

Lesson 6 Control Bus Servo

1. Working Principle

According to the communication protocol, servo is controlled to rotate by sending the commands including servo ID, rotation angle and time.

The path to the source code of the program is 5.Hardware Basic

Learning/Python Development/Program Files/Control Bus Servo/main.py

```
1 import time
2 from BusServo import BusServo
3
4 # Control bus servo
5
6 bus_servo = BusServo()
7
8 if __name__ == '__main__':
9     bus_servo.run(1, 500, 1000) # The ID1 servo is set as 500 width pulse and
10    the running time is set as 1000ms.
11    time.sleep_ms(1000) # The delay of 1000ms
12
13    bus_servo.run(1, 700, 1000) # The ID1 servo is set as 700 width pulse and
14    the running time is set as 1000ms.
15    time.sleep_ms(1000)
16
17    bus_servo.run(1, 300, 2000) # The ID1 servo is set as 300 width pulse and
18    the running time is set as 2000ms.
19    time.sleep_ms(2000)
20
21    bus_servo.run(1, 500, 1000) # The ID1 servo is set as 500 width pulse and
22    the running time is set as 1000ms.
23    time.sleep_ms(1000)
```

Control bus servo by calling run() function in BusServo library. Take the code “bus_servo.run(1, 500, 1000)” as example.

The first parameter “1” is the servo ID. Here is ID1 servo.

The second parameter “500” represents the rotation position. The parameter is the data converted by angle.

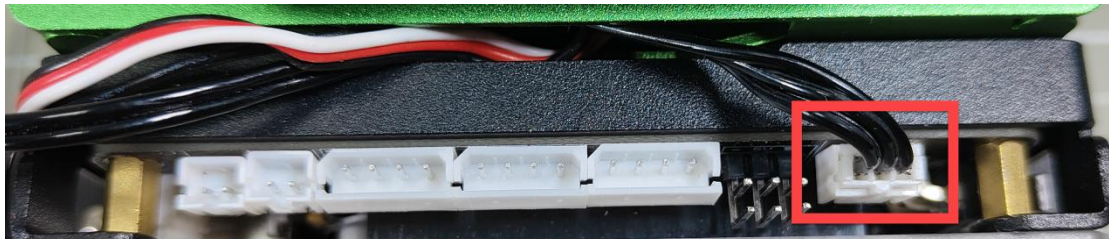
The third parameter “1000” represents the rotation time (unit is ms). Here the

time is 1000ms.

The rotation range of bus servo is between 0 and 1000 pulse width which corresponds to 0° - 240° , i.e, 1° is roughly equal to 4.2 pulse width. The conversion formula for angle and pulse width is: $\text{pulse width} = 4.2 \times \text{angle}$ (just for reference).

2. Preparation

Please make sure the bus servo is individually connected to bus servo port on MaxArm controller. The wiring method is as follow:



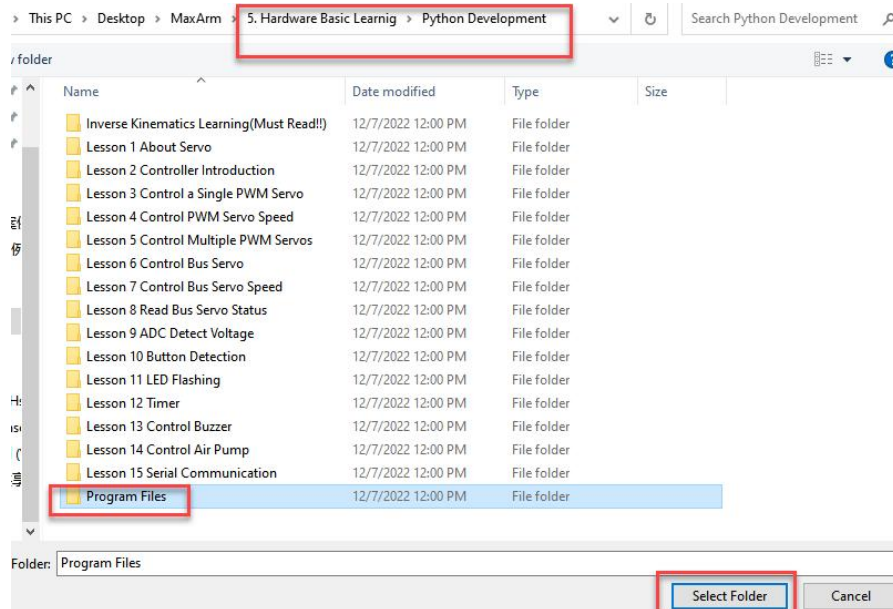
Note: The servo cable uses anti-reverse plug. Please do not insert it violently.

3. Operation Steps

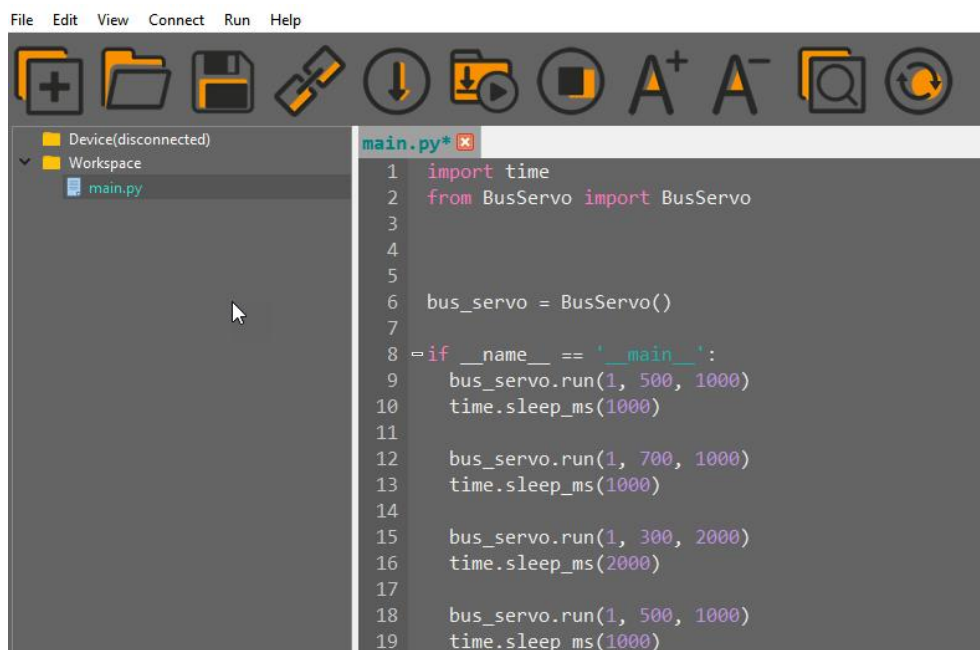
- 1) Please connect MaxArm to Python editor according to the tutorial in folder "4. Underlying Program learning/Python Development/Lesson 1 Set Development Environment".



- 2) After connecting, change the path of Workspace to "5.Hardware Basic Learning/Python Development" and select "Program Files".



3) Double click folder “Control Bus Servo”, and then double click “main.py” to open program.



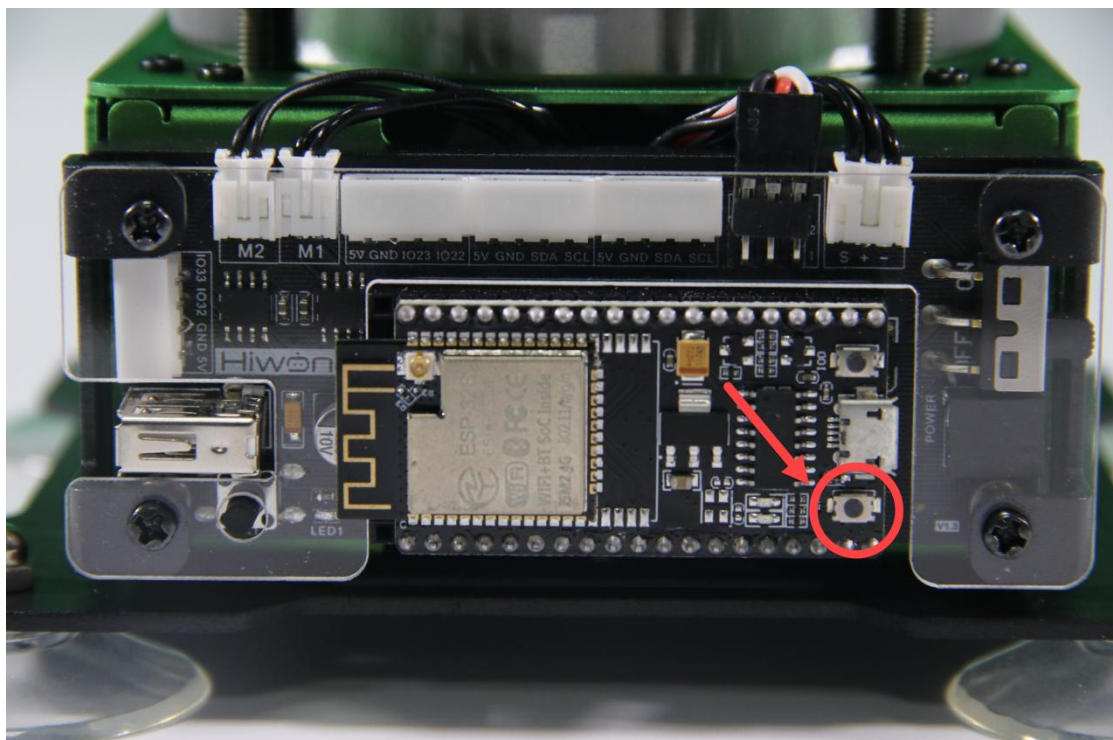
- 4) Click on the download icon to download program to ESP32 controller.



- 5) When the terminal prints the prompt, as shown in the image below, it means download completed.



- 6) After downloading, click on the reset icon or press the reset button on ESP32 controller to run program.



4. Project Outcome

When running program, ID1 servo will rotate 45° to the right, then 90° to the left, finally 45° to the right to return to the initial position. After the servo stops rotating, exit the program automatically.

The rotation range of bus servo is between 0 and 1000 pulse width which corresponds to 0° -240° , i.e, 1° is roughly equal to 4.2 pulse width. The conversion formula of angle and pulse width is pulse width=4.2×angle (just for reference).

5. Function Extension

If want to modify servo rotation angle, you can modify the corresponding code. In this section, the pulse width position of the first rotation will be changed from 700 to 800. The specific operation steps are as follow:

1) Find the following program:


```
8 if __name__ == '__main__':
9     bus_servo.run(1, 500, 1000)
10    time.sleep_ms(1000)
11
12    bus_servo.run(1, 700, 1000)
13    time.sleep_ms(1000)
14
15    bus_servo.run(1, 300, 2000)
16    time.sleep_ms(2000)
17
18    bus_servo.run(1, 500, 1000)
19    time.sleep_ms(1000)
```

2) Change the second parameter of bus_servo.run() function to 800, as shown in the figure below:

```
12    bus_servo.run(1, 800, 1000) # The ID1 servo is set as 700 width
13    time.sleep_ms(1000)
```

- 3) After modifying, click on  icon to check grammar. In the mean time, the terminal will show the following prompt.

```
>>>  
Syntax check completed,no errors
```

- 4) Click on  icon.
- 5) Refer to “Operation Steps 4-6” to download and run the program.