

## Expt No.1

**Title:** Study of different types of Arduino and Install IDE of Arduino.

### **Description:**

Arduino board is an open-source platform used to make electronics projects. It consists of both a microcontroller and a part of the software or Integrated Development Environment (IDE) that runs on your PC, used to write & upload computer code to the physical board.

### **Types of Arduino**

#### ***1. Arduino Uno (R3)***

This Arduino board depends on an ATmega328P based microcontroller. ATmega328 is a single-chip microcontroller created by Atmel in the megaAVR family. As compared with other types of Arduino boards, it is very simple to use like the Arduino Mega type board. It consists of 14-digital I/O pins, where 6-pins can be used as PWM(pulse width modulation outputs), 6-analog inputs, a reset button, a power jack, a USB connection, an In-Circuit Serial Programming header (ICSP), etc. It includes everything required to hold up the microcontroller; simply attach it to a PC with the help of a USB cable and give the supply to get started with an AC-to-DC adapter or battery.

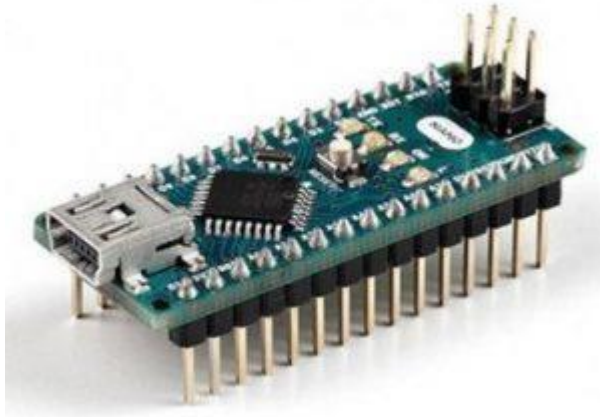


*Arduino Uno (R3)*

Arduino Uno is the most frequently used board and it is the standard form apart from all the existing Arduino Boards. This board is very useful for beginners.

## ***2. Arduino Nano***

This is a small board based on the microcontrollers like ATmega328P, otherwise ATmega628 but the connection of this board is the same as to the Arduino UNO board. This kind of microcontroller board is very small in size, sustainable, flexible, and reliable.



*Arduino Nano*

As compared with the Arduino Uno board, it is small in size. The devices like mini USB and Arduino IDE are necessary to build the projects. This board mainly includes analog pins-8, digital pins-14 with the set of an I/O pin, power pins-6 & RST (reset) pins-2.

## ***3. Arduino Micro***

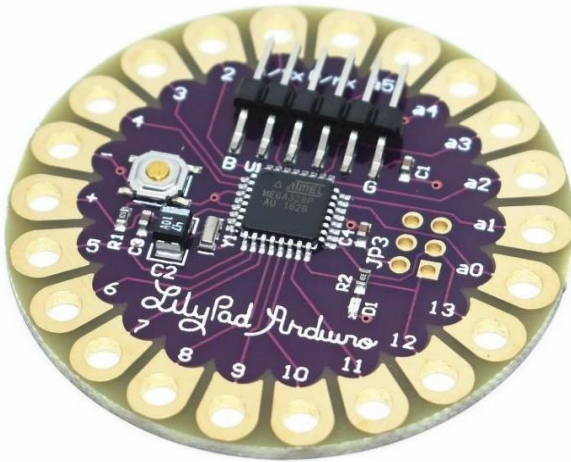
The Arduino Micro board mainly depends on the ATmega32U4 based Microcontroller that includes 20-sets of pins where the 7-pins are PWM pins, 12-analog input pins. This board includes different components like an ICSP header, RST button, small USB connection, crystal oscillator-16MHz. The USB connection is inbuilt and this board is the shrunk version of the Leonardo board.



*Arduino Micro*

#### ***4. LilyPad Arduino Board***

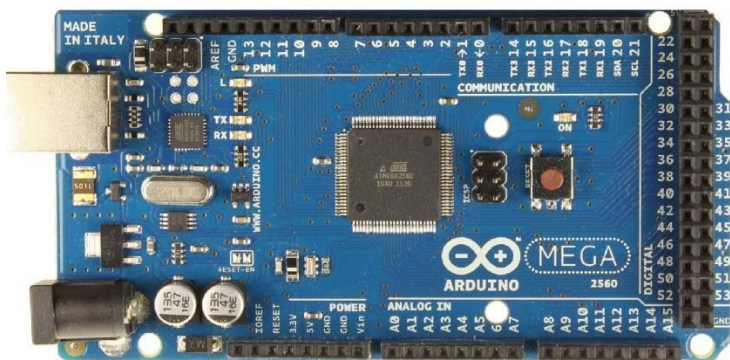
The Lily Pad Arduino board is a wearable e-textile technology expanded by Leah “Buechley” and considerably designed by “Leah and SparkFun”. Each board was imaginatively designed with huge connecting pads & a smooth back to let them to be sewn into clothing using conductive thread. This Arduino also comprises of I/O, power, and also sensor boards which are built especially for e-textiles. These are even washable!



**LilyPad Arduino Boards**

#### ***5.Arduino Mega (R3) Board***

The Arduino Mega is similar to the UNO's big brother. It includes lots of digital I/O pins (from that, 14-pins can be used as PWM o/p's), 6-analog inputs, a reset button, a power jack, a USB connection, and a reset button. It includes everything required to hold up the microcontroller; simply attach it to a PC with the help of a USB cable and give the supply to get started with an AC-to-DC adapter or battery. The huge number of pins make this Arduino board very helpful for designing projects that need a bunch of digital i/p's or o/p's like lots of buttons.



**Arduino Mega (R3) Board**

## ***6.Arduino Leonardo Board***

The first development board of an Arduino is the Leonardo board. This board uses one microcontroller along with the USB. That means, it can be very simple and cheap also. Because this board handles USB directly, program libraries are obtainable which let the Arduino board to follow a keyboard of the computer, mouse, etc.



*Arduino Leonardo Board*

## ***7.RedBoard Arduino Board***

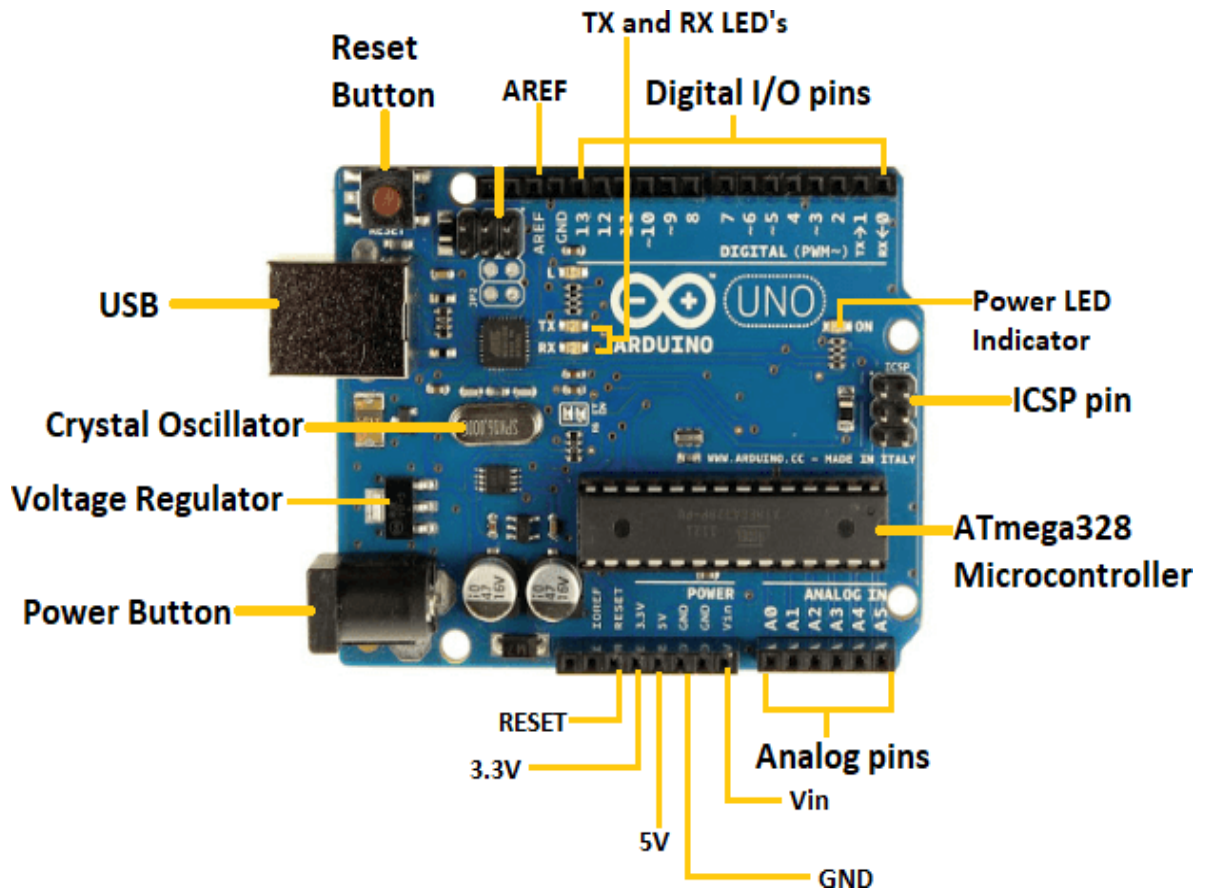
The RedBoard Arduino board can be programmed using a Mini-B USB cable using the Arduino IDE. It will work on Windows 8 without having to modify your security settings. It is more constant due to the USB or FTDI chip we used and also it is entirely flat on the back. Creating it is very simple to utilize in the project design. Just plug the board, select the menu option to choose an Arduino UNO and you are ready to upload the program. You can control the RedBoard over a USB cable using the barrel jack.



