19.Photoresistor

Introduction

In this lesson, we will learn how to use photoresistor.

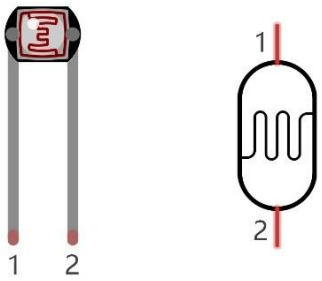
Hardware Required

- ✓ 1 * Raspberry Pi
- ✓ 1 * T-Extension Board
- ✓ 1 * PCF8591
- ✓ 1 * 40-pin Cable
- ✓ Several Jumper Wires
- ✓ 1 * Breadboard

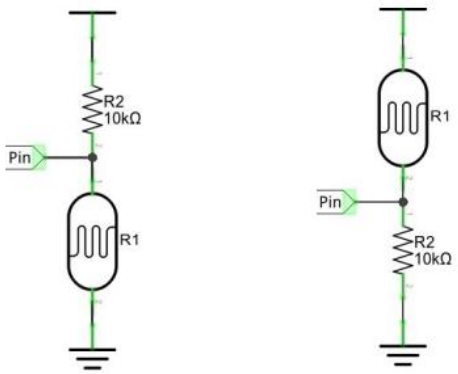
Principle

Photoresistor

Photoresistor is a light sensitive resistor. When the strength that light casts onto the photoresistor surface is not the same, resistance of photoresistor will change. With this feature, we can use photoresistor to detect light intensity. Photoresistor and symbol are as follows.



The circuit below is often used to detect the change of photoresistor resistance:



In the above circuit, when photoresistor resistance changes due to light intensity,

voltage between photoresistor and resistor R1 will change, so light's intensity can be obtained by measuring the voltage.

The PCF8591 four modules red short-circuit cap instructions

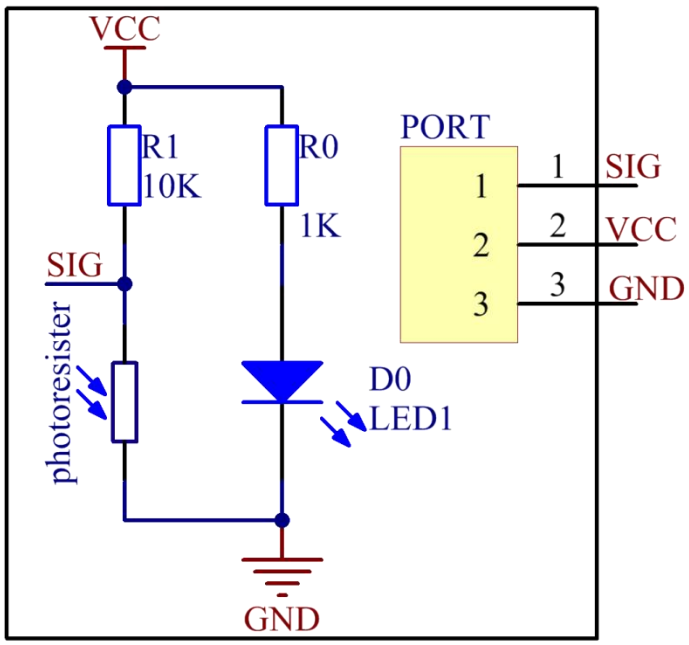
Module a total of three red short-circuit cap, respectively, as follows:

P4 connected to P4 short-circuit cap, select the thermistor access circuit

P5 connected to P5 short-circuit cap, select the photosensitive resistor access circuit

P6 connected to P6 short-circuit cap, select 0-5V adjustable voltage access circuit

Schematic Diagram



Experimental Procedures

Step 1: Build the circuit.

