



Arduino Programming



Hello!

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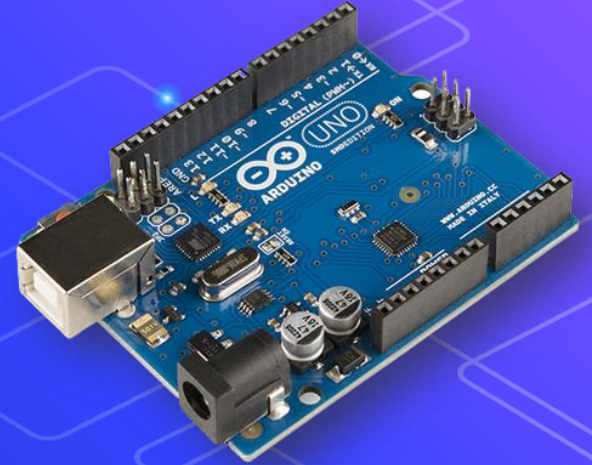


1. What is Arduino?

Let's talk about Arduino...



“ Arduino is an open-source electronics platform based on easy-to-use hardware and software.



2. What is IoT?

Have you heard of the Internet of Things?



Everyday
Things get
connected



For Smarter
Tomorrow



IOT in Agriculture



Embedded System



Smart Retail



Internet of
Things



Wireless Connection



Smart Homes & Cities

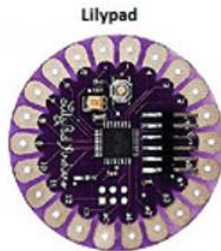
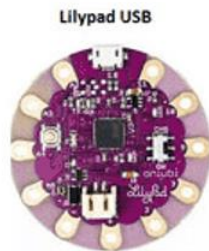


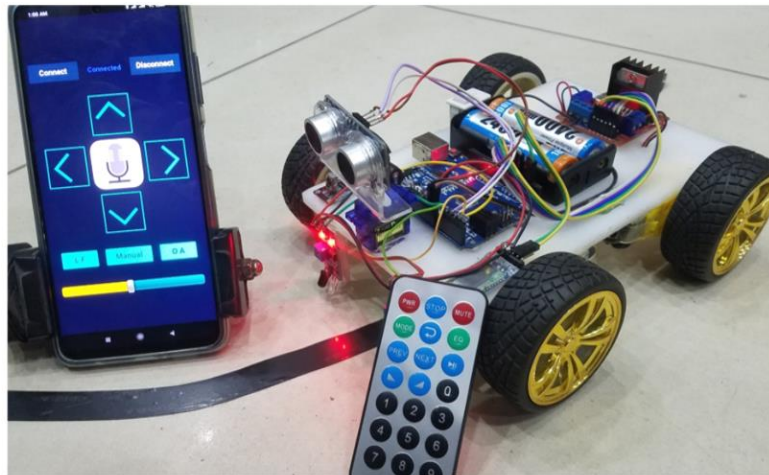
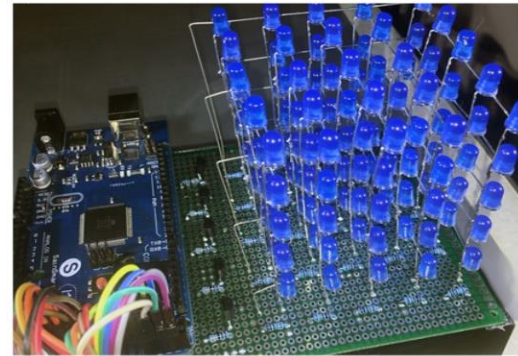
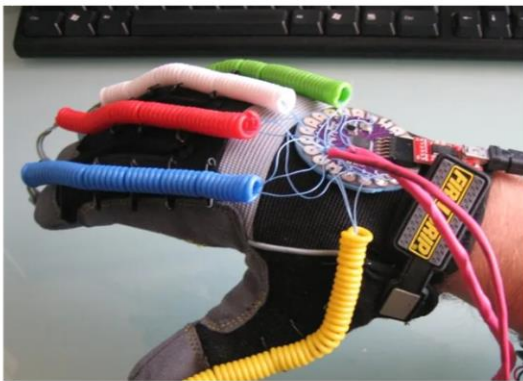
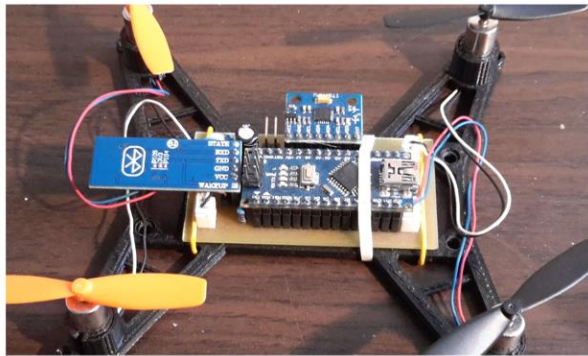
Vehicle ,Asset , Pet
Monitoring & Controlling

