RAIN SENSOR USING ARDUINO UNO

A PROJECT REPORT

SUBMITTED BY

NEHEMYA .V   **(411521106038)**

SILAMBARASAN.S   **(411521106052)**

MOHAMMED KHALITH.R   **(411521106033)**

PRATHAP.K   **(411521106042)**

In partial fulfilment for the award of

the degreeOf

BACHELOR OF ENGINEERING

In

ELECTRONICS AND COMMUNICATION

PERI INSTITUTE OF TECHNOLOGY, WEST TAMBARAM

ANNA UNIVERSITY: CHENNAI 600025

OCTOBER 2023

ANNA UNIVERSITY: CHENNAI 600025

BONAFIDE CERTIFICATE

Certified that this project report "RAIN SENSOR USING ARDUINO UNO" is the bonafide work of **S. SILAMBARASAN** (411521106052), **R. MOHAMMED KHALITH** (411521106033), **NEHEMYA** (411521106038), **K. PRATHAP** (411521106042) who carried out of the project work under my supervision.

SIGNATURE   **SIGNATURE**

                                                         DR. DURAIRAJ M.E., PH.D.

HEAD OF THE DEPARTMENT   **SUPERVISOR**

Department of Electronics and Communication   Department of Electronics and comunication

Peri Institute of technology West Tambaram   Peri Institute of technology West Tambaram,

Chennai - 600 048.   Chennai - 600 048.

Submitted for University Project Examination held on ………………………… at Peri Institute of Technology, Chennai -600 048.

INTERNAL EXAMINER   **EXTERNAL EXAMINER**

ACKOWLEDGEMENT

First and foremost, we wish to express our sincere thanks to our Honorable founder and and **Chairman Mr. SARAVANAN PERISAMY M.S., for** his endeavor in educating us in his premier Institution.

The inception, preparation and completion of project in time could not have been accomplished without the guidance and co-operation from several individuals. I also express my gratitude to individual who have provided help directly or indirectly in offering in the best results.

We express our sincere gratitude and grateful gratefulness to our principal **DR.R. PALSON KENNEDY M.E., PH.D.,** for his constant encouragement in bringing out our Project work successful.

We manifest our heartiest thankfulness to our **Head of The Department** for her support during the entire course of thisproject work and his valuable suggestions and constant encouragement for successful completion of this project.

We manifest our heartiest thankfulness to our **guide DR. DURAIRAJ M.E., (PH.D.)** for her support during the entire course of this project work.

Finally, we wish to thank all the members of our department staffs and technicians for their help to complete this project as a successful one.

ABSTRACT

RAIN SENSOR is a switching device activated by rainfall, there are two main applications for rain sensors, one is for the automatic irrigation system and another is for the automatic mode of windscreen wipers. This project designing a rain detection system that uses a rain sensor to detect the rain. The rain sensor is used to detect any rainfall falling on it and then it will sense and perform the required actions. This system is controlled through Arduino. Arduino UNO board is sufficed to control rain sensor and also to interface the sensor. Whereas, the movement of the sensor is controlled by using a rain control module. This module is controlled using the Arduino Uno board as a microcontroller.This system is controlled through **ARDUINO UNO** board is sufficed to control rain sensor and also to interface the sensor. The signal received from the sensor is processed using "Processing Development Environment Software".

CHAPTER 1

INTRODUCTION

1.1 GENERAL INTRODUCTION OF THE PROJECT:

RAIN SENSOR is one of the kinds of switching device which is used to detect the rainfall. It works like a switch and the working principle of this sensor is, whenever there is rain, the switch will be normally closed. In 1958, the Cadillac Motor Car Division of General Motors experimented with a water-sensitive switch that triggered.

various electric motors to close the convertible top and raise the open windows of a specially-built Eldorado Biarritz model, in case of rain. Raindrop sensor is basically a board on which nickel is coated in the form of lines. It works on the principal of resistance. Rain sensor module allows to measure moisture via analog output pins and it provides a digital output when a threshold of moisture exceeds. The module is based on the LM393 op amp. It includes the electronics module and a printed circuit board that collects the rain drops.

As rain drops are collected on the circuit board, they create paths of parallel resistance that are measured via the op amp. The sensor is a resistive dipole that show less resistance when wet and more resistance when dry.

When there is no rain drop on board it increases the resistance so we get high voltage according to $V=IR$. When rain drop present it reduces the resistance because water is a conductor of electricity and presence of water connects nickel lines in parallel so reduces resistance and reduces voltage drop across it.

