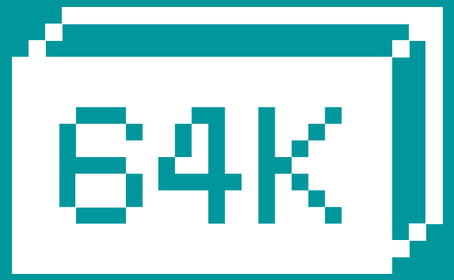


FONDAMENTI DI ARDUINO

LEZIONE 1: LE BASI

8 novembre 2016

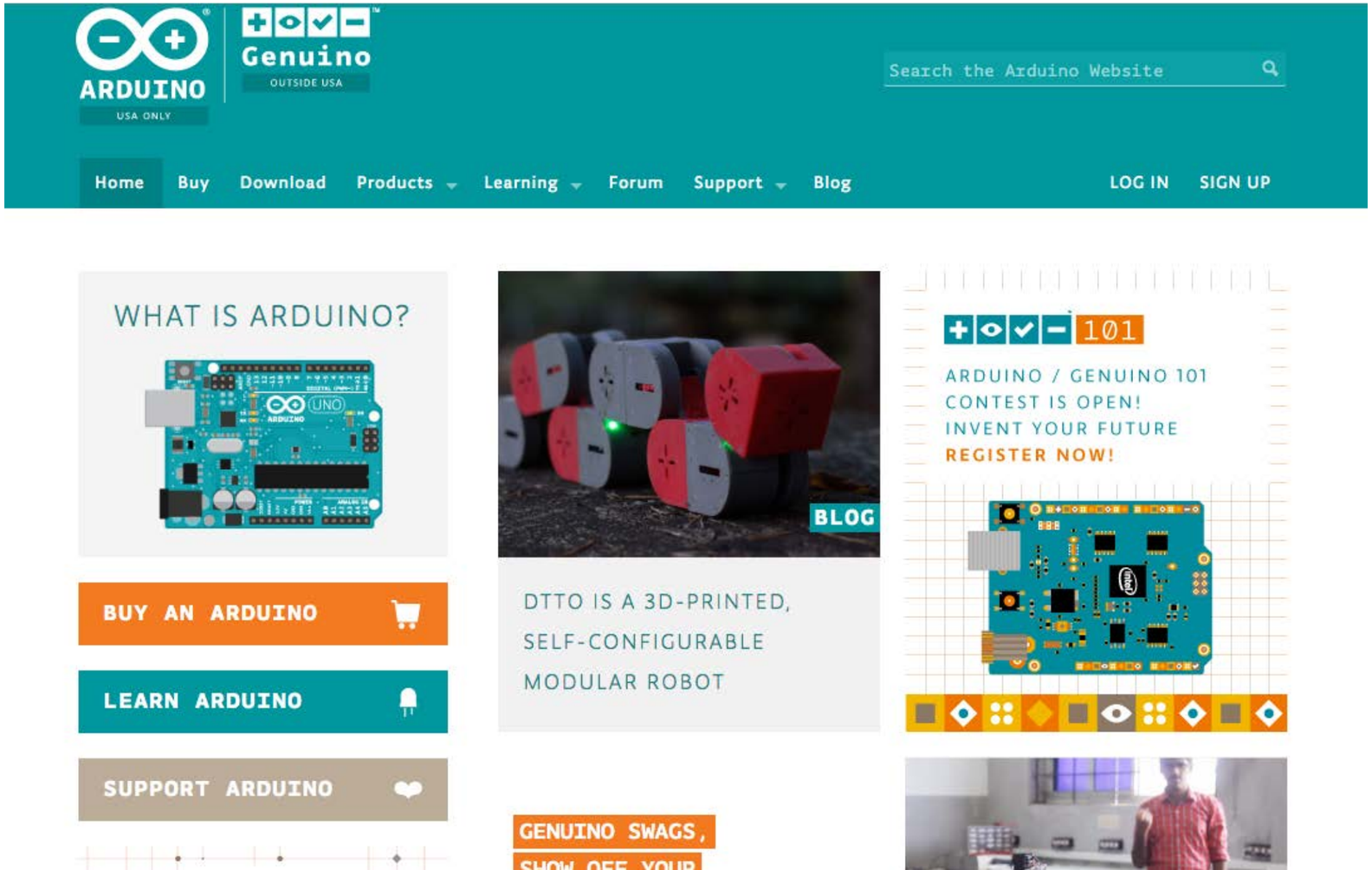
presso POLIFACTORY

il makerspace del Politecnico di Milano

PROGRAMMA DEL CORSO

8/11	Le basi, corrente elettrica, led, resistenze
10/11	Ingressi analogici, PWM, debouncing
15/11	Display + seriale + wifi
17/11	Supporto al progetto

CHE COS'È ARDUINO?



CHE COS'È ARDUINO?

Arduino è una piattaforma di prototipazione elettronica open-source basata su un di un hardware e un software flessibile, facile da usare.

È stato progettato per artisti, designer, hobbysti e per chiunque sia interessato alla creazione di oggetti e ambienti interattivi.

CHE COS'È ARDUINO?

HARDWARE

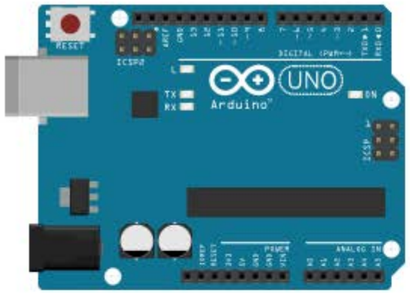
+

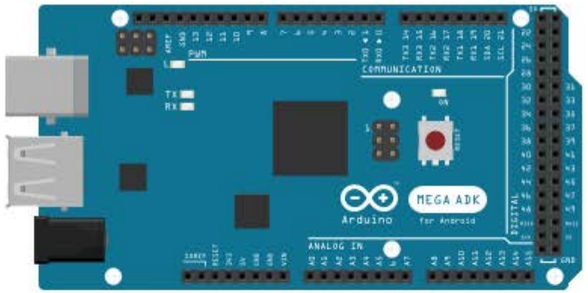
COMMUNITY

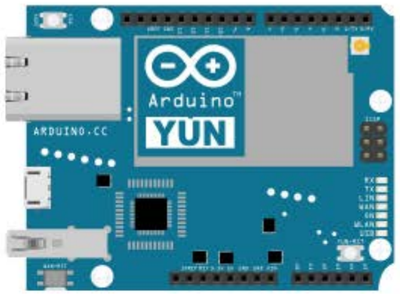
+

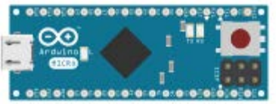
SOFTWARE

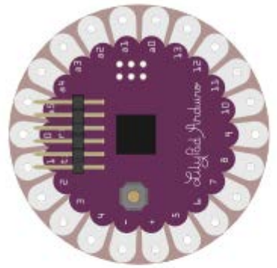
HARDWARE: BOARD

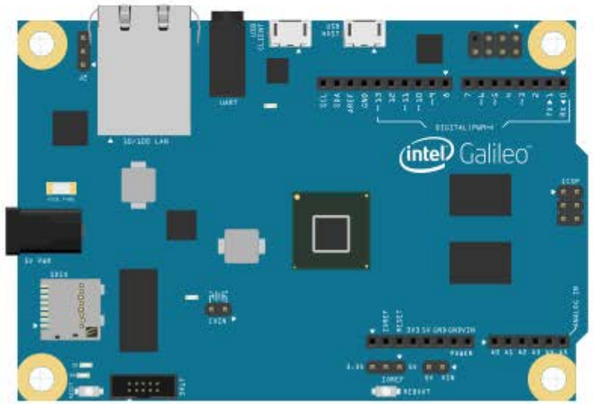


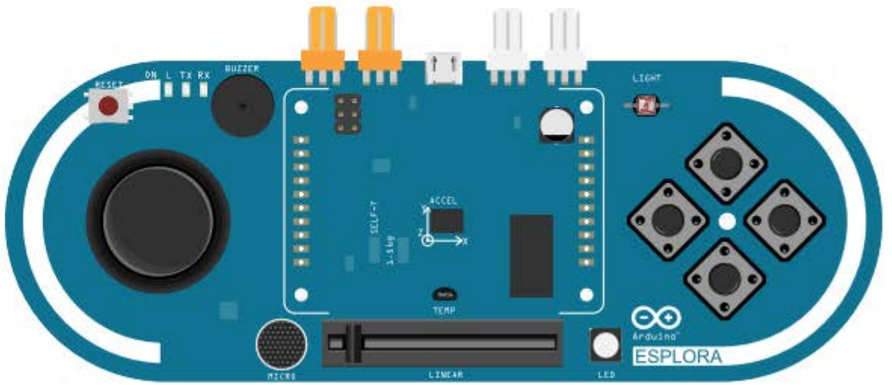


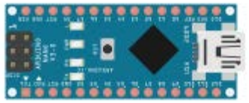


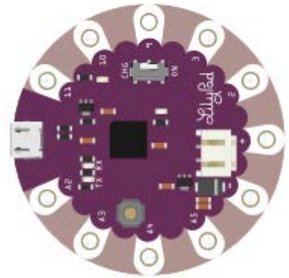




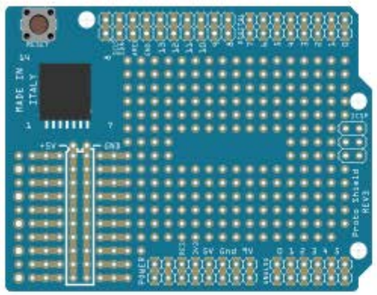


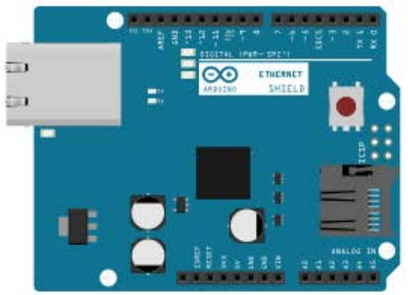


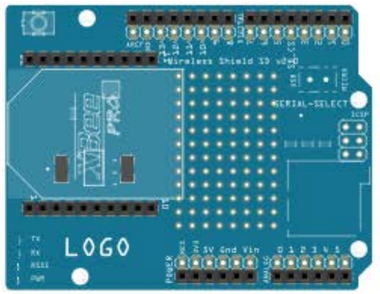


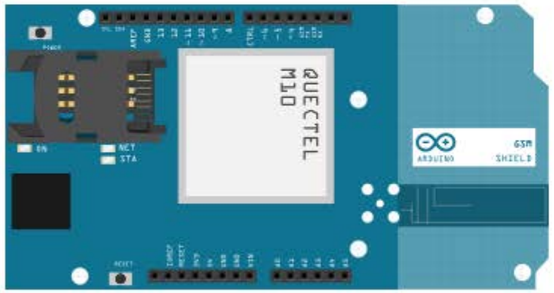


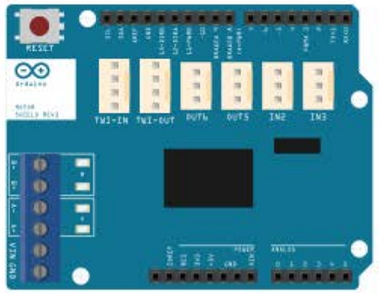
HARDWARE: SHIELD



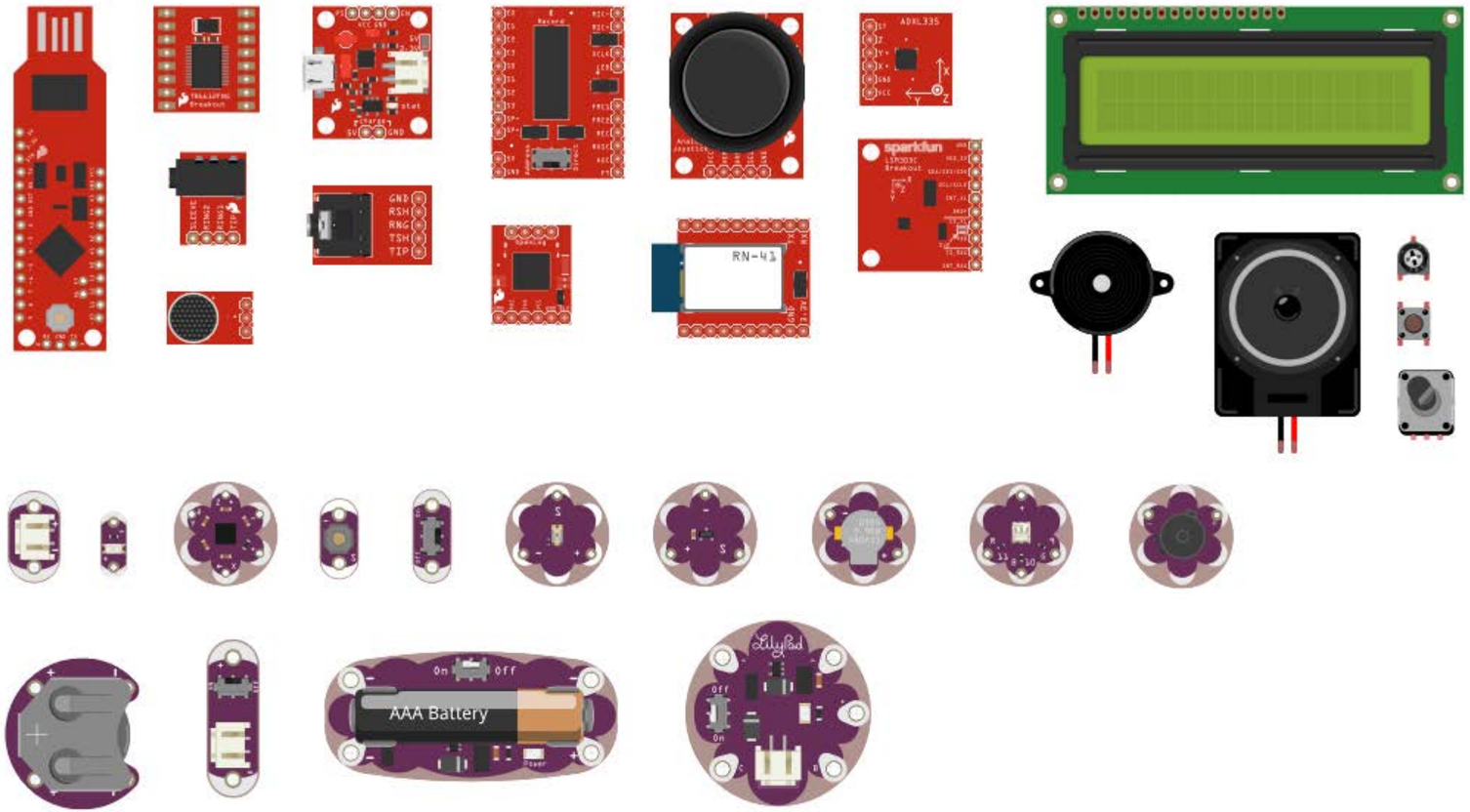




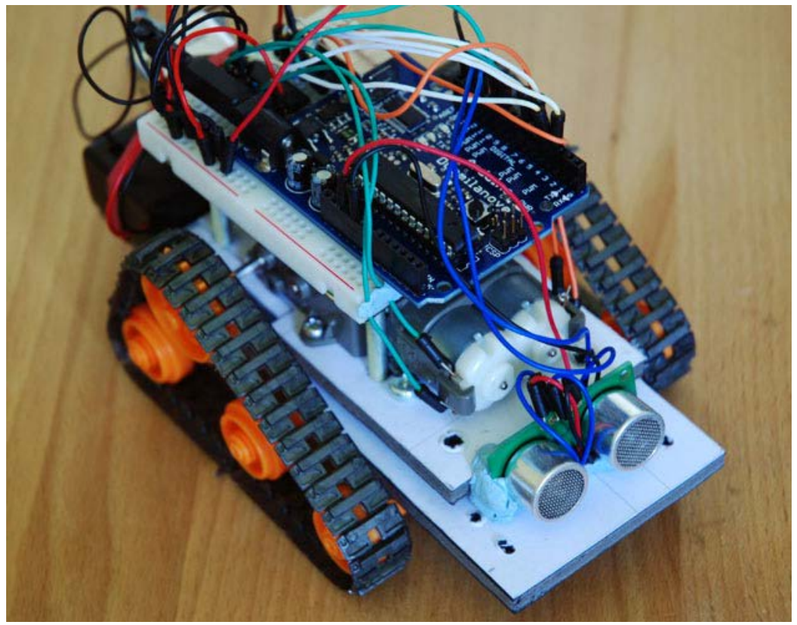


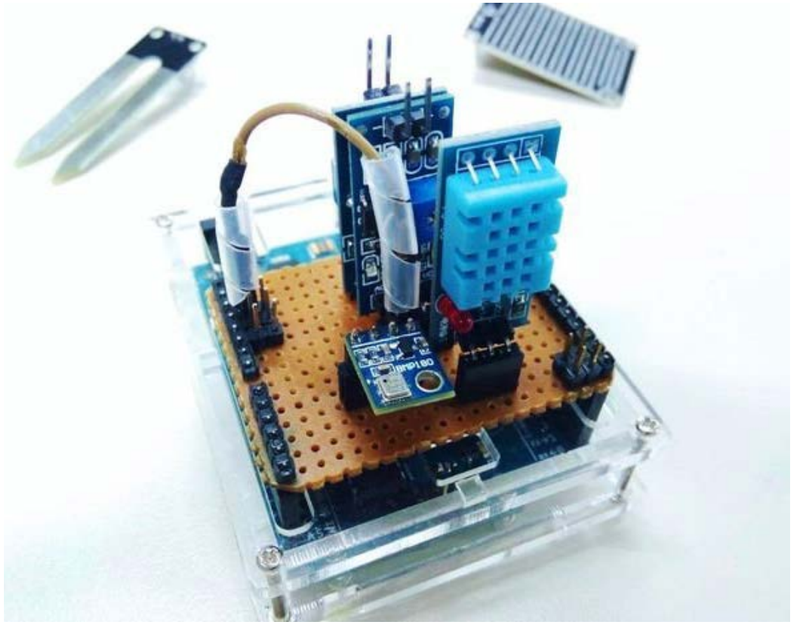


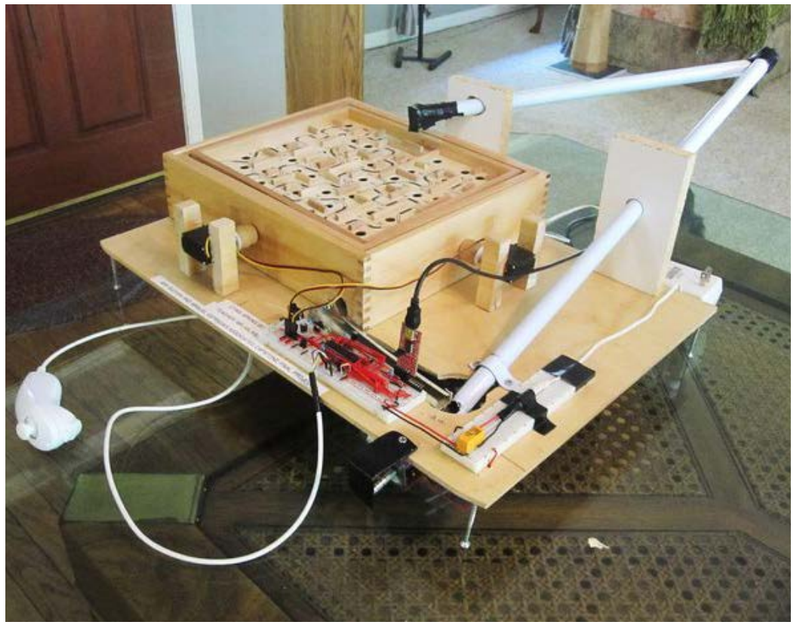