3. Arduino Boards

Let's see different types of Arduino boards...







4. Arduino UNO

Have you heard about the most popular
Arduino board?



Reset Button

Resets the ATmega microcontroller

Pin 13 LED

The Arduino built-in LED

Digital Pins

Send and receive digital signals

USB Port

Used for powering Arduino, uploading sketches to Arduino, and for communicating with Arduino sketch

TX and RX LEDs

The following LEDs show that Arduino and computer are in communication

Power connector

This is how you power your Arduino when it isn't plugged into a USB port for power. Acceptable voltages 7-12V dc.

Power LED

This indicates that Arduino is receiving power

ATmega microcontroller

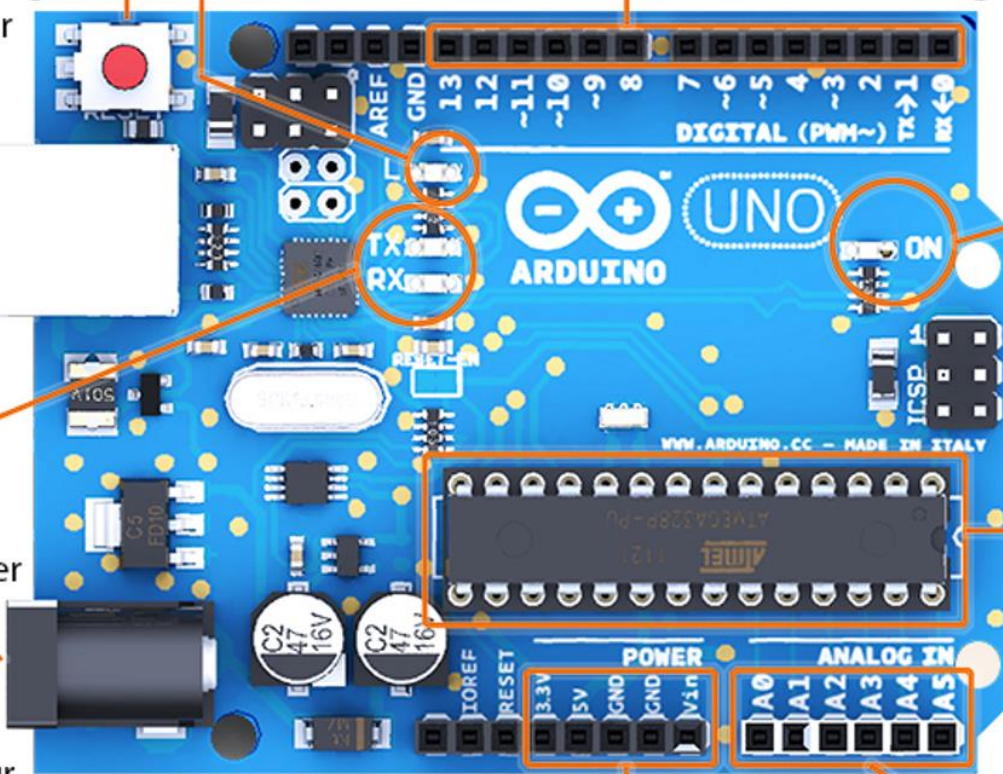
The heart and brain of Arduino Uno

Power Pins

Distribute power to inputs and outputs

Analog in

To receive an analog value



5. Arduino IDE

Let's have a look about the Arduino
Integrated Development Environment.

