

# Microcontrollers and Robotic

## Week 9: Simulator I



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# Simulator

Arduino is an open-source electronics platform that can be used to make interactive projects.

As such, if you like tinkering with an Arduino, you'll need a

- Breadboard
- A lot of small components (LEDs, Buttons, etc...)
- Arduino

# Simulator

Before taking the plunge with the real deal, you can start experimenting with an Arduino simulator.

A good simulator should allow you to digitally recreate several aspects of the process:

- Design your own components and circuits (or import from some kind of library)
- Create programs (sketches) or import from Arduino IDE
- Simulate interaction between the Arduino, IO interfaces, and program
- Design boards and schematics (optional but useful)
- Export boards and schematics for PCB production (optional)

# Simulator

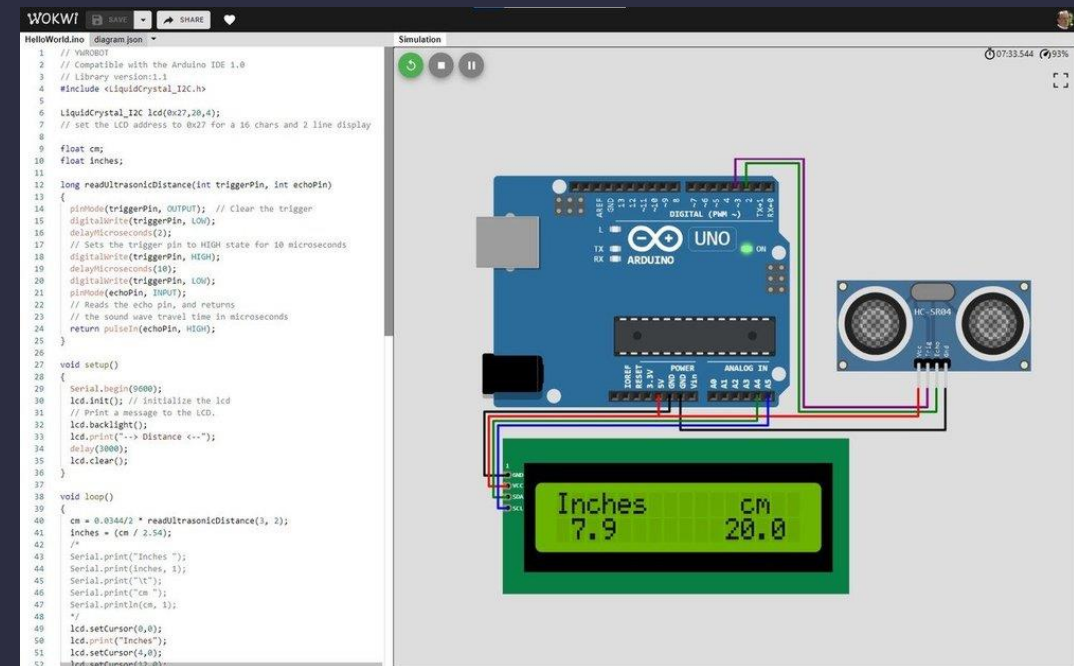
There are lots of simulators

- Tinkercad: <https://www.tinkercad.com/learn/circuits>
- SimulIDE: <https://www.simulide.com/p/home.html>
- PICSimLab: <https://lcgamboa.github.io/>
- Wokwi: <https://wokwi.com/>
- UnoArduSim: <https://www.sites.google.com/site/unoardusim/services>
- IO Simulator: <https://xevro.be/>
- Proteus VSM: <https://www.labcenter.com/whyvsm/>

# Simulator

## Wokwi Simulator

- It's based on AVR8js
- A JavaScript implementation of the AVR 8-bit architecture.
- Opensource:  
<https://github.com/wokwi/avr8js>

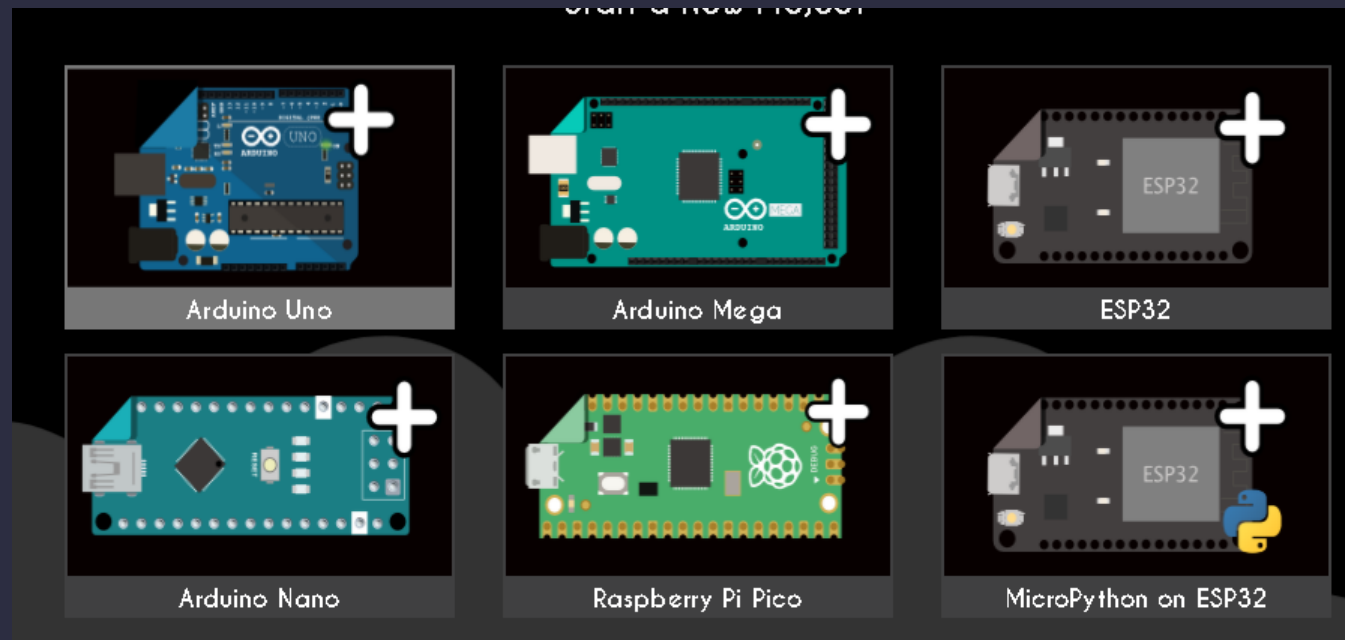


# Simulator

## Simulator

<https://wokwi.com/>

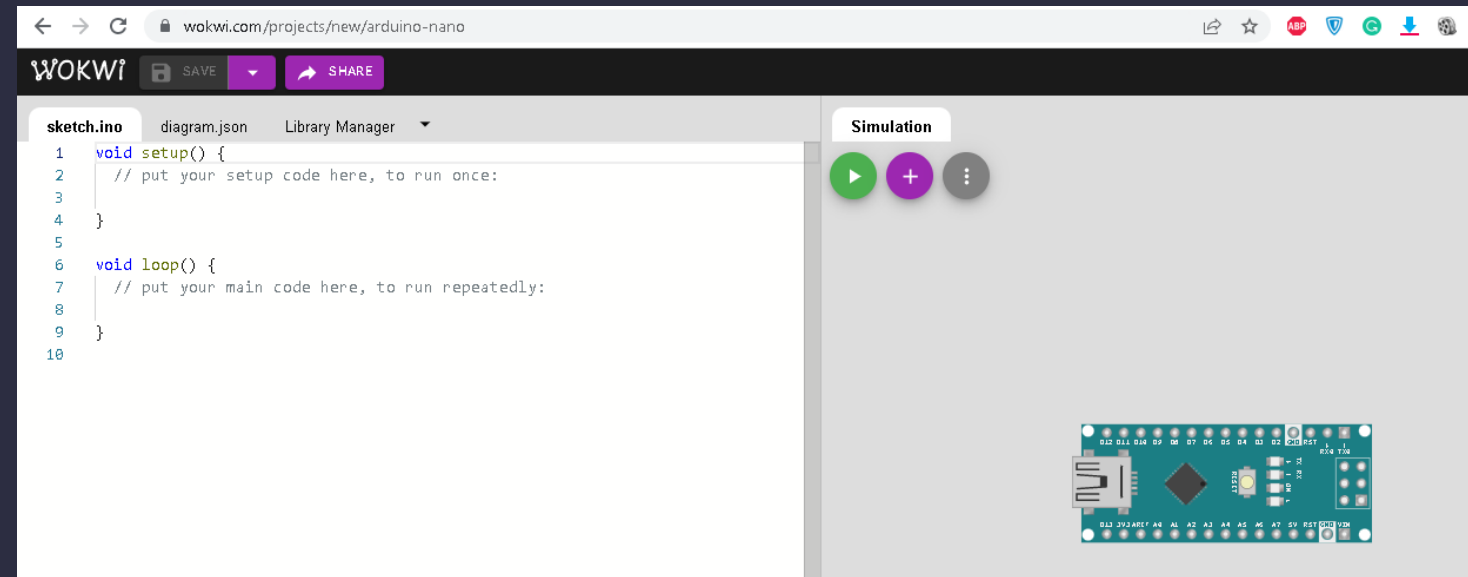
At home page, choose a arduino



