BoomBox Workshop
Day 2

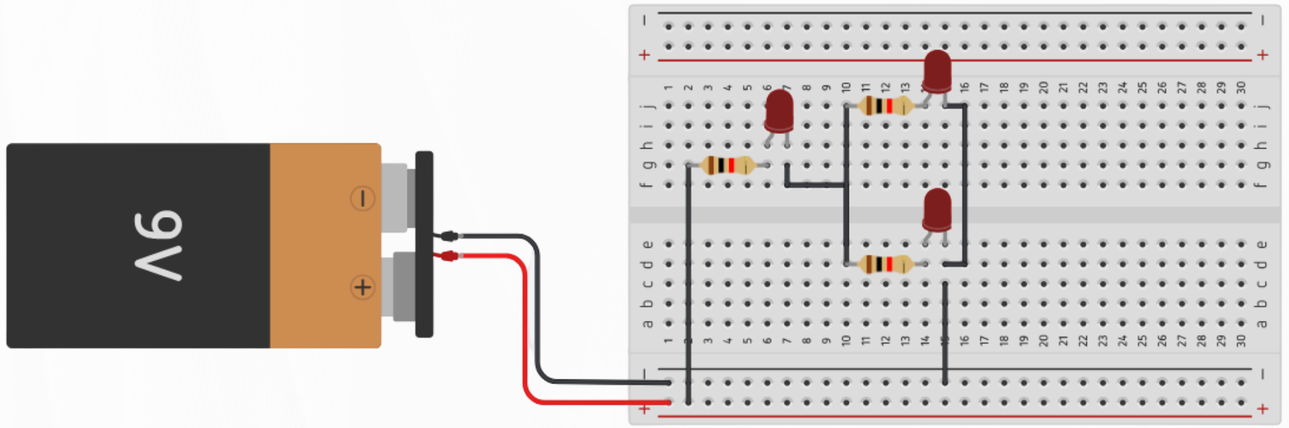
Agenda

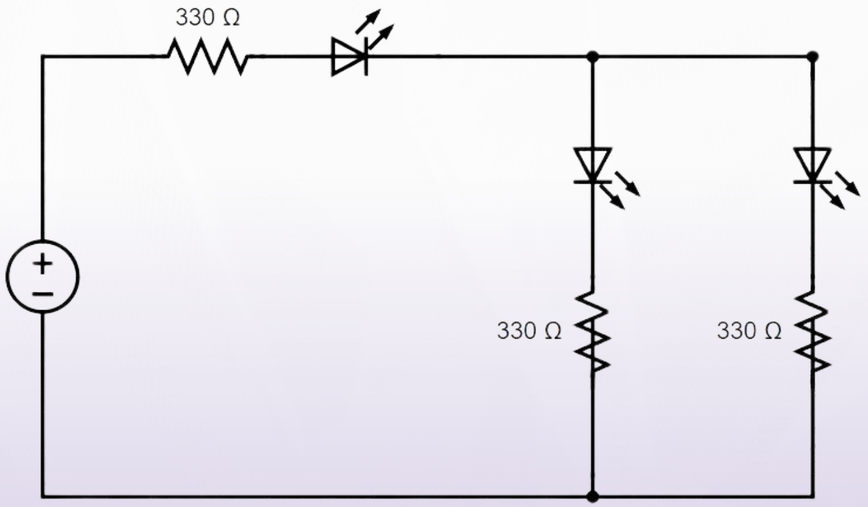
Day 1 : 3D Printing+ Electrical Basics

- Day 2 : Microcontrollers

Day 3 : Building the BoomBox!

Day 1 Recap!





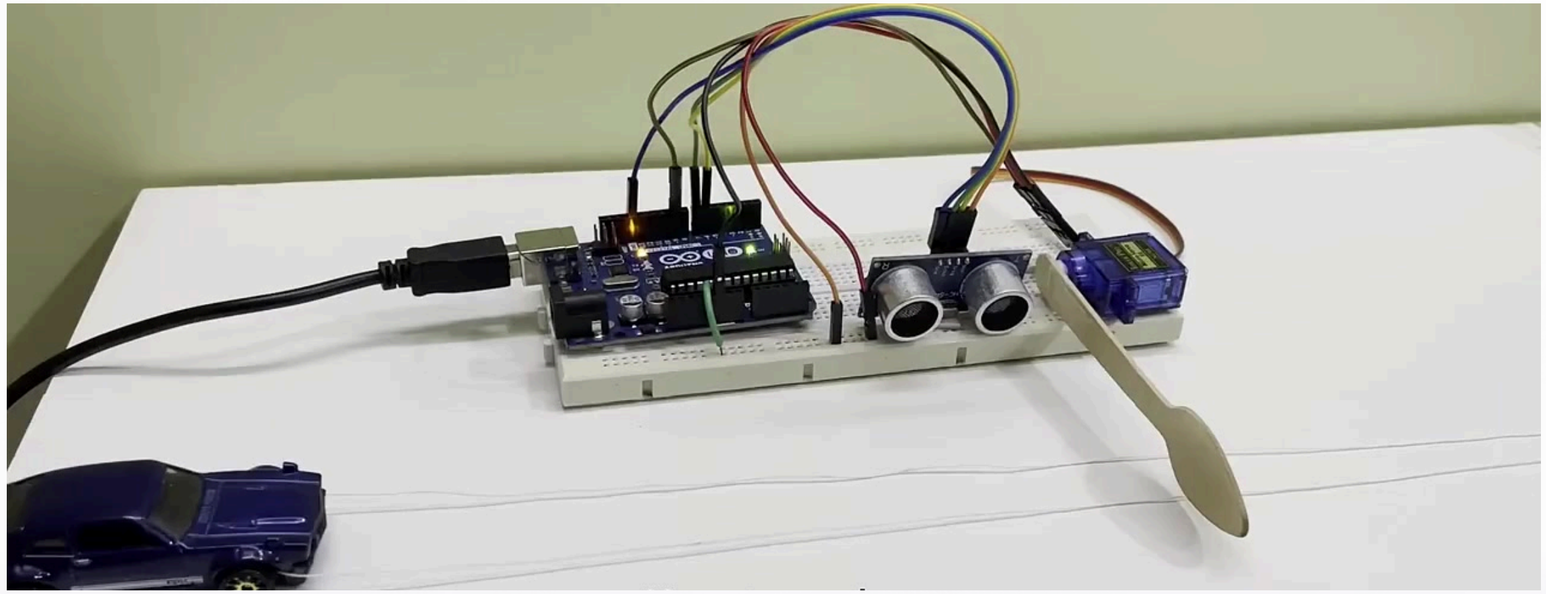
Day 1 Quiz!!!