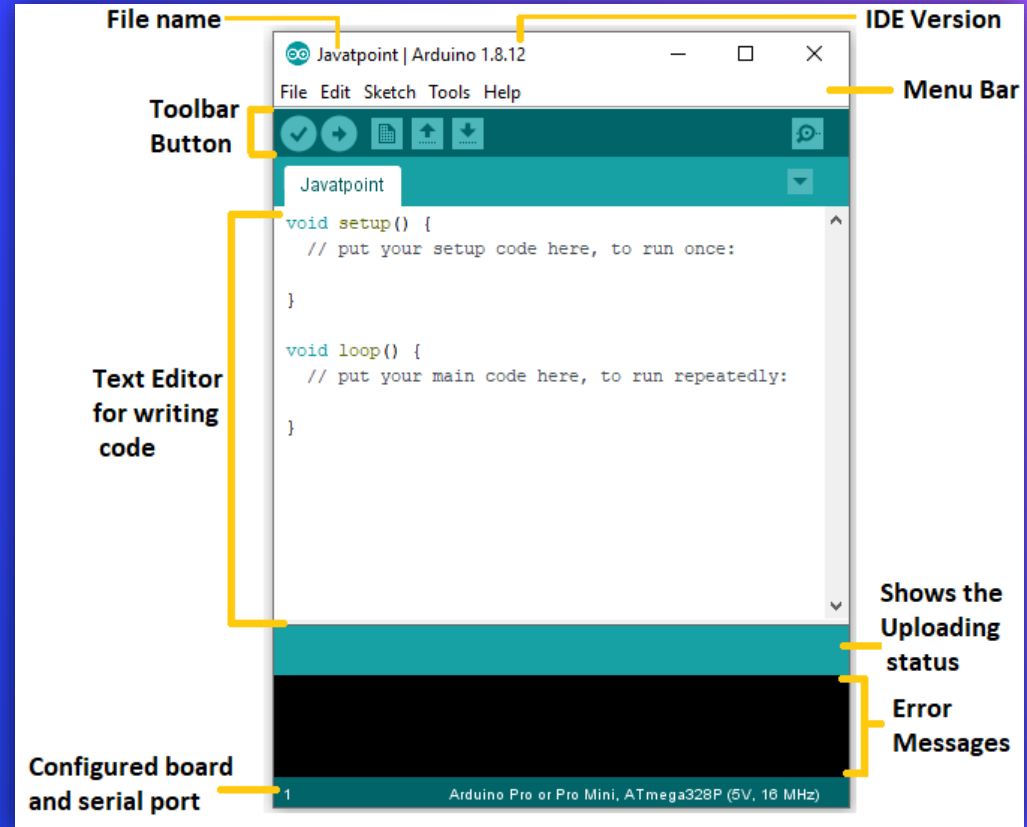


Arduino IDE Installation

- Visit <https://www.arduino.cc/en/software> to download Arduino Legacy IDE version.
- Once you successfully install the Arduino IDE by running the setup file, launch the Arduino software by double clicking on the desktop shortcut.

Arduino IDE

This is the place where you give commands to your Arduino board...



