

Manager Hackathon

How to code



Basics zu Arduino
und Programmierung

Arduino is a microcontroller that can be used to create physical interactions



ARDUINO UNO REV3



ARDUINO MKR WIFI 1010
(CONCEPTUALLY
SIMILAR TO UNO BUT WITH WIFI)

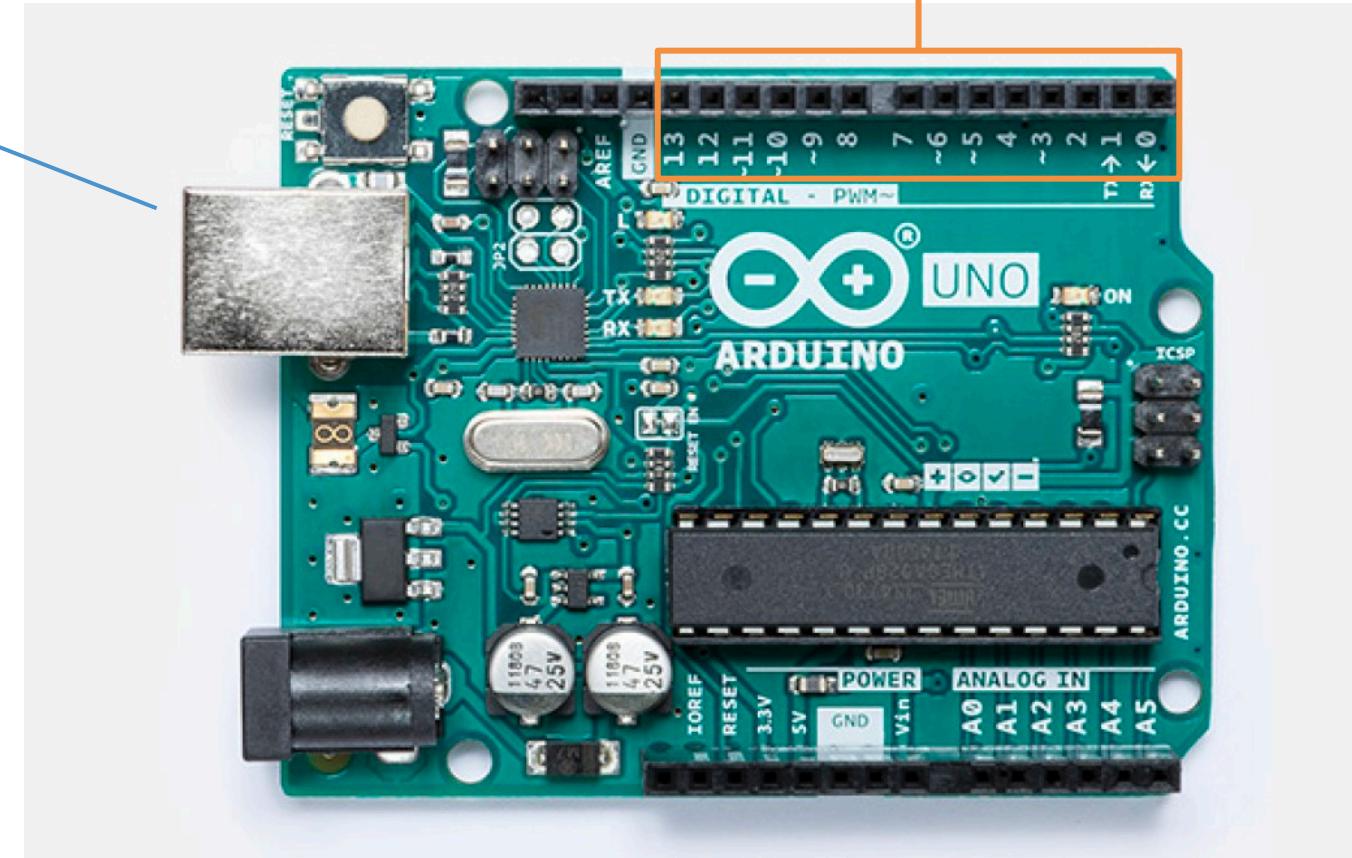


ARDUINO UNO WIFI REV2
(CONCEPTUALLY
SIMILAR TO UNO BUT WITH WIFI)

