Nugget Lab: Breadboarding Your Meow Mixer Circuit

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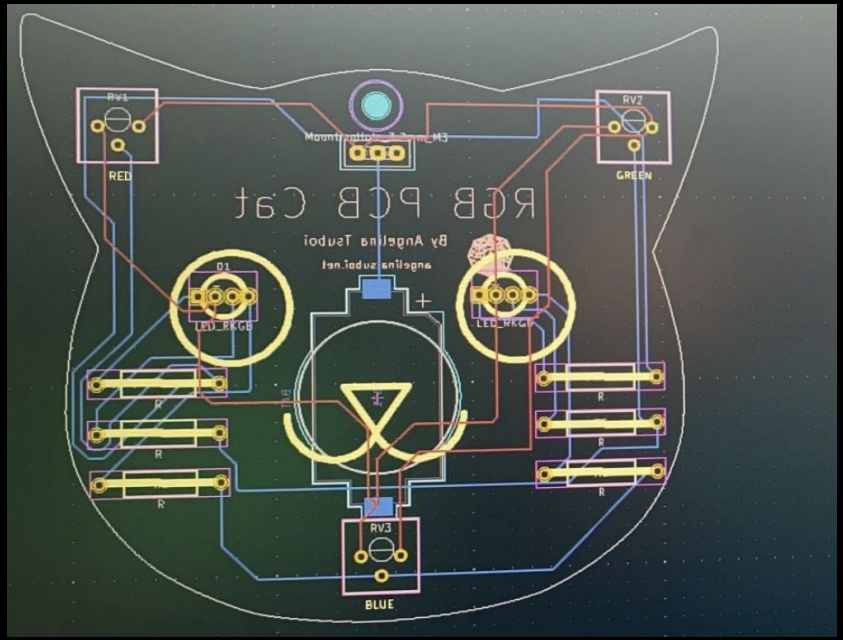
Introduction to Electronics and Breadboarding

Introduction

How the circuit works

The circuit we're making today controls the color of light by turning a knob!

Cat-shaped PCB



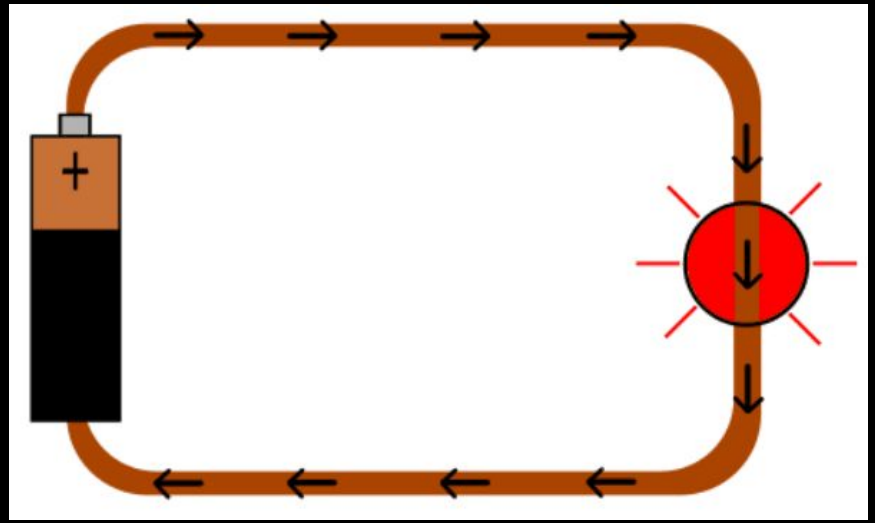
Three Potentiometers for Color Control:

- Three Potentiometers knobs are mounted on the PCB, one for each color (red, green, and blue) channel of the RGB LEDs.
- These potentiometers control the power applied to each color.
- By turning the potentiometers, we can adjust the intensity of each color.

Circuit Components

- 1x SMD CR2032 Battery Holder
- 1x 3.3 volt CR2032 battery
- 1x SPDT slide switch
- 3x 10K Ohm Trim Potentiometers
- 2x 10mm Common Cathode RGB LEDs
- 6x 100 Ohm resistors

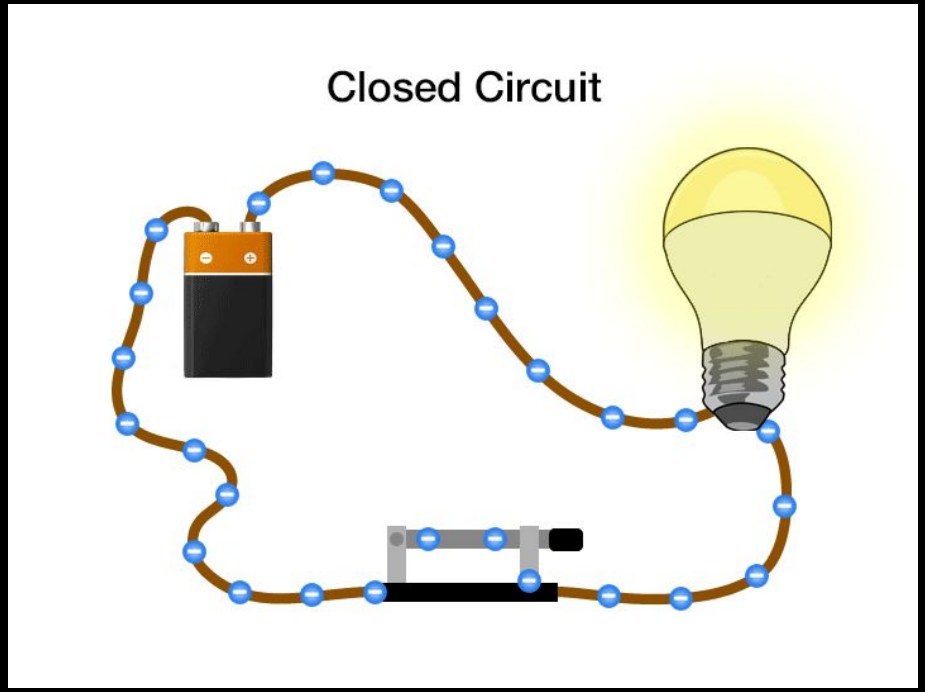
What is a Circuit?



How do we make a circuit?

- Electricity flows from positive to negative
- We can create a loop for it to flow in called a circuit
- We can make the electricity do work while it passes through the circuit, like water pushing a water wheel

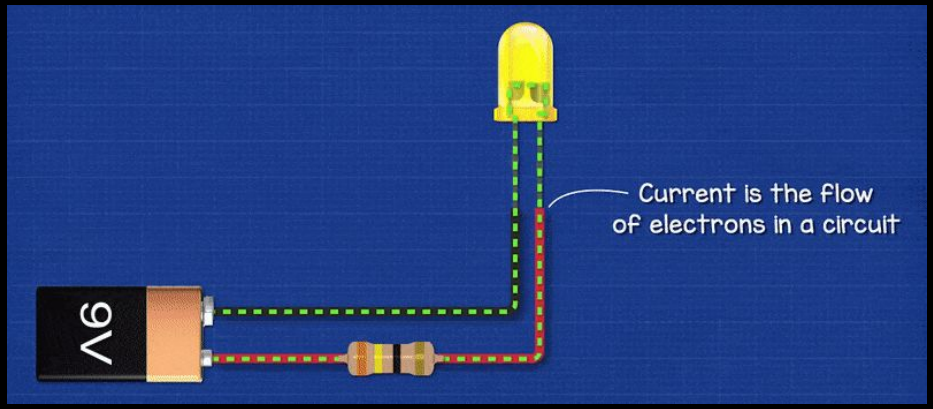
How to we control power?



A circuit is either open or closed

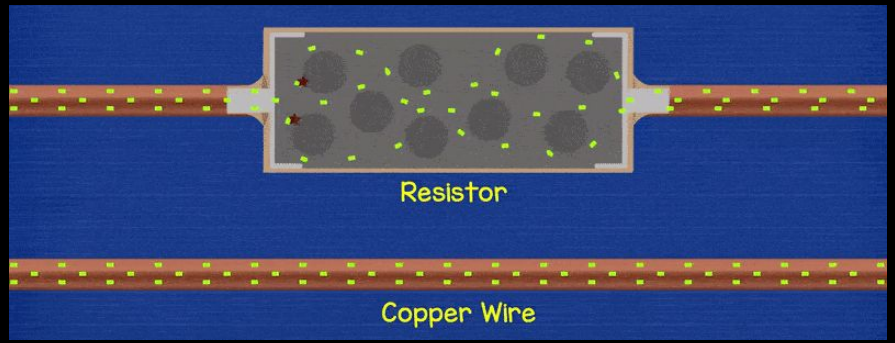
- An open circuit is disconnected, so electricity cannot flow
- A closed circuit is connected, and means that electricity is able to flow.

How do we add parts?

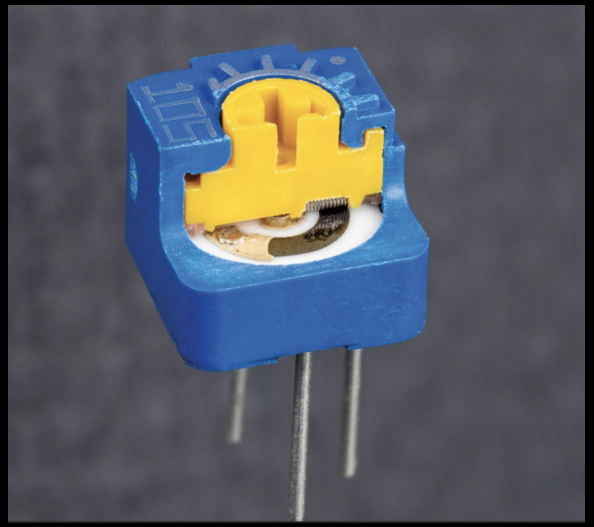


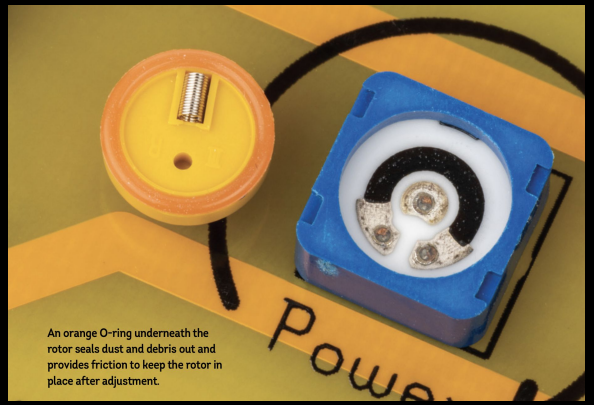
To add components, we need to make sure they don't burn or explode from too much electricity

- A resistor slows down the flow of electricity
- By adding the right resistor, we can add parts like an LED



