



waag society

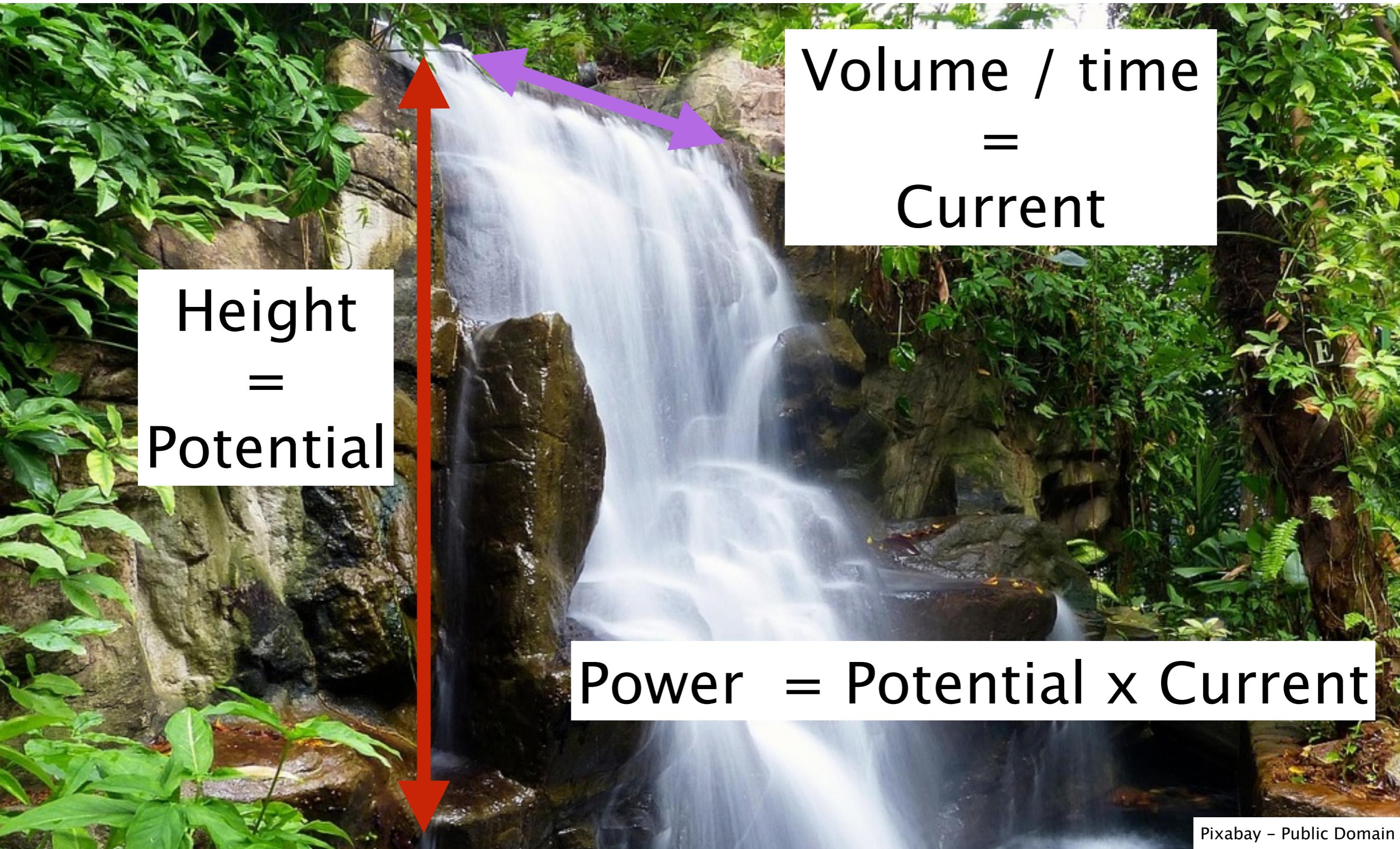
institute for art, science and technology



