Lesson 5 RGB LED

Introduction

In this lesson, you will use PWM to control an RGB LED and cause it to display all kinds of colors.

Components

- 1 * RGB LED
- 3 * Resistor (220Ω)
- 1 * Breadboard
- 1 * Arduino Uno board
- Jumper wires
- USB cable

Principle

RGB

RGB stands for the red, green, and blue color channels and 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 which, if you've followed the lessons thus far, you already have a basic understanding of. Here we input a value between 0 and 255 to the three pins of the RGB LED to make it display different colors.

Experimental Procedures

Step 1: Build the circuit

Turn Over!!!
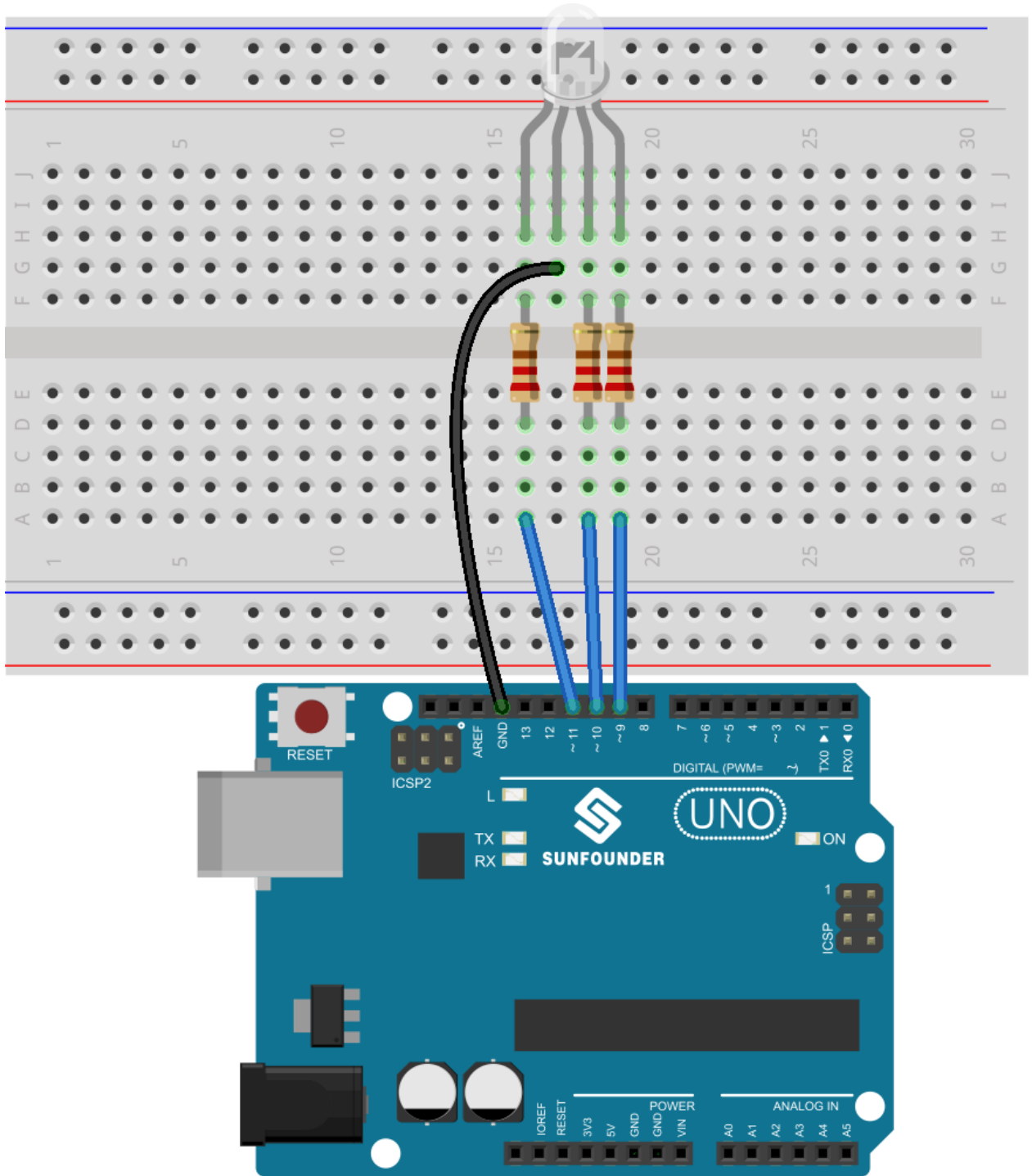
Step 2: Program
Step 3: Compile the code
Step 4: Upload the sketch to the Arduino Uno board

Here you should see the RGB LED flash circularly red, green, and blue first, then red, orange, yellow, green, blue, indigo, and purple.

Code

```
//RGB LED
//The RGB LED will appear red, green, and blue first, then red, orange,
yellow, green, blue, indigo, and purple.
/*********************************************************************/
const int redPin = 11; // R petal on RGB LED module connected to digital pin
11
const int greenPin = 10; // G petal on RGB LED module connected to digital
pin 9
const int bluePin = 9; // B petal on RGB LED module connected to digital pin
10
/*********************************************************************/
void setup()
{
pinMode(redPin, OUTPUT); // sets the redPin to be an output
pinMode(greenPin, OUTPUT); // sets the greenPin to be an output
pinMode(bluePin, OUTPUT); // sets the bluePin to be an output
}
/*********************************************************************
/
void loop() // run over and over again
{
// Basic colors:
color(255, 0, 0); // turn the RGB LED red
delay(1000); // delay for 1 second
color(0,255, 255); // turn the RGB LED green
delay(1000); // delay for 1 second
color(0, 0, 255); // turn the RGB LED blue
delay(1000); // delay for 1 second
// Example blended colors:
color(255,0,0); // turn the RGB LED red
delay(1000); // delay for 1 second
color(237,109,0); // turn the RGB LED orange
delay(1000); // delay for 1 second
color(255,215,0); // turn the RGB LED yellow
delay(1000); // delay for 1 second
color(34,139,34); // turn the RGB LED green
delay(1000); // delay for 1 second
color(0,0,255); // turn the RGB LED blue
delay(1000); // delay for 1 second
```

```
color(0,46,90); // turn the RGB LED indigo
delay(1000); // delay for 1 second
color(128,0,128); // turn the RGB LED purple
delay(1000); // delay for 1 second
}
/****************************************************/
void color (unsigned char red, unsigned char green, unsigned char blue) //
the color generating function
{
analogWrite(redPin, red);
analogWrite(bluePin, blue);
analogWrite(greenPin, green);
}
/****************************************************/
```