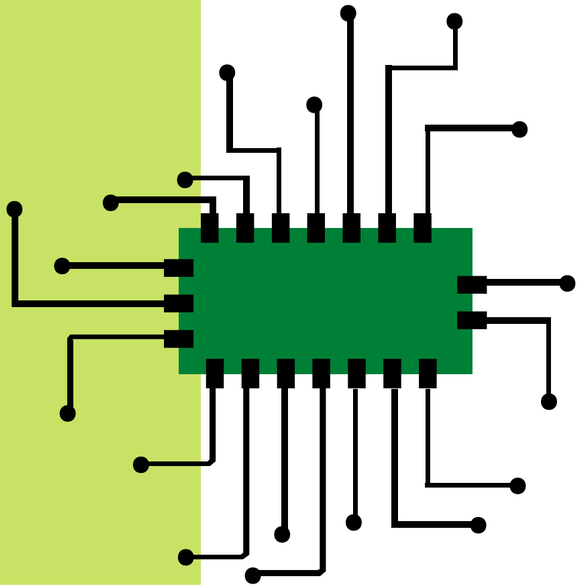
ROBOTICS & AUTOMATION

PERSONALLY, I'M NOT AFRAID OF A ROBOT UPRISING.

THE BENEFITS FAR OUTWEIGH THE THREATS

From the thought to the circuit

THE PROBLEM, THE RECOGNITION & THE SOLUTION



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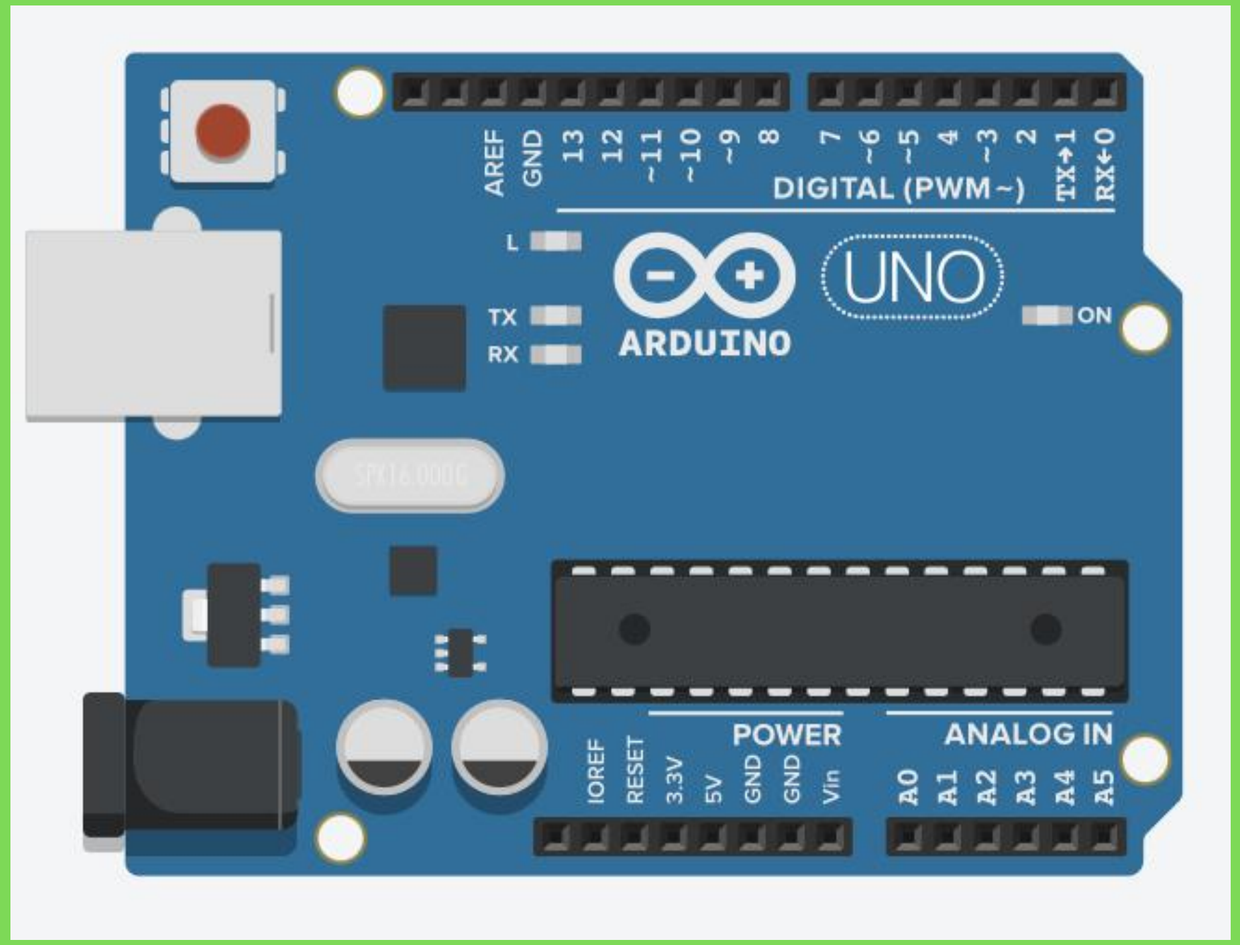
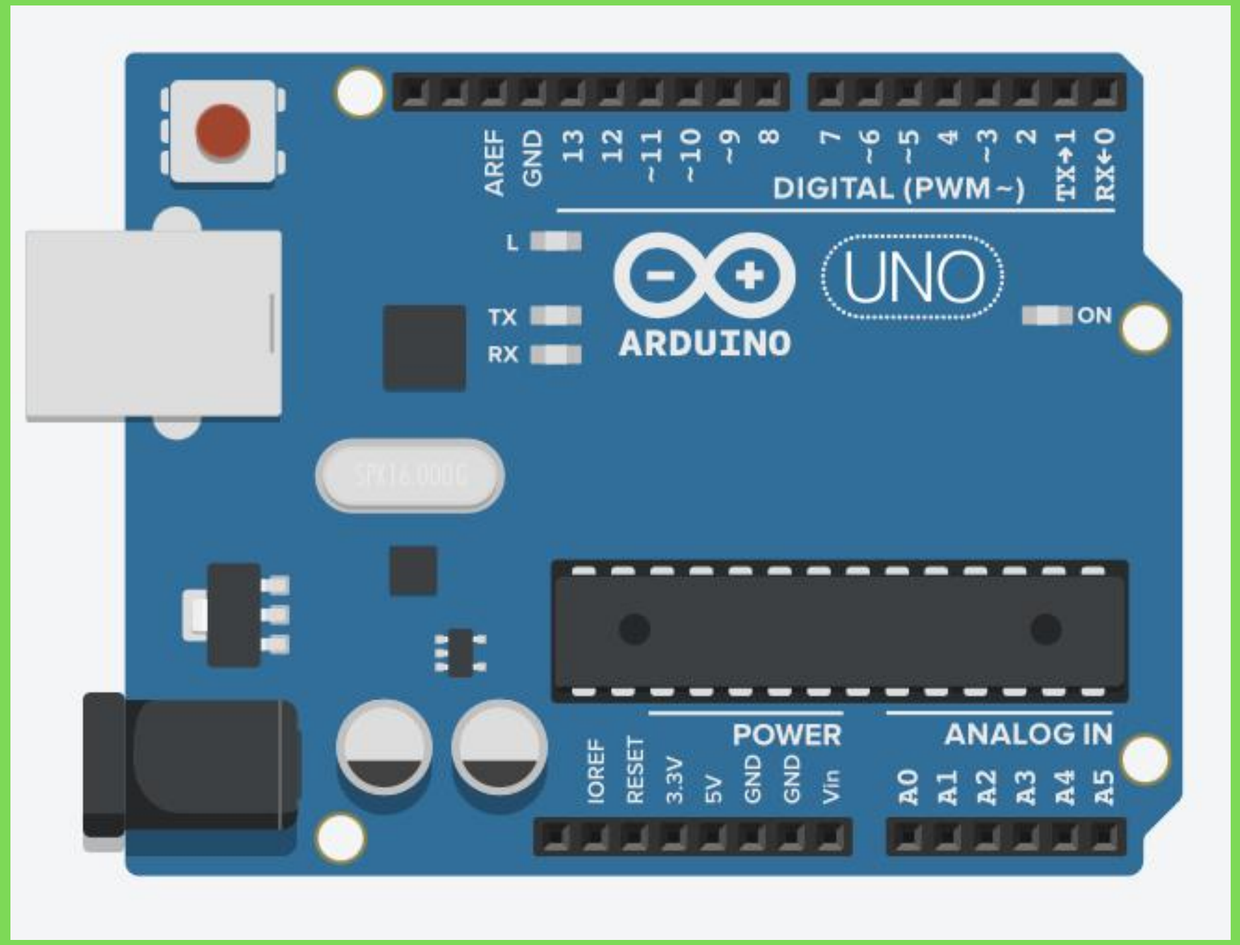
What is an Arduino?



What is an Arduino?

The Arduino is a pocket computer or **microcontroller**, which is programmed and used to control circuits.

It interacts with the external world via **sensors**, LEDS , motors, speakers, and even the internet.



Human

Inputs

Outputs

Eyes

Stimulus & Motion

Ears / Nose

Sneezing

Skin / Limbs

Motion

Human

Inputs

Outputs

Eyes

Stimulus &
Motion

Ears / Nose

Sneezing

Processing

Skin / Limbs

Motion

Arduino Board

Inputs

Outputs

Light sensors

Temperature sensor

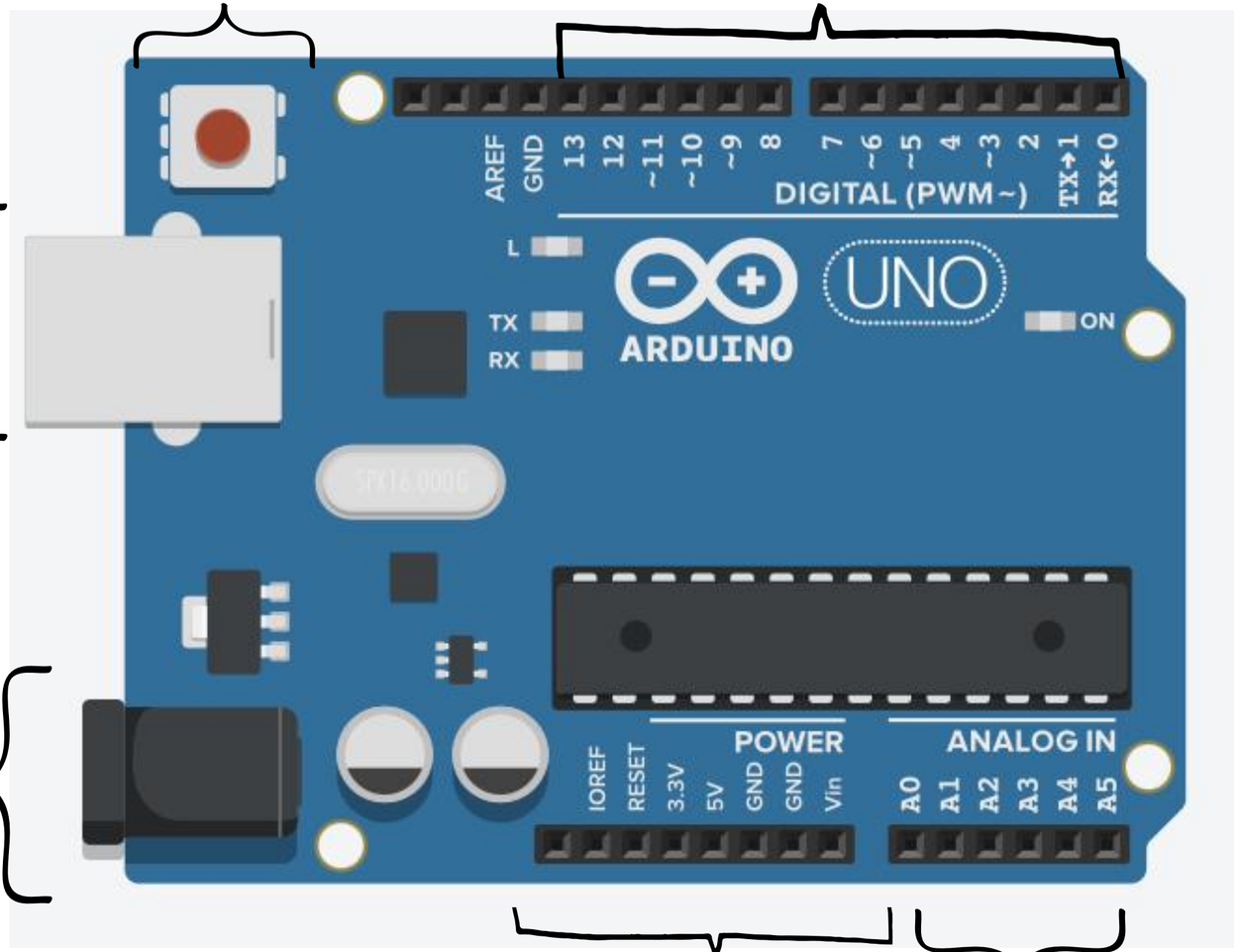
Heart rate sensors

LEDS activation

Servo motor activation

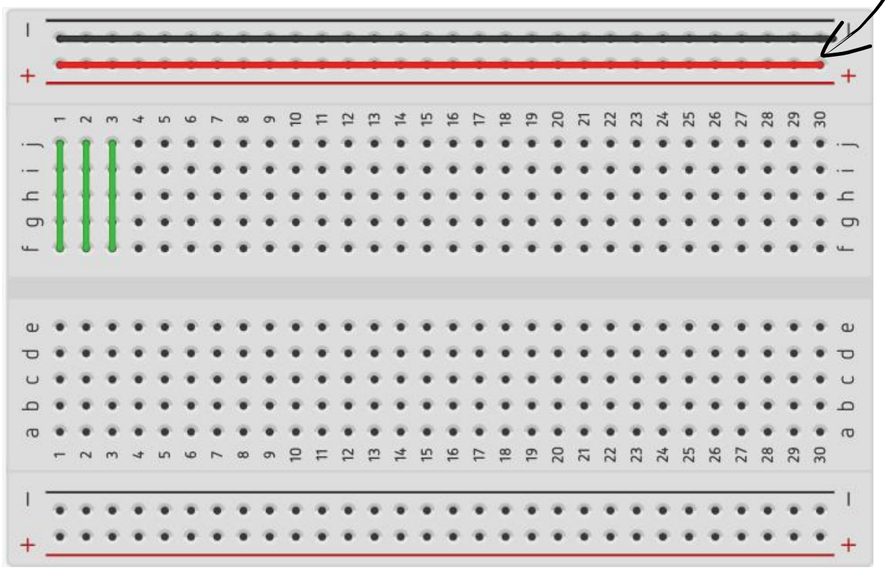
Activating buzzer

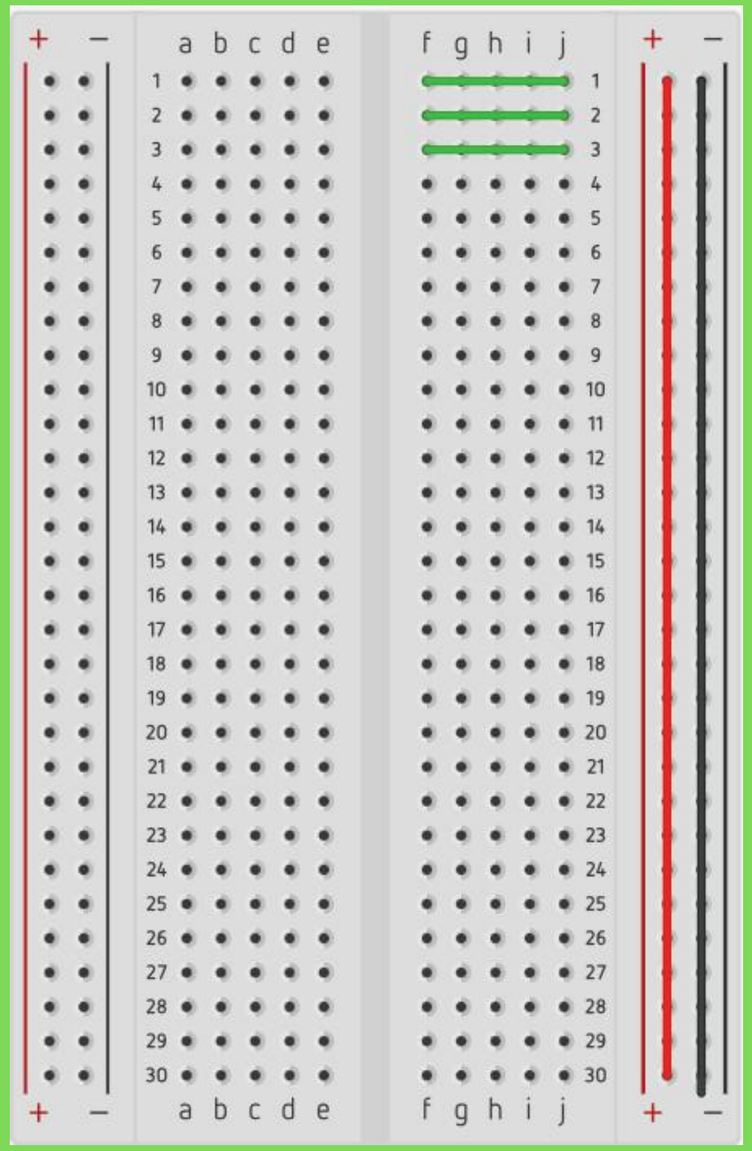
THE BOARD


Reset
Digital I/O
PWM(3,5,6,9,10,11)
USB(to computer)
Power In
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
DIGITAL (PWM~)
L
TX
RX
ARDUINO
UNO
ON
POWER
ANALOG IN
IOREF
RESET
3.3V
5V
GND
GND
Vin
A0
A1
A2
A3
A4
A5
POWER
(5V,3.3V,GND)
Analog
Inputs

Breadboard

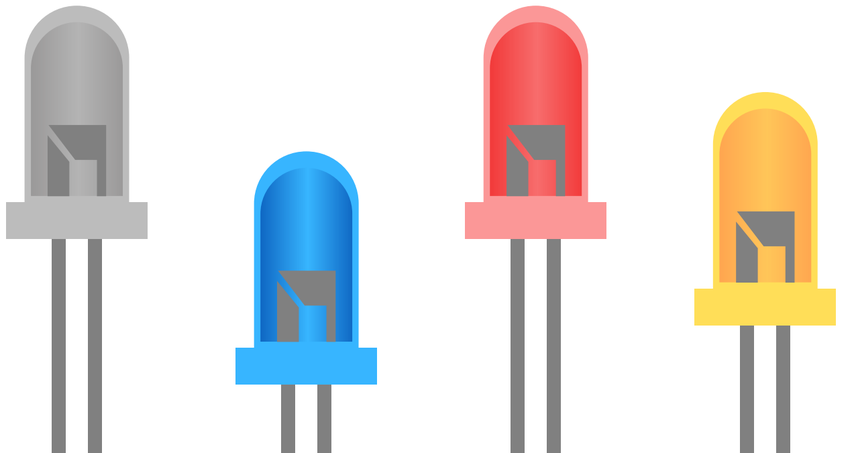
- the base of the circuit
- shorted 5s
- short-circuited V/GND columns

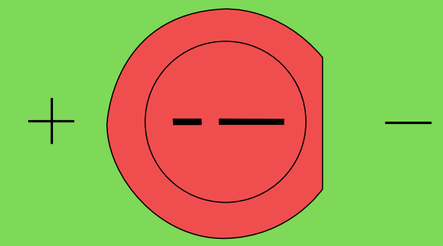




LED-Light Emission Diode

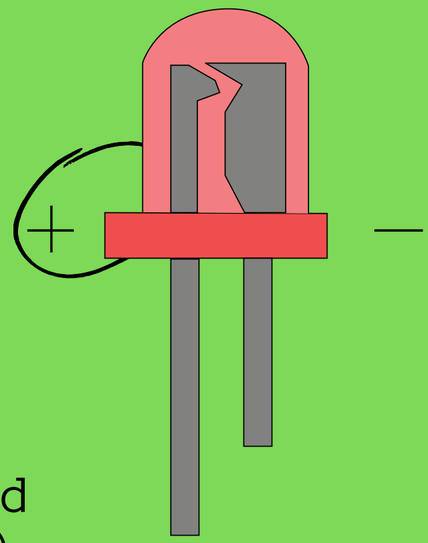
- the classic LED
- attention to the current flow
- many colors





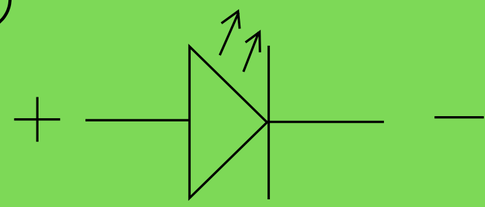
Rounded Side
(positive)

Flat Side
(negative)



Longer Lead
(positive)

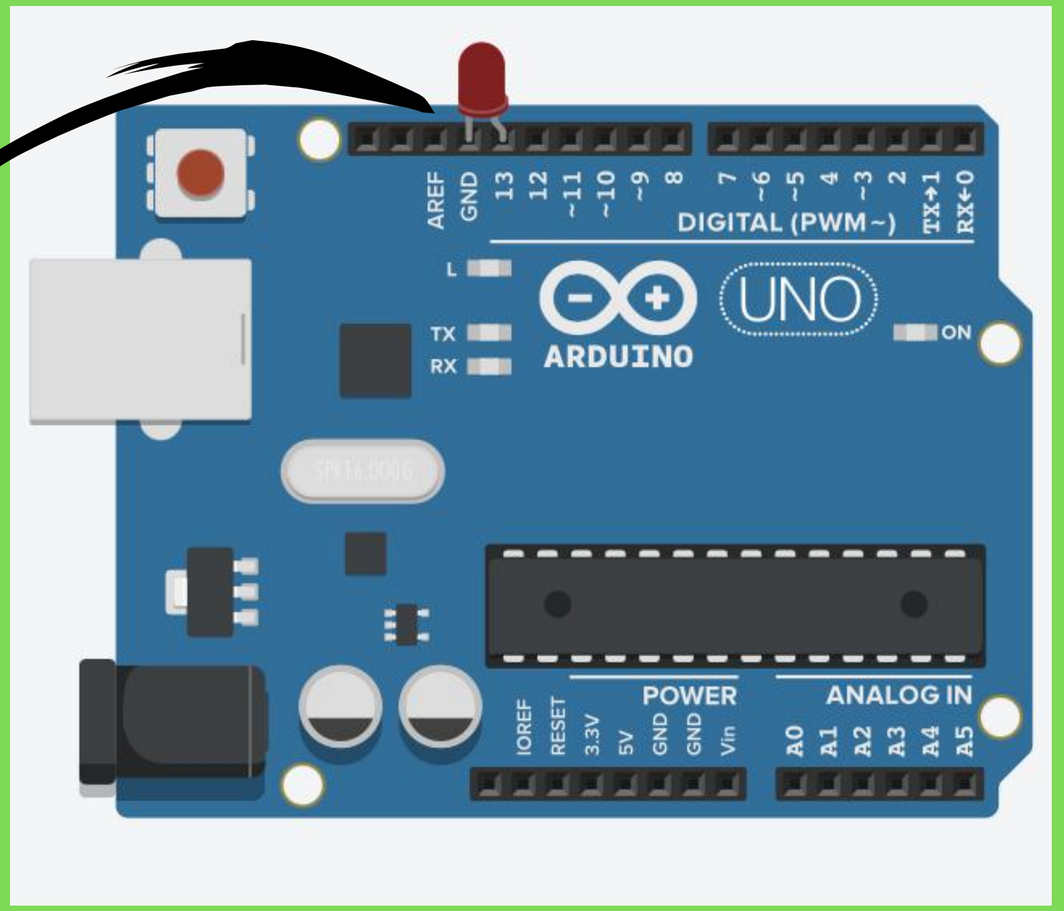
Shorter Lead
(negative)



LED-Light Emission Diode

GND <-- negative leg

Voltage <-- positive leg

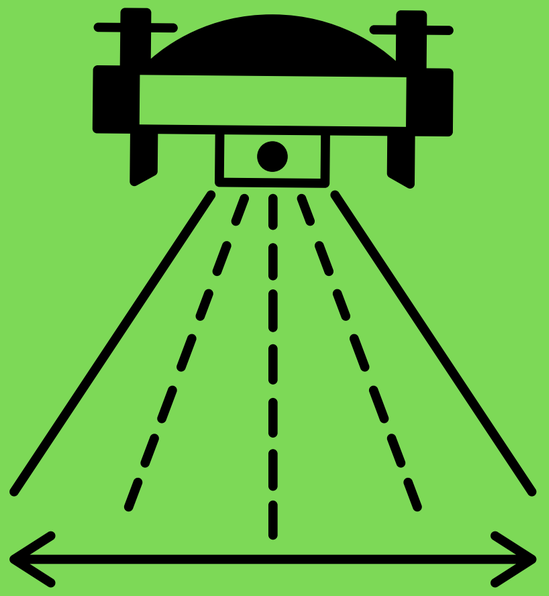


Sensors

It is a device that detects a physical quantity and converts it into an **electrical signal**.