HARDWARE: PARTS



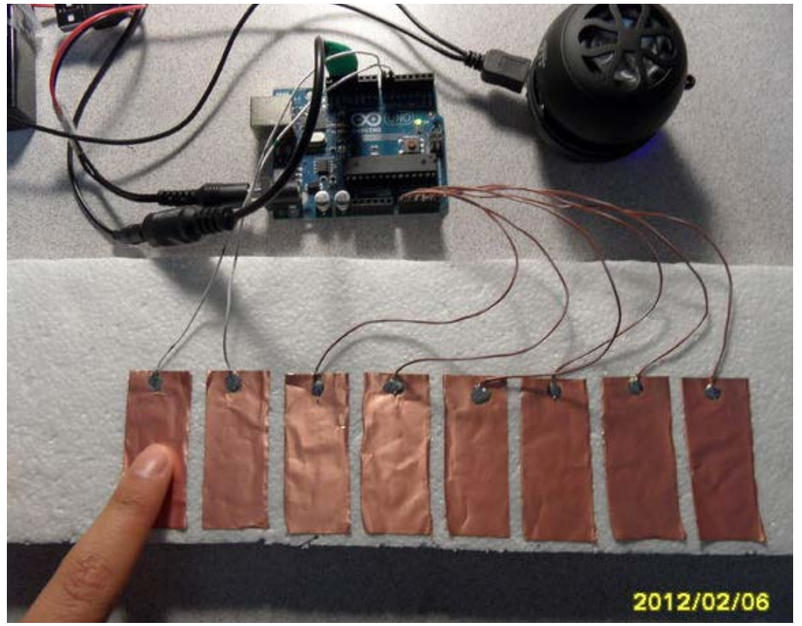
COMMUNITY

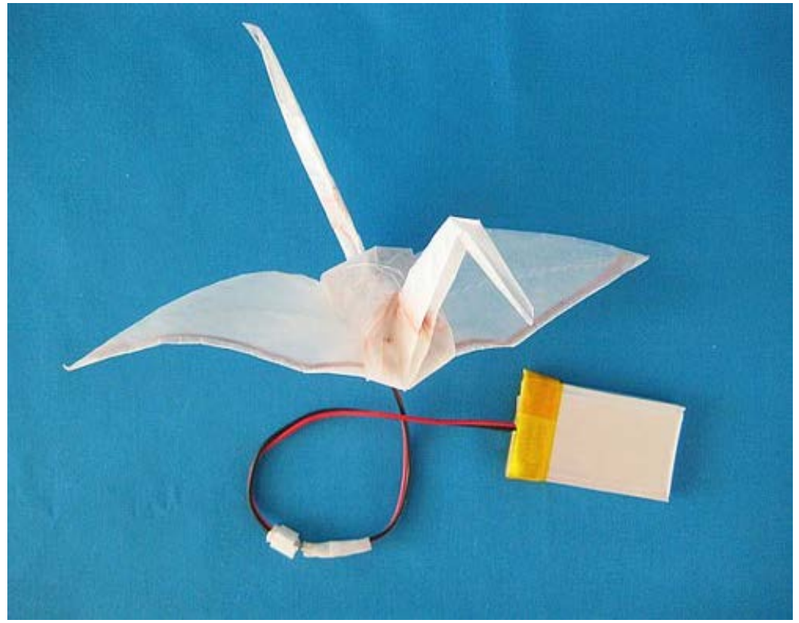






COMMUNITY





SOFTWARE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ENGLISH
Download the Arduino Software
ARDUINO 1.6.12
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 (Microsoft Store)
Get
Mac OS X 10.7 Lion or newer
Linux 32 bits
Linux 64 bits
Linux ARM (experimental)
Release Notes
Source Code
Checksums (sha512)

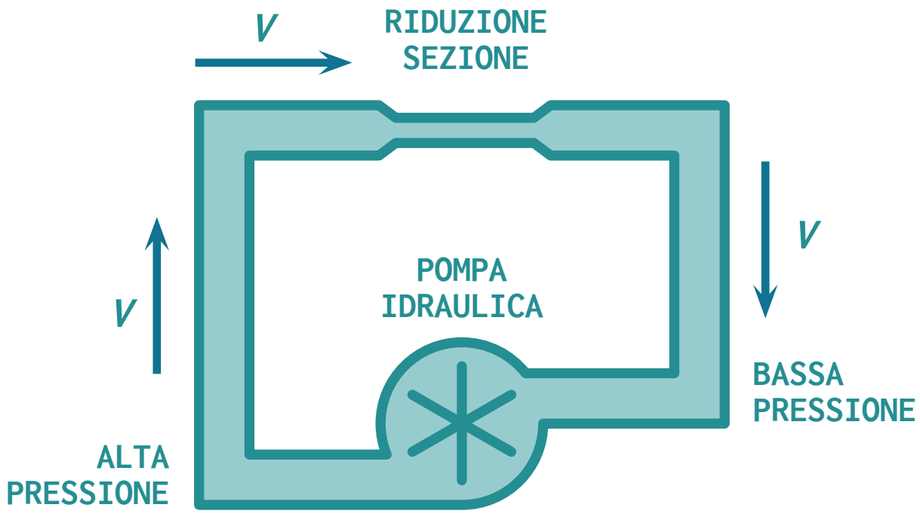
SOFTWARE

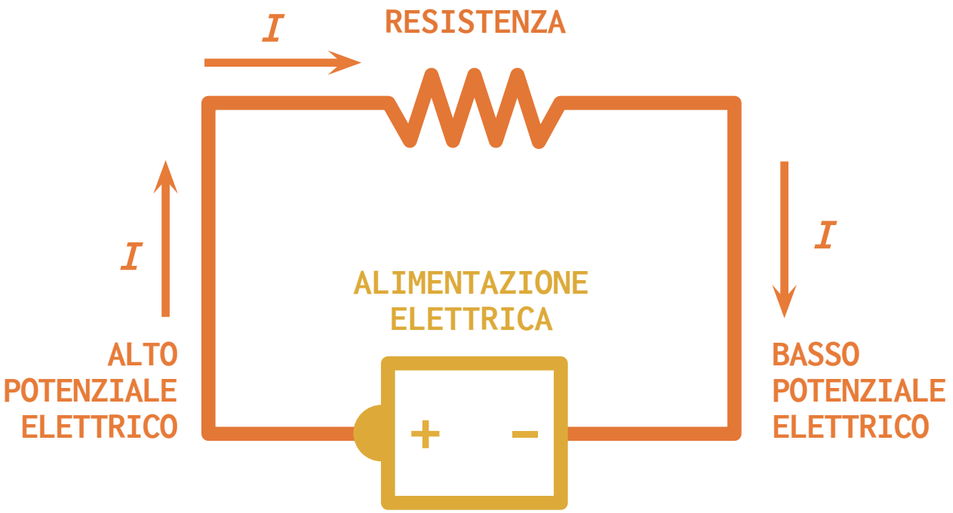

ARDUINO
Genuino
AN OPEN PROJECT WRITTEN, DEBUGGED,
AND SUPPORTED BY ARDUINO.CC AND
THE ARDUINO COMMUNITY WORLDWIDE
LEARN MORE ABOUT THE CONTRIBUTORS
OF ARDUINO.CC on arduino.cc/credits

COME CONQUISTARE IL MONDO...

...O FARLO ESPLODERE!

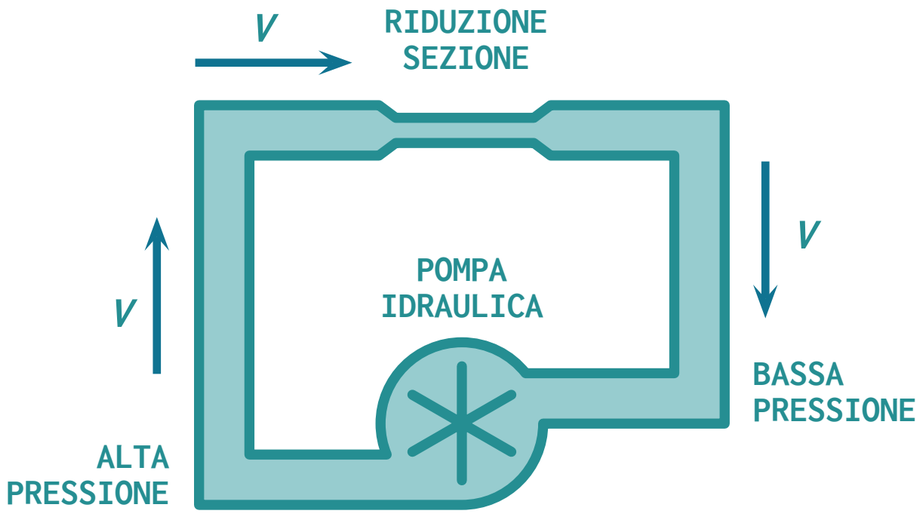
VOLTAGGIO. CORRENTE. RESISTENZA.

