Basic Arduino

This guide will introduce you to what an Arduino is and its basic usage.

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Introduction

Arduino is an open-source hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices.

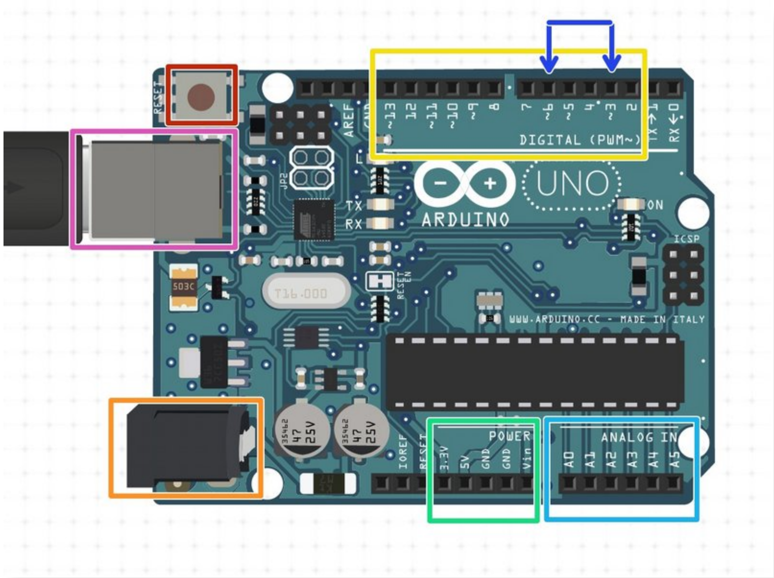
PARTS:

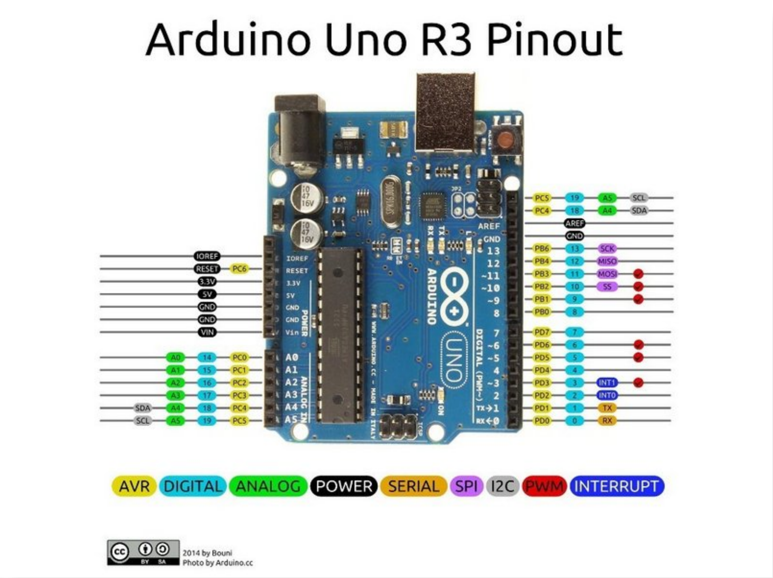
- Arduino (1)
- led (1)
- USB-A to USB-B (1)
- Jumper Wires (2)
- 220 Ohm Resistor (1)
- Breadboard (1)

Step 1 — What is a microcontroller? Arduino?

- A microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system. A typical microcontroller includes a processor, memory and input/output (I/O) peripherals on a single chip.
- Arduino Uno is a microcontroller board based on the ATmega328P.
- Thanks to its simple and accessible user experience, Arduino has been used in thousands of different projects and applications. The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users.

