



# Hardware Livre USP

Introdução ao Arduino

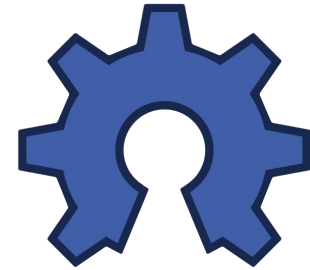
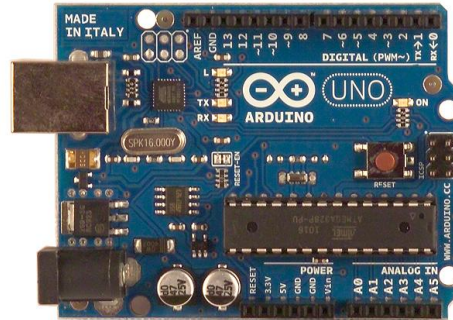


- Hardware Livre
- Hardware Livre USP
- Corrente e Tensão
- Resistência
- Diodo
- Protoboard
- Arduino
- Blink
- Push Button
- Genius
- Sorteio



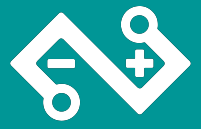
## Open Source ?

- Uso livre
- Projeto aberto
- Liberdade para alterar
- Liberdade para Redistribuir



open hardware

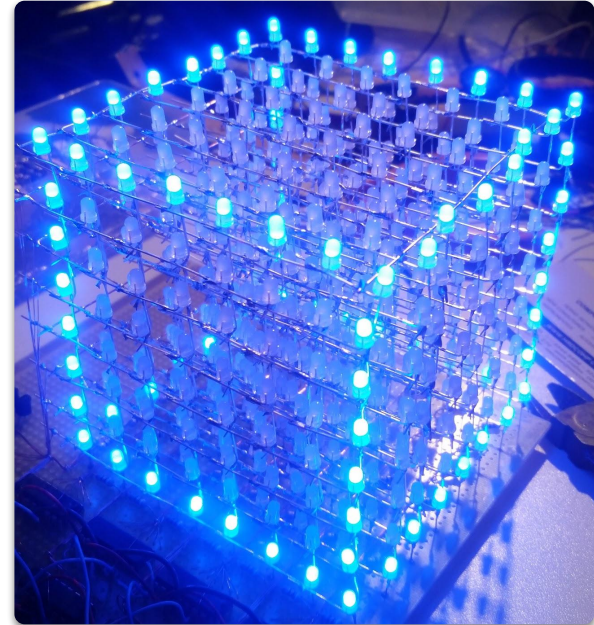
# Hardware Livre USP



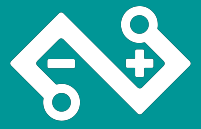




- 512 leds e um Arduino com 13 pinos. (Que magia é essa??)
- Projeto feito em parceria com a Matemateca
- Desafio em aberto...



# Centrífuga



- Feita em parceria com o Symbio
- Medalhista de prata no IGEM em Boston





- Feito para a semana de recepção dos calouros de 2015
- Controle através de aplicativo por meio de Bluetooth

