# Arduino per la fisica

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# Cos’è Arduino?

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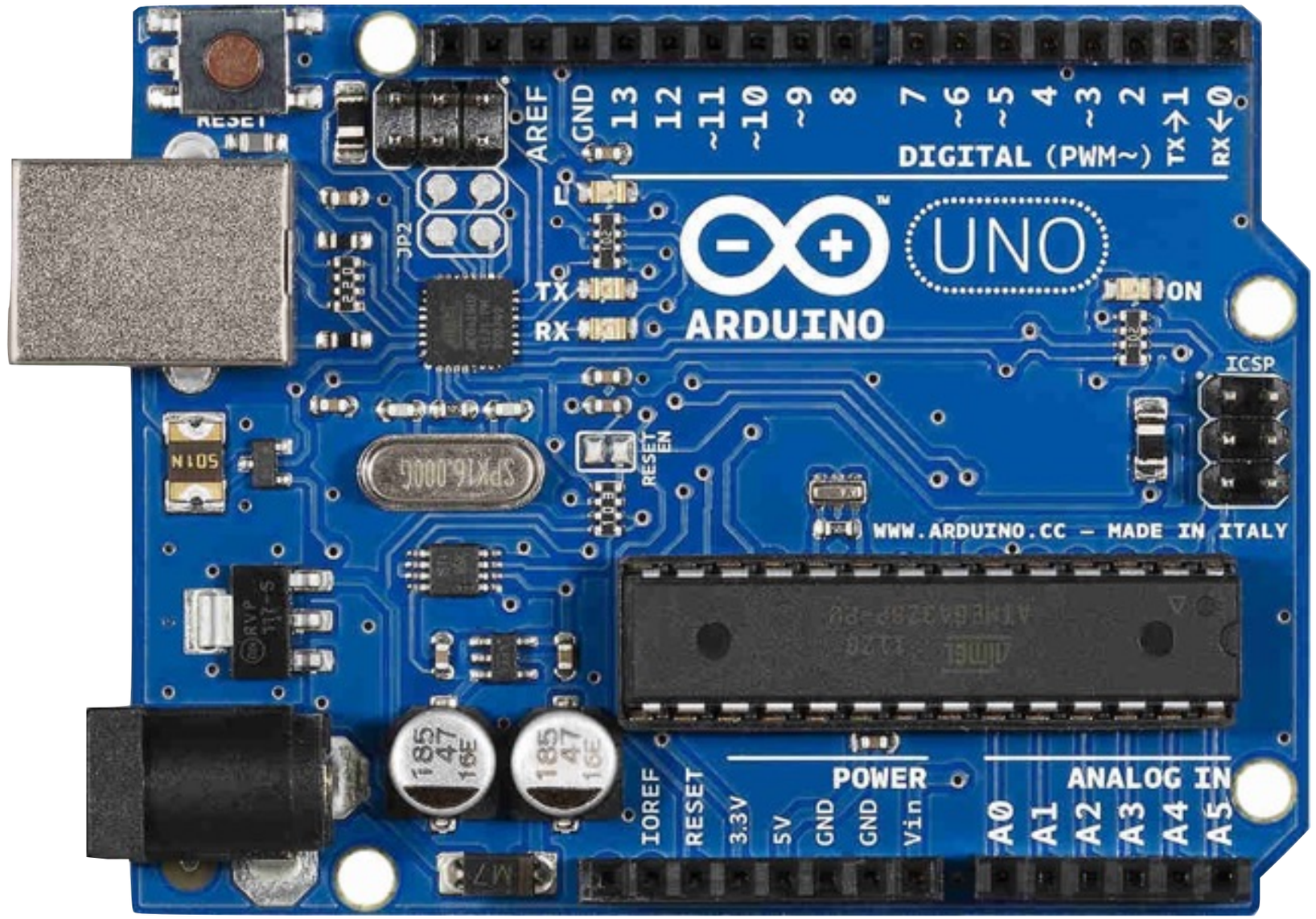
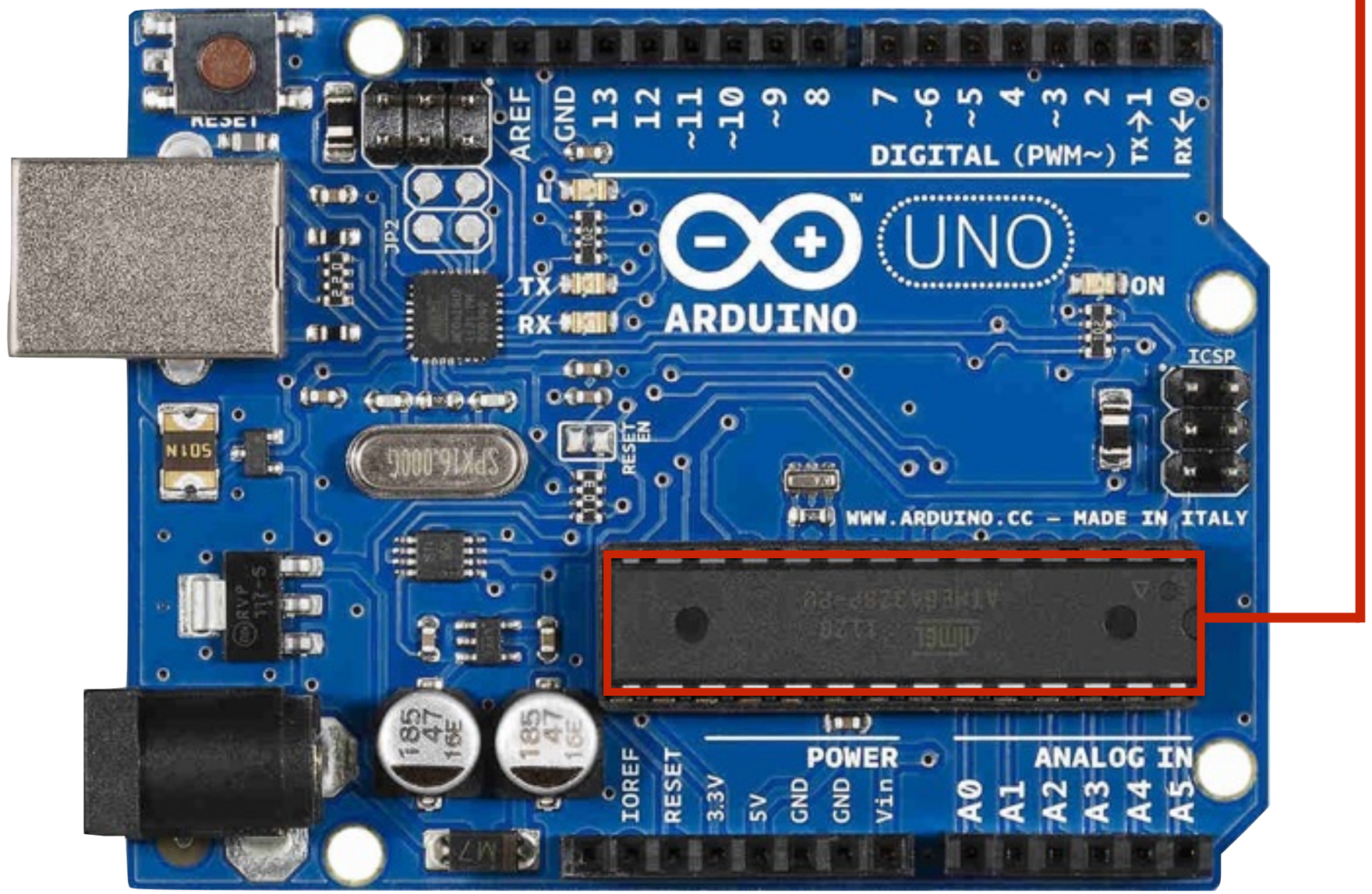


# Cos’è Arduino?

AtMega328P



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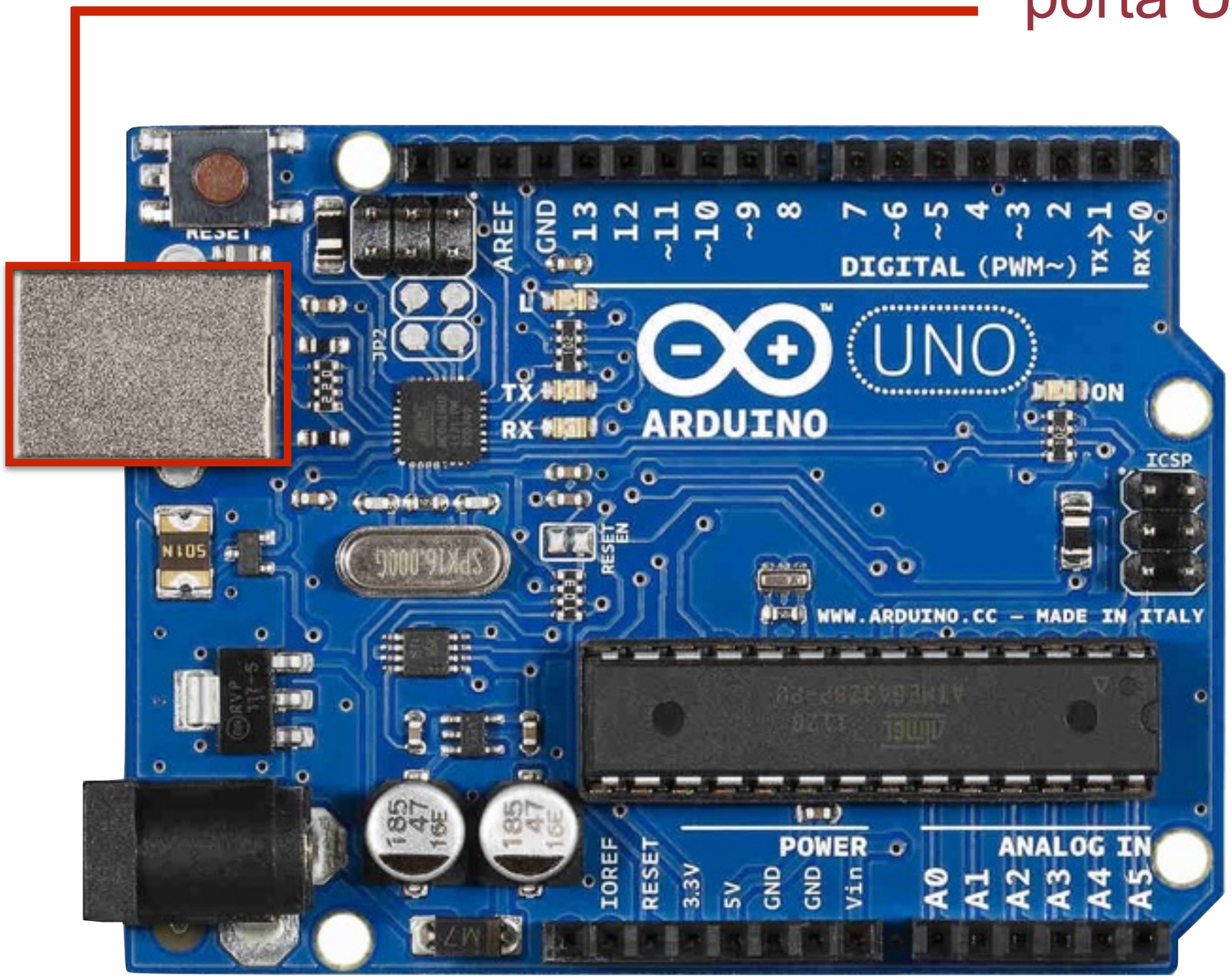

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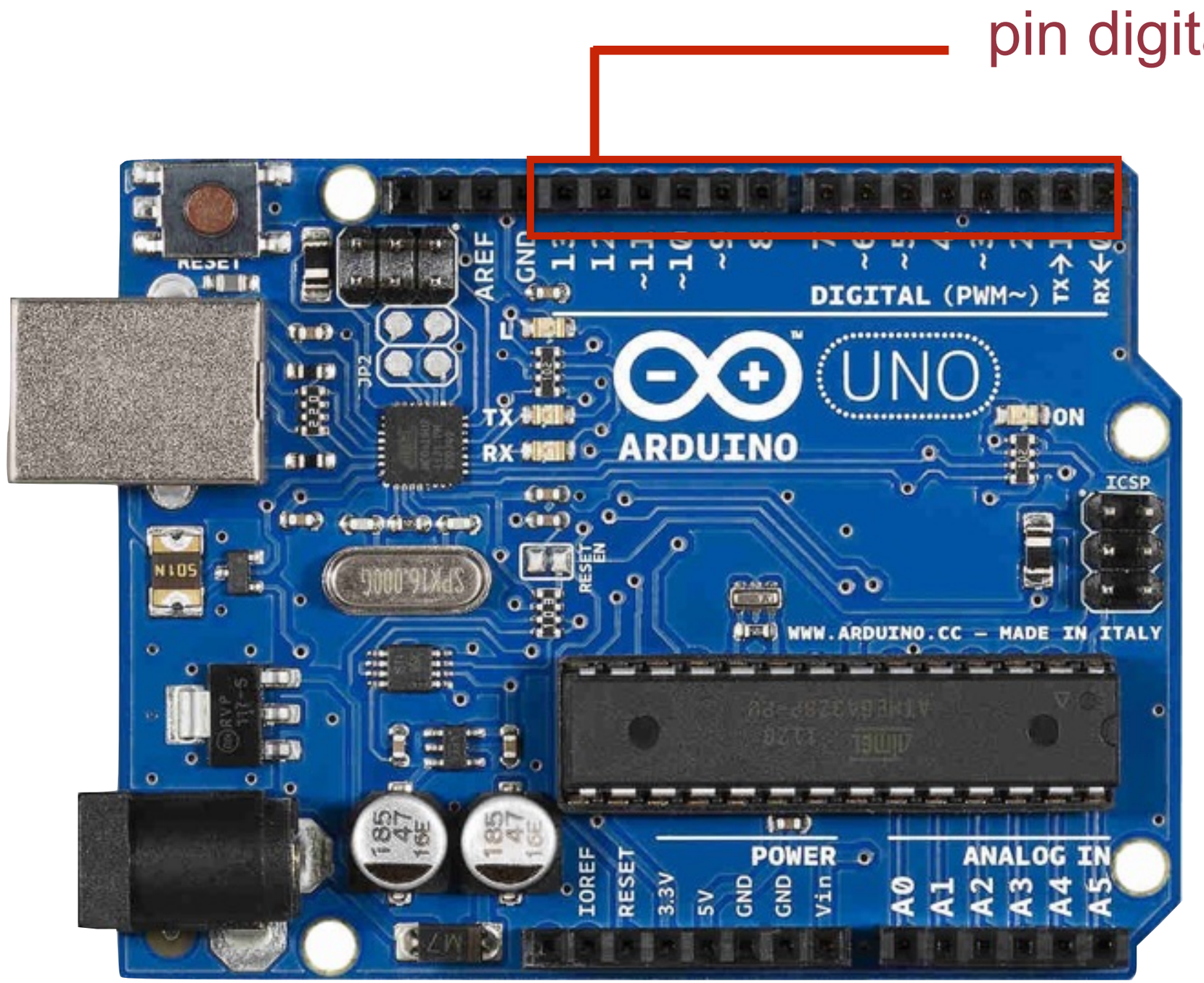
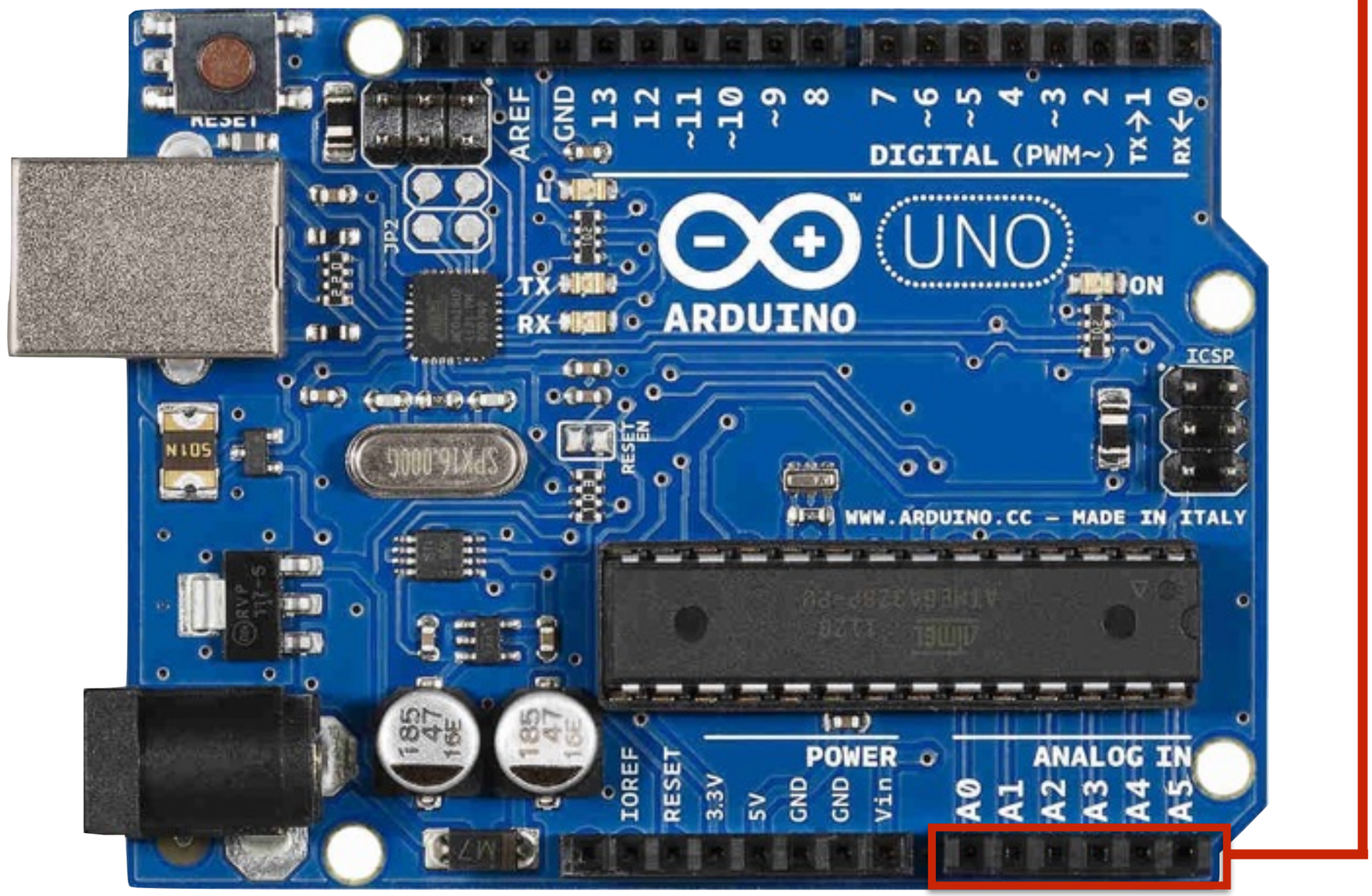