# Simulator

## Simulator

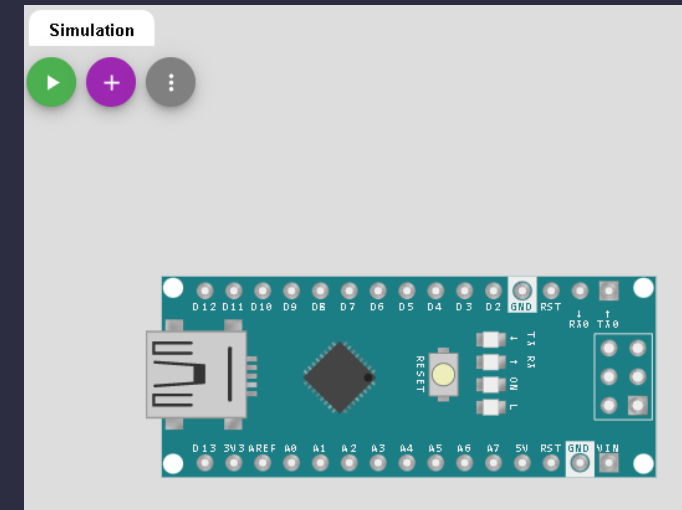
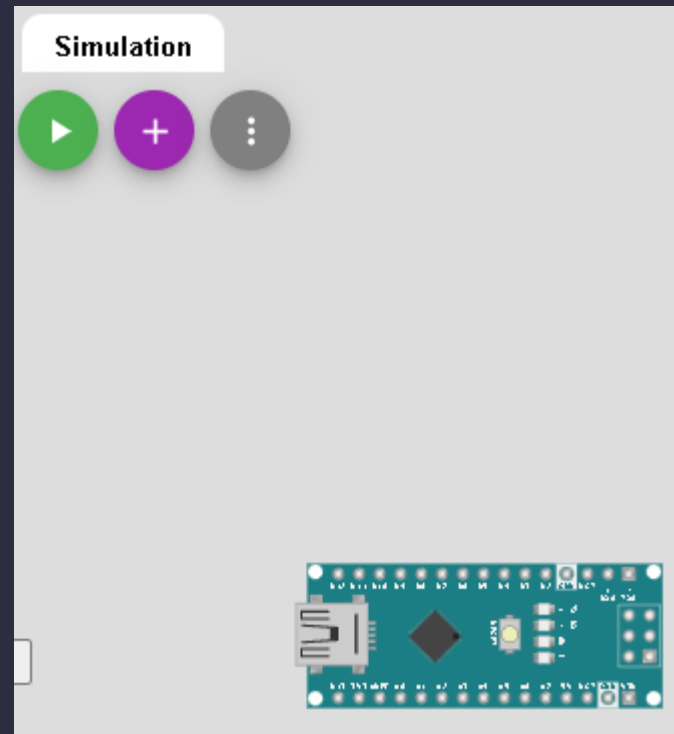
- MCU source code will be written to left side
- MCU circuit will be developed at right side



# Simulator

## Simulator

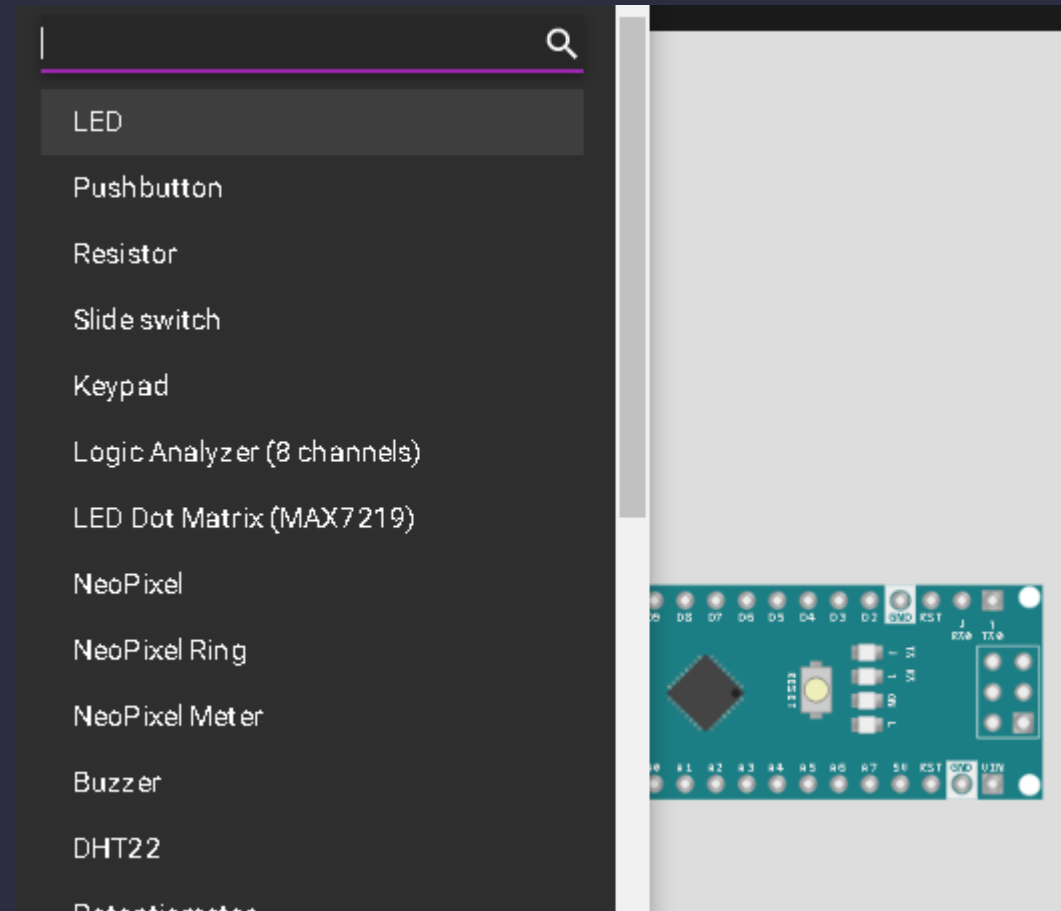
- To navigate click left mouse button and navigate
- Use mouse wheel to zoom in/out operations