*RedBoard Arduino Boards*



## Arduino UNO Board Description



### Pin Description:

- o **ATmega328 Microcontroller**- It is a single chip Microcontroller of the ATmel family. The processor code inside it is of 8-bit. It combines **Memory (SRAM, EEPROM, and Flash)**, **Analog to Digital Converter**, **SPI serial ports**, **I/O lines**, **registers**, **timer**, **external and internal interrupts**, and **oscillator**.
- o **ICSP pin** - The In-Circuit Serial Programming pin allows the user to program using the firmware of the Arduino board.

- o **Power LED Indicator**- The ON status of LED shows the power is activated. When the power is OFF, the LED will not light up. This LED should light up when you plug your Arduino into a power source to indicate that your board is powered up correctly
- o **Digital I/O pins**- The digital pins have the value HIGH or LOW. The pins numbered from D0 to D13 are digital pins The Arduino UNO board has 14 digital I/O pins (15) (of which 6 provide PWM (Pulse Width Modulation) output.
- o **TX and RX LED's**- TX (transmit) and RX (receive). The successful flow of data is represented by the lighting of these LED's.
- o **AREF**- The Analog Reference (AREF) pin is used to feed a reference voltage to the Arduino UNO board from the external power supply.
- o **Reset button**- It is used to add a Reset button to the connection.
- o **USB**- It allows the board to connect to the computer. It is essential for the programming of the Arduino UNO board. Arduino board can be powered by using the USB cable from your computer. All you need to do is connect the USB cable to the USB connection (1).
- o **Crystal Oscillator**- The Crystal oscillator has a frequency of 16MHz, which makes the Arduino UNO a powerful board.
- o **Voltage Regulator**- The voltage regulator converts the input voltage to 5V. The function of the voltage regulator is to control the voltage given to the Arduino board and stabilize the DC voltages used by the processor and other elements.
- o **GND**- Ground pins. The ground pin acts as a pin with zero voltage.
- o **Vin**- It is the input voltage.
- o **Power Button (Barrel Jack)**

Arduino boards can be powered directly from the AC mains power supply by connecting it to the Barrel Jack (2).

### o **Arduino Reset**

You can reset your Arduino board, i.e., start your program from the beginning. You can reset the UNO board in two ways. First, by using the reset button (17) on the board. Second, you can connect an external reset button to the Arduino pin labelled RESET (5).

### **Pins (3.3, 5, GND, Vin)**

- 3.3V (6) – Supply 3.3 output volt
- 5V (7) – Supply 5 output volt
- Most of the components used with Arduino board works fine with 3.3 volt and 5 volt.
- GND (8)(Ground) – There are several GND pins on the Arduino, any of which can be used to ground your circuit.
- Vin (9) – This pin also can be used to power the Arduino board from an external power source, like AC mains power supply.

### o **Analog pins**

The Arduino UNO board has six analog input pins A0 through A5. These pins can read the signal from an analog sensor like the humidity sensor or temperature sensor and convert it into a digital value that can be read by the microprocessor.

## Installation of Arduino IDE:

IDE stands for **I**ntegrated **D**evelopment **E**nvironment.

The Arduino IDE is an open-source software, which is used to write and upload code to the Arduino boards. The IDE application is suitable for different operating systems such as **Windows, Mac OS X, and Linux**

The Arduino Integrated Development Environment contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

Programs written using Arduino Software (IDE) are called **sketches**. These sketches are written in the text editor and are saved with the file extension **.ino**. We need to connect the Arduino board with the IDE to upload the sketch written in the Arduino IDE software.

