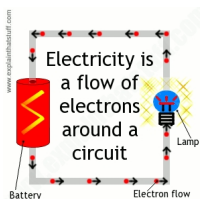


Introduction to microcontrollers and electronics



Basic Electronics



Electricity is the movement of electrons. Electrons create charge, which we can harness to do

Introduction to microcontrollers and electronics

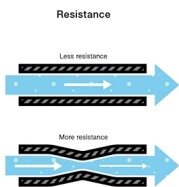
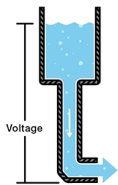
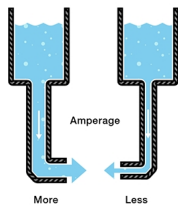
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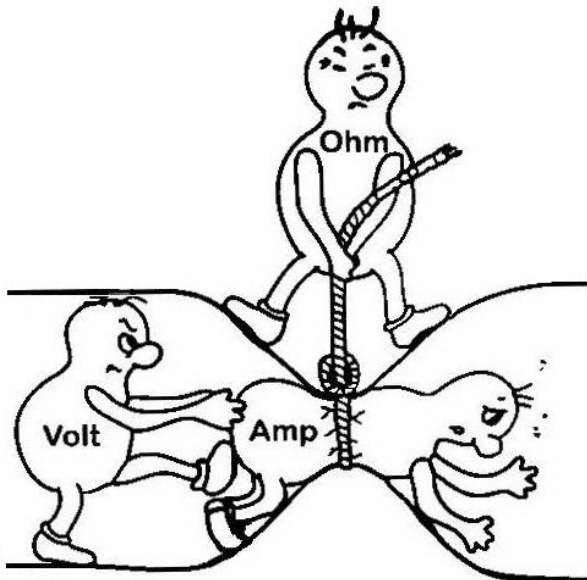
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work. Your light-bulb, your stereo, your phone, etc., are all harnessing the movement of the electrons in order to do work. They all operate using the same basic power source: the movement of electrons.

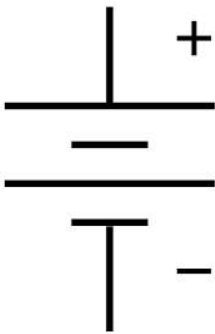
There are three basic principles to electricity

- **Voltage** is the difference in charge between two points. (The pressure)
- **Current** is the rate at which charge is flowing. (Flow)
- **Resistance** is a material's tendency to resist the flow of charge (current).





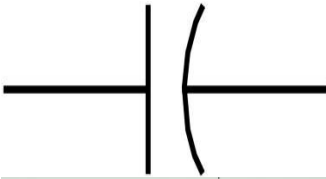
Basic Electrical Components



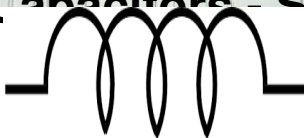
Battery - converts chemical energy into electricity



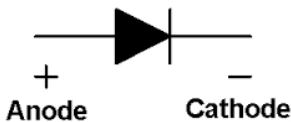
Resistors - Resists the flow of electricity



