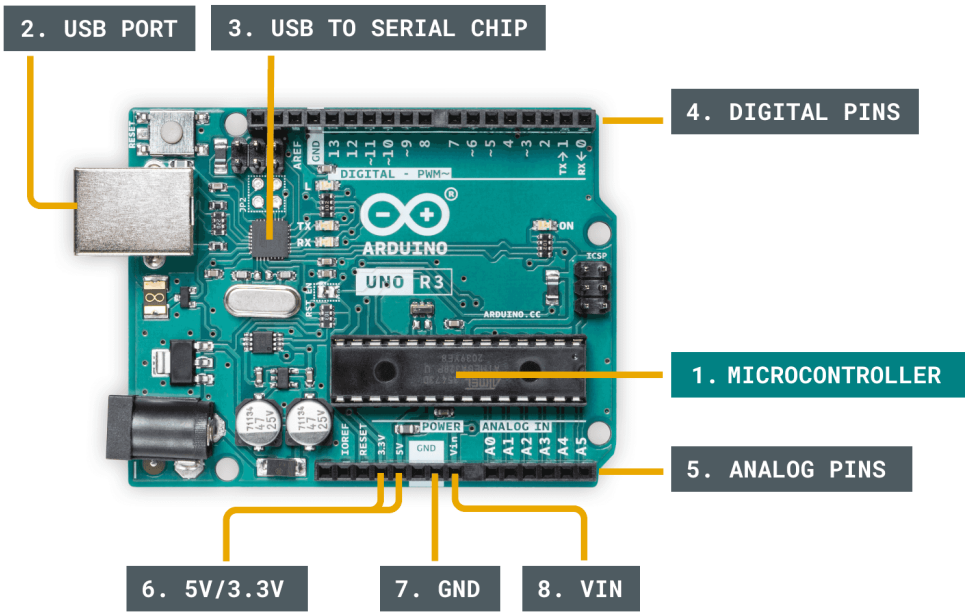
COMPONENT DOCUMENTATION

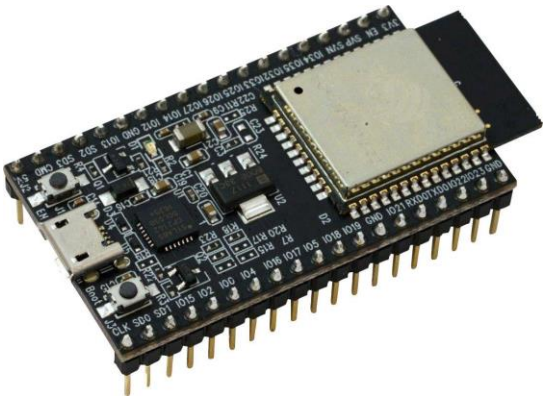
1. Arduino development board

   This is an open-source electronics platform designed for creating interactive projects. It consists of both hardware and software components. The board has a small, programmable microcontroller with input and output pins that can be connected to various sensors, actuators, and other electronic components. The Arduino programming language is based on Wiring language framework, a simplified variant of C/C++



2. ESP32

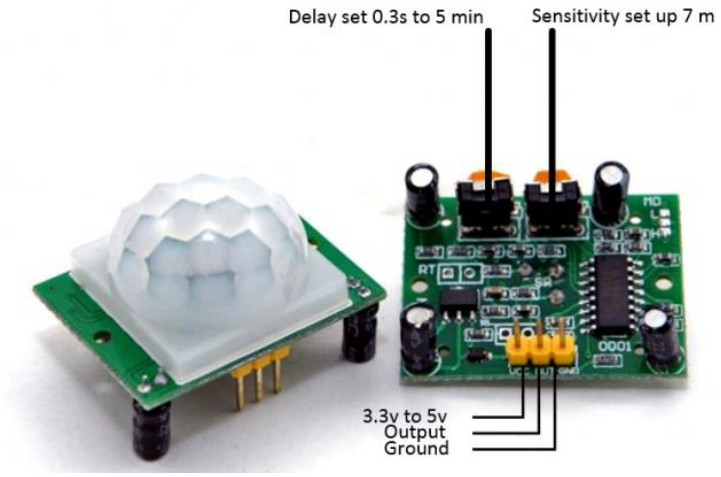
   The ESP32 is a highly versatile and powerful microcontroller-based development board. It is widely known for its advanced features, low power consumption, built-in Wi-Fi and Bluetooth connectivity. The ESP32 offers a dual-core processor, ample memory, and a rich set of peripherals, making it suitable for a wide range of IoT applications.