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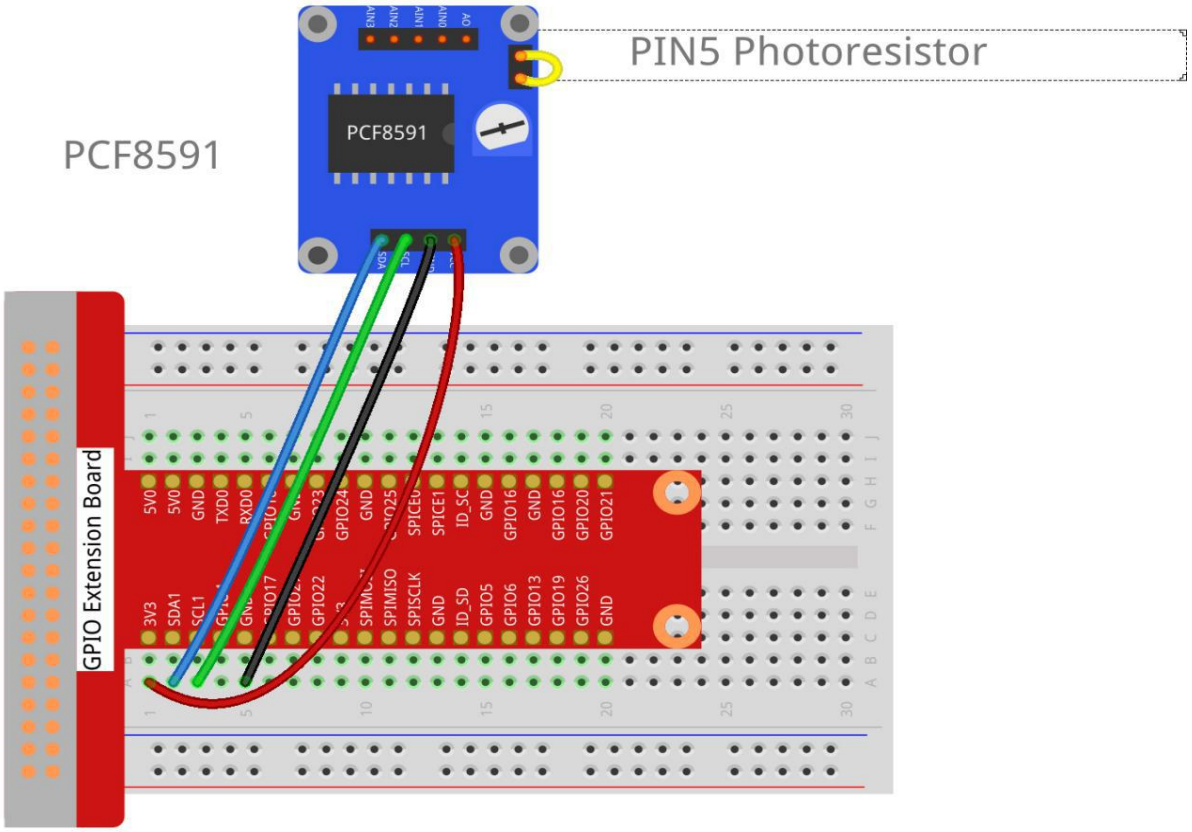

Step 2: Go to the folder of the code.

```
cd /home/pi/REXQualis_Raspberry_Pi_Complete_Starter_Kit/C/19.Photoresistor
```

Step 3: Compile the code.

```
gcc 19.Photoresistor.c -o Photoresistor.out -lwiringPi
```

Step 4: Run the executable file.

```
sudo ./Photoresistor.out
```

After the program is executed, when you cover the photosensitive resistance or make a flashlight toward the photoresistor, the brightness of LED will be enhanced or weakened. And the terminal window will print out the current input voltage value of PCF8591 AIN0 pin and the converted digital quantity.

Code

```
#include <stdio.h>
#include <wiringPi.h>
```

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```
#include <pcf8591.h>
#include <math.h>

#define      PCF       120    //pcf base
#define      DOpin   0

int main()
{
    int analogVal;

    if(wiringPiSetup() == -1){
        printf("setup wiringPi failed !");
        return 1;
    }
    // Setup pcf8591 on base pin 120, and address 0x48
    pcf8591Setup(PCF, 0x48);

    while(1) // loop forever
    {
        analogVal = analogRead(PCF + 0);
        printf("Value: %d\n", analogVal);

        delay (200);
    }
    return 0;
}
```

For Python Language Users

Step 2: Go to the folder of the code.

```
cd /home/pi/REXQualis_Raspberry_Pi_Complete_Starter_Kit/Python
```

Step 3: Run the executable file.

```
sudo python3 19.Photoresistor.py
```

After the program is executed, when you cover the photosensitive resistance or make a flashlight toward the photoresistor, the brightness of LED will be enhanced or weakened. And the terminal window will print out the current input voltage value of PCF8591 AIN0 pin and the converted digital quantity.

Code

The code here is for Python3, if you need for Python2, please open the code with the suffix py2 in the attachment.

```
#!/usr/bin/env python3
import PCF8591 as ADC
import RPi.GPIO as GPIO
import time

DO = 17
GPIO.setmode(GPIO.BCM)

def setup():
    ADC.setup(0x48)
    GPIO.setup(DO, GPIO.IN)

def loop():
    status = 1
    while True:
        print ('Value: ', ADC.read(0))

        time.sleep(0.2)
```

```
if __name__ == '__main__':
    try:
        setup()
        loop()
    except KeyboardInterrupt:
        pass
        analogVal = ADC0834.getResult()
        print ('analog value = %d' % analogVal)
        led_val.ChangeDutyCycle(analogVal*100/255)
        time.sleep(0.2)


if __name__ == '__main__':
    setup()
    try:
        loop()
    except KeyboardInterrupt: # When 'Ctrl+C' is pressed, the program destroy() will be executed.
        destroy()
```

Phenomenon Picture

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