Capacitors - Stores electrons in an electric field

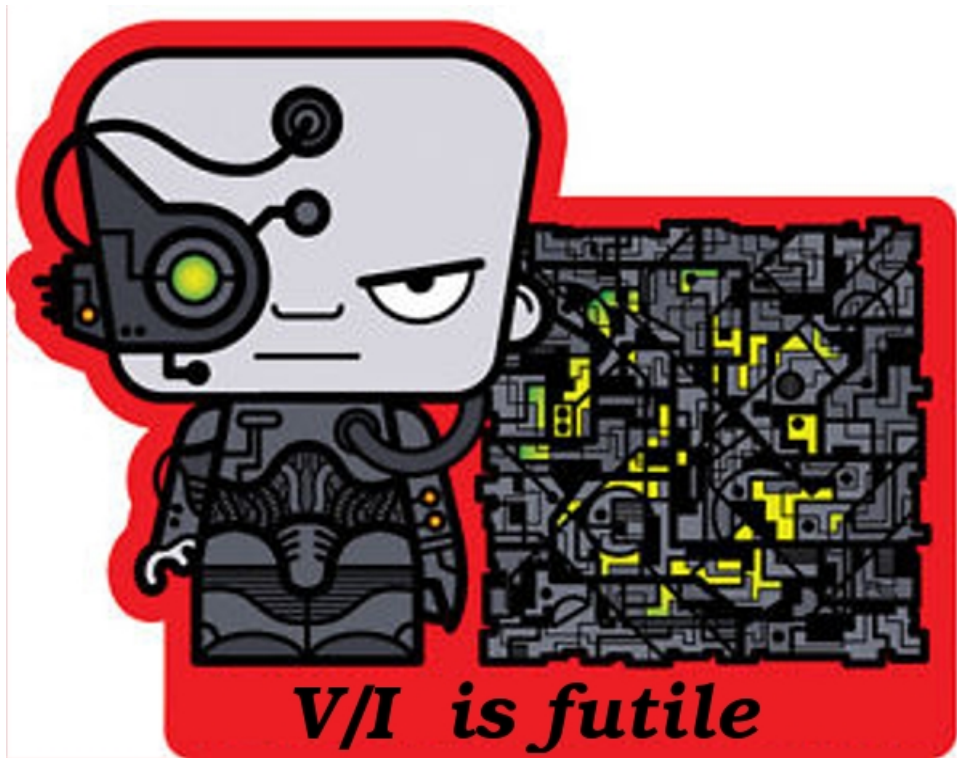


Inductors - Stores electrons in a magnetic field



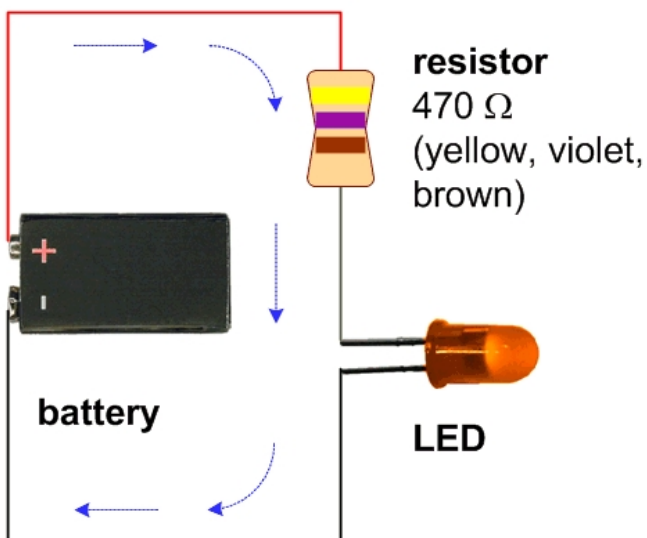
Diodes - Only allows electrons to flow in one direction