Arduino IDE 1.8.19

To download Arduino IDE , goto Arduino official website:

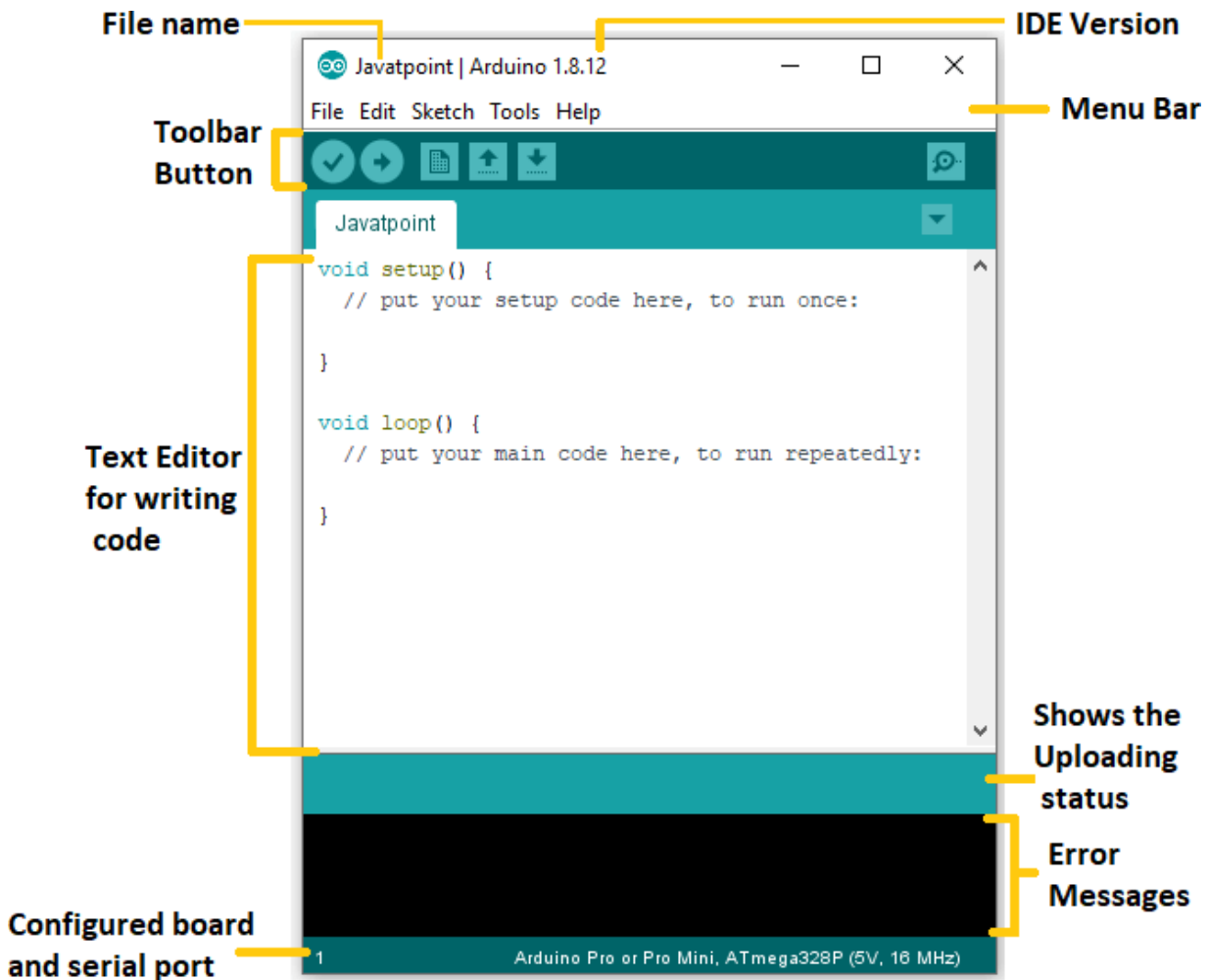
<https://www.arduino.cc/en/software>



The Arduino IDE is an open-source software, which is used to write and upload code to the Arduino boards.

The IDE application is suitable for different operating systems such as **Windows, MacOS X, and Linux**. Here, IDE stands for **Integrated Development Environment**.

The program or code written in the Arduino IDE is often called as sketching. We need to connect the Genuino and Arduino board with the IDE to upload the sketch written in the Arduino IDE software. The sketch is saved with the extension '.ino.'



### Toolbar Button

The icons displayed on the toolbar are **New**, **Open**, **Save**, **Upload**, and **Verify**. It is shown below-



**Conclusion:** Thus we have studied various types of Arduino and installed IDE of Arduino UNO.