1.2 OBJECTIVES

A simple Rain Detection System can be easily built by interfacing an Arduino with Rain Sensor. The sensor will detect any rainfall falling on it and the Arduino board will sense it and can perform required actions. A system like this can be used in many different fields, such as agriculture and automobile fields. Rainfall detection can be used to automatically regulate the Irrigation process. Also, continuous rainfall data can help farmers use this smart system to automatically water the crop only when absolutely required. Similarly, in the automobiles sector windshield wipers can be made fully automatic by using the rain detection system.

1.3 PROPOSED SYSTEM

The main idea of the project is to detect the rain fall using the rain sensor and it alerts the person to make some arrangements as in agriculture or in households to harvest the rain water and use it for later purposes. When the rain falls on the sensor it automatically triggers the buzzer and warns the person. As water is the main thing in human life we must try to save it and use for future purposes. Water is the most precious in our life for living so we must conserve water. Rain sensor can be made at a low cost and used in wide variety of area like in automobiles as it rains the wind shield wipers automatically switch on in the vehicle, uses in agriculture irrigation as the sensor detects rain it automatically stops the automatic irrigation system in the agriculture, used in household purposes to harvest the rain water and increase the underground water levels for using in future instead of flowing it into drainages.

1.4 AIM OF THE PROJECT

Rain sensor alarm project is a simple but very useful project which detects the rain and automatically triggers the alarm or buzzer. The sensor acts like a simple switch where the switch closes when it rains and is normally open when the rain stops. As water is basic need in everyone's life.

Saving the water and proper usage is very important. This project will trigger the alarm when it rains so we can make some actions for rain water harvesting and also to save the rain water for using it later for agriculture in fields. It is used in automobiles when the detector detects the rain it will automatically activates the windshield wipers of the vehicles.

It can also be used in household for harvesting the rain water and increasing ground water storage instead of flowing it into drainage. So, the main purpose of this project is to prevent the material from rain, can be used in automobiles and in many other purposes. It is an easy and simple reliable circuit which can be constructed at a low cost.

CHAPTER 2

LITERATURE SURVEY

ABSTRACT:

This work focuses on using rain sensor, and it can be used in both everyday life and manufacturing. The ultimate goal of this project is to detect rain using a rain sensor. It works like a timer, sending a pulse as its signal, which is then read the buzzer. Water conservation and good use are important. Here is a simple project that will sound an alarm when it rains, allowing us to take action to gather rainwater and store it for later use.

We can increase the groundwater level with the aid of Underwater recharge technologies by saving this rainwater and Using it. When the rain detector senses rain, it sounds an alarm. The desired result was achieved in various aspects of using rain water detectors in irrigation, home automation, electronics, vehicles, and other fields. Here is a low-cost rainwater detector circuit that is simple and effective. Rain alarm project is a simple but very useful project which detects the rain and automatically triggers the alarm or buzzer. The sensor acts like a simple switch where the switch closes when it rains and is normally open when the rain stops. As water is basic need in everyone's life. Saving the water and proper usage is very important. This project will trigger the alarm when it rains so we can make some actions for rain water harvesting and also to save the rain water for using it later for agriculture in fields. It is used in automobiles when the detector detects the rain it will automatically activates the windshield wipers of the vehicles. It can also be used in household for harvesting the rain water and increasing ground water storage instead of flowing it into drainage.
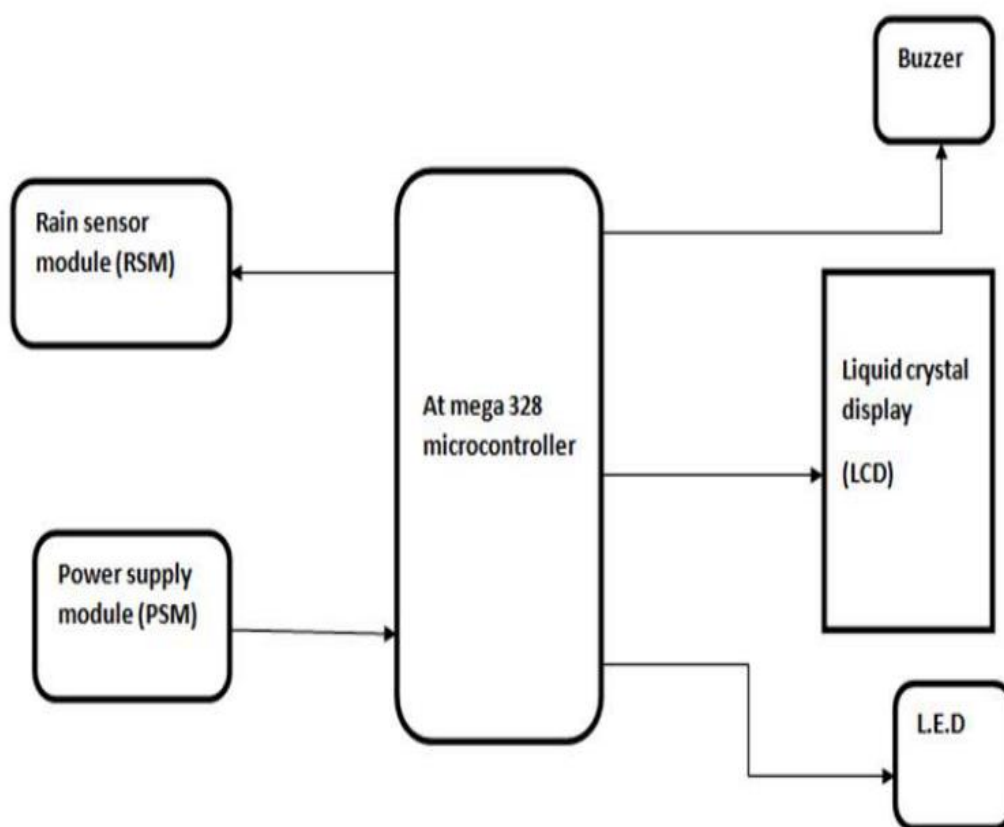
CHAPTER 3

