

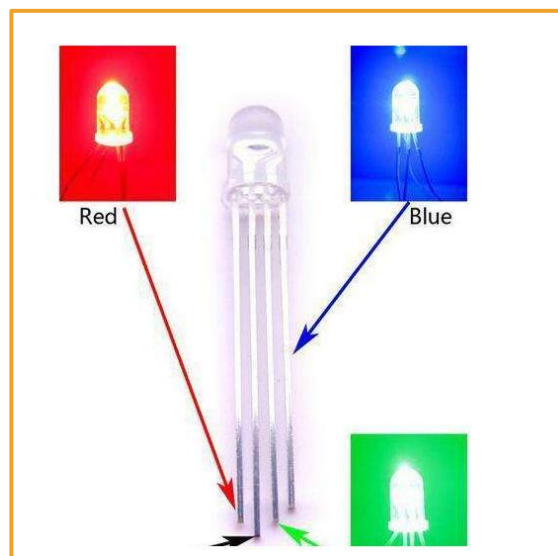
## RGB LED Experiment

### Introduction to RGB leds

In this course, you will use PWM to control the RGB LED lights and make them display different colors.

When two leds are lit by three primary color leds, they can emit yellow, purple and cyan (such as red and blue leds). If red, green and blue leds are lit at the same time, they produce white light. If a circuit can make red, green, and blue leds light up in pairs, individually, and three primary leds light up at the same time, it can emit seven different colors of light, thus resulting in the phenomenon of colorful LED lights.

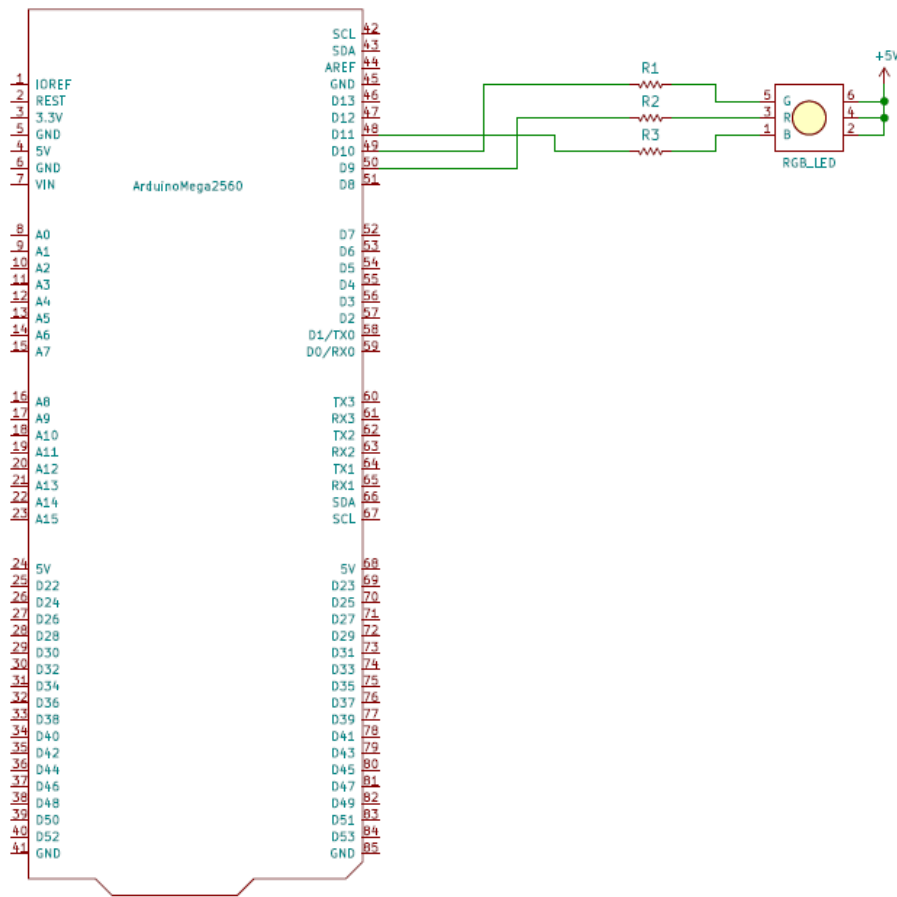
The color changing light is made up of red (R), green (G) and blue (B) leds. Two-color leds are very familiar to us. Generally consists of red LED and green LED. It can emit red or green light alone. When red and green light are both bright, the red and green light are mixed into orange. RGB is divided into common Yin and common Yang, the long pin is the common end, the other pins are as follows



### Component List

- ◆ Keywish Arduino Mega 2560 Mainboard
- ◆ Breadboard
- ◆ USB cable
- ◆ RGB LED\*1
- ◆ Resistor (220Ω) \*3
- ◆ Jumper wires

## Schematic Diagram



## Experimental Principle

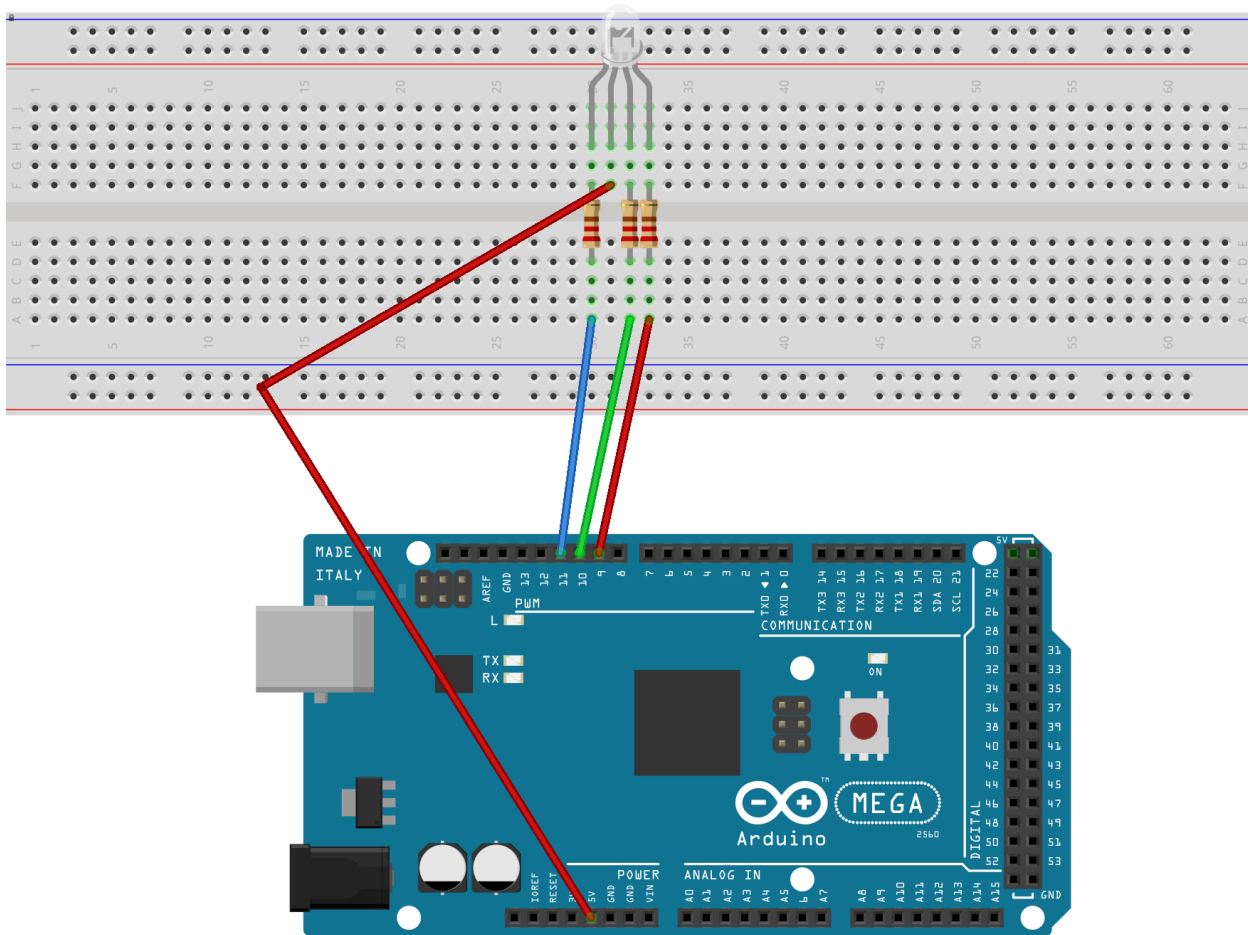
RGB stands for the red, green, and blue color channels, it is an industry color standard. RGB displays various new colors by changing the three channels and superimposing them, which, according to statistics, can create 16,777,216 different colors. If you say the color displayed doesn't completely match a natural color, then it almost certainly cannot be differentiated with the naked eyes.

Each of the three color channels of red, green, and blue has 255 stages of brightness. When the three primary colors are all 0, "LED light" is the darkest, that is, it turns off. When the three primary colors are all 255, "LED light" is the brightest. When superimposing the light emitted by the three primary colors, the colors will be mixed. However, the brightness is equal to the sum of all brightness, and the more you mix, the brighter the LED is. This process is known as additive mixing.

