Lesson 5 Control Bus Servo Rotation

1. Working Principle

On the basis of communication protocol, send ID, rotation angle or time commands to control the rotation of bus servo.

The source code of program is located in:

/home/ubuntu/armpi_pro/src/armpi_pro_demo/expansion_board_demo/BusServo_

Move.py

```
1   import time
2   import Board
3
4   print('''
5   **********************************************************
6   *********Function: Hiwonder Raspberry Pi expansion board. Servo Routine*************
7   **********************************************************
8   ----------------------------------------------------------
9   Official website:https://www.hiwonder.com
10  Online mall:https://hiwonder.tmall.com
11  ----------------------------------------------------------
12  Tips:
13   * Press "Ctrl+C" to close the running program. If fail to close, please try several times!
14  ----------------------------------------------------------
15  ''')
16
17  while True:
18      # Parameter: parameter 1: servo ID; paramter 2: position; parameter 3: running time
19      # The rotation of servo ranges 0°-240° corresponding to 0-1000, that is, the range of parameter 2 is 0-1000.
20
21      Board.setBusServoPulse(6, 800, 1000) # The ID6 servo rotates to 800 in 1000ms.
22      time.sleep(0.5) # Delay 0.5s
23
24      Board.setBusServoPulse(6, 200, 1000) # The ID6 servo rotates to 200 in 1000ms.
25      time.sleep(0.5) # Delay 0.5s
```

The bus servo can be controller by calling setBusServoPulse() function under Board library. Take the code "Board.setBusServoPulse(6, 800, 1000)" as example.

The first parameter "9" is the port number of the connected bus servo. The port number here is No.9.

The second parameter "800" is the rotation position.

The third parameter "1000" is the duration of rotation (the unit is ms). Here is 1000ms.

The rotation range of bus servo is between 0 and 1000 pulse width which corresponds to 0-240°, that is, 1° is roughly equal to 4.2 pulse width.

The rotation range of the bus servo is between 0 and 1000 pulse pulse width, which is equivalent to 0-240°, that is, 1° is roughly equal to 4.2 pulse width.

This parameter is obtained by angle conversion. The conversion formula of angle and pulse width is: pulse width = 4.2 * angle (this formula is only for reference)

2. Preparation

2.1 Hardware Wiring

Connect single bus servo only to one of bus servo ports on Raspberry Pi expansion board. Take LX-15D servo as example.
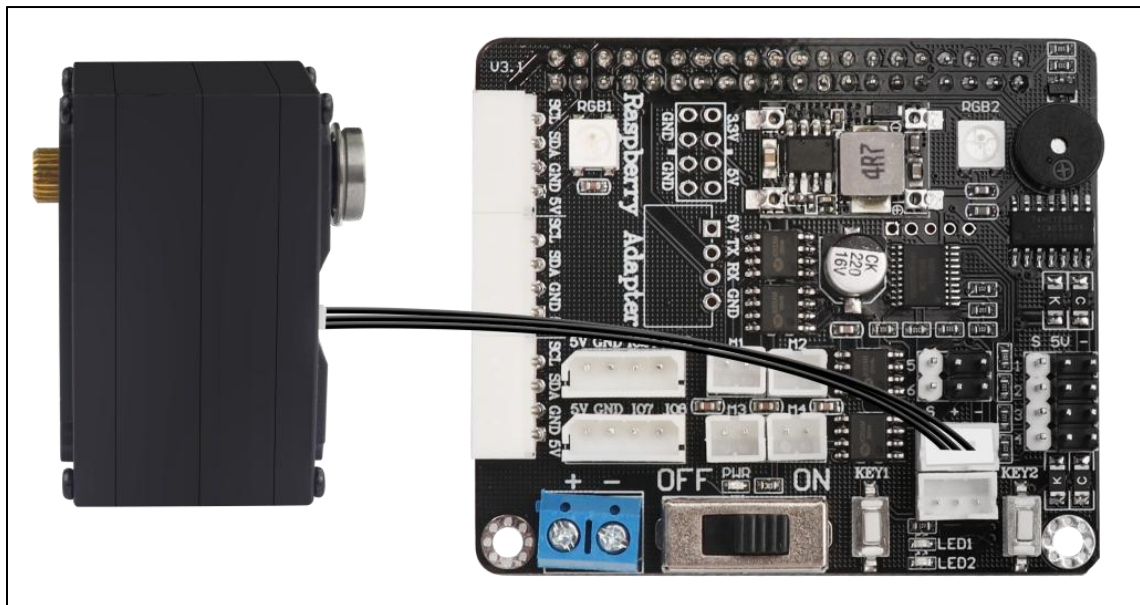
Reminder: The wire of bus servo uses anti-reverse plug. Please do not insert it forcefully.
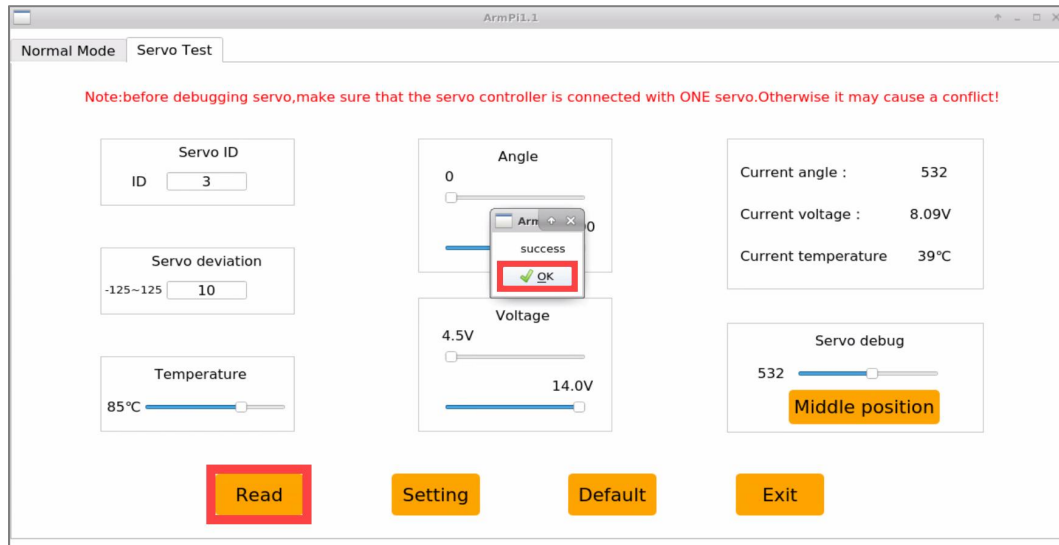
2.2 Set ID

Take controlling ID6 servo as example. Set Servo ID in "Servo Test Tool" in ArmPi Pro PC software.
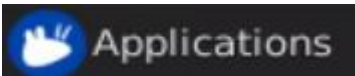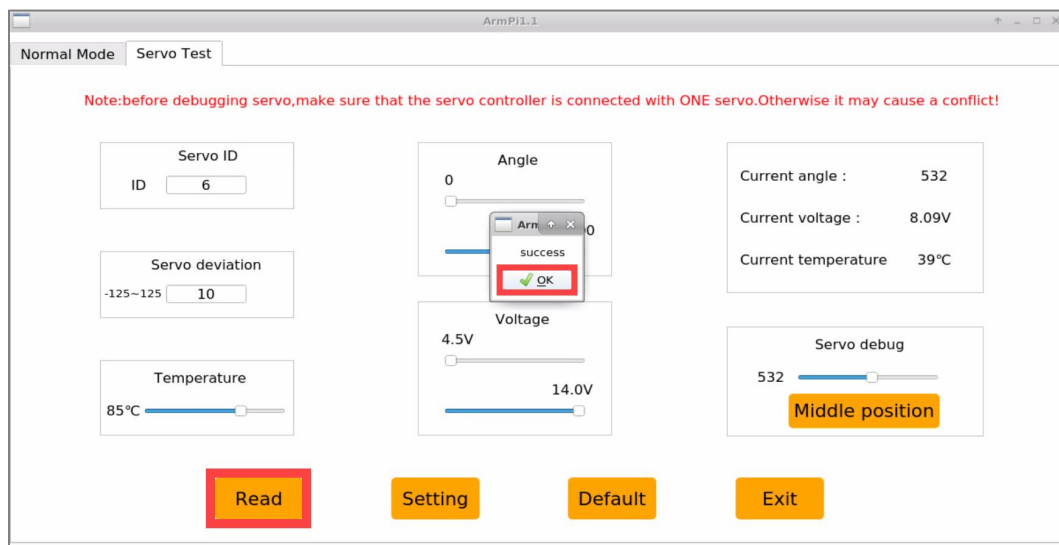
1) Click "**PC_Software**" to open ArmPi Pro PC software.

2) Click "Servo Test" menu bar, click "Read" , and wait for the prompt "success".

3) In the "Servo ID" area, input "6" for servo ID, click "Set" button, and wait for the prompt "success".

3. Operation Steps

1) Open the terminal. Click in the lower left corner and select to enter the terminal.

2) 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/
```

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

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

4) If want to exit the program, you can press "Ctrl+C".

4. Project Outcome

After running program, bus servo will rotate between 800 and 200 repeatedly.

5. Function Extension

If want to modify the rotation position of servo, you can modify program to realize it. Take modifying ID6 servo 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 BusServo_Move.py" and press "Enter" to open the program file, .

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

3) Find the program block in the red box, as the figure shown below.

```
21          Board.setBusServoPulse(6, 800, 1000)
22          time.sleep(0.5) # Delay 0.5s
23
24          Board.setBusServoPulse(6, 200, 1000)
25          time.sleep(0.5) # Delay 0.5s
```

4) Press "i" on keyboard. When "INSERT" appears, it has switched to the editing mode.

```
24          Board.setBusServoPulse(6, 200, 1000)
-- INSERT --
```

5) We can change the rotation position of servo by changing pulse width

```
21          Board.setBusServoPulse(6, 600  1000)
22          time.sleep(0.5) # Delay 0.5s
23
24          Board.setBusServoPulse(6, 400  1000)
25          time.sleep(0.5) # Delay 0.5s
```

The range of rotation position is between 0 and 1000 which corresponds to 0°

-240°, that is, 1° is equal to 4.17 pulse width. The conversion formula can

refer to "pulse width=angle×4.17".

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

exit.

```
25          time.sleep(0.5) # Delay 0.5s
:wq
```

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

outcome.