# Simulator

## Simulator

- Click + icon for adding circuit elements

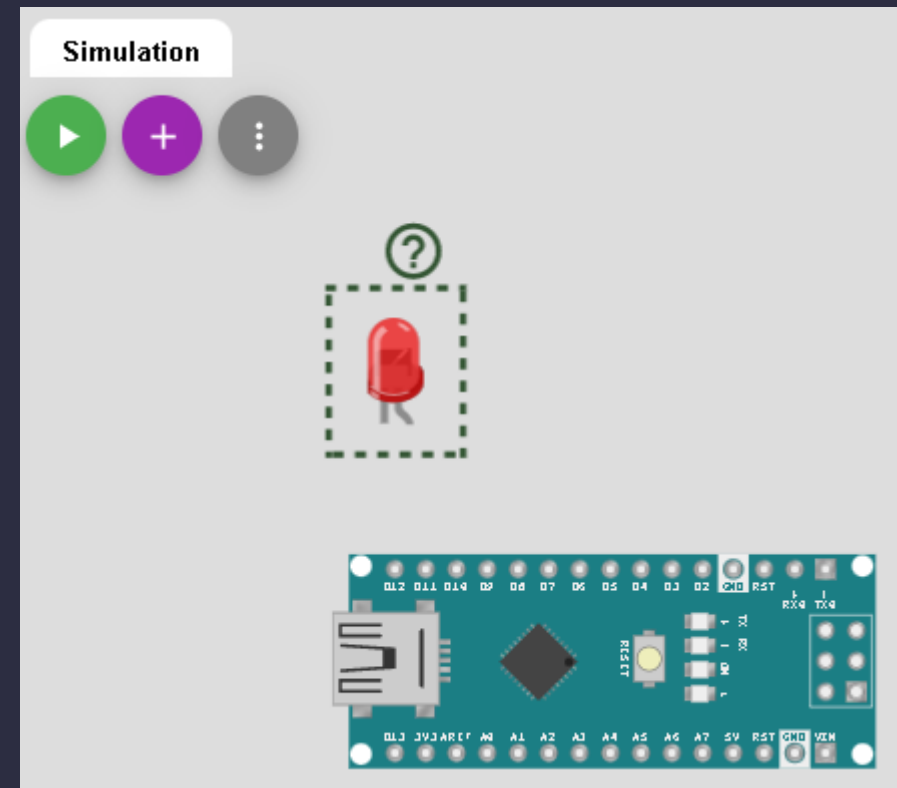


# Simulator

## Simulator

### Example

- Add a LED element to circuit

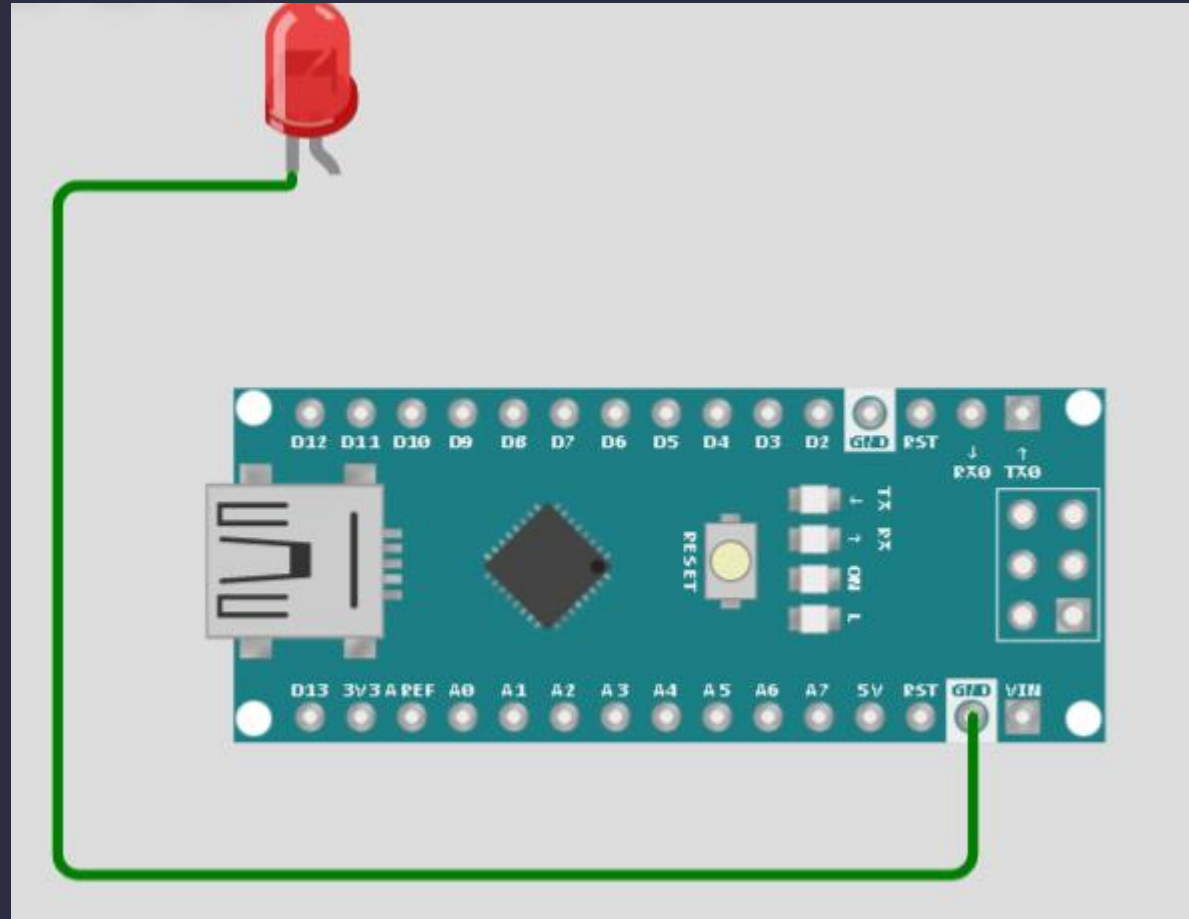