For example:

A light sensor converts the light it receives into voltage or resistance



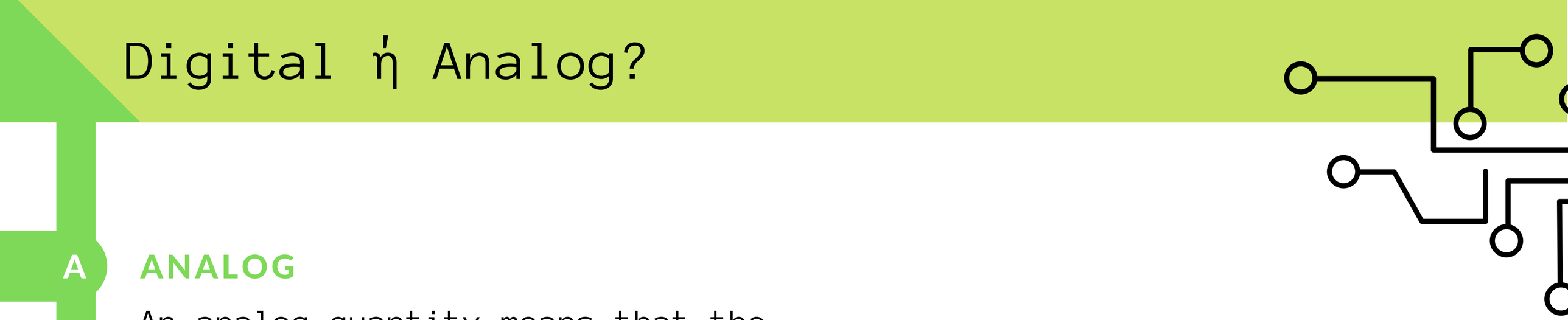
Digital ή Analog?

A ANALOG

An analog quantity means that the quantity can take any value between its maximum and minimum value (**range**).

D DIGITAL

Digital quantity means that the quantity takes specific levels of values with a **specific offset** between them.



?

What quantity is the **temperature**?

+1000xp

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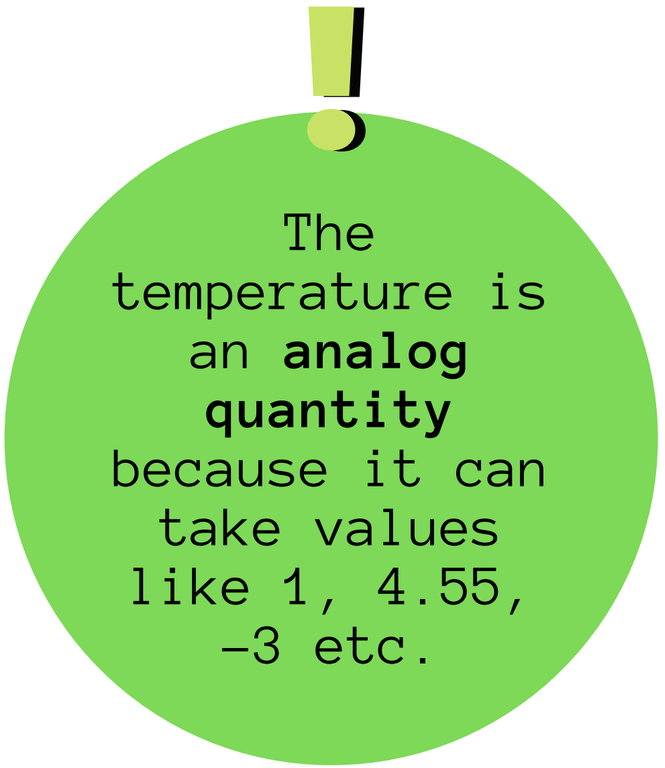


Circuit analogs

How can we understand what is happening in a circuit?

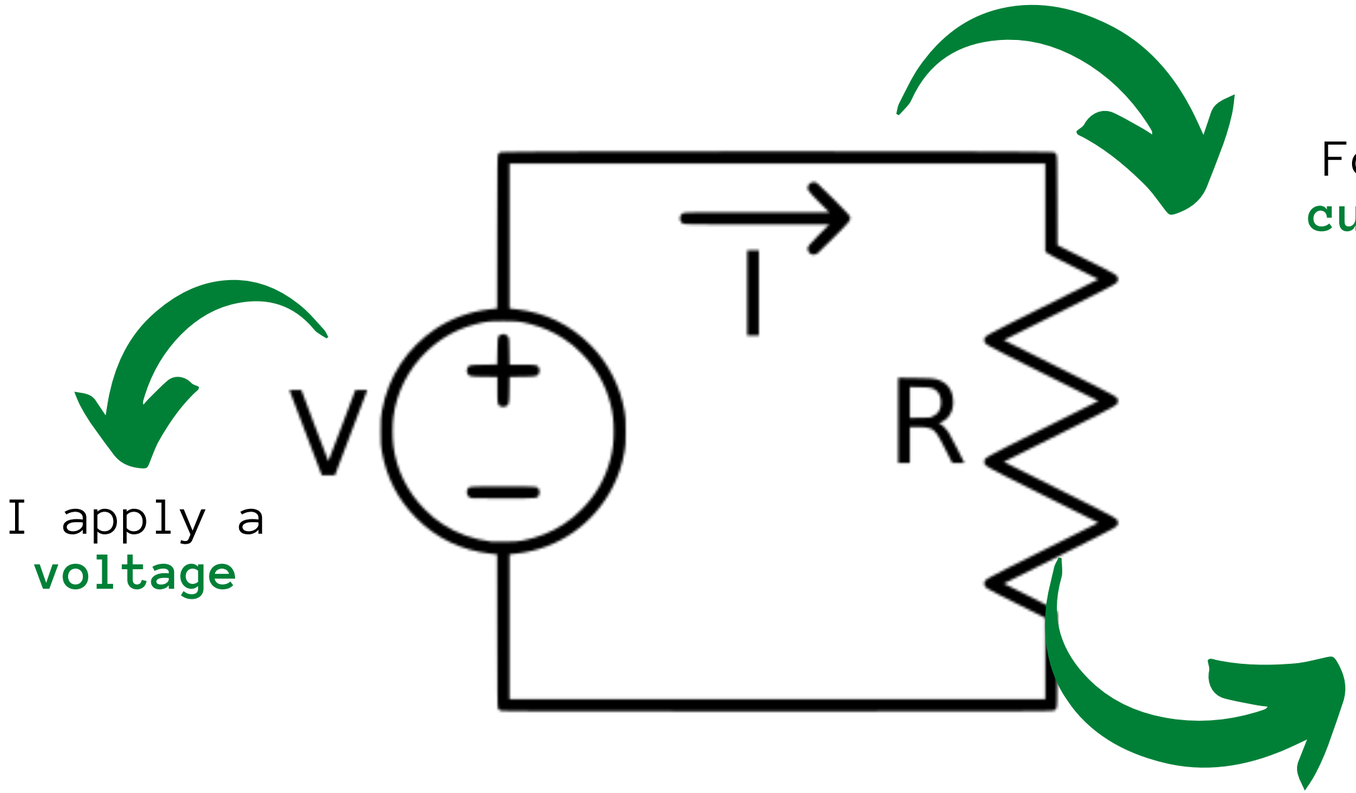
What are the **basic quantities** in electricity and how are they related to each other?

