

ARDUINO PROGRAMMING: WHAT IS ARDUINO AND HOW TO PROGRAM IT?

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Arduino Programming: What is Arduino and How to Program it?

What is Arduino?

An Arduino is an open source hardware platform with built in programming support. No additional hardware or software (e.g. Hex burner) is required to transfer your programs (i.e. hex file) to the Arduino. There are all the necessary peripherals attached for the basic operation. It is based on simple AVR microcontrollers.

Arduino is a growing industry nowadays and the major reason behind it is the vast majority of libraries. Users don't have to invent the wheel again. Long traditional codes have been reduced to few lines now. It is easy to use and enhance productivity. Arduino can be used to make a variety of projects taking analogue as well as digital inputs and can easily interface with different hardware like switches, encoders, Sensors, Motors, relays and many more.

Arduino board PCB designs and schematics are freely available on internet community and blogs and it can also be purchased from the respective sellers and its Integrated Development Environment is free to download, different versions of this IDE are available to make it compatible with different OS (Operating systems) like Mac, windows, etc.

- PCB Designing: How To Design a PCB (Step by Step & Pictorial Views)
- How to Program PIC18 Microcontroller in C. Step by Step Tutorial

Why to choose Arduino?

1) Arduino has its built in programmer to burn the Hex file in it, for most of the beginners, it is very irritating to buy Microcontroller and Burner separately and sometimes it is very annoying, when poor hardware has a little hidden broken wire and you will waste plenty of precious hours.

2) Its open source so the whole world developer constantly working on its upgrade and fixing its bugs, so its support is readily available worldwide.

3) The largest number of libraries is freely available so person does not need to write a lot of basic code to make the things run.

4) Arduino support many different shields, which can be attached to the basic Arduino board with male to female Headers. It reduces the traditional wiring and chances of errors are less. It is also space and power efficient.

These all the above features are generally not available with single stand-alone microcontroller. That's why Arduino is loved by the hobbyist as well as professionals.

- Arduino PWM Programming and its functions in Arduino
- Arduino Serial: Serial Communication by Arduino

Types of Arduino :

Arduino has many boards it starts from basic Arduino UNO and goes to Arduino mega, ArduinoFio, Lily Pad so on and so forth.

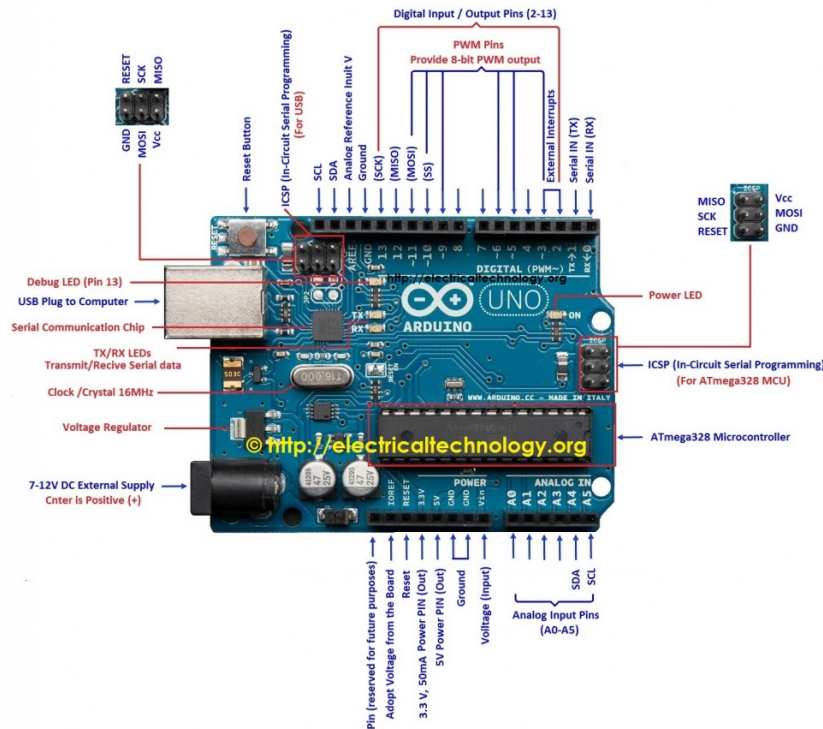
- Arduino UNO
- Arduino Mega
- Arduino Duemilanove
- Arduino Fio
- Lily Pad Arduino
- Arduino Extreme V2

And many other boards.

Arduino Programming

Programming Arduino (First program)

Let's start with Arduino UNO its simple enough to start with, it is based on Atmega 328 Microcontroller



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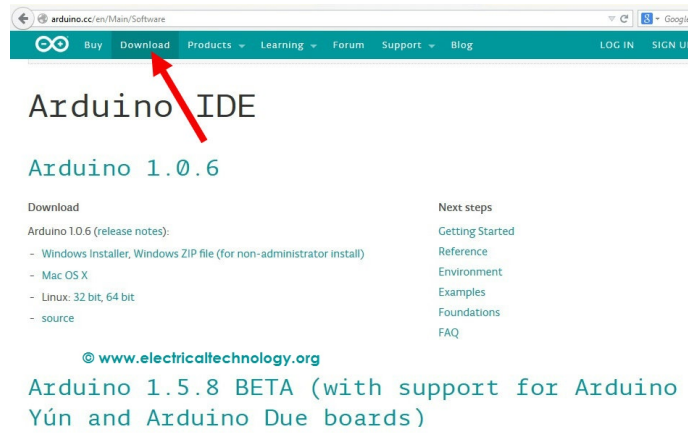
Arduino UNO PIN & Components Labels

Arduino UNO salient features are:

- | | |
|---|---|
| • Microcontroller (MCU) | ATmega328 |
| • Operating Voltage (DC) | 5V |
| • Input Supply Voltage (External) | 6-20VDC (MAX) |
| • Recommended Input Supply Voltage (DC) | 7-12V |
| • Number of Digital Input / Output (I/O) Pins | 14 |
| • PWM (Pulse Width Modulation) outputs | 6 (Pin 3, 5, 6, 9, 10 and 11) |
| • Input Pins (Analog) | 6 (A0-A5) |
| • DC Current (Max) | 40 mA (per I/O Pin) |
| • DC Current for 3.3V Pin | 50 mA |
| • Flash Memory | 32 KB (ATmega328) (0.5 KB used by boot-loader) |
| • Clock Speed (Ceramic Resonator) | 16 MHz |
| • SRAM (Memory) | 2 KB (ATmega328 MCU) |
| • EEPROM (Memory) | 1 KB (ATmega328 MCU) |

Now start with Arduino First basic program.

Download the Arduino IDE from www.arduino.cc, install it and then double click on the software icon to run.



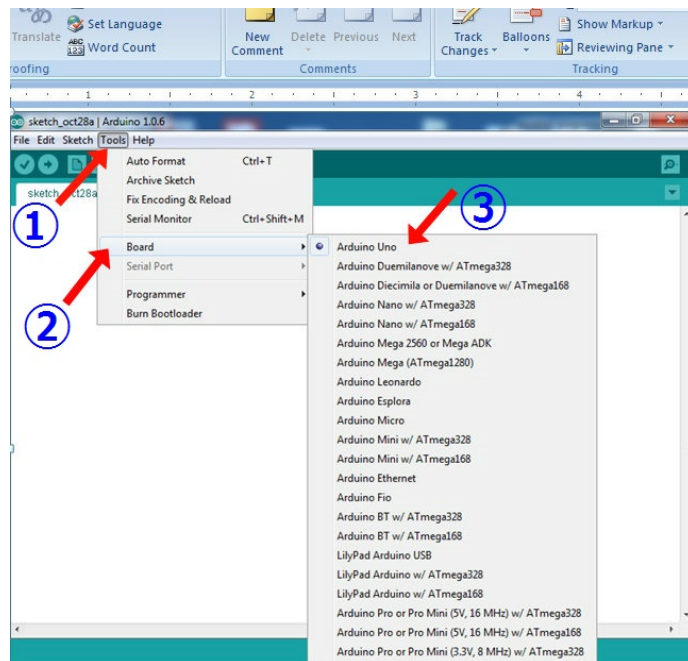
Basics Arduino Programming :

Arduino coding has two major blocks. One of them is called void setup and the other one is void loop. In void setup, we define that which pin should be input and output. It is used to initialize variables and start using libraries.

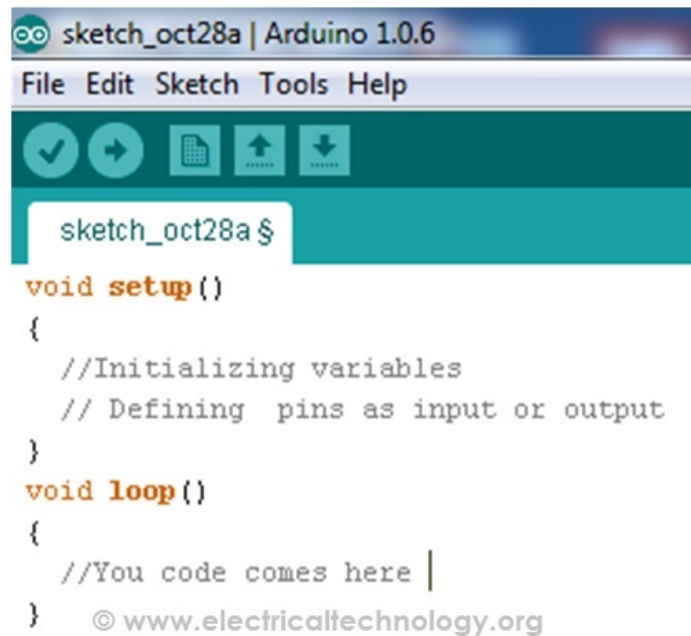
Second block of the code is void loop. It contains all the code and logics placed within the brackets (it will repeat endlessly).

Let's write this bare minimum code:

Do not forget to select the appropriate board.



Once the board is selected now start writing the code for this specific board.



A few basic functions of Arduino Programming to remember:

Defining Pins:

This syntax is used while assigning a specific name to the pins of arduino.

Int LED = 13;

Here 13 is the pin number and LED is the new name of that pin now we can access the same pin with both names .

PinMode(x,y) function:

We want to write the code to blink the led. PinMode (X, Y) function: this function takes 2 arguments

- 1) Pin name or number (X)
- 2) Defines as output or input (y)

Example: pinMode(led,OUTPUT)

The above statement defines Led as output.

digitalWrite(x,y) function:

This function Write Digital 1 or 0 to the pin defined in the arguments of this function. This function also takes 2 arguments

- Pin number or name
- Whether writing "Low" or "High"

Example:

Digitalwrite(Led,HIGH)

The above statement will write +5 volts on the pin named LED.

Delay Function:

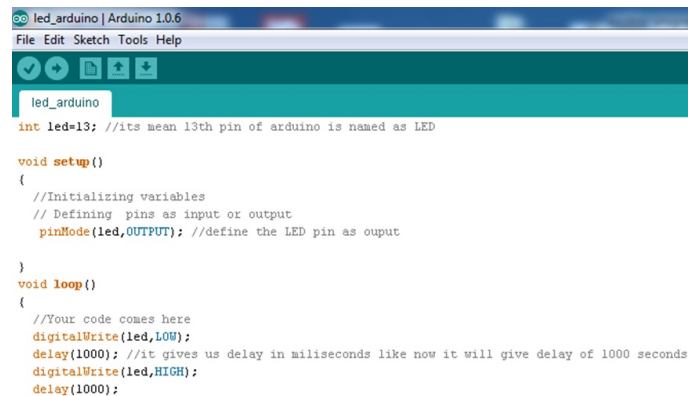
This is a built in function of Arduino IDE. It has only one argument i.e. it gives delay in milliseconds.

Example:

Delay(1000);

Then this function will give us delay of 1000 milliseconds.

Final LED Program:



```

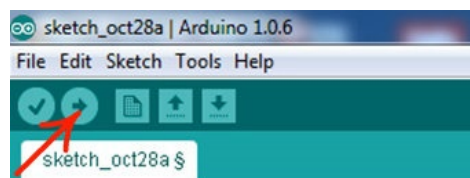
led_arduino | Arduino 1.0.6
File Edit Sketch Tools Help

led_arduino
int led=13; //its mean 13th pin of arduino is named as LED

void setup()
{
  //Initializing variables
  // Defining pins as input or output
  pinMode(led,OUTPUT); //define the LED pin as output
}

void loop()
{
  //Your code comes here
  digitalWrite(led,LOW);
  delay(1000); //it gives us delay in miliseconds like now it will give delay of 1000 seconds.
  digitalWrite(led,HIGH);
  delay(1000);
}
  
```

Now click on the button (as shown in the above image) to load the program to the Arduino board. you have done 😊



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