

# Exit Coding Game

## How to code

Basics zu Arduino  
und Programmierung



**How to code**

**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)



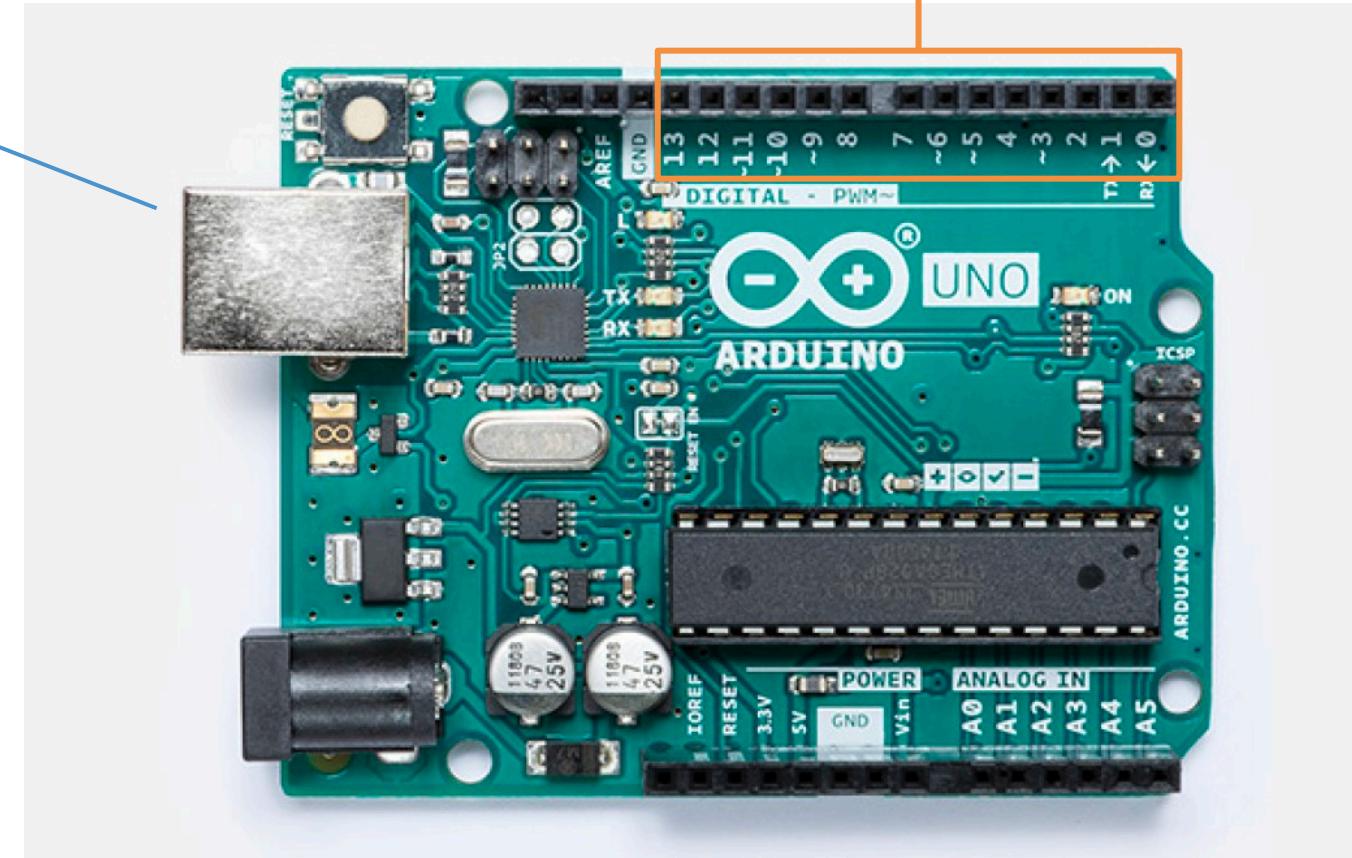
ARDUINO UNO WIFI REV2  
(CONCEPTUALLY  
SIMILAR TO UNO BUT WITH WIFI)

## How to code

**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

How to code

# Some things Arduino can sense



Temperature



Light



Interaction  
(buttons)



Interactions  
(joystick)



