Lesson 8 Controlling a RGB LED with PWM

Overview

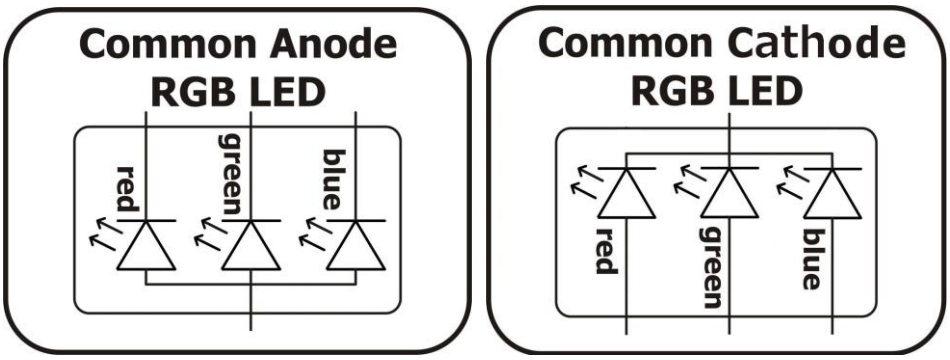
In this lesson, we will program the Raspberry Pi for RGB LED control, and make RGB LED emits a variety of colors of light.

Requirement

- 1* Raspberry Pi
- 1* RGB LED
- 3* 220Ω Resistor
- 1* Breadboard
- Several Jumper wires

Principle

RGB LEDs consist of three LEDs, one red, one green and one blue. These three colored LEDs are capable of producing any color. Tri-color LEDs with red, green, and blue emitters, in general using a four-wire connection with one common lead (anode or cathode). These LEDs can have either common anode or common cathode leads.



What we used in this experiment is the common anode RGB LED. The longest pin is the common anode of three LEDs. The pin is connected to the +3.3V pin of the Raspberry Pi, and the three remaining pins are connected to the Raspberry Pi's pin11, pin12, pin13 through a current limiting resistor.

In this way, we can control the color of RGB LED by 3-channel PWM signal.

Key function:

- **int softPwmCreate (int pin, int initialValue, int pwmRange)**

This creates a software controlled PWM pin. You can use any GPIO pin and the pin numbering will be that of the wiringPiSetup() function you used. Use 100 for the pwmRange, then the value can be anything from 0 (off) to 100 (fully on) for the given pin.

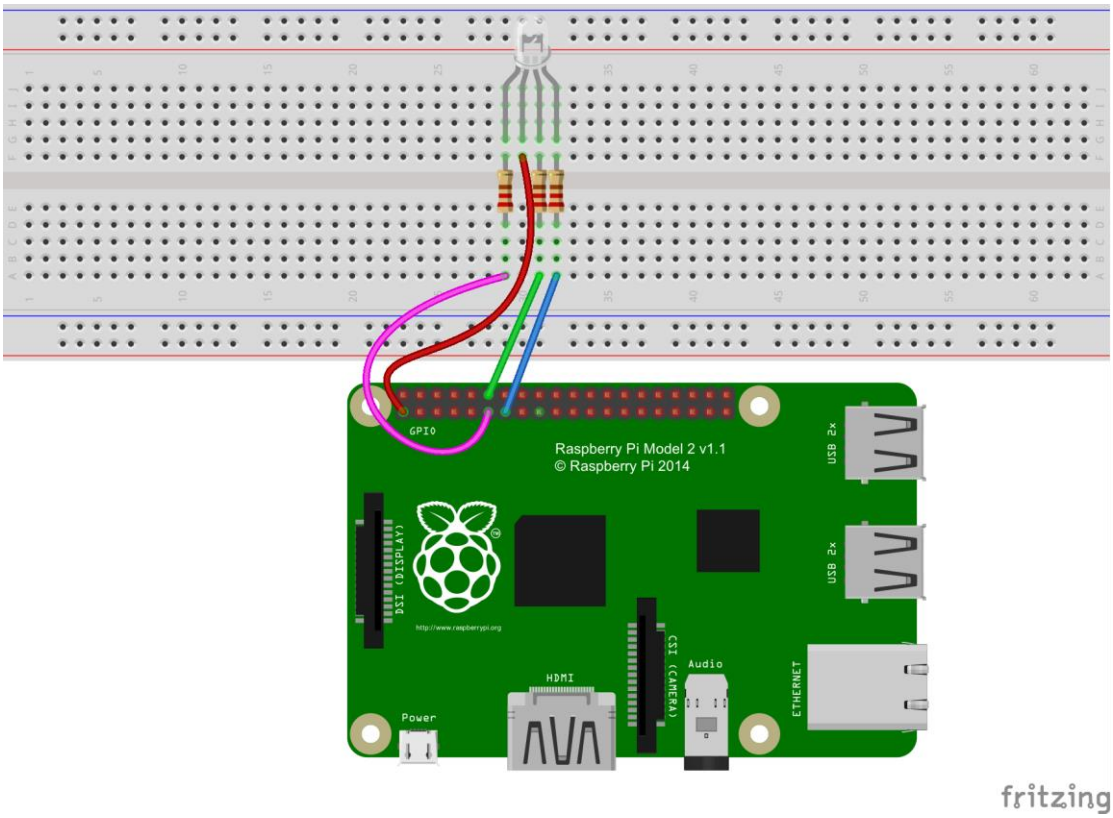
The return value is 0 for success. Anything else and you should check the global errno variable to see what went wrong.

