Workshop Arduino Bàsics

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@akirasan

Ripolab Hacklab

¿Quienes somos?

@ripolab

https://www.facebook.com/ripolabhacklab

http://ripolab.org

ripolab.hacklab@gmail.com

https://groups.google.com/forum/#!forum/ripolab-hacklab

RipoLab
hacklab

Ripolab Hacklab

RipoLab
hacklab

Ripolab Hacklab
Manifesto de Vailets Hacklab

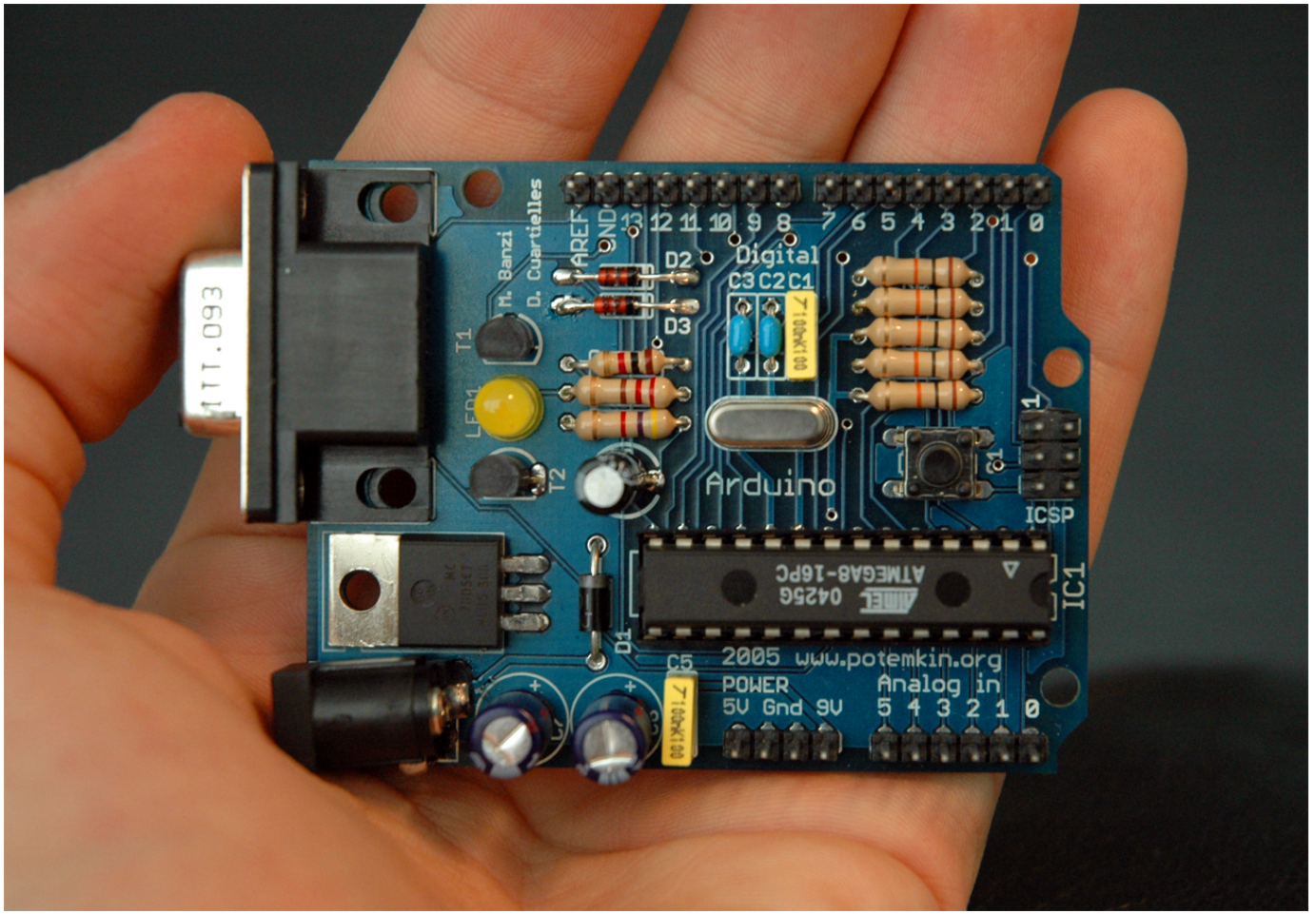
- Vailets HackLab és una **comunitat** de persones amb l'objectiu principal de potenciar el desenvolupament de les distintes **intel·ligències** dels nens a través de la **tecnologia**.

- Entenem que és necessari l'ús, estudi i manipulació de la tecnologia tant a **l'escola** com al **nucli familiar**.

- Organitzem de forma **altruista, independent i auto-organitzada**, tota mena de **tallers de programació, robòtica o tinkering**, així com esdeveniments, xerrades o cursos, amb l'esperança de trobar el retorn en forma d'una **societat més preparada, justa i solidària**.