Toolbar Buttons

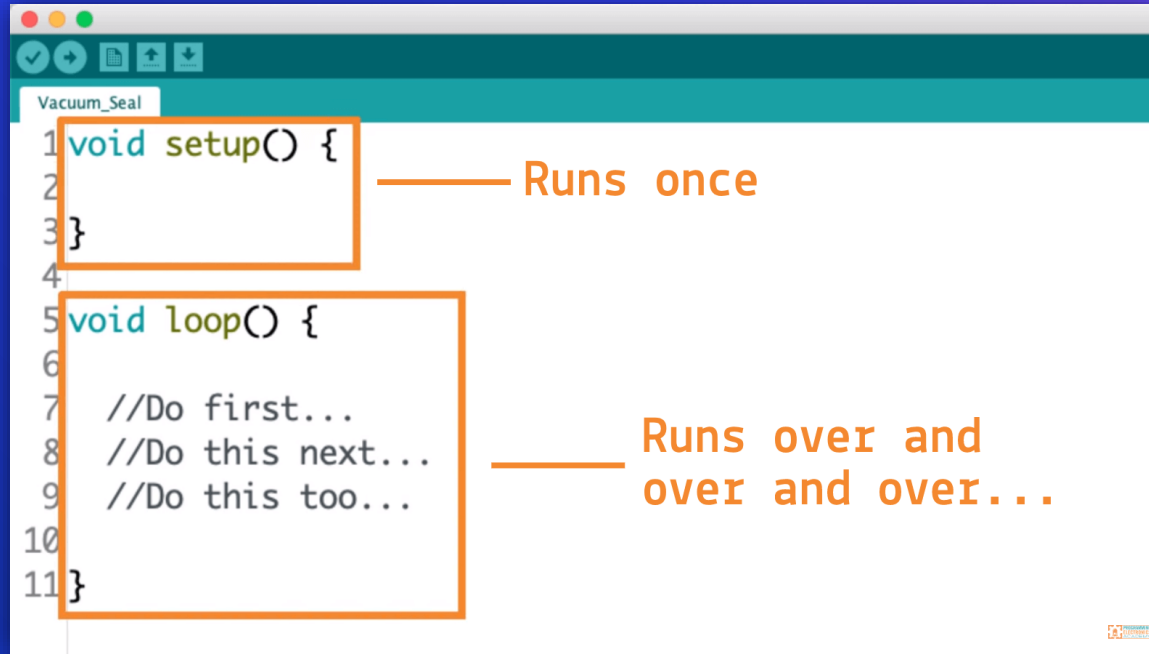


6. setup() & loop() Functions

What are those default functions?



void setup() & void loop()



7.

Arduino Syntax & Program Flow

Let's see Arduino programming language syntax and program flow...



- 👁️ Curly Braces
- 👁️ Semicolon
- 👁️ Indentation
- 👁️ Comments

```
sketch_feb22a | Arduino 1.8.19
File Edit Sketch Tools Help

sketch_feb22a $
void setup() {
  // Curly braces are used to add scope

  // This is a comment
  // You can add a single line comment by using two slashes

  // int i = 5;
  // Indentation is given by two spaces

  pinMode(3, OUTPUT);
  // Semicolons are used to terminate statements
}

void loop() {
  /*digitalWrite(3, LOW);
  delay(1000);*/
  // slash star and star slash is used to add multiline comments
}
```

Configure Arduino Setup



Board:

Select your Arduino Board name from the available list.

Port:

Select the port that your Arduino is currently connected at.

7. Other Function

Let's walk through some other important functions...



pinMode() Function

Syntax	<code>pinMode(pin, mode)</code>
Parameters	pin: the Arduino pin number to set the mode of. mode: INPUT, OUTPUT, or INPUT_PULLUP.
Example	<code>pinMode(5, OUTPUT);</code> <code>pinMode(6, INPUT);</code>

digitalWrite() Function

Syntax	<code>digitalWrite(pin, value)</code>
Parameters	pin: the Arduino pin number. value: HIGH or LOW.
Example	<code>digitalWrite(13, HIGH);</code> <code>digitalWrite(12, LOW);</code>

delay() Function

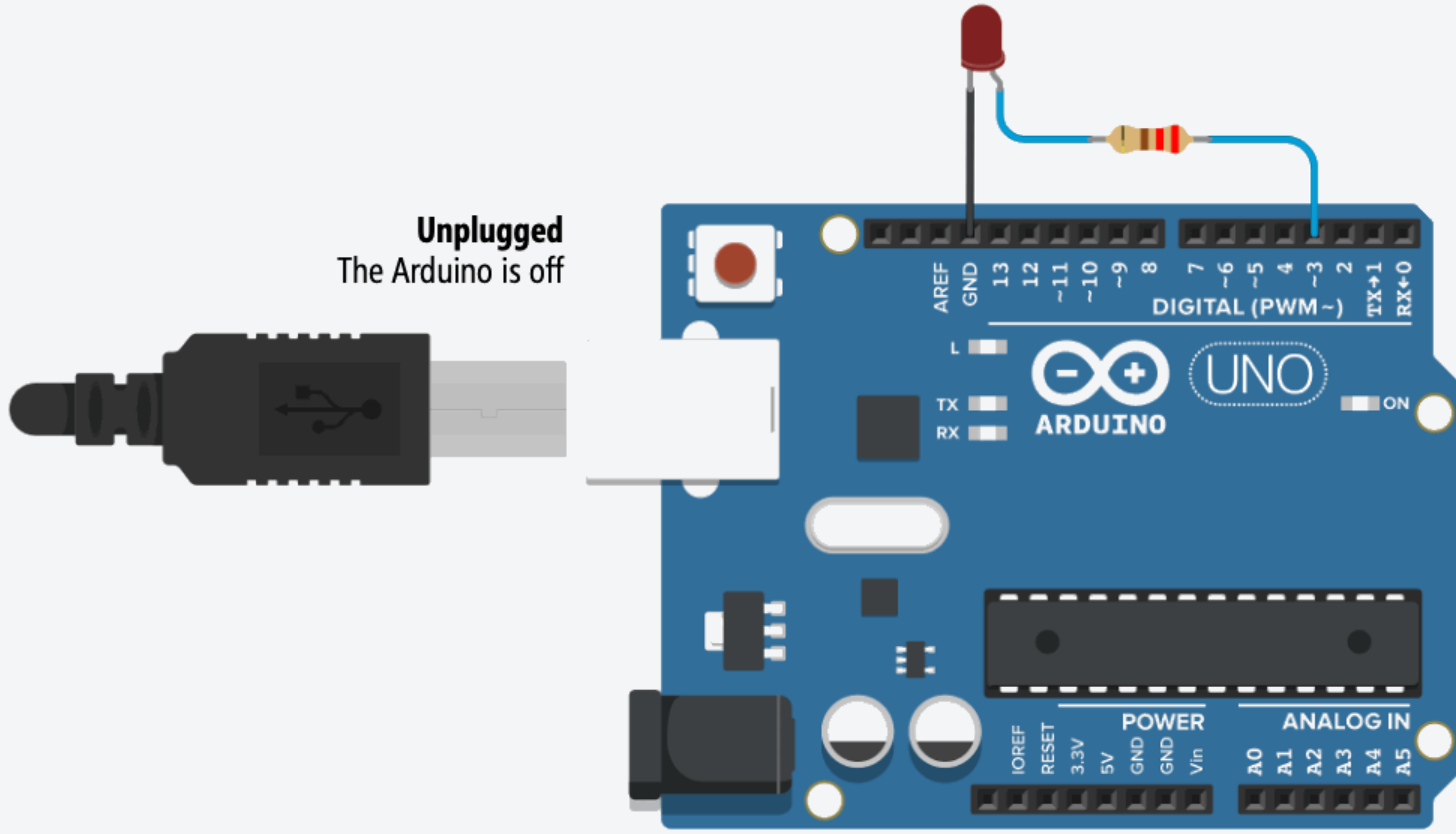
Syntax	<code>delay(ms)</code>
Parameters	<code>ms</code> : the number of milliseconds to pause. Allowed data types: unsigned long.
Example	<code>delay(1000); // waits for a second</code> <code>delay(1500); // waits for a second and a half</code>

8. Project 1 Blink a LED

Let's build our first simple project



Unplugged
The Arduino is off



```
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File Edit Sketch Tools Help

sketch_feb22a $
void setup() {
  pinMode (3, OUTPUT); // LED anode pin
}

void loop() {
  digitalWrite(3, HIGH); // Turn LED on
  delay(1000); // Wait for one second
  digitalWrite(3, LOW); // Turn LED off
  delay(1000); // Wait for one second
}
```

Pin Setup & Code

LED Anode	Digital pin 3
LED Cathode	GND

Similar Codes

```
void setup() {  
  pinMode(3, OUTPUT);  
}  
  
void loop() {  
  digitalWrite(3, HIGH);  
  delay(500);  
  digitalWrite(3, LOW);  
  delay(100);  
}
```

```
void setup() {  
  pinMode(3, OUTPUT);  
}  
  
void loop() {  
  digitalWrite(3, HIGH);  
  delay(500);  
  digitalWrite(3, LOW);  
  delay(100);  
  digitalWrite(3, HIGH);  
  delay(1000);  
  digitalWrite(3, LOW);  
  delay(100);  
}
```

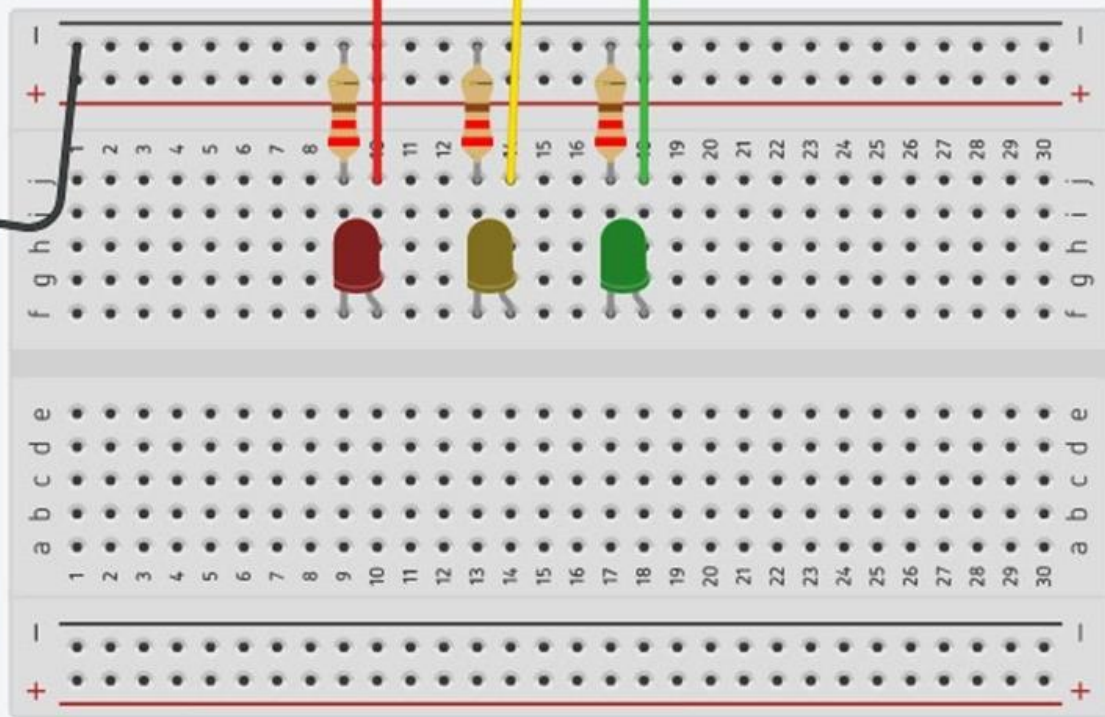
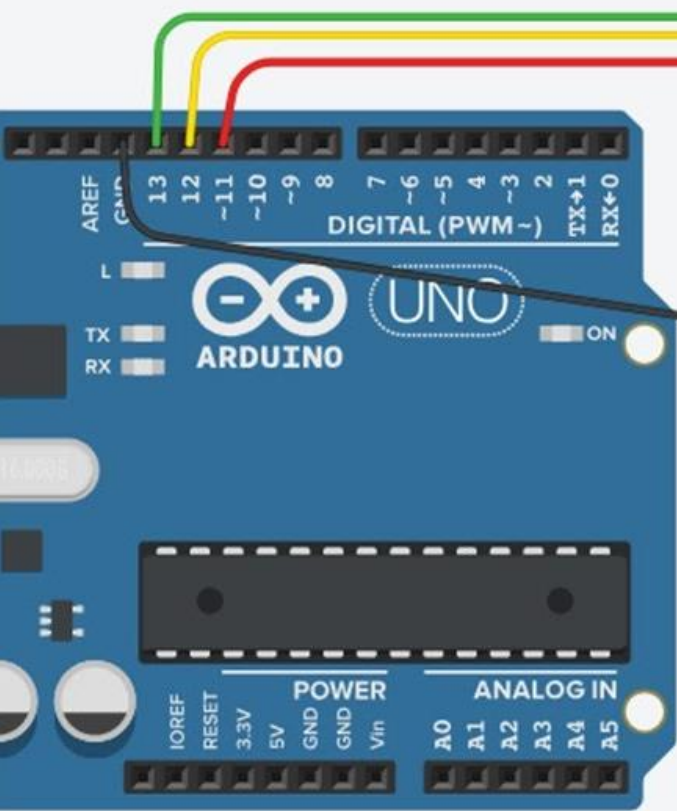
9.