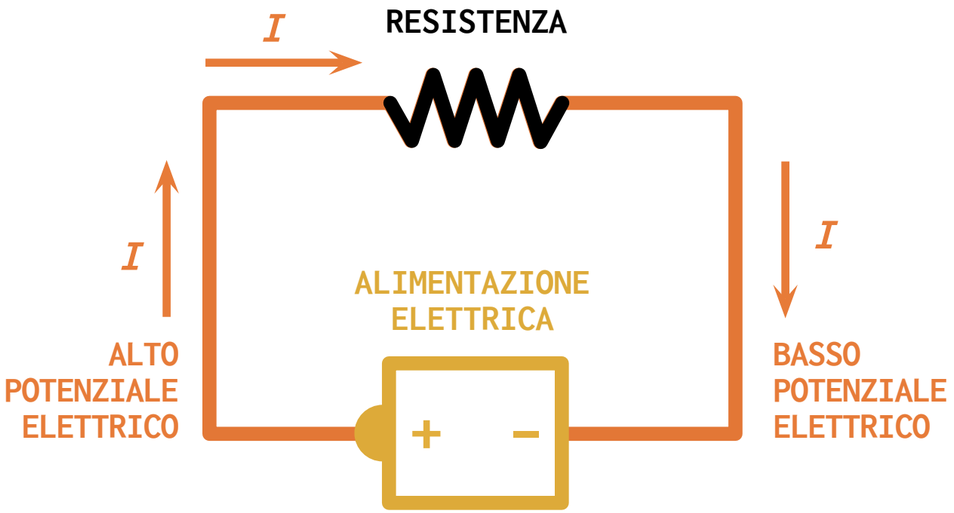




LA METAFORA ACQUATICA:
se immaginiamo di avere un circuito chiuso d’acqua, quest’ultima rappresenta gli elettroni.

VOLTAGGIO. CORRENTE. RESISTENZA.





(I) La velocità del flusso d'acqua rappresenta la **corrente**

(V) La differenza di pressione fra due punti rappresenta la **tensione** (o differenza di potenziale) tra due punti

(R) La variazione di sezione è la **resistenza**

LA LEGGE DI OHM

$$V = R * I \qquad I = \frac{V}{R}$$

Moltiplicando la resistenza per l’intensità di corrente elettrica, si ottiene la differenza di potenziale elettrico ai capi di un conduttore.

Dividendo da differenza di potenziale con l’intensità di corrente, si ottiene il valore della reistenza elettrica.

LA LEGGE DI OHM

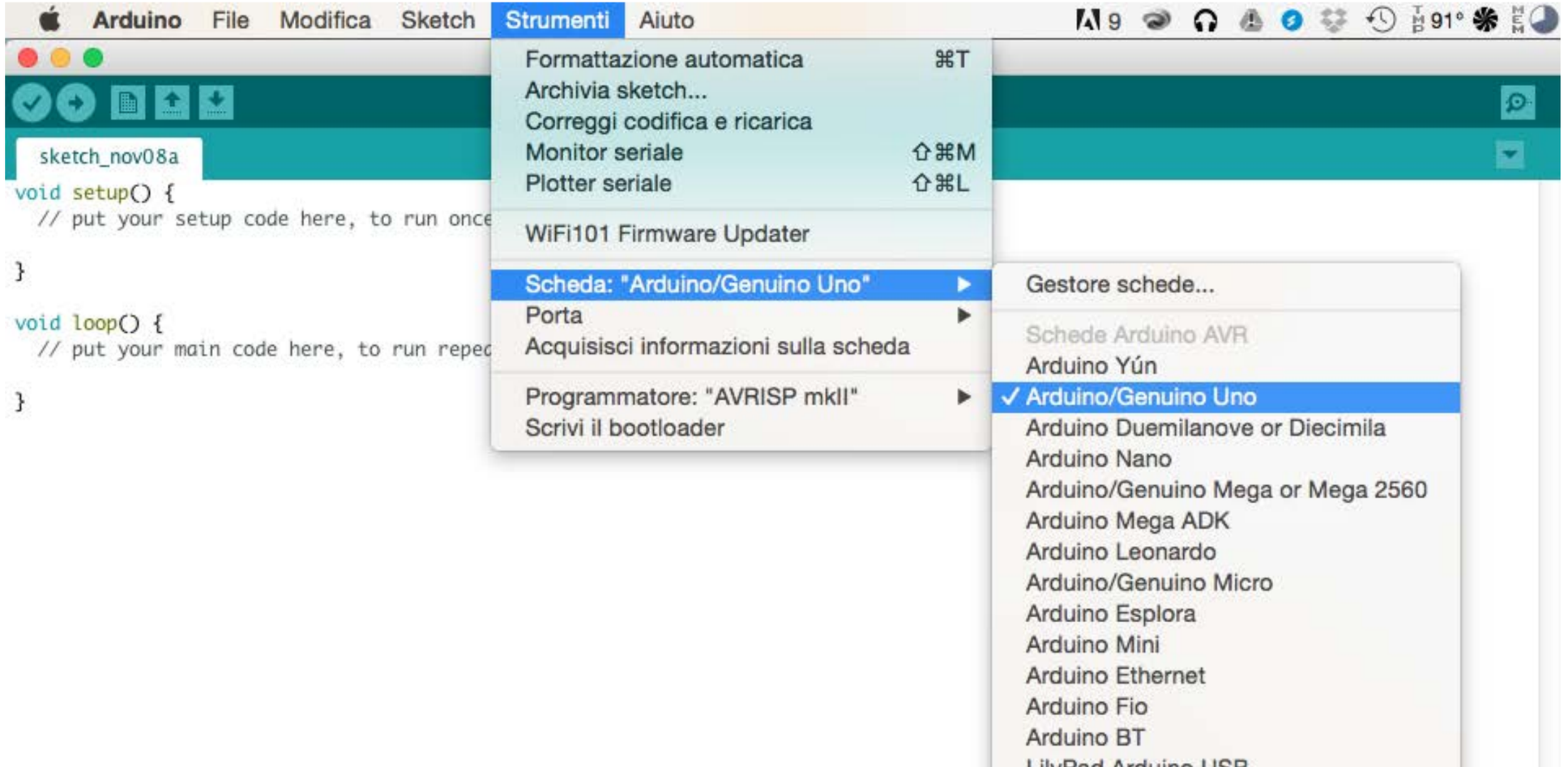
$$V = R * I \qquad I = \frac{V}{R}$$

A **parità di differenza di potenziale** *(V)*:
* se aumento la resistenza (R) diminuirà la corrente (I)
* se diminuisco la resistenza (R) aumenterà la corrente (I)

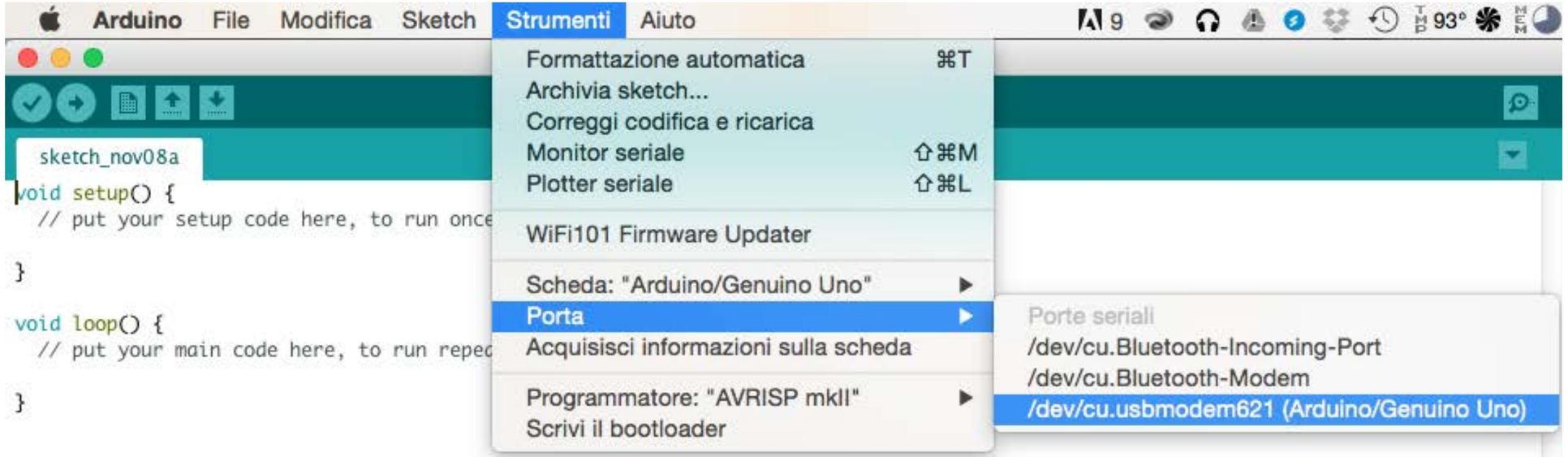
Casi limite:
* in un CIRCUITO APERTO la resistenza è infinita, quindi non passa corrente
* se la resistenza è zero si verifica un CORTO CIRCUITO, poichè passa infinita corrente


SI PARTE!

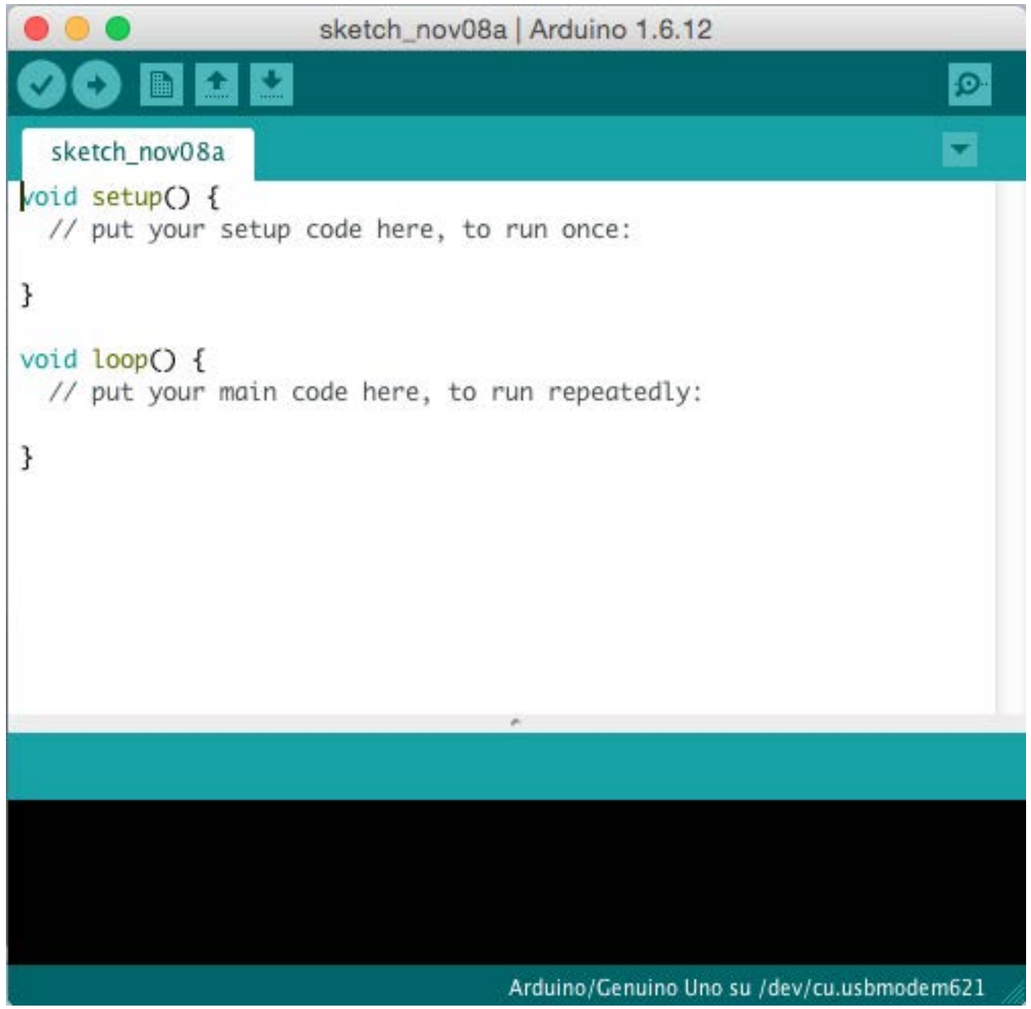
COLLEGAMENTO DI ARDUINO: SELEZIONE SCHEDA



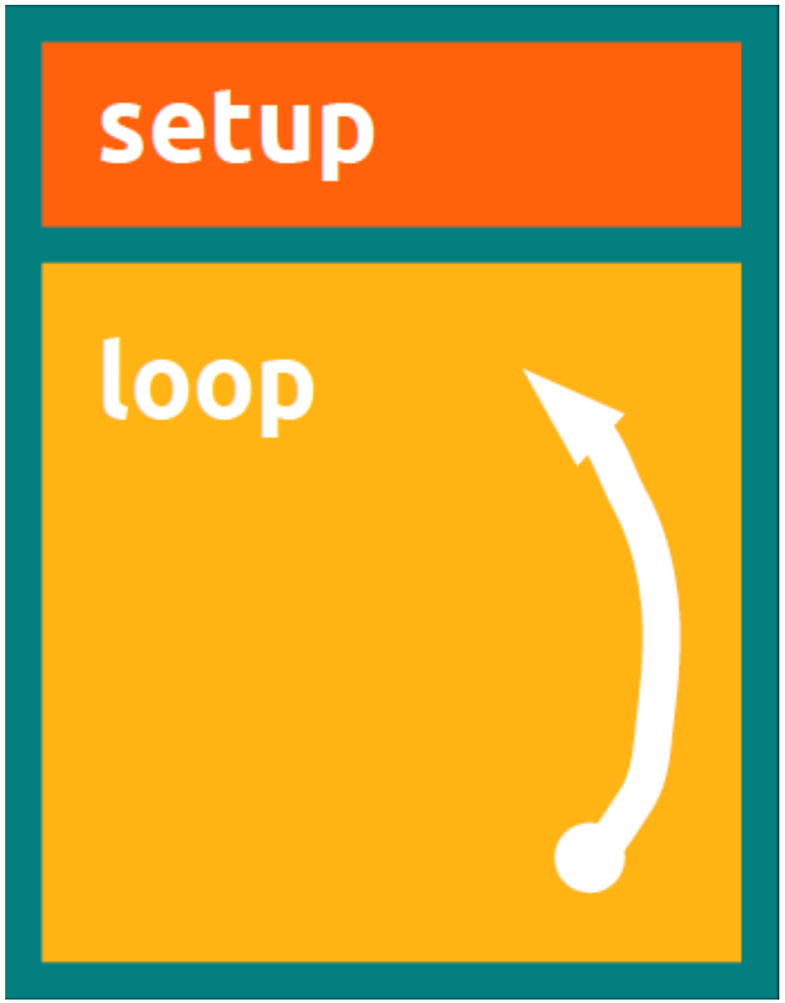
COLLEGAMENTO DI ARDUINO: SELEZIONE PORTA



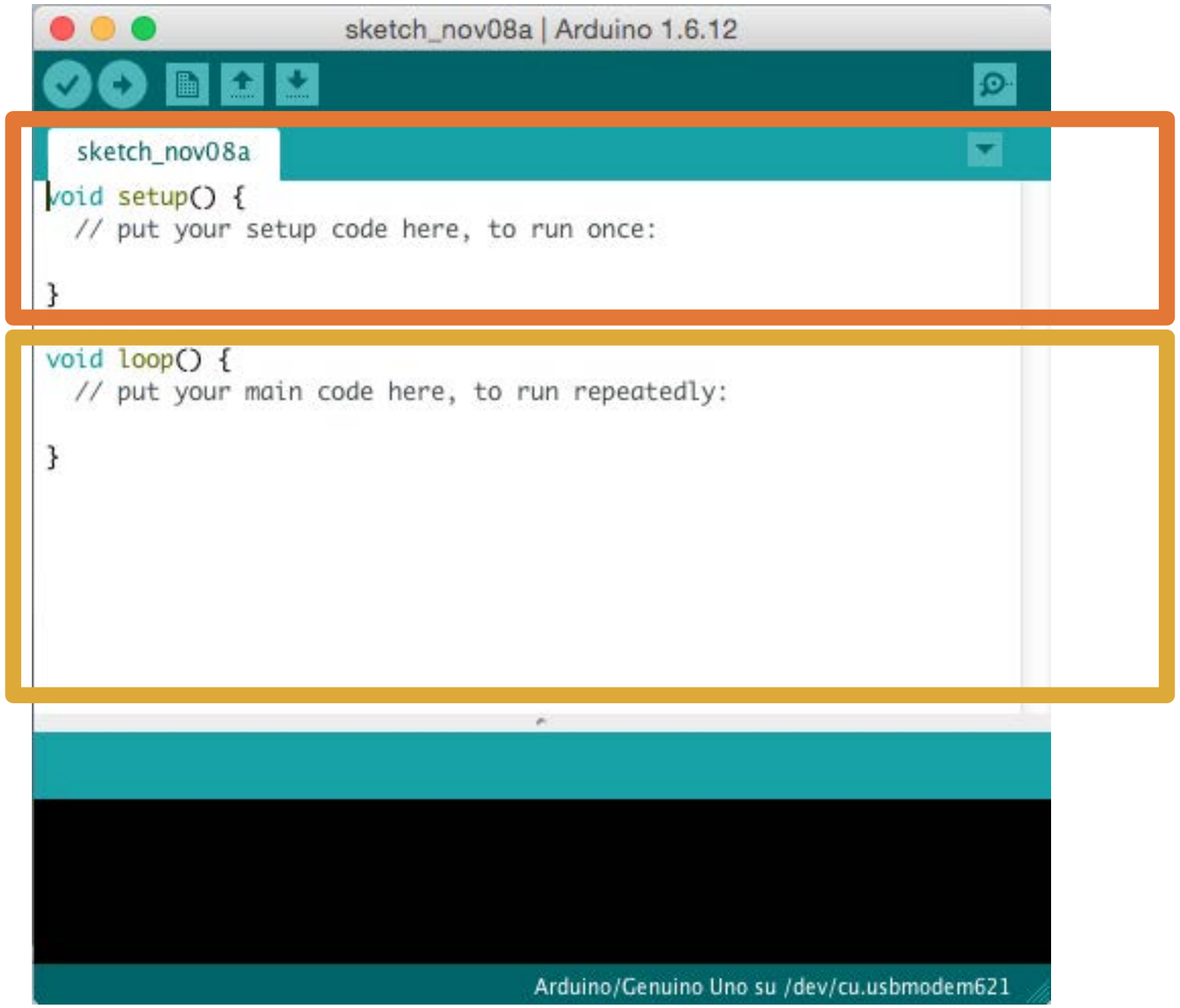
INTERFACCIA DI ARDUINO

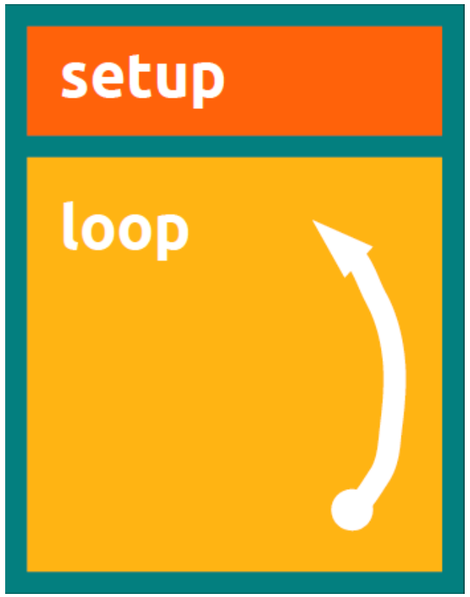


SETUP + LOOP



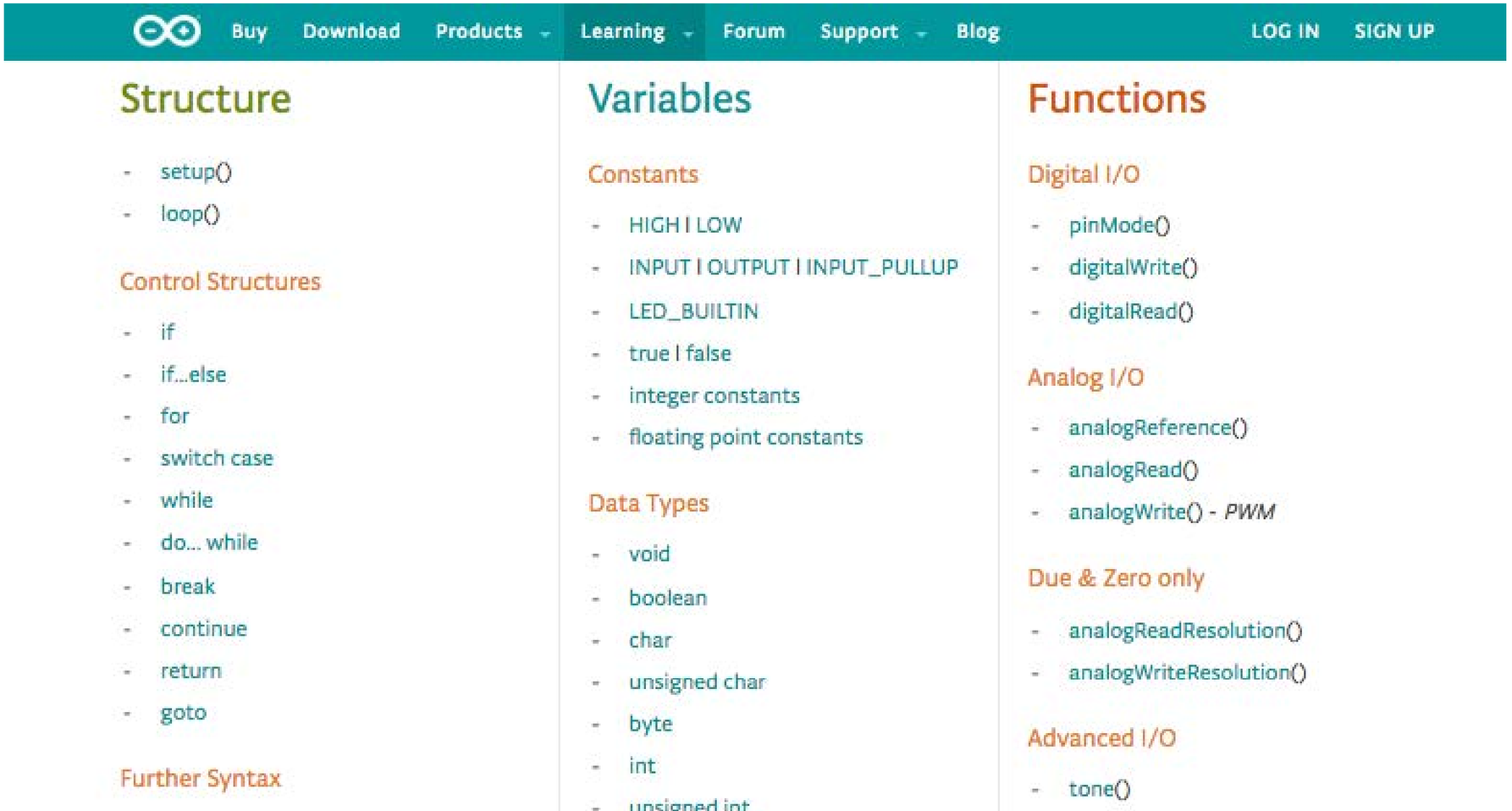
SETUP + LOOP


sketch_nov08a | Arduino 1.6.12
sketch_nov08a
void setup() {
// put your setup code here, to run once:
}
void loop() {
// put your main code here, to run repeatedly:
}
Arduino/Genuino Uno su /dev/cu.usbmodem621