- void softPwmWrite (int pin, int value)

This updates the PWM value on the given pin. The value is checked to be in-range and pins that haven't previously been initialised via softPwmCreate will be silently ignored.

Procedures

1. Build the circuit



2. Program

C user:

2.1 Edit and save the code with vim or nano.

(Code path: /home/Adeept_Ultimate_Starter_Kit_C_Code_for_RPi/08_rgbLed/rgbLed.c)

2.2 Compile the program

```
$ gcc rgbLed.c -o rgbLed -lwiringPi -lpthread
```

NOTE: The compiler option '-lpthread' is essential, because the implementation of softPwm is based on linux multithreading.

2.3 Run the program

```
$ sudo ./rgbLed
```

Python user:

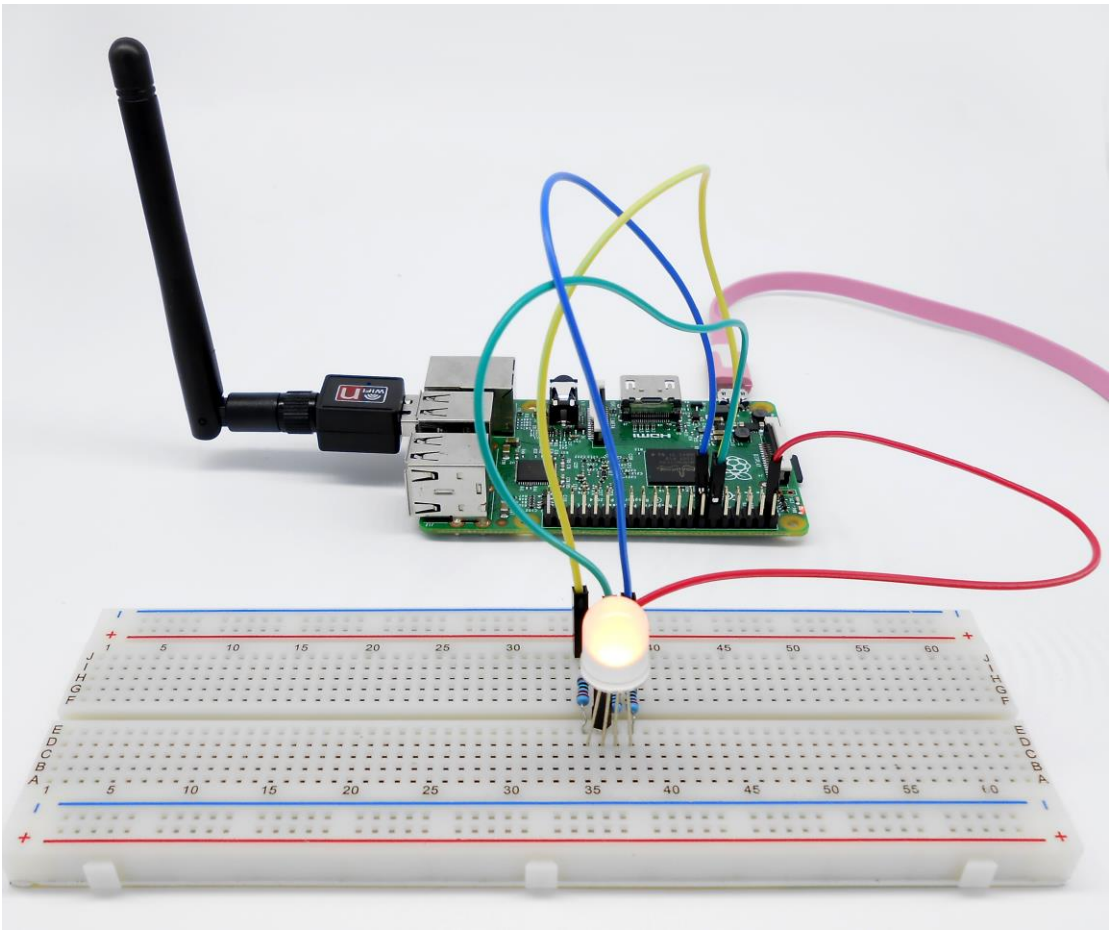
2.1 Edit and save the code with vim or nano.

(Code path: /home/Adeept_Ultimate_Starter_Kit_Python_Code_for_RPi/08_rgbLed.py)

2.2 Run the program

```
$ sudo python 08_rgbLedLed.py
```

Now, you can see that the RGB LED emitting red, green, blue, yellow, white and purple light, then the RGB LED will be off, each state continues 1s, after repeating the above procedure.



Summary

By learning this lesson, I believe that you have already known the principle and the programming of RGB LED. I hope you can use your imagination to achieve even more cool ideas based on this lesson.