# Simulator

## Simulator

### Example

- Click LED's short pin and connect it to arduino's gnd pin

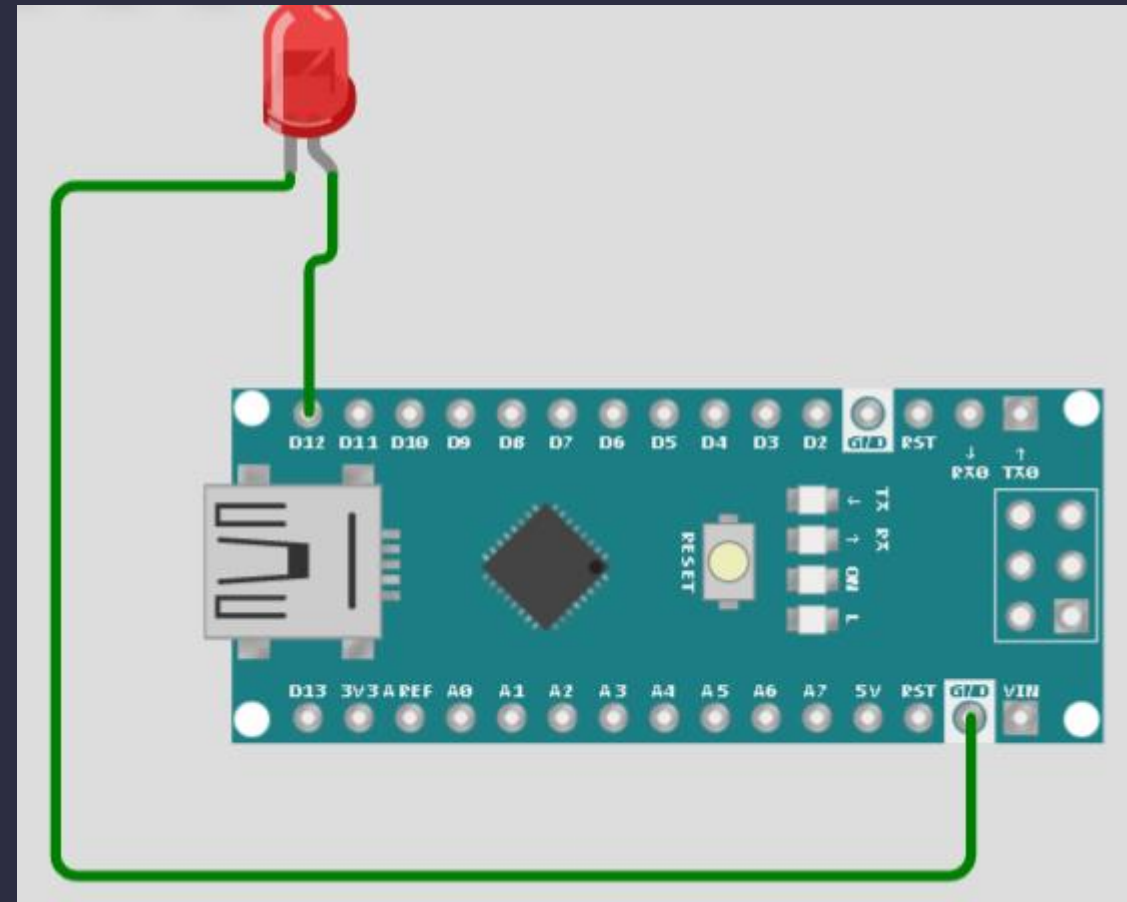


# Simulator

## Simulator

### Example

- Click LED's long pin and connect it to ardunio's digital pin (ex 12)

