Lesson 11 Control Single PWM Servo

1. Working Principle

Control single PWM servo by sending pulse signal to servo. You can modify the servo port, rotation angle and rotation time to control the servo in program.

The source code of program is located in: **/home/ubuntu/armpi_pro/src/armpi_pro_demo/expansion_board_demo/PWMServo_**

Single.py

```python
#!/usr/bin/python3
# coding=utf8
import sys
import time
import threading
import Board

print('''
**********************************************************
******Function: Hiwonder Raspberry Pi expansion board. PWM Rotation Routine *******
**********************************************************
----------------------------------------------------
Official website:https://www.hiwonder.com
Online mall:https://hiwonder.tmall.com
----------------------------------------------------
Tips:
 * Press "Ctrl+C" to close the running program. If fail to close, please try several times!
----------------------------------------------------
''')

if sys.version_info.major == 2:
    print('Please run this program with python3!')
    sys.exit(0)


if __name__ == '__main__':
    for i in range(5): #loop 5 times
        Board.setPWMServoPulse(1, 500, 1000) # PWM servo connected to No.1 port rotates to 500 in 1000ms
        Board.setPWMServoPulse(1, 1500, 1000) # PWM servo connected to No.1 port rotates to 1500 in 1000ms
        time.sleep(1)
        Board.setPWMServoPulse(1, 500, 1000) # PWM servo connected to No.1 port rotates to 1500 in 1000ms
```

Control PWM servo by calling setPWMServoPulse() function under Board library. Take the code "Board.setPWMServoPulse(1, 500, 1000)" as example.

The first parameter "1" is the port number of the connected bus servo. The port number here is 1.

The second parameter "500" is the rotation position, which is converted by angle conversion formula.

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

2. Preparation

Connect single PWM servo to PWM servo ports of Raspberry Pi expansion board. Take LFD-01 (5V) servo as example. The servo wiring method is as follow:
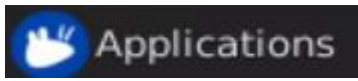

Ground wire

Positive pole of power supply

Signal wire
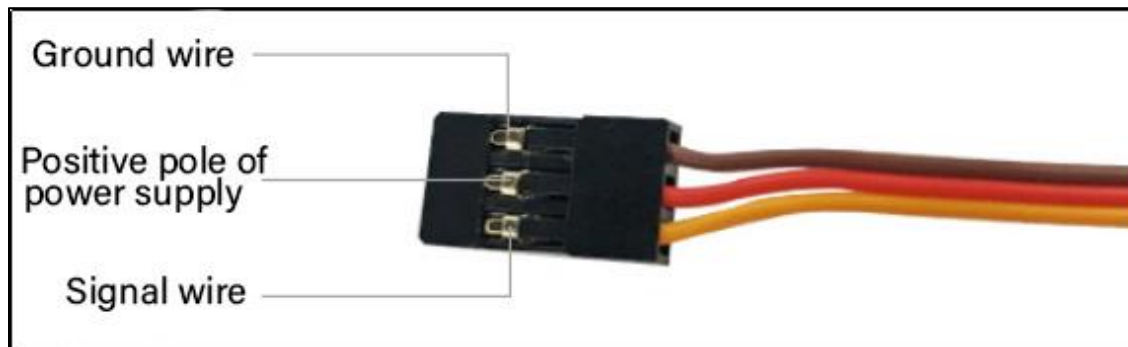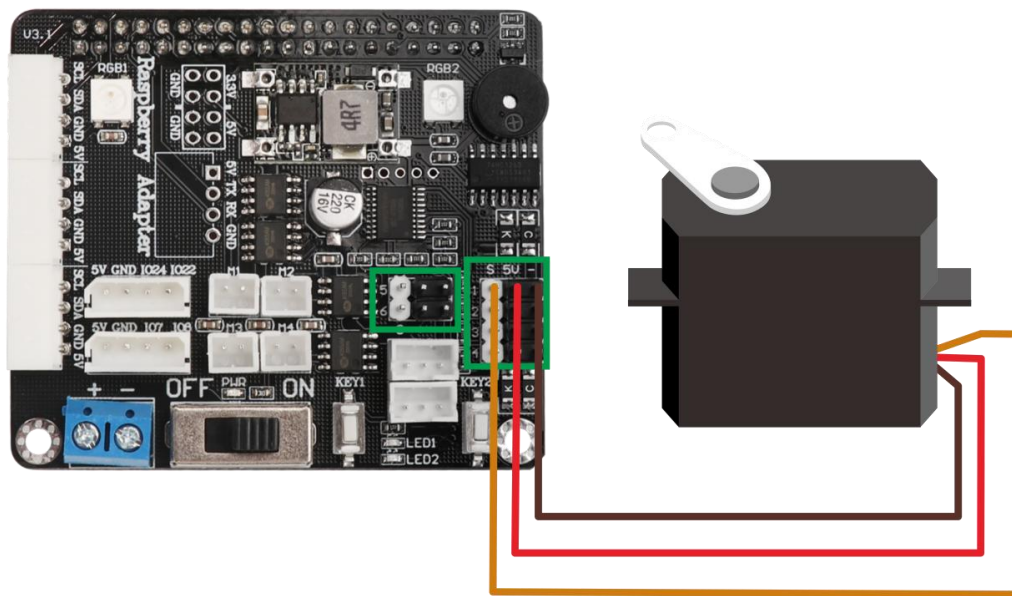
Notes:

1. No.1-No.6 are PWM servo ports. The working voltage of No.1-No.4 are 5V.

The working voltage of No.5-No.6 servo ports are the same as that of power supply ports.

2. Please take notice of the wiring direction when connecting servo, otherwise

it is easy to burn out servo (the white interface end on the expansion board is the signal end).

3. Operation Steps

1) Please refer to the tutorial in "6.Raspberry Pi and Expansion Board Lessons/2.Raspberry Pi Expansion Board/Lesson 4 Set Environment Development" to remotely connect through NoMachine.

2) Open the terminal. Click [Applications] in the lower left corner and select [Terminal Emulator] to enter the terminal.

3) In the opened interface, enter the command "cd armpi_pro/src/armpi_pro_demo/expansion_board_demo/" and press "Enter" to access to game programmings directory .

```
ubuntu@ubuntu:~$ cd armpi_pro/src/armpi_pro_demo/expansion_board_demo/
```

4) Then enter command "sudo python3 PWMServo_Single.py" and press "Enter" to start the game.

```
ubuntu@ubuntu:~/armpi_pro/src/armpi_pro_demo/expansion_board_demo$
sudo python3 PWMServo_Single.py
```

5) If want to exit the program, you can press "Ctrl+C". If fail to exit, please try it multiple times.

3. Project Outcome

When the program is running, LFD-01 servo turns from 0° to 90° and then back to 0°. After 5 cycles, it will automatically exit the program.

4. Function Extension

The default servo port in program is No.1 servo. If want to change servo port, you can modify the program. Take connecting No.2 servo port as example.

1) Enter command "**cd armpi_pro/src/armpi_pro_demo/expansion_board_demo/**" press "Enter" to access to the game programmings directory and .

```
ubuntu@ubuntu:~$ cd armpi_pro/src/armpi_pro_demo/expansion_board_demo/
```

2) Enter command "sudo vim PWMServo_Single.py" and press "Enter" to open the program file.

```
ubuntu@ubuntu:~/armpi_pro/src/armpi_pro_demo/expansion_board_demo$
sudo vim PWMServo_Single.py
```

3) Find the code shown in the figure below.

```
28        Board.setPWMServoPulse(1, 500, 1000)
29        time.sleep(1)
30        Board.setPWMServoPulse(1, 1500, 1000)
31        time.sleep(1)
32        Board.setPWMServoPulse(1, 500, 1000)
```

4) Press "i" key. When "INSERT" word appears, which means it has been switched to the editing mode.

```
32        Board.setPWMServoPulse(1, 500, 1000)
-- INSERT --
```

5) We can change servo connection port by modifying servo parameters (Board.setPWMServoPulse (1, 500, 1000). The first parameter "1" is servo port; the second parameter is the pulse width; the third parameter is the running time, as the figure shown below:

```
28        Board.setPWMServoPulse 2  500, 1000)
29        time.sleep(1)
30        Board.setPWMServoPulse 2  1500, 1000)
31        time.sleep(1)
32        Board.setPWMServoPulse 2  500, 1000)
```

6) After modifying, press "Esc". Then enter ":wq" and press "Enter" to save and exit.

```
32        Board.setPWMServoPulse(2, 500, 1000)
:wq
```

7) After saving program, please refer to "3.Operation Steps" to check the outcome.