RipoLab
hacklab

¿Qué es Arduino?: Hardware + Software

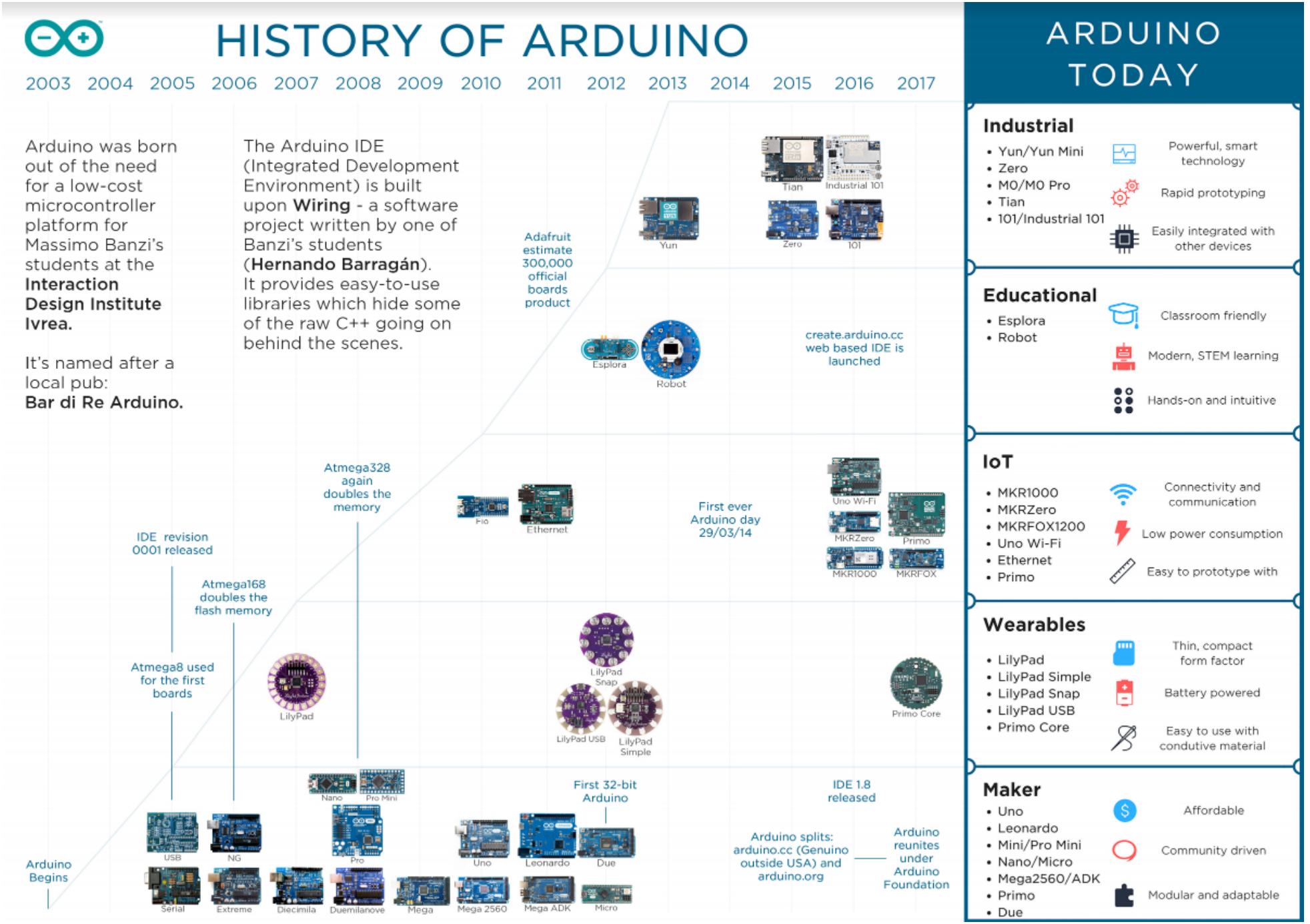


open source

open source hardware

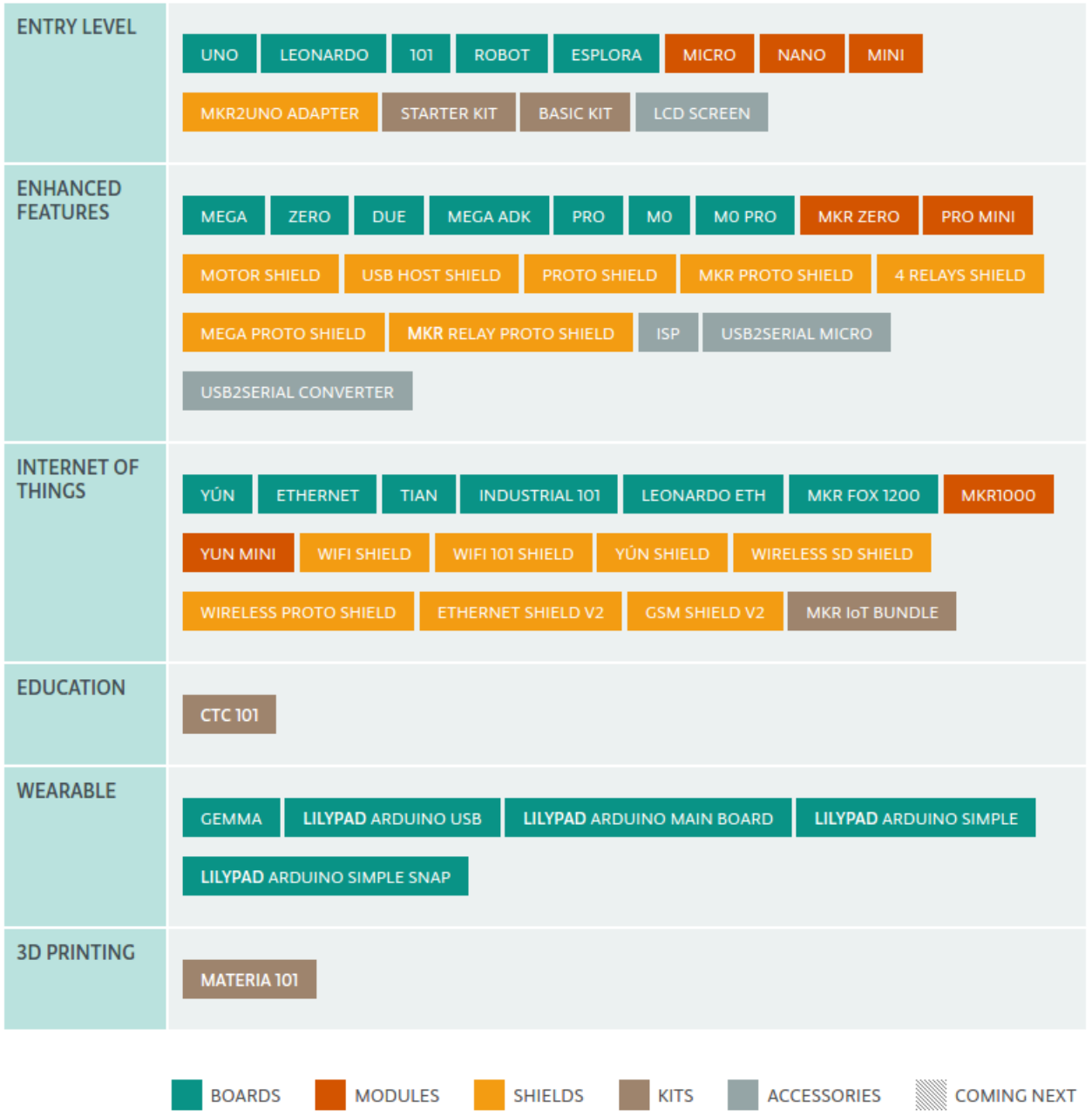
LOS ORIGENES: Los padres de la criatura

LOS ORIGENES: Evolución constante

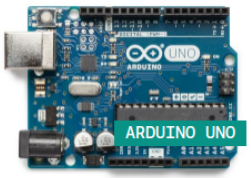


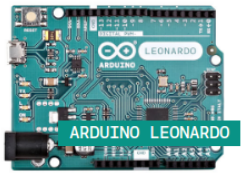
https://core-electronics.com.au/tutorials/history-of-arduino.html

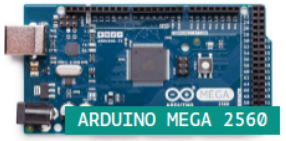
La Familia: Sabores para todos

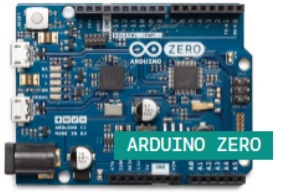


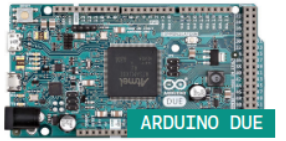
La Familia: Sabores para todos

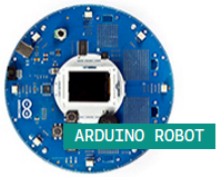


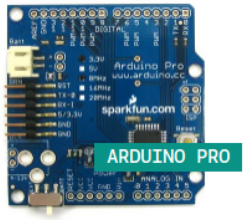


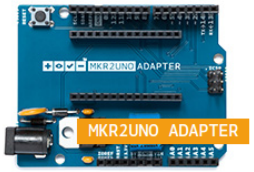


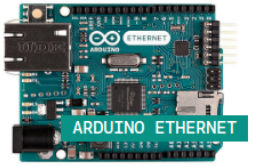


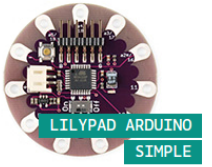


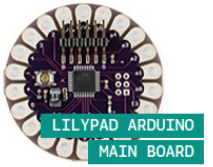


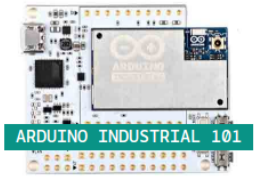


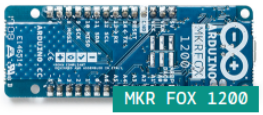


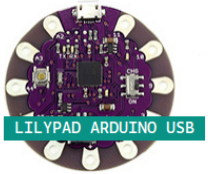


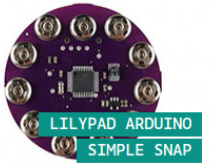




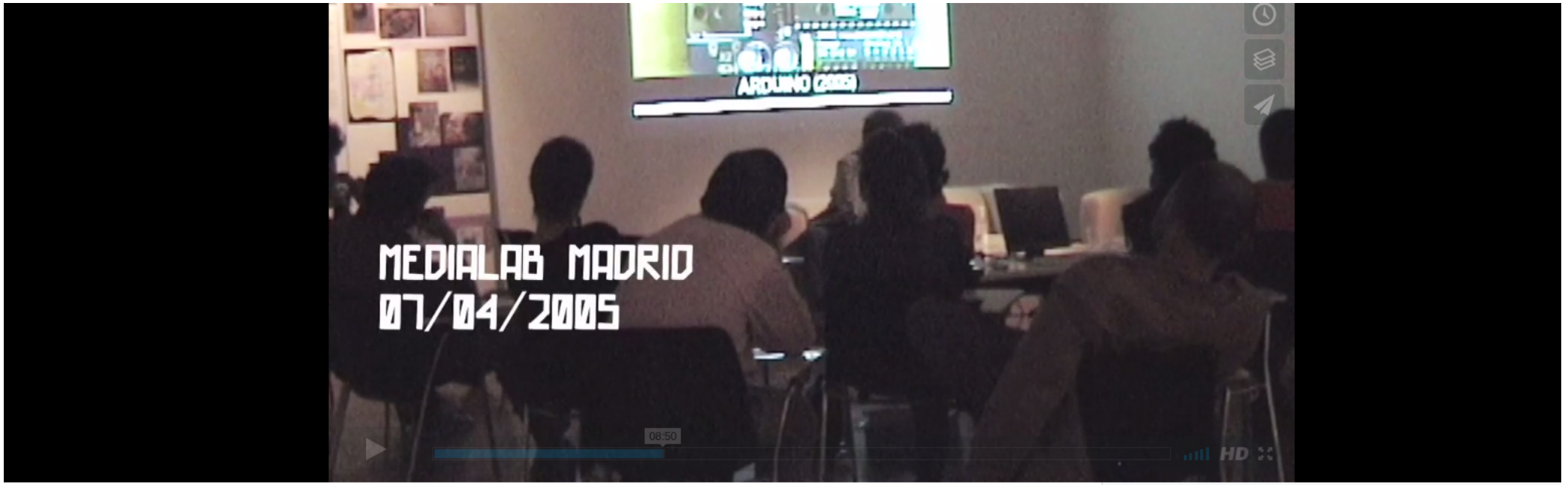








LOS ORIGENES: Arduino The Documentary



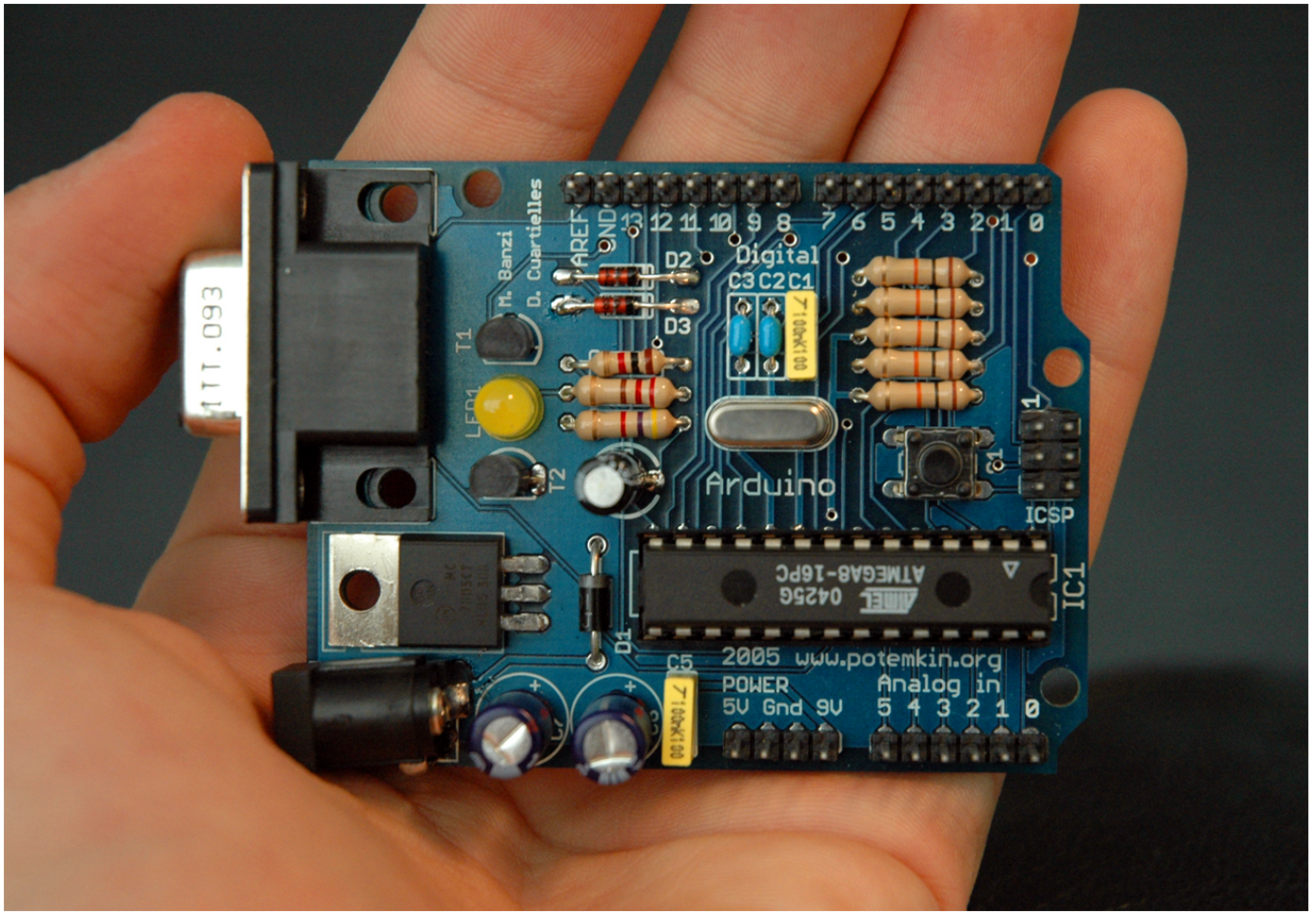
Arduino The Documentary (2010) Spanish HD

Más de Documentales

Reproducir de forma automática el siguiente video

https://vimeo.com/18390711

Hardware/Software: Vayamos por partes

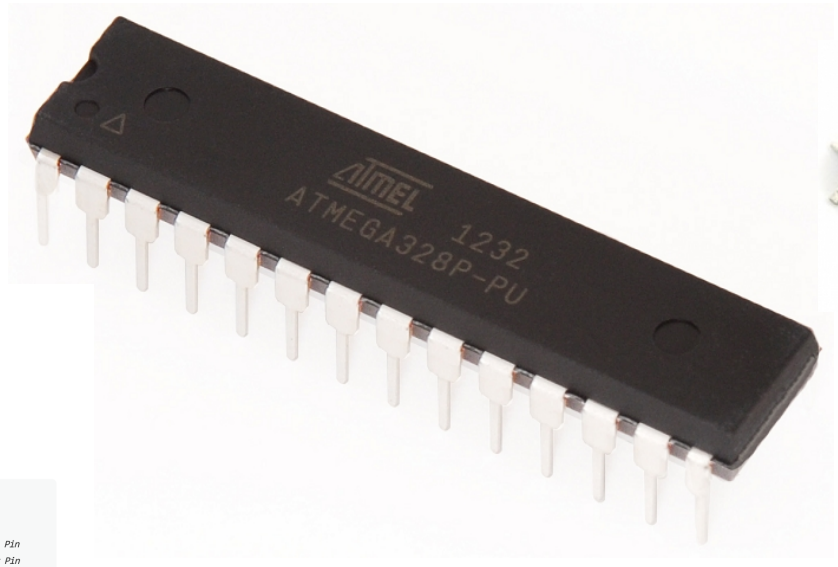


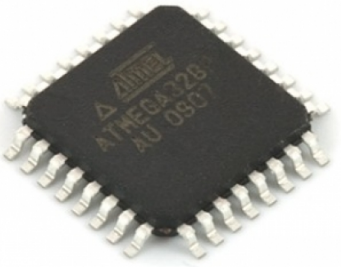
open source

open source hardware

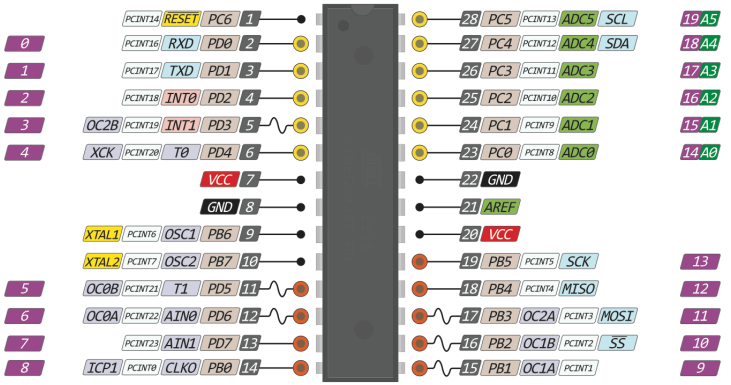
Hardware

Hardware: El microprocesador y algo mas...





ATMEGA328 PINOUT

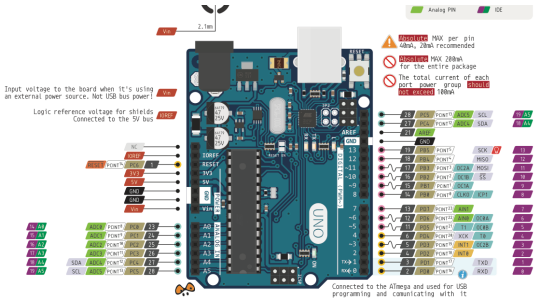


IDE
Power
GND
Serial Pin
Analog Pin
Control
Pin Change Int
Physical Pin
Port Pin
Pin function
Ext Interrupt
PWM Pin
Port Power

Absolute MAX per pin 40mA
recommended 20mA

Absolute MAX 200mA
for entire package

The power sum for each pin's group should not exceed 100mA



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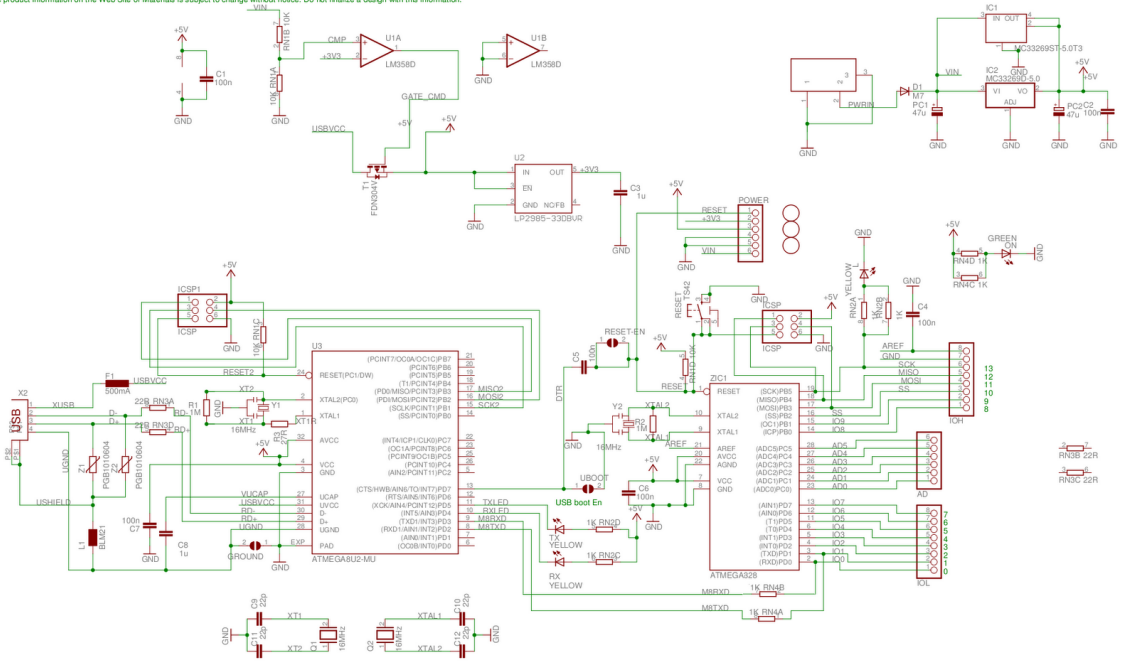
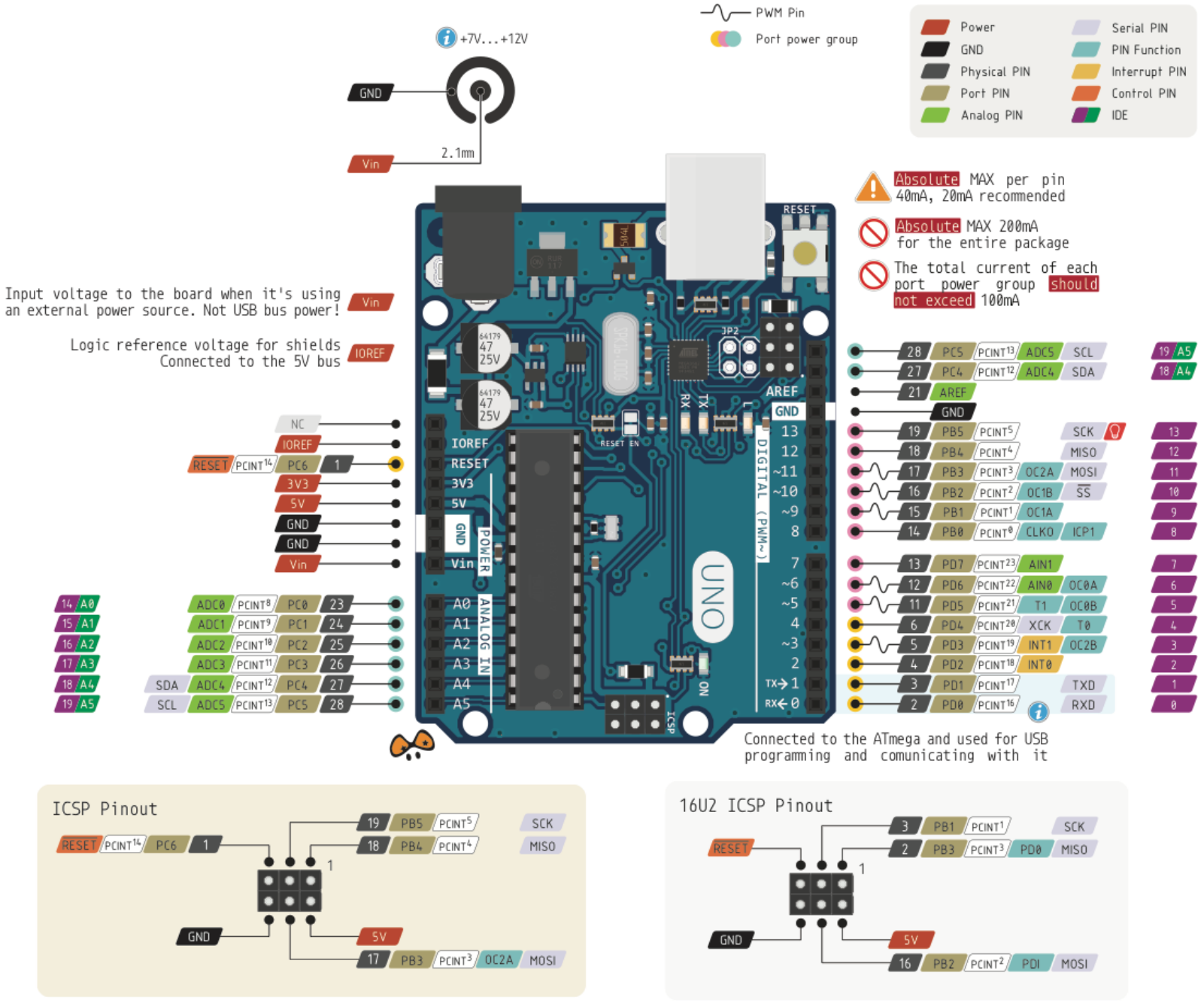


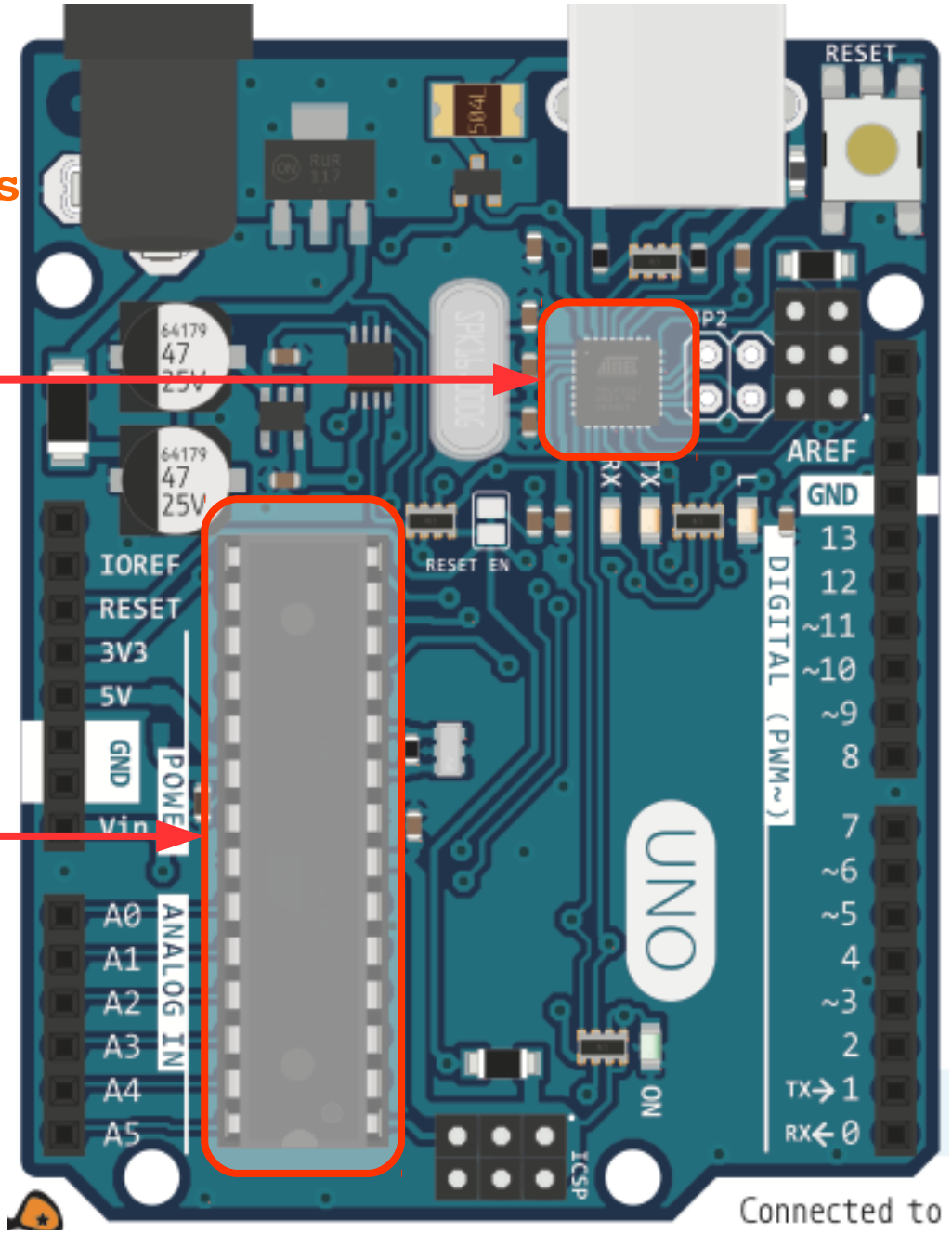
Hardware: El microprocesador y algo mas...



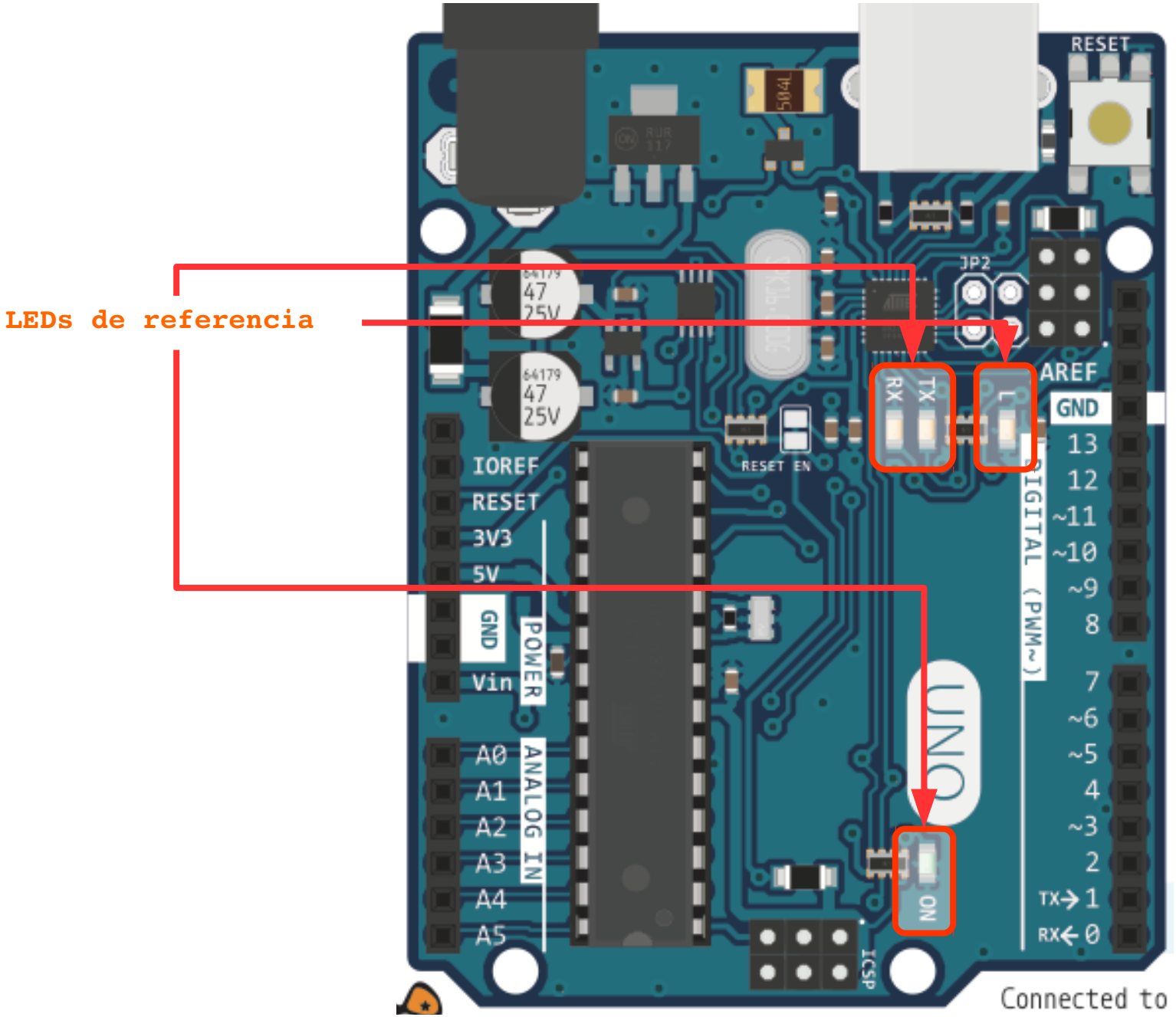
http://www.pighixxx.com

Hardware: El microprocesador y algo mas...

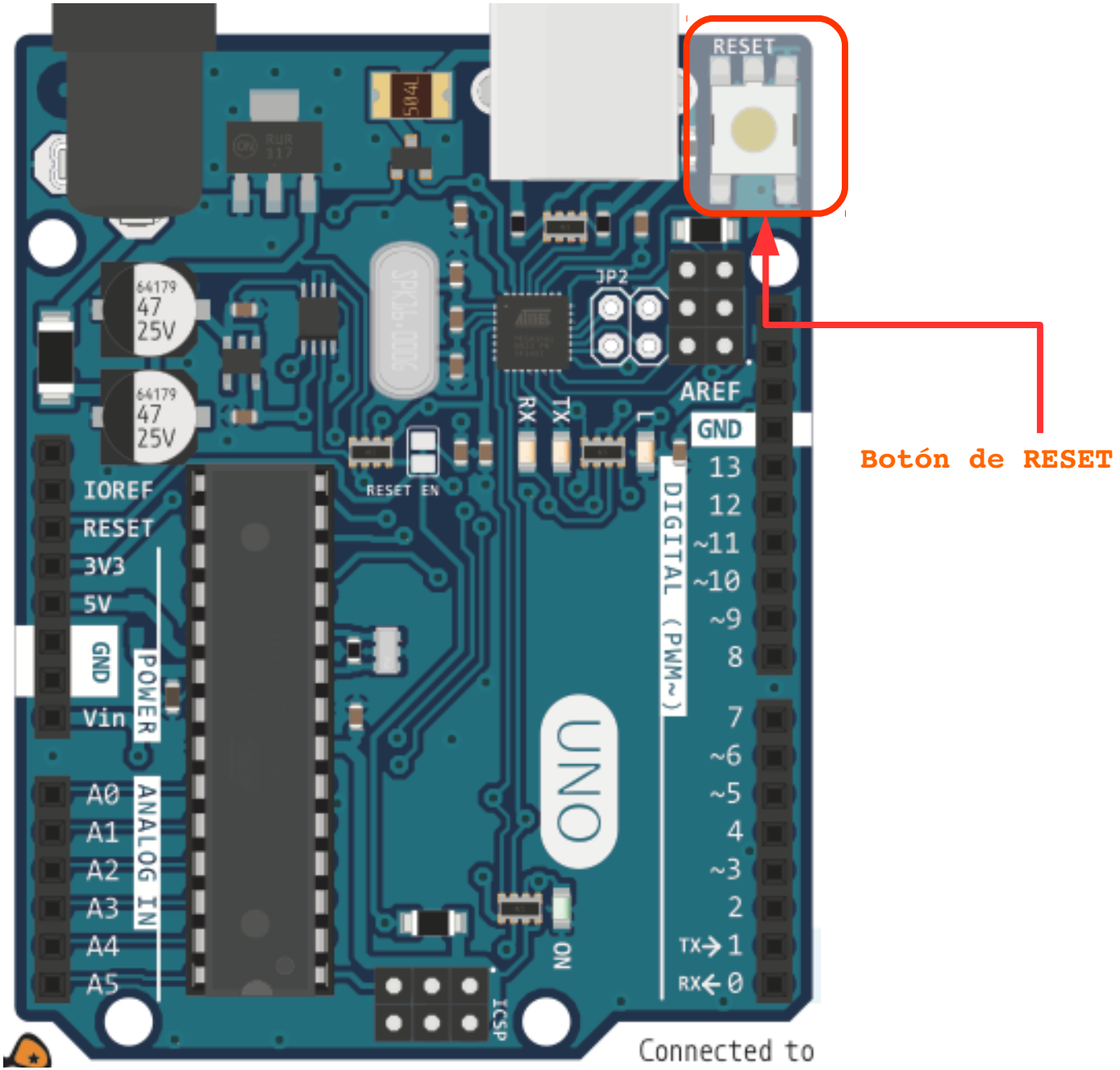
microprocesadores



Hardware: El microprocesador y algo mas...

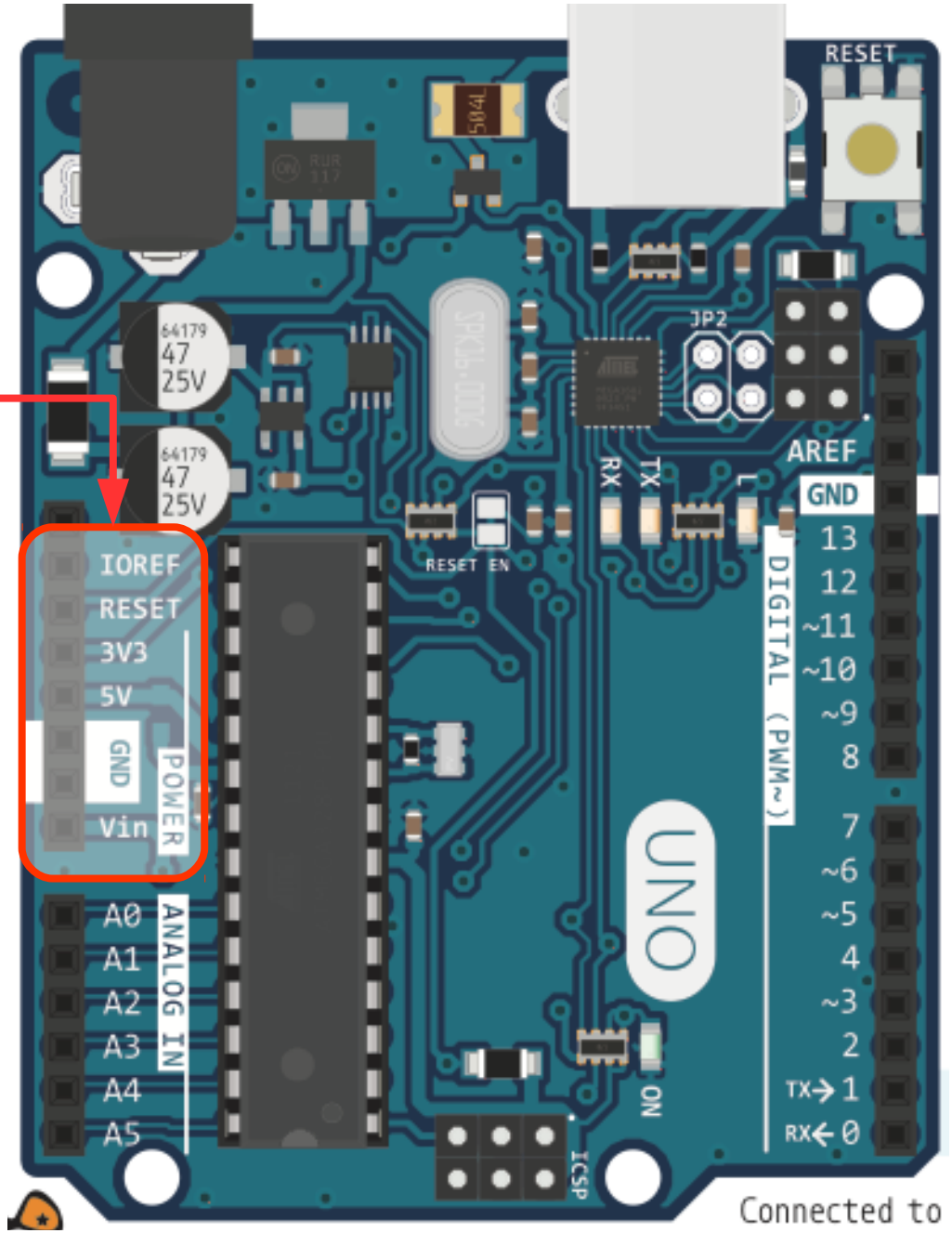


Hardware: El microprocesador y algo mas...



Hardware: El microprocesador y algo mas...

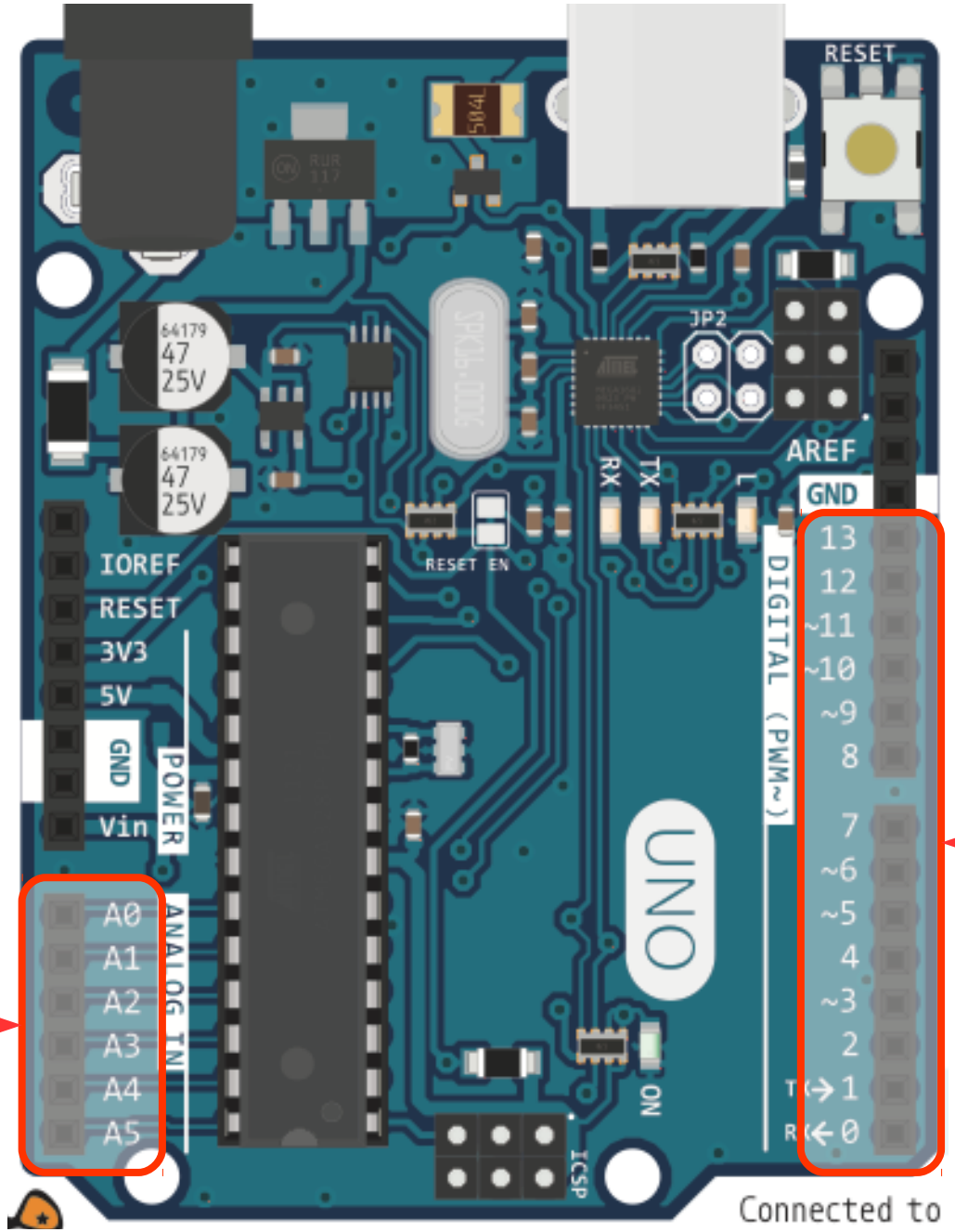
Pines de voltaje



Hardware: El microprocesador y algo mas...

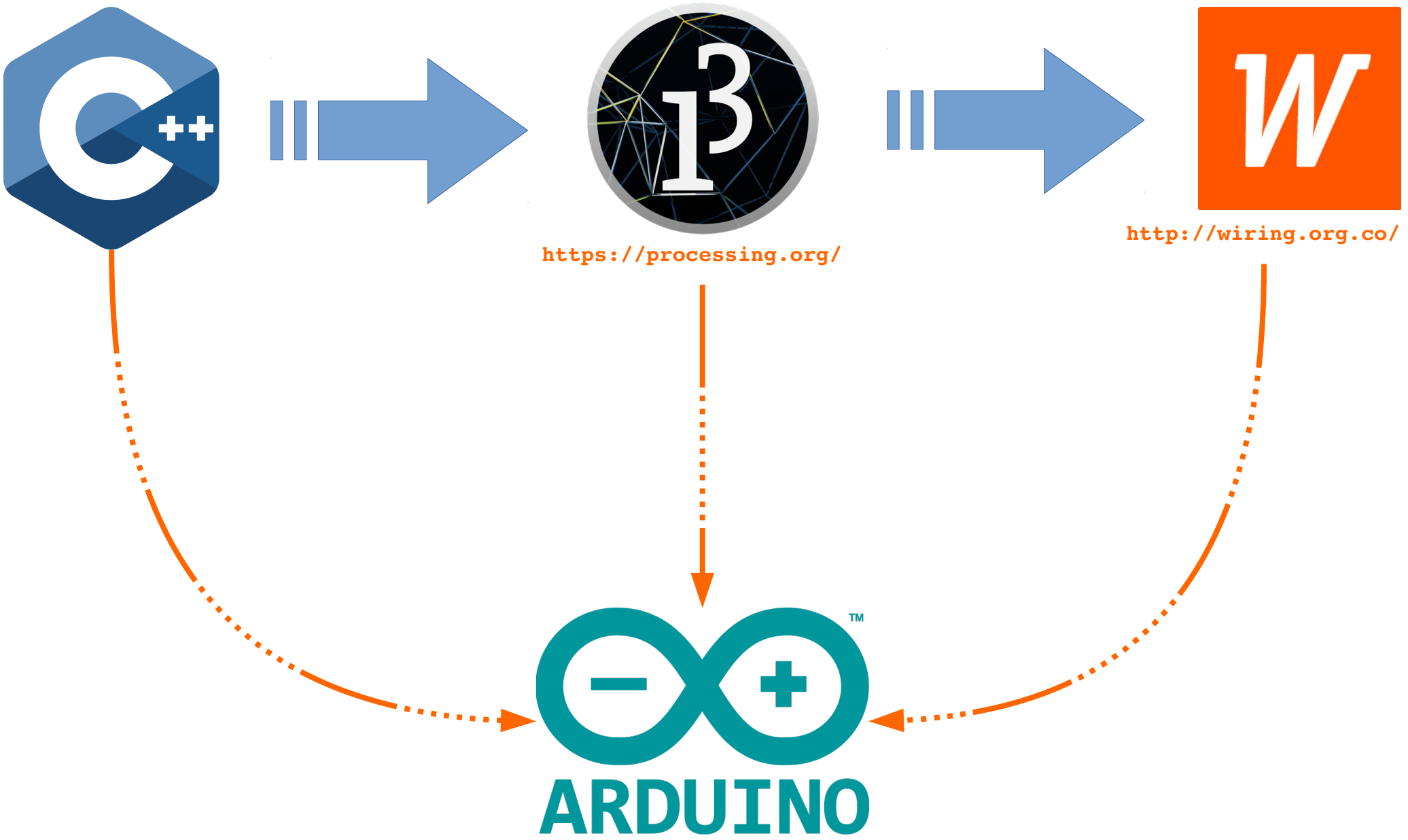
14 pines digitales:
8 digital
6 PWM ~ (salida)

6 pines analógicos



Software

Software: Antepasados comunes del lenguaje



Software: IDE. El entorno para humanos

IDE: Integrated Development Environment

Access the Online IDE

ARDUINO WEB EDITOR

Start coding online with the Arduino Web Editor, save your sketches in the cloud, and always have the most up-to-date version of the IDE, including all the contributed libraries and support for new Arduino boards. The Arduino Web Editor is one of the Arduino Create platform's tools.

Try It Now
Getting Started

Download the Arduino IDE

ARDUINO 1.8.3

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.
This software can be used with any Arduino board.
Refer to the Getting Started page for Installation instructions.

Windows Installer
Windows ZIP file for non admin install

Windows app Get

Mac OS X 10.7 Lion or newer

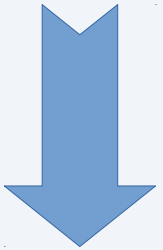
Linux 32 bits
Linux 64 bits
Linux ARM

Release Notes
Source Code
Checksums (sha512)

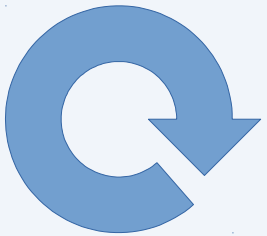
LENGUAJE HUMANO. Estructura básica de UN PROGRAMA

```
Librerías

Varibles Globales
Constantes
Funciones propias
```

```
void setup() {
   // código de configuración
}
```



```
void loop() {
   // código que ejecuta “para siempre”
}
```



COMPILADOR. El traductor: HUMANO vs MÁQUINA

compilador

Archivo Editar Programa Herramientas Ayuda

ejemplo_hola_mundo_led §

```
/*

  Ripolab Hacklab 2017

  Ejemplo HOLA MUNDO --- LED

*/

int PinLED = 13;

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


void loop() {

  // LED activado
  digitalWrite(PinLED, HIGH);
  delay(1000);

  // LED apagado
  digitalWrite(PinLED, LOW);
  delay(1000);

}
```

ejemplo_hola_mundo_led.ino.hex

```
:100000000C945C000C946E000C946E000C946E00CA
:100010000C946E000C946E000C946E000C946E00A8
:100020000C946E000C946E000C946E000C946E0098
:100030000C946E000C946E000C946E000C946E0088
:100040000C946E000C946E000C946E000C946E00CC
:100050000C946E000C946E000C946E000C946E0068
:100060000C946E000C946E0000000080002010069
:1000700000030407000000000000000000000072
:1000800025002800 2B0000000000240027002A0083
:1000900004040404040404040202020202020032E
:1000A000030303030102040810204080010204083 6
:1000B000102001020408102011241FBECFEFD8E049
:1000C000DEBFCDBF21E0A0E0B1E001C01D92A930AC
:1000D000B207E1F70E9463010C94D4010C94000074
:1000E00090E0FC01E859FF4F3491FC01EC55FF4FC3
:1000F0002491FC01E057FF4FE491EE2309F43BC04B
:10010000332339F1333091F038F43130A9F0323003
:1001100001F584B58F7D12C0373091F03830A1F0F1
:100120003430B9F4809180008F7D03C080918000CD
:10013000 8F77809380000DC084B58F7784BD09C010
:100140008091B0008F7703C08091B0008F7D809345
:10015000B000F0E0EE0FFF1FE458FF4FA591B491FF
```

HUMANO vs MÁQUINA

Language Reference

Arduino programs can be divided in three main parts: *structure*, *values* (variables and constants), and *functions*.

Structure

- setup()
- loop()

Control Structures

- if
- if...else
- for
- switch case
- while
- do... while
- break
- continue
- return
- goto

Further Syntax

- ; (semicolon)
- {} (curly braces)
- // (single line comment)
- /* */ (multi-line comment)
- #define
- #include

Arithmetic Operators

- = (assignment operator)
- + (addition)
- - (subtraction)
- * (multiplication)
- / (division)
- % (modulo)

Comparison Operators

- == (equal to)
- != (not equal to)
- < (less than)
- > (greater than)
- <= (less than or equal to)
- >= (greater than or equal to)

Boolean Operators

- && (and)
- || (or)
- ! (not)

Pointer Access Operators

- * dereference operator
- & reference operator

Bitwise Operators

- & (bitwise and)
- | (bitwise or)
- ^ (bitwise xor)
- ~ (bitwise not)
- << (bitshift left)
- >> (bitshift right)

Compound Operators

- ++ (increment)
- -- (decrement)
- += (compound addition)
- -= (compound subtraction)
- *= (compound multiplication)
- /= (compound division)
- %= (compound modulo)
- &= (compound bitwise and)
- |= (compound bitwise or)

Variables

Constants

- HIGH | LOW
- INPUT | OUTPUT | INPUT_PULLUP
- LED_BUILTIN
- true | false
- integer constants
- floating point constants

Data Types

- void
- boolean
- char
- unsigned char
- byte
- int
- unsigned int
- word
- long
- unsigned long
- short
- float
- double
- string - char array
- String - object
- array

Conversion

- char()
- byte()
- int()
- word()
- long()
- float()

Variable Scope & Qualifiers

- variable scope
- static
- volatile
- const

Utilities

- sizeof()
- PROGMEM

Functions

Digital I/O

- pinMode()
- digitalWrite()
- digitalRead()

Analog I/O

- analogReference()
- analogRead()
- analogWrite() - *PWM*

Due & Zero only

- analogReadResolution()
- analogWriteResolution()

Advanced I/O

- tone()
- noTone()
- shiftOut()
- shiftIn()
- pulseIn()

Time

- millis()
- micros()
- delay()
- delayMicroseconds()

Math

- min()
- max()
- abs()
- constrain()
- map()
- pow()
- sqrt()

Trigonometry

- sin()
- cos()
- tan()

Characters

- isAlphaNumeric()
- isAlpha()
- isAscii()
- isWhitespace()
- isControl()
- isDigit()
- isGraph()
- isLowerCase()
- isPrintable()
- isPunct()
- isSpace()
- isUpperCase()
- isHexadecimalDigit()

Random Numbers

- randomSeed()
- random()

Bits and Bytes

- lowByte()
- highByte()
- bitRead()
- bitWrite()
- bitSet()
- bitClear()
- bit()

External Interrupts

- attachInterrupt()
- detachInterrupt()

Interrupts

- interrupts()
- noInterrupts()

Communication

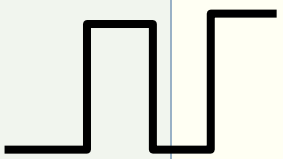
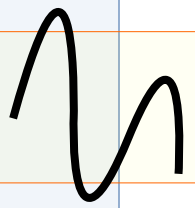
- Serial
- Stream

USB (32u4 based boards and Due/Zero only)

- Keyboard
- Mouse

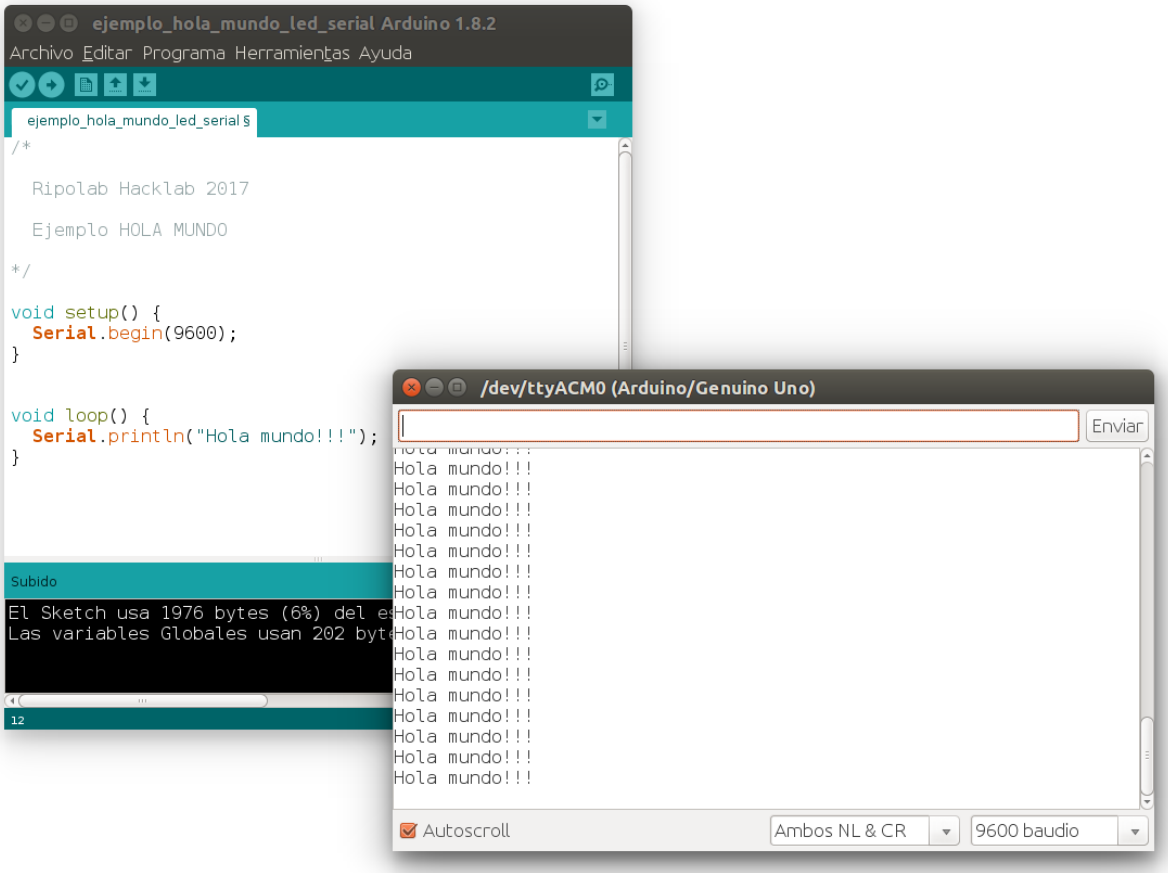
https://www.arduino.cc/en/Reference/HomePage

Lenguaje Básico. Hablar con las máquinas

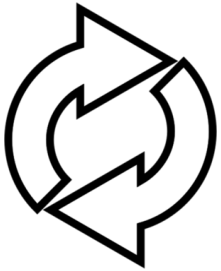
ESCRIBIR / HABLAR	LEER / ESCUCHAR
`pinMode(#pin,OUTPUT)`	`pinMode(#pin,INPUT)`
`digitalWrite(#pin,HIGH)` `digitalWrite(#pin,LOW)`	`digitalRead(#pin)` 
`analogWrite(#pin,#valor)`	`analogRead(#pin)` 

Lenguaje Básico. Enterarse por el Serial

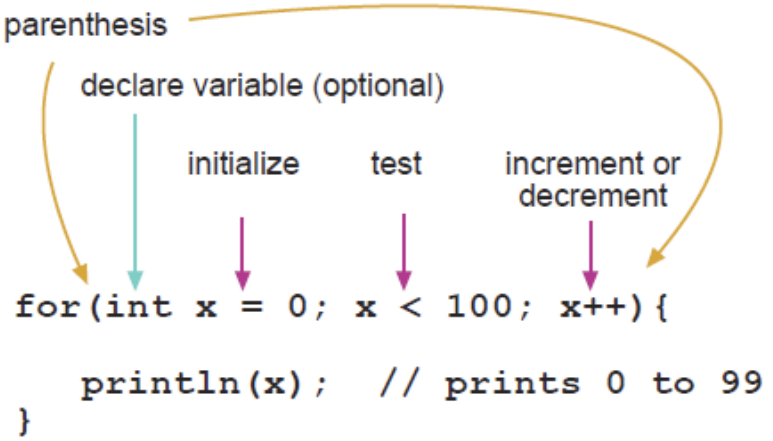
```
void setup() {
    Serial.begin(9600);
}

void loop() {
    Serial.println("Hola mundo!!!");
}
```



Lenguaje Básico. Repetir y repetir



```
for ([valor inicial]; [condición]; [incremento/decremento])
{
   // código que se repite
}
```



Lenguaje Básico. Tomar decisiones

```
if ([condición])
{
   // código que se ejecuta si se cumple la condición_1
}
```

```
if ([condición_1])
{
   // código que se ejecuta si se cumple la condición_1
}

else

{
   // código que se ejecuta si NO se cumple la condición_1
}
```

Al cacharreo!!!