

Lesson 15 Control DC Motor

1. Working Principle

The motor can be controlled to rotate clockwise or counterclockwise by setting the motor parameters. When the value is positive, the motor will rotate clockwise; when the value is negative, the motor will rotate counterclockwise.

The source code of program is located in:

/home/ubuntu/arduino_pro/src/arduino_pro_demo/expansion_board_demo/motor_control_demo.py

```
1  #!/usr/bin/python3
2  # coding=utf8
3  # Date:2022/06/30
4  import sys
5  import time
6  import signal
7  import Board as Board
8
9  print("""
10 *****
11 *****Function: Hiwonder Raspberry Pi expansion board. Motor Control Routine*****
12 *****
13 -----
14 Official website:https://www.hiwonder.com
15 Online mall:https://hiwonder.tmall.com
16 -----
17 Tips:
18 * Press "Ctrl+C" to close the running program. If fail to close, please try several times!
19 -----
20 """)
21
22
23 if sys.version_info.major == 2:
24     print('Please run this program with python3!')
25     sys.exit(0)
26
27 #Process before closing
28 def stop(signum, frame):
29     Board.setMotor(2, 0) # No.2 motor stops
30
31     signal.signal(signal.SIGINT, stop)
32
33 if __name__ == '__main__':
34     Board.setMotor(2,100) # No.2 servo rotates at the speed of 100.
35     time.sleep(2) # Delay 2 seconds
36     Board.setMotor(2,50) # No.2 servo rotates at the speed of 50.
37     time.sleep(2)
38     Board.setMotor(2,-100) # No.2 servo rotates at the speed of -100.
39     time.sleep(2)
40     Board.setMotor(2, 0) # No.2 servo stops
```

The DC motor can be controlled by setMotor() function under Board library.

Take the code “Board.setMotor(2, 100)” as example.

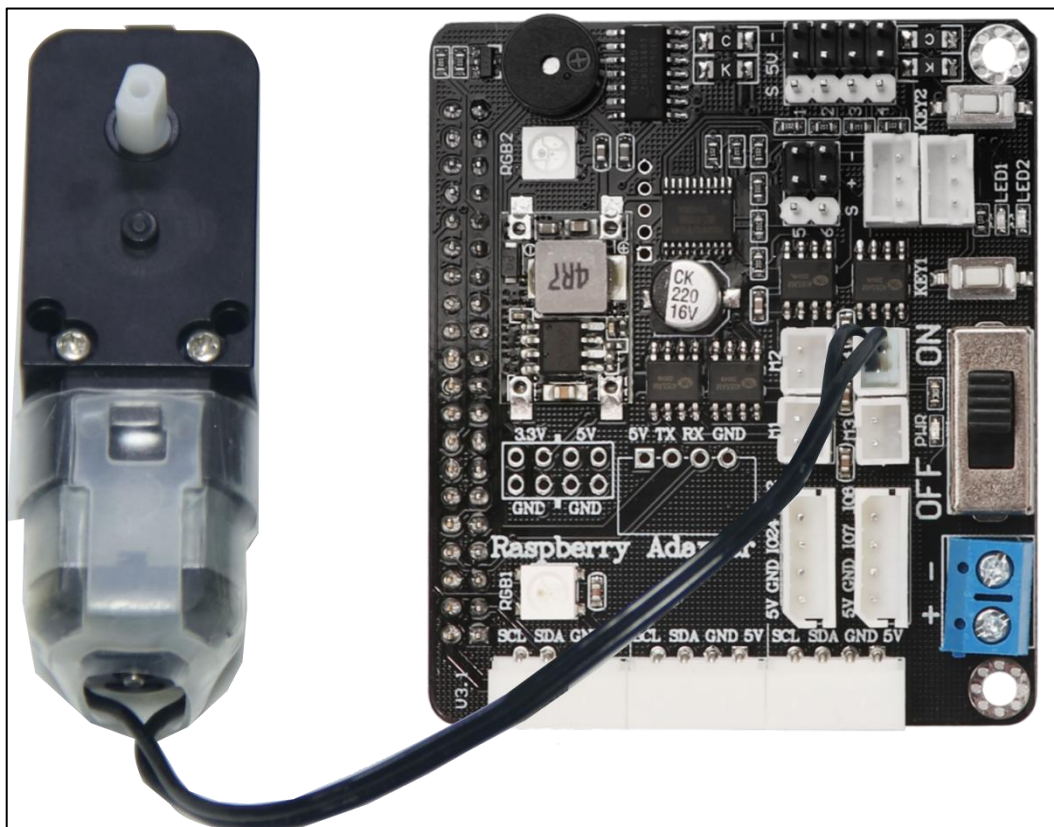
The first parameter “2” is the port number of the connected motor. The port here is No.4.