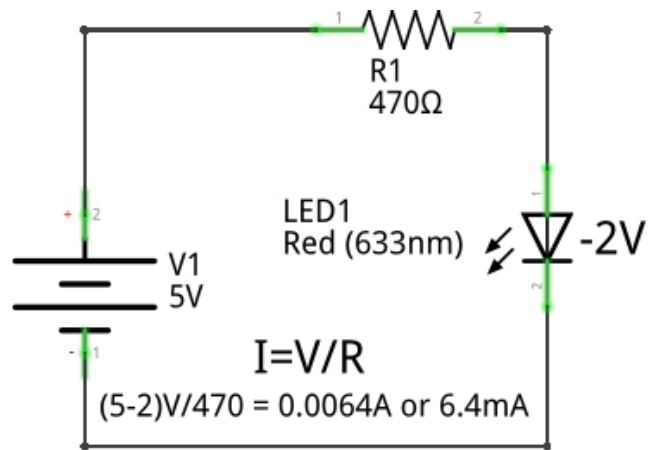
Ohm's Law



$$V = I \times R \quad I = \frac{V}{R} \quad R = \frac{V}{I}$$

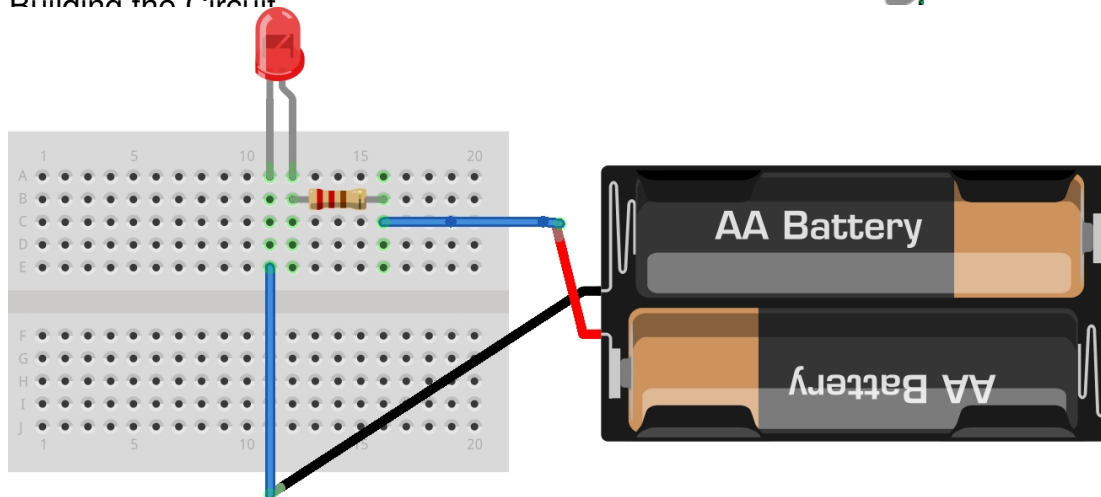
Using Ohm's law to check the max current in the circuit.
LED specs: -2V and 20mA or 0.02A Max





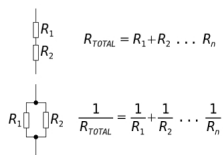
fritzing

Building the Circuit



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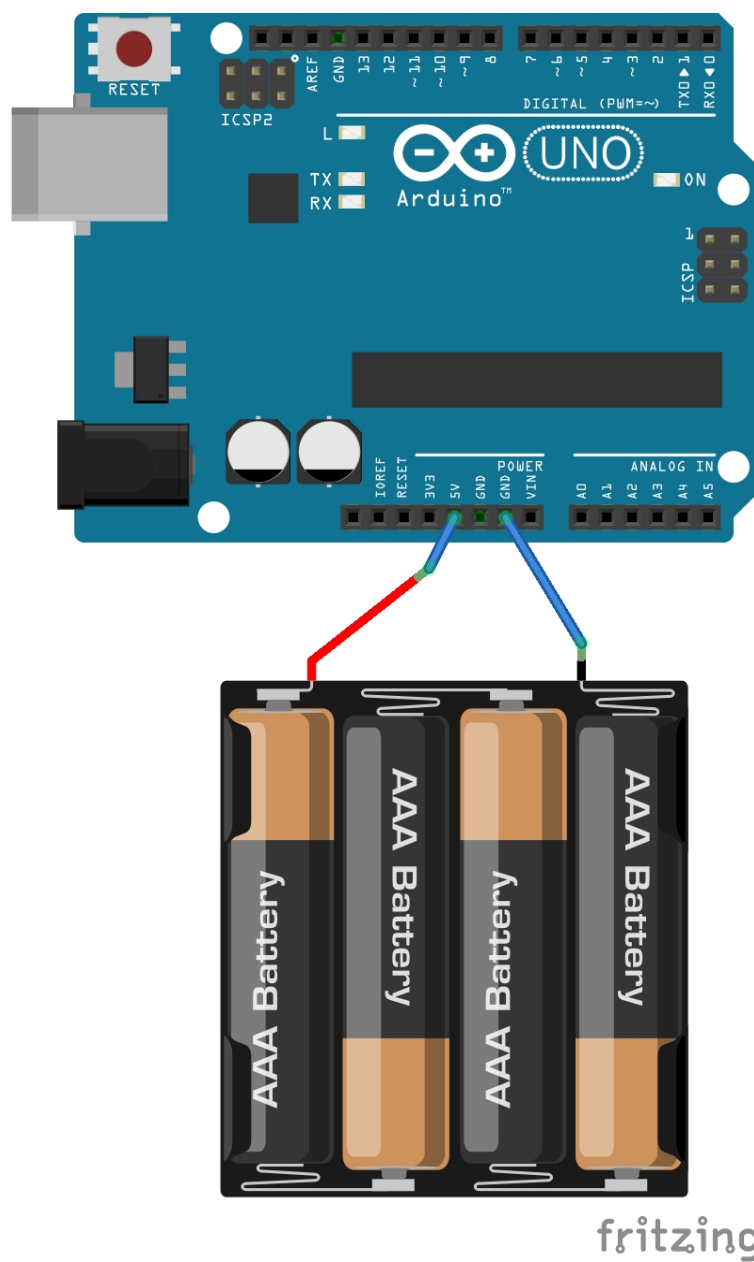
Resistors in parallel and series