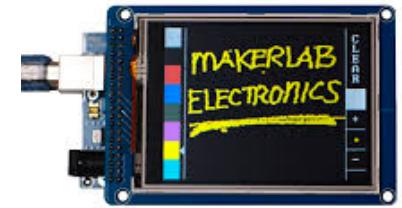
Interactions  
(potentiometer)



Proximity  
(Range detector)

How to code

# Some things Arduino can do



Turn on  
light

Make  
noise

Display  
text

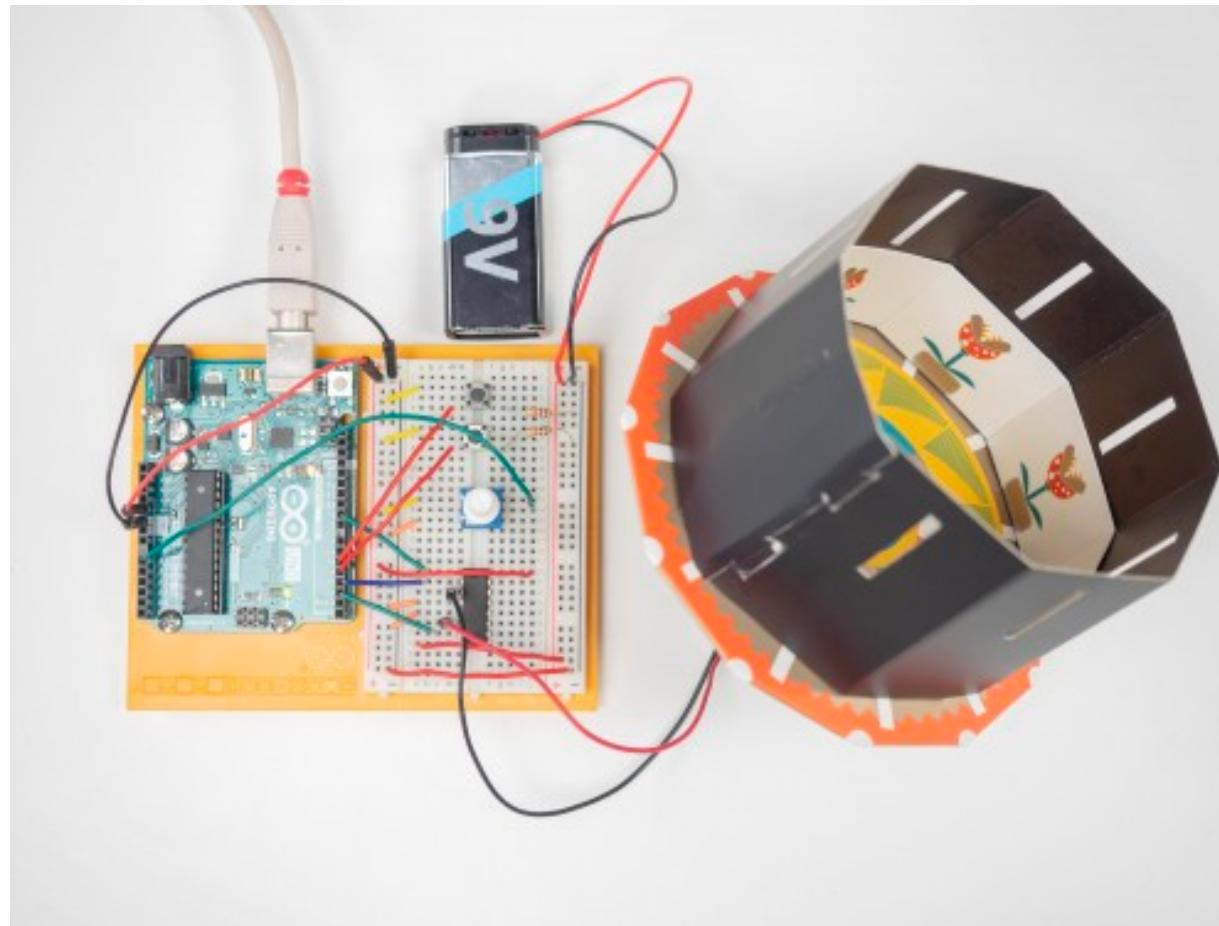
Control  
motor

Control  
servo

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

## How to code

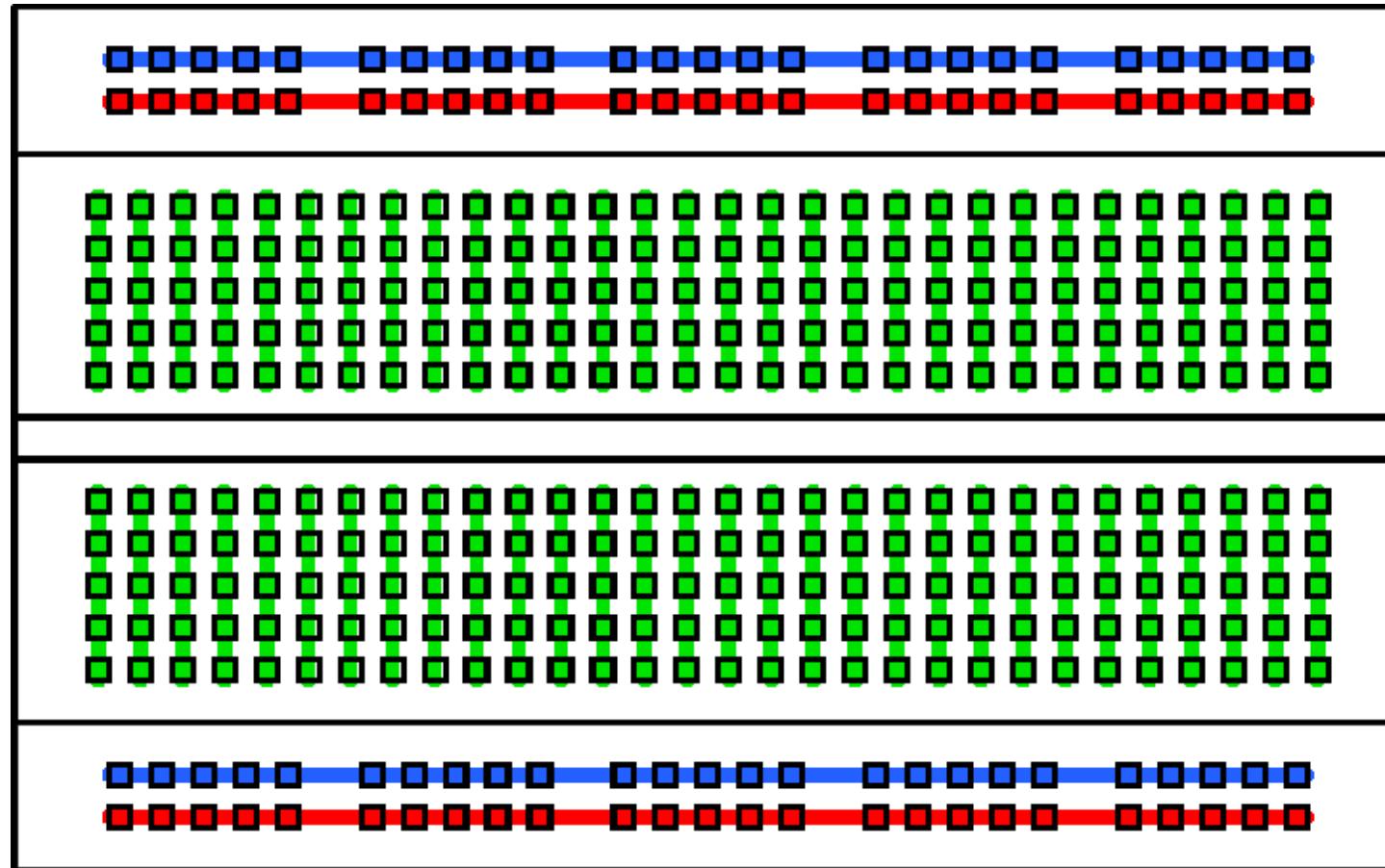
**Connecting sensors and actuators (i.e. creating circuits) is possible through a breadboard and jumper wires**



Arduino and breadboard

How to code

# Breadboard – How everything is connected

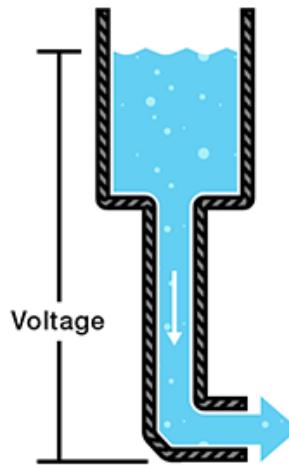


Source: <http://designbuildcode.weebly.com/breadboard-circuits.html>

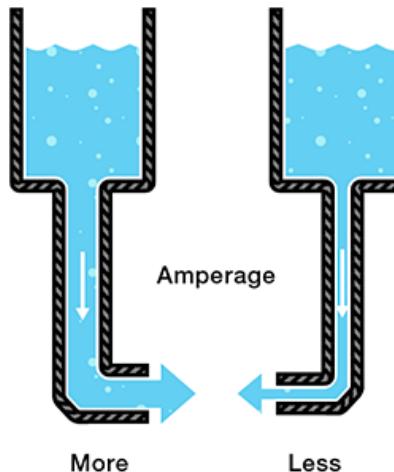
## How to code

# Basics of electronic circuits

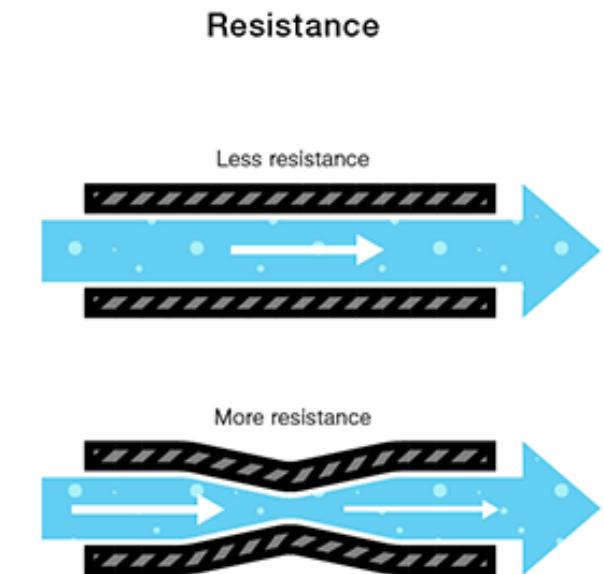
- **Voltage** is the difference in charge between two points.
- **Current** is the rate at which charge is flowing.
- **Resistance** is a material's tendency to resist the flow of charge (current)