+3

+2

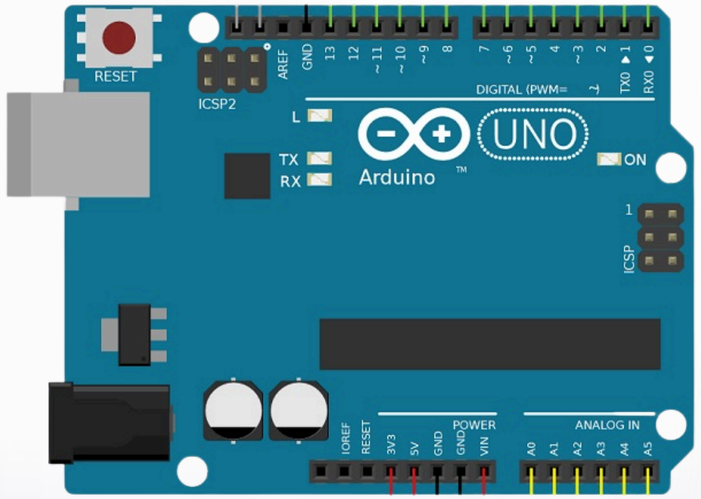
+1

Microcontrollers



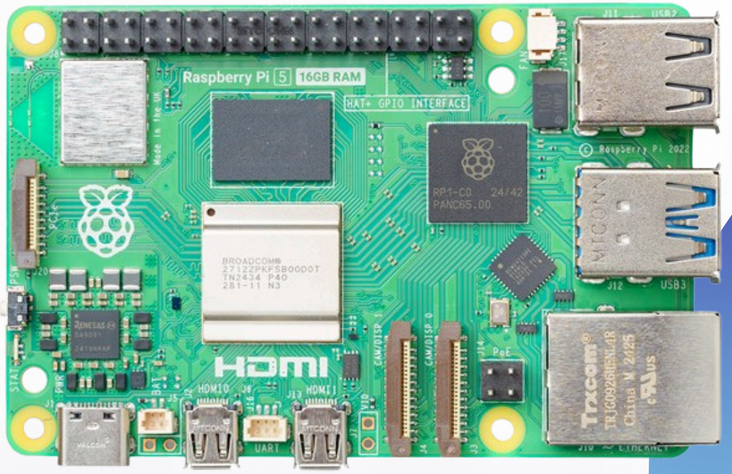
Common Controllers

Arduino UNO



ESP32

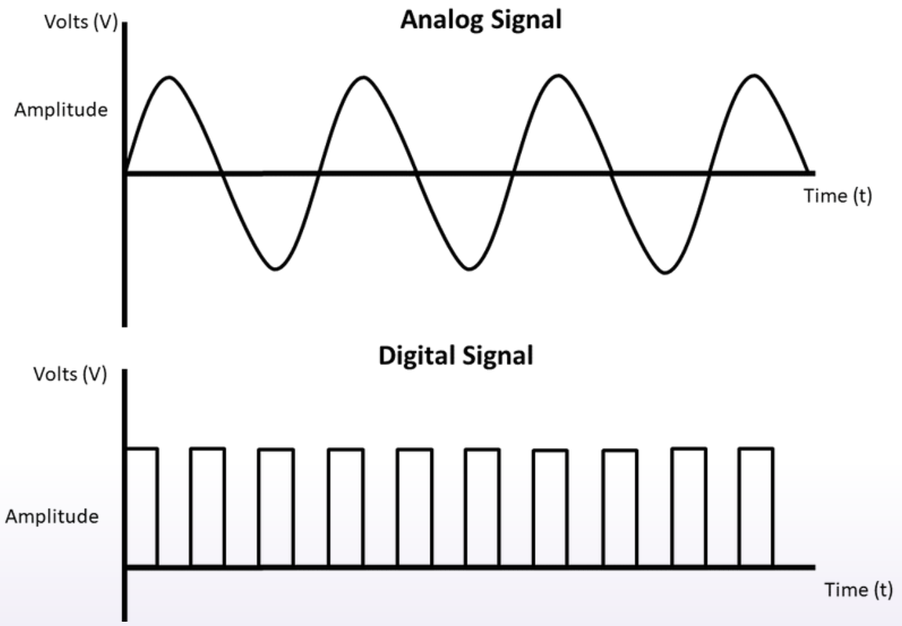
Raspberry pi



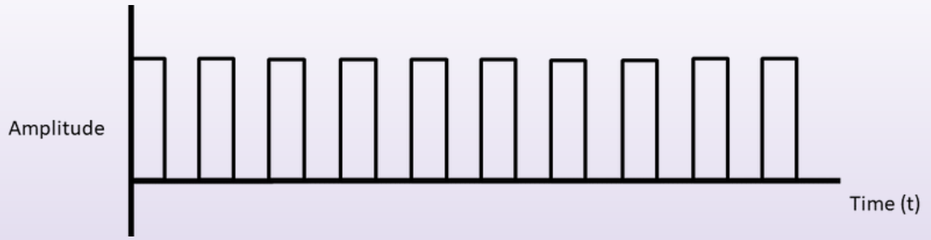
Digital vs Analog

Analog: any value

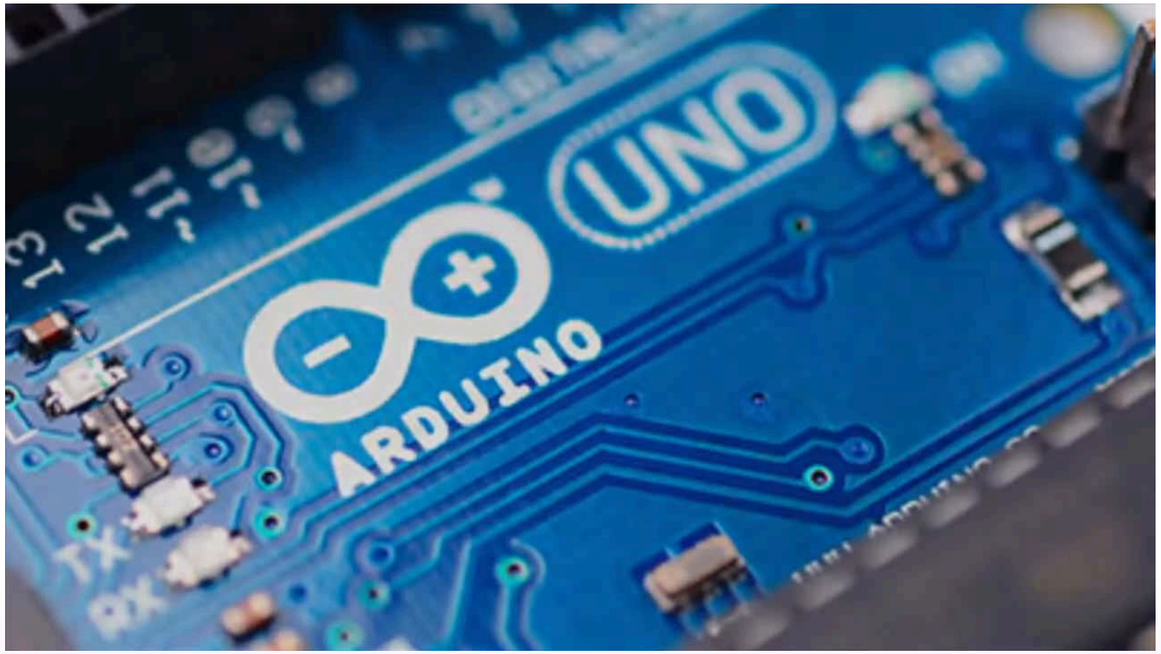
Digital: 0 (off) or 1 (on)

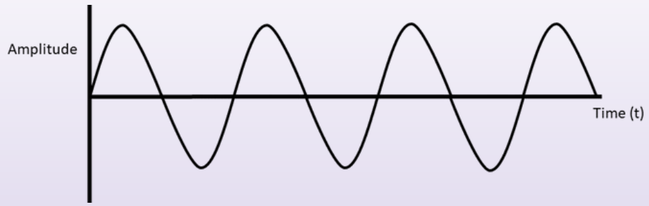


Digital

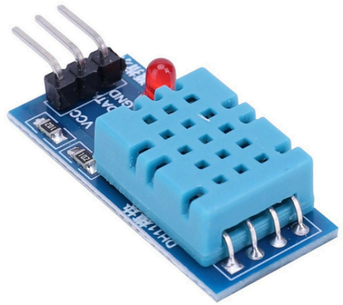


Analog



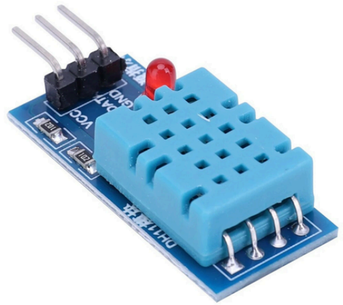


Digital or Analog?



Temperature Sensor

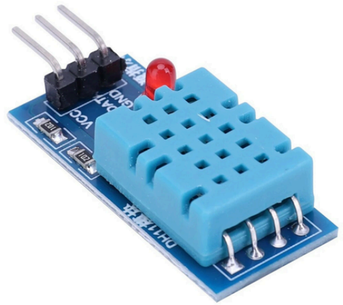
Digital or Analog?