BLOCK DIAGRAM

Fig. 1: Block diagram of the design

CHAPTER 4
COPONENTS

4.1ARDUINO UNO

Arduino is a single-board microcontroller meant to make the application more accessible which are interactive objects and its surroundings. The hardware features with an open-source hardware board designed around an 8-bit Atmel AVR microcontroller or a 32-bit Atmel ARM. Current models consists a USB interface, 6 analog input pins and 14 digital I/O pins that allows the user to attach various extension boards.
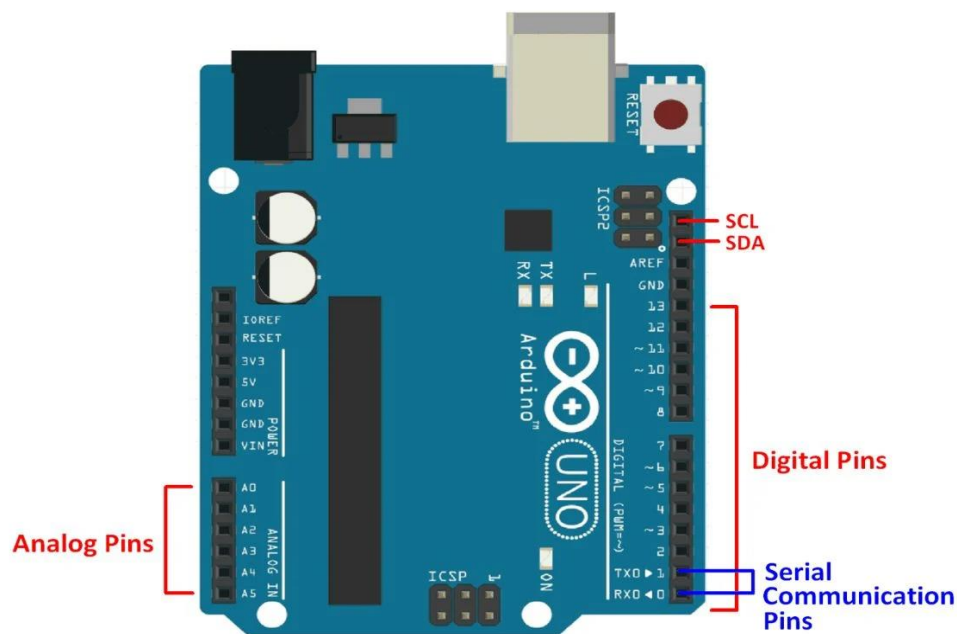
4.1 ARDUINO UNO