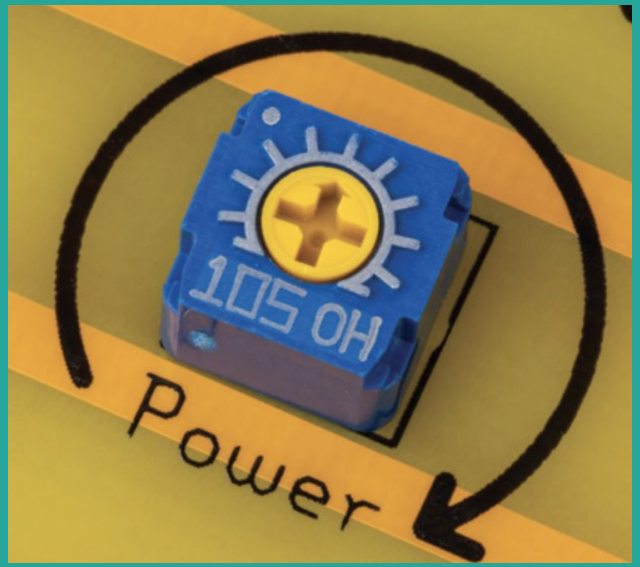
Potentiometers: Variable Resistors

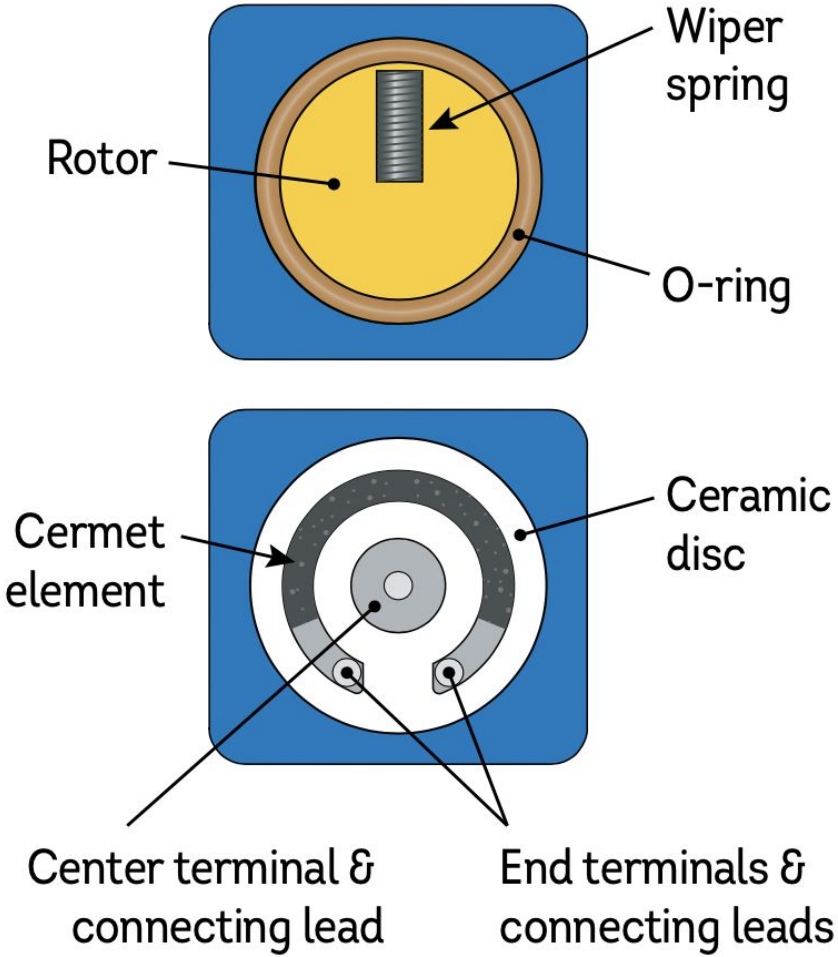




An orange O-ring underneath the rotor seals dust and debris out and provides friction to keep the rotor in place after adjustment.

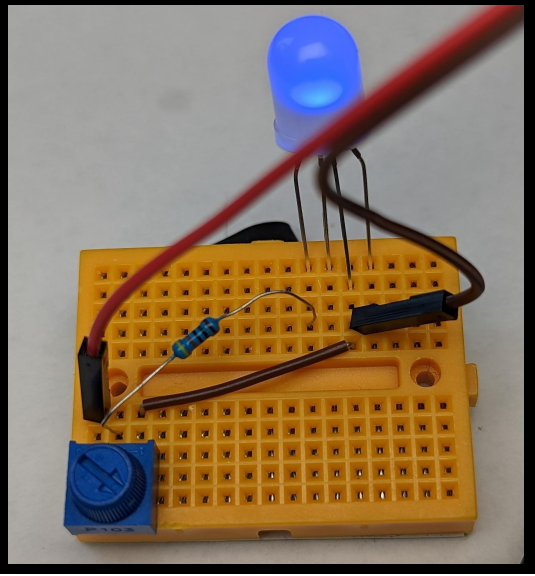
A potentiometer is a variable resistor that moves a contact along a conductive trace, increasing or decreasing the voltage allowed to pass through.

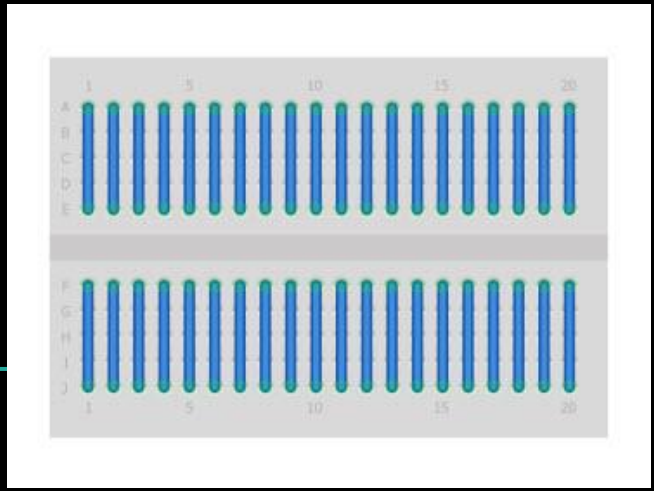




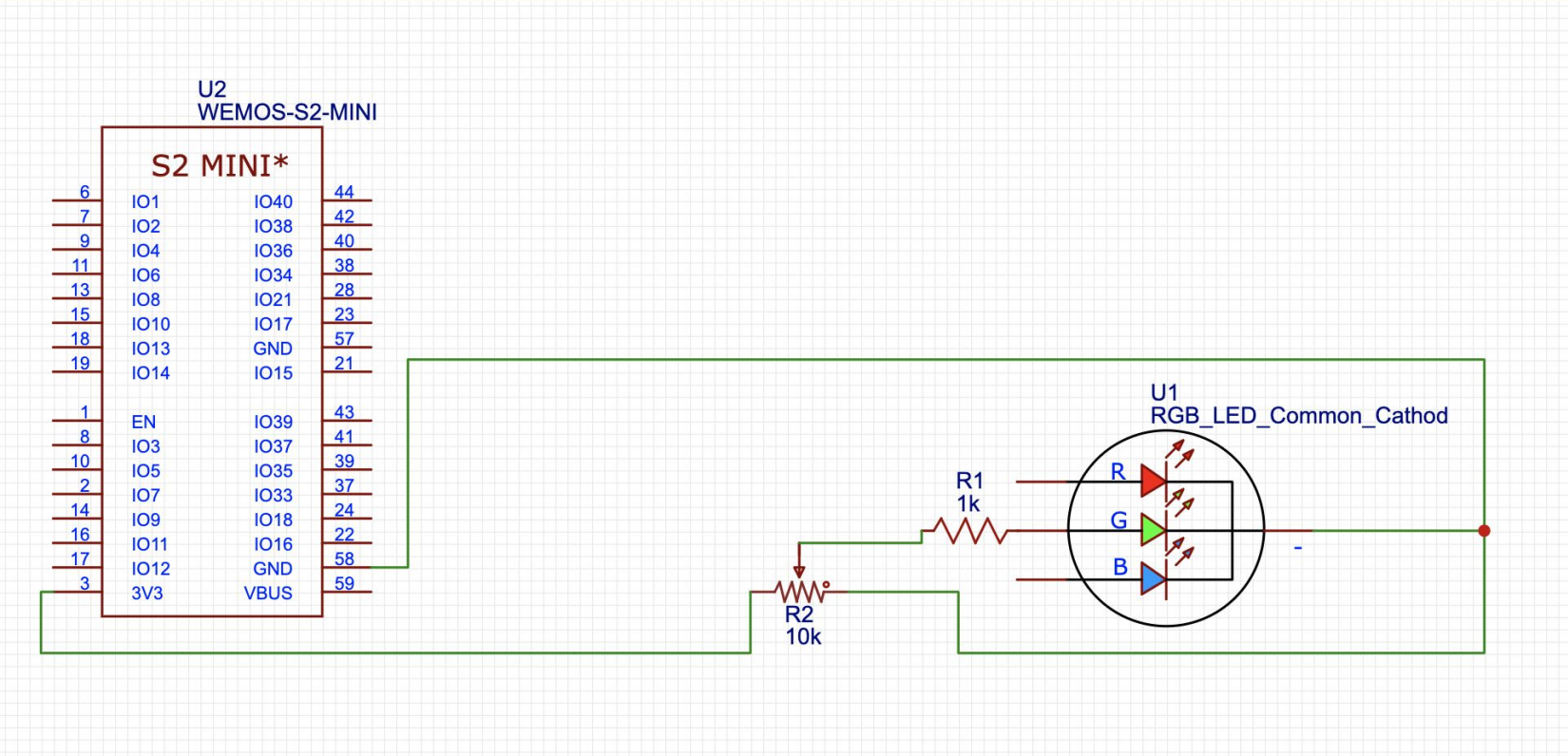
What is Breadboarding?

- Breadboards let us test circuits before soldering
- Easy to take apart and put together
- Rows on a breadboard are linked electronically
- You can plug in components to connect them!



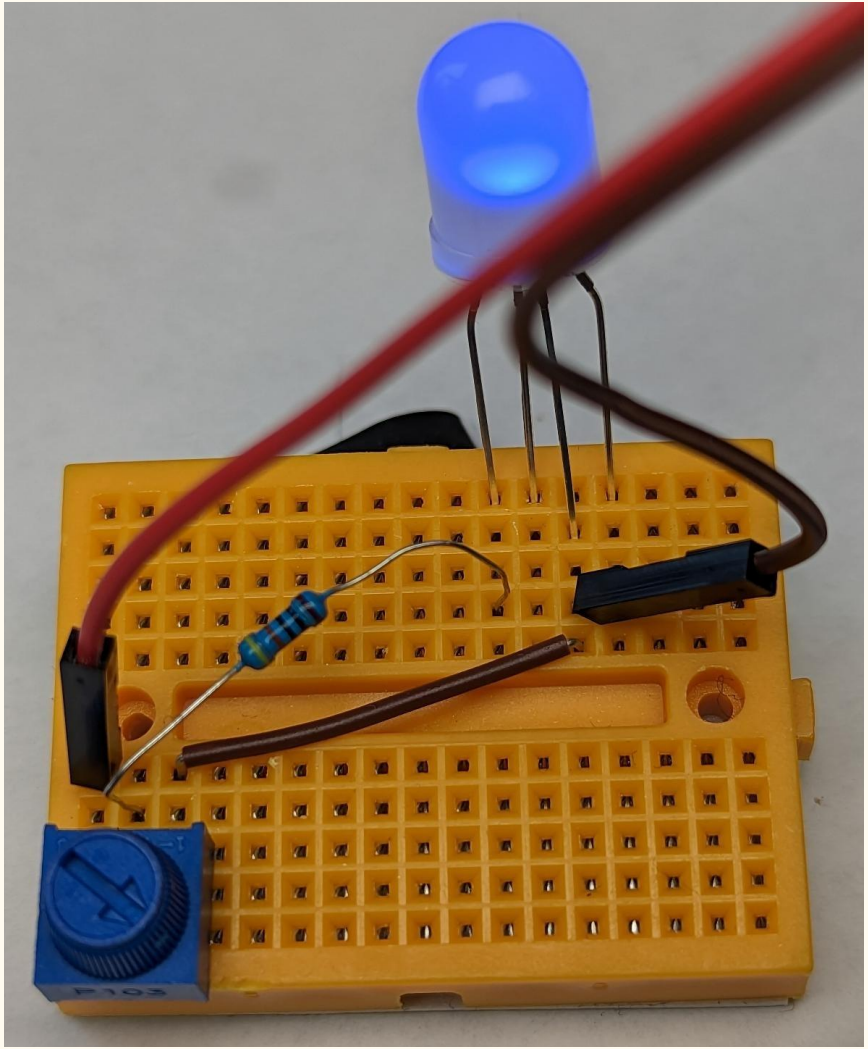


Basic Schematic



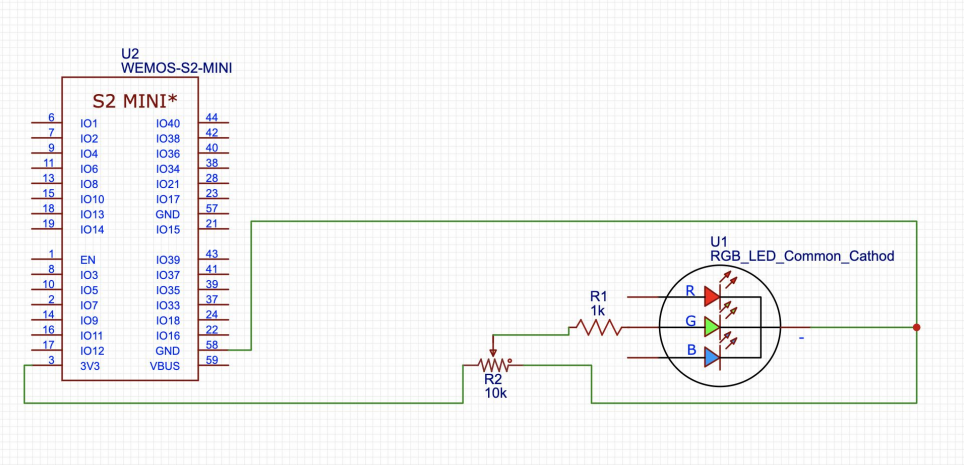
Breadboard Components

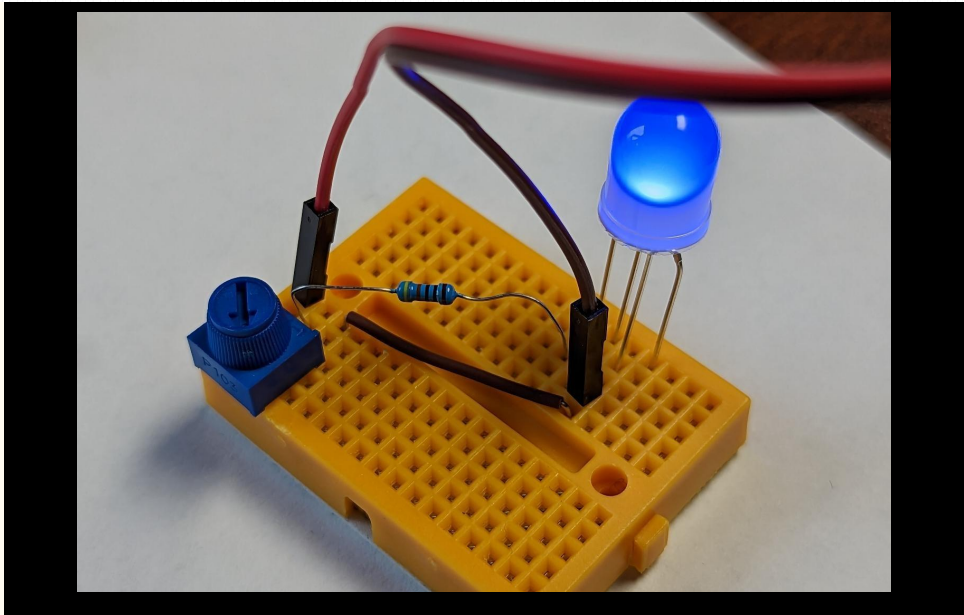
1. USB Nugget for ground and 3.3V power supply
2. Breadboard
3. Jumper wires
4. RGB LED
5. 100 Ohm resistor
6. Potentiometer



What do the parts do?

- Our Nugget will provide 3.3v power
- The 100 Ohm resistors limit the electrical flow and prevent damage to the LEDs.
- The potentiometer controls the power to a color channel on the RGB LEDs, adjusting the intensity of the color.
- The LED lights up according to how much power is applied to its legs



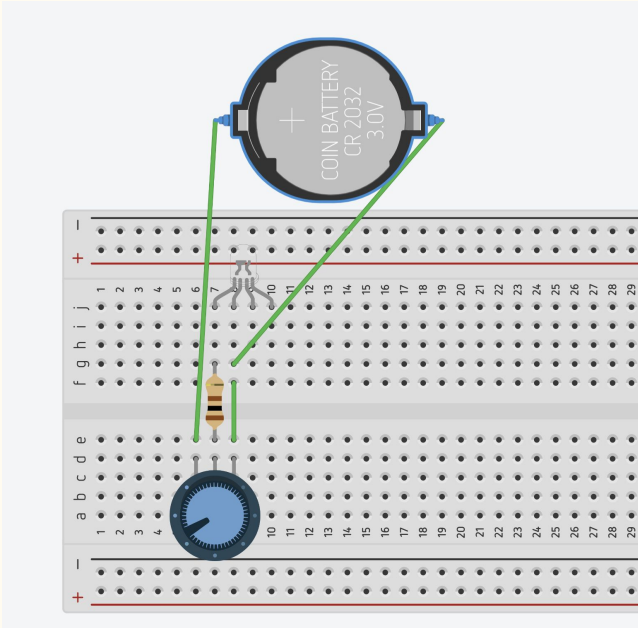


Simple Version of the Circuit

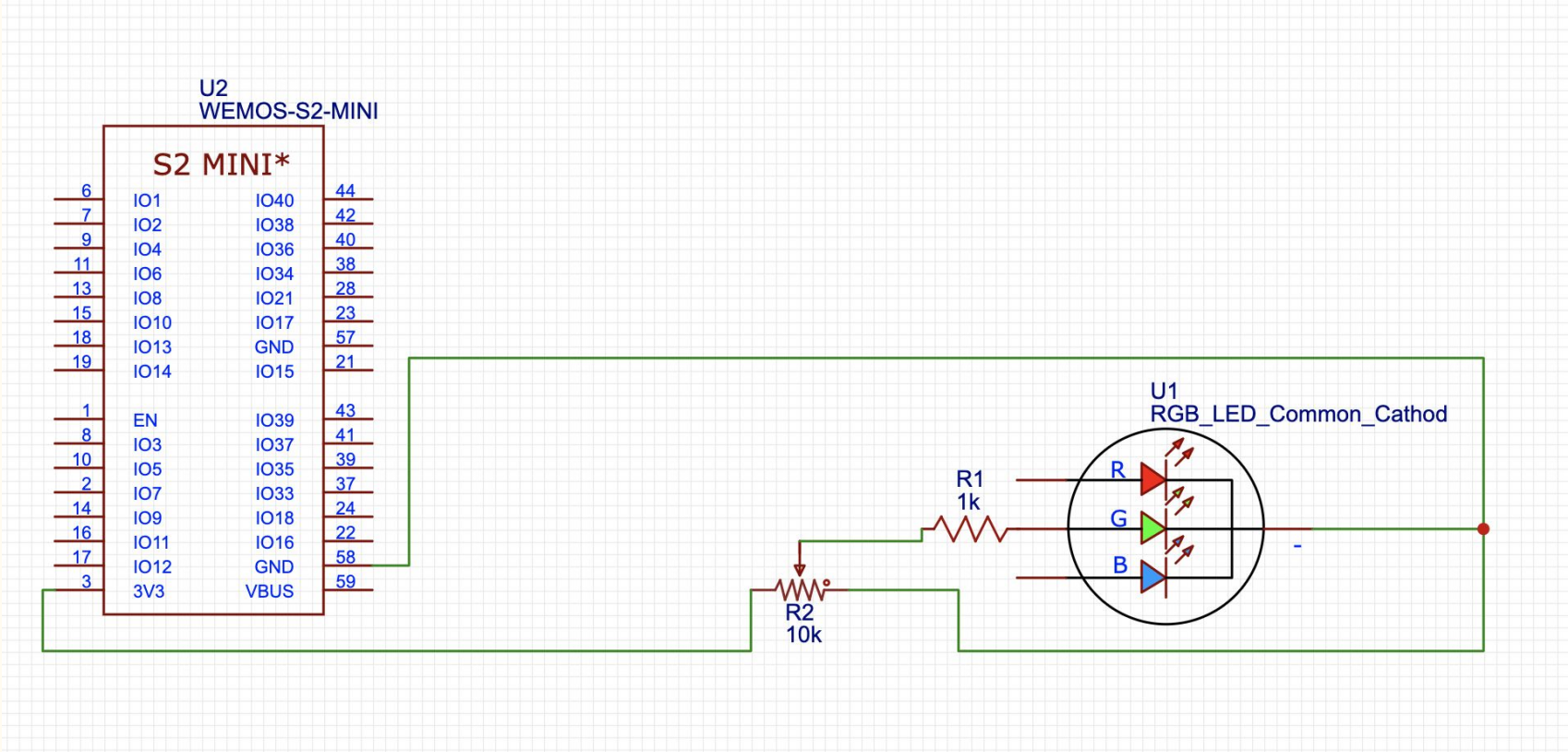
To build a basic version of the RGB tuner circuit on a breadboard, we will use only:

- 1 LED,
- 1 potentiometer
- 1 resistor
- 3 wires

This simplified circuit will allow you to understand the basic functionality of the RGB tuner circuit and test the components before scaling up to the full design.

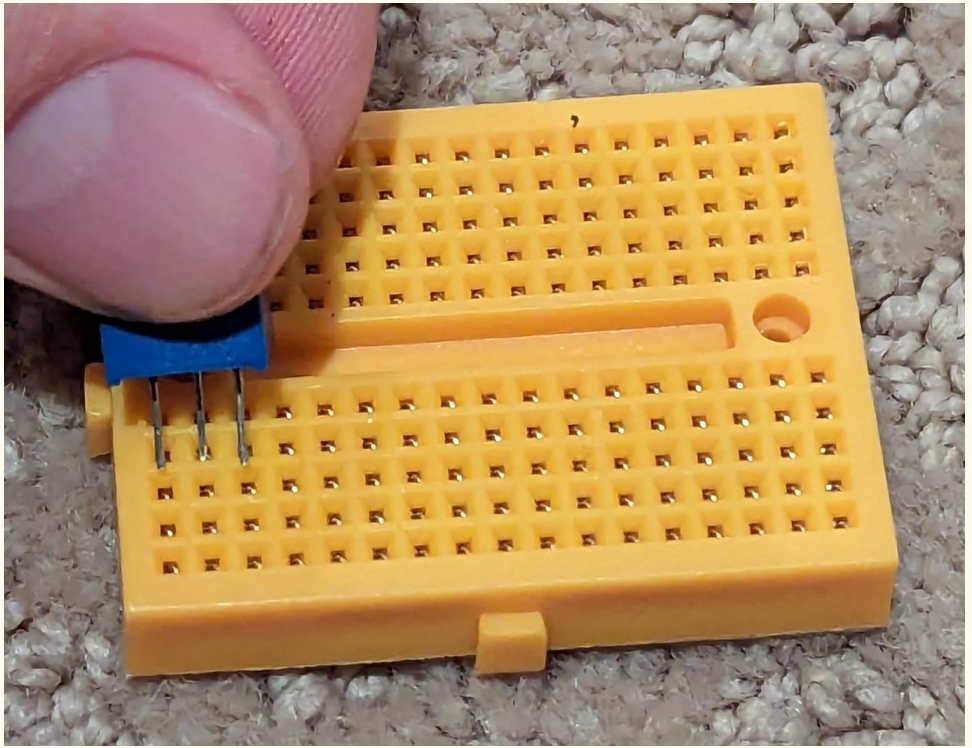


Breadboard Circuit Diagram



Step 1

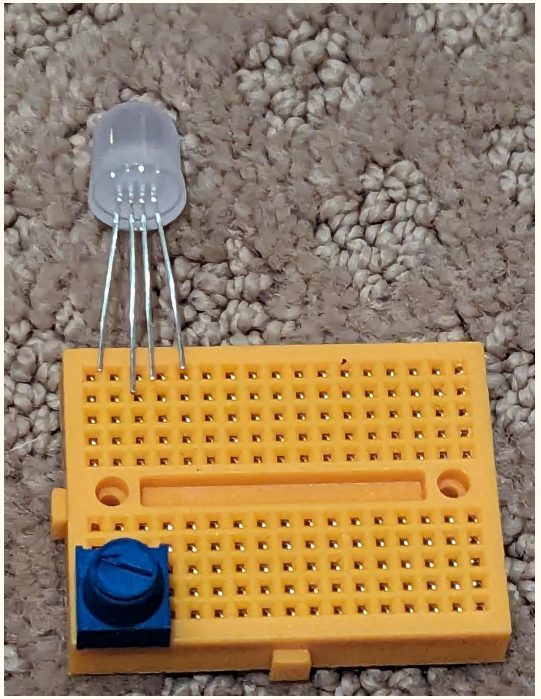
Add the potentiometer to the bottom left of the breadboard

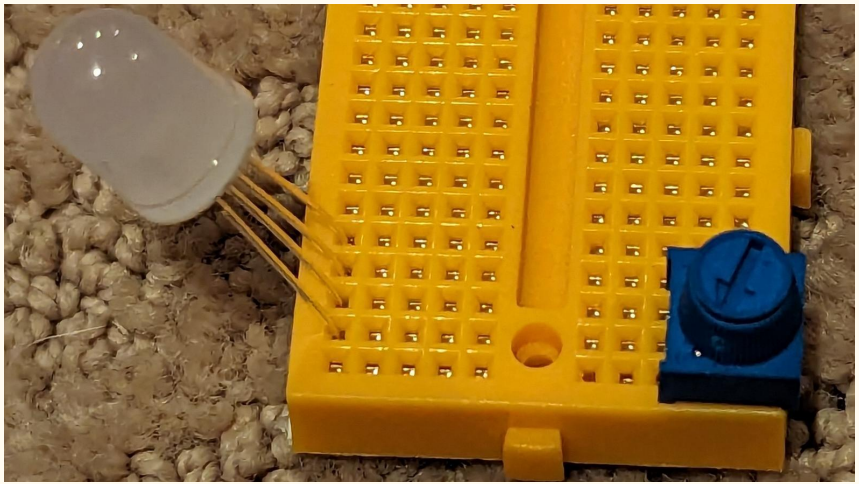


Step 2

Add the LED, with the longest leg on the left side.

Make sure to put the first pin on the left side of the LED on the same row as the middle pin of the potentiometer

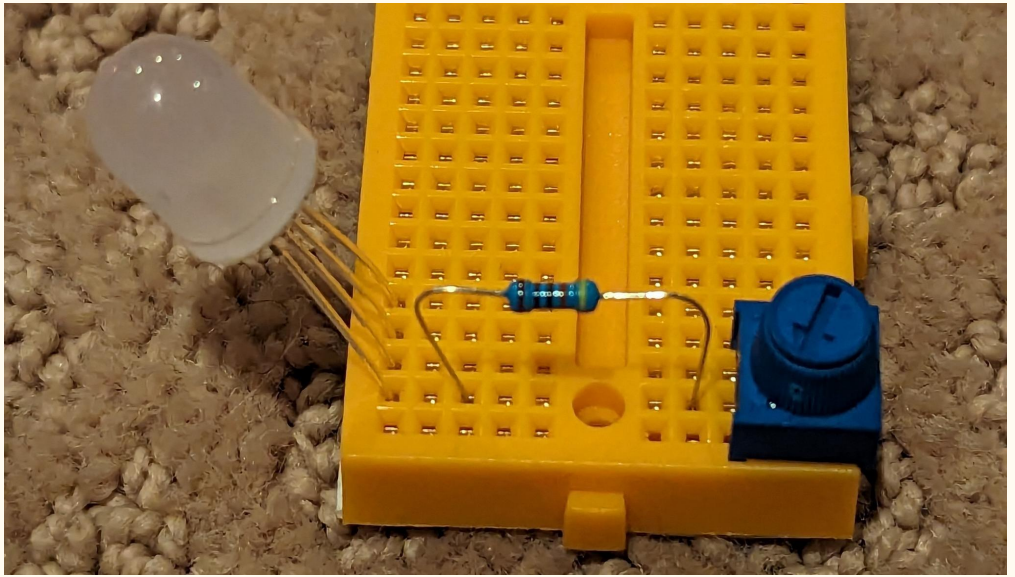




Step 3

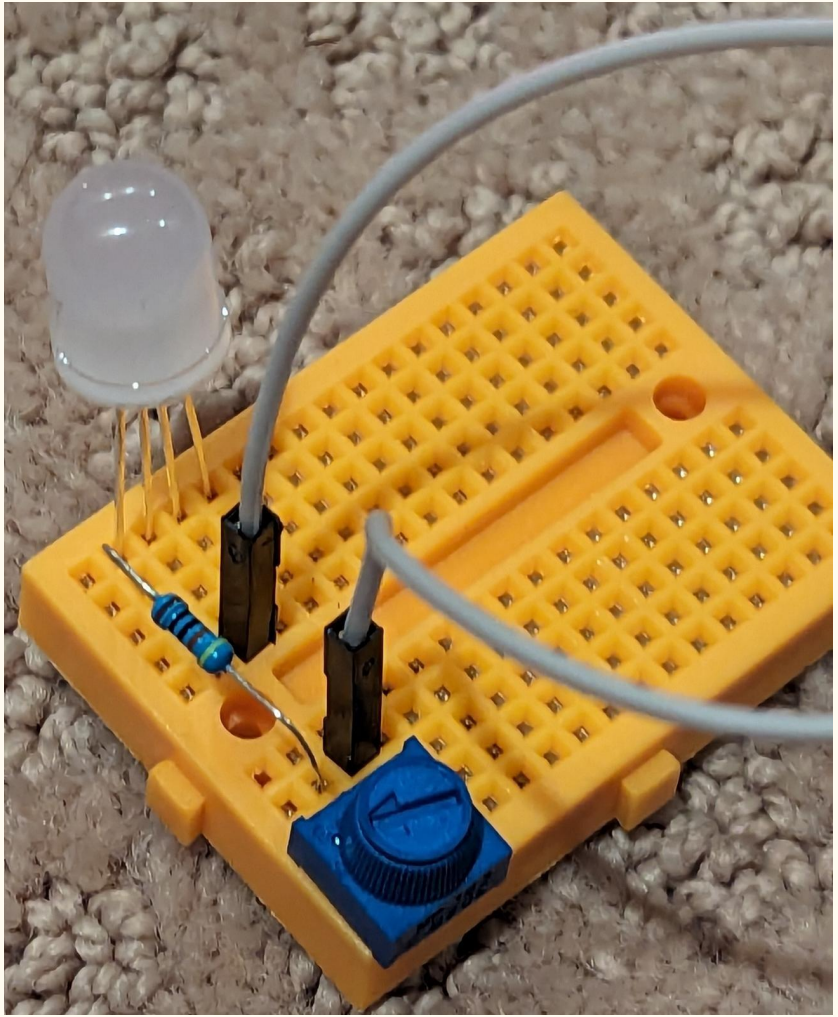
Add the resistor!