The second parameter “100” is rotation speed, which means motor rotates clockwise at the speed of 100. The value “0” means the motor stop rotating.

The negative value means counterclockwise rotation.

2. Preparation

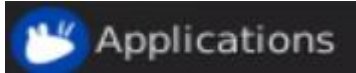

Connect single DC motor to Raspberry Pi expansion board. Take the plastic axis TT motor (DC3V-6V) as example.



Note: 2PIN wire uses anti-reverse plug. Please do not plug it forcefully.

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  in the lower left corner and select  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 “python3 Buzzer_Control.py” and press “Enter” to start the game.

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

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

4. Project Outcome

When the program is running, DC motor rotates clockwise for 4 seconds first. Then rotate counterclockwise for 2 seconds and stop. Finally, exit the program automatically. We can find that the speed of clockwise rotation is fast first and then slow down.

5. Function Extension

5.1 Adjust Speed

Note: The speed of motor ranges from -100 to 100. The setting of value do not exceed speed range to avoid motor damage.

In program, the motor defaults to rotate clockwise at the speed of 50, then rotate counterclockwise at the speed of 100. Here will change the counterclockwise speed from 100 to 50.

- 1) Enter command “`cd armpi_pro/src/arnpi_pro_demo/expansion_board_demo/`” and press “Enter” to access to the game programmings directory.

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

- 2) Enter command “`sudo vim Motor_Control.py`” and press “Enter” to open the program file.

```
ubuntu@ubuntu:~/arnpi_pro/src/arnpi_pro_demo/expansion_board_demo$ sudo vim Motor_Control.py
```

- 3) Find the code shown in the figure below.

```
34 Board.setMotor(2,100) # No.2 servo rotates at the speed of 100.
35 time.sleep(2)         # Delay 2 seconds
36 Board.setMotor(2,50)  # No.2 servo rotates at the speed of 50.
37 time.sleep(2)
38 Board.setMotor(2,-100) # No.2 servo rotates at the speed of -100.
39 time.sleep(2)
40 Board.setMotor(2, 0)  # No.2 servo stops
```

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

```
40 Board.setMotor(2, 0) # No.2 servo stops
-- INSERT --
```

- 5) Change the parameter of motor speed from -100 to -50.

```
36 Board.setMotor(2,50) # No.2 servo rotates at the speed of 50.
37 time.sleep(2)
38 Board.setMotor(2,-50) # No.2 servo rotates at the speed of -100.
39 time.sleep(2)
40 Board.setMotor(2, 0) # No.2 servo stops
```

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

```
33 if __name__ == '__main__':
34     Board.setMotor(2,100) # 2号电机,以100速度旋转
35     time.sleep(2) # 延时2S
36     Board.setMotor(2,50) # 2号电机,以50速度旋转
37     time.sleep(2)
38     Board.setMotor(2,-50) # 2号电机,以-100速度旋转
39     time.sleep(2)
40     Board.setMotor(2, 0) # 2号电机停止
41 :wq
```

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

5.2 Change Motor Connection Port

- 1) In program, the connected port of motor is No.2 port by default. This section will change to No.3. You can refer to the operation steps in “5.1 Adjust Speed (1-4)” to switch to the editing mode. Now, let’s get started.
- 2) Change the motor port to No.3, as the figure shown below:

```
23 if sys.version_info.major == 3:
24     print('Please run this program with python3!')
25     sys.exit(0)
26
27 #Process before closing
28 def stop(signum, frame):
29     Board.setMotor(3, 0) # No.2 motor stops
30
31 signal.signal(signal.SIGINT, stop)
32
33 if __name__ == '__main__':
34     Board.setMotor(3,100) # No.2 servo rotates at the speed of 100.
35     time.sleep(2) # Delay 2 seconds
36     Board.setMotor(3,50) # No.2 servo rotates at the speed of 50.
37     time.sleep(2)
38     Board.setMotor(3,-100) # No.2 servo rotates at the speed of -100.
39     time.sleep(2)
40     Board.setMotor(3, 0) # No.2 servo stops
```

- 3) After modifying, press “Esc”. Then enter “:wq” and press “Enter” to save

and exit.

```
40      Board.setMotor(3, 0)    # No.2 servo stops  
-- INSERT --
```

- 4) After saving program, please refer to “3.Operation Steps” to check the outcome.