Temperature Sensor

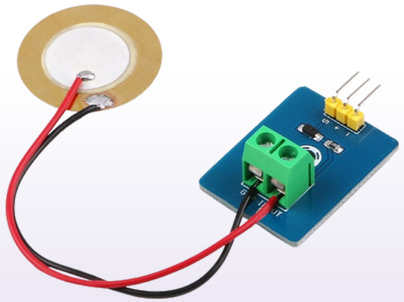
Motion Sensor

Digital or Analog?



Temperature Sensor

Motion Sensor



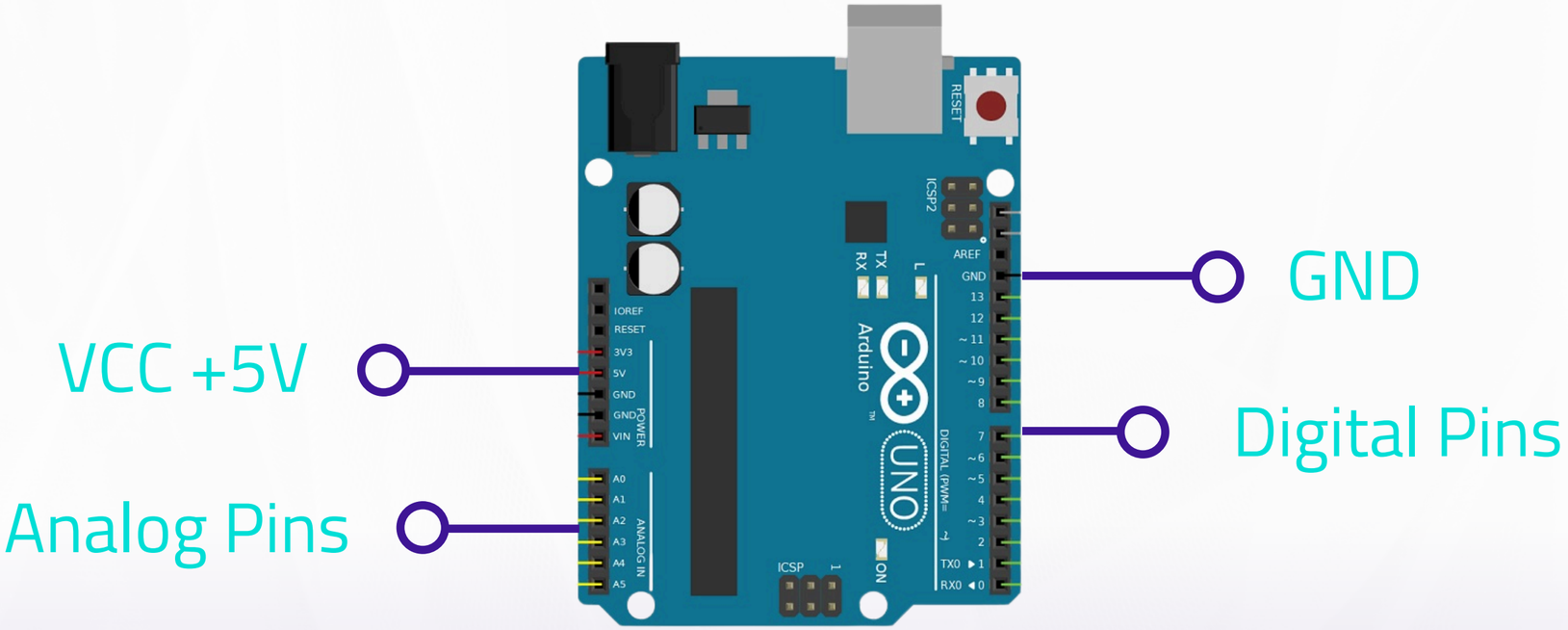
Vibration sensor

Activity

List examples of analog and digital signals

+3 +2 +1

Arduino UNO


VCC +5V
Analog Pins
GND
Digital Pins
RESET
ICSP2
AREF
GND
13
12
~ 11
~ 10
~ 9
8
7
~ 6
~ 5
4
~ 3
2
TX0 ▶1
RX0 ◀0
DIGITAL (PWM=~)
TX
RX
L
ON
Arduino
UNO
IOREF
RESET
3V3
5V
GND
GND
VIN
POWER
A0
A1
A2
A3
A4
A5
ANALOG IN
ICSP
1

Arduino IDE

Programming

```
1   void setup() {
2
3   }
4
5
6
7   void loop() {
8
9   }
```

1

2

Programming

```
1   void setup() {
2
3   }
4
5
6
7   void loop() {
8
9   }
```

1

Runs the code once

2

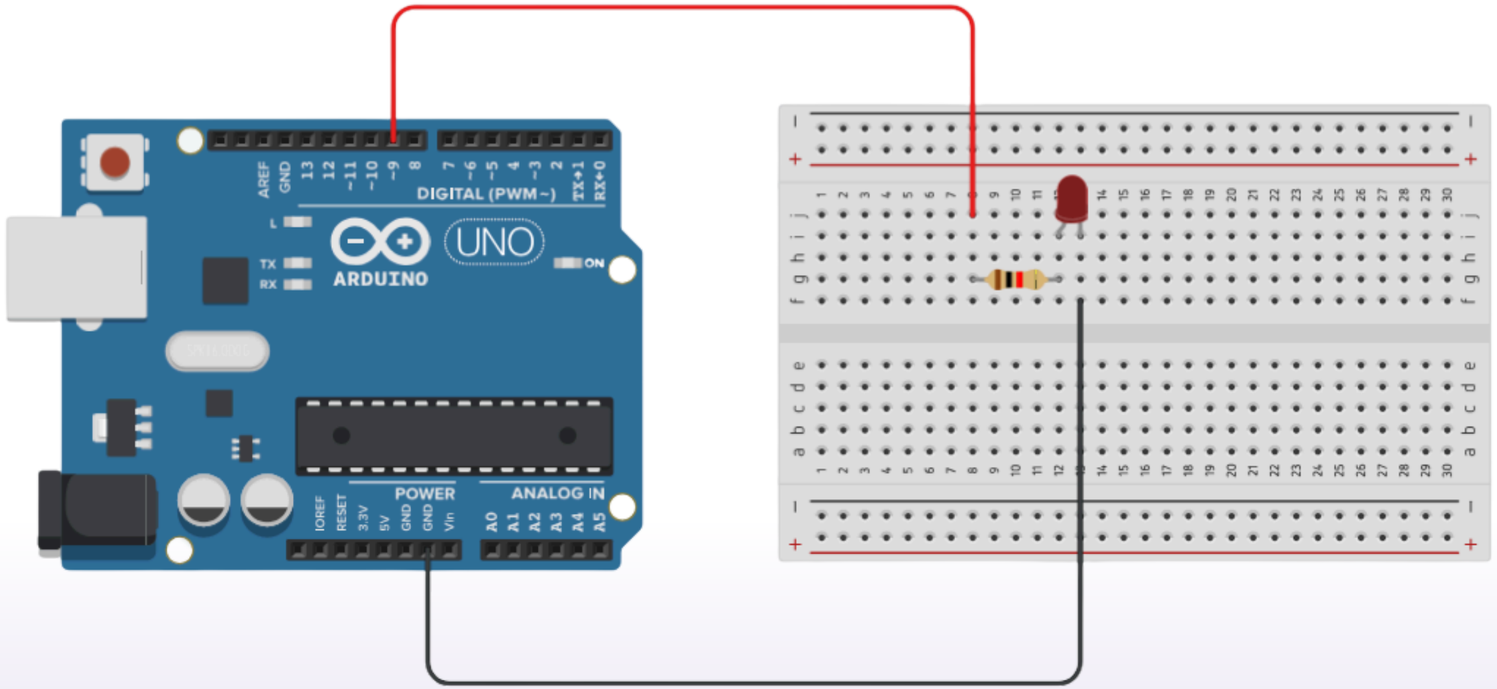
infinite loop

Programming

Basic steps:

1. Include Libraries (if needed)
2. Define pin numbers
3. Define Pin modes
4. Code!

Activity - LED Blink

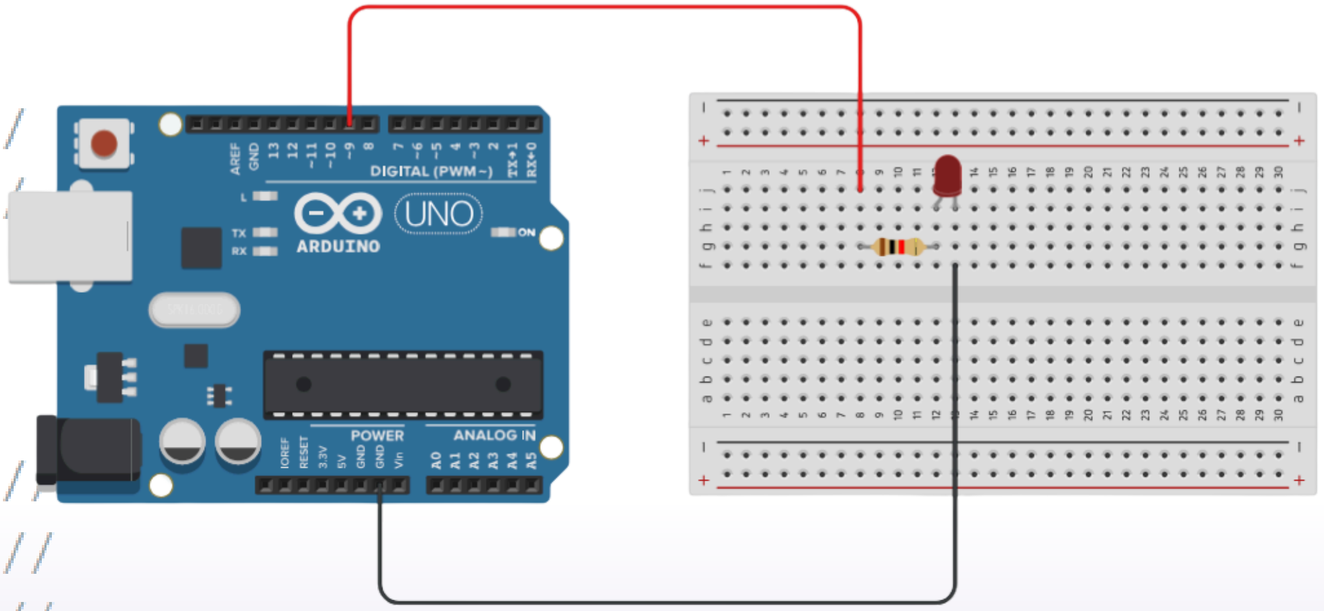


LED Blink Code

```
1   int ledPin = 9;          // assign pin once, globally
2
3   void setup() {
4     pinMode(ledPin, OUTPUT);   // configure it as an output
5     digitalWrite(ledPin, LOW); // start LOW (off)
6   }
7
8   void loop() {
9     digitalWrite(ledPin, HIGH); // LED on
10    delay(1000);                // wait 1 s
11    digitalWrite(ledPin, LOW);  // LED off
12    delay(1000);                // wait 1 s
13  }
```