Use the resistor to connect the **MIDDLE** pin of the potentiometer to the **FIRST** pin on the left of the LED



Step 4

Add a wire: connect the SECOND LEFT pin on the LED and the RIGHT pin on the potentiometer.



Step 5

Add a wire to the same row as the SECOND LEFT pin on the LED.

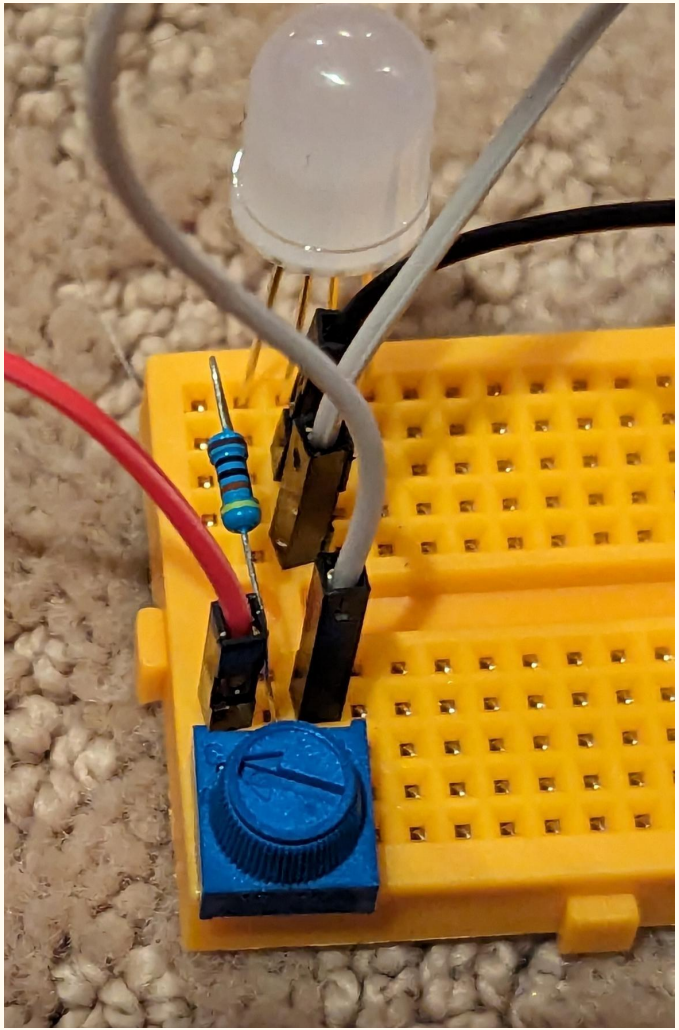
This is the **ground wire**, you can use black or white wire to mark it if you want to.

Step 6

Finally, add a wire to the same row as the FIRST LEFT pin of the potentiometer.

This is our 3.3 Volt Power wire. We can use red, orange, or another bright color to mark this if we want.

Now we’re ready to plug in our circuit.



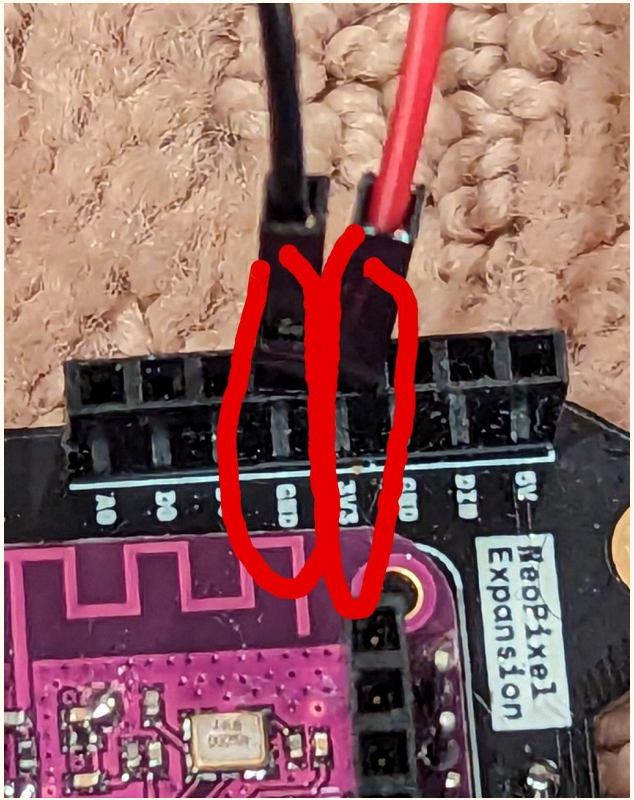
Step 7

UNPLUG YOUR NUGGET

Now, plug the ground wire into the port marked GND

Plug the power wire into the port marked 3V3

STOP and have a helper check your circuit.



After a helper verifies your circuit,
it’s time to test!