Arduino can read data from sensors, process the data and output data to actuators

USB

- power supply
- upload of programs



Digital In- and Output Pins

- 0 or 1

Some things Arduino can sense



Temperature



Light



Interaction
(buttons)



Interactions
(joystick)



Interactions
(potentiometer)



Proximity
(Range detector)

Some things Arduino can do



Turn on
light

Make
noise

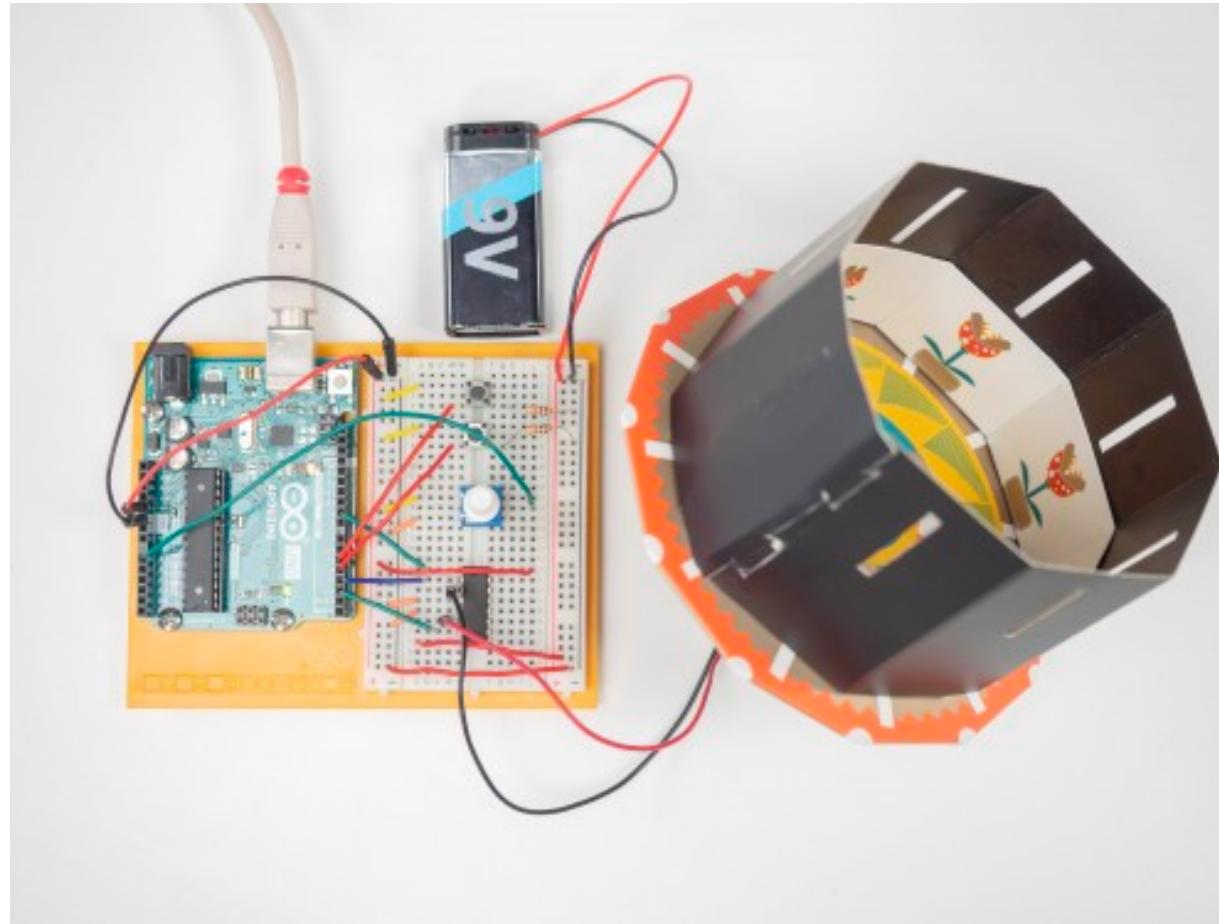
Display
text

Control
motor

Control
servo

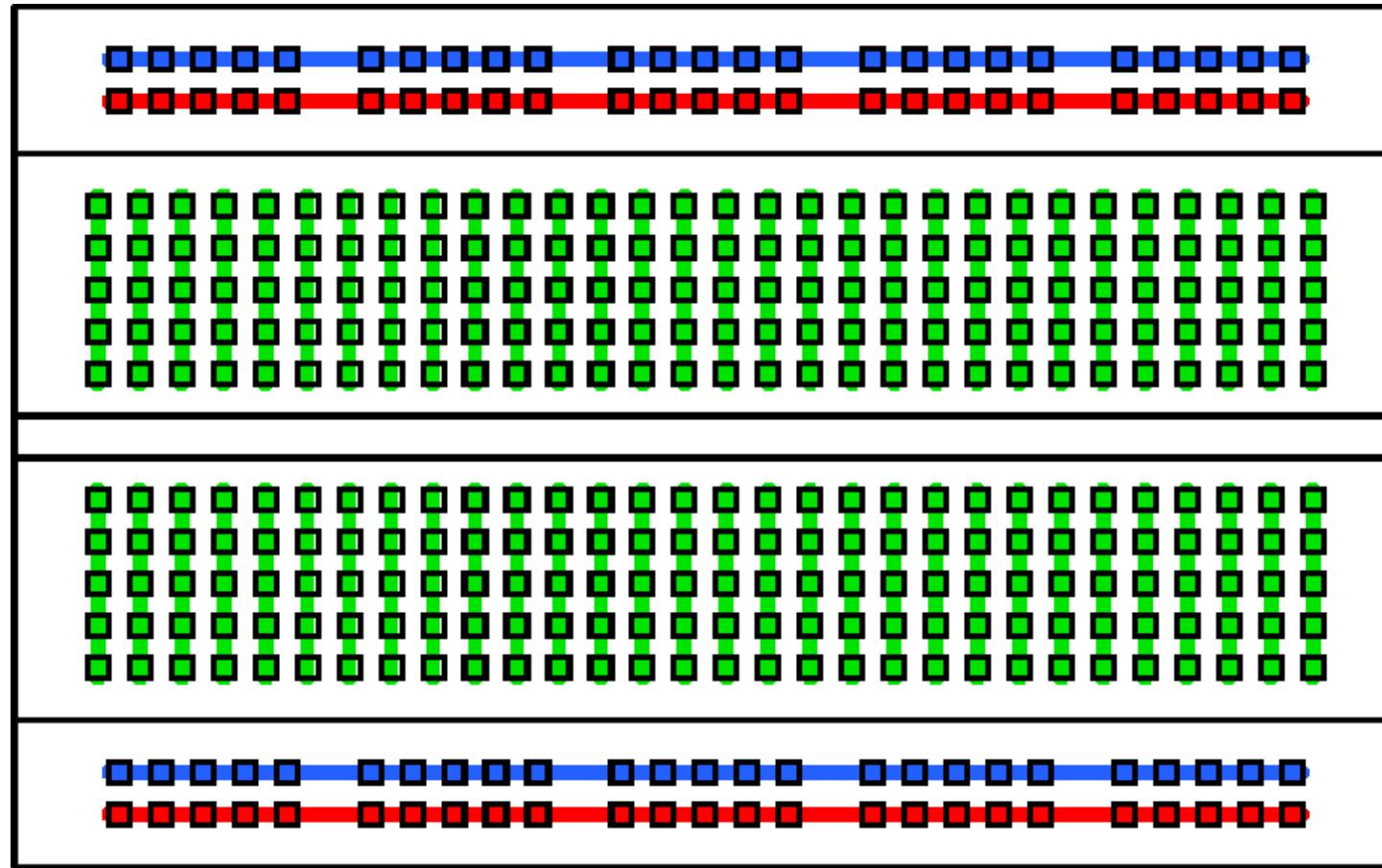
Display graphics
(Raspberry Pi
is better at this...)