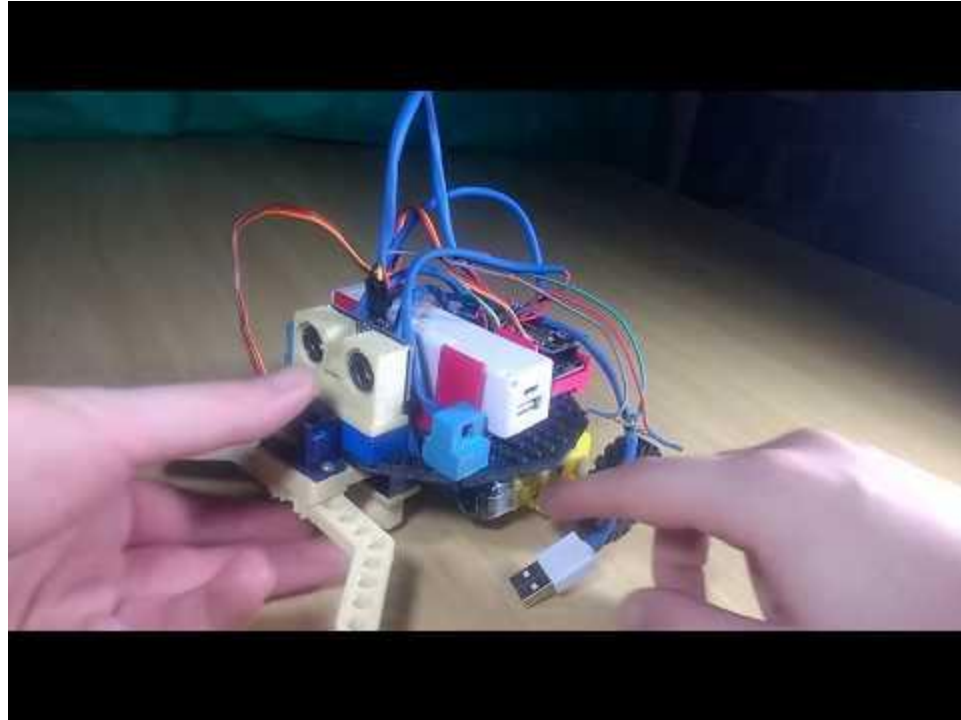




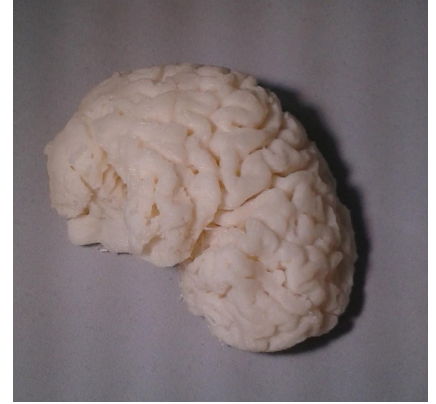
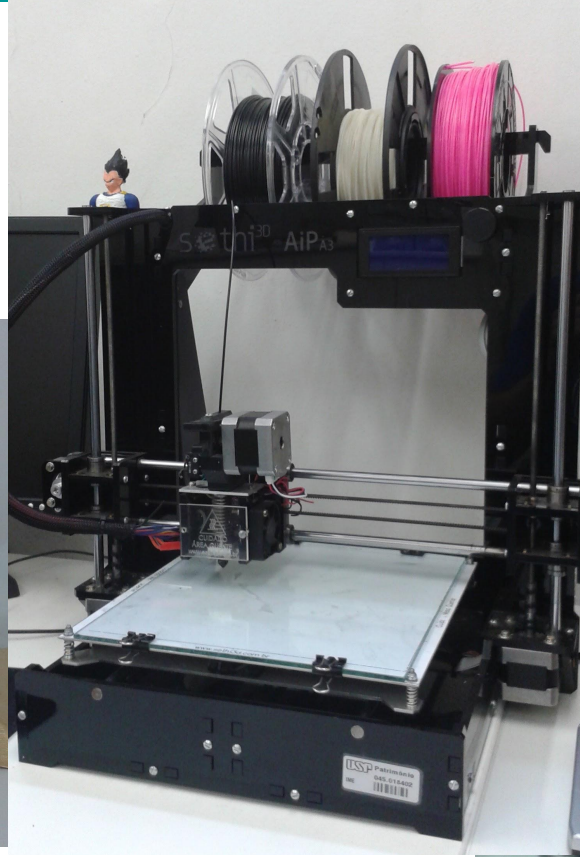
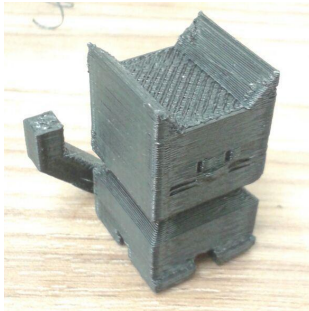
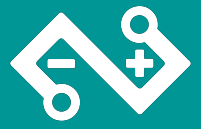


- Robô para ensino de lógica de programação para crianças e adolescentes
- Interface de programação gráfica
- Peças impressas em 3D
- Composto por ferramentas abertas





# Laboratório de Impressão 3D



# Corrente e Tensão

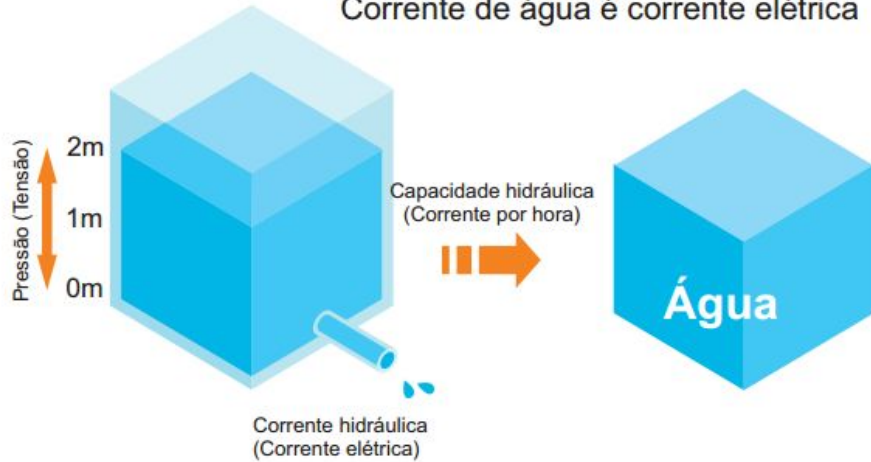


## Bateria

Pressão é Tensão

Volume é Capacidade

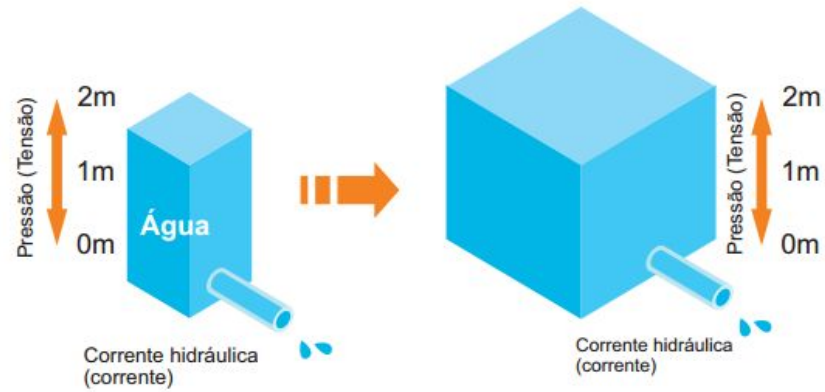
Corrente de água é corrente elétrica

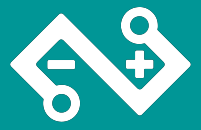


## Bateria

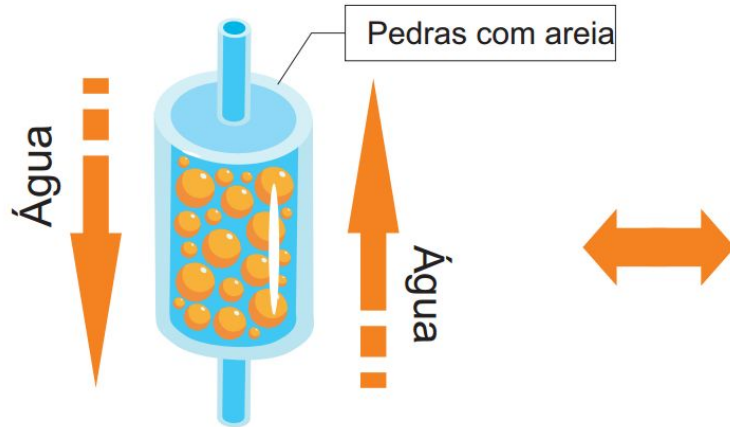
Mesmas tensões

mas com diferentes capacidades



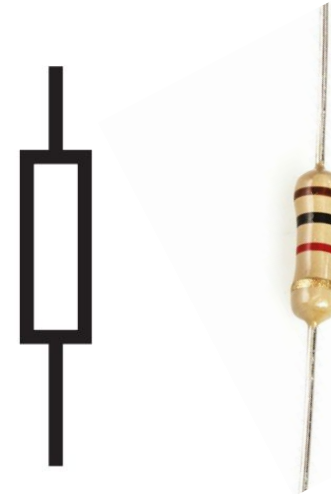


## Resistência Hidráulica

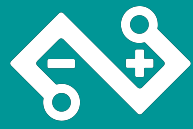


A água pode fluir nas duas direções

## Resistência Elétrica



Resistência em Ohms ( $\Omega$ )