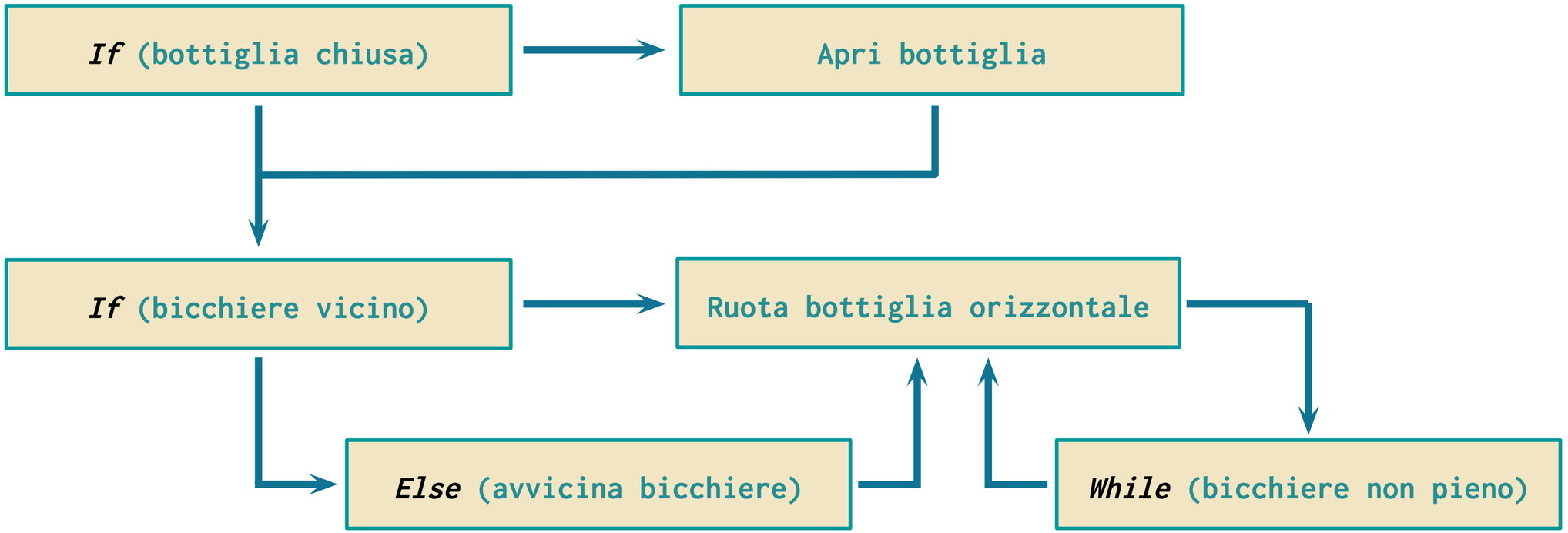

setup
loop

LINGUAGGIO DI PROGRAMMAZIONE

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



ESEMPIO:
COME VERSARSI DA BERE CON ARDUINO



ESERCIZIO 1:
BLINKG LED

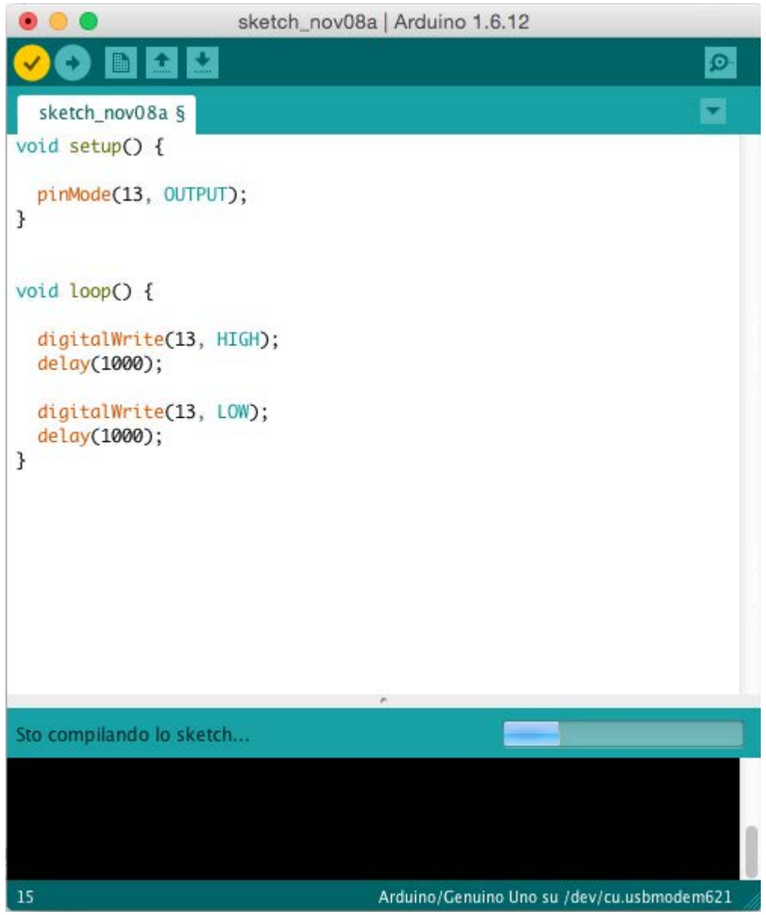
BLINKING LED: SETUP

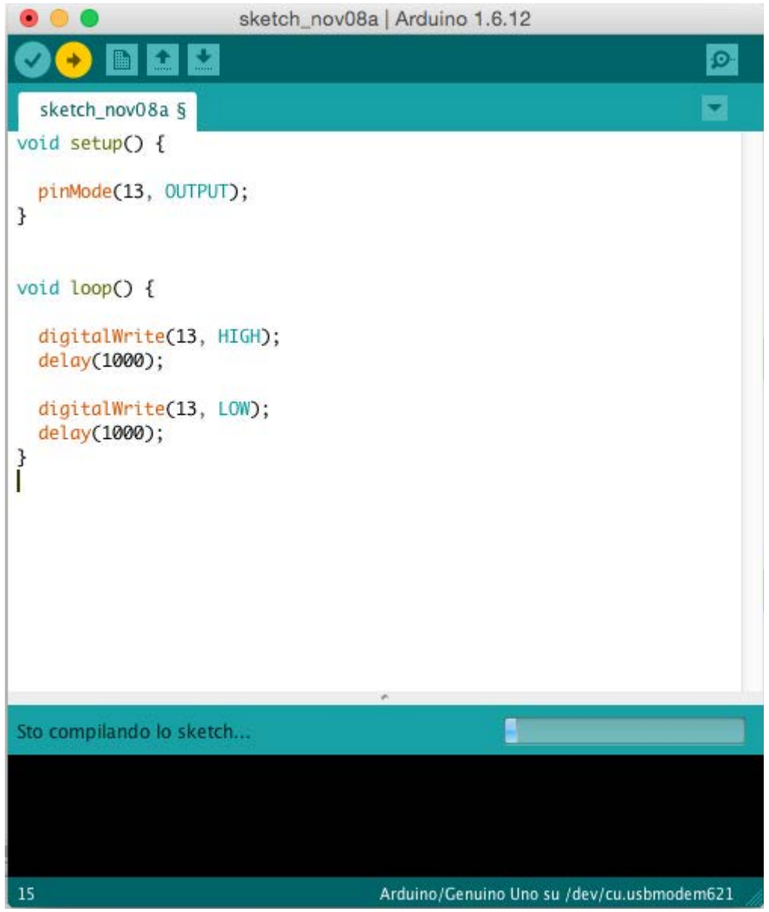
```
void setup() {

  pinMode(13, OUTPUT);
}
```

BLINKING LED: LOOP

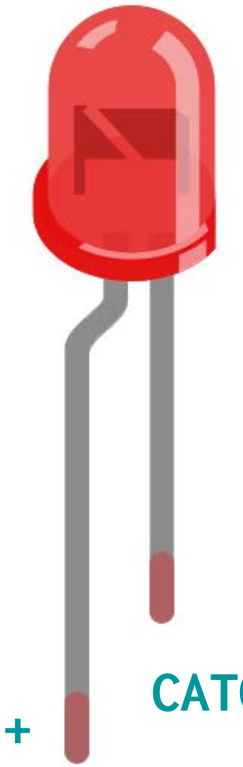
```
void loop() {

  digitalWrite(13, HIGH);
  delay(1000);

  digitalWrite(13, LOW);
  delay(1000);
}
```

VERIFICA + CARICA





LED



ANODO +