In this experiment, we will also use PWM, if you've followed the lessons thus far, you, for sure, already have a basic understanding. Here we input a value between 0 and 255 to the three pins of the RGB LED to make it display different colors.

## Wiring of Circuit

| Arduino Uno | RGB |
|-------------|-----|
| 11          | 1   |
| 10          | 3   |
| 9           | 4   |
| +5V         | 2   |



fritzing

## Code

```
#define RGB_RED    11
#define RGB_GREEN  10
#define RGB_BLUE   9

void setup()
{
    pinMode(RGB_RED, OUTPUT);
    pinMode(RGB_GREEN, OUTPUT);
    pinMode(RGB_BLUE, OUTPUT);
}

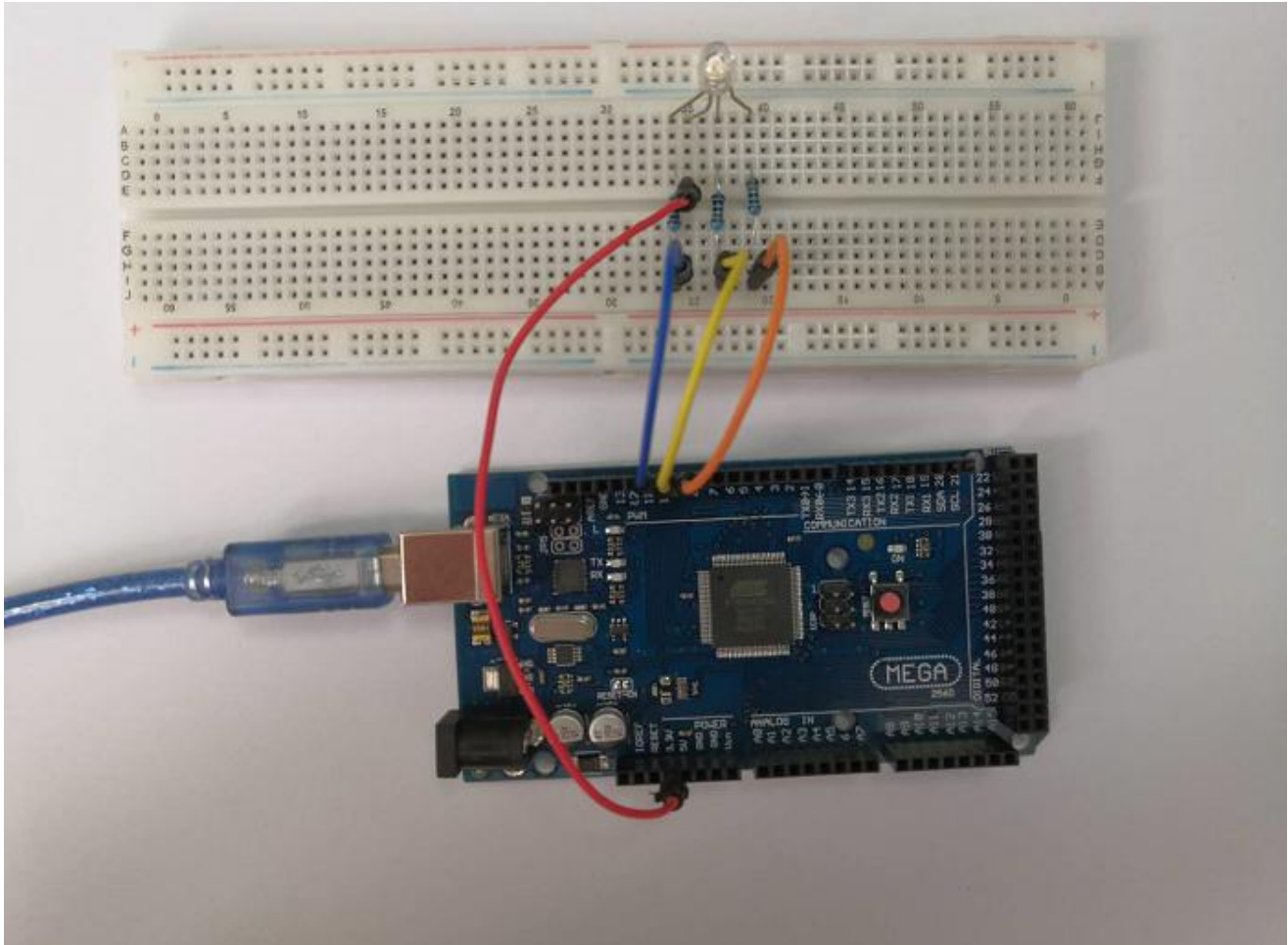
void loop()
{
    int i;
    for (i=255; i>0 ;i--)
    {
        analogWrite(RGB_RED, i);
        analogWrite(RGB_GREEN, 255);
        analogWrite(RGB_BLUE, 255);
        delay(4);
    }
    delay(500);           //turn the RGB LED red smoth

    for (i=255; i>0; i--)
    {
        analogWrite(RGB_RED, 255);
        analogWrite(RGB_GREEN, i);
        analogWrite(RGB_BLUE, 255);
        delay(4);
    }
    delay(500);           //turn the RGB LED green smoth

    for (i=255; i>0; i--)
    {
        analogWrite(RGB_RED, 255);
        analogWrite(RGB_GREEN, 255);
        analogWrite(RGB_BLUE, i);
        delay(4);
    }
    delay(500);           //turn the RGB LED blue smoth
}
```

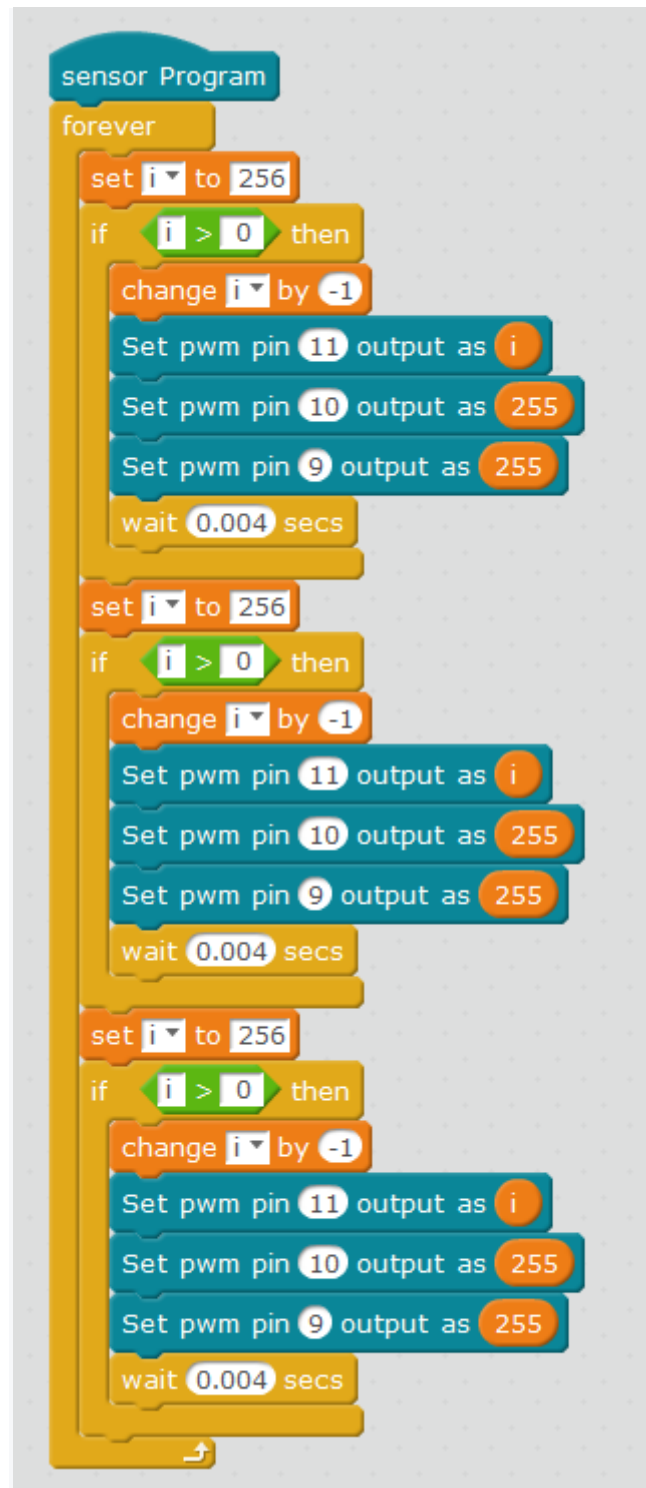
## Experiment Result

Here you should see the RGB LED flashes circularly, and blue first, then red, green.



## MBlock programming program

The program prepared by mBlock is shown in the figure below:



## MagicBlock graphical programming program

MagicBlock writes the RGB patch module program as shown in the following figure :



## Mixly graphical programming program

Mixly writes the breathing lamp program as shown in the following figures :