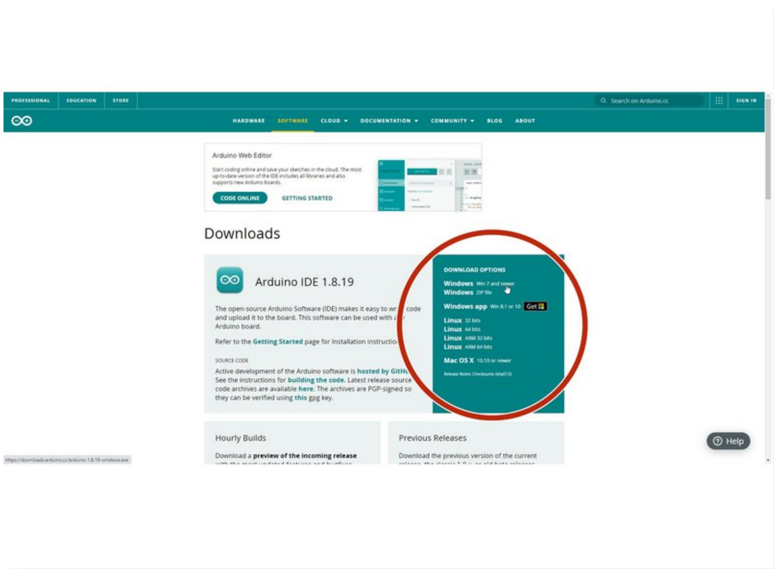
Step 2 — Arduino Uno Ports and Pinouts





- Reset
- USB-A Connector
- DC power jack
- Digital I/O pins
  - Pin numbers with ~ has PWM features
- Power Pins
- Analog Pins
- A more detailed layout is illustrated in the second image

Step 3 — Installing Arduino IDE



Arduino Web Editor

Start coding online and save your sketches in the cloud. The most up-to-date version of the IDE includes all libraries and also supports new Arduino boards.

Downloads

Arduino IDE 1.8.19

The open-source Arduino Software (IDE) makes it easy to wr code and upload it to the board. This software can be used with a Arduino board.

Refer to the Getting Started page for Installation instructio

SOURCE CODE

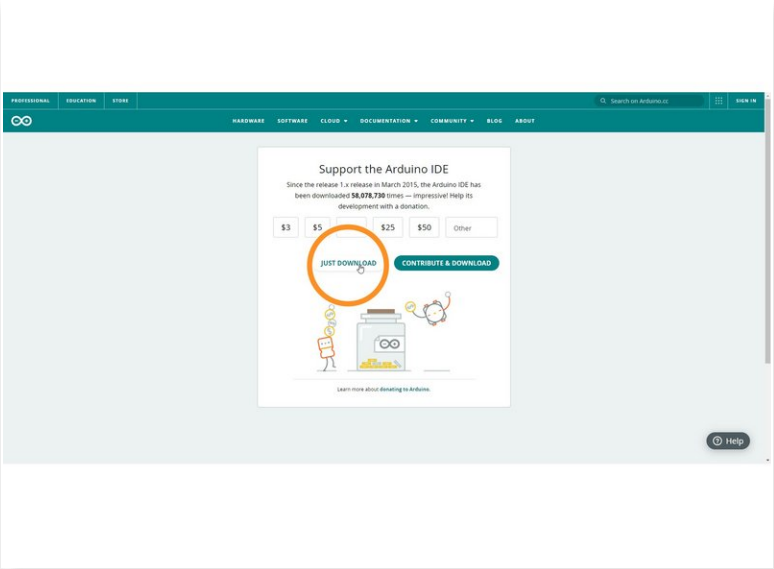
Active development of the Arduino software is hosted by GitHu See the instructions for building the code. Latest release source code archives are available here. The archives are PGP-signed so they can be verified using this gpg key.

Hourly Builds

Download a preview of the incoming release

Previous Releases

Download the previous version of the current



Support the Arduino IDE

Since the release 1.x release in March 2015, the Arduino IDE has been downloaded **58,078,730** times — impressive! Help its development with a donation.

Learn more about donating to Arduino.

- Visit Arduino's Official Download Page:
- https://www.arduino.cc/en/software
- Choose the version that is applicable to your computer
- Click "Just Download"
- Once the download is completed, double click the downloaded file and follow the on-screen instructions to install the IDE

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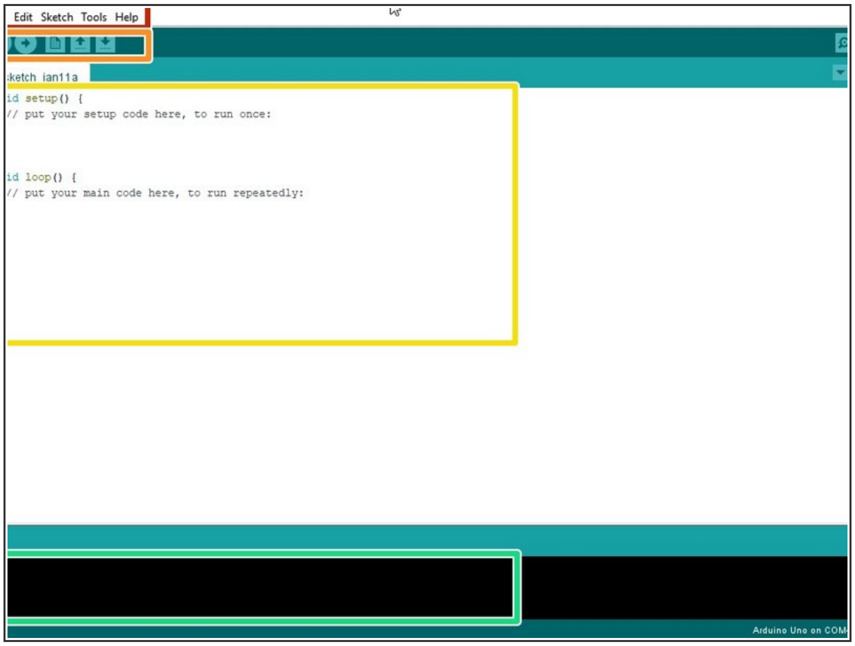
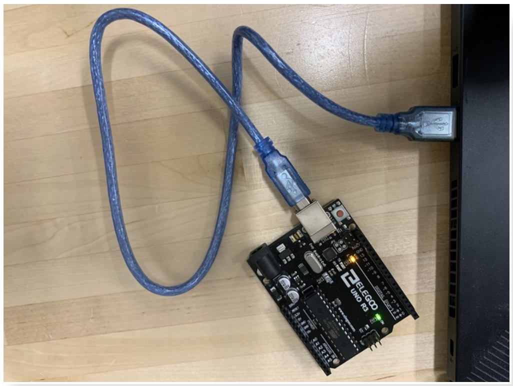
Step 4 — Overview of Arduino IDE Workspace

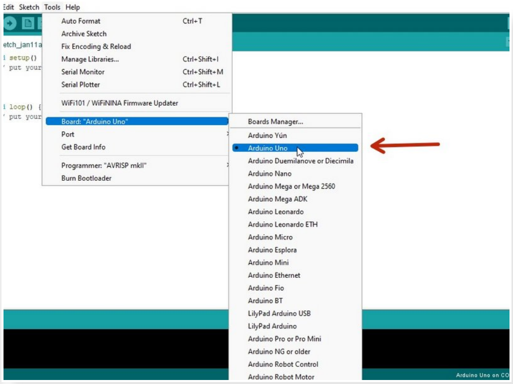


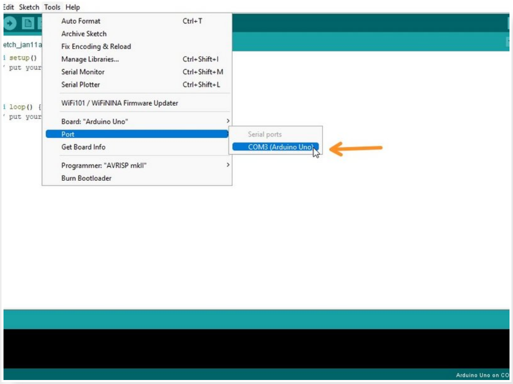
```
id setup() {
// put your setup code here, to run once:


id loop() {
// put your main code here, to run repeatedly:
```

- File Management, Settings, Preferences, Libraries etc
- Verify, Upload, and File Management.
- Program
- Serial Console

Step 5 — Connecting an Arduino Uno







- Connect the Arduino to the computer with a USB-A to USB-B cable.
- Select the board type
  - Tools > Board > Arduino Uno
- Connect to port
  - Tools > Port > COM <Port Number>

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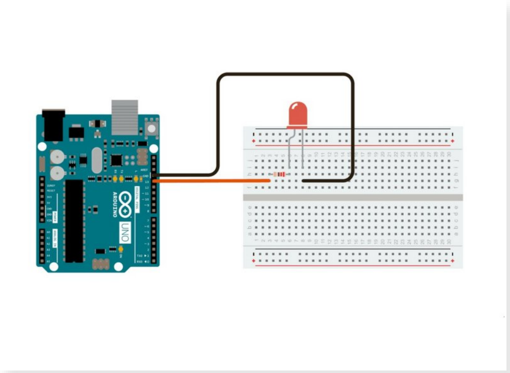
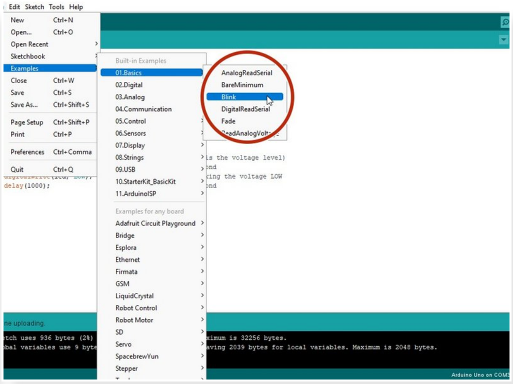
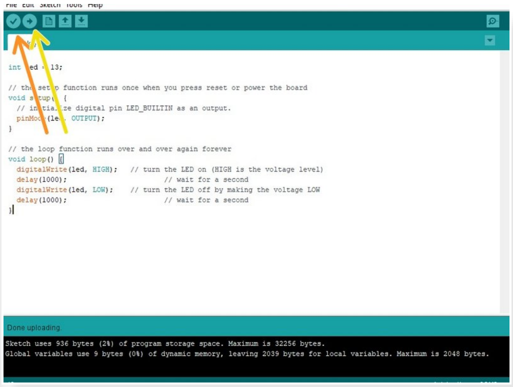
Step 6 — Example Code: Blink (Upload)







```
int  ed   13;

// the set p function runs once when you press reset or power the board
void s tup(  {
  // in tia ize digital pin LED_BUILTIN as an output.
  pinMo  (le , OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(led, HIGH);   // turn the LED on (HIGH is the voltage level)
  delay(1000);                       // wait for a second
  digitalWrite(led, LOW);    // turn the LED off by making the voltage LOW
  delay(1000);                       // wait for a second
}
```

```
Done uploading.
Sketch uses 936 bytes (2%) of program storage space. Maximum is 32256 bytes.
Global variables use 9 bytes (0%) of dynamic memory, leaving 2039 bytes for local variables. Maximum is 2048 bytes.
```

- Complete the wiring diagram
  - ⓘ Make sure the longer end of the LED is connected to Pin 13.
- Open the example code, File > Examples > 01.Basics > Blink
  - Make small edit to match what is on here.
- Click Verify
  - Clicking the verify button checks to make sure there are no errors in your code.
- Click Upload
  - Clicking upload transfers your code from your computer to your Arduino so it can run on your Arduino board.

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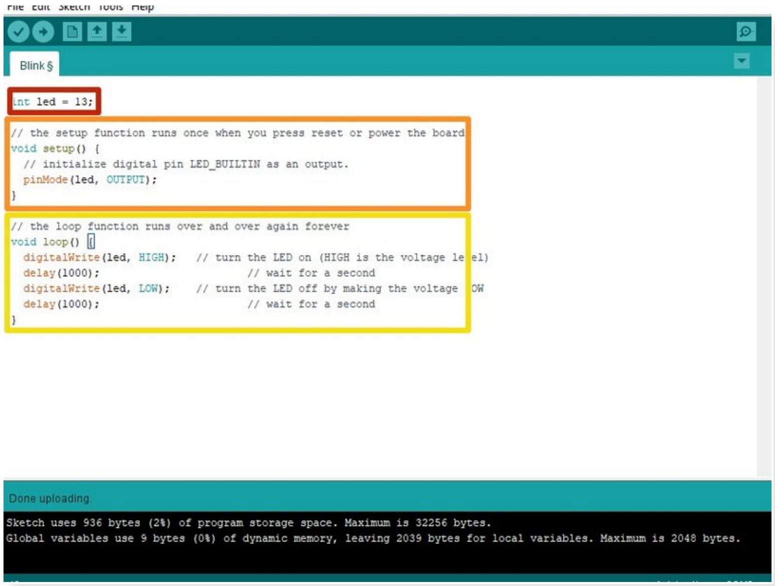
Step 7 — Example Code: Fade (Explanation)



```
int led = 13;

// the setup function runs once when you press reset or power the board
void setup() {
  // initialize digital pin LED_BUILTIN as an output.
  pinMode(led, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(led, HIGH);   // turn the LED on (HIGH is the voltage le el)
  delay(1000);                       // wait for a second
  digitalWrite(led, LOW);    // turn the LED off by making the voltage  OW
  delay(1000);                       // wait for a second
}
```

Done uploading.

```
Sketch uses 936 bytes (2%) of program storage space. Maximum is 32256 bytes.
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```

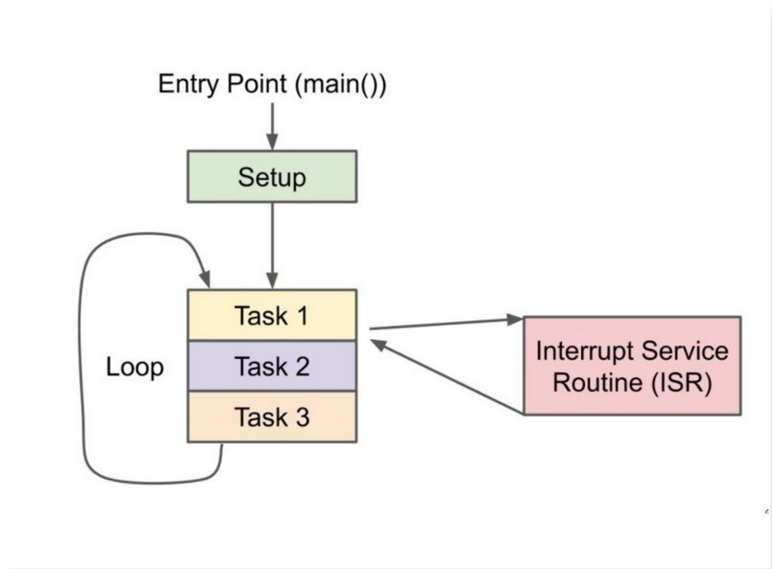

- Variables can be declared and initialed before the setup() function.
- The setup() function is called when a sketch starts. Use it to initialize variables, pin modes, start using libraries, etc. The setup() function will only run once, after each powerup or reset of the Arduino board.
- After creating a setup() function, which initializes and sets the initial values, the loop() function does precisely what its name suggests, and loops consecutively, allowing your program to change and respond. Use it to actively control the Arduino board.

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