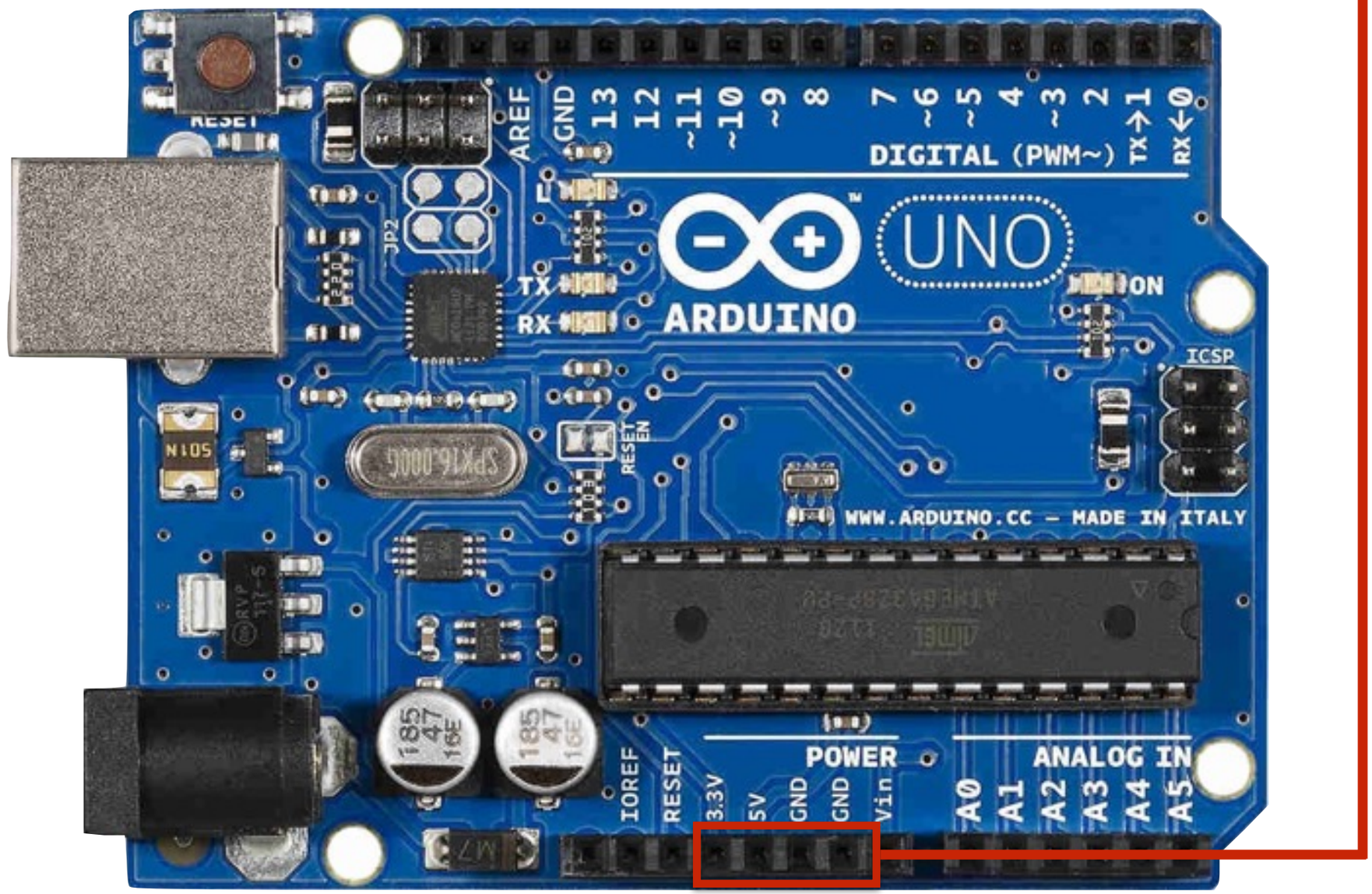
# Cos’è Arduino?