The Arduino Uno board is a microcontroller based on the ATmega328. It has 14 digital input/output pins in which 6 can be used as PWM outputs, a 16 MHz ceramic resonator, an ICSP header, a USB connection, 6 analog inputs, a power jack and a reset button. This contains all the required support needed for microcontroller. In order to get started, they are simply connected to a computer with a USB cable or with a ACto-DC adapter or battery. Arduino Uno Board varies from all other boards and they will not use the FTDI USB-to-serial driver chip in them. It is featured by the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

The features of Arduino Uno ATmega328 includes the following: It is an easy USB interface. This allows interface with USB as this is like a serial device.The chip on the board plugs straight into your USB port and supports on your computer as a virtual serial port. The benefit of this setup is that serial communication is an extremely easy protocol which is time-tested and USB makes connection with modern computers and makes it comfortable. It is easy-to-find the microcontroller brain which is the ATmega328 chip. It has more number of hardware features like timers, external and internal interrupts, PWM pins and multiple sleep modes of the Arduino Uno into the real world. Simply plug your electronic devices and sensors into the sockets that correspond to each of these pins and you are good to go.

4.2 BUZZER

The buzzer consists of an outside case with two pins to attach it to power and ground. Inside is a piezo element, which consists of a central ceramic disc surrounded by a metal (often bronze) vibration disc. When current is applied to

the buzzer it causes the ceramic disk to contract or expand. This then causes the surrounding disc to vibrate.

4.2 BUZZER

That's the sound that you hear. By changing the frequency of the buzzer, the speed of the vibrations changes, which changes the pitch of the resulting sound. A buzzer is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or key stroke.

4.3 LED

In the simplest terms, a light-emitting diode (LED) is a semiconductor device that emits light when an electric current is passed through it. Light is produced when the particles that carry the current (known as electrons and holes) combine together within the semiconductor material.

4.3 LED

Since light is generated within the solid semiconductor material, LEDs are described as solid-state devices. The term solid-state lighting, which also encompasses organic LEDs (OLEDs), distinguishes this lighting technology from other sources that use heated filaments (incandescent and tungsten halogen lamps) or gas discharge (fluorescent lamps).

4.4 RAINSENSOR & MODULE

A rain sensor is a electronic device which is activated by the rainfall. It consists of a sensing pad with series of nickel coated line and comes with LM393 IC comparator and mainly works on the resistance principle. The sensing pad with

series of exposed copper traces, together acts as a variable resistor (just like a potentiometer) whose resistance varies according to the amount of water on its surface.
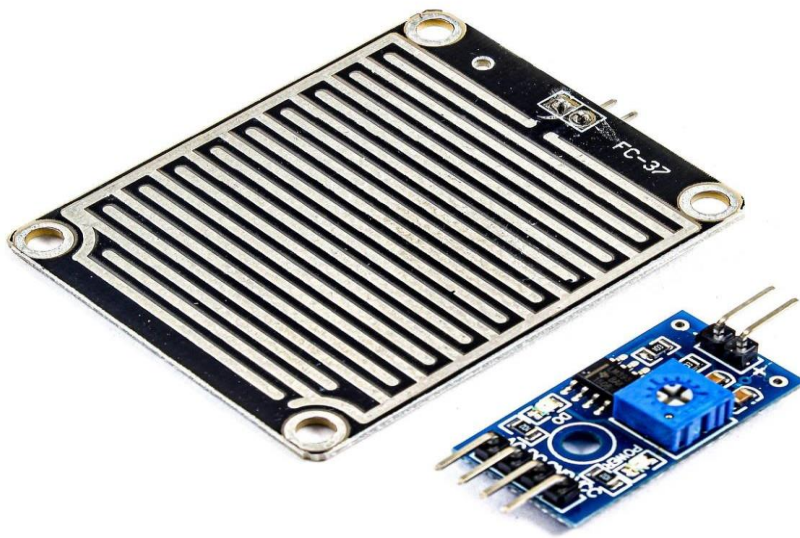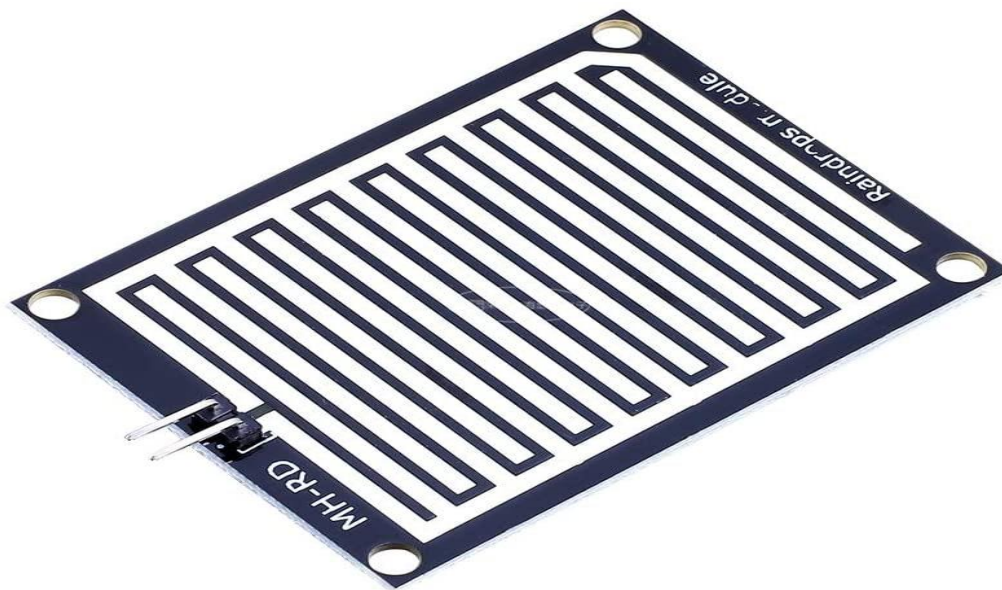
4.4 RAIN SENSOR & MODULE