LED Blink Code

```
1   int ledPin = 9;          // assign
2
3   void setup() {
4     pinMode(ledPin, OUTPUT);    //
5     digitalWrite(ledPin, LOW); //
6   }
7
8   void loop() {
9     digitalWrite(ledPin, HIGH); //
10    delay(1000);                //
11    digitalWrite(ledPin, LOW);  //
12    delay(1000);                //
13  }
```



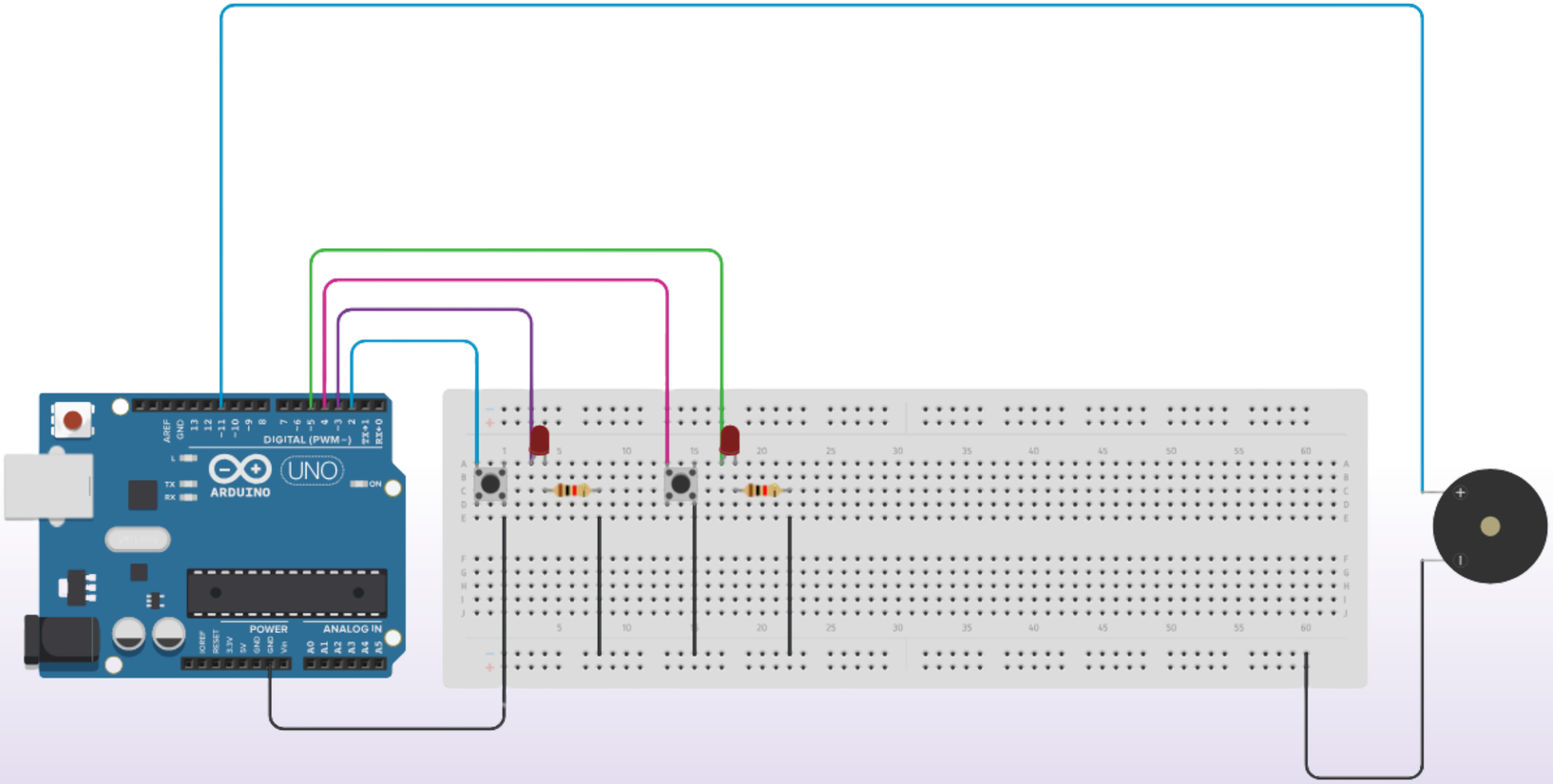
GitHub

Break

Activity - Mini-Piano

Complete the code from Github!!!!

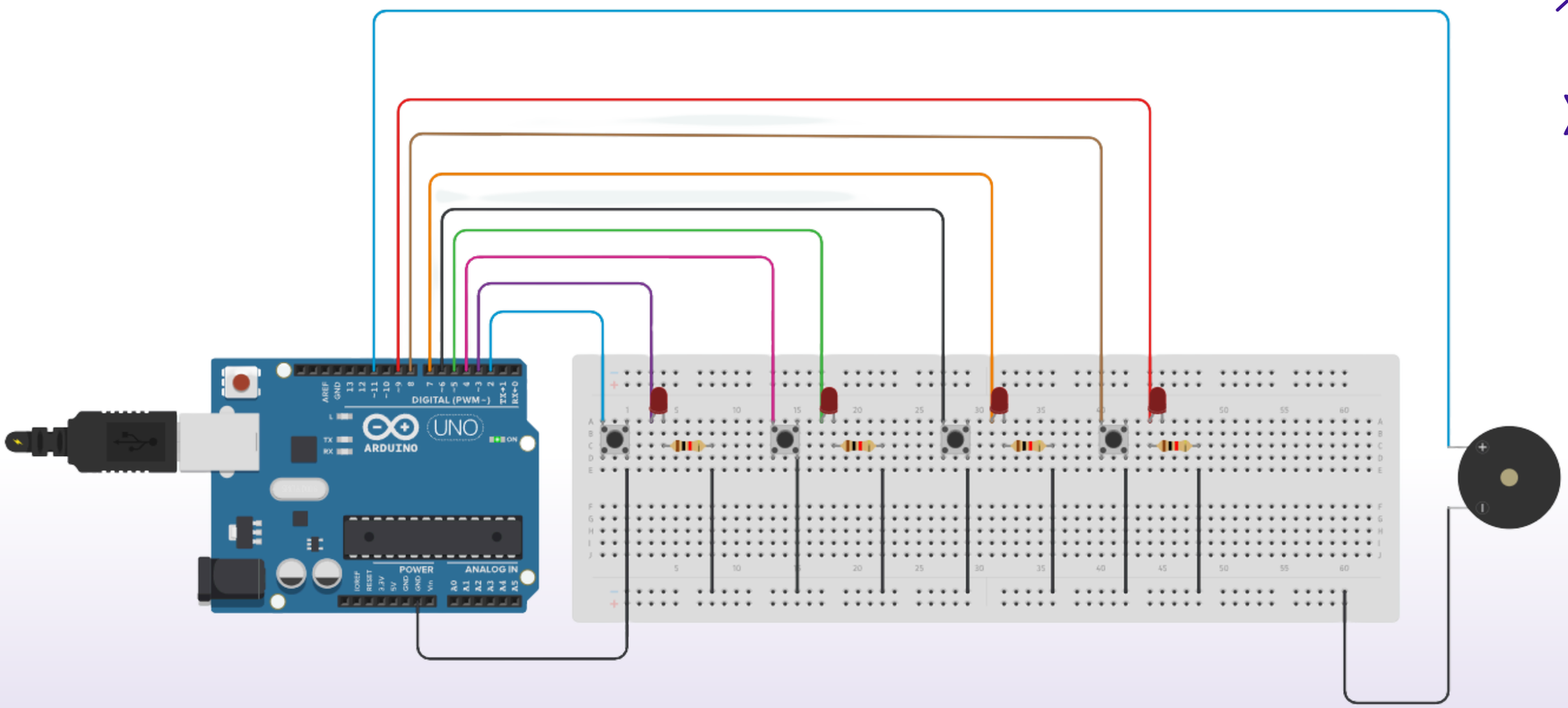
+2



Activity - Mini-Piano

Complete the code from Github!!!!