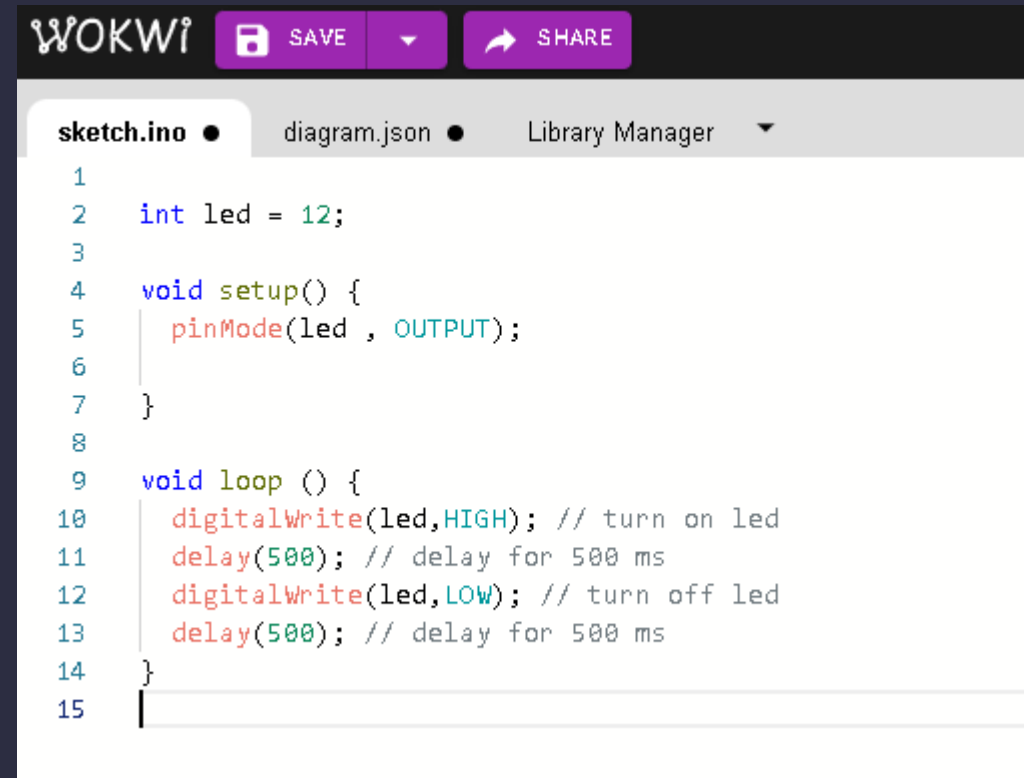


# Simulator

## Simulator

### Example

- Write a test code

The image shows the Wokwi web-based simulator interface. At the top, there's a black header with the 'WOKWI' logo in white, followed by a purple 'SAVE' button with a floppy disk icon and a purple 'SHARE' button with a share icon. Below the header is a light gray bar containing tabs for 'sketch.ino' (selected), 'diagram.json', and 'Library Manager'. The main area is a white code editor showing an Arduino sketch. The code is as follows:

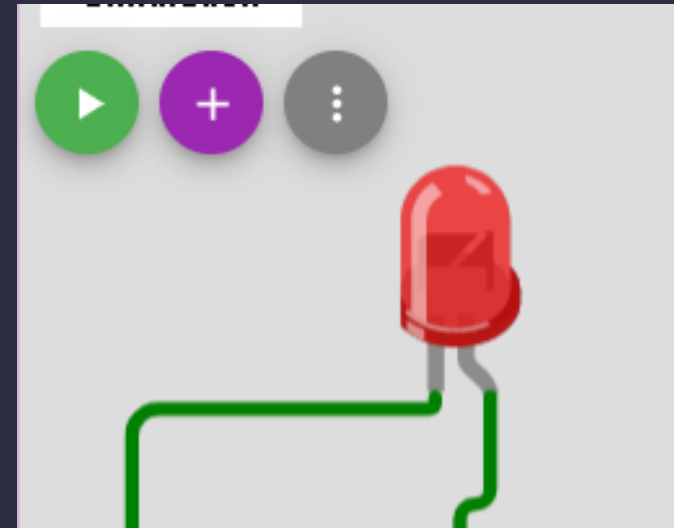
```
1
2  int led = 12;
3
4  void setup() {
5    pinMode(led , OUTPUT);
6  }
7
8
9  void loop () {
10   digitalWrite(led,HIGH); // turn on led
11   delay(500); // delay for 500 ms
12   digitalWrite(led,LOW); // turn off led
13   delay(500); // delay for 500 ms
14 }
15
```