A rain sensor is one kind of low-cost electronic sensor which is used to detect the rainfall or water drops. It works as a switch. Normally the switch is open condition. This sensor is consists of mainly two parts, one is Sensing Pad and another one is the Sensor Module. When rainfall or water drops fall on the Sensing Pad surface, then the switch will be closed. The Sensor Module reads data from the sensor pad and processes the data and converts it into a digital/analog output. So, the sensor can provide both types of output Digital output (DO) and Analog output(AO).

MODULE

The sensor contains a sensing pad with series of exposed copper traces that is placed out in the open, possibly over the roof or where it can be affected by rainfall. Usually these traces are not connected but are bridged by water. The Rain Sensor Module's Sensing Pad consists of two nickel-coated series copper tracks.


SENSING MODULE

Also, it has two Header pins, these are internally connected to the two copper tracks of the Sensing Pad. These pins are used to connect the Sensing Pad to the rain sensor module circuit through two jumper wire. Always, one pin of the rain sensor circuit provides a +5v power supply to the one track of the sensing pad, and another pin is received the return power supply from another track of the sensing pad.

4.5 JUMPING WIRES

Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed. Fairly simple. In fact, it doesn't get much more basic than jumper wires.
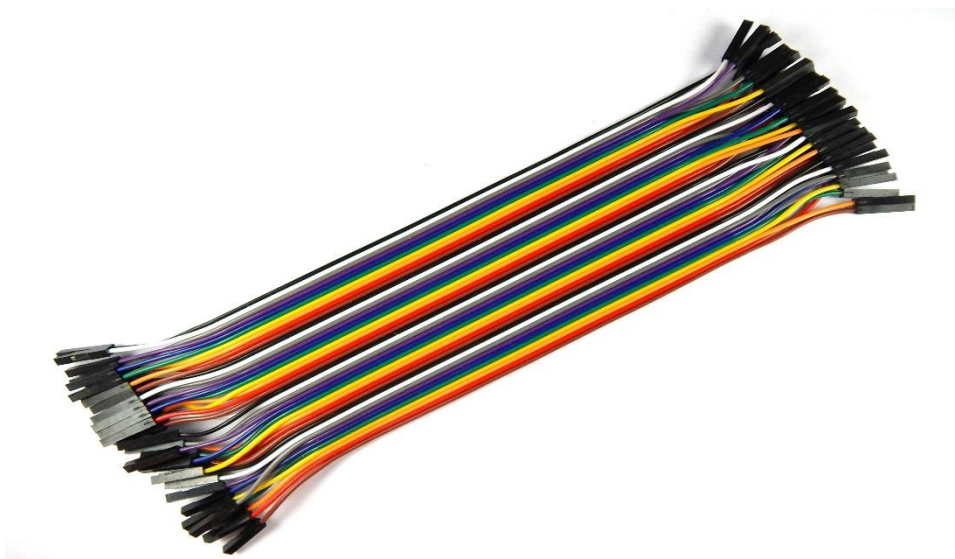
4.5 jumping wires