BioHack Academy
Arduino & Soldering

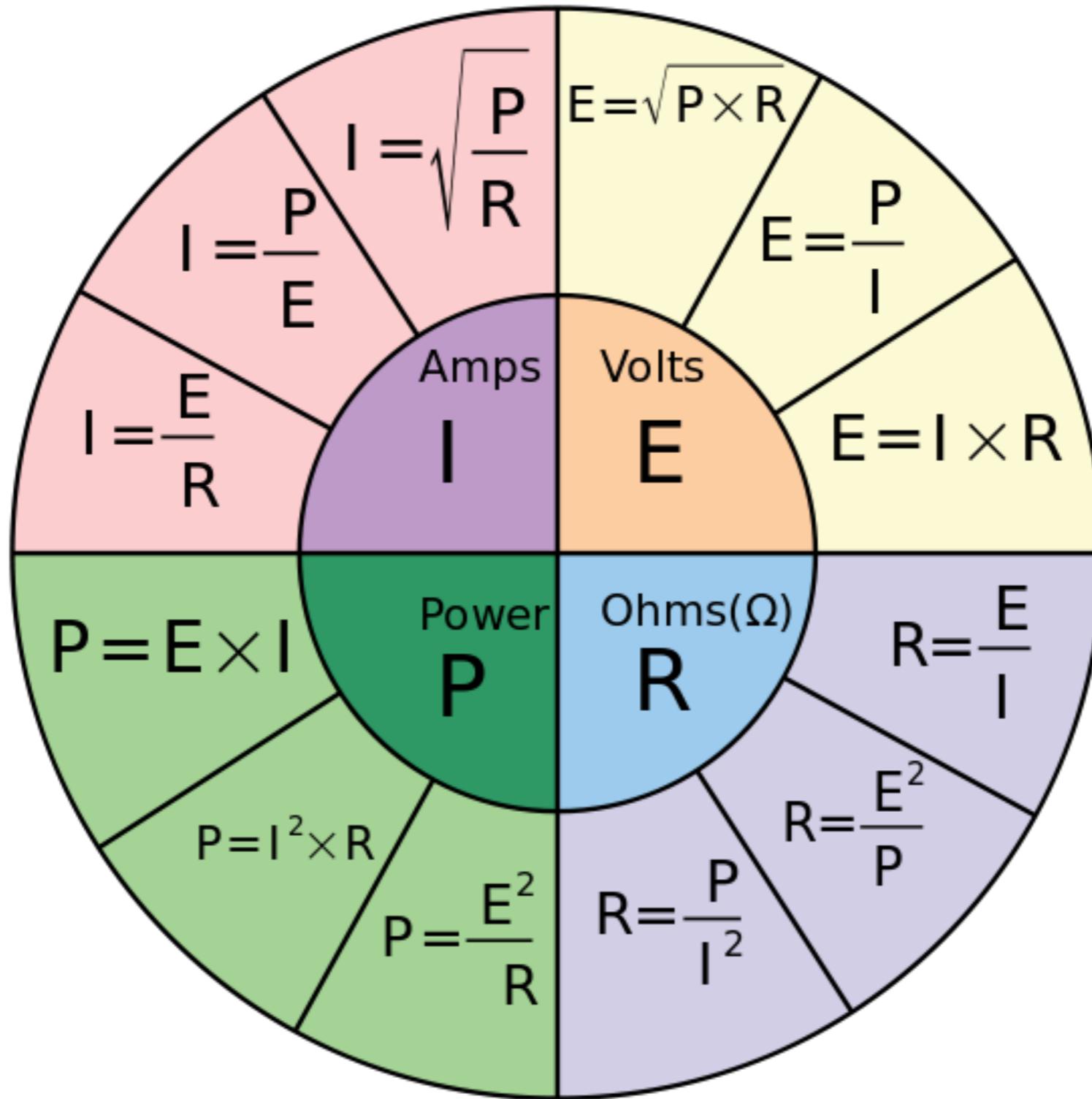


Waterfall





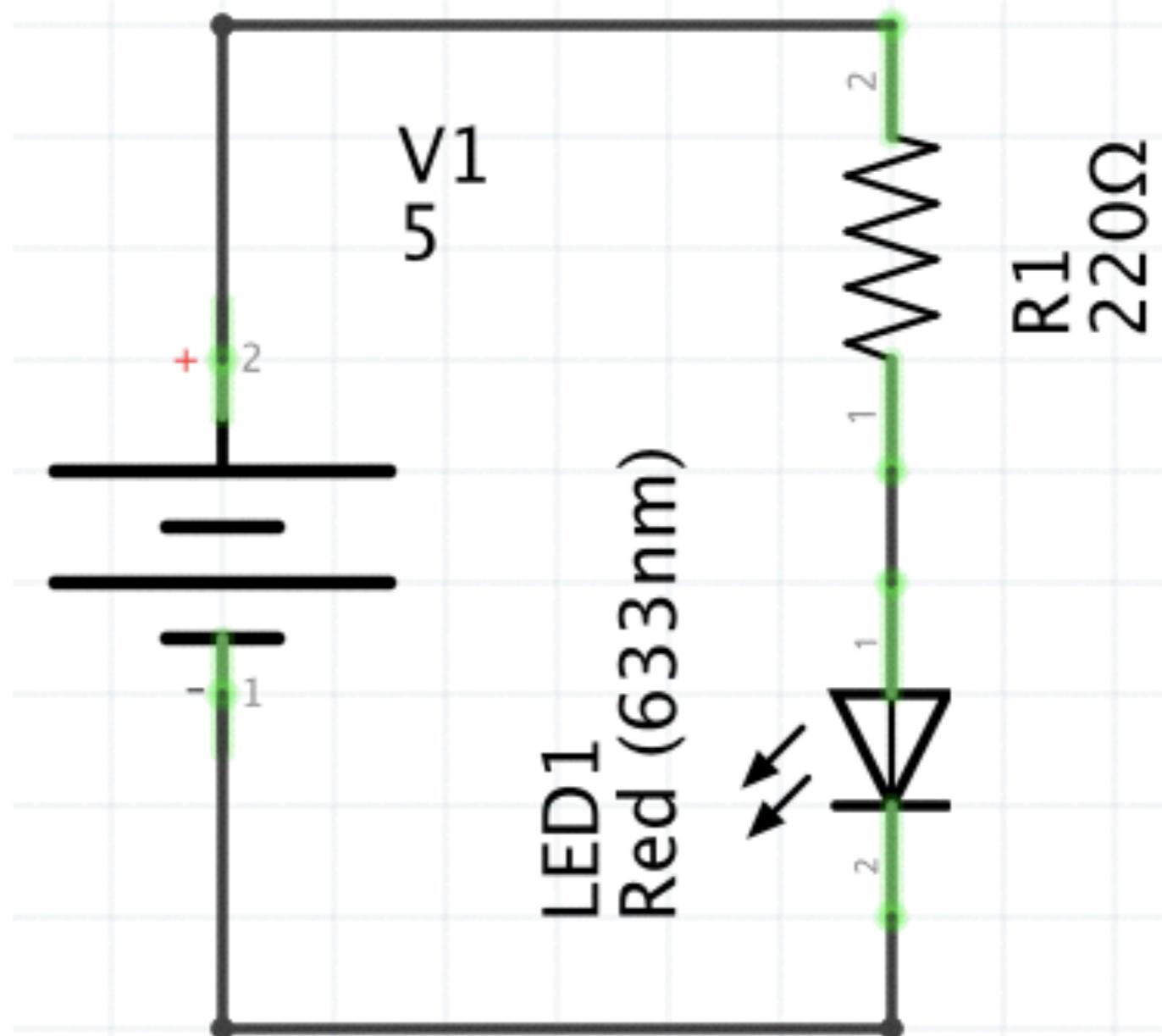
Ohm's Law





