding 100, it will not be able to be adjusted by software. You need to remove the main shaft screw of the servo with large deviation, rotate it to the vertical attitude and install it again.


4. The standard of deviation adjustment

1) After the robotic arm is powered up and reset, the servo main shaft bracket must be parallel, that is, the screws in the vertical direction of the bracket where the servo is located should be in the same straight line.

2) When the robotic arm is placed as the figure shown below, the screw close to the No.5 servo main shaft should be in the middle of the two adjacent screws.
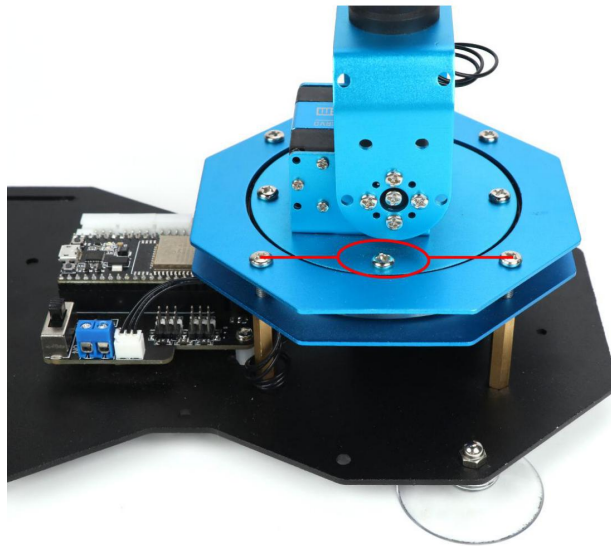
5. How to adjust

5.1 Small deviation adjustment

Small deviation means that the deviation value is less than 100 (the deviation angle is less than 30°). This lesson takes the following picture as an example to adjust ("Servo Reset" operation has been performed)
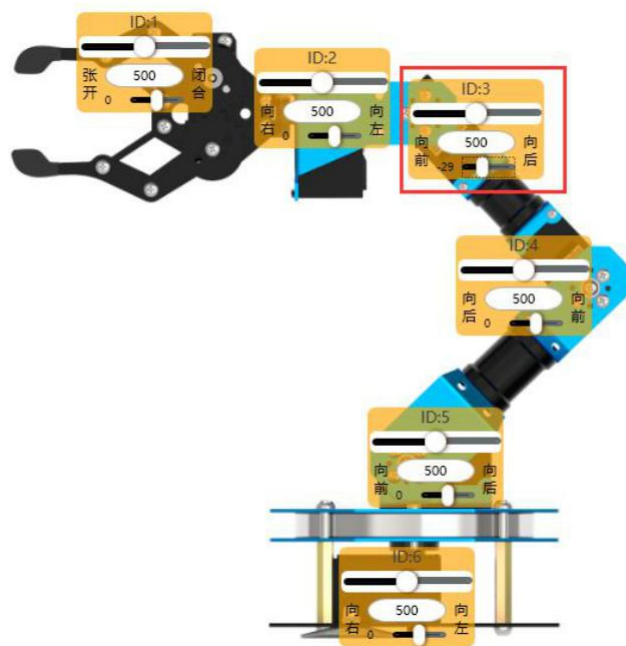

Step1: Observe the attitude of the servo at each position of the robotic arm. It can be seen that only the No.3 servo needs to be adjusted.