4.6 BREADBOARD

Breadboards are temporary work boards for electronic circuits. The general shape of a breadboard . Compatible with most breadboards, 24-gauge wire is used to connect circuits; solid wire, not stranded. Sometimes, kits may be available with various colors of fixed lengths to specifically fit breadboards. These are a nice convenience.
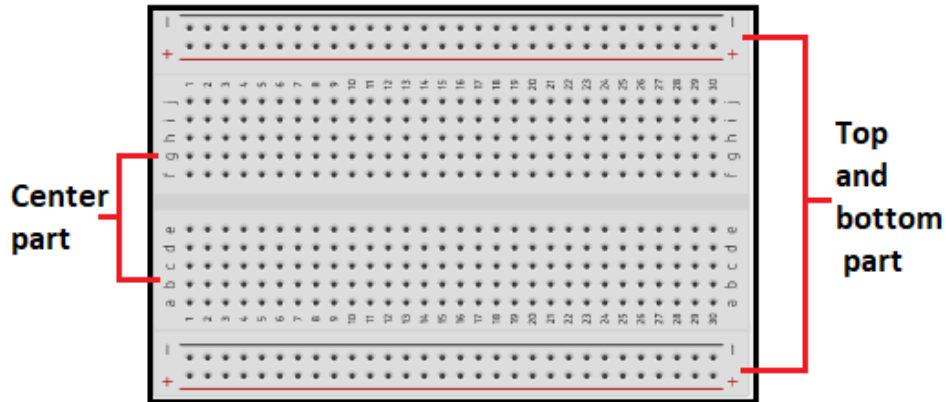
4.6 BREADBOARD

Breadboards are temporary work boards for electronic circuits. The general shape of a breadboard . Compatible with most breadboards, 24-gauge wire is used to connect circuits; solid wire, not stranded. Sometimes, kits may be available with various colors of fixed lengths to specifically fit breadboards. These are a nice convenience.