$$R_{TOTAL} = R_1 + R_2 \dots R_n$$

$$\frac{1}{R_{TOTAL}} = \frac{1}{R_1} + \frac{1}{R_2} \dots \frac{1}{R_n}$$

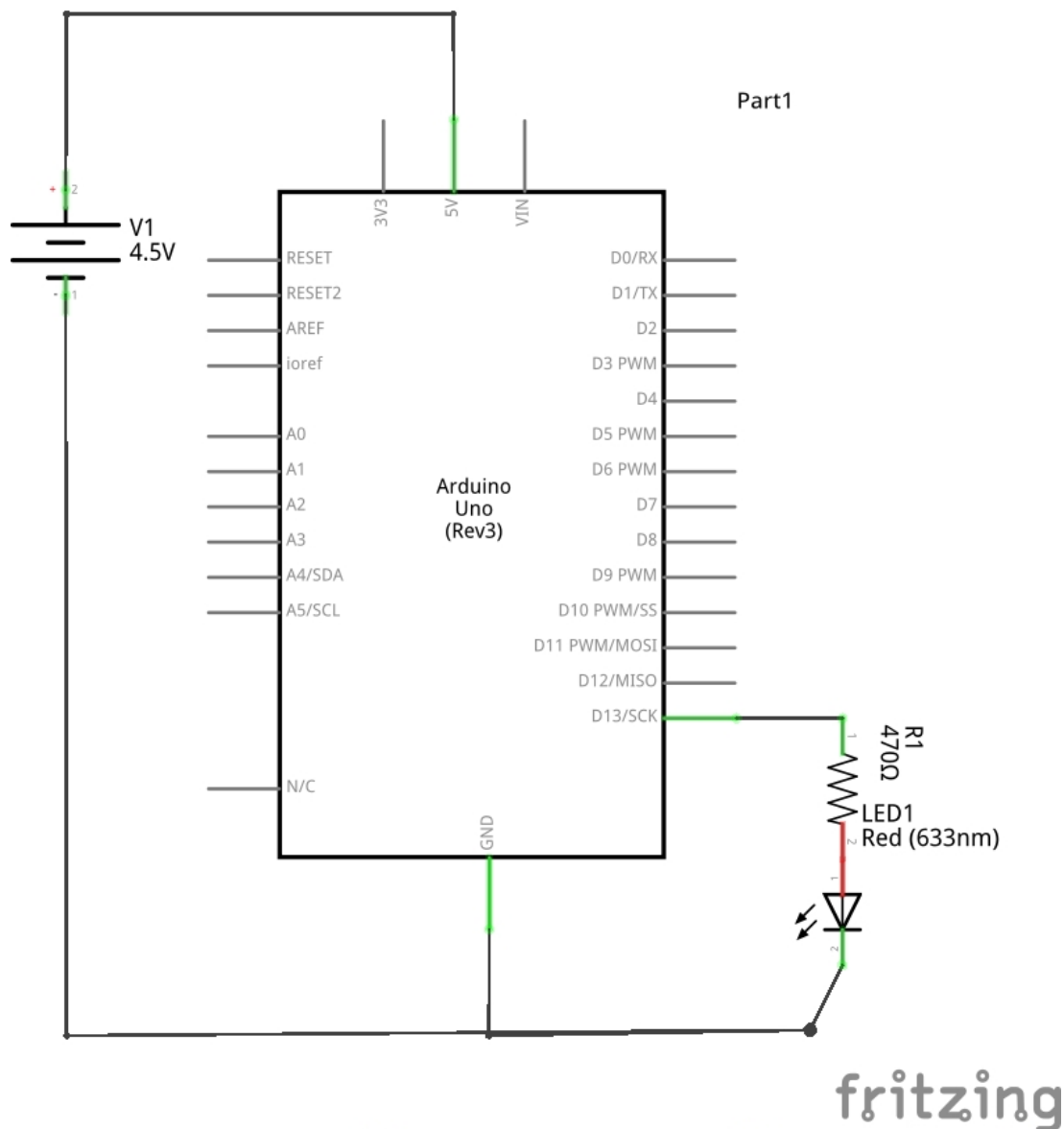
Using a microcontroller

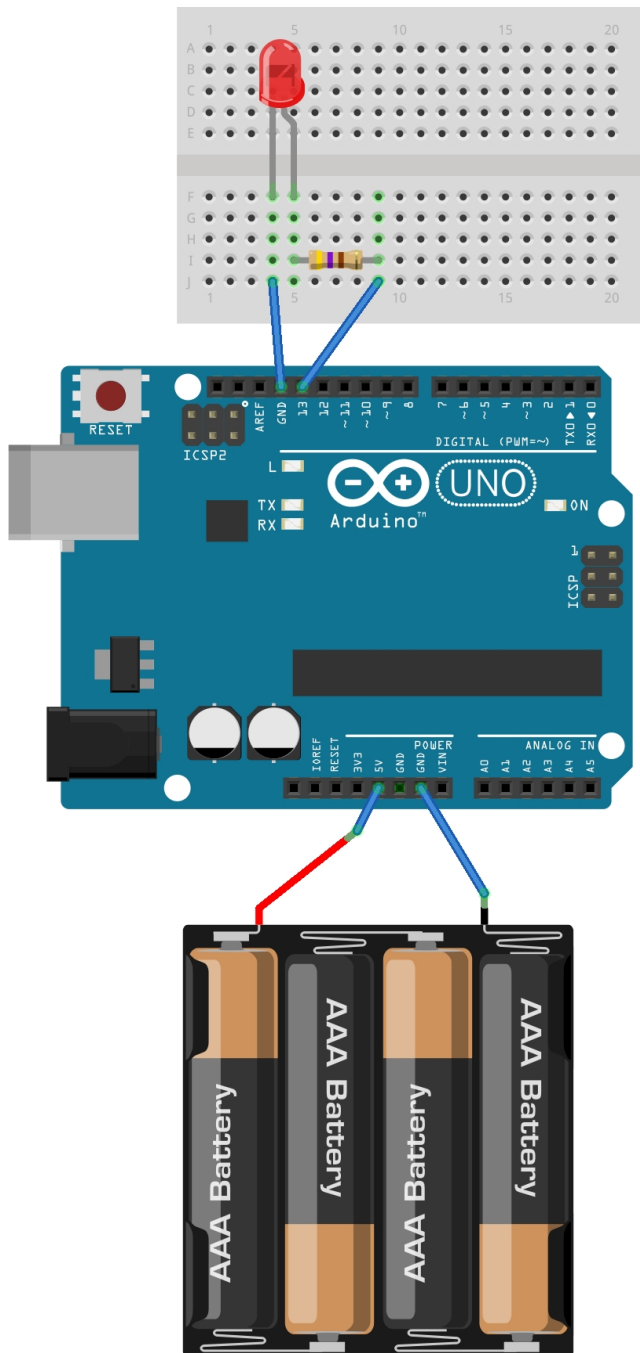


Using a microcontroller to control an LED

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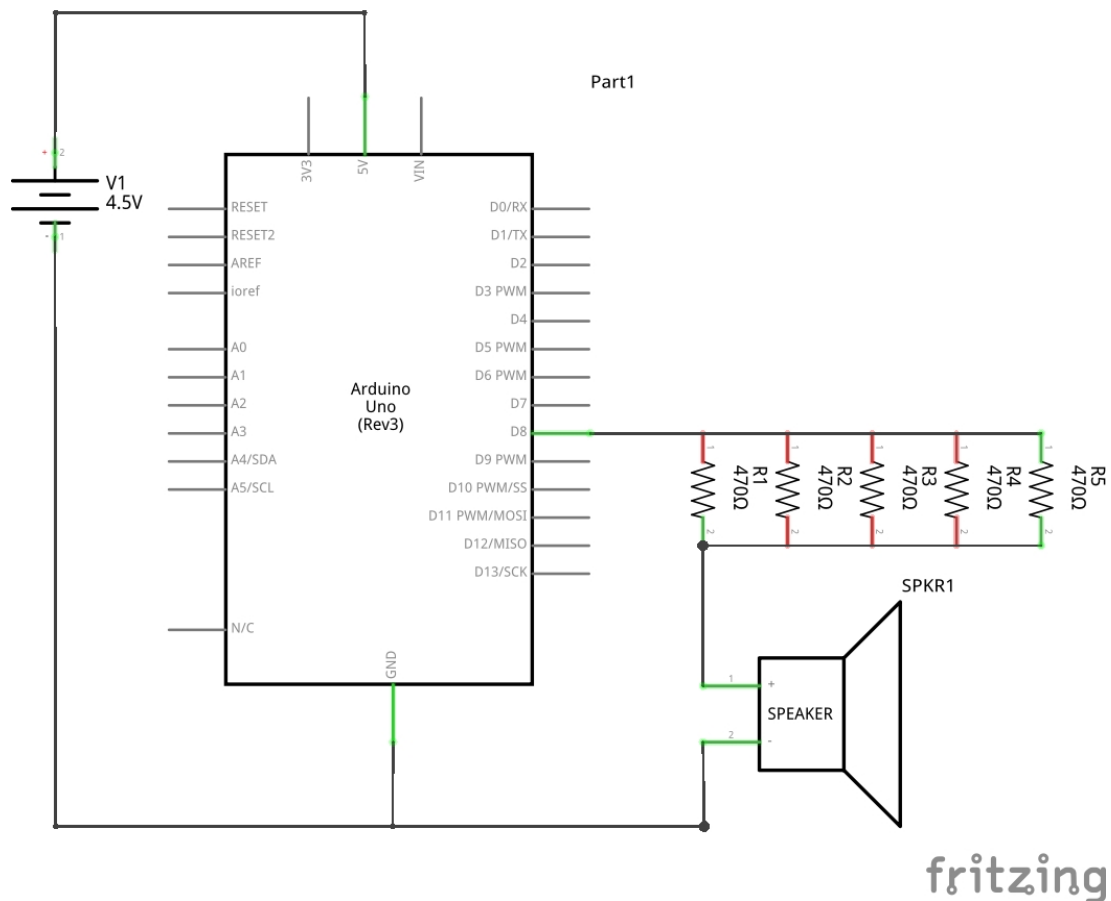
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Using a microcontroller to control a speaker

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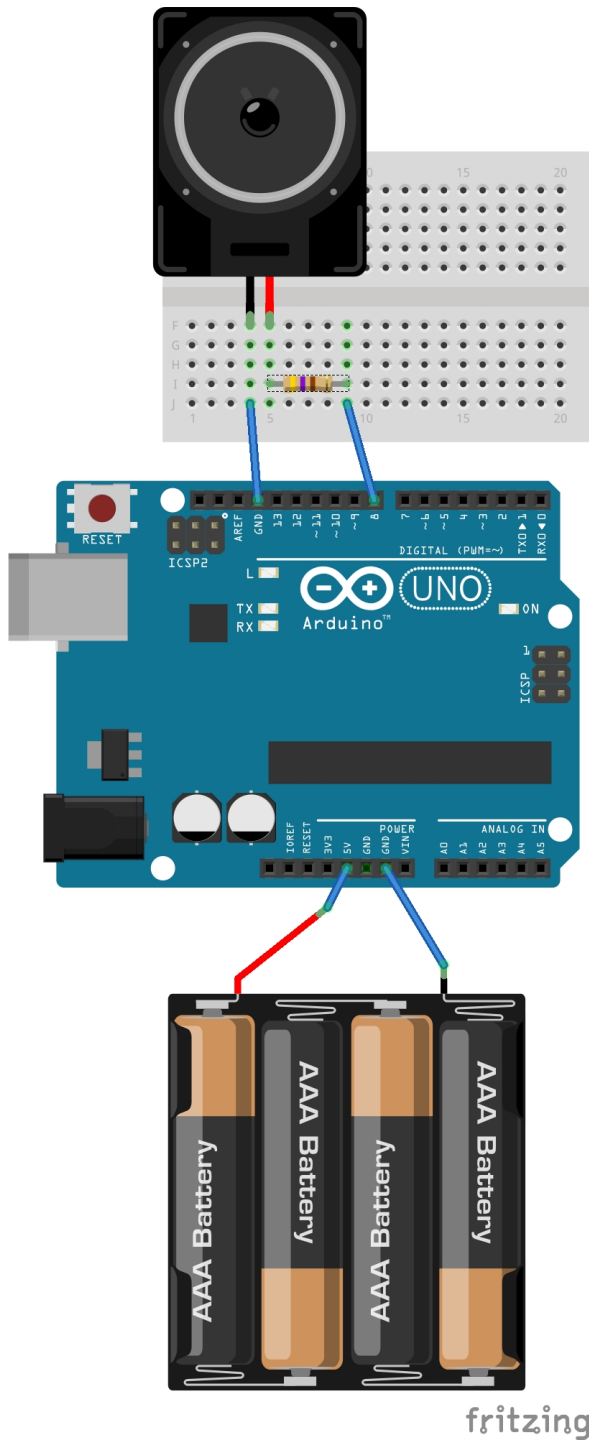
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