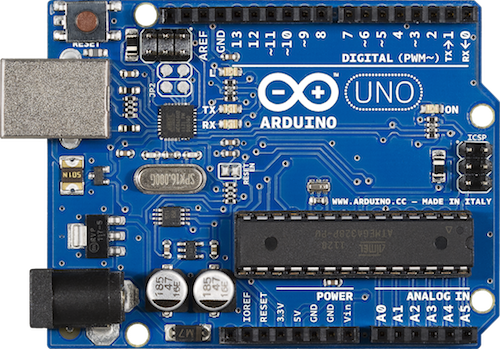
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Under supervision of:

Dr. Waled Desoky

Smart Home

Prepared By:   
Alhassan Mohamed

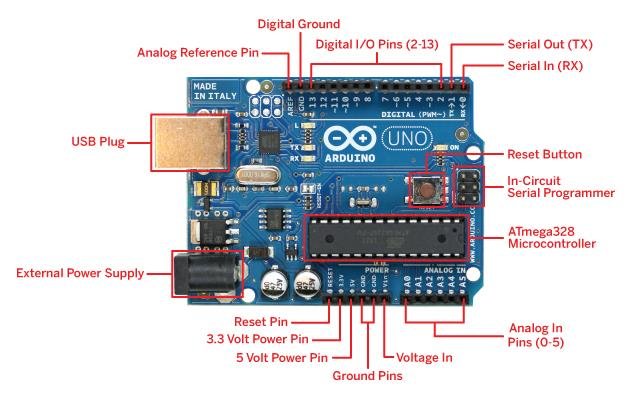
**What is Arduino?**

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards can read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments.

**Arduino board components**

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**As mentioned in the image above Arduino board consist of:**

1- Atmega328 Microcontroller

2- Digital I/O pins (2-13)

3- Ground pins (3 pins)

4- Serial Out / Serial In pins

5- Usb plug

6- External power supply

7- Analog in pins (0 - 5)

8- power pins (5v – 3.3v)

9- Volt in pin

These are the most important parts in the Arduino board.

**Smart Home**

**Aim: -**

The aim of this project is to make a small embedded system that facilitates controlling smartly your house by mean of some sensors. In this small manual I will explain the project by function, I mean by that if many parts of the project collaborate in one function, I will explain it together.

**Functions of the project:**

1- Open a door lock by a servo motor and keypad  
2- The buzzer makes alarm sounds if the fire sensor detect fire.

3- The motor drive controls the fan speed when the temperature sensor read a specific value of temperature.

4- Turn on and off a 220v lamps though switch on/off relay module by detecting clapping use sound sensor.

**1- Open a door lock by a servo motor and keypad**

 Devices:

1- door lock

2- servo motor

3- keypad

This function can be done by using a servo motor. To move a door lock handle to open the door By entering a specific password saved on the EEPROM in the Atmega328 for example if the saved Password is (1234) then the user write it on the keypad, then press (#) key if the password is correct then the motor opens the lock by pull the handle if the password is incorrect the buzzer plays a specific sound in a case you want to change the password just enter (\*\*) then enter the old password (1234) for the first time then (#) then enter the new password and enter (##)





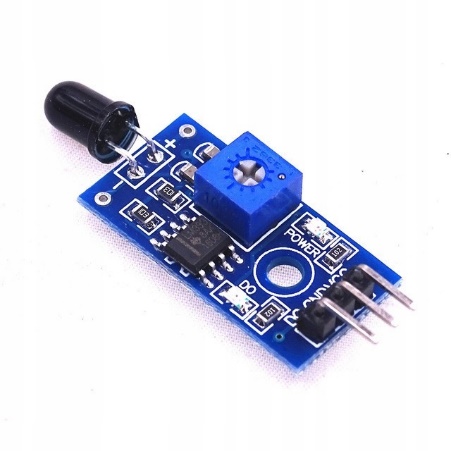
**2- The buzzer makes alarm sounds if the fire sensor detect fire.**

Devices:

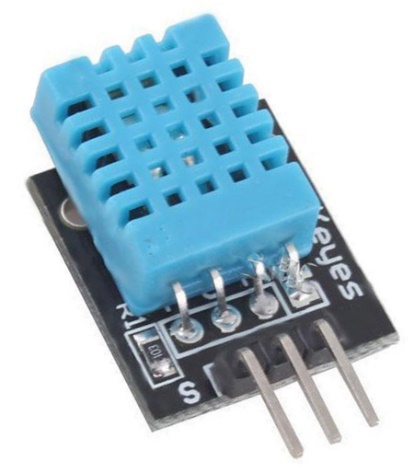
1- Flame sensor

2- buzzer

The pin that the buzzer attached to is programmed to make a certain alarm sound when the pin that the fire sensor attached to detect a reading that comes from the sensor when detect fire.



**3- The motor drive controls the fan speed when the temperature sensor read a specific value of temperature.**

Devices:

1- dht11 temperature sensor

2- 12-volt fan

3- l9110 2-channel motor driver

4- 9-volt adapter

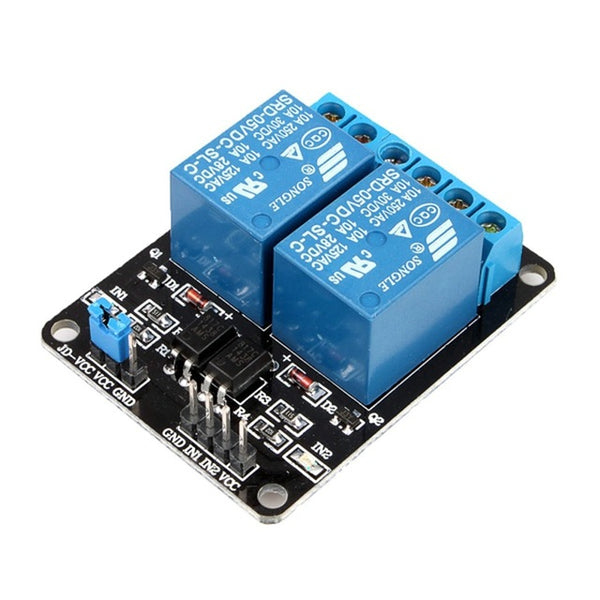
The motor drive powered up by a 9volt adapter

A close-up of a circuit board

Description automatically generated with medium confidenceAnd has two other wires comes out of it to control the speed of the 12volt fan under a certain temperature value.  
here we have five speed the fan can be in depend on distance this value from the temperature limit this value function is if the temperature sensor read less that this value the fan completely stop but above it we have five speeds 1- if the temp value above 2 degree from the temp limit then the fan speed is in its lowest speed.

2- if temp - limit > 4 and temp - limit < 6 the fan in the second level speed  
and so on until if the level 5 if the temp – limit > 8 then the fan in its full speed



**4- Turn on and off a 220v lamps though switch on/off relay module by detecting clapping use sound sensor.**

Devices:

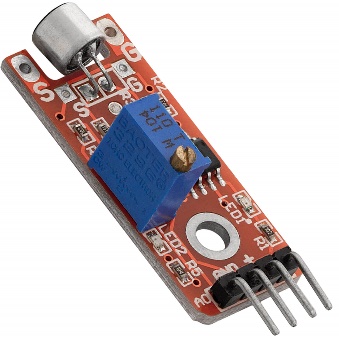
1- 2-channel relay module

2- KY-038 sound sensor

3- 2- 220-volt lamps

When we clap in front of the sound sensor a certain clap (two clap have a certain time between them) To differentiate between it and any other loud sound.

In first clap we open one of the two lamps on the second calp we open the second lamp and turn off the first lamp on the third clap we turn on both lamps on the fourth clap we turn off both of them.



**References**

1- [What is Arduino? | Arduino](https://www.arduino.cc/en/Guide/Introduction)  
2- [How to Use KY-037 Sound Detection Sensor with Arduino - Arduino Project Hub](https://create.arduino.cc/projecthub/electropeak/how-to-use-ky-037-sound-detection-sensor-with-arduino-a757a7)

3- [Arduino - Keypad | Arduino Tutorial (arduinogetstarted.com)](https://arduinogetstarted.com/tutorials/arduino-keypad)

4- [Arduino Modules - Flame Sensor - Arduino Project Hub](https://create.arduino.cc/projecthub/SURYATEJA/arduino-modules-flame-sensor-6322fb)

5- [Guide for Relay Module with Arduino | Random Nerd Tutorials](https://randomnerdtutorials.com/guide-for-relay-module-with-arduino/)

6- [How to Use Temperature and Humidity (DHT) Sensors - Arduino Project Hub](https://create.arduino.cc/projecthub/MisterBotBreak/how-to-use-temperature-and-humidity-dht-sensors-9e5975)

7- [Interfacing L9110 / HG7881 Dual Channel Motor Driver Module with Arduino (electropeak.com)](https://electropeak.com/learn/interfacing-l9110s-dual-channel-h-bridge-motor-driver-module-with-arduino/)

8- [USE a BUZZER MODULE (PIEZO SPEAKER) USING ARDUINO UNO - Arduino Project Hub](https://create.arduino.cc/projecthub/SURYATEJA/use-a-buzzer-module-piezo-speaker-using-arduino-uno-89df45)

9- [Servo Motor Basics with Arduino | Arduino Documentation | Arduino Documentation](https://docs.arduino.cc/learn/electronics/servo-motors)