CHAPTER 5

SOFTWARE REQUIREMENT

5.1 ARDUINO IDE
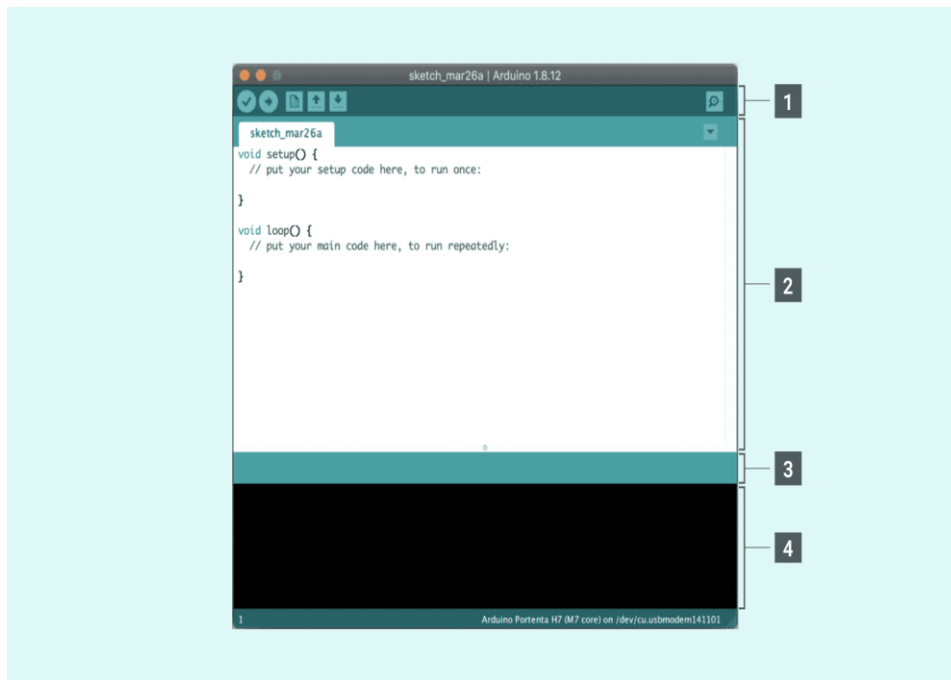
5.1 ARDUINO IDE

CHAPTER 6

WORKING PRINCIPLE

6.1 WORKING

This system works in such a way that, when there is rain, the rainwater acts as a trigger, which switches on the buzzer. In the **Rain Drop Sensor Arduino Code**, we defined that pins 5, and A0 are buzzer and rainfall. By doing this, we can change the pins in the defined part of the function, and the remaining part of the code will be untouched. This will make the programmer in editing the pins easily.
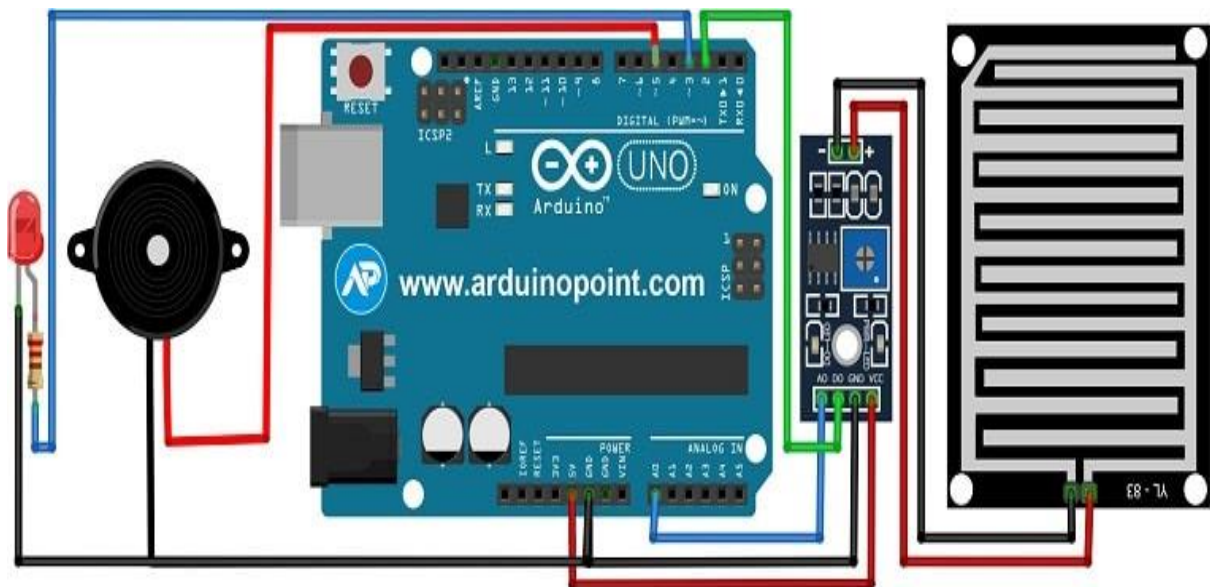
5.1 WORKING MODEL

In the void loop, the *analogRead* command reads the value from the sensor. In the next line, the command *Serial.println(value),* prints the value on the serial monitor. This will be helpful while debugging. The map function maps the incoming value between 0 -225. The function format for the **map** is a map (value, min value, maximum value, value to be mapped for minimum value, value to be

mapped for maximum value). The buzzer will be switched ON or OFF, depending on the set value and the output of the sensor. This value is compared in the if function, with the set value. If the value is greater than the set value, it will switch on the buzzer. If the value is less than the set value, the buzzer will be switched off.

The complete working can be found in the **video** linked below. This is one application among the many, the same principle will be seen in windshield wipers, other home automation, agriculture sectors, etc. Hope you understood the project and enjoyed building something useful. If you have any questions, use the comment section below or use our forums for other technical questions.

Code

```
//For buzzer put this code in Arduino IDE


int Buzzer    = 10;

int Rain_sensor = 3;

int Rain_detected;

void setup ()

{

 Serial.begin(9600);

 pinMode(Buzzer, OUTPUT);

 pinMode(Rain_sensor, INPUT);

}
```

```
void loop()

{

  Rain_detected = digitalRead(Rain_sensor);

  Serial.println(Rain_detected);

  delay(500);

  if (Rain_detected == 0)

  {

   Serial.println("Rain detected...! take action immediately.");


   digitalWrite(Buzzer, HIGH);

   delay(2000);

  }

  else

  {

   Serial.println("No Rain detected. stay cool");


   digitalWrite(Buzzer, LOW);

   delay(2000);

  }

}
```

CHAPTER 7

CONCