CANADA LEARNING CODE

RGB Colour Mixer

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LEVEL	SUBJECTS	PROVINCES / TERRITORIES	TOOL
Grades 4-6, 7-8	Art, Science and Technology	Across Canada	Little Robot Friends

Overview

In this activity, learners transform their robots into RGB Colour Mixers by programming the touch sensors into red, green, and blue colour controllers. Learners can mix their own colours by tapping the touch sensors to increase the colour values of their robots' LED eyes.

Prep Work

- Download the LRF Blocks App on each computer: learn.littlerobotfriends.com/downloads
- Review the complete LRF Blocks file for this project: bit.ly/rgb-colour-mixer-example (Download > Open LRF Blocks app > Select “Projects” > “Import File” > Select file from your downloads folder)
- Print the Solution Sheet: bit.ly/rgb-colour-mixer-solution
- This activity requires computers and Little Robot Friends robots

Key Coding Concepts

- Algorithms
- Boolean Logic
- Conditional Statements
- Events
- Operators
- Sequences
- Variables

Terminology

Algorithms
A step-by-step set of operations to be performed to help solve a problem

Boolean Logic
and, or, not are examples of boolean logic. they are values that can be either true or false

Lesson

Introduction

RGB stands for red, green, and blue. This is the system for representing colours on your computer display. You can think of it as the primary colours of your computer display, but instead of it being red, yellow, and blue like we learn in elementary school, it is red, green, and blue.

The intensity of the colours is measured on a scale from 0 to 255. You can think of the value 0 as 0% of intensity and the value 255 as 100% of intensity. Any colour can be created using different combinations and proportions of red, green, and blue!

Code Along

Launch the LRF Blocks App and open a new project.

Explain the different categories in the blocks menu. Show students how to move and connect blocks to create a "script".

Give students a few minutes to experiment with the LRF Blocks App and try to control one or more of their robot's sensors.

Activity

Let's transform your robot into an RGB Colour Mixer! Ready?

Use the solution sheet to complete the following steps:

- Create a new project
- Tell your robot which colours we are mixing
- Add more Red
- Add more Green
- Add more Blue

Conditional Statements
Making decisions based on conditions i.e. if some condition is met do something, else do nothing or something else

Events
One thing causing another thing to happen i.e. 'when clicked' block

Operators
Mathematical and logical expressions i.e. X+X block

Sequences
Identifying a series of steps for a task. Computers and Scratch read and perform commands in order from top to bottom

Variable
Stores a piece of information i.e. score of a game that increases by 1 value for each goal

References

https://littlerobotfriends.com/

- Reset the amount of colour

Troubleshooting

Check out the Little Robot Friends FAQ (https://learn.littlerobotfriends.com/support/#common-issues) for possible solutions. You may need to connect robots to the LRF App and install a firmware update if it is not working.

Assessment

Learning Outcomes

I can program my robot's eyes using the RGB colour scale from 0 to 255
I can use events to control when things happen in my project
I can use conditionals to check whether or not something is true
I can use variables to store information in my project

Success Criteria

I programmed a condition to make RGB colours increment by 10
I programmed a condition to detect when a colour exceeds the maximum RGB colour value
I programmed the colours red, green, and blue to reset back to zero when it gets too bright
I programmed my robot to mix different colours when you tap different touch sensors

Extension

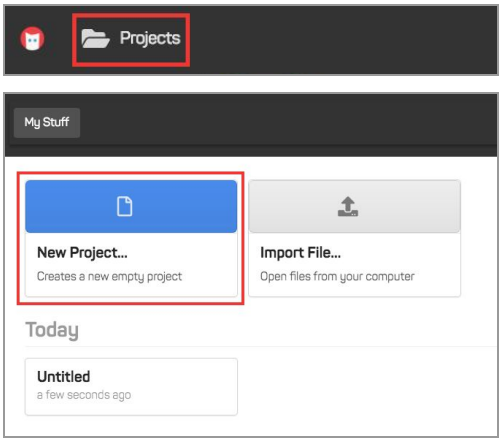
Can students program another sensor event into a different colour controller?

Can students figure out how to decrease a colour value when you tickle the touch sensors?

RGB Colour Mixer

STEP 1: Create a new project

1. Open the LRF Blocks App
2. Plug in your Little Robot Friend
3. Select “Projects” (top)
4. Select “New Project” to get started
5. Clear all the blocks from your editor

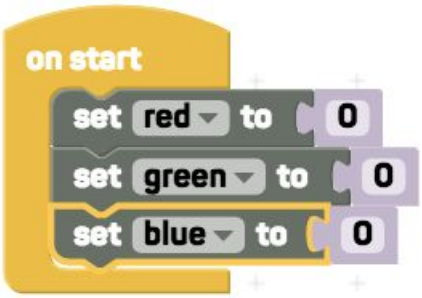


STEP 2: Tell your robot which colours we are mixing

We are mixing Red + Green + Blue colours. We need our robot to know which colours we are mixing, and change how much of each colour is being mixed together. Let’s tell the robot which colours are being mixed by creating a **variable** for each. (A variable is like a box - it stores information for us!)

Ask: Which colours are we mixing? (Red, Green, and Blue!)

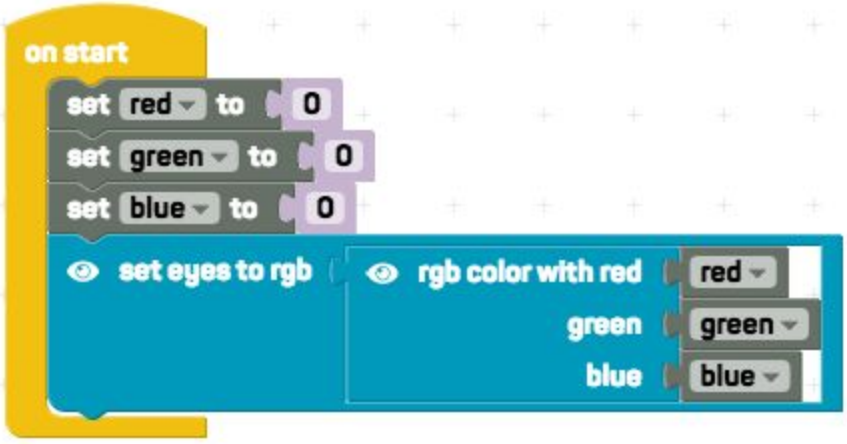
1. Make a variable for “red” (Variables > Make a Variable)
2. Set the Red variable to start with “0” colour
   (Drag “Set __ to” block over and use the drop-down to choose “red”)
3. Do the same thing for Green: Make a variable for “green” and set it to “0”
4. Do the same thing for Blue: Make a variable for “blue” and set it to “0”
5. **Ask: How does our robot know *when* to start?**
   Add an “on start” block and wrap it around our existing blocks. (Note: This can be found under “loops”)



STEP 3: Set the eye colour

Our mixed RGB colours will be shown through the LED lights of our robots eyes.

1. Set the eye colour to RGB (Look under “Eyes and Patterns”)
2. Add the RBG colours
3. Set each colour to their variable name (red, green, blue → Under “Variables”)
4. Test it out! Change the red value to a larger number (e.g. 10) then click on the Refresh button (bottom, left) → Remember to set it back to “0” after testing it out.

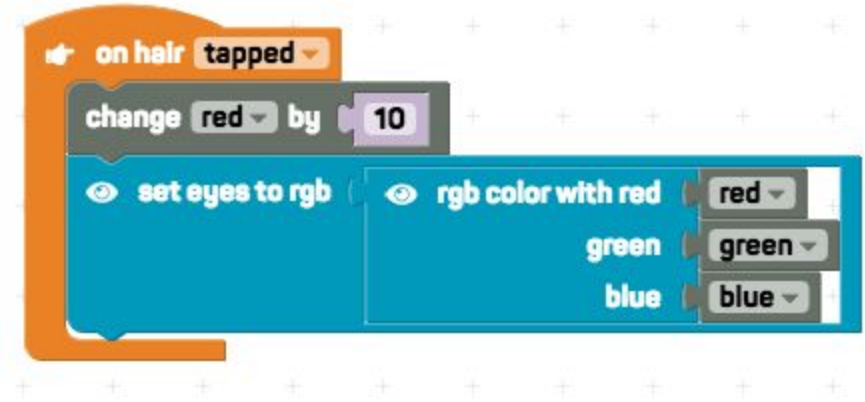


5. **Reminder: SAVE YOUR PROJECT!** Name it and click on the save icon at the bottom

STEP 4: Add more Red

We need to tell our robot when to add more colour, and which colour we are adding to. Let's start with Red:

1. **Ask: *When* should the robot add more Red?**
   Add an event - for example "On hair tapped"
2. Add more Red → Increase the value of the Red variable (e.g. change by 10)
3. We need the robot's eye colour to update to this new colour. Use the same blocks from earlier to set the robot's eye colour (Hint: Right click > Duplicate to save time)

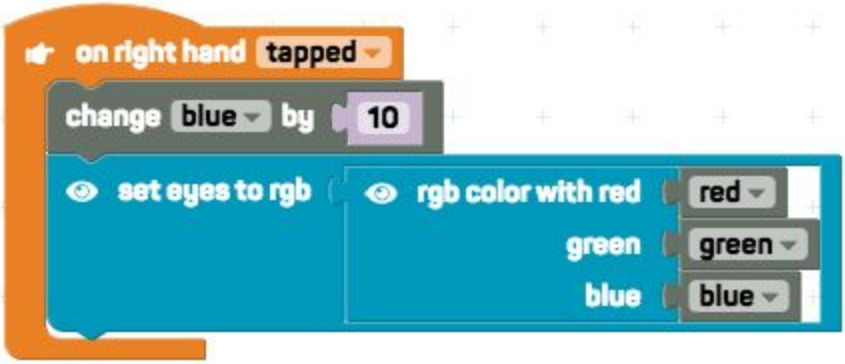


STEP 5: Add more Green

1. You may need to side-scroll within the Blocks app so that you have more space for these next few steps
2. **Ask: *When* should the robot add more Green?** (We need a new event)
   Add the "On left hand tapped" event
3. Same steps as above: Add more Green → Increase the value of the green variable
4. Update the eye colour (same as above) (Hint: Duplicate to save time)

STEP 6: Add more Blue

1. **Ask: *When* should the robot add more Blue?** (We need a new event)
   Add the "On right hand tapped" event
2. Same steps as above: Add more Blue → Increase the value of the blue variable
3. Update the eye colour (same as above) (Hint: Duplicate to save time)

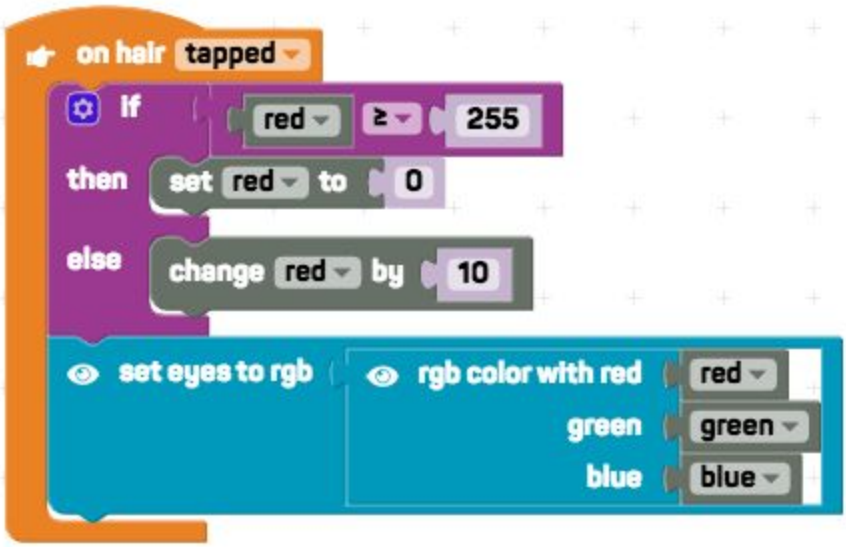


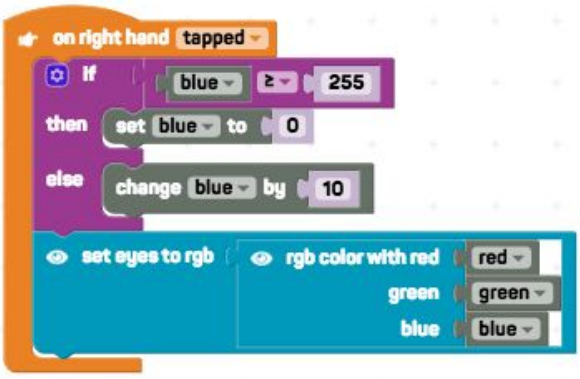
STEP 7: Reset the colours

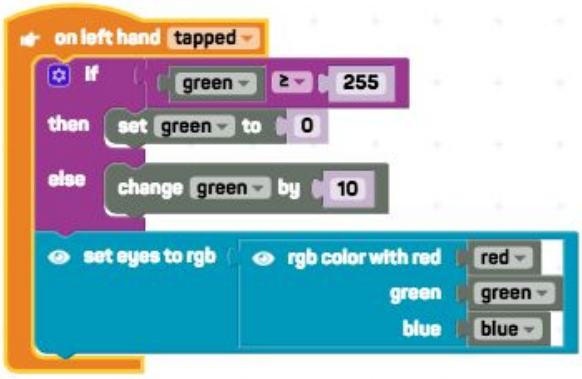
Ask: What is the largest number (value) that RBG colours can have?
We want to reset the colour back to 0 once it gets to 255 (max amount). To do this, we need to check IF the variable is above 255.
Ask: IF Red is above 255, THEN what should it do?
Ask: ELSE (if Red is any number below 255) what should it do?

1. Add an IF, THEN, ELSE block (under Logic)
2. Check to see IF Red is greater than (or equal to) 255
3. IF this is true, THEN set Red back to 0
4. ELSE (this is not true) continue to change it by 10
5. Note: Make sure that the blue RGB block is below the purple block and not inside of the ELSE condition.

6. Do the same thing for the other colours: Green and Blue







Reminder: SAVE YOUR PROJECT AGAIN!