LESSON 2 RGB PROJECT-SEVEN COLOR RGB

Lesson Overview

Students will learn three-primary colors, how RGB LED works, use coding to experiment consist of different color.

Lesson Target

1. Learn three-primary colors, how to adjust percentage of the three-primary colors and get different color.
2. Learn how to code robot with PC.
3. Learn the sequence and loop of code.

Lesson Tag

GRADE LEVEL	SUBJECTS	DIFFICULTY	DURATION	GROUP
Elementary, middle	STEAM, computer science physical	Beginner	2 x 50 mins	1-2 students

Supplies

Robot	Accessories	Other Material	Tools Used
WeeeBot Kit	USB cable	PC with WeeeCode software and drawing software. USB port required;	

Lesson Outline

INTRO: Talk about rainbows, the color and the time we can see a rainbow. Learn how rainbow formed, and learn what is three-primary colors. (20 mins)

CREATE: Students will learn the RGB LED module and create 7 colors of rainbow. (30 mins)

PLAY: Each group tests, then records learnings from their invention. Students explore how their invention works, plus the coding concepts behind it. (30 mins)

REMIX: Students will customize and enhance their inventions to create their own rainbow through opportunities to change the circuit, code, and the game play. (20 mins)

1. INTRODUCE RAINBOW AND THREE-PRIMARY COLORS.

Student discussion:

Q: Where did you see a rainbow? Describe the color of rainbow.

A: We always find a rainbow near waterfall, or in the sky after rain. Rainbow is consist of seven colors, and the colors always appear in the same order: Red, Orange, Yellow, Green, Blue, Indigo, and Violet.

Q: Why it's very possible to find a rainbow after rain or near waterfall?

A: Rainbows are an arc of color that appears in the sky after certain weather conditions. Water in the air acts as a prism, splitting sunlight into its component colors and reflecting those colors back to the viewer.

Story behind

At the age of 23, Isaac Newton reinvestigated this same dispersion of white sunlight into a rainbow of colors. Newton had quarantined himself in his rooms to avoid the plague that was raging through England at the time. When he held a prism of glass in the path of a beam of sunlight coming through a hole in the blind of his darkened room, he observed that the white sunlight was split into red, orange, yellow, green, cyan and blue light. But Newton observed something no one else had because he extended the experiment. Using prisms and mirrors, he discovered that when the light from three separate parts of his rainbow, the red, green, and blue regions, were recombined they would regenerate white light. He called these the primary colors.
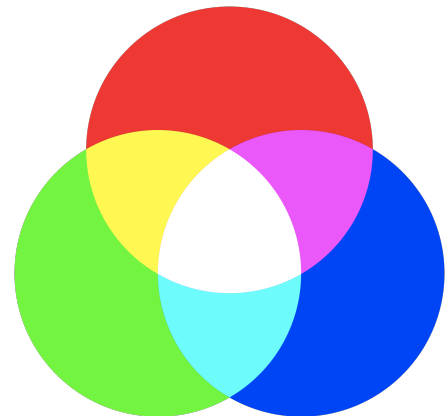
2. HARDWARE AND SOFTWARE INTRODUCTION

Hardware - RGB LED Module

We will use the RGB LED on WeeeBot mainboard. RGB LED can show many colors, R stands for Red, G stands for Green, B Stands for Blue. Each color value can be varied from 0-255, RGB LED can show 256x256x256=16,777,216 different colors.
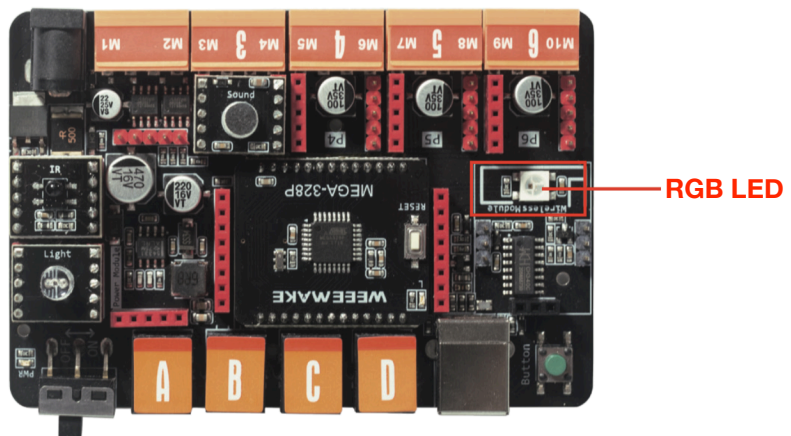
RGB LED

WEEEEMAKE

Software - WeeeCode module

Open WeeeCode software, find "WeeeCode" category in coding block zone, and check below RGB LED coding block. Five values can be modified.
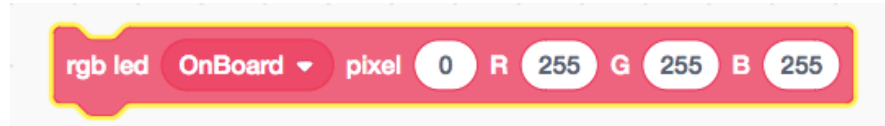
Port: the first drop-down box is port. We use Onboard RGB LED here, one unit only. If you connect external RGB LED module, please select the right port.

Pixel: the second blank is pixel position. Each one unit of RGB LED is one pixel. The onboard RGB LED only have one unit, we can fill "0" on pixel position. If more than one unit of RGB LED were connected, you can change the number here to select the RGB LED unit you want to control.

RGB: the third to five blank is value of red, green, and blue. You can fill value 0-255 for each color to mix those three colors, and get your color.
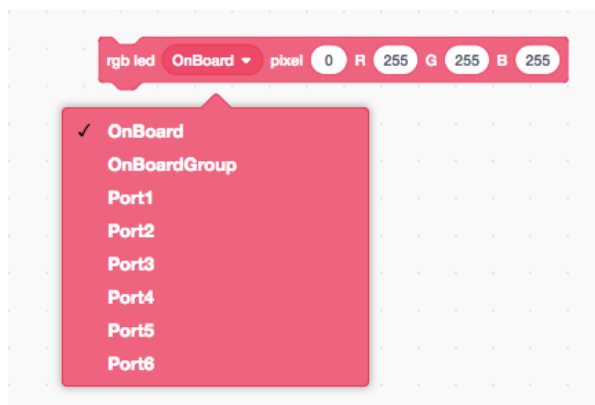

How to Code

1. USB cable can transfer data information between computer and robot. Now connect robot to computer with USB cable.
2. Find the power switch of your robot, and turn it on.
3. Open WeeeCode software, connect and select "Arduino" mode.
4. Click "Restore Firmware" ->"Restore Online Firmware". When you see green words "Upload succeed".
5. Robot will be disconnected after each uploading, please remember to connect your robot.
6. Put code blocks together, set RGB value to 255, 255, 255.
7. Click green flag to run your code, RGB LED on robot will show the color you designed.
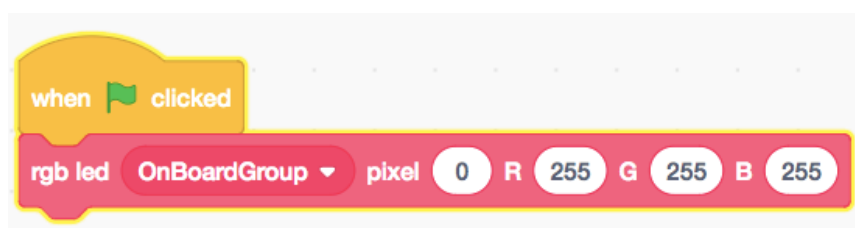
Confirm Your Code