## O Diodo



**Barreira Direcional**  
Como eu posso determinar  
em qual direção flui a água?

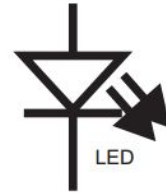
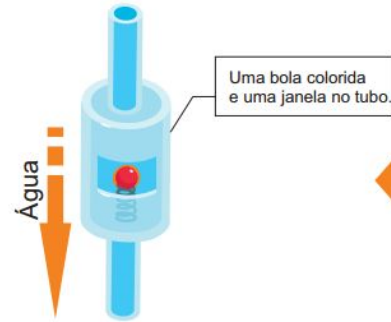


**Barreira Direcional  
Elétrico**

## LED

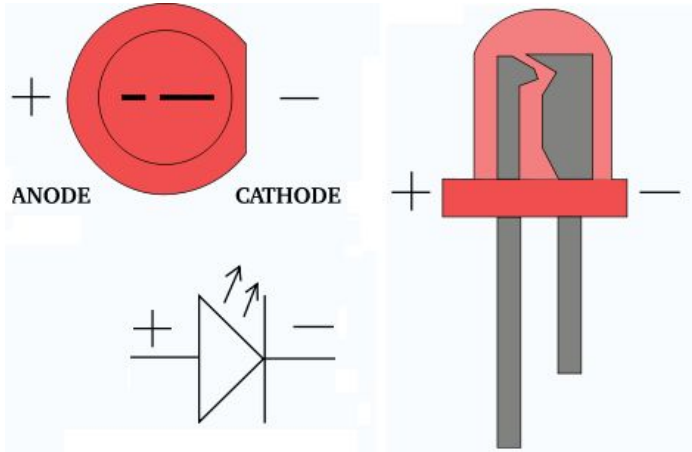
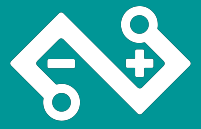


**Barreira Direcional**  
E o LED???



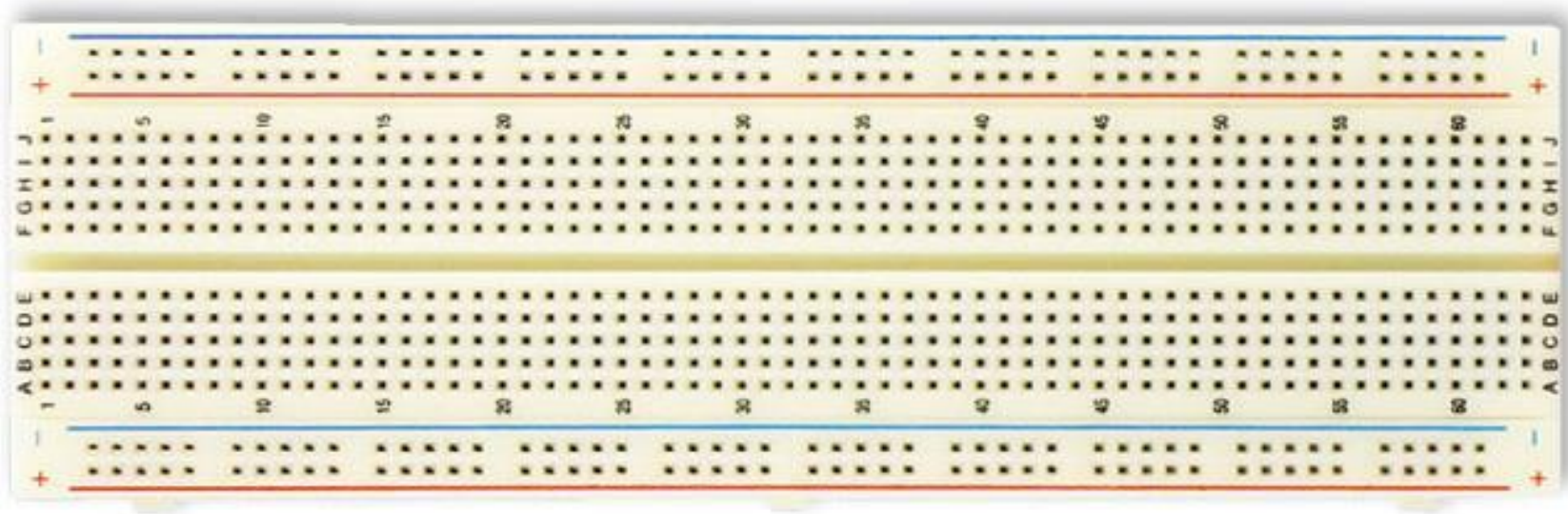
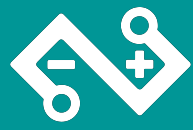
**Barreira Direcional  
Elétrica**

# LED (Light Emitting Diode)



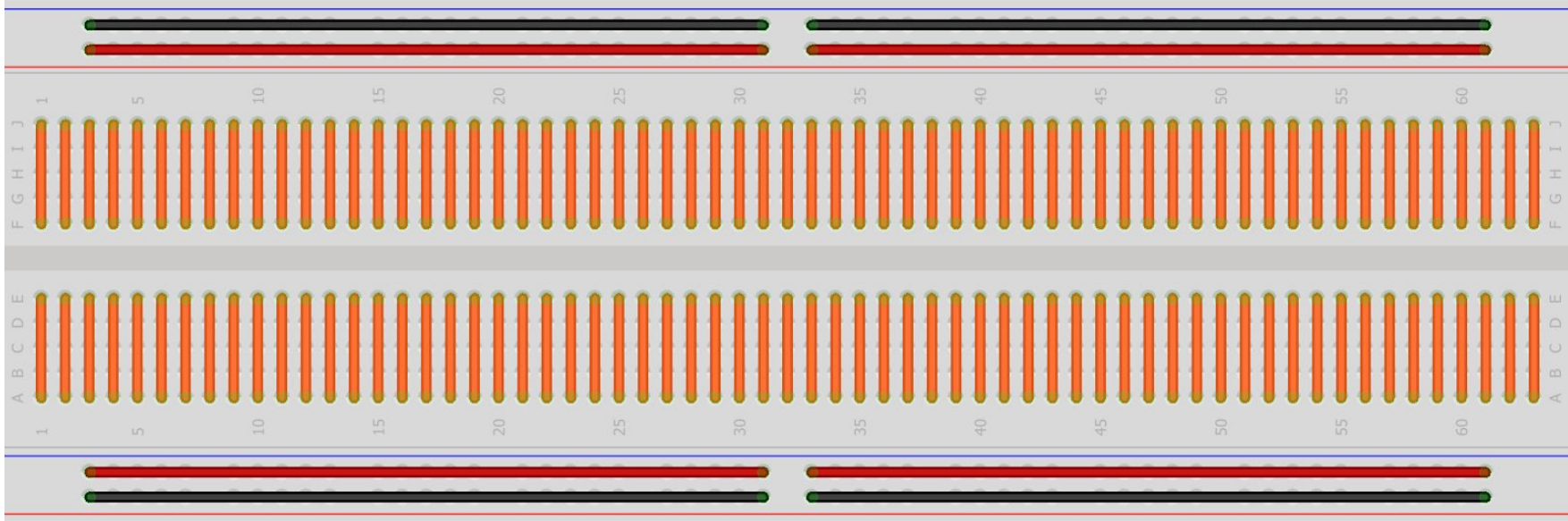
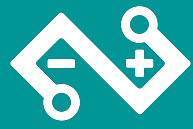
- Usualmente operam em um nível de tensão de 1,6 a 3,3 volts e sob uma corrente elétrica próxima de 20 mA
- Possuem polaridade
  - Perna maior é positiva
  - Perna menor é negativa

# Protoboard

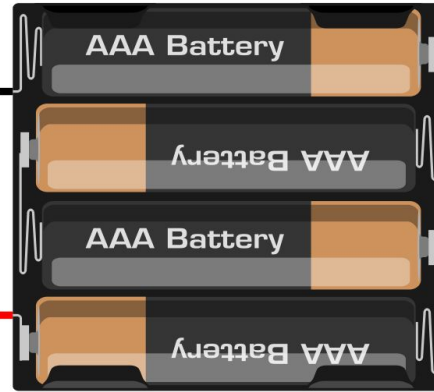
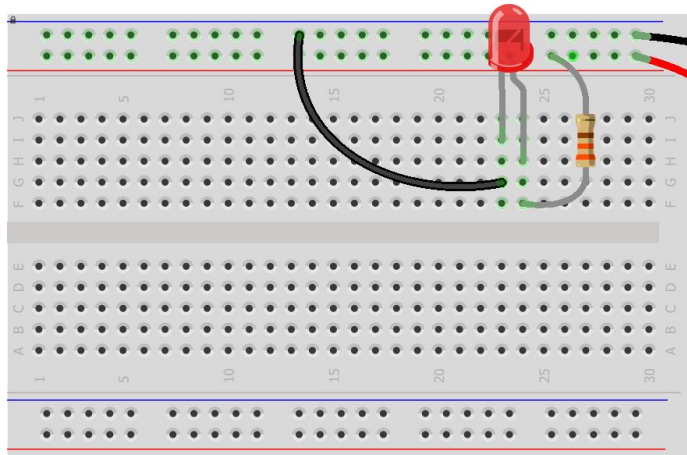
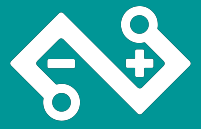




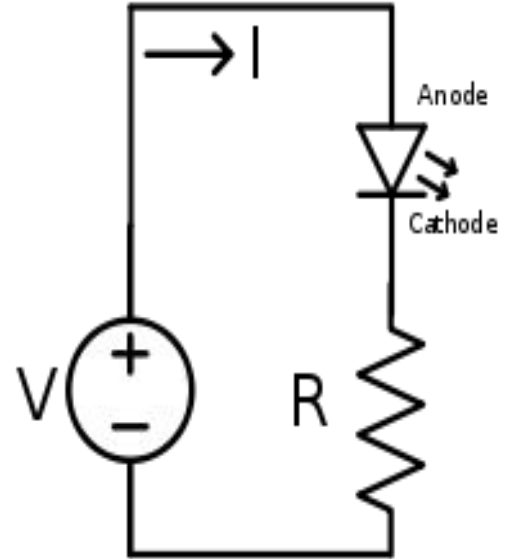
# Protoboard - Matriz de Contatos

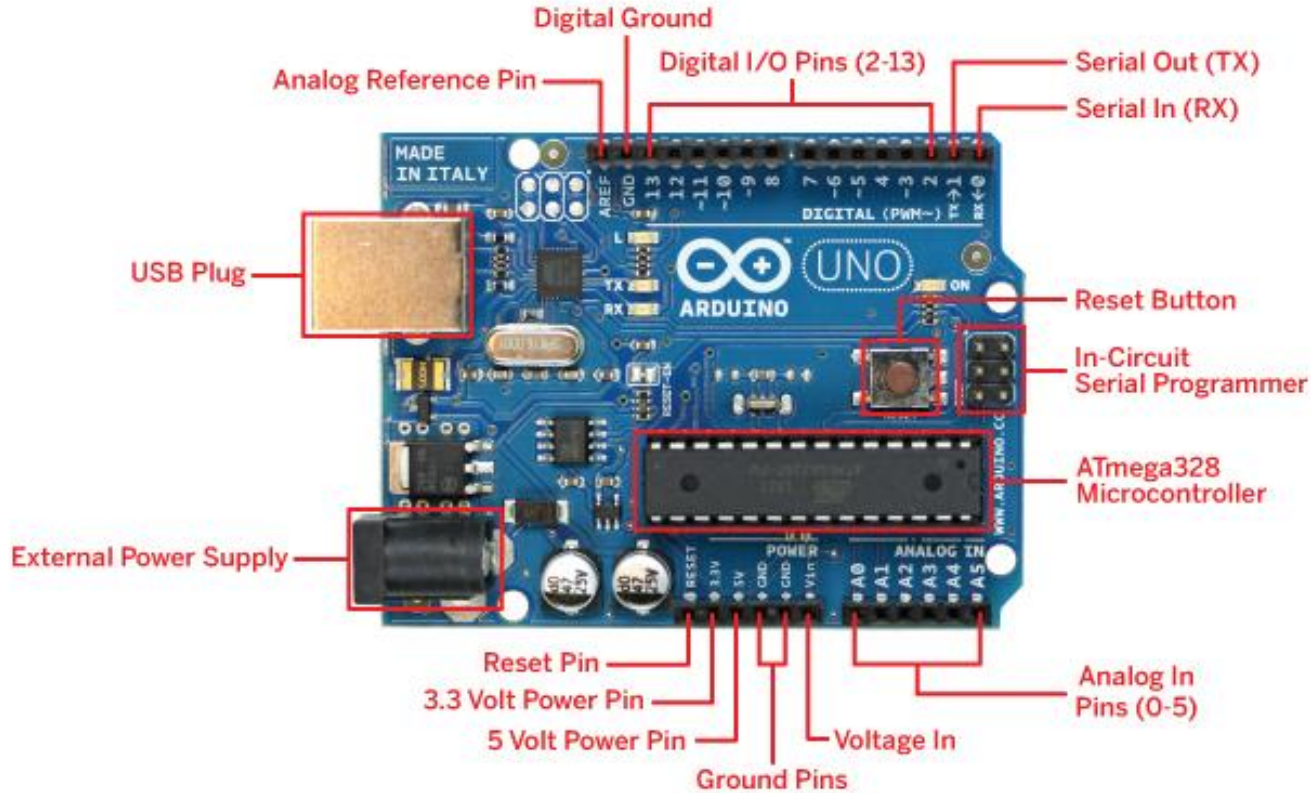


# “Hello World”

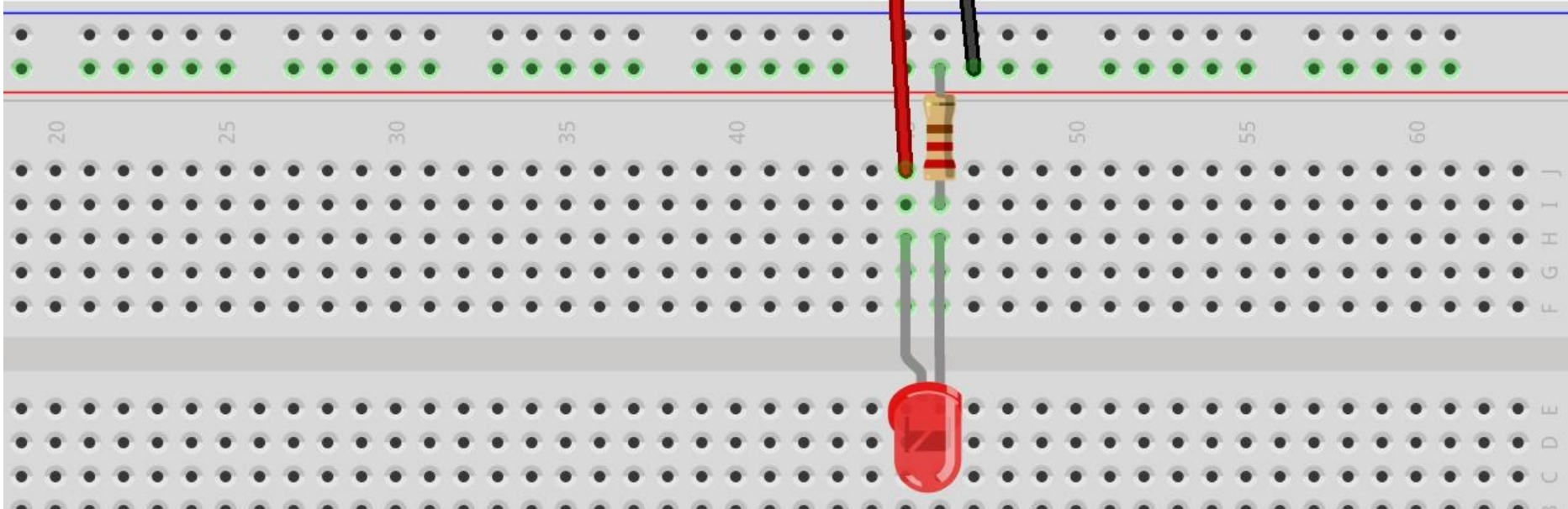
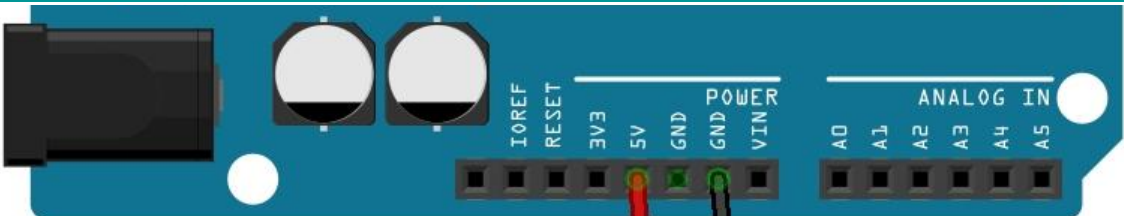


Made with  Fritzing.org

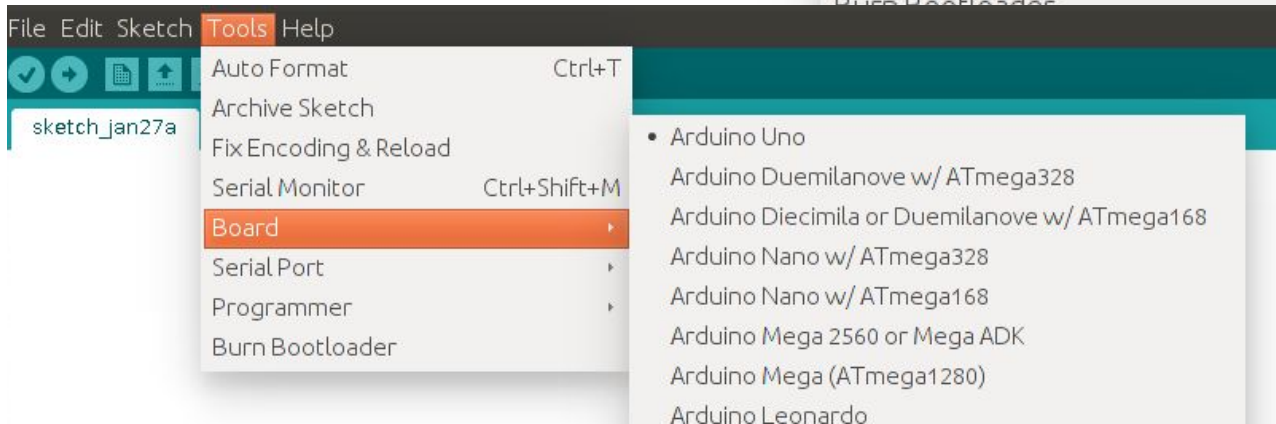
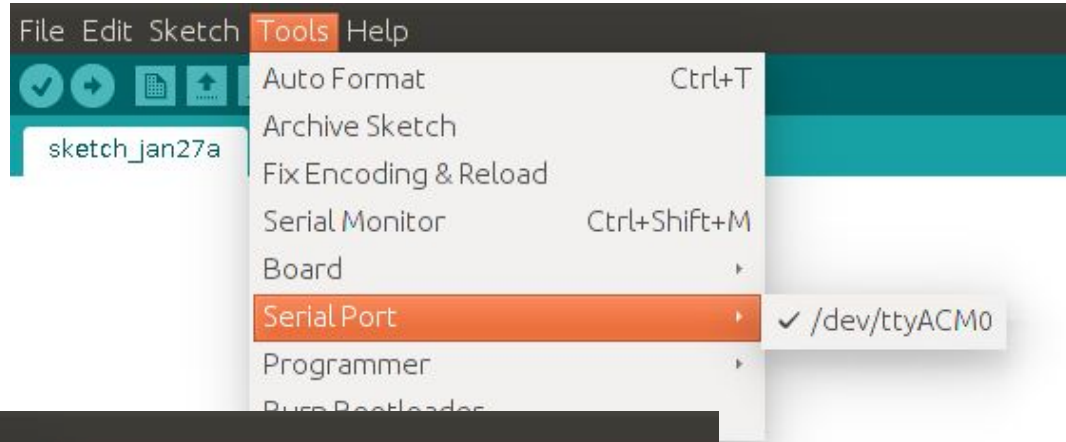




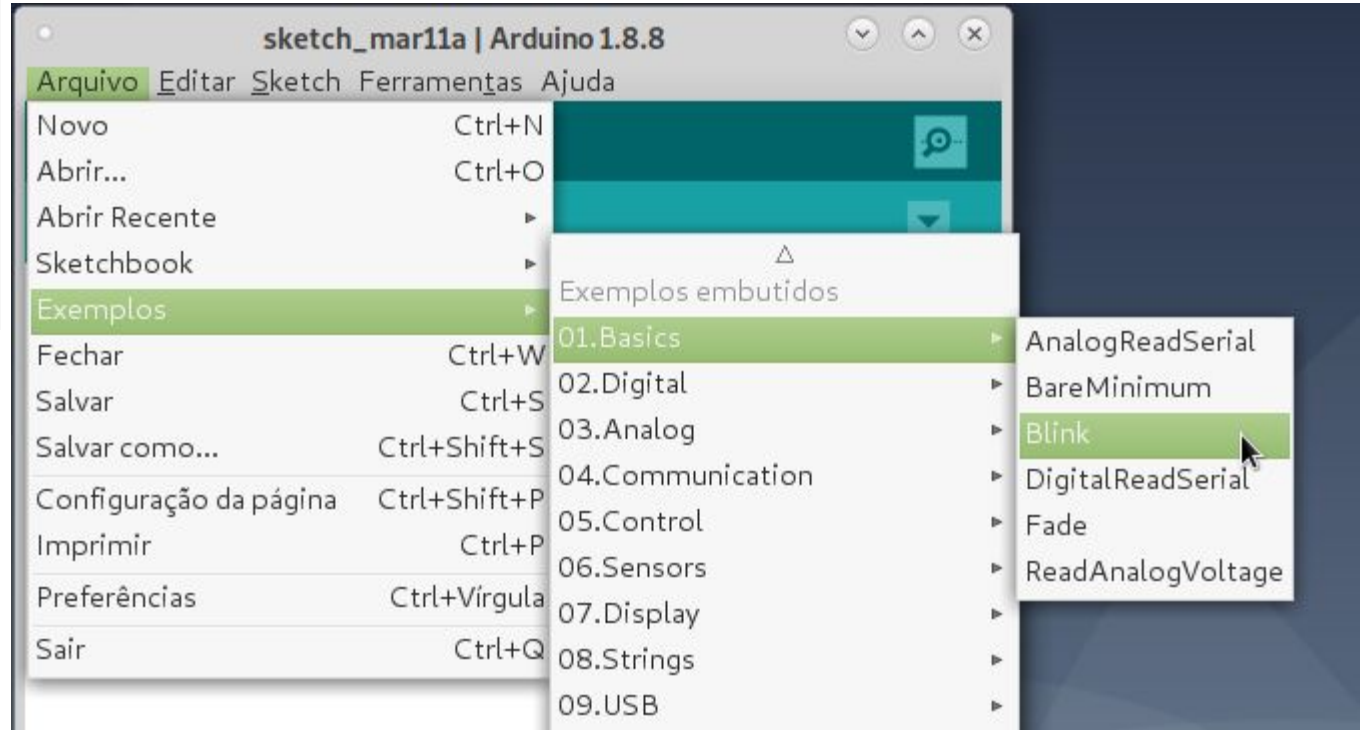
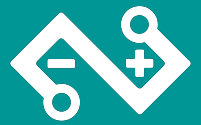
# Hello World Arduino



# Arduino IDE - Seleccionando a placa



# Arduino IDE - Blink







## Blink §

```
// Blink
```

```
int led = 13;
```

Apelidamos o pino 13 de led

```
void setup() {
```

```
  pinMode(led, OUTPUT);
```

```
}
```

Este conjunto de instruções é executado apenas uma vez sempre que o Arduino é inicializado

```
void loop() {
```

```
  digitalWrite(led, HIGH);
```

```
  delay(1000);
```

```
  digitalWrite(led, LOW);
```

```
  delay(1000);
```

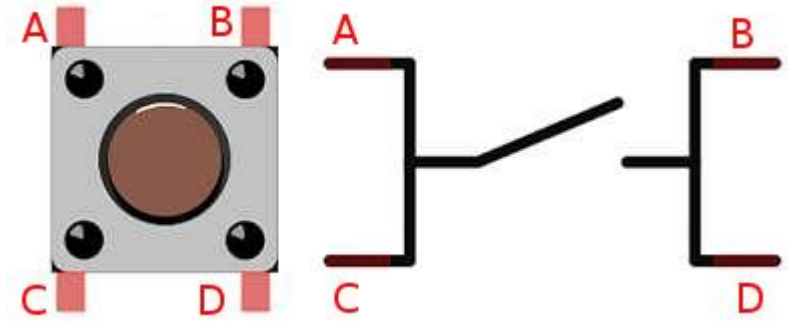
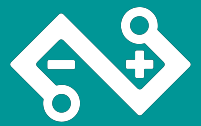
```
}
```

O pino do led vai ser usado para envio de sinais

Este conjunto de instruções é executado continuamente enquanto o Arduino estiver ligado

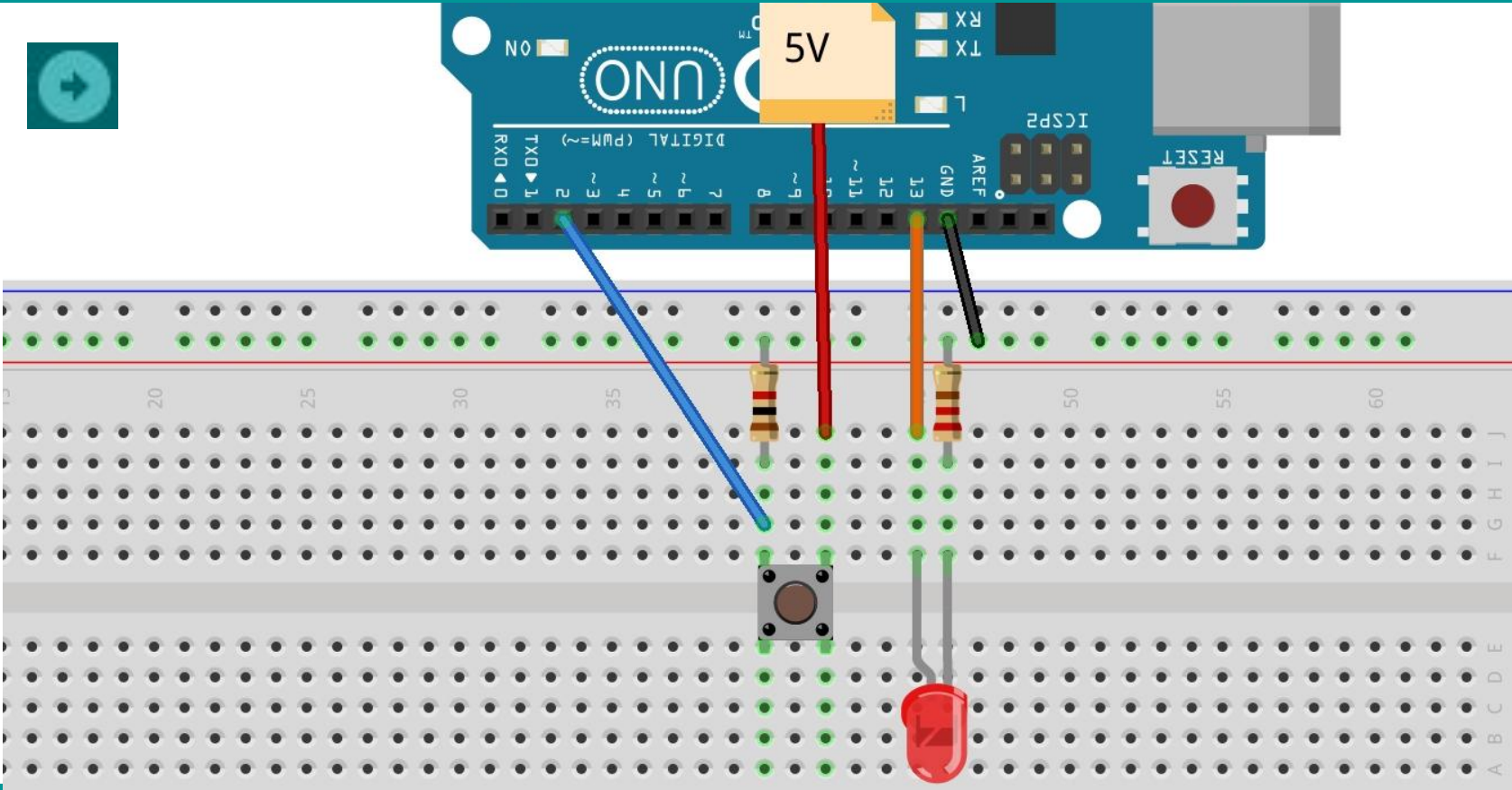


# O botão / push button



Quando pressionado o botão conecta os contatos A e C aos contatos em B e D.