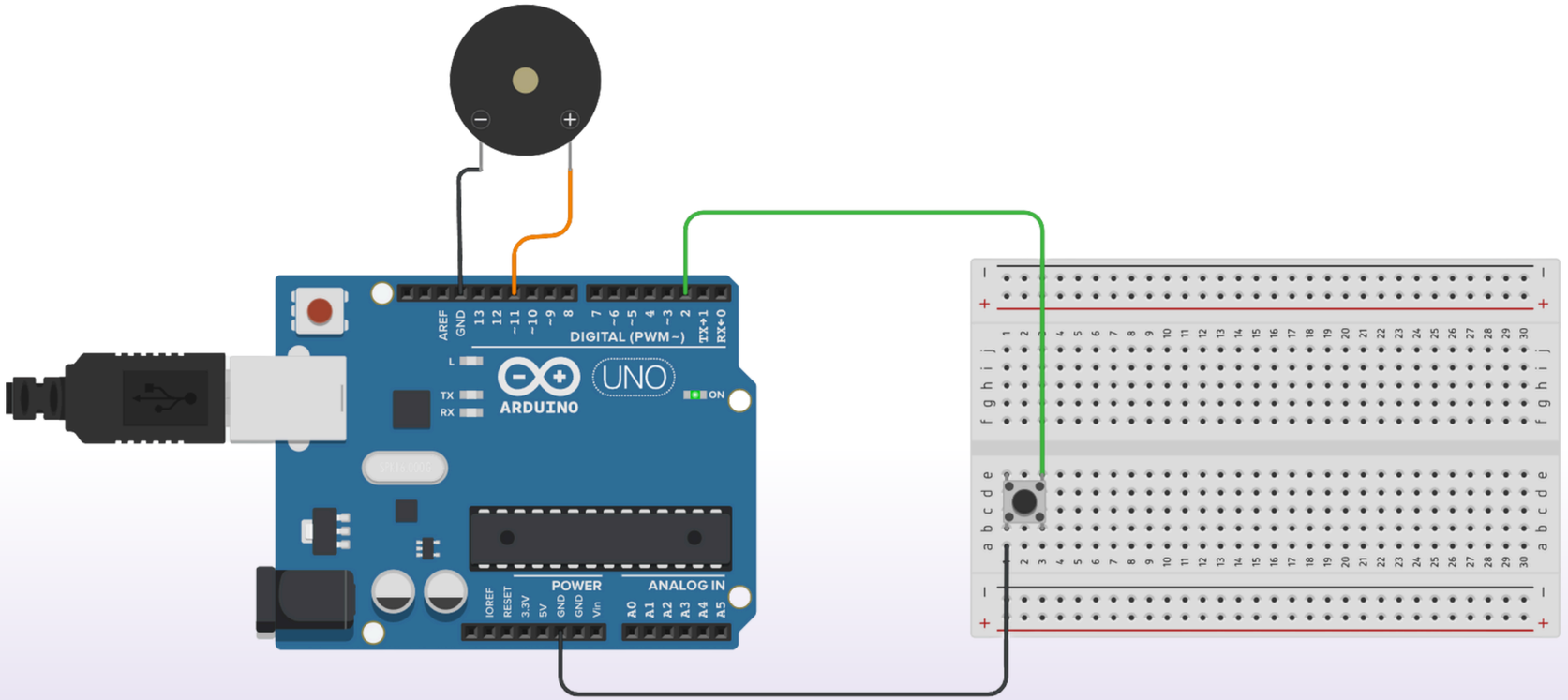
+2



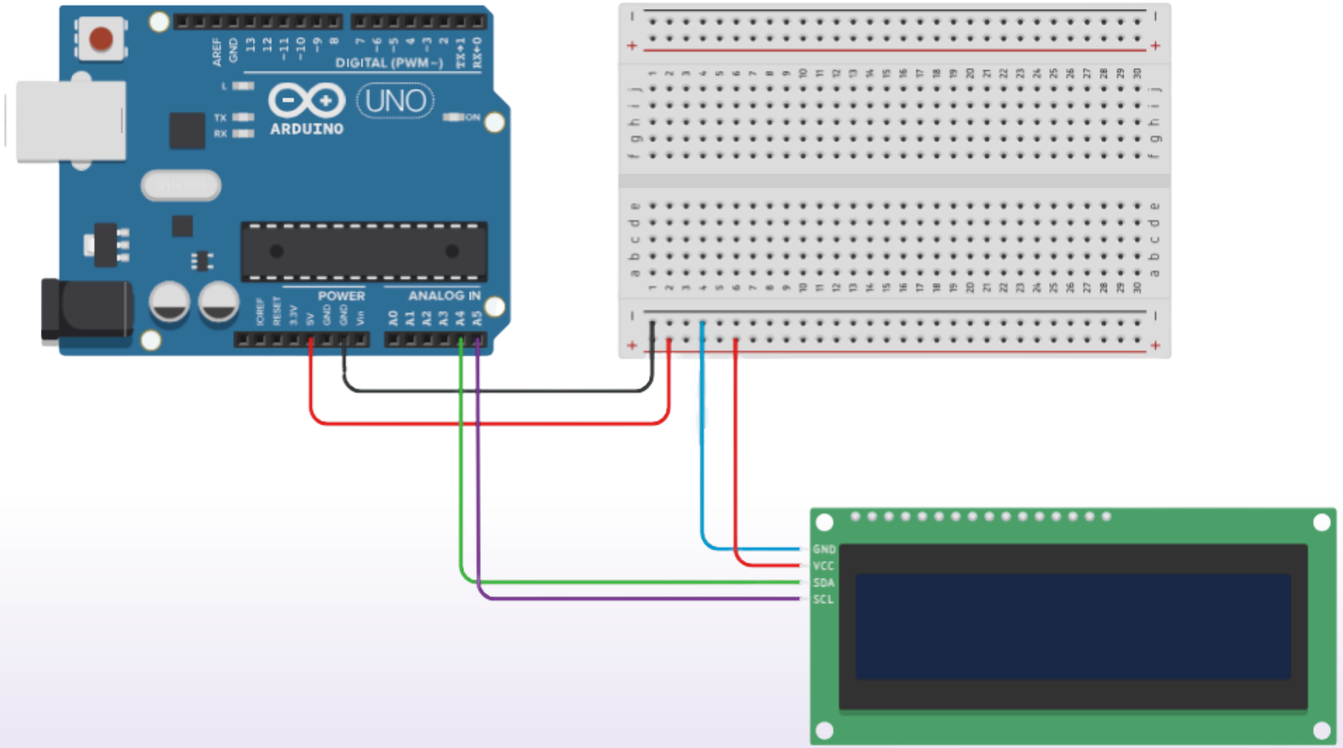
Break

Project! - Music Box

Get the code from github and add your music!



LCD Circuit



LCD Code

```
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd1(0x27,16,2); // LCD1

void setup() {

lcd1.init();                      // initialize the lcd
lcd1.backlight();
lcd1.clear();
lcd1.setCursor(4,0);  // column , raw
lcd1.print("BoomBox");
lcd1.setCursor(6,1);
lcd1.print("Workshop");
delay(5000);
lcd1.clear();

}
void loop() {
  // put your main code here, to run repeatedly:
  lcd1.setCursor(4,0);  // column , raw
  lcd1.print("Abdullah's Project!")
}
```

Bonus! - Add LCD to your project

Write the code for this circuit +3