Step2: Click "Read Deviation", and then click "Continue" in the pop-up deviation prompt.
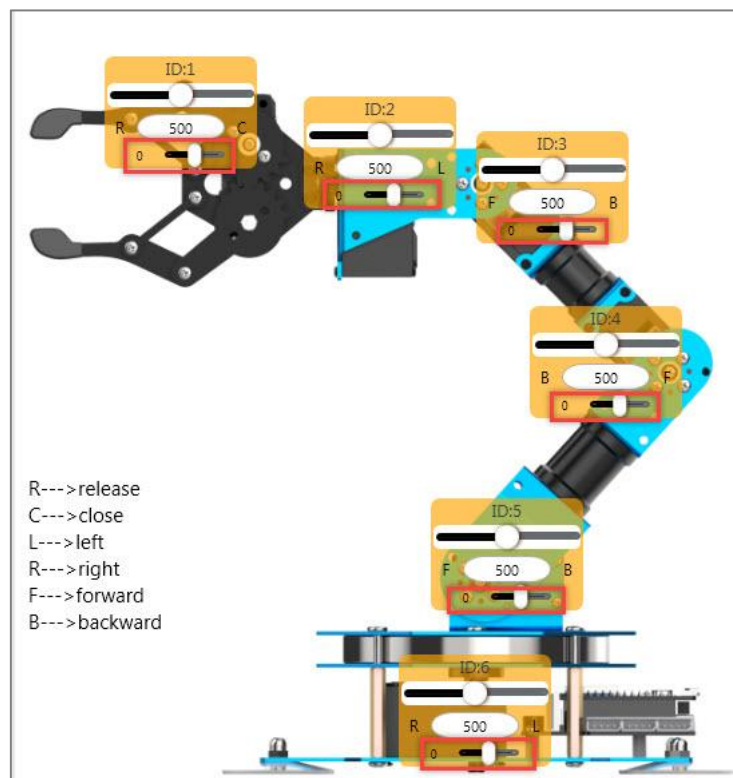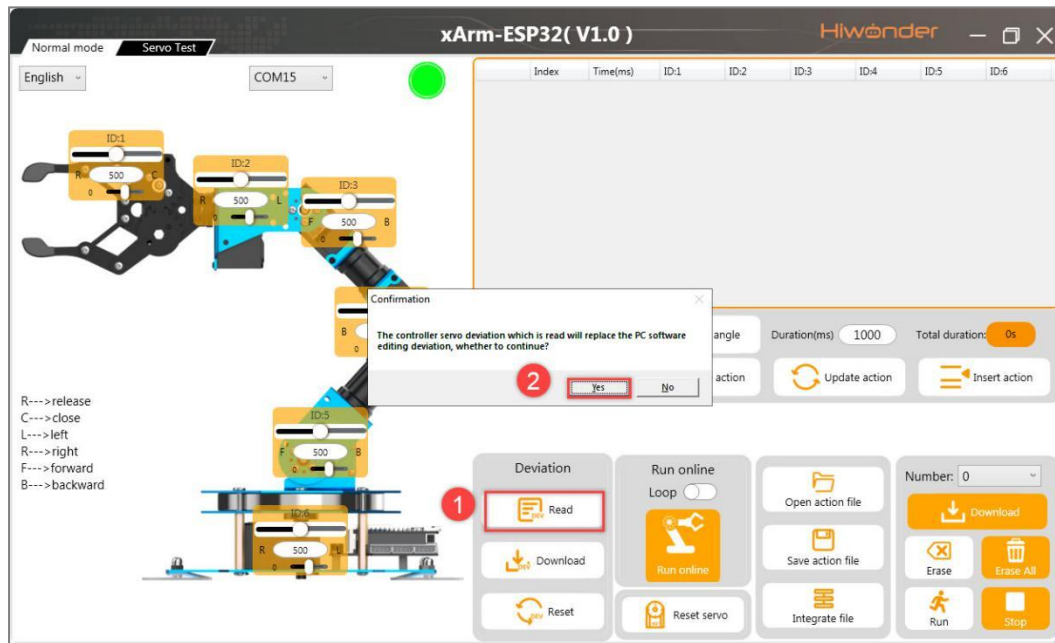
Step 3: Click the deviation adjustment area under ID3 servo, and drag the slider to line the screws of ID3 servo bracket and the ID4 bracket up.

Step4: After adjustment is completed, click "Download deviation" to save the deviation to the controller.

Step5: Click "Servo Reset" again and observe whether the robotic arm deviation adjustment is consistent with the standard in "3. The target of deviation adjustment". If they are consistent, it means the deviation has been successfully adjusted. If they are inconsistent, return to step 1 and then follow the steps to make fine adjustments.

5.2 Large deviation adjustment

Large deviation means that the deviation value is greater than 100 (the deviation angle is greater than 30°). This lesson take the following picture as an example to adjust. ("Servo Reset" operation has been performed)

Step1: Observe the stance of each servo. It can be seen that No.3 servo has a large deviation,so it needs to be re-installed once.

Step 2: Remove the screw on main servo horn of No.3 servo, and then slightly open the servo bracket to separate the servo main shaft from the bracket.

Note: Do not exert much force on the bracket to avoid deformation of the bracket.
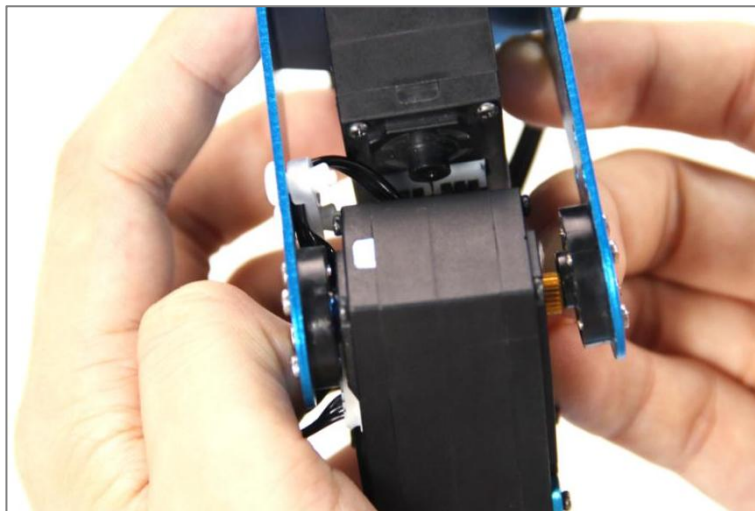
Step 3: Rotate the No.3 servo bracket to adjust the screw on No.3 servo bracket to align with the screws on the No.4 and No.5 servo bracket below.

Step4: Install the bracket back to the No.3 servo main shaft and tighten the screws.

Step5: Click"Servo Reset" and observe whether the robotic arm deviation adjustment is consistent with the standard in "3.The target of deviation adjustment". If they are consistent, it means the deviation has been successfully adjusted. If there is small deviation, then follow the instruction in "5.1 Small deviation adjustment" to make adjustments.