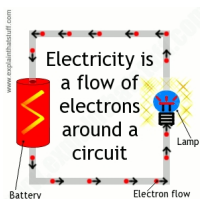


Introduction to microcontrollers and electronics



Basic Electronics



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

Introduction to microcontrollers and electronics

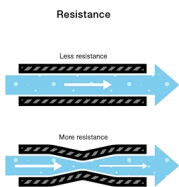
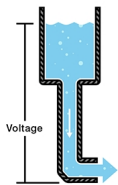
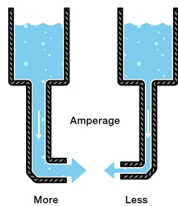
Written by Lior

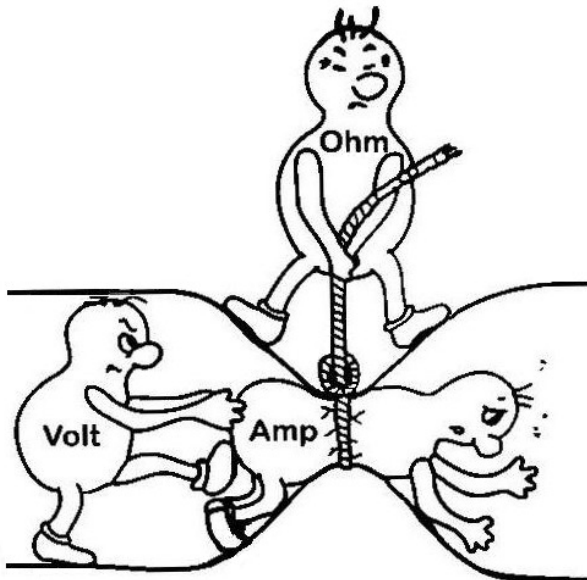
Friday, 24 October 2014 13:47 - Last Updated Saturday, 25 October 2014 14:38

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.

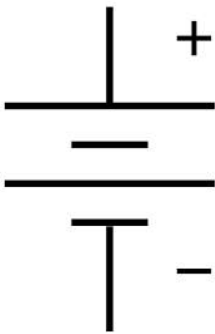
There are three basic principles to electricity

- **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).





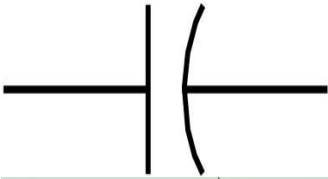
Basic Electrical Components



Battery - converts chemical energy into electricity



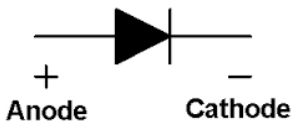
Resistors - Resists the flow of electricity



Capacitors - Stores electrons in an electric field

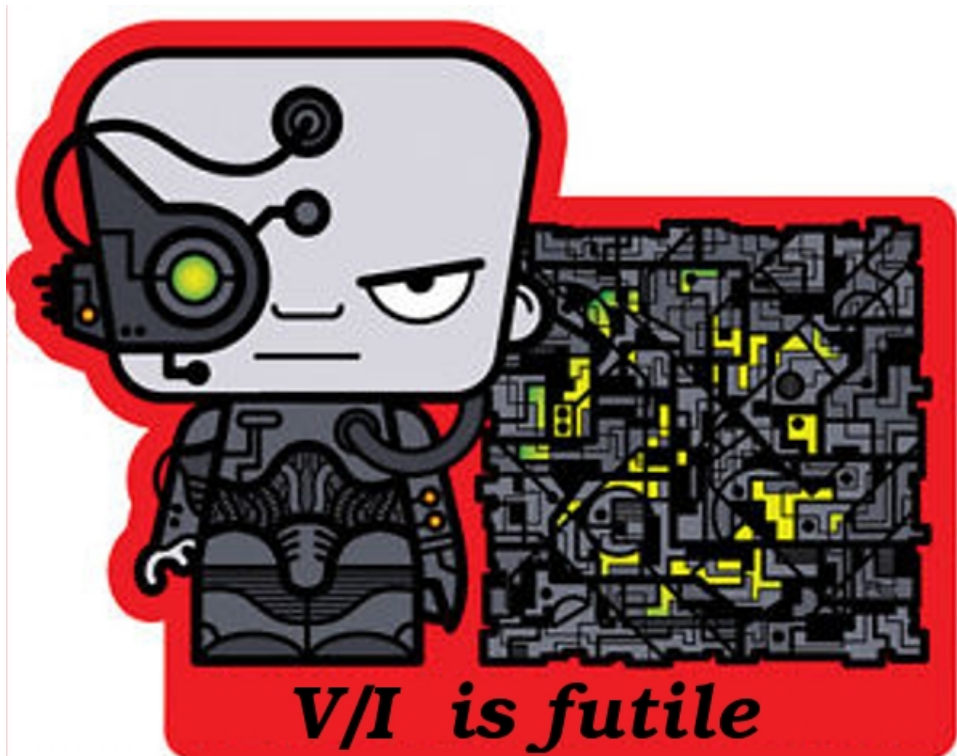


Inductors - Stores electrons in a magnetic field



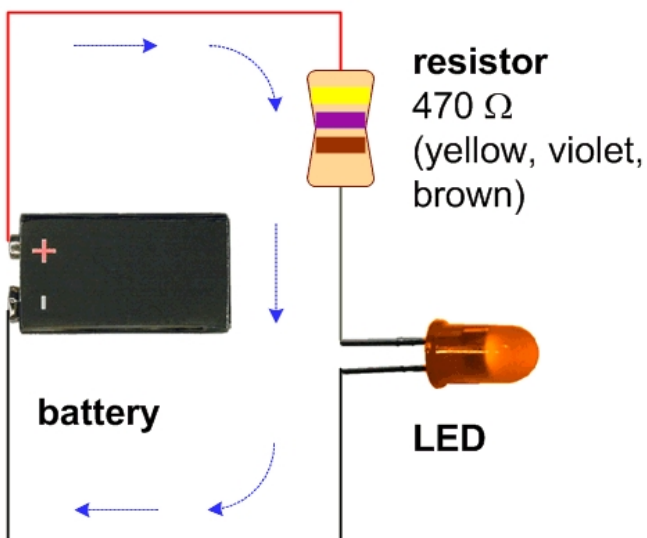
Diodes - Only allows electrons to flow in one direction

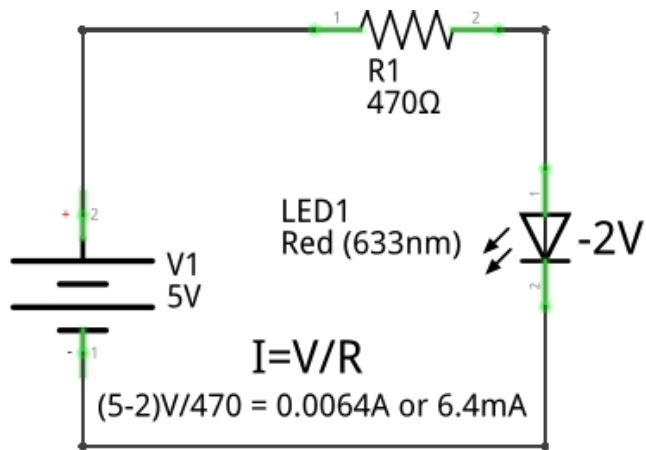
Ohm's Law



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

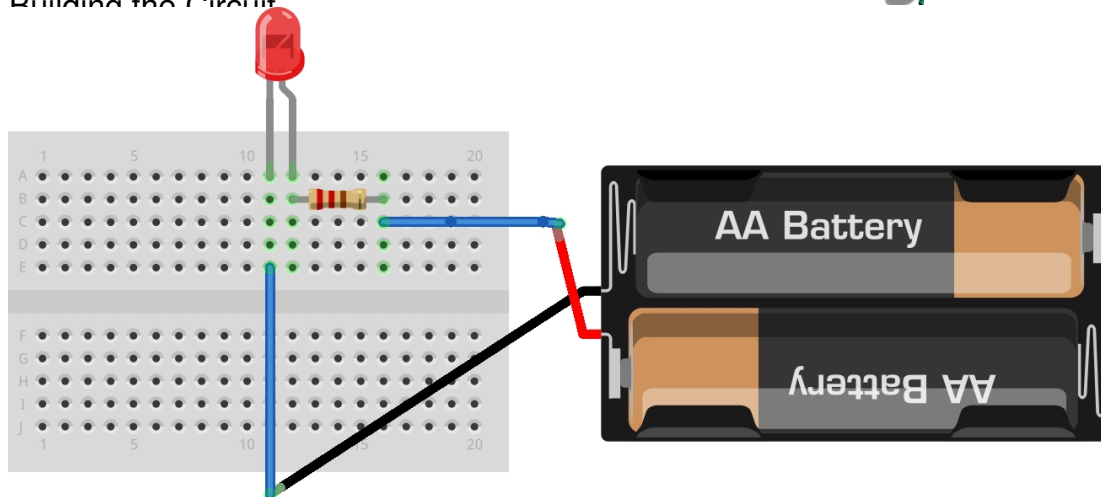
Using Ohm's law to check the max current in the circuit.
LED specs: -2V and 20mA or 0.02A Max





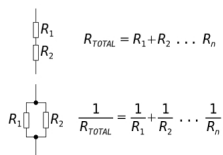
fritzing

Building the Circuit



fritzing

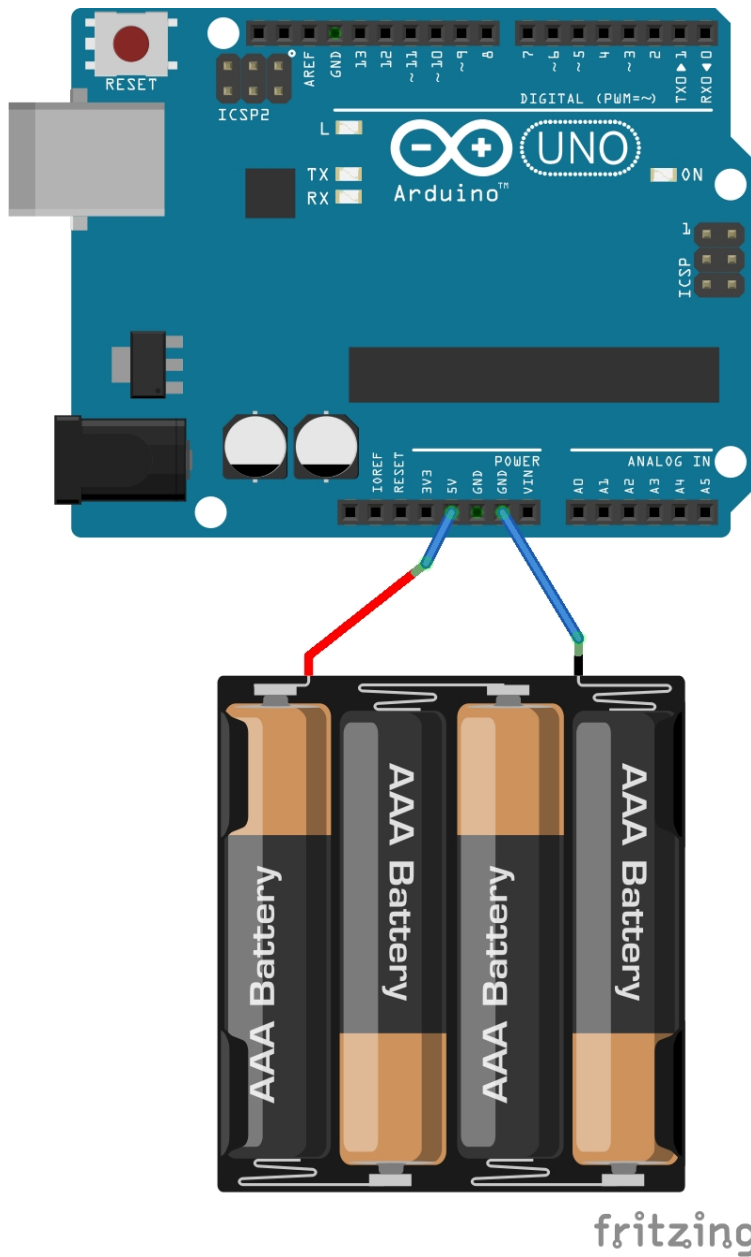
Resistors in parallel and series



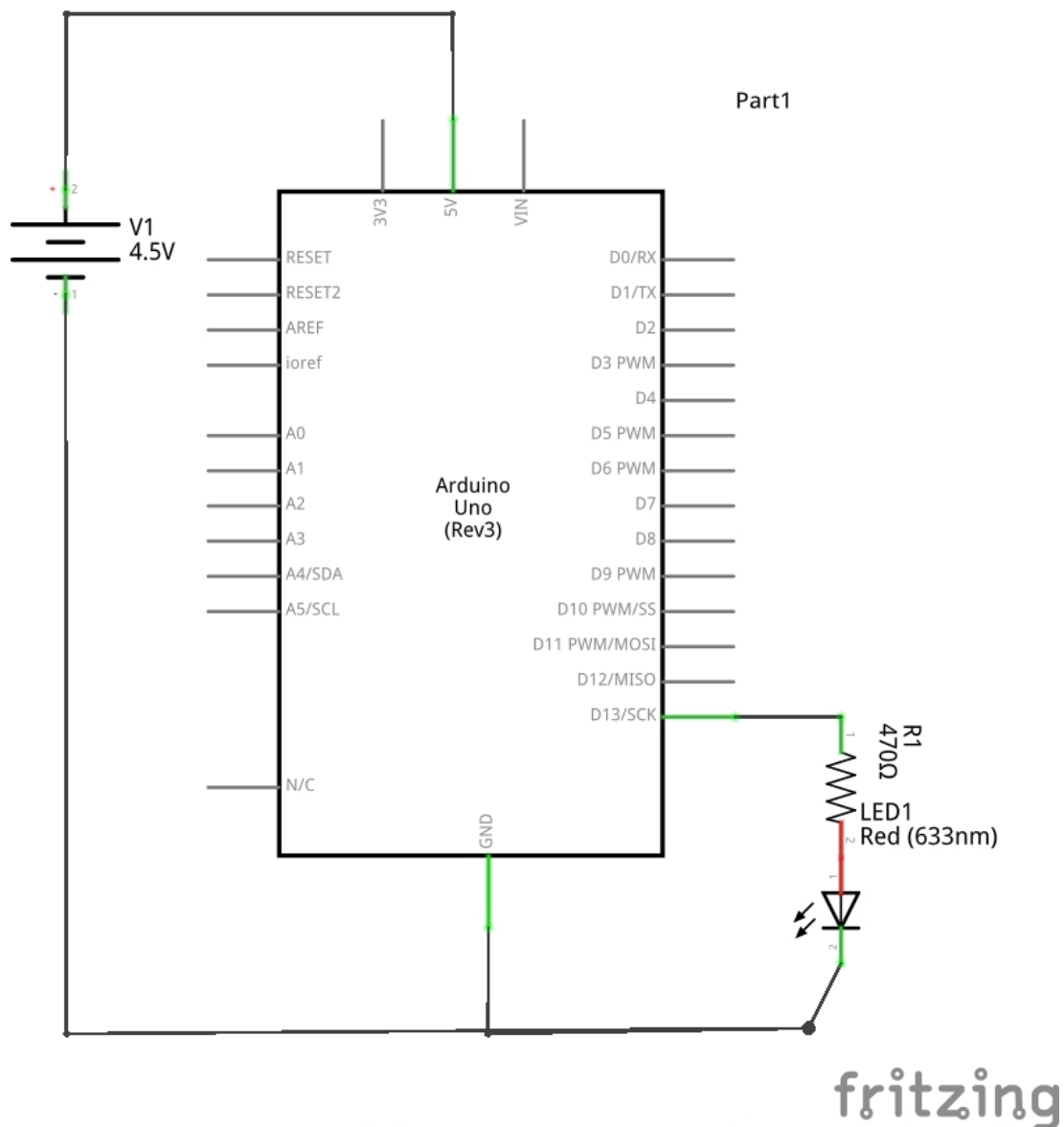
$$R_{TOTAL} = R_1 + R_2 \dots R_n$$

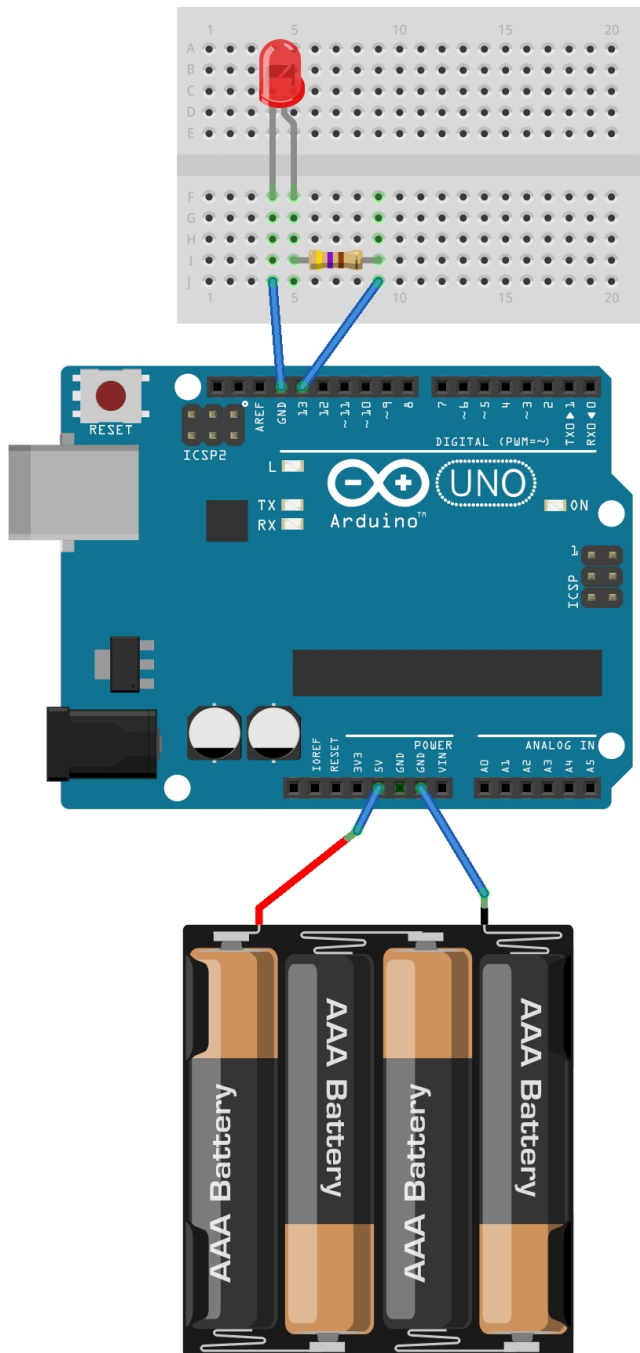
$$\frac{1}{R_{TOTAL}} = \frac{1}{R_1} + \frac{1}{R_2} \dots \frac{1}{R_n}$$