3. HC-SR501 PIR Motion sensor

A PIR motion sensor measures infrared light emitted from objects in its field of view. The word
passive indicates that the sensor doesn't emit infrared, rather receives infrared data. It detects
motion based on changes in infrared light, which indicate changes in temperature. This makes it
ideal for detecting humans or animals because it will pick up living things that move within its
range but not inanimate objects, like a leaf blowing in the wind.
The module has two potentiometers

- Sensitivity adjust potentiometer – Sets the maximum distance over which motion can be detected. Range is 3 to 7 meters.
- Time delay adjust potentiometer - Sets how long that the output will remain HIGH after
  detection. At minimum it is 3 seconds, at maximum it is 300 seconds or 5 minutes.



4. MQ-2 Smoke sensor

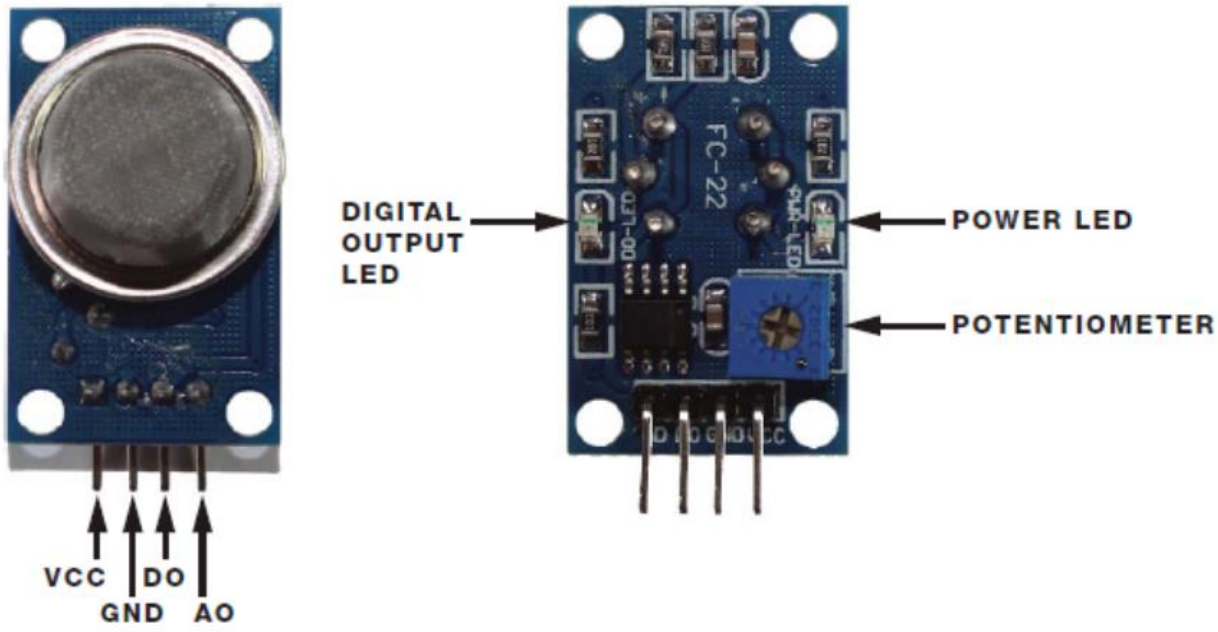
The MQ-2 sensor is used to detect propane, butane, methane, alcohol, and hydrogen.

It has two ways of outputting gas levels. The first is to read the gas concentration in the atmosphere and output it as an analog signal from the analog output pin AO, where the higher
the gas levels, the higher the output voltage.

The second is to set a certain threshold and then output a HIGH signal from the digital output
pin DO if the gas levels are above that threshold, and a LOW signal if the gas levels are below
that threshold. The MQ-2 has a potentiometer built into the back that you can adjust with a
screwdriver to change this threshold.

The sensor also has a power LED in the back that indicates if the sensor is on, and a digital output LED that lights up when detected gas levels are above the set threshold.

It is important to let the module heat up for about a minute before using it in order to get accurate readings.

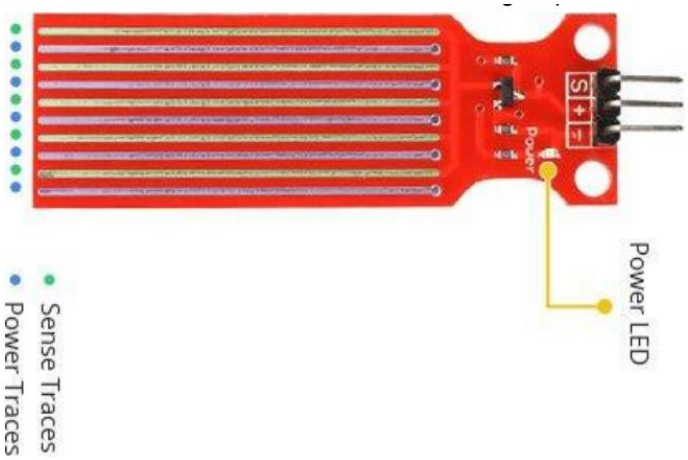


5. WATER LEVEL SENSOR

The series of exposed parallel conductors together acts as a variable resistor (just like a potentiometer) whose resistance varies according to the water level. The change in resistance
corresponds to the distance from the top of the sensor to the surface of the water.
The resistance is inversely proportional to the height of the water:

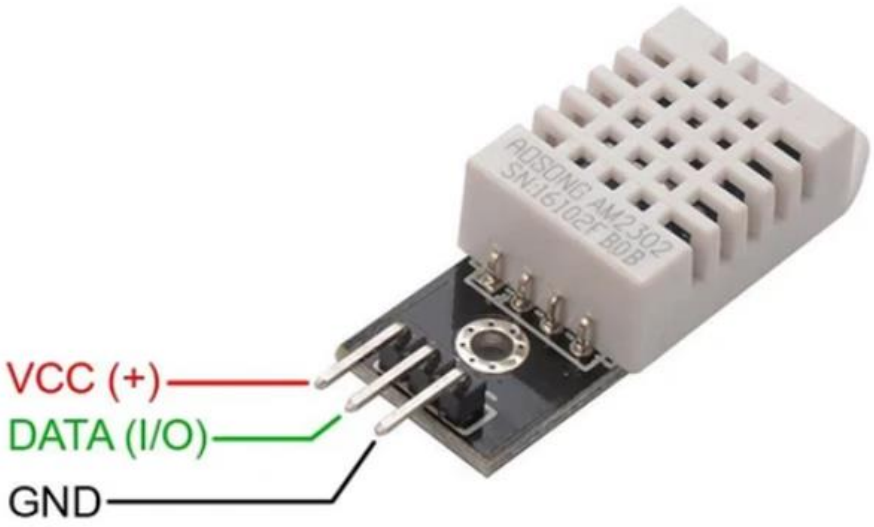
- The more water the sensor is immersed in, results in better conductivity and will result in
a lower resistance.
- The less water the sensor is immersed in, results in poor conductivity and will result in a
higher resistance.

The sensor produces an output voltage according to the resistance, which by measuring we can
determine the water level. There's a Power LED on the board which will light up when the board is powered.



6. TEMPERATURE & HUMIDITY SENSOR (DHT22)

The DHT22 is a commonly used temperature and humidity sensor that comes with a dedicated
NTC to measure temperature and an 8-bit microcontroller to output the values of temperature
and humidity as serial data.
The humidity sensing ranges from 20% to 90% with ±5% accuracy and the temperature sensing
ranges from 0 degrees to the 50 degrees Celsius with ±2°C accuracy. The sampling time of this
sensor is almost 2 seconds. This temperature and humidity sensor uses digital pins to communicate with the microcontroller unit and does not have any kind of analog pins.



7. FAN FIRE EXTINGUISHING MODULE

This fan module is based on the L9110 motor driver. There are 4 pins on the card which are

Vcc, GND, INA and INB pins. The INA and INB pins are the motor direction pins. The motor

direction can be changed by selecting between them.

8. SERVO MOTOR

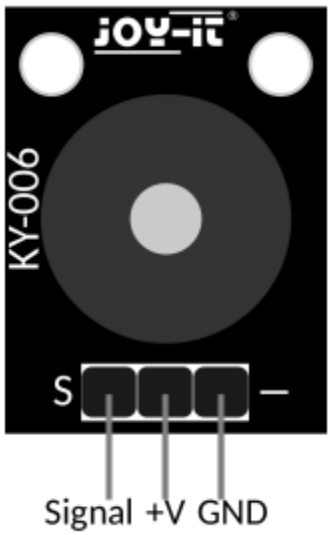
Servo motors are components that can rotate usually between 0-180 degrees. The angle of

rotation of the servo motor is controlled by the width of the pulse width modulation (PWM) signal
going through the signal pin of the motor. If:

- PWM width= minimum width of PWM, the servo rotates to 0 degrees
- PWM width= maximum width of PWM, the servo rotates to 180 degrees
- PWM width is between minimum and maximum width of PWM, the servo rotates to an angle between 0 and 180 degrees in proportion.

9. PASSIVE PIEZO-BUZZER (KY-006)

This module creates audible sound of varying frequencies using pulse width modulation (PWM).
It can produce a range of tones and sounds depending on the input. Due to this, it is commonly
used to create sound effects or simple musical notes for short songs.



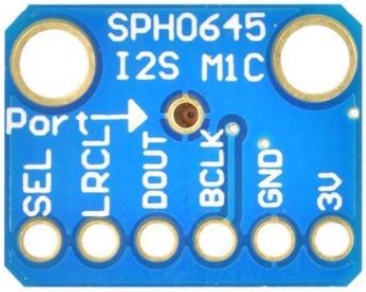
10. SOUND SENSOR MODULE (SPH0645)

This sound sensor module utilizes the I2S communication protocol. I2S stands for Inter-Integrated Circuit Sound and is the standard to connect different digital audio devices.

This microphone doesn't have an analog output, it's purely digital.

Instead of an analog output, there are three digital pins: Clock, Data and Left-Right (Word Select) Clock. When connected to your microcontroller, the 'I2S Master' will drive the clock and
word-select pins at a high frequency and read out the data from the microphone. No analog
conversion required!

This I2S MEMS microphone is bottom ported, so make sure you have the hole in the bottom
facing out towards the sounds you want to read.



11. LED MODULE

The RGB LED has a common cathode pin (-) and can display red, green or blue depending on
which anode pin power is connected to. How the module works is it has 3 PWM (pulse width
modulation) pins which stand for the colors red, green, and blue (RGB). The idea is that any
color can be created with a combination of red, green, and blue.

By programming the module with a microcontroller, you can program the LED to turn to any
color that you want.

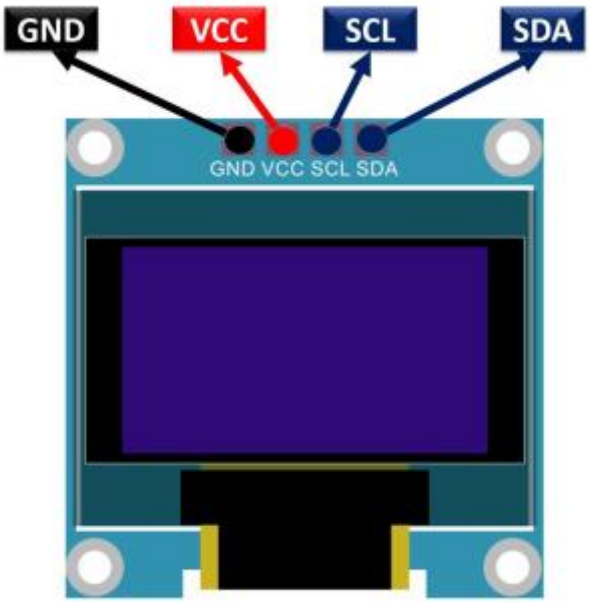
12. OLED DISPLAY

An OLED (organic light-emitting diode) is used frequently in displaying texts, bitmap images,
shapes, and different types of clocks. They offer good view angles and pixel density in a cost-effective manner.

This SSD1306 0.96-inch OLED display uses I2C protocol to communicate with the microcontrollers. It has 128×64 pixels. The reason for the popularity is the lower number of pins.

The OLED displays can vary in size, color, and shape but are primarily programmed in a similar
way.

There are four pins in this display. Imprinted as VCC, GND, SCL, and SDA respectively. The VCC and GND pins will power the OLED display and will be connected with the ESP board's
power supply pins as they require a driving voltage of 3.3-5V. The SCL and SDA pins are necessary for generating the clock signal and in the transmission of data respectively.



13. LIGHT DEPENDENT RESISTOR

The main component of the module is a light dependent resistor which changes resistance
depending on light intensity. Increasing light leads to a decrease in resistance while decreasing
light intensity will increase the resistance of the resistor.
The output of the module is analog and can be used to determine the intensity of the light.