



## Know Your Kit Component

### Jumper/ Connecting wires

#### Male-to-Female wires

Single / Group of Electric wires with connector or pin at each end it is used to interconnect the components. Female ends are used to plug into things.



#### Male-to-Male wires

The difference between these wires is in the endpoint. Male ends have a pin protruding and can plug into things.



#### 9V Battery

This is General purpose 9V Original HIW marked Non-Rechargeable Battery for all your project and application needs. It is useful in many DIY projects, household applications and they can easily be replaced and installed.



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#### Battery cap(DC jack)

It is used to connect a 9V battery to the arduino board. You can use this battery cap with other boards which have a DC jack.



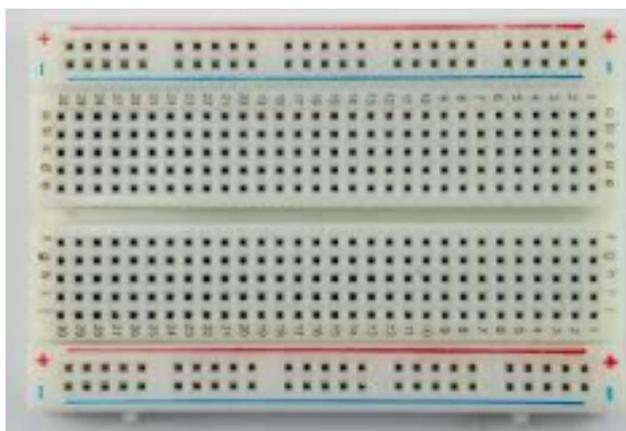


## Screw Driver

A screwdriver is used to fix small appliances or hardware by turning screws with slotted heads.

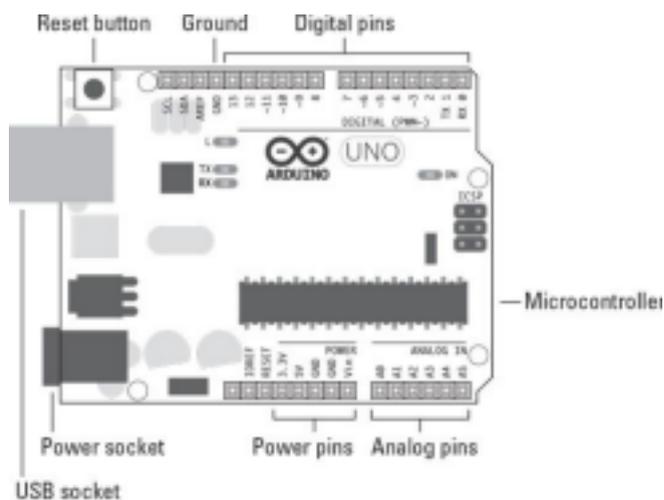
## Breadboard

It is a solderless circuit board. It is a fast and an easy way to assemble/replace any circuitry without soldering. The holes on the outer two rows are horizontally connected together and the holes on middle two rows are vertically connected together.



## Arduino Uno DIP

The Arduino UNO is a microcontroller board based on a removable, dual-inline-package (DIP) ATmega328 AVR microcontroller.





## Features

- Operating voltage: 5 V
- Input voltage (recommended): 7-12 V
- Digital I/O pins: 14 (of which 6 provide PWM output)
- Analog input pins: 6
- DC current per I/O pin: 40 mA
- DC current for 3.3V pin: 50 mA
- Flash memory: 32 KB (ATmega328) of which 0.5 KB is used by the bootloader
- SRAM: 2 KB (ATmega328)
- EEPROM: 1 KB (ATmega328)
- Clock speed: 16 MHz

## Arduino Uno Cable

Arduino contains a mini/micro or type B USB port that can be used to connect to a PC via a regular USB port and the connection is done via USB cable.



Consumables are goods used by individuals and businesses that must be replaced regularly because they wear out or are used up.

Here the consumables are listed as:

- Spacers, screws, nut and bolts
- Jumper connectors

## LDR: Light Dependent Resistor

As the name suggests, an LDR is dependent upon the intensity of light. It is a low cost and simple sensor used to detect the absence or presence of light, like in a camera light metre.

There are many applications of an LDR.





1. The most obvious application is automatically switching lights on and off. This application is used in streetlights.
2. Camera shutter control: LDRs can be used to control the shutter speed of a camera. An LDR is used to measure the intensity of light and set the camera shutter speed to the appropriate level.
3. Other common applications: alarm clocks and light intensity metres.

### **WHAT is an IR LED?**

An IR LED (INFRARED light-emitting diode) is A Solid-State lighting (SSL) device that emits light in the INFRARED range of the Electromagnetic radiation spectrum. Used with INFRARED cameras, IR LEDs can act as a spotlight while remaining invisible to the naked eye.

The following are the common parts of an IR sensor:

- IR emitter: Light emitted by the LED
- IR receiver: Receives the signal from the IR emitter
- VCC: Power supply
- GND: Ground Pin
- Out: Output signal

An IR sensor is an obstacle-detection sensor. It can detect an obstacle from up to 10 cm to 30 cm away. This sensor has many indoor applications. The basic idea is to send infrared light through IR-LEDs, which is then reflected by an object in front of the sensor.

### **FEATURES AND SPECIFICATIONS:**

- It is an obstacle detector.
- Its logical output is either 1 or 0.
- The sensitivity is adjustable up to 30 cm.