Using a microcontroller



Using a microcontroller to control an LED





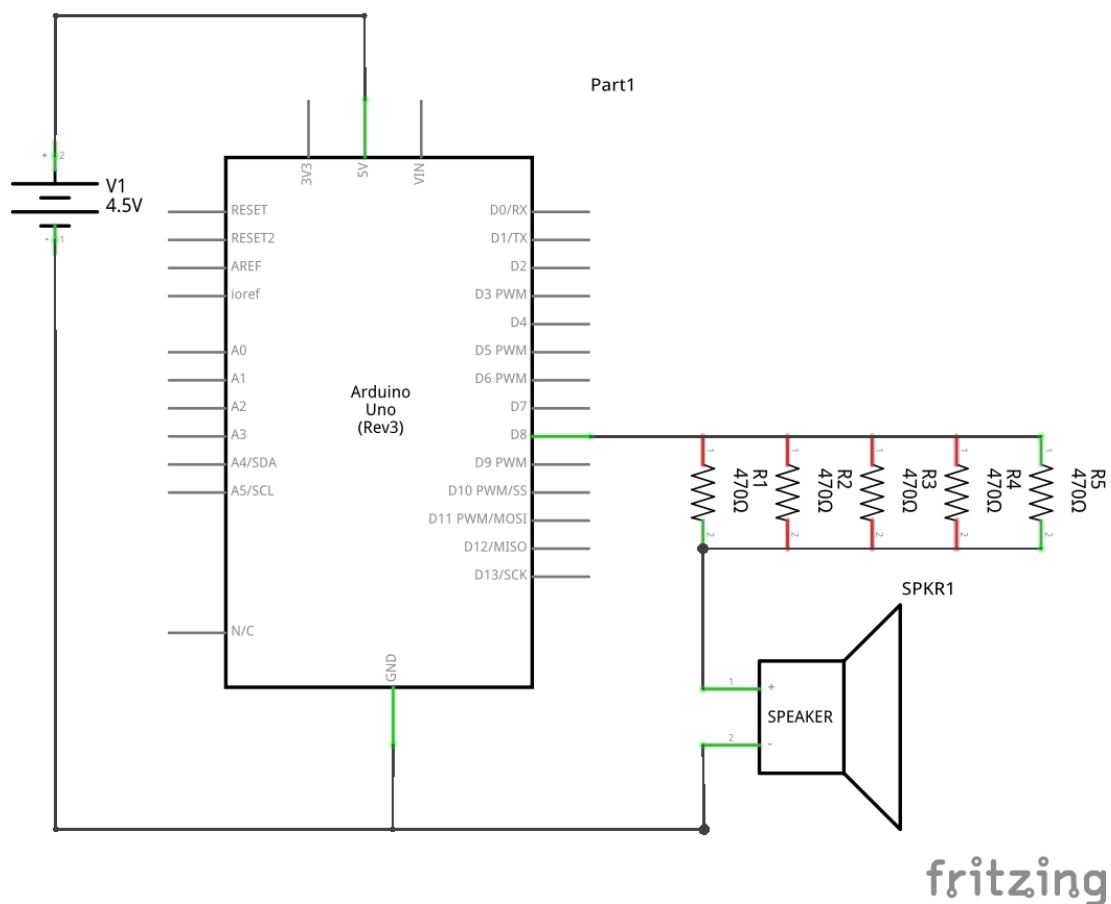
fritzing

Using a microcontroller to control a speaker

Introduction to microcontrollers and electronics

Written by Lior

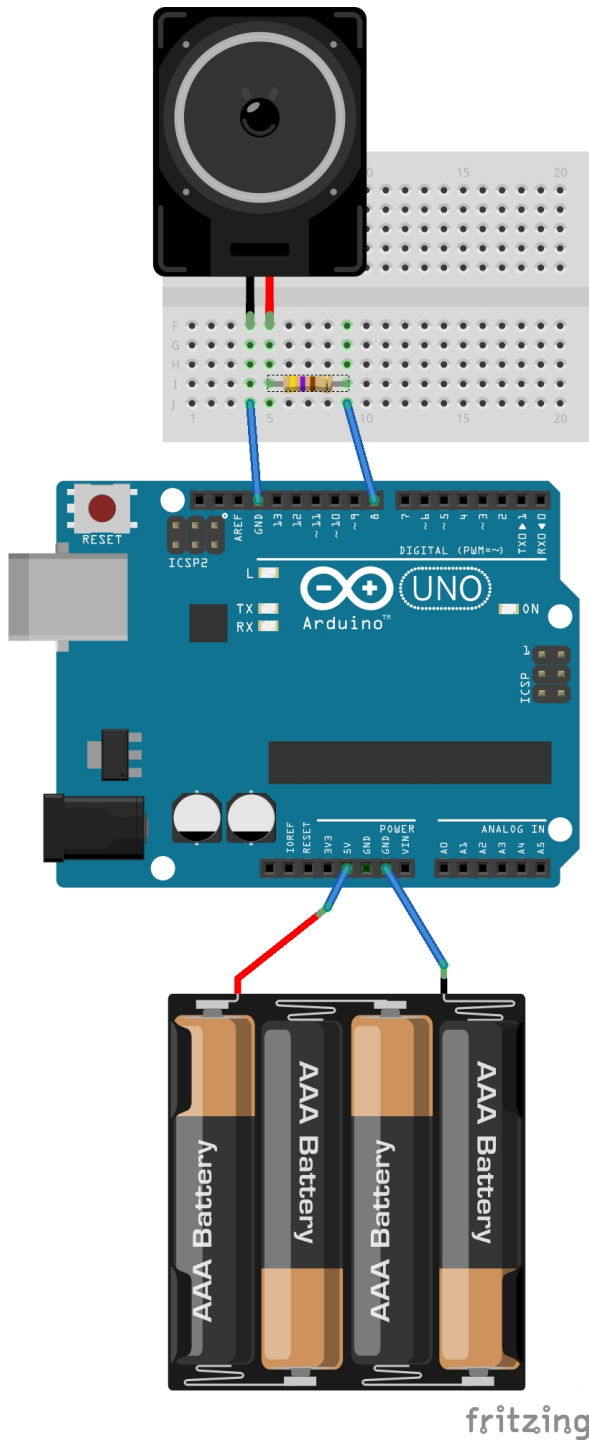
Friday, 24 October 2014 13:47 - Last Updated Saturday, 25 October 2014 14:38



Introduction to microcontrollers and electronics

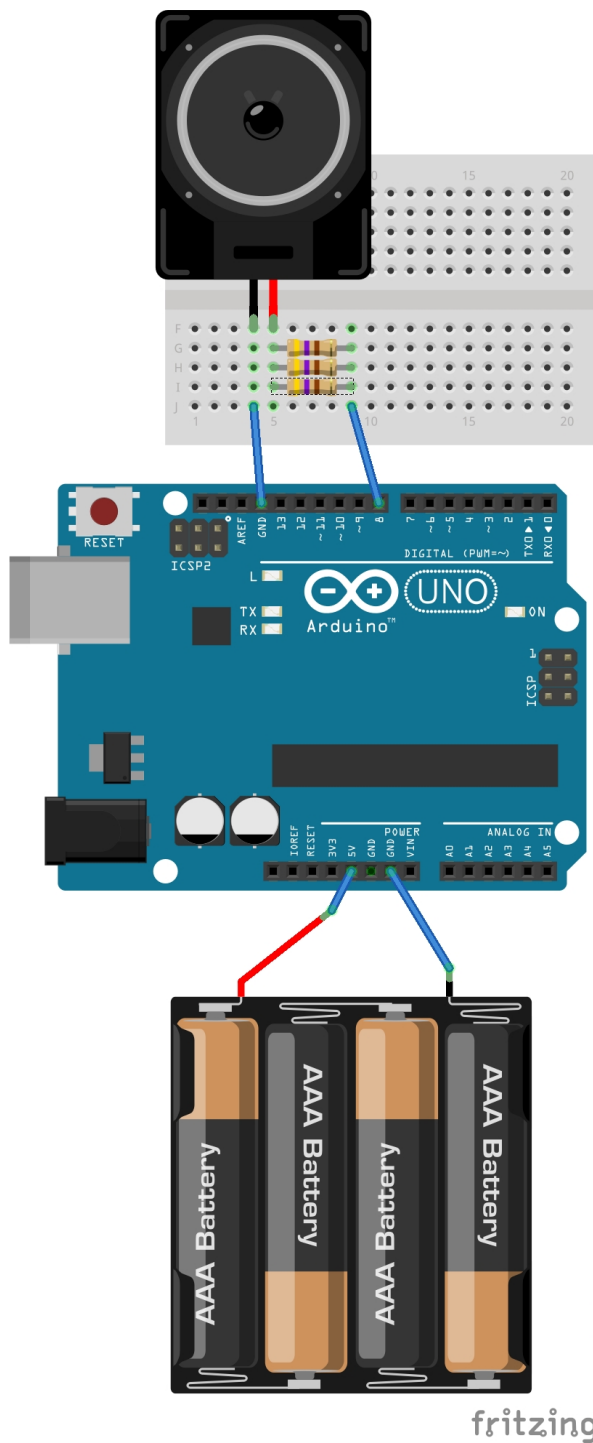
Written by Lior

Friday, 24 October 2014 13:47 - Last Updated Saturday, 25 October 2014 14:38



Written by Lior

Friday, 24 October 2014 13:47 - Last Updated Saturday, 25 October 2014 14:38

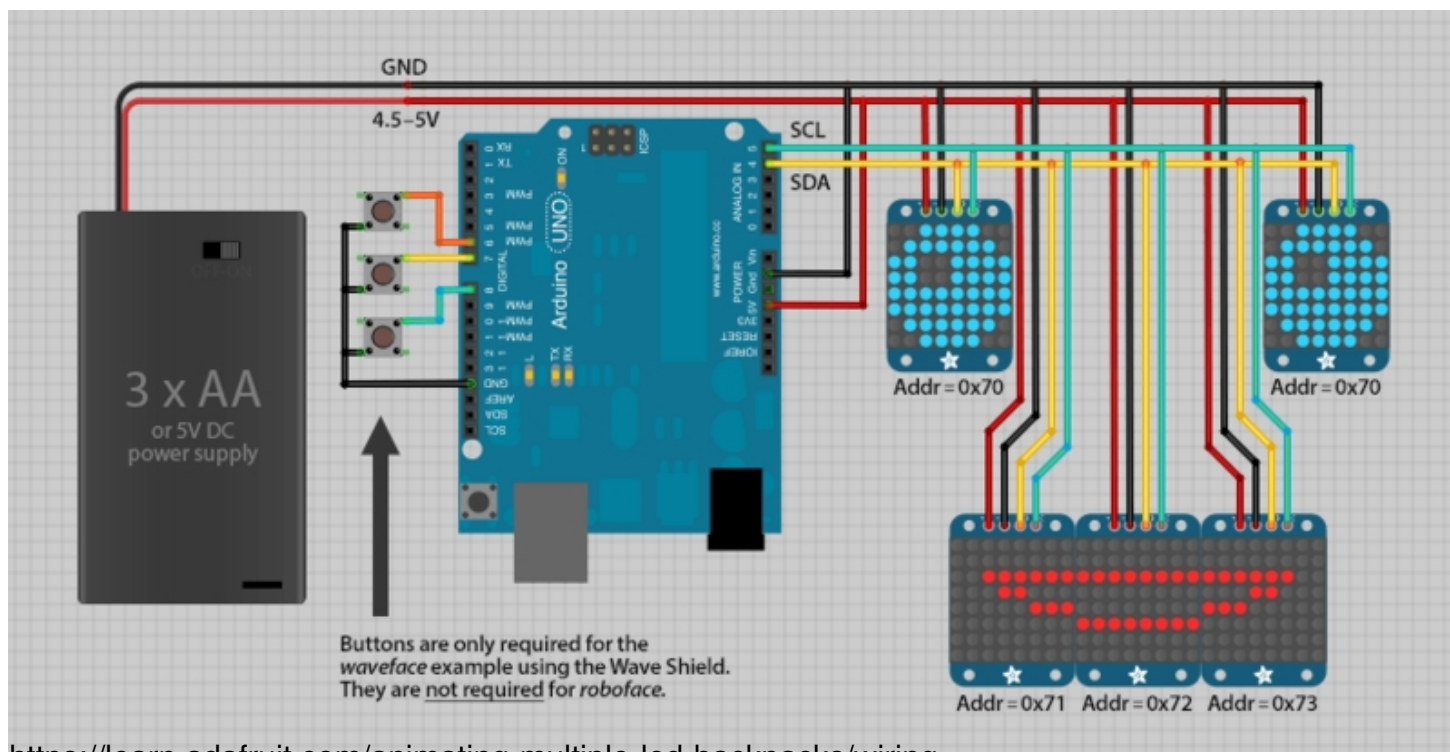


Connecting the 8x8 LED matrix

Introduction to microcontrollers and electronics

Written by Lior

Friday, 24 October 2014 13:47 - Last Updated Saturday, 25 October 2014 14:38



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