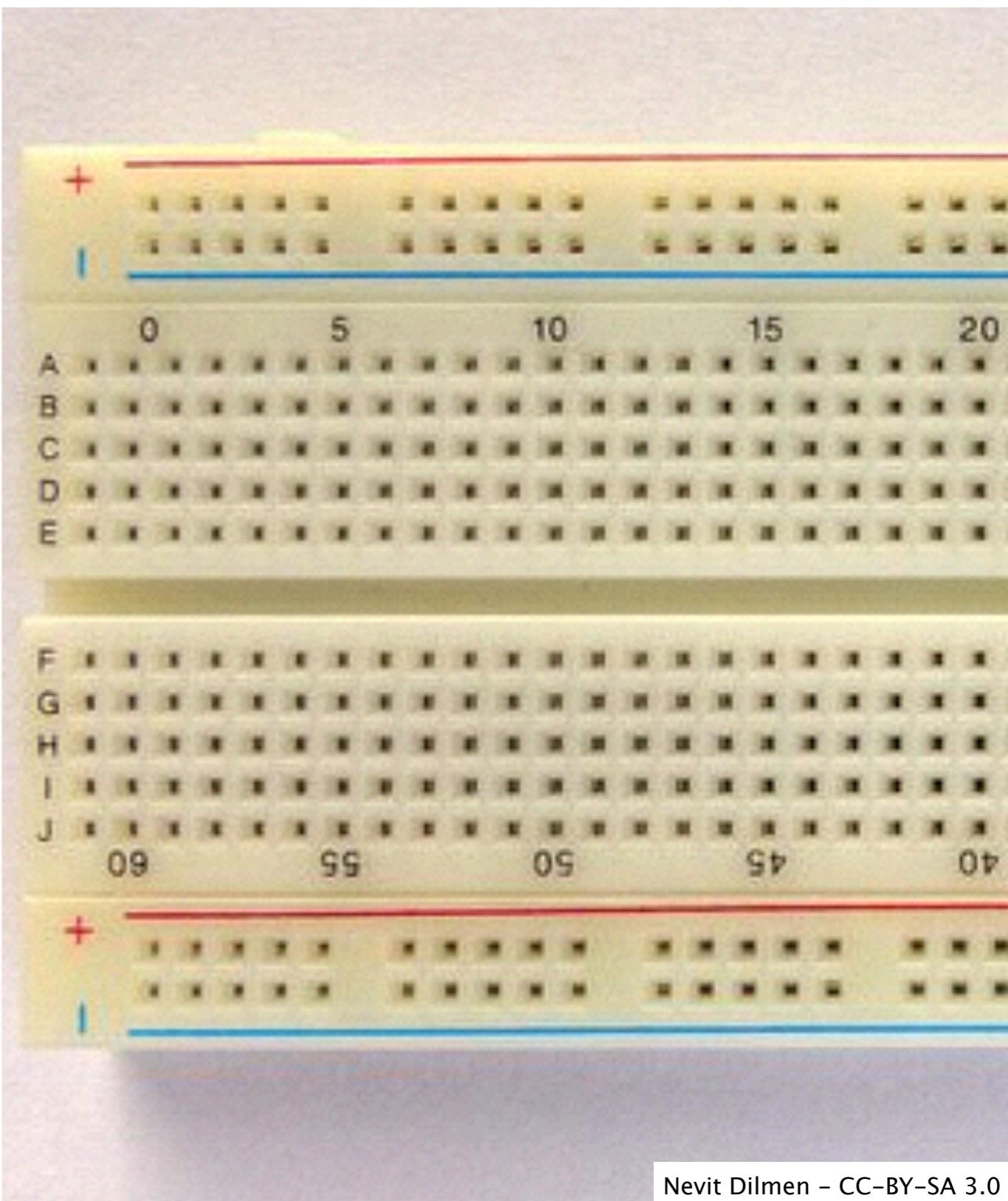
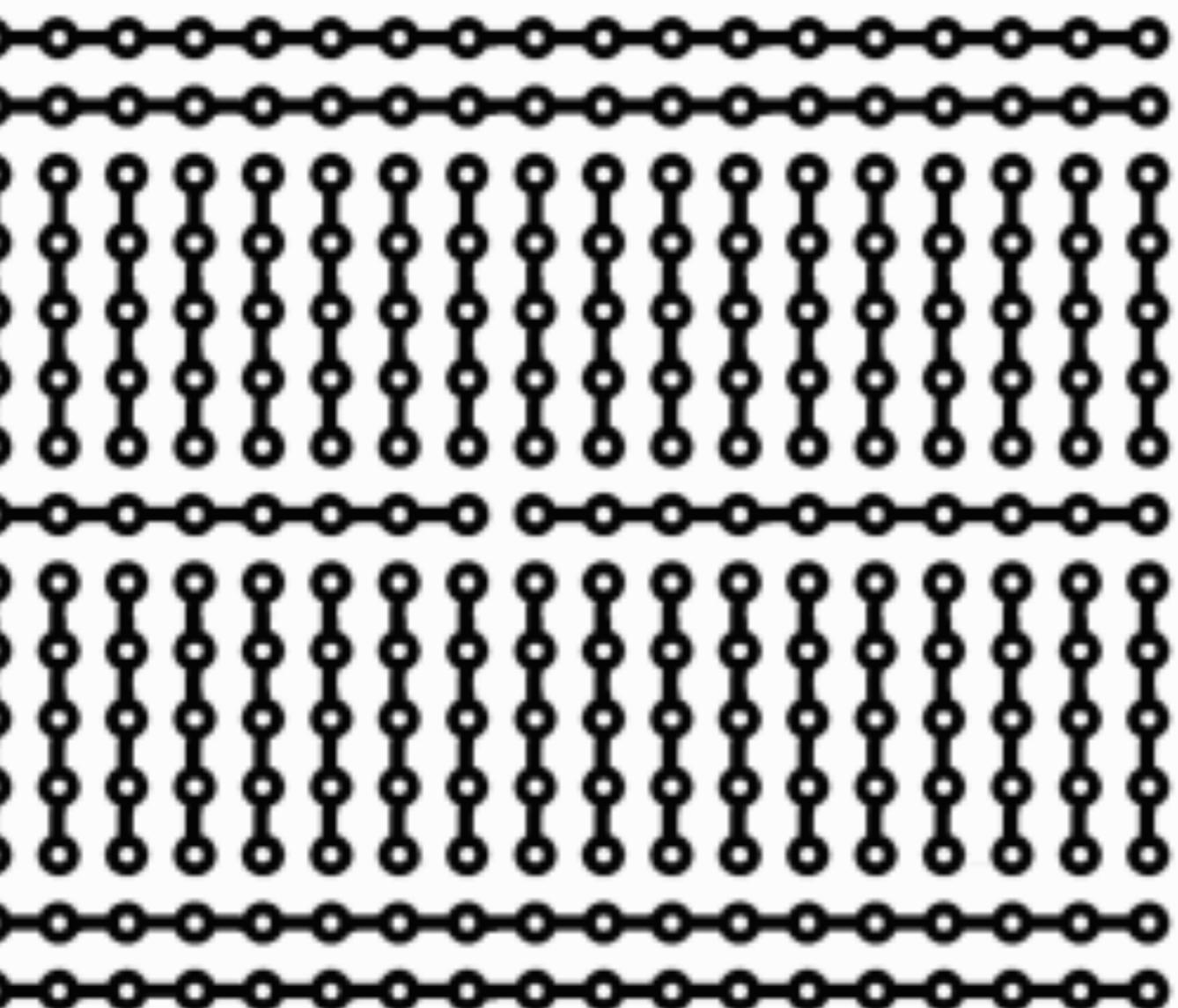
Limiting current