pin analogici

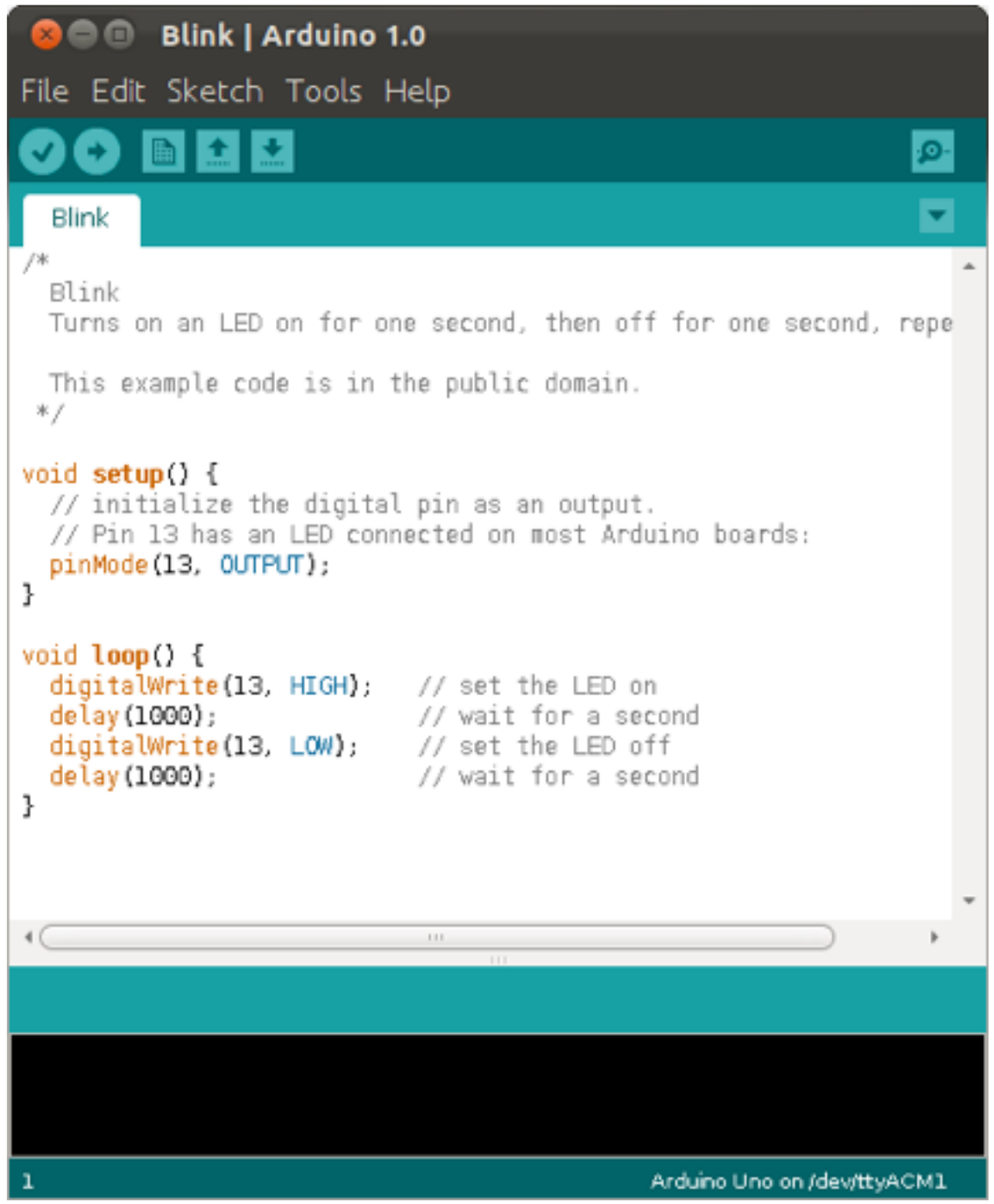


# Cos’è Arduino?

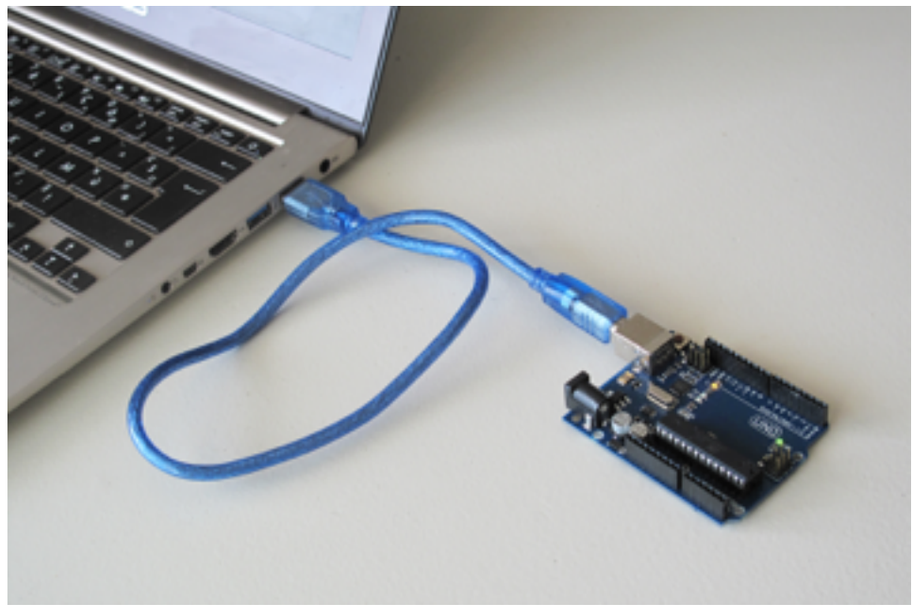
pin di alimentazione



# La IDE di Arduino



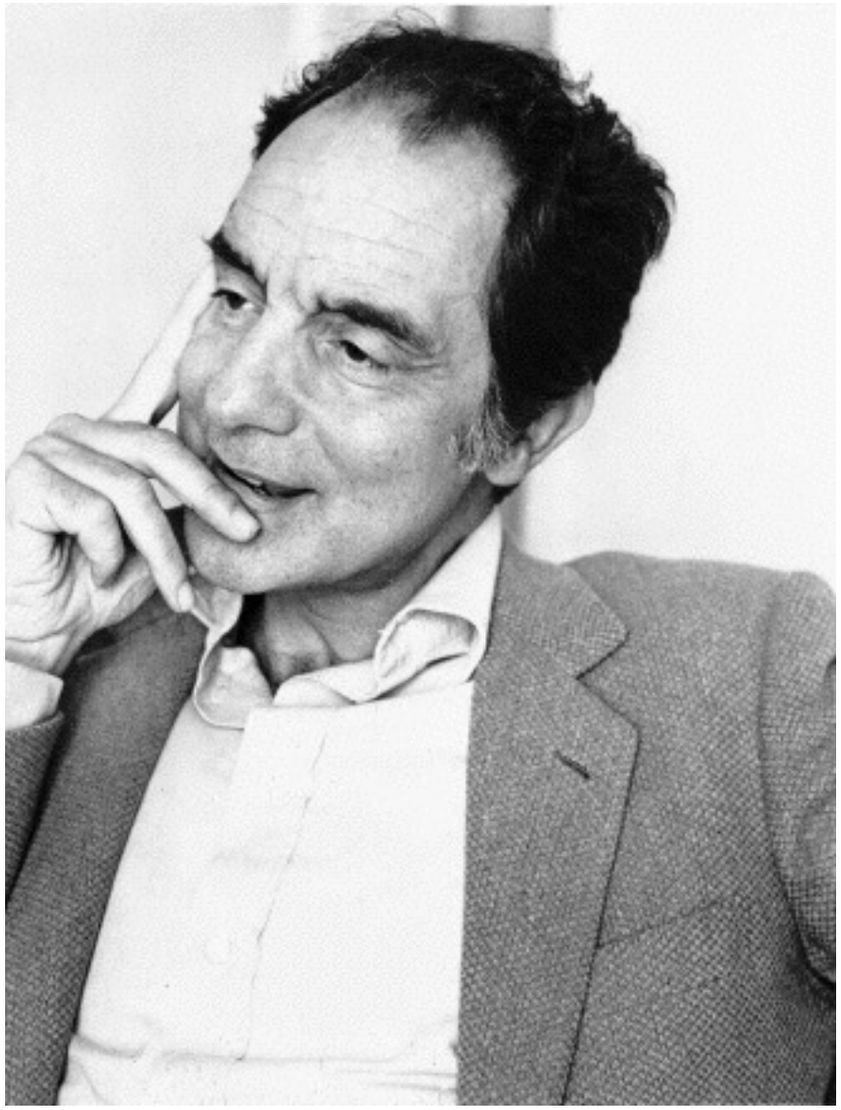

- Open Source
- Facile da usare
  - Edit su PC
  - Compilazione su PC
  - Trasferimento codice ad Arduino via USB



# Perché Arduino?

- fisica a scuola = formazione complessiva
- laboratorio fondamentale (IBSE)
- esperimenti complicati e costosi
- apparati commerciali = “scatole nere”
- coding
- Sviluppo di competenze

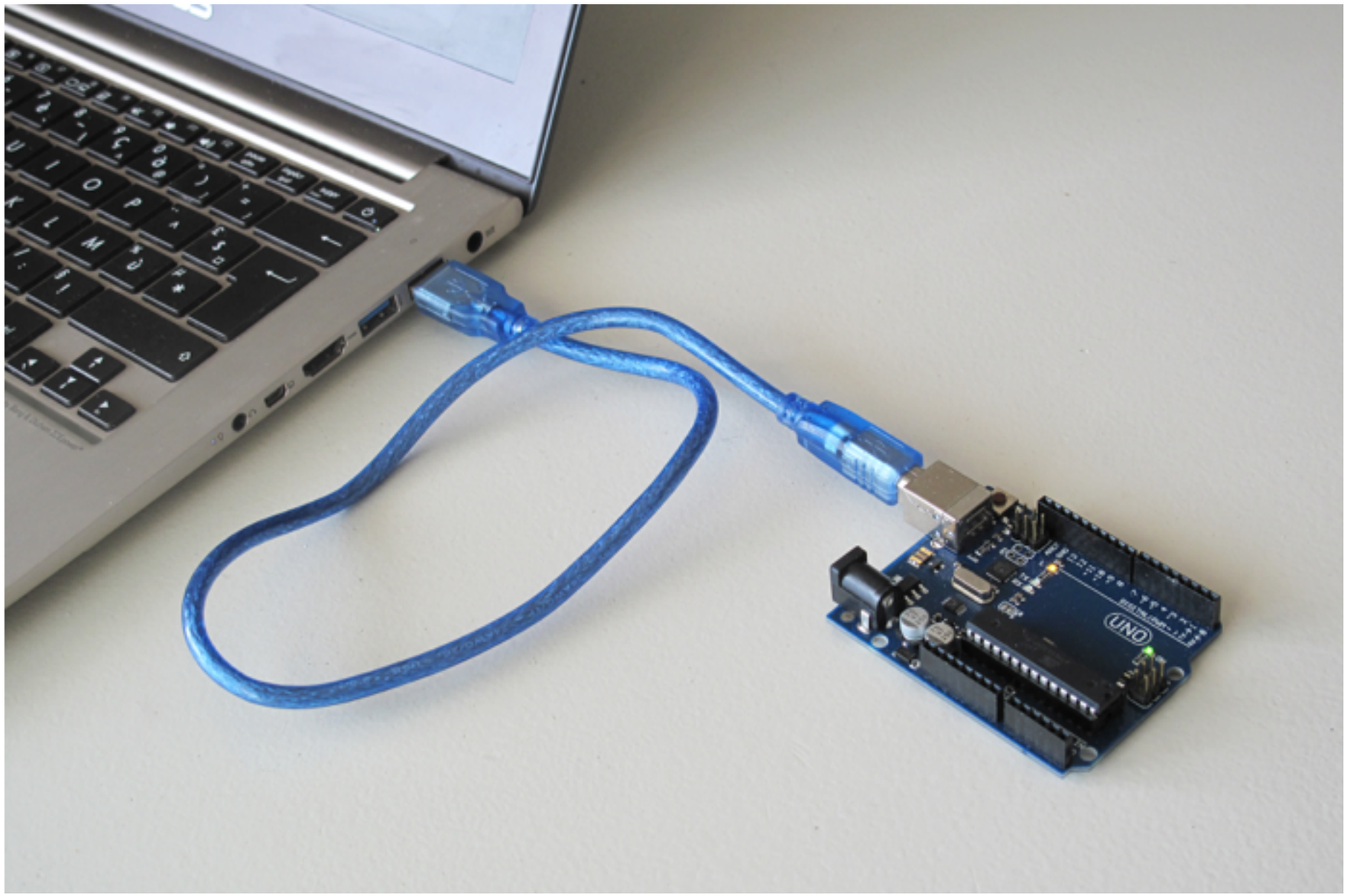
# Perché Arduino?



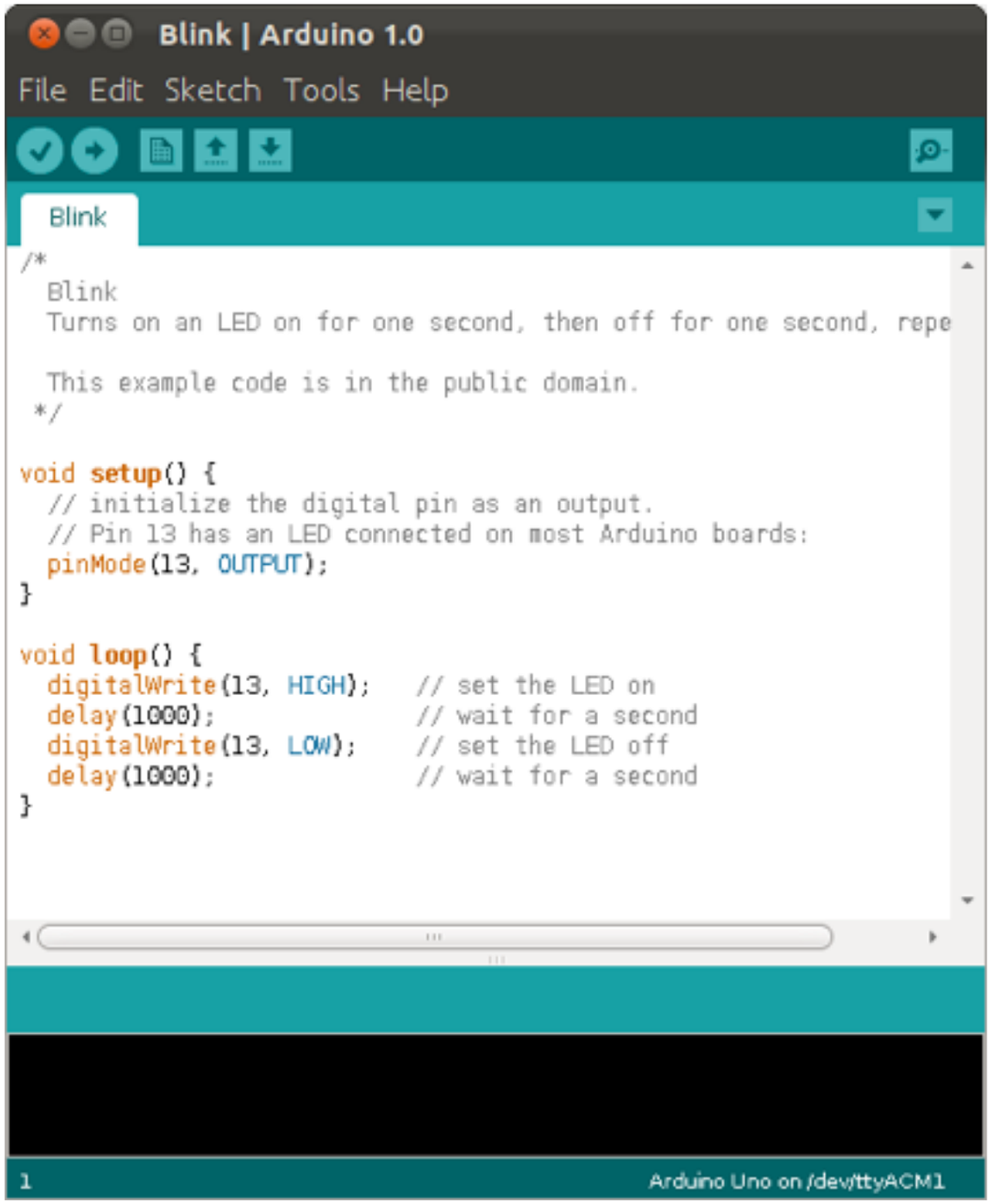
Italo Calvino - Lezioni Americane (1988)

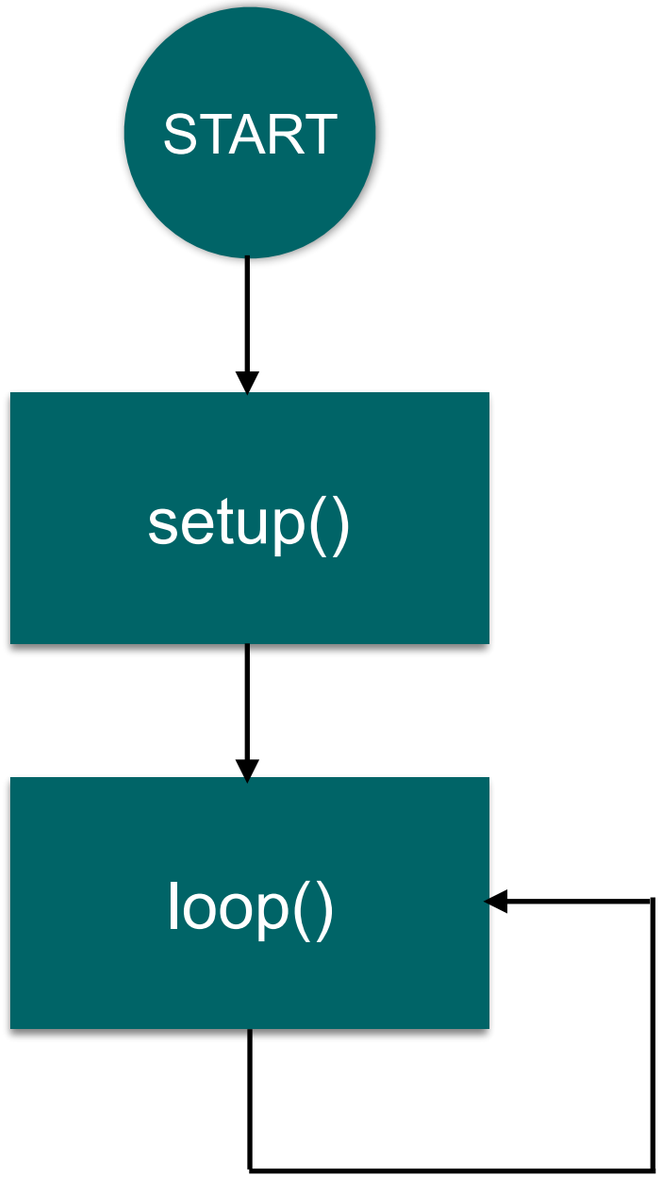
> “È vero che il software non può esercitare i poteri della sua leggerezza se non mediante la pesantezza dell’hardware. Ma è il software che comanda…”

# Come si usa



# Come si usa


Blink | Arduino 1.0
File Edit Sketch Tools Help
Blink
/*
Blink
Turns on an LED on for one second, then off for one second, repe
This example code is in the public domain.
*/
void setup() {
// initialize the digital pin as an output.
// Pin 13 has an LED connected on most Arduino boards:
pinMode(13, OUTPUT);
}
void loop() {
digitalWrite(13, HIGH); // set the LED on
delay(1000); // wait for a second
digitalWrite(13, LOW); // set the LED off
delay(1000); // wait for a second
}
1
Arduino Uno on /dev/ttyACM1


START
setup()
loop()

# setup()

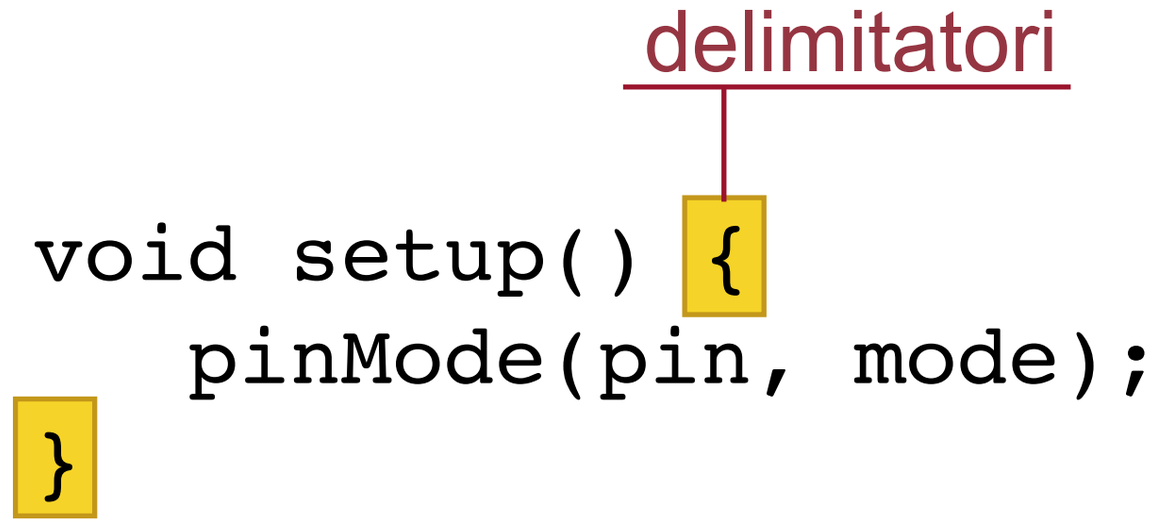
```
void setup() {
   pinMode(pin, mode);
}
```

# setup()

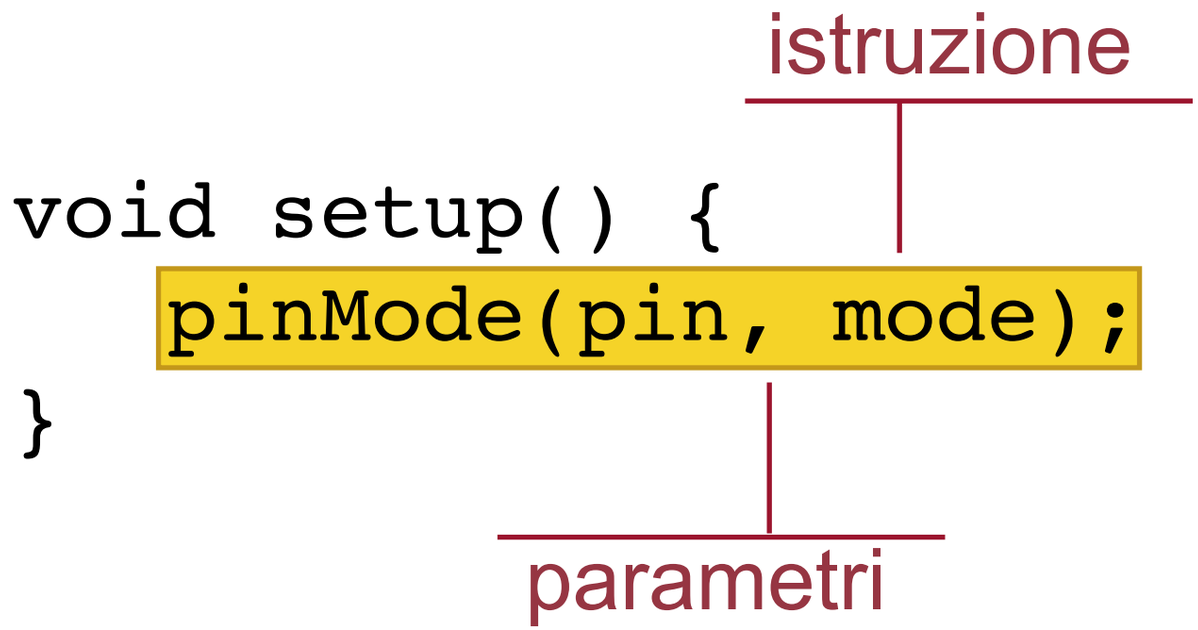
funzione

```
void setup() {
    pinMode(pin, mode);
}
```

# setup()



# setup()



# setup()

```
void setup() {
   pinMode(10, OUTPUT);
}
```

# setup()

```
void setup() {
   pinMode(10, INPUT);
}
```

# loop()

```
float V;

void setup() {
   …
}

void loop() {
   V=analogRead(pin)*5./1024;
}
```

# loop()

le variabili vanno dichiarate

```
float V;

void setup() {
   …
}

void loop() {
   V=analogRead(pin)*5./1024;
}
```

# loop()

```
float V;

void setup() {
   …
}

void loop() {
    V=analogRead(pin)*5./1024;
}
```

i valori si assegnano con l'operatore =

# loop()

```
float V;

void setup() {
   …
}

void loop() {
    V=analogRead(pin)*5./1024;
}
```

analogRead(pin)
legge la tensione
sul pin analogico

# loop()

```
float V;

void setup() {
   …
}

void loop() {
    V=analogRead(A0)*5./1024;
}
```

i pin analogici si indicano con A0-A5

# loop()

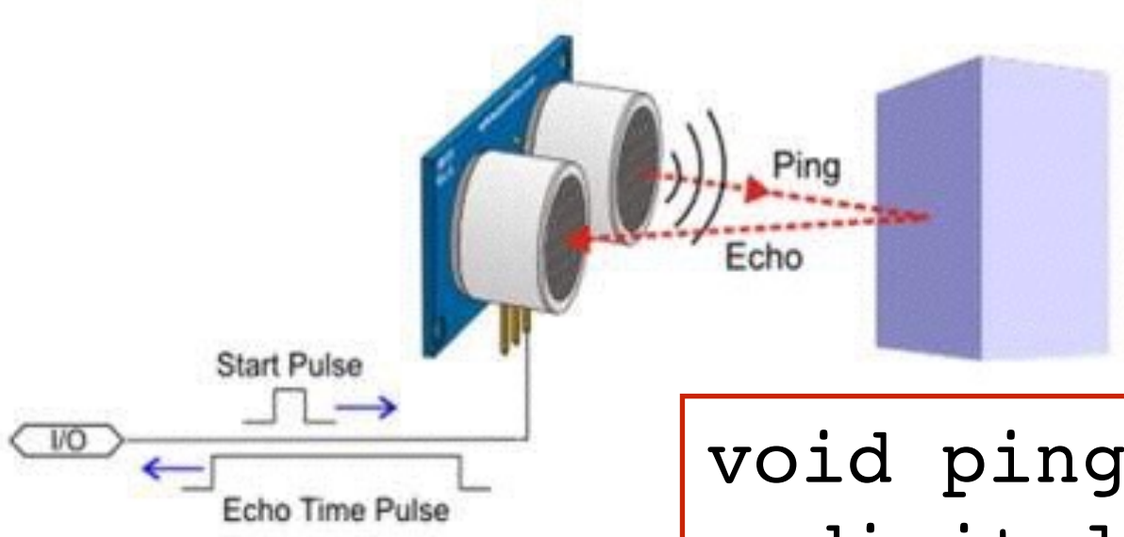
```
float V;

void setup() {
   …
}

void loop() {
   V=analogRead(pin)*5./1024;
}
```

fattore di conversione

# What can you do with Arduino?

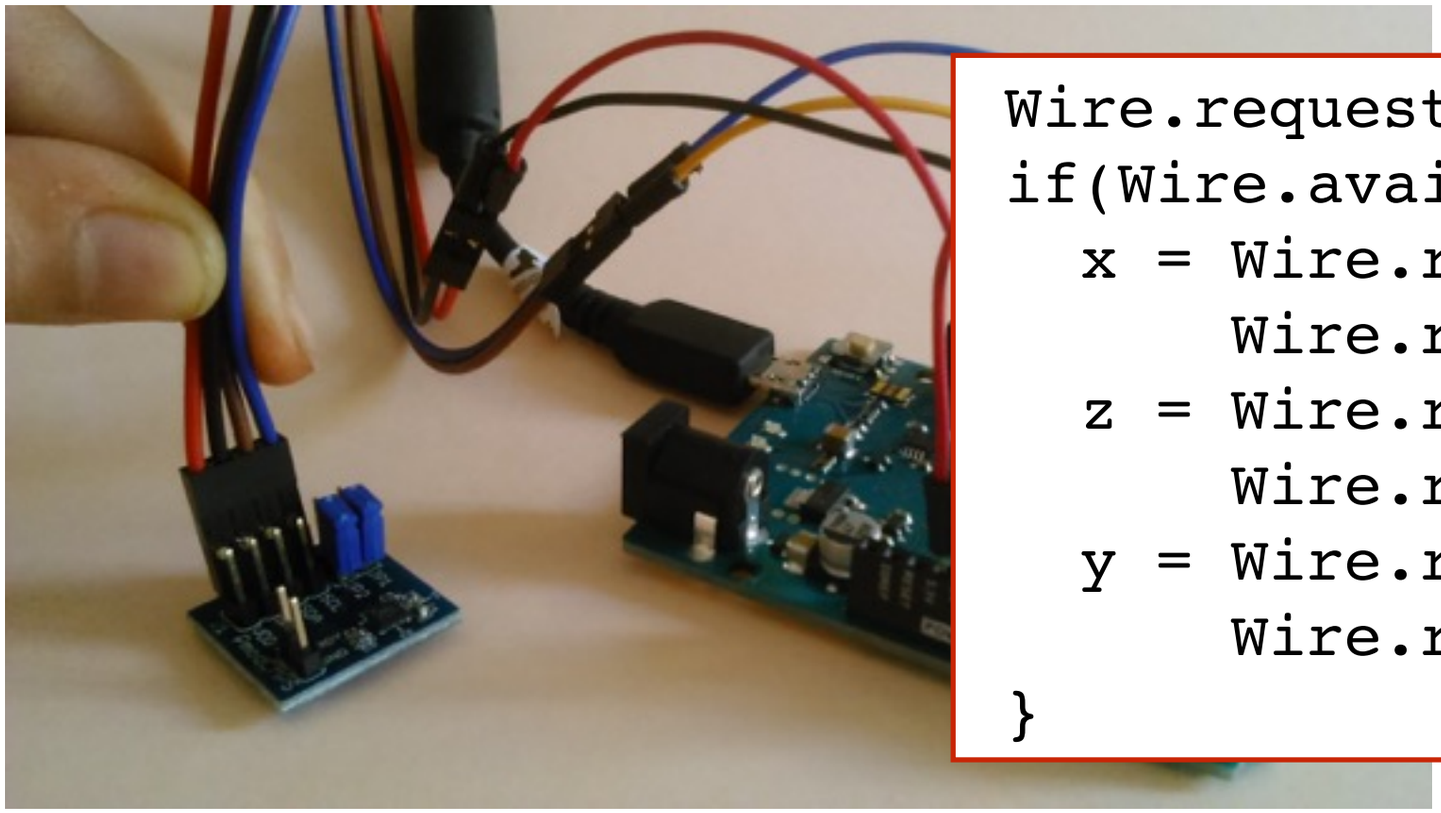



```
void ping(){
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
}
```

```
void loop(){
  int x = 0;
  ping();
  x = pulseIn(echoPin, HIGH);
  t = micros();
}
```

# What can you do with Arduino?

Example: mapping magnetic field in 3D



```
Wire.requestFrom(ADDRESS , 6);
if(Wire.available()) {
  x = Wire.read()*256+
      Wire.read();
  z = Wire.read()*256+
      Wire.read();
  y = Wire.read()*256+
      Wire.read();
}
```