# Simulator

## Simulator

### Example

- To start simulation, click play button

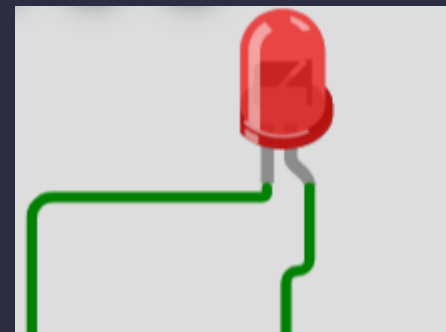
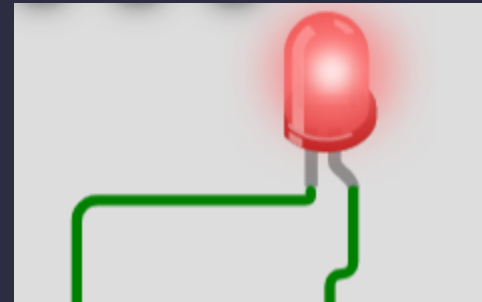


# Simulator

## Simulator

### Example

- You will need to see blinking LED



# Simulator

## Simulator

Check examples:

- Servo 1: <https://wokwi.com/arduino/libraries/Servo/Sweep>
- Servo 2: <https://wokwi.com/arduino/libraries/Servo/Knob>

# Simulator

## Simulator

Check examples:

- Distance Sensor + LCD:  
<https://wokwi.com/projects/290043622233997832>

# Simulator

## Simulator

Check examples:

- Uart Tx Example:  
<https://wokwi.com/projects/310190486586393154>

# Simulator

## Simulator

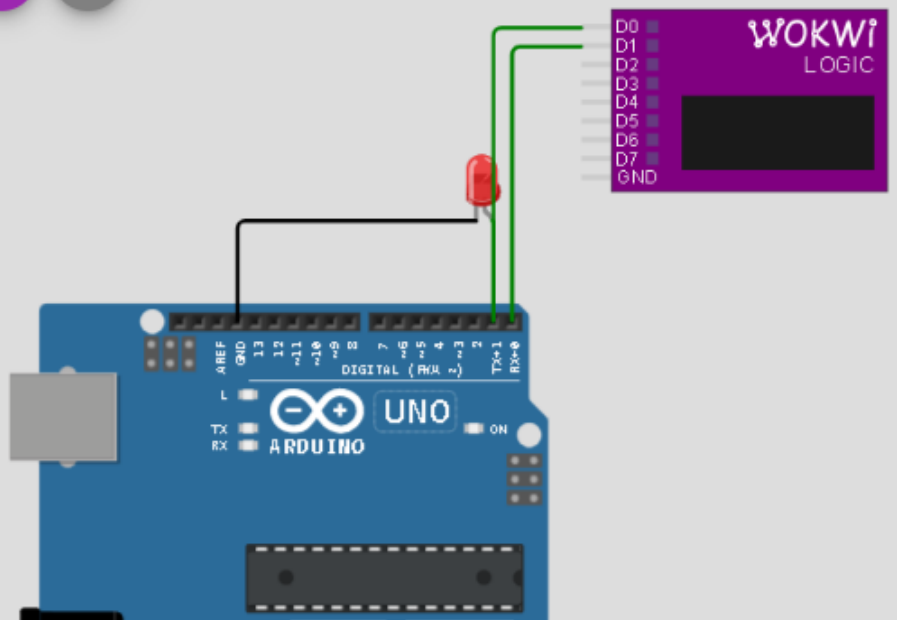
- Uart Rx Example:

uart-blink-led.ino • diagram.json • Library Manager ▾

```
1 void setup() {
2   noInterrupts();
3   CLKPR = _BV(CLKPCE); // enable change of the clock prescaler
4   CLKPR = _BV(CLKPS3); // divide frequency by 256
5   interrupts();
6
7   Serial.begin(1000);
8   Serial.write("test");
9 }
10
11
12 void loop() {
13   if(Serial.available()){
14     Serial.write("I received:"); //print I received
15     Serial.write(Serial.read()); //send what you read
16   }
17 }
18
19
20
```

Simulation

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# Simulator

## Examples

- Pushbutton
- Keypad
- Buzzer
- UART