- Most components have a maximum current rating
- Typical LED:
 - Voltage drop: 1.8V
 - Max current: 20 mA
- If supply voltage is +5V
 - The voltage across R1 = $5 - 1.8 = 3.2V$
 - Dividing voltage by resistance gives current:
 - $3.2 V / 220 \text{ ohm} = 0.015 A = 15 \text{ mA}$
 - 15 mA is well below 20 mA



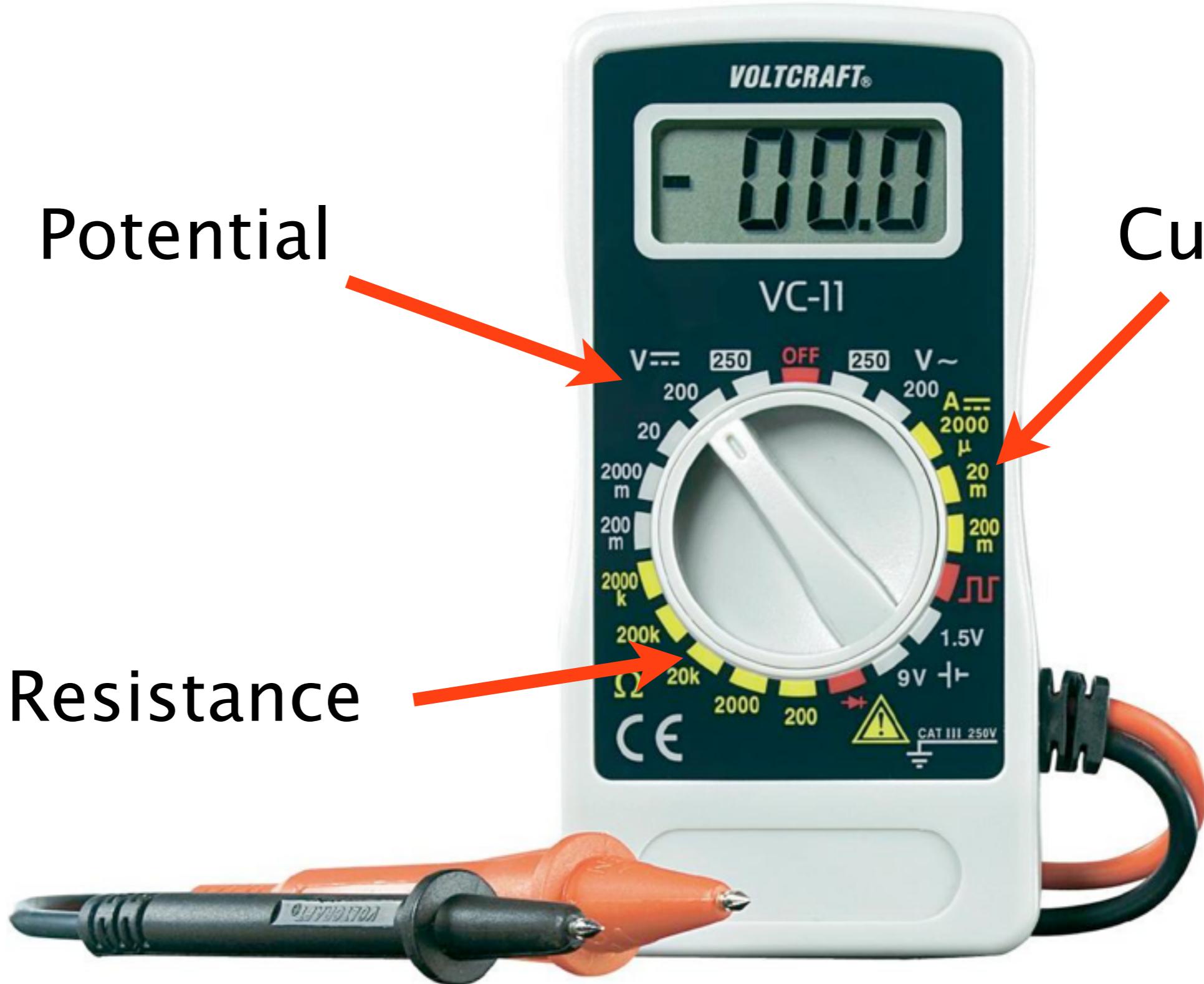


Breadboard



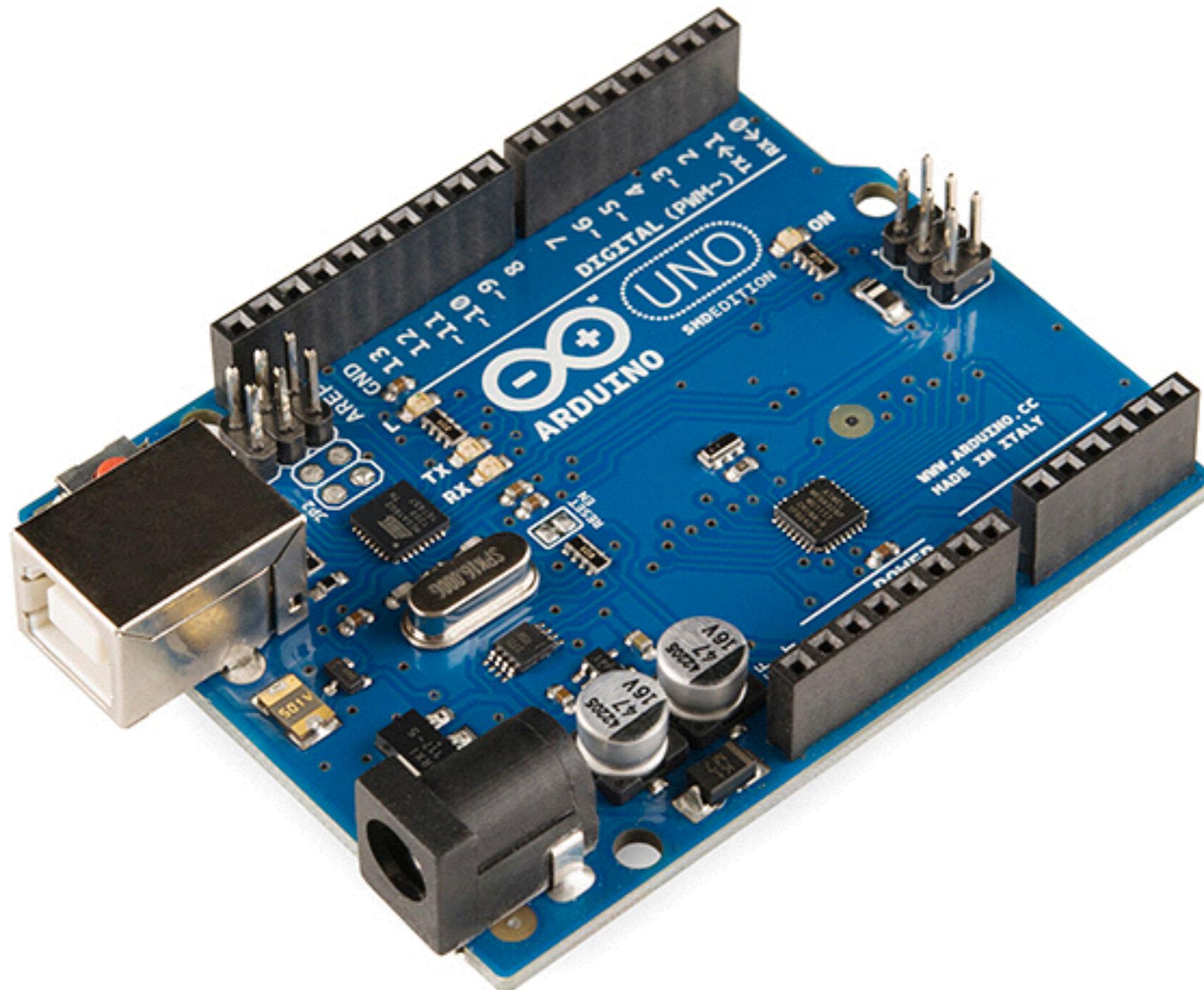


Measuring



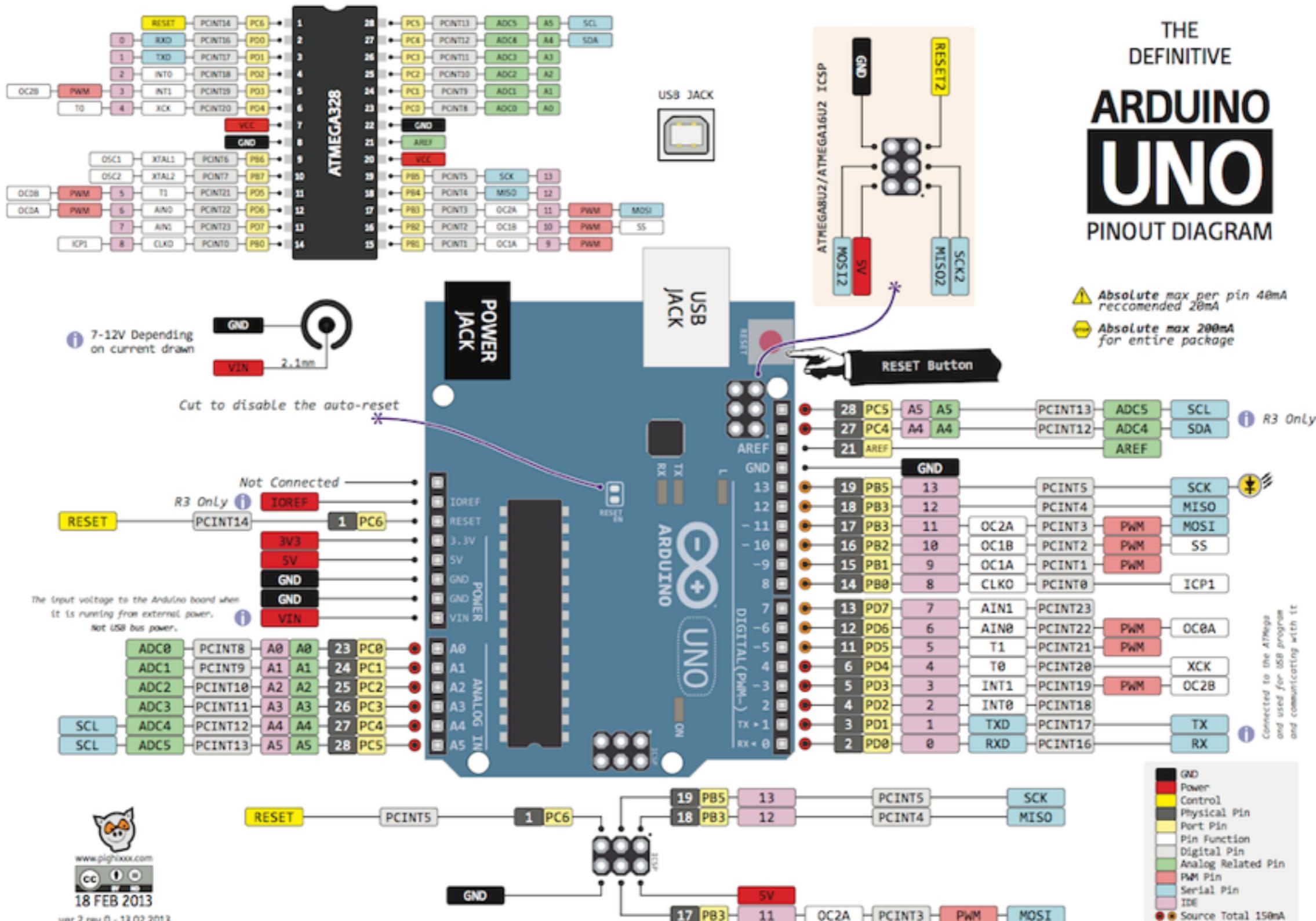


Arduino





Arduino is Open Source





Programming

- Arduino IDE
- Setup() function
- Loop() function

The screenshot shows the Arduino IDE interface with the title bar "sketch_feb04a | Arduino 1.5.8". The main area displays the following code:

```
void setup() {
  // put your setup code here, to run once:

}

void loop() {
  // put your main code here, to run repeatedly:

}
```

The code consists of two empty function definitions: `setup()` and `loop()`. The `setup()` function is intended for one-time initialization code, and the `loop()` function is where the main processing logic is placed.



Programming

Blinking an LED

- `pinMode()`
- `digitalWrite()`
- `delay()`

The screenshot shows the Arduino IDE interface with the title bar "Blink | Arduino 1.5.8". The code editor displays the "Blink" sketch, which blinks an LED connected to digital pin 13. The code includes comments explaining the setup and loop functions. The status bar at the bottom right shows "Arduino Uno on /dev/cu.usbserial-AM01VCF6".

```
/*
Blink
Turns on an LED on for one second, then off for one second, repeatedly.

Most Arduinos have an on-board LED you can control. On the Uno and Leonardo, it is attached to digital pin 13. If you're unsure what pin the on-board LED is connected to on your Arduino model, check the documentation at http://arduino.cc

This example code is in the public domain.

modified 8 May 2014
by Scott Fitzgerald
*/
// the setup function runs once when you press reset or power the board
void setup() {
    // initialize digital pin 13 as an output.
    pinMode(13, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
    digitalWrite(13, HIGH);      // turn the LED on (HIGH is the voltage level)
    delay(1000);                // wait for a second
    digitalWrite(13, LOW);       // turn the LED off by making the voltage LOW
    delay(1000);                // wait for a second
}
```



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Soldering



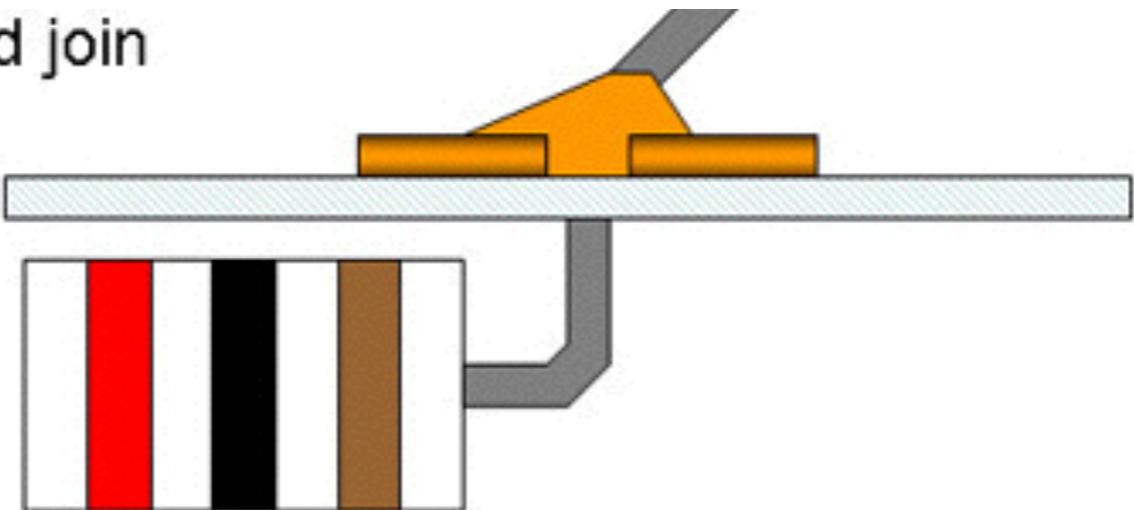
Soldering Iron - 350 C



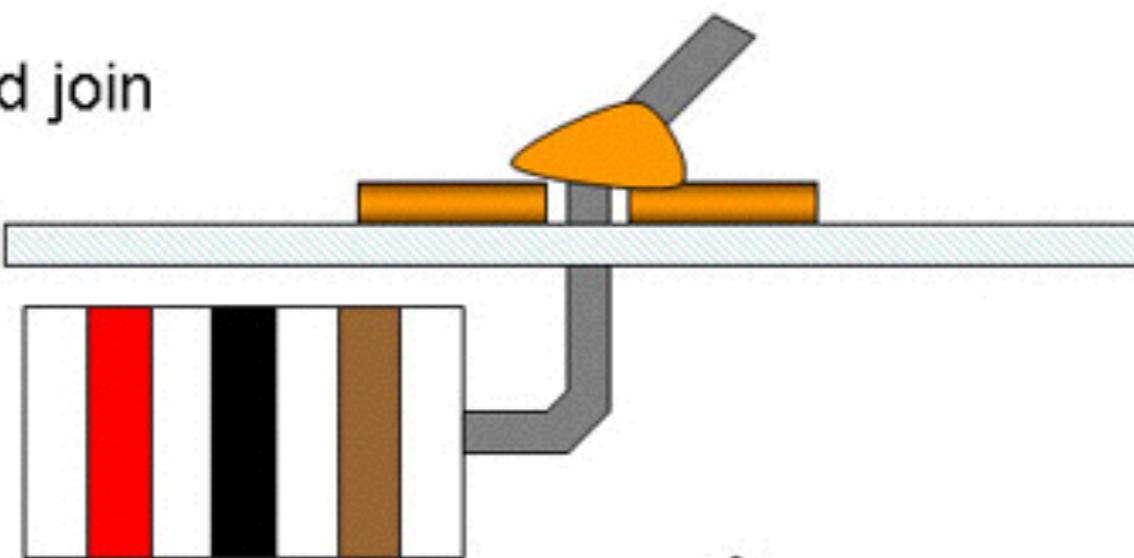


Soldering is easy

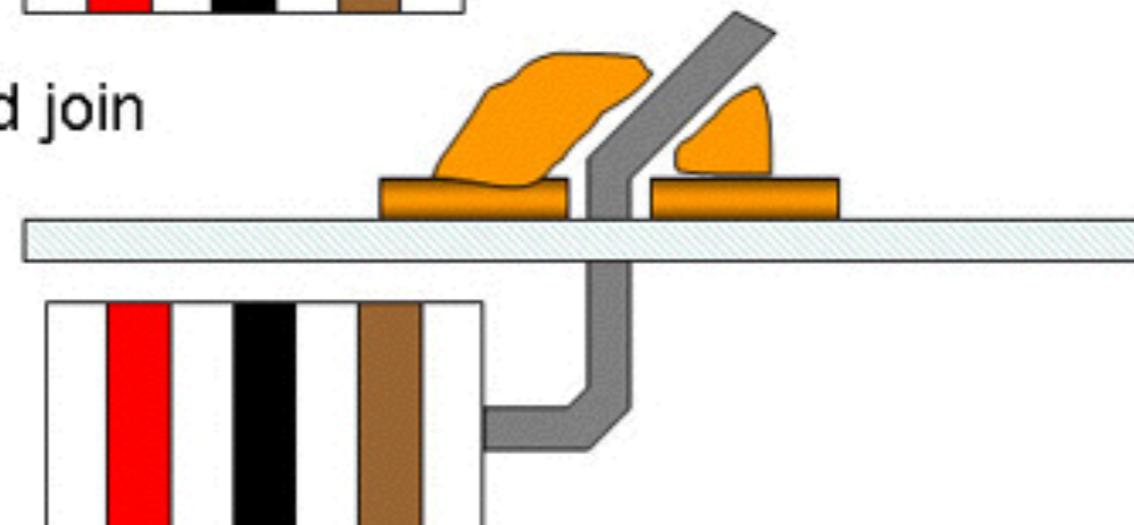
Good join



Bad join



Bad join





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Electrical Safety



Remember what your mother told you

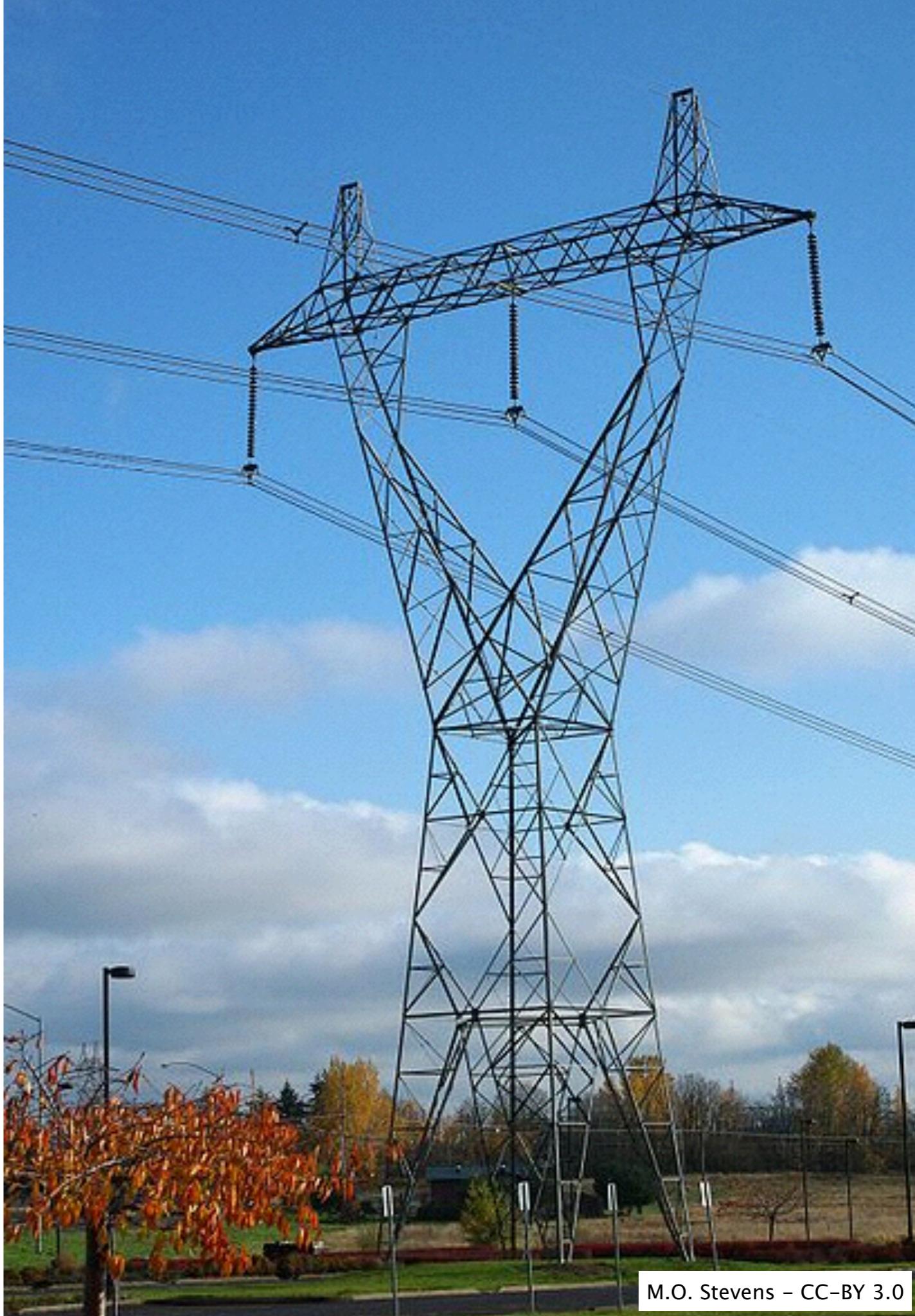


220 VOLTS



Dangers:

- High voltage
- Low resistance
=
- High Current
- Make use of isolation!
- Better safe than sorry!





some
rights
reserved