



**ERASMUS+ PROJECT**  
**Innovative Information Technologies in the Modern**  
**VET School**  
2020-1-RS01-KA202-065381

# Arduino

## The components and notions necessary to perform an experiment

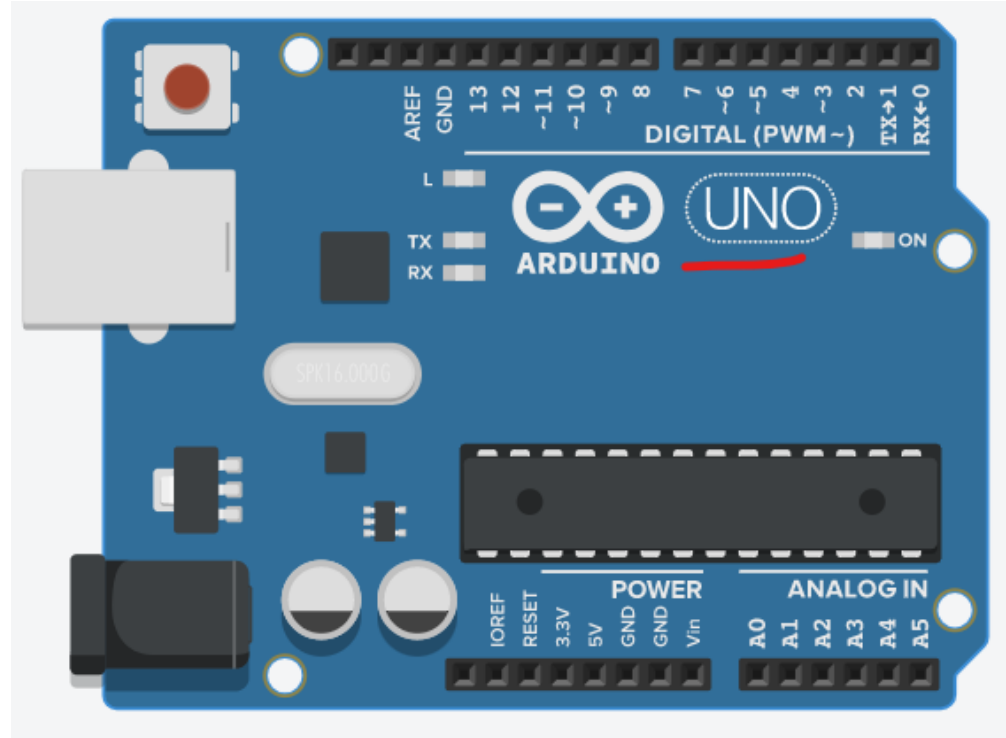
# Contents just

In this presentation we will review all the components and notions necessary to carry out the challenge.

We shall just use the kit components.

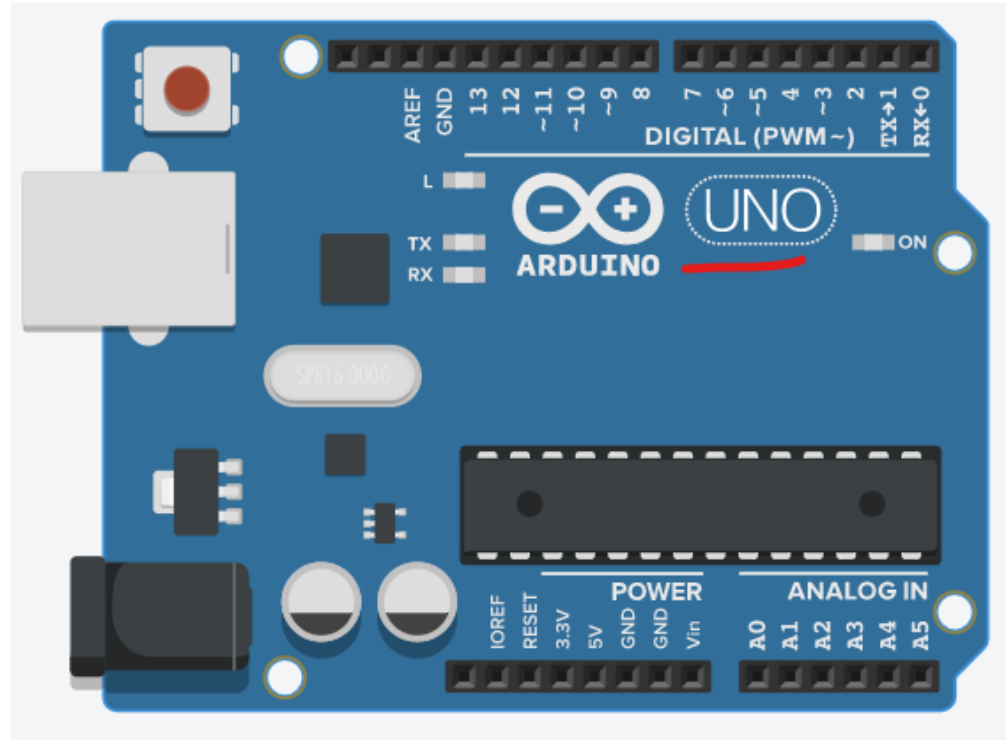
# Contents

We obviously need an Arduino UNO R3 board



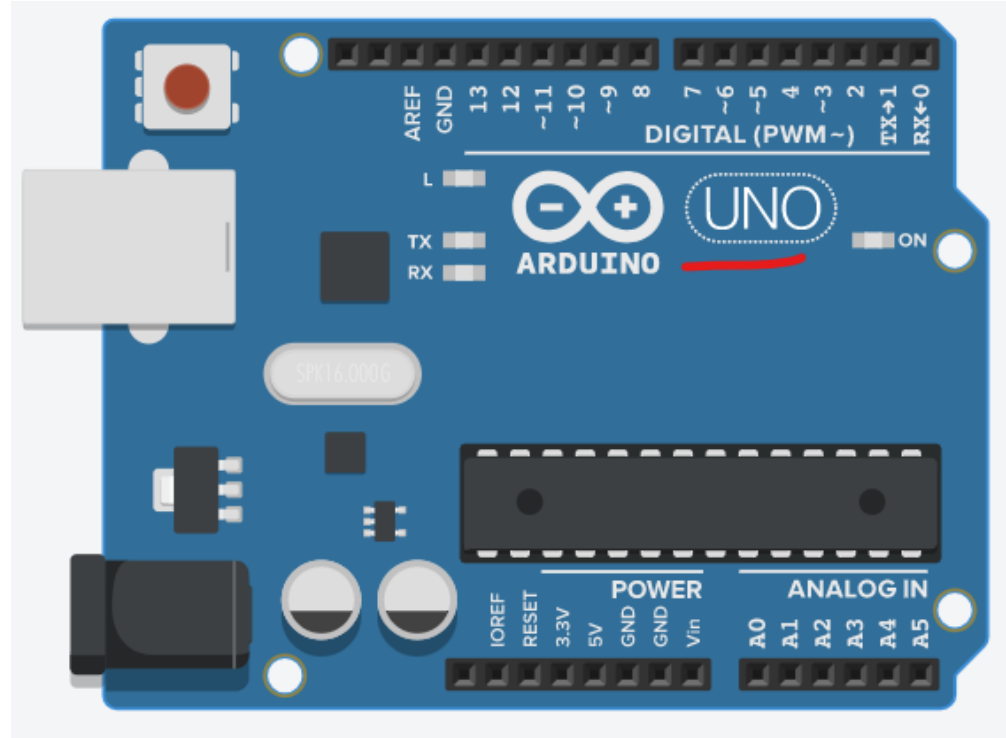
# Contents

In the examples we will use both digital Inputs/Outputs and analog Inputs/Outputs.



# Contents

We need to install additional libraries



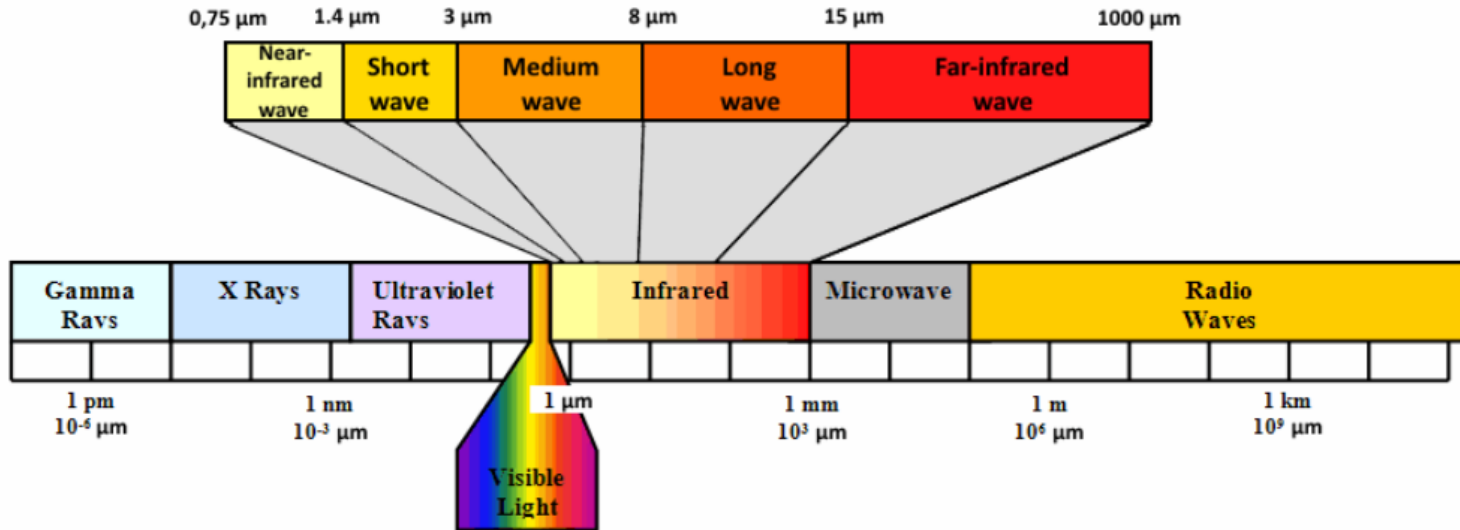
# A little bit of Physics

## Infrared Radiation

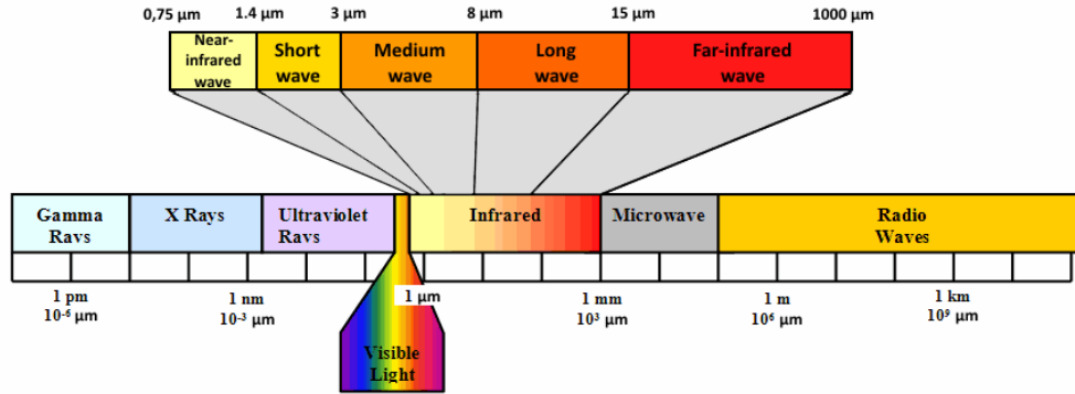
In our experiments we will use an infrared remote controller and receiver

# A little bit of Physics

## Visible light spectrum range



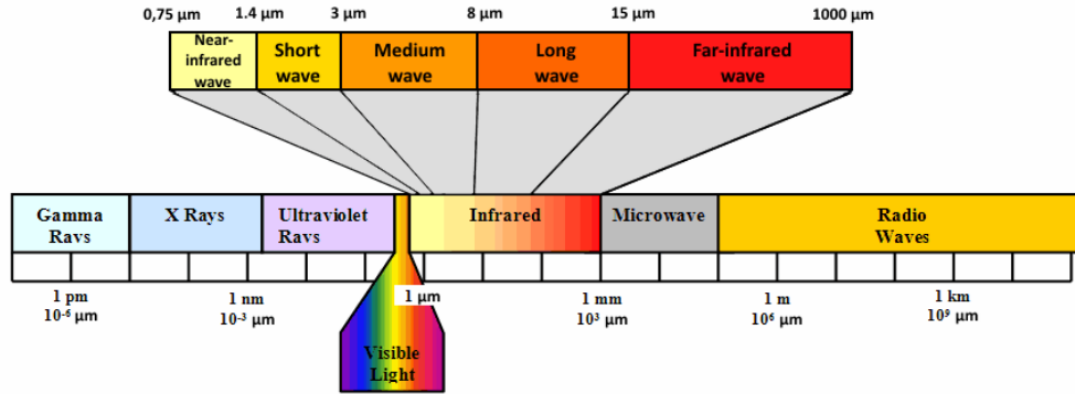
# A little bit of Physics



As you can see, at the two extremes of visible light there are ultraviolet and infrared rays.



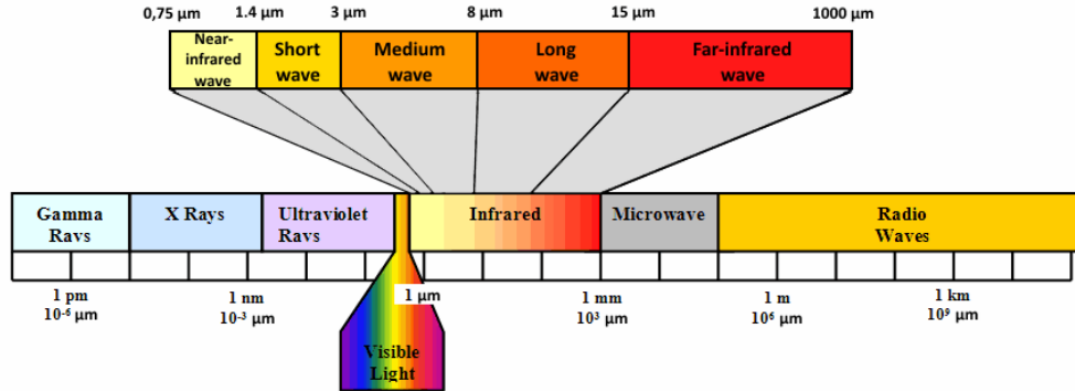
# A little bit of Physics



The physical variable shown in the graph is called wavelength.

It is measured, like every length, in meters.

# A little bit of Physics



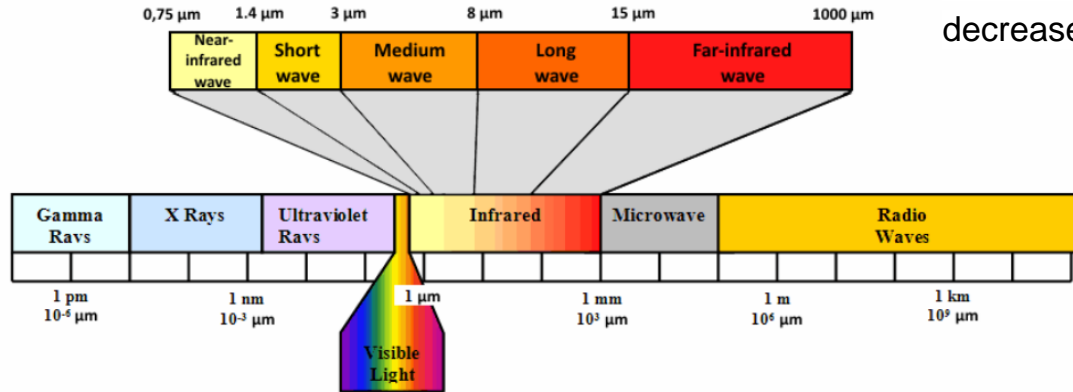
The radiation frequency and wavelength are inversely proportional.

$$\lambda = \frac{c}{f}$$

$c$  = speed of radiation (in vacuum)  
 $v=300.000$  km/s

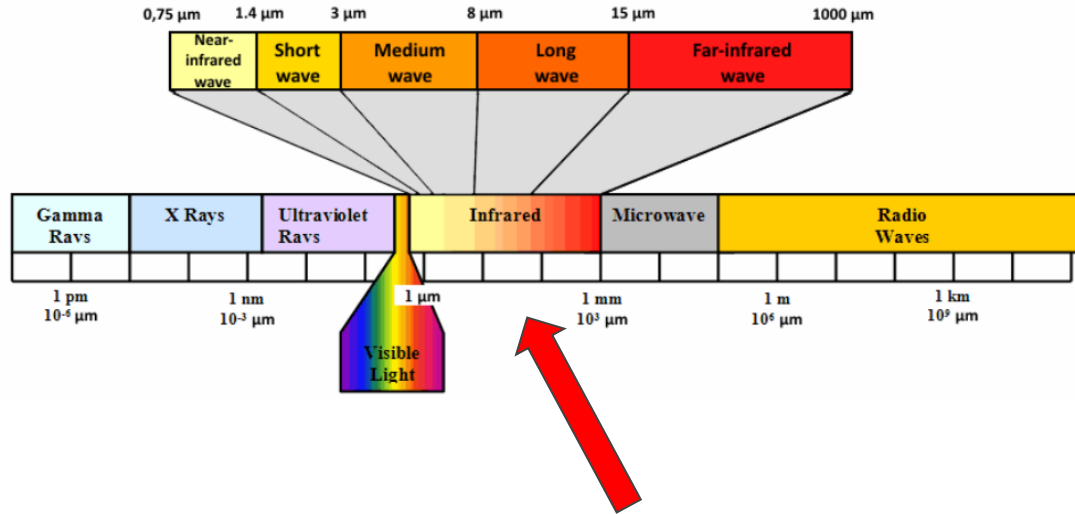
# A little bit of Physics

As shown in this graph, the wavelength increases going to the right while the frequency decreases.



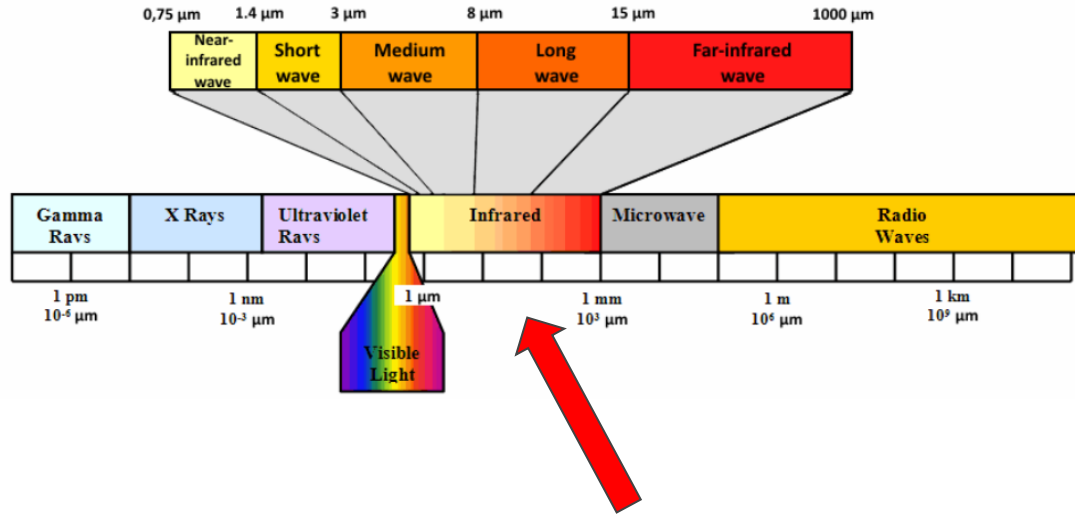
$$\lambda = \frac{v}{f}$$

# A little bit of Physics



In our experiment we will use the infrared part of the electromagnetic spectrum to transport the signal from the transmitter to the receiver.

# A little bit of Physics



This infrared part of the electromagnetic spectrum, as shown by the graph, is not visible.

# A little bit of Electronics

## LED (Light Emitting Diode)

It's a semi-conductor component capable of emitting a certain wavelength radiation

We can have LEDs capable of emitting a visible colored light like red, green, yellow or green.



Infrared LEDs emit radiation with a wavelength included in the infrared range, therefore outside the visible



# A little bit of Electronic

## Infrared remote controller

It is an electronic device that sends encoded signals through an infrared diode.



The **remote controller** provided with the kit is powered by a 3V button battery like the one shown here



# A little bit of Electronics

## The infrared receiver

It's a receiver diode having the same wavelength of the remote controller

The receiver diode provided with the kit is marketed under the TL1838 code



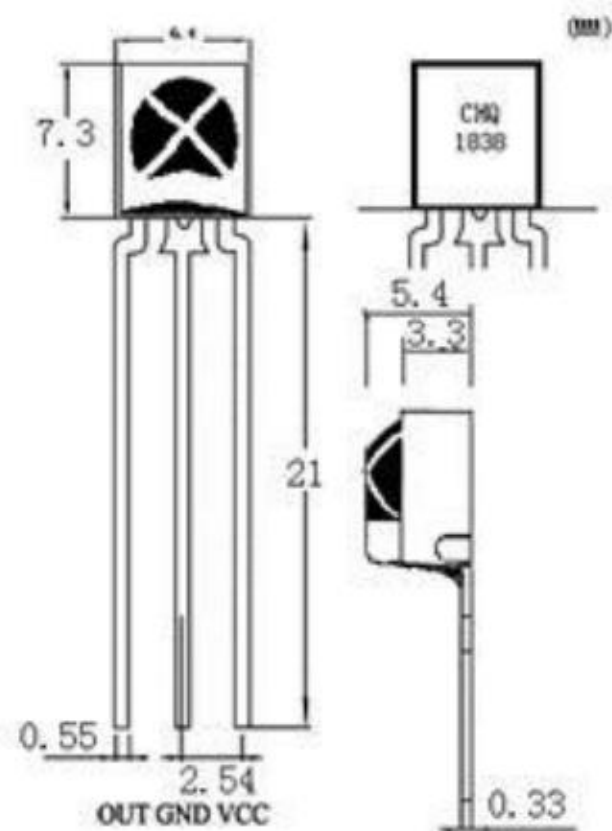


# A little bit of Electronics

## The infrared receiver

The device pin arrangements are shown here

Two of the pins are dedicated to the power supply, one is dedicated to input/output data



# A little bit of Electronics

## The servomotor

It's a kind of electric motor turning when commanded by a signal received on the pin «signal».

The two other pins are dedicated to the power supply.



# A little bit of Electronics

## The servomotor

The driving pulses of a servomotor have a fixed frequency and a variable time length.

The time length of a pulse determines the angle of rotation.

This driving method is called **PWM (Pulse Width Modulation)**



# Thanks for your attention



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