# Botão (esquema)



# Botão (código)



```
Button §
// Button
const int buttonPin = 2;
const int ledPin = 13;

int buttonState = 0;

void setup() {
  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT);
}

void loop(){
  buttonState = digitalRead(buttonPin);
  if (buttonState == HIGH) {
    digitalWrite(ledPin, HIGH);
  }
  else {
    digitalWrite(ledPin, LOW);
  }
}
```

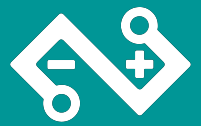
Apelidando os pinos 2 e 13 de buttonPin e ledPin, respectivamente.  
const indica que os apelidos não mudam.

buttonState guarda o estado do botão.  
1 / HIGH para pressionado, 0 / LOW

O pino do botão recebe sinais 5V ou 0V

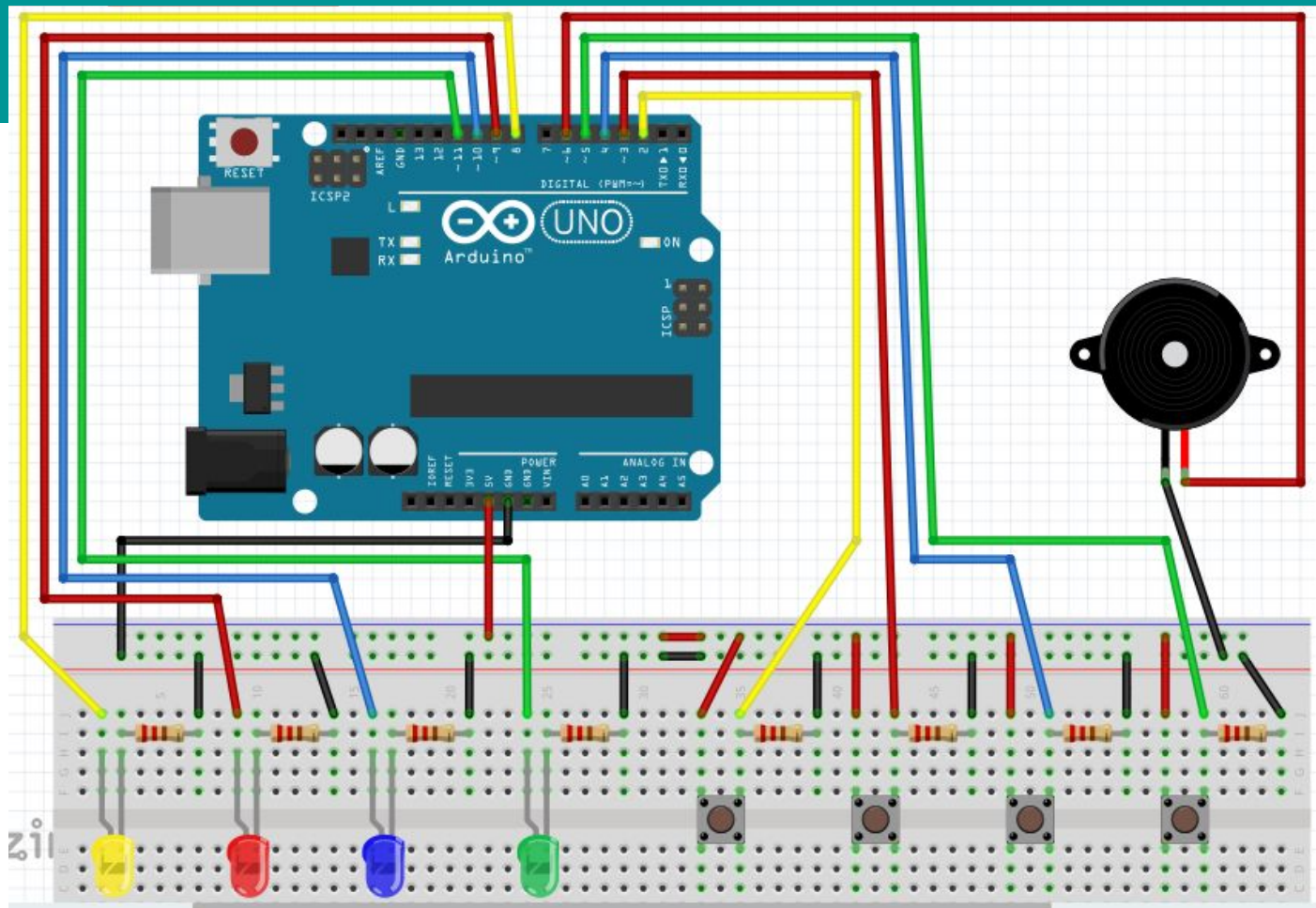
Obtendo o estado do botão

Se o botão estiver pressionado ligue o LED, caso contrário desligue-o



- Hardware necessário
  - Arduino
  - Protoboard
  - 4 LEDs
  - 8 Resistores
  - 4 botões
  - 1 alto falante (speaker)
  - Fios para conectar os componentes





Código do projeto em <https://bit.ly/2VXdaiR>



# Chamada de voluntários para projetos



Interessados comparecer sexta-feira na reunião do Hardware Livre USP  
(não necessita de conhecimentos prévios)

- Uselessbox
- Pet feeder
- Lasercat
- Checkin com RFID
- Lampada de emergencia
- Tiro ao alvo com laser
- Dado eletrônico
- Outros (instructables, hackaday, WR Kits etc.)