What Is Arduino?

Arduino is an open source programmable circuit board that can be integrated into a wide variety of makerspace projects both simple and complex. This board contains a microcontroller which is able to be programmed to sense and control objects in the physical world. By responding to sensors and inputs, the Arduino is able to interact with a large array of outputs such as LEDs, motors and displays. Because of it’s flexibility and low cost, Arduino has become a very popular choice for makers and makerspaces looking to create interactive hardware projects. Arduino was introduced back in 2005 in Italy by Massimo Banzi as a way for nonengineers to have access to a low cost, simple tool for creating hardware projects. Since the board is open-source, it is released under a Creative Commons license which allows anyone to produce their own board. If you search the web, you will find there are hundreds of Arduino compatible clones and variations available but the only official boards have Arduino in it’s name.

Digital Pins

To read digital input, Arduino uses a function called **digitalRead(),** and it tells you if a voltage on a pin is HIGH (5volts) or LOW (0) volts. Before you can read the digital pin, you will need to tell the Arduino that the pin will be used for reading input. Therefore, we use the function **pinMode(pin, input)** to configure the pin.

On the Arduino Uno Board, see the picture above. There are 14 digital pins (numbered 0 to 13). Pins 0 and 1 (named RX and TX) are for serial connection and should not be used for other uses. If 14 digital pins are not enough, you can always use the analog pins as digital pins.

The digital pins on an Arduino Board have two states: off and on. If voltage is flowing, the circuit will be on. If it is not flowing, the circuit is off.

**digitalWrite()**is the command that tells the pin to be on or off. This can be useful, for instance, to turn an LED on or off.

**Analog Pins**

Unlike a digital value, which is on or off, analog values have multiple readings. For example, the volume settings on your mobile. It is not just on or off, but it can have a range of values between on and off. Arduino uses a function named analogRead to get the sensor value proportional to the voltage it sees on the analog pin.

The value will be 0 if there are 0 volts on the pin and the value will be 1023 if there are 5 volts on the pin. The value in between will be proportional. So 2.5 volts will give a value of 511. On the Arduino Uno Board, there are six analog pins (numbered from 0 to 5). Remember, these pins can also be used as digital pins. In the upcoming tutorials, we will see how we can adjust the voltage on a pin manually or by sensing the environment from the sensor.

**Raspberry Pi**

The Raspberry Pi is a low cost, **credit-card sized computer** that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It’s capable of doing everything you’d expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.

What’s more, the Raspberry Pi  has the ability to interact with the outside world, and has been used in a wide array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras. We want to see the Raspberry Pi being used by kids all over the world to learn to program and understand how computers work.

Jumper Wire

Jumper wires are used to connect two points in a circuit. All Electronics stocks jumper wire in a variety of lengths and assortments. Frequently used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed. Male jumpers are designed to plug securely into the holes in a breadboard. Female jumpers are useful for connecting male header posts and pin terminals on components. Jumpers are available in female-female, male-male and male-female configurations.

**An ultrasonic sensor**

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

**light-emitting diode** (**LED**)

A light-emitting diode (LED) is a [semiconductor](https://en.wikipedia.org/wiki/Semiconductor) [light source](https://en.wikipedia.org/wiki/Light_source) that emits light when [current](https://en.wikipedia.org/wiki/Electric_current) flows through it. [Electrons](https://en.wikipedia.org/wiki/Electron) in the semiconductor recombine with [electron holes](https://en.wikipedia.org/wiki/Electron_hole), releasing energy in the form of [photons](https://en.wikipedia.org/wiki/Photon). The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the [band gap](https://en.wikipedia.org/wiki/Band_gap) of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting [phosphor](https://en.wikipedia.org/wiki/Phosphor) on the semiconductor device.

**Breadboard**

A **breadboard** is a widely used tool to design and test circuit. You do not need to solder wires and components to make a circuit while using a bread board. It is easier to mount components & reuse them. Since, components are not soldered you can change your circuit design at any point without any hassle. It consist of an array of conductive metal clips encased in a box made of white ABS plastic, where each clip is insulated with another clips. There are a number of holes on the plastic box, arranged in a particular fashion. A typical bread board layout consists of two types of region also called strips. Bus strips and socket strips. Bus strips are usually used to provide power supply to the circuit. It consists of two columns, one for power voltage and other for ground.

Socket strips are used to hold most of the components in a circuit. Generally it consists of two sections each with 5 rows and 64 columns. Every column is electrically connected from inside.

**A temperature sensor**

A temperature sensor is an electronic device that measures the temperature of its environment and converts the input data into electronic data to record, monitor, or signal temperature changes. There are many different types of temperature sensors. Some temperature sensors require [direct contact](https://www.electronics-tutorials.ws/io/io_3.html) with the physical object that is being monitored (contact temperature sensors), while others indirectly measure the temperature of an object (non-contact temperature sensors).

Non-contact temperature sensors are usually infrared (IR) sensors. They remotely detect the IR energy emitted by an object and send a signal to a calibrated electronic circuit that determines the object's temperature.

**PIR Sensor**

PIR (passive infrared) sensors utilise the detection of infrared that is radiated from all objects that emit heat. This type of emission is not visible to the human eye, but sensors that operate using infrared wavelengths can detect such activity. They are sometimes referred to as ‘motion-based detectors’, as they sense the presence of people, animals and objects through the movement of their infrared wavelengths.

## What is a Buzzer?

Buzzer is a kind of voice device that converts audio model into sound signal. It is mainly used to prompt or alarm. According to different design and application, it can produce music sound, flute sound, buzzer, alarm sound, electric bell and other different sounds.

Typical applications include siren, alarm device, fire alarm, air defense alarm, burglar alarm, timer, etc. It is widely used in household appliances, alarm system, automatic production line, low-voltage electrical equipment, electronic toys, game machines and other products and industries.

A **resistor**

A **resistor** is a [**passive**](https://en.wikipedia.org/wiki/Passivity_(engineering))[**two-terminal**](https://en.wikipedia.org/wiki/Terminal_(electronics))[**electrical component**](https://en.wikipedia.org/wiki/Electronic_component) that implements [**electrical resistance**](https://en.wikipedia.org/wiki/Electrical_resistance) as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to [**divide voltages**](https://en.wikipedia.org/wiki/Voltage_divider)**,**[**bias**](https://en.wikipedia.org/wiki/Biasing) active elements, and terminate [**transmission lines**](https://en.wikipedia.org/wiki/Transmission_line), among other uses. High-power resistors that can dissipate many[**watts**](https://en.wikipedia.org/wiki/Watt) of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for [**generators**](https://en.wikipedia.org/wiki/Electric_generator)**.** Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (such as a volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity.