

RED-GREEN-BLUE

Activity Overview

In this activity the student coders identify and use a function to create colors using the on-board RGB component of the LilyPad ProtoSnap Plus board.

Learning Objectives

Students will be able to:

- Identify a new function
- Use color function to create desired colors

Files/Materials Needed

- Computer
- Engineering journal
- LilyPad ProtoSnap Plus
- Micrio-B USB Cable
- RGB.ino sketch

Code Vocabulary

- Function – a segment of code that performs a defined task and is independent of the remaining code
- Argument – a value that you use in a function; synonym with parameter
- Analog – a signal that is a continuous signal which represents physical measurements opposite of digital

Syntax

- `analogWrite(pin, value);`
- color function: `color (argument1, argument2, argument3) color (redValue, blueValue, greenValue)`
- indentation – does not change the way the code functions, however aligning your code in different functions helps with “readability”.

Lesson Instructions

“Sew” What: The Hook

Function activity:

A function is a subroutine, when written globally, you call it anytime (in the code). A function is a group of statements that is given a name, and which can be called (put into action) from another point in the program.

Design a dance or movement routine:

1. Have students come up with at least 10 movements, writing them in pseudocode.

2. Give small groups of students time to work on their dance move.

Depending on time, have each group of students show their code and have the class “run” their code.

Discussion:

Students can pair-up and describe their understanding of the following question.

How does a “function” help us when writing code?

Possible Answer: Using a function can specialize your code and helps the loop do something interesting.

Present New Information

Tell students that today we will be working with a component that needs a function. This is a component you will be available to use in the final project quilt design. The RGB light can create colors with various mixes of red, green, and blue. The RGB LED is located in the middle of the LilyPad ProtoSnap Plus on ports 12, 13, and 14.

Apply Skills in Coding: A Guided Practice

3. Ask students to open and upload RGB LED code in Arduino (Guided Practice)
 - What does the code do? (say in pseudocode)
4. Go through the 4 parts of code
5. Explain how to change the color of the RGB.

The color is changed by “mixing” different intensities of the colors red, blue, and green. We identify the intensity with a value between 0 – 255 using the color function syntax. For example, red is (255, 0, 0). This means the red pin is “turned up” to the maximum value, while green and blue are not. However (255, 255, 0) is yellow. If you remember from color wheel class, red and green make yellow. Thus, turning on green and yellow to their maximum value, and leaving off blue, we will generate yellow.

6. Show students the color matrix or the table below.

Color	(R,G,B)		Color	(R,G,B)
White	(255, 255, 255)		Silver	(128, 128, 128)
Red	(255, 0, 0)		Magenta	(255, 0, 255)
Green	(255, 255, 0)		Light Green	(0, 255, 255)

Yellow	(255, 255, 0)		Olive	(0, 128, 0)
Blue	(0, 0, 255)		Cyan	(0, 255, 255)

7. Choose a color and have the class change the code to match your color.

Let's change:

- Yellow to olive
- White to silver
- Purple to cyan

8. Have students explore with the color code and delay to make their own color combinations and blink patterns.

Assess Learning through Challenge

- Make a stop light
- Cycle through the colors of the rainbow
- Program colors of favorite cartoon character
- Program a party light
- Add any of the other components to the code