1. In Windows, open Microsoft Paint software. In Mac, open Pages.
2. Find color editor, enter RGB value of 255, 255, 255, watch the result.
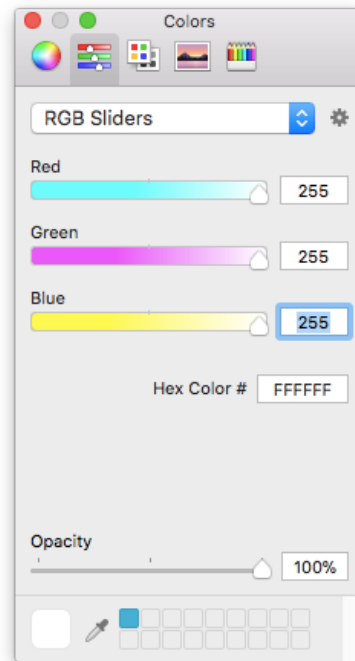
3. REMIX

Test the color of below value, observe the relationship between different color value. Create your own color and confirm it.

| No.	Red	Green	Blue
1	50	50	50
2	100	100	100
3	60	30	0
4	120	60	0
4	0	60	30
6	0	120	60

4. EXERCISE

We know rainbow is consist of seven colors, and the colors always appear in the same order: Red, Orange, Yellow, Green, Blue, Indigo, and Violet. Please make a seven-color LED project. Try add "forever", "wait 1 second" in program.
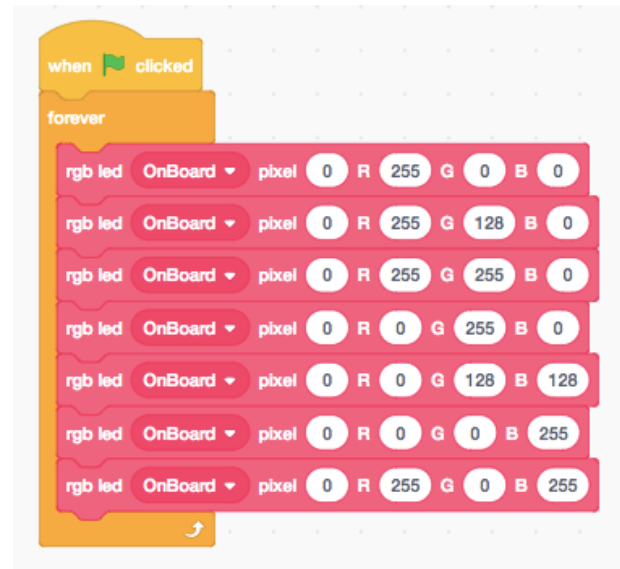
Sample Program

Step 1: get 7 color of rainbow, run those code. It's one time flash, and our target is make RGB LED always flash in rainbow color.
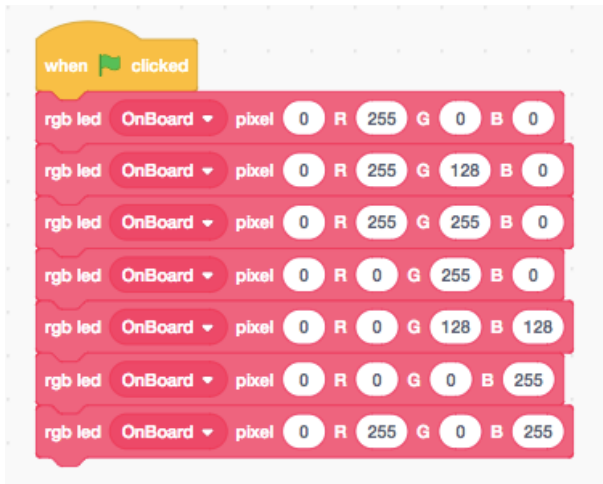
Step 2: add "forever" coding block into program. Now RGB LED will show seven color in order, but it's too fast that we cannot see color clearly.

Step 3: we add a gap before RGB LED change to the next color, by adding "wait 1 secs" block.

Step 4: create your project, save it, record all ideas and share to your classmate.