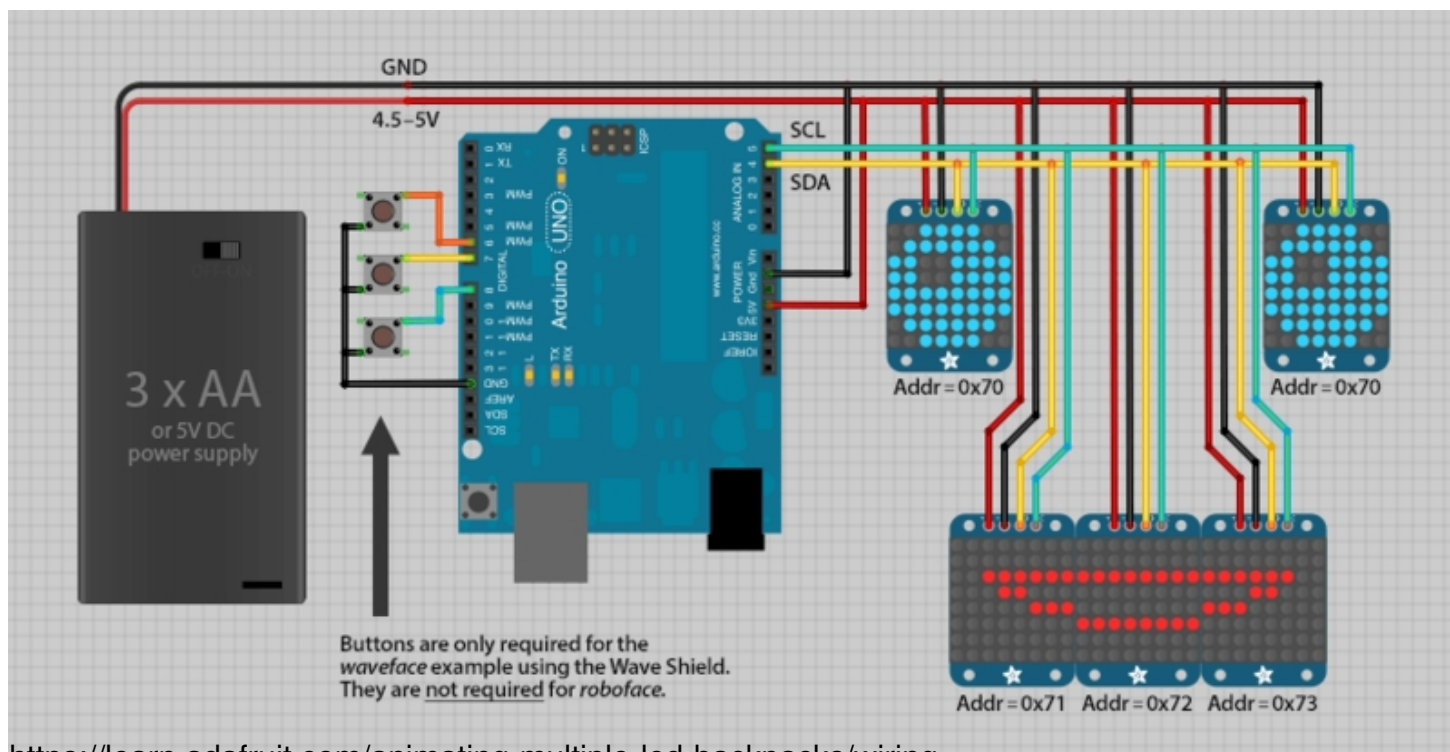




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<https://learn.adafruit.com/animating-multiple-led-backpacks/wiring>