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



More current (I) is flowing  
in wider hose

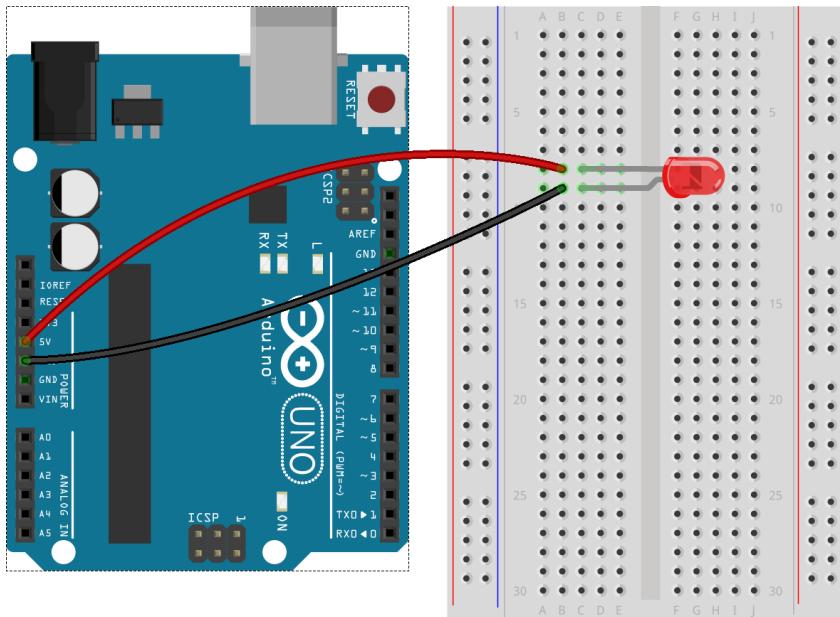


A resistor (R) limits the amount  
of charge that can flow

# How to code Some components require a limitation of current through a resistor

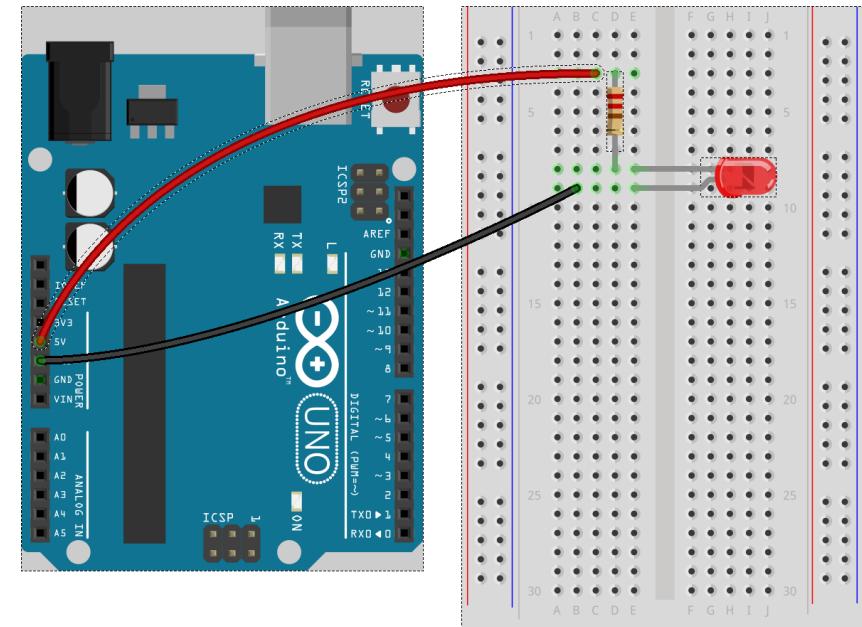


The current flows from the 5V pin to the GND pin



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

## How to code

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

Upload code to  
Arduino

Open

Save

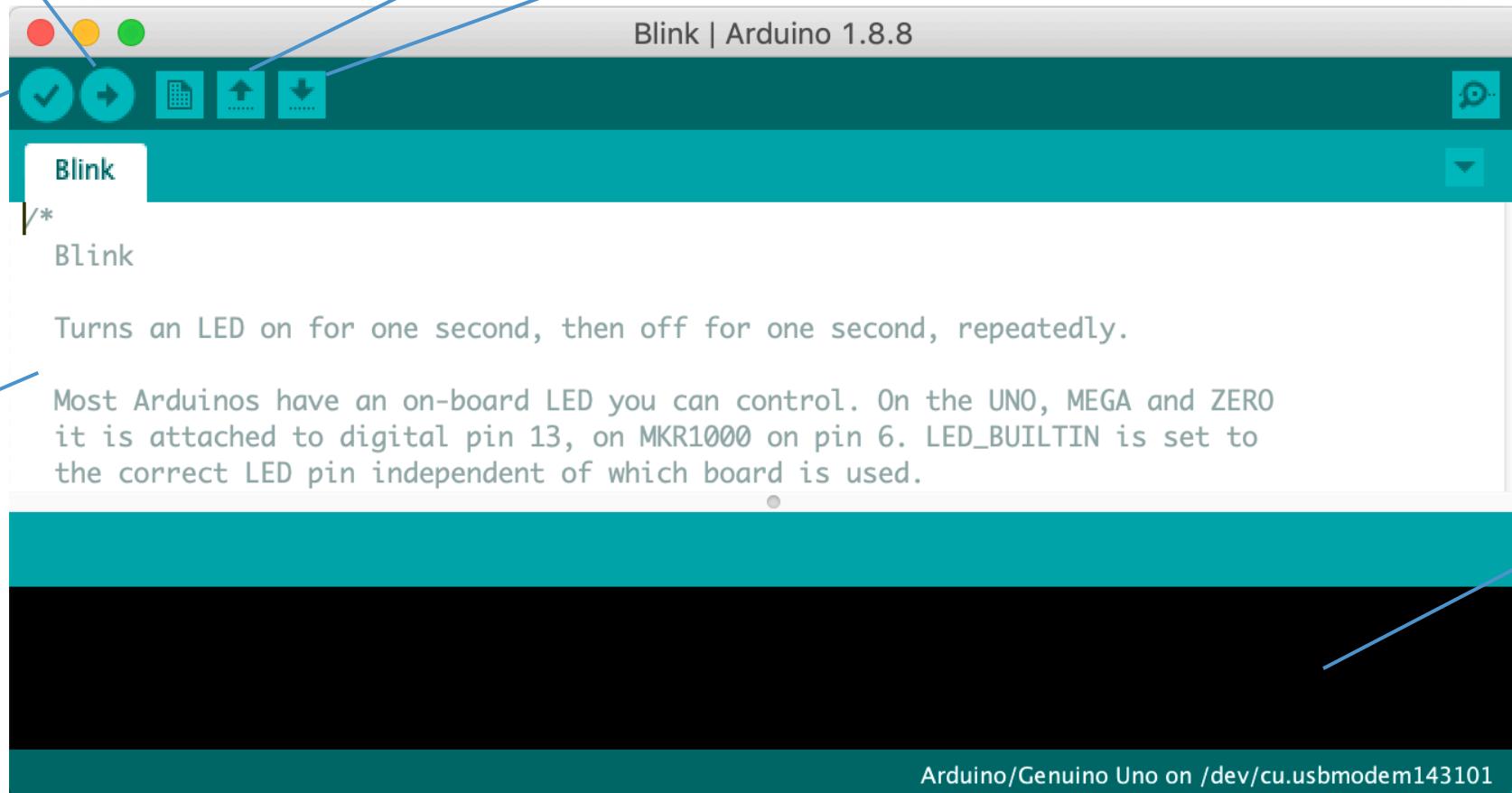
Compile your  
code

Turns an LED on for one second, then off for one second, repeatedly.

Code editor

Most Arduinos have an on-board LED you can control. On the UNO, MEGA and ZERO it is attached to digital pin 13, on MKR1000 on pin 6. LED\_BUILTIN is set to the correct LED pin independent of which board is used.

Compiler and  
upload messages

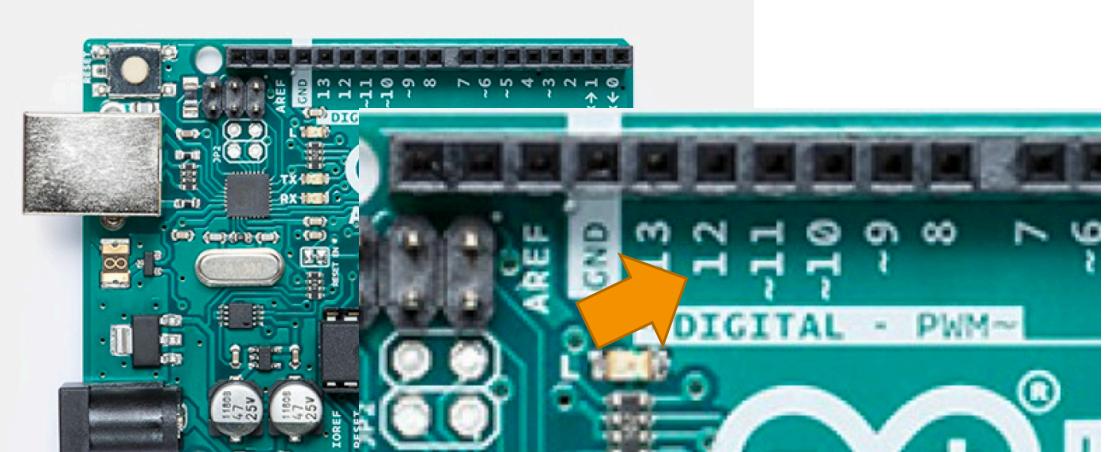


# How to code Arduino

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;  
  
void setup() {  
    pinMode(LED_PIN, OUTPUT);  
}  
  
void loop() {  
    digitalWrite(LED_PIN, HIGH);  
    delay(1000);  
    digitalWrite(LED_PIN, LOW);  
    delay(1000);  
}
```

Speichert den Wert 12 in der Variable LED\_PIN  
(12 ist der PIN, an dem die LED angeschlossen ist)



# How to code Arduino

```
int LED_PIN = 12;  
  
void setup() {  
    pinMode(LED_PIN, OUTPUT);  
}  
  
void loop() {  
    digitalWrite(LED_PIN, HIGH);  
    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 (Aktor) verwendet...

# How to code Arduino

```
int LED_PIN = 12;

void setup() {
    pinMode(LED_PIN, OUTPUT);
}

void loop() {
    digitalWrite(LED_PIN, HIGH);
    delay(1000); 
    digitalWrite(LED_PIN, LOW);
    delay(1000);
}
```

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 (PIN, d.h. LED bleibt „an“)

Schaltet LED aus

Wartet eine Sekunde (PIN, d.h. LED bleibt „aus“)

## How to code

**Los gehts... Öffnen Sie jetzt den Umschlag  
*Infomaterial***