+1000xp

How do we use them?

Circuit analogs

How can we understand what is happening in a circuit?

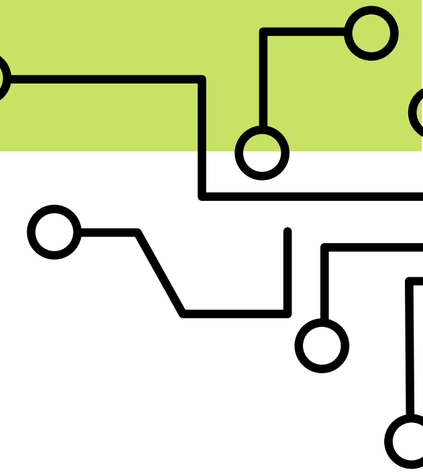


I apply a **voltage**

Force the **current** to move

The movement of the current depends on the **resistance**

Circuit analogs



What are the **basic quantities** in electricity and how are they related to each other?

+1000xp

Circuit analogs

What are the **basic quantities** in electricity and how are they related to each other?

Resistance R [Ohm]

Amperage I [Ampere - Amp]

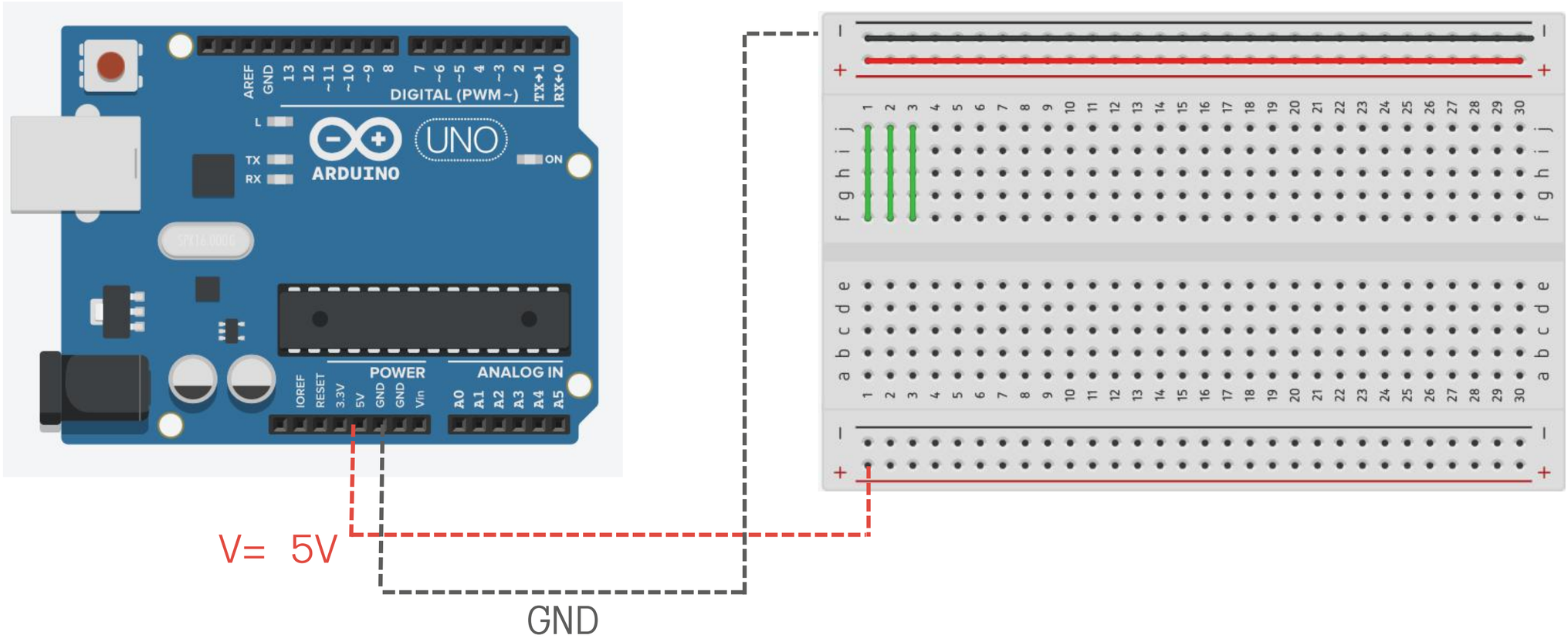
Voltage V [Volts]

OHM'S LAW $V = I*R$

The intensity of the current flowing through a circuit is proportional to the applied voltage and inversely proportional to the resistance of the circuit