CATODO –

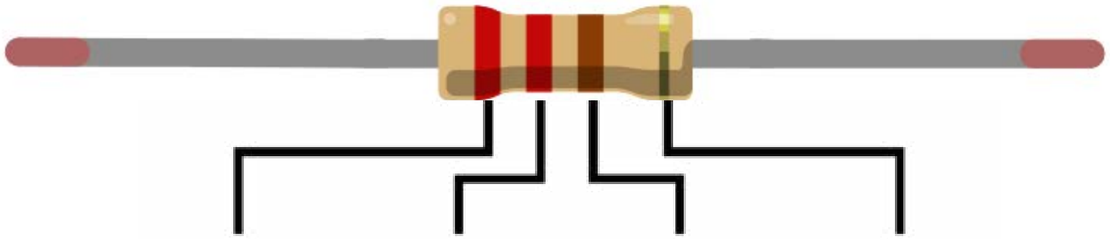
Il led si accende quando l’anodo si trova almeno a ~2.0 V in più rispetto al catodo

Il **polo -** è collegato a **GND**

Il **polo +** è collegato al **PIN** dopo il collegamento in serie ad una **resistenza**

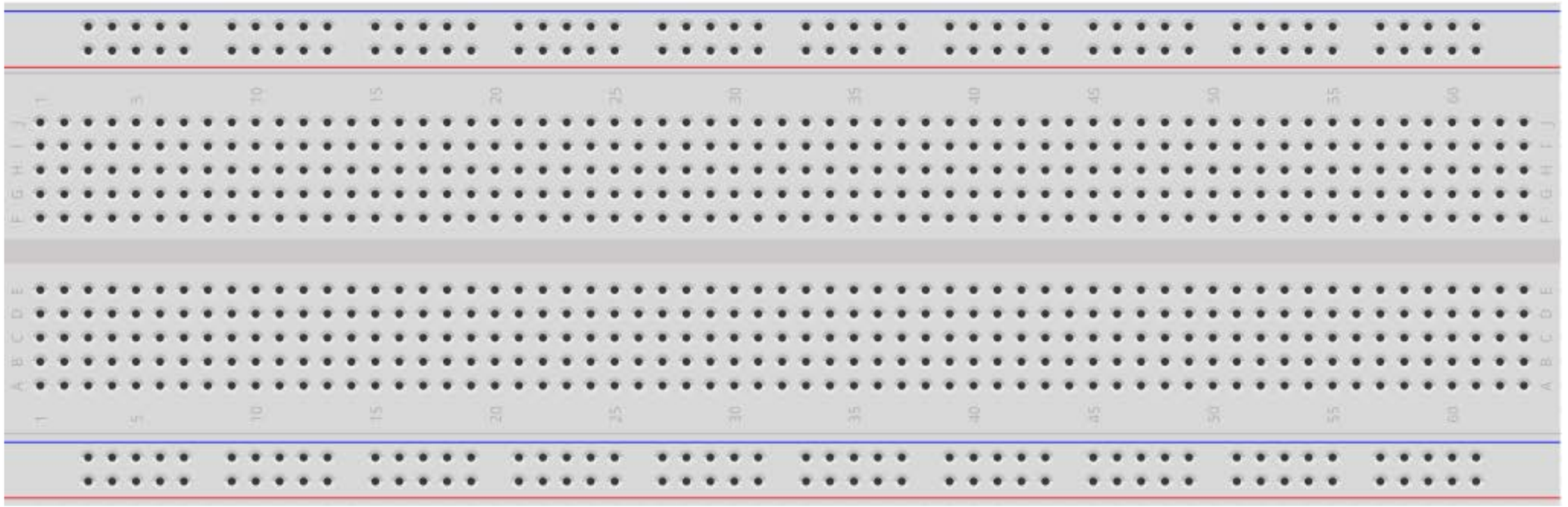
NB: NON COLLEGARE MAI IL LED SENZA UNA RESISTENZA IN SERIE

RESISTENZA

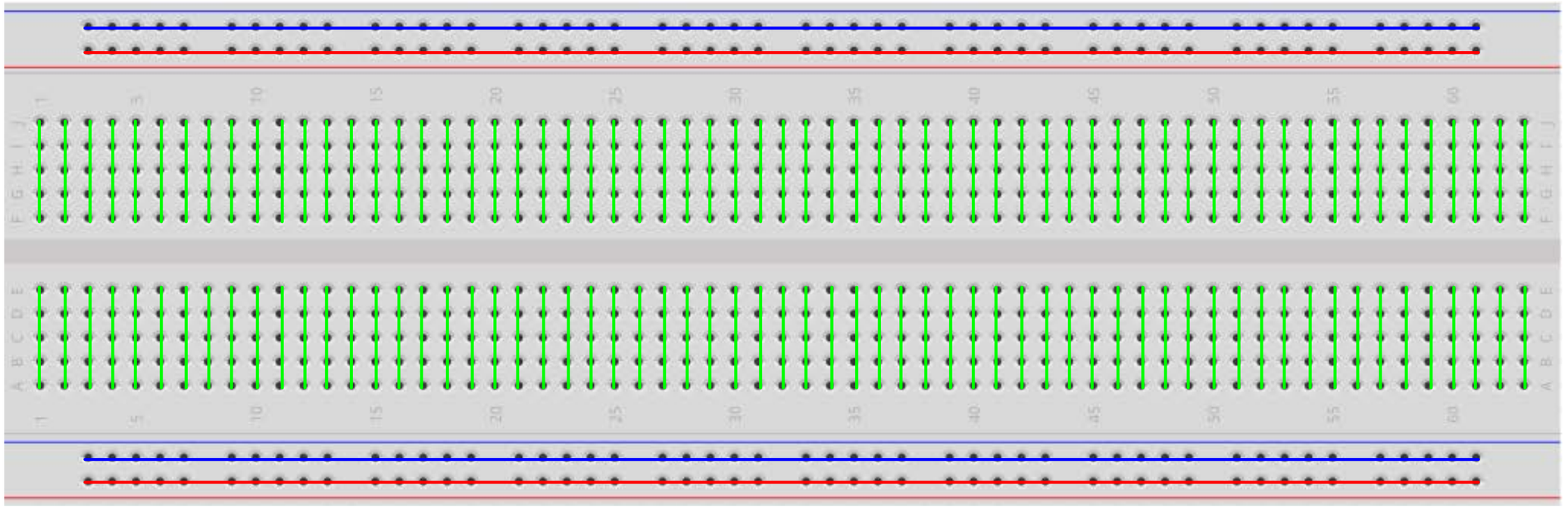


1st digit	2nd digit	Multiplier	Tolerance
0	0	x 1	
1	1	x 10	±1%
2	2	x 100	±2%
3	3	x 1K	
4	4	X 10K	
5	5	x 100K	
6	6	x 1M	
7	7		
8	8	x 0.1	±5%
9	9	x 0.01	±10%

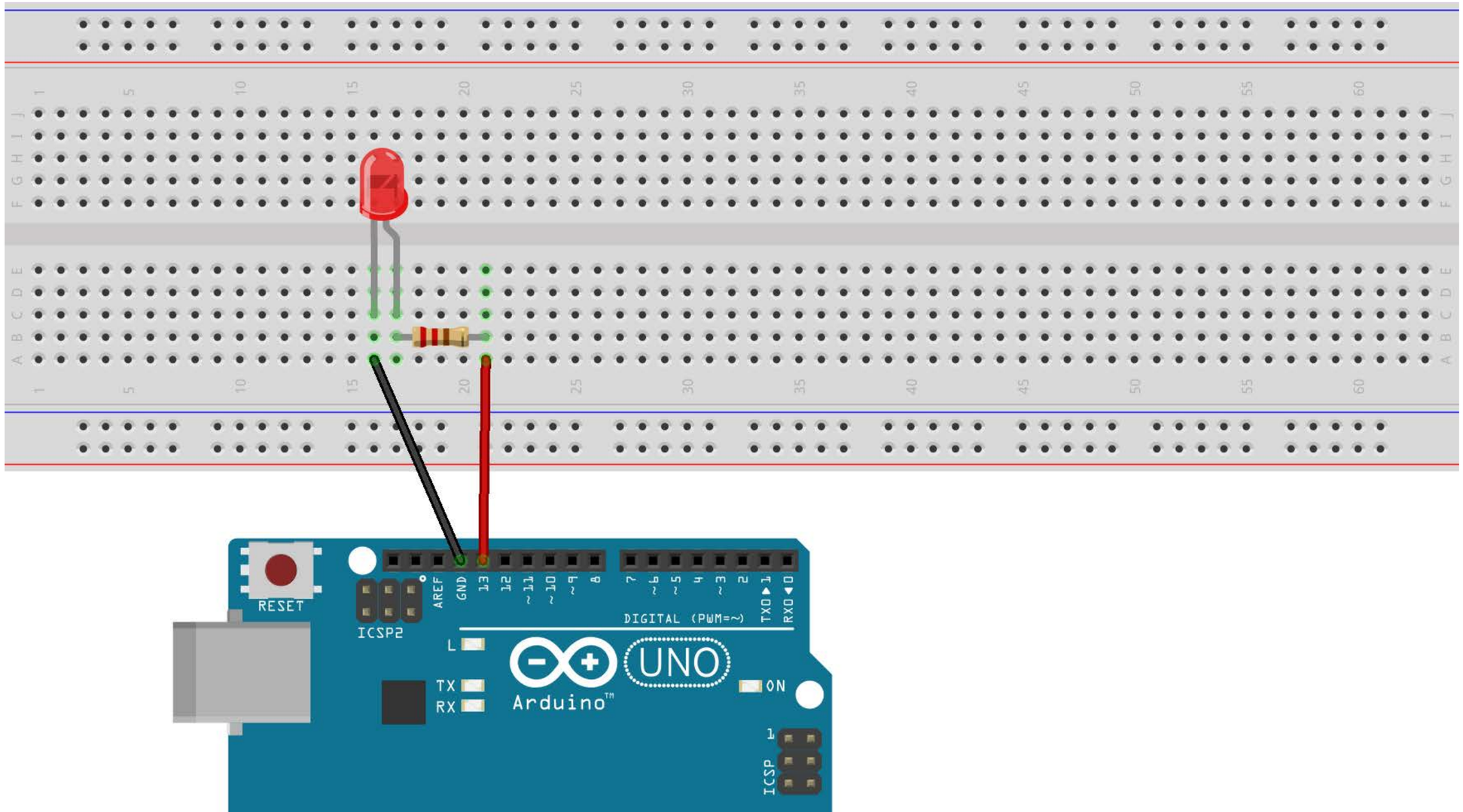
BREADBOARD



BREADBOARD



BLINKING LED: VCOLLEGAMENTI



ESERCIZIO 1B:

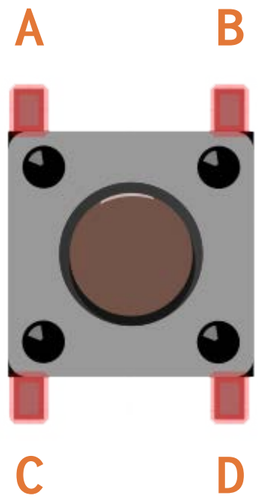
S O S

BLINKING LED: SOS SOLUTION

```
void loop() {
  digitalWrite(13, HIGH);
  delay(500);
  digitalWrite(13, LOW);
  delay(500);
  digitalWrite(13, HIGH);
  delay(500);
  digitalWrite(13, LOW);
  delay(500);
  digitalWrite(13, HIGH);
  delay(500);
  digitalWrite(13, LOW);
  delay(500);
  digitalWrite(13, HIGH);
  delay(2000);
  digitalWrite(13, LOW);
  delay(500);
  digitalWrite(13, HIGH);
  delay(2000);
  digitalWrite(13, LOW);
  delay(500);
  digitalWrite(13, HIGH);
  delay(2000);
  digitalWrite(13, LOW);
  delay(500);
  digitalWrite(13, HIGH);
  delay(500);
  digitalWrite(13, LOW);
  delay(500);
  digitalWrite(13, HIGH);
  delay(500);
  digitalWrite(13, LOW);
  delay(500);
  digitalWrite(13, HIGH);
  delay(500);
  digitalWrite(13, LOW);
  delay(2000);
}
```

ESERCIZIO 2:
PULSANTE

PULSANTE



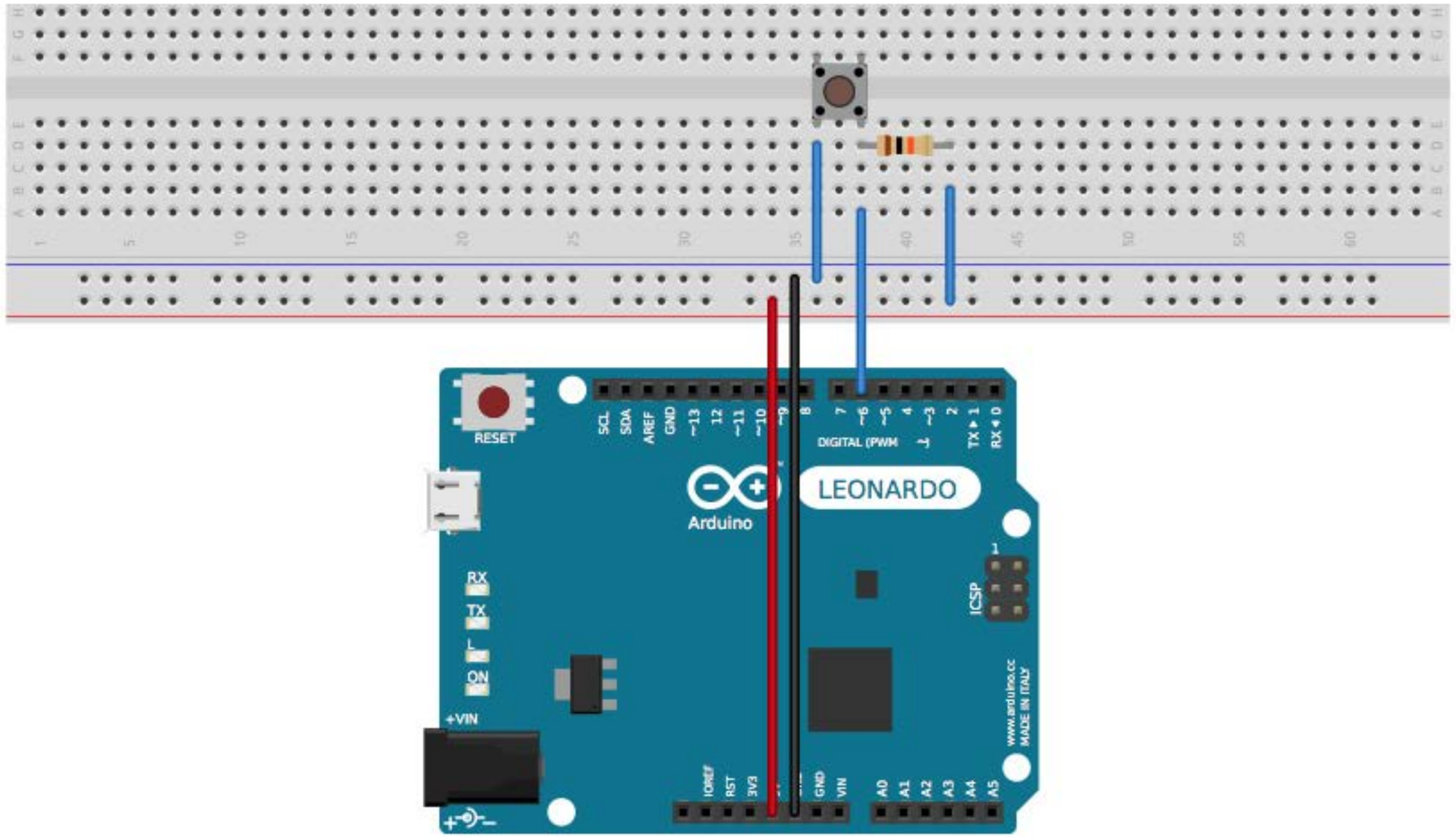
A e C sono sempre connessi,

B e D sono sempre connessi.

Quando si schiaccia il bottone sono tutti connessi

PULSANTE: COMPONENTI

PULSANTE: COLLEGAMENTI



PULSANTE: SETUP

```
int ledPin = 13;
int buttonPin = 6;
int interval = 1000;

void setup(){

  pinMode(buttonPin, INPUT);
  pinMode(ledPin, OUTPUT);

}
```

PULSANTE: LOOP

```
void loop(){

  if (digitalRead(buttonPin) == LOW){
    digitalWrite(ledPin, HIGH);
    delay(interval);
    digitalWrite(ledPin, LOW);
    delay(interval);
  } else {

  digitalWrite(ledPin, LOW);
  }
}
```

A GIOVEDÌ

CON LA SECONDA LEZIONE