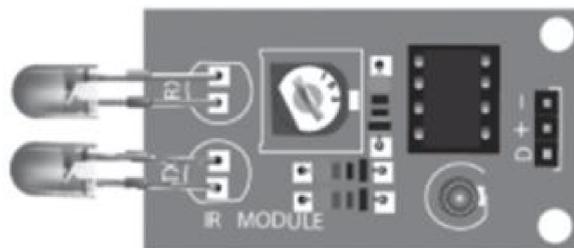
### The Working of an IR Sensor:

a semiconductor diode, when exposed to light, generates a potential difference or changes its electrical resistance.

### What is an IR LED?

An IR sensor detects obstacles using an IR transmitter and receiver. The transmitter transmits light radiation. If an obstacle is near the IR sensor, these radiations will get reflected back and detected by the receiver.

If the sensor detects a reflected light signal, it will give high output. If there is no obstacle, the transmitted light will not get reflected and the IR sensor will give a low output.



### Ultrasonic sensor:

An ultrasonic sensor is an electronic device that is used to measure the distance of an object by emitting ultrasonic sound waves. It converts the reflected sound waves into an electrical signal. This is exactly how bats navigate in the dark. A bat can produce ultrasonic sound waves that bounce off a wall, or an insect, so the bat knows where there is an obstruction and where there is food.

### Ultrasonic sensors have two main components:

1. **The transmitter** emits the ultrasonic sound using piezoelectric crystals.
2. **The receiver** - receives the ultrasonic sound after it has travelled from the target.

Pin Number	Name
1	VCC
2	Trigger
3	Echo
4	Ground





### The working principle of an ultrasonic sensor:

Have you ever wondered how a bat flies at night? bats use ultrasonic sound to avoid obstacles in their way and fly at night.



### What is ultrasonic sound?

If we divide the word ultrasonic, we get 'ultra' and 'sonic'. 'sonic' means 'sound' and 'ultra' means 'large.' ultrasonic means sounds of higher frequencies. Ultrasound is a sound with a frequency above the human hearing range. The highest frequency that the human ear can detect is approximately 20,000 hz. This is where the sonic range ends and where the ultrasonic range begins. Ultrasonic finds its applications in sonar. Sonar (sound navigation and ranging) is a method that uses the propagation of sound (usually underwater, as in submarine navigation) to navigate, communicate with or detect objects on or below the surface of oceans.

The ultrasonic sensor transmits ultrasonic waves and receives them after they bounce off the surface of the object. It then measures the time the entire process takes which is equal to the distance between the object and the sensor itself. The formula for calculating the distance by using ultrasonic sound is given by  $\text{Distance} = \text{Speed} \times (\text{Time}/2)$ .



### Flame Sensor:

A flame-sensor is a type of detector developed primarily to detect and respond to the appearance of a fire or flame. The reaction of flame detection can rely on its fitting. It involves an alarm system, a line for natural gas, propane and a system for fire suppression. This sensor is used in boilers for commercial use. Because of its mechanism during the identification of the blaze, the reaction of



these sensors is quicker and more precise compared to a heat/smoke detector.

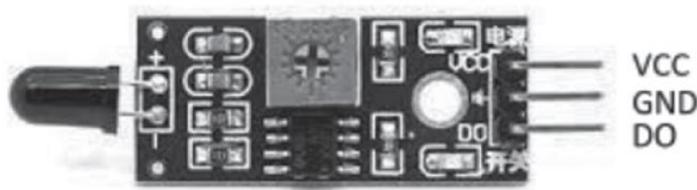
#### **Working principle of FLAME sensor:**

This sensor/detector can be designed with an electronic circuit, such as electromagnetic radiation, using a receiver. This sensor uses the flash system of the infrared flame, which enables the sensor to run through a layer of oil, ashes, water vapour, or frost.

#### **Pin CONFIGURATION of FLAME Sensor Module:**

The pin configuration of this sensor is shown below. It includes three pins which include the following. when this module works with a microcontroller unit then the pins are:

- Pin1 (VCC pin): Voltage supply ranges from 3.3V to 5.3V
- Pin2 (GND): This is a ground pin
- Pin3 (DOUT): This is a digital output pin



#### **FEATURES AND SPECIFICATIONS:**

- It is responsive to the flame range.
- Accuracy can be adjustable
- The operating voltage of this sensor is 3.3V to 5V
- Power indicator & digital switch o/p indicator
- If the flame intensity is lighter within 0.8 m then the flame test can be activated, if the flame intensity is high, then the detection of distance will be improved.

**Piezo buzzer** is a simple electronic component used to generate tones and beeps. We can find piezo buzzers in alarm clocks, computers, timers and many other appliances.



## Precautions

- Always keep your work area dry.
- Never work on a circuit while power is applied.
- Do not connect power to a circuit until the circuit is finished.
- Double check the polarities of any connections you make.
  - If you smell anything burning immediately disconnect the power and examine your circuit to find out what went wrong.
- Always ensure that all electronic equipment are properly grounded.
- Do not work with metallic jewellery on your hands like watches, rings and bracelets.
- Keep a consistent wiring colour code for jumper/connecting wires. Use red wire for power and black wire for ground.
- Be careful what you touch while troubleshooting. Arduinos usually don't deal with very high voltages but inductors and capacitors can build up higher charges than you expect and hold it after power is removed.