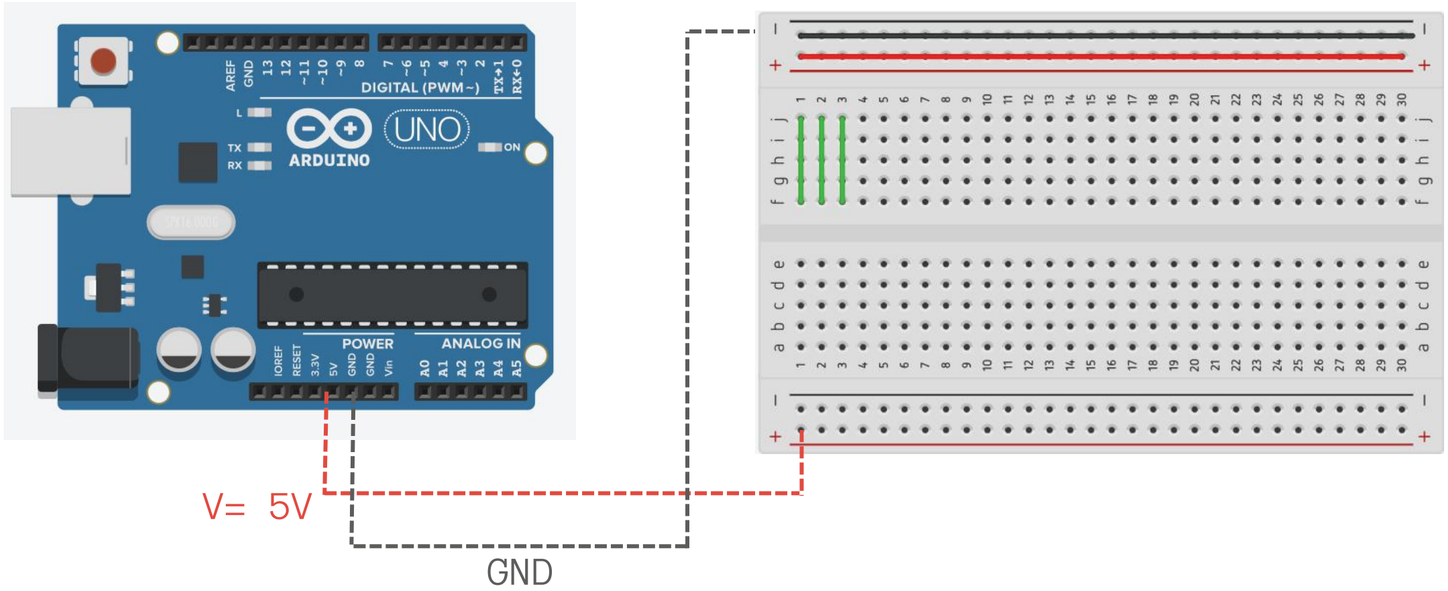
Circuit analogs

How do we use them?



Circuit analogs

How do we use them?



What is the **earthing**?

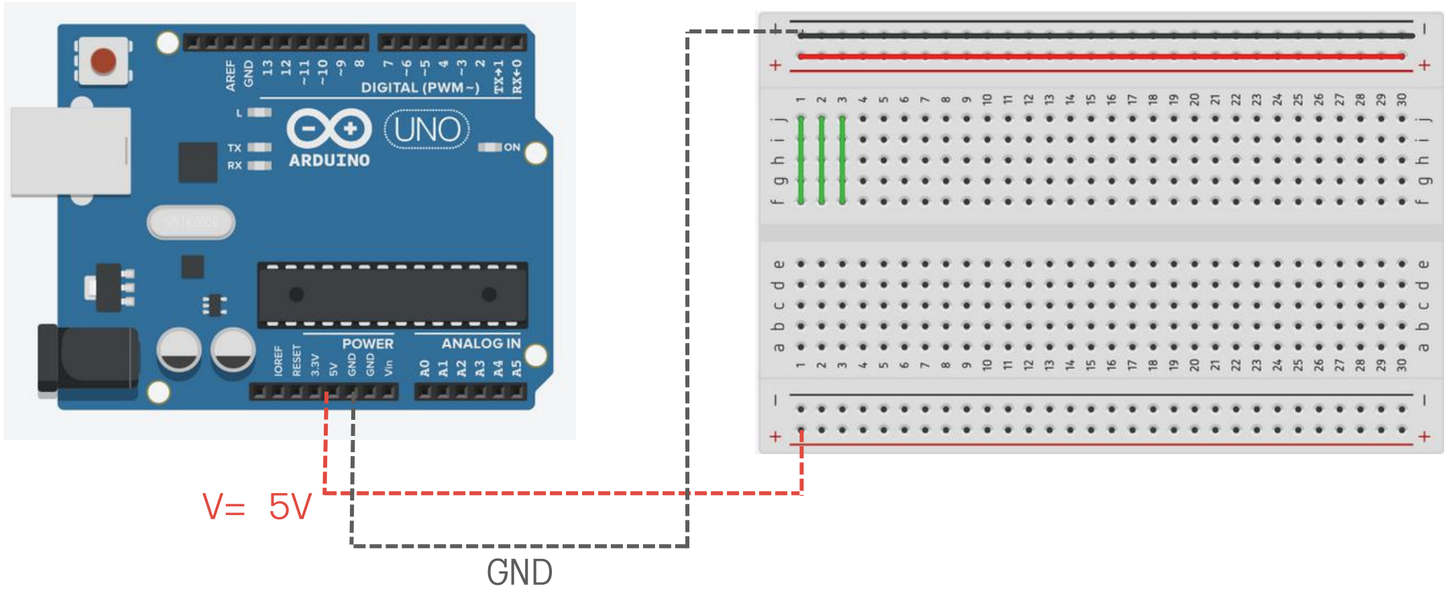
+1000xp

Why do we connect them there?

+1000xp

Circuit analogs

How do we use them?



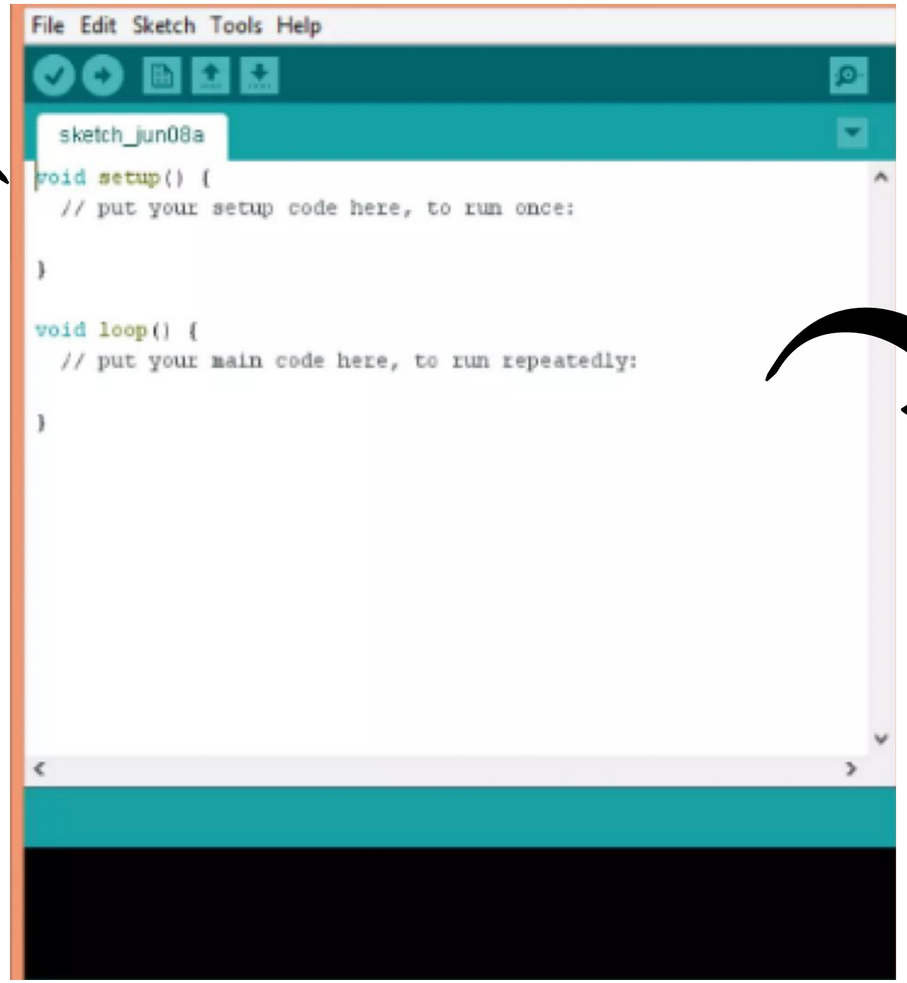
Earthing is the conductive connection of an electrical circuit terminal to ground or another object of zero potential.

Vg=0 V

Components & modules for an Arduino

FROM PIECES TO CIRCUIT

ARDUINO SOFTWARE

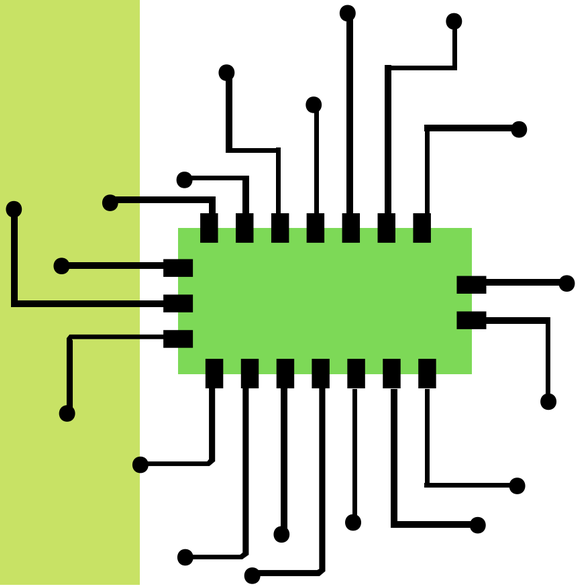



```
void setup(){
 //put your setup code
   here, to run once:
          ...}
```

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

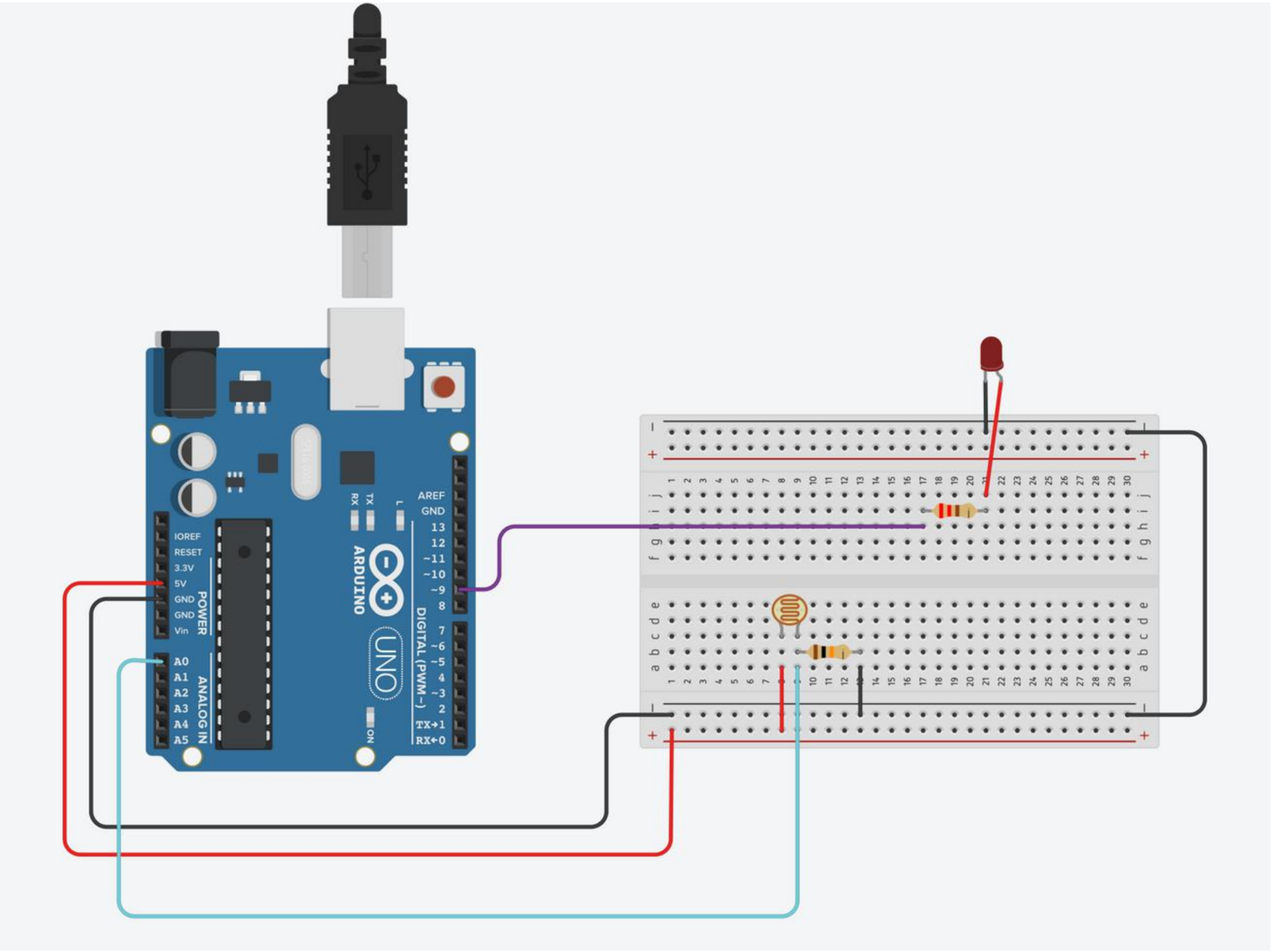
Circuits

WHAT CAN WE MAKE TODAY



THE CIRCUIT

LDR SENSOR



QUESTIONS

SCIENTIX
The community for science education in Europe
cisco
STE(A)M PARTNERSHIPS
Education Resilience in Europe
European Schoolnet
SCIENTIX