Project 2

Blink 3 LEDs

Let's blink two more LEDs...





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File Edit Sketch Tools Help

sketch_feb22a

void setup() {
  pinMode(11, OUTPUT); // First LED anode pin
  pinMode(12, OUTPUT); // Second LED anode pin
  pinMode(13, OUTPUT); // Third LED anode pin
}

void loop() {
  digitalWrite(11, HIGH); // Turn first LED on
  delay(1000); // Wait for one second
  digitalWrite(11, LOW); // Turn first LED off
  delay(1000); // Wait for one second
  digitalWrite(12, HIGH); // Turn second LED on
  delay(1000); // Wait for one second
  digitalWrite(12, LOW); // Turn second LED off
  delay(1000); // Wait for one second
  digitalWrite(13, HIGH); // Turn third LED on
  delay(1000); // Wait for one second
  digitalWrite(13, LOW); // Turn third LED off
  delay(1000); // Wait for one second
}
```

Pin Setup & Code

1 st LED Anode	Digital pin 11
1 st LED Cathode	GND
2 nd LED Anode	Digital pin 12
2 nd LED Cathode	GND
3 rd LED Anode	Digital pin 13
3 rd LED Cathode	GND

10. Few Extra Functions

Would you like to learn more?



Serial.begin() Function

Syntax	<code>Serial.begin(speed)</code>
Parameters	speed: bits per second (Supported values are: 9600, 14400, 19200, 38400, 57600, 115200, 230400 bps.)
Example	<code>Serial.begin(9600);</code>

Serial.print() Function

Syntax	<code>Serial.print(val)</code>
Parameters	val: the value to print. (Allowed data types: any data type.)
Example	<code>Serial.print("Hello World");</code> <code>Serial.print("Hi there");</code>

Serial.println() Function

Syntax	<code>Serial.println(val)</code>
Parameters	<code>val</code> : the value to print. (Allowed data types: any data type.)
Example	<pre>Serial.println("Hello"); Serial.println("World"); Serial.println("Programme");</pre>

Thanks!

Any Questions?

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