Lesson 4 Control PWM Servo Speed

1. Working Principle

A single PWM servo can be controlled by sending pulse signal so that you can change servo port, rotation angle and rotation time in program to control servo.

The path to the source code of the program is 5.Hardware Basic Learning/ Python Development/Program Files/Control PWM Servo Speed/main.py

```
import time
from PWMServo import PWMServo

# Control PWM servo speed

pwm = PWMServo()
pwm.work_with_time()

if __name__ == '__main__':
  pwm.run(1, 500, 1000) # ID1 PWM servo is set as 500 pulse width. The running time is 1000ms
  (PWM servo cannot read the current position, so the runing time can not be controlled at the firs time)
  time.sleep_ms(2000) # The delay of 2000ms

  for t in (500, 2000): # Run one round at different times, the longer the time, the slower the speed.
    pwm.run(1, 500, t) # The ID1 servo is set to run to 500 pulse width.
    time.sleep_ms(t)

    pwm.run(1, 2500, t) # Set the ID1 servo as 2500 pulse width
    time.sleep_ms(t)

    pwm.run(1, 500, t) # Set the ID1 servo as 500 pulse width
    time.sleep_ms(t)
```

PWM servo mainly calls run() function in PWMServo library. Take the code “pwm.run(1, 500, t)” as example.

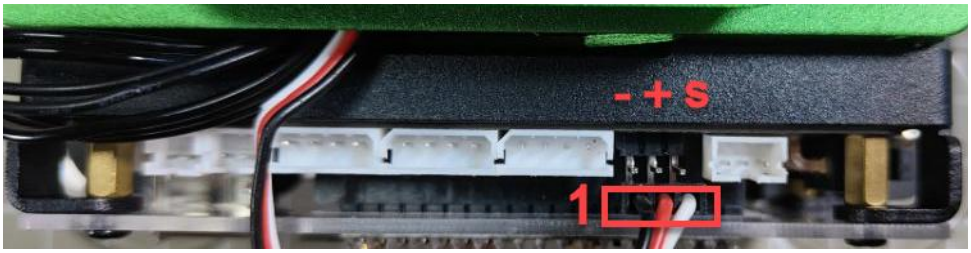
The first parameter “1” is the port number of PWM servo. Here is No.1 port.

The second parameter “500” is the rotation position which is converted by pulse width data (pulse width=11.1×angle+500, the formula just for your information). Therefore, the parameter 500 corresponds to 0° rotation angle.

The third parameter “t” is the rotation time (unit:ms). The parameter for the first rotation is 500, i.e, 500ms. The second round of rotation is 2000, i.e. 2000ms.

2. Preparation

Connect a single PWM servo to PWM servo port on MaxArm controller. Take connecting LFD-01M servo (5V) to No.1 port as example (The servo used to control the suction nozzle is LFD-01M, do not need to assemble by yourself). The wiring method is as follow:

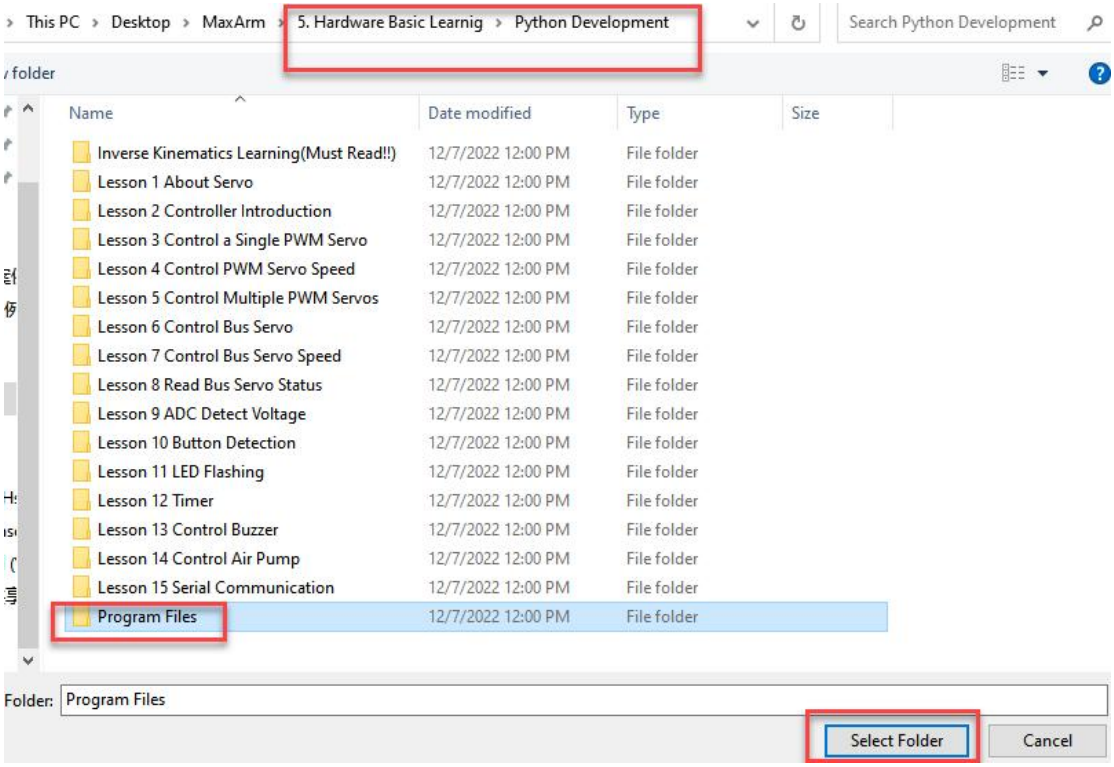


Note: Please note the direction of servo cable, otherwise servo may burn out (S pin is signal terminal).

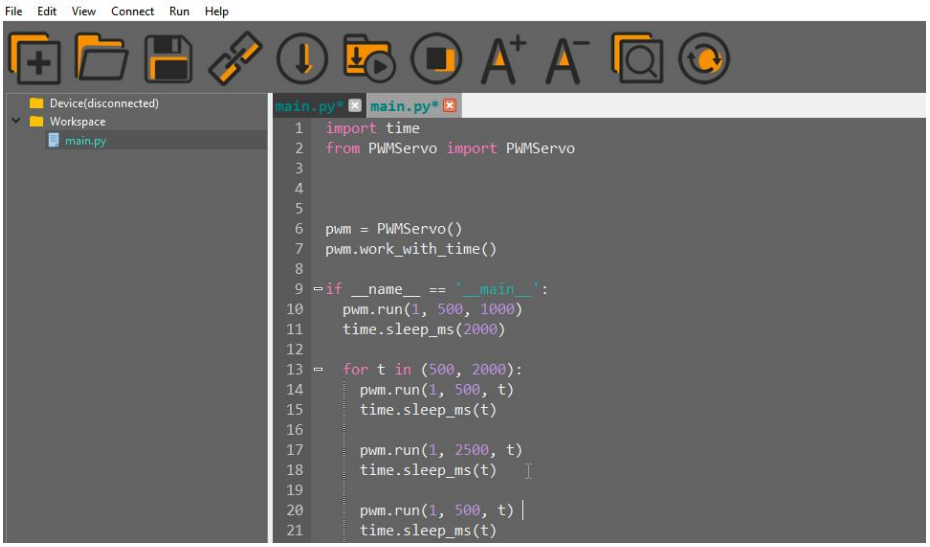
3. Operation Steps

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".



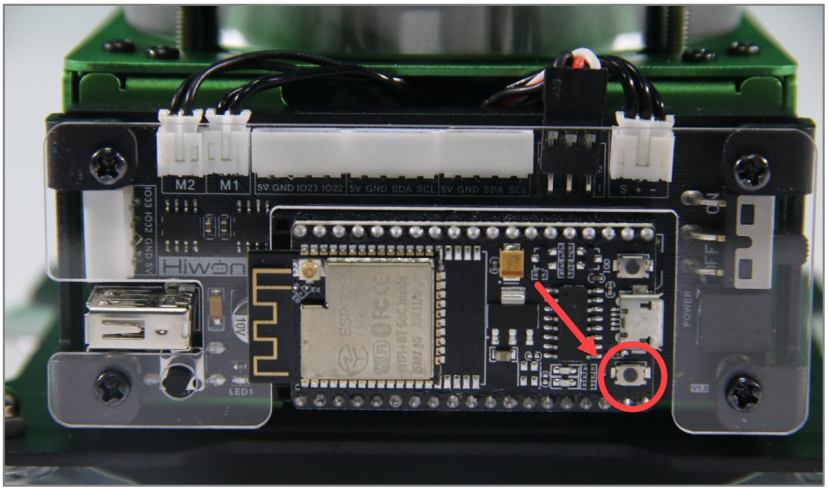
3) Double click folder “Control PWM Servo Speed”, and then double click “main.py” to open program.



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, LFD-01M servo will rotate from “0° to 180° , and then to 0° . This process will repeat twice and the second rotation will be much slower than the first rotation. After the servo stops rotating, exit the program automatically.

5. Function Extension

The first rotation speed set in program is faster than the second one. If want to modify its rotation speed, please modify the corresponding code. Here the “t” parameter value is changed from (500,2000) to (2000,500). The specific operation steps are as follow:

1) Find the following program code:

```
if __name__ == '__main__':
    pwm.run(1, 500, 1000)
    time.sleep_ms(2000)

    for t in (500, 2000):
        pwm.run(1, 500, t)
        time.sleep_ms(t)

        pwm.run(1, 2500, t)
        time.sleep_ms(t)

        pwm.run(1, 500, t)
        time.sleep_ms(t)
```

2) Change the first parameter of “t” to 2000 and the second parameter to 500, as shown in the image below:

```
    for t in (2000, 500): # Run one round at different times, the lo
        pwm.run(1, 500, t) # The IDi servo is set to run to 500 pulse
        time.sleep_ms(t)
```

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 and refer to “Operation Steps 4-6” to download and run the program.