Connecting sensors and actuators (i.e. creating circuits) is possible through a breadboard and jumper wires



Arduino and breadboard
Innovation Lab

Breadboard – How everything is connected

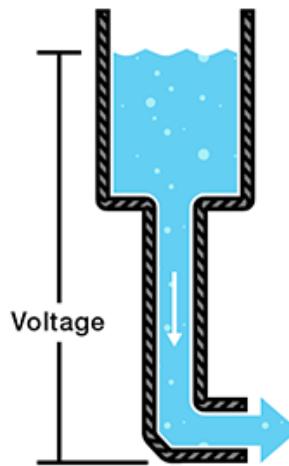


Source: <http://designbuildcode.weebly.com/breadboard-circuits.html>

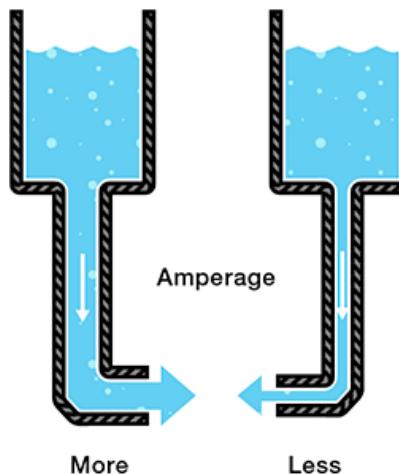
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Basics of electronic circuits

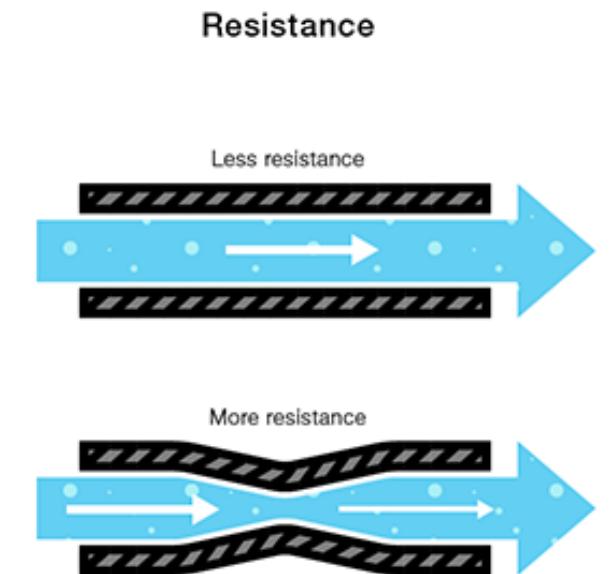
- **Voltage** is the difference in charge between two points.
- **Current** is the rate at which charge is flowing.
- **Resistance** is a material's tendency to resist the flow of charge (current)



Voltage (V) is the pressure
at the end of the hose



More current (I) is flowing
in wider hose

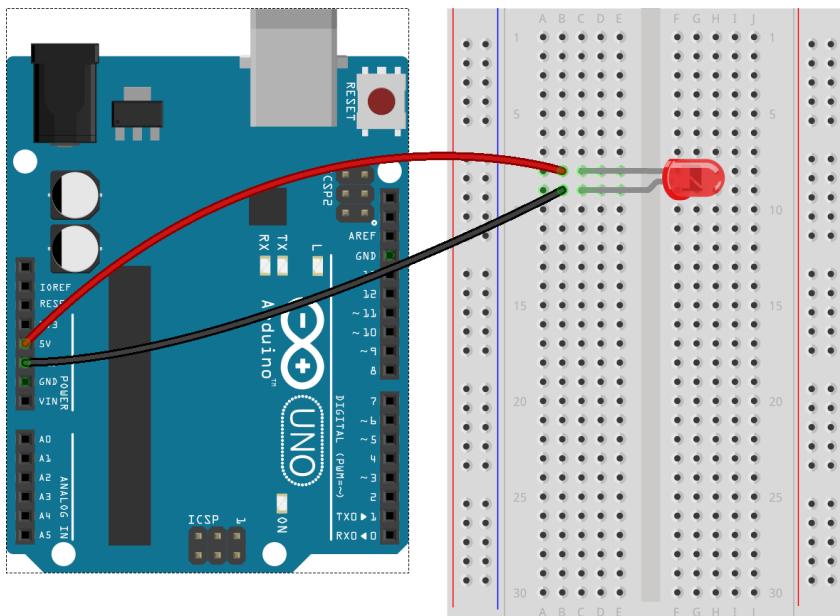


A resistor (R) limits the amount
of charge that can flow

Some components require a limitation of current through a resistor

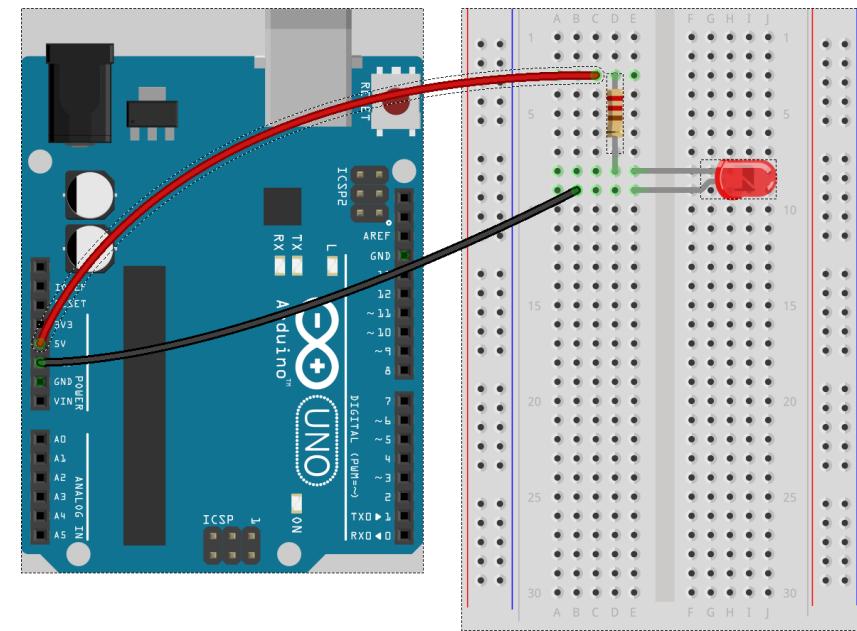


The current flows from the 5V pin to the GND pin



fritzing

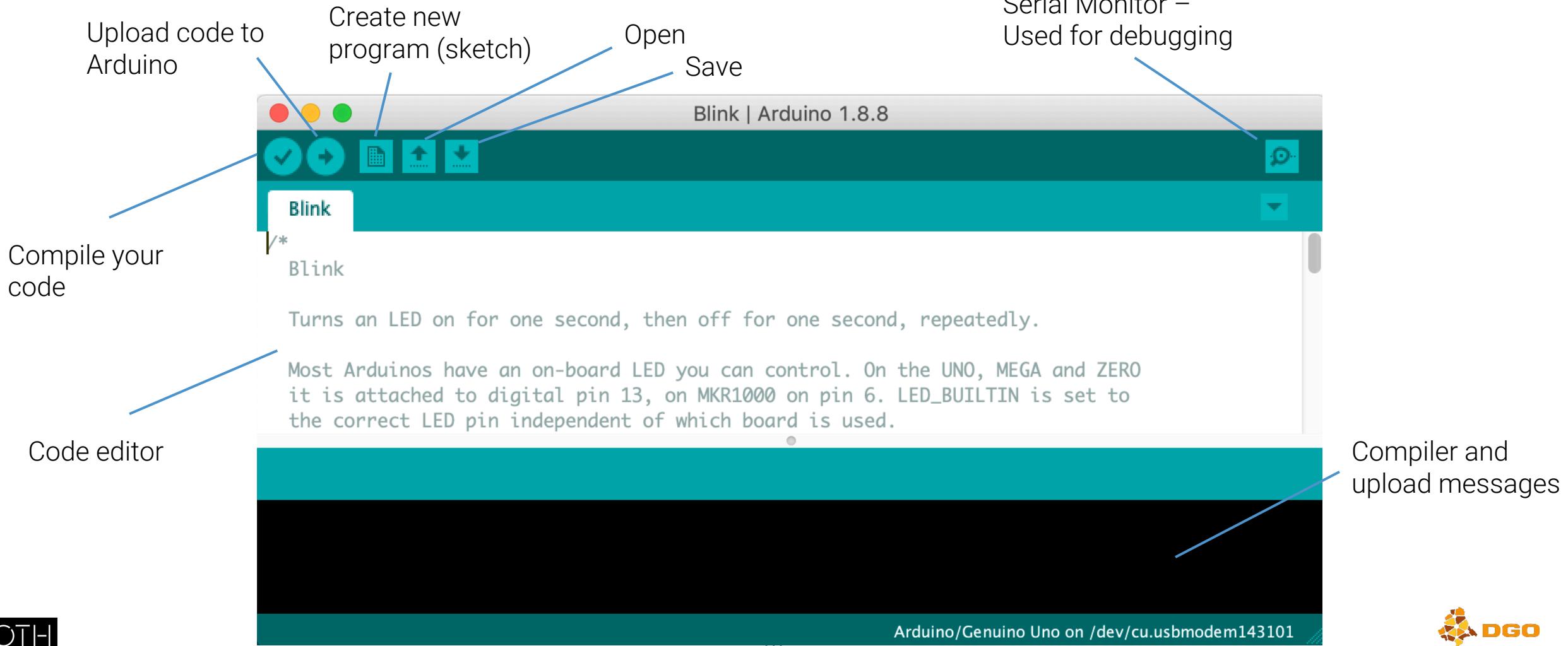
DO NOT TRY THIS
- It will fry your LED



fritzing

A resistor is needed to limit the amount of current that is flowing through the circuit

The Arduino IDE is a deliberately simple tool to create programs (sketches) for your microcontroller



How to code

Arduino

Legt eine Variable LED_PIN an – Variablen sind “Schachteln im Computer” in denen Werte abgespeichert werden, die man später wieder auslesen kann

```
int LED_PIN = 12;           Speichert den Wert 12 in der Variable LED_PIN  
                           (12 ist der PIN, an dem die LED angeschlossen ist)  
  
void setup() {  
    pinMode(LED_PIN, OUTPUT);  
}  
  
void loop() {  
    digitalWrite(LED_PIN, HIGH);  
    delay(1000);  
    digitalWrite(LED_PIN, LOW);  
    delay(1000);  
}
```

How to code Arduino

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}  
  
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    delay(1000);  
    digitalWrite(LED_PIN, LOW);  
    delay(1000);  
}
```

Setup ist eine Funktion, d.h. eine Anweisung, die der Computer ausführen kann – Funktionen können weitere Funktionen enthalten

pinMode ist eine weitere Funktion – Hier wird für den PIN 12, der Wert OUTPUT gesetzt, d.h. PIN 12 wird am Arduino in diesem Programm für die Ausgabe verwendet...

How to code Arduino

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}
```

Loop wird von Arduino laufend aufgerufen, d.h. alle Funktionen innerhalb von loop werden aufgerufen, dann geht es wieder von vorne los...

„Schaltet PIN 12 ein“ – LED leuchtet

Wartet eine Sekunde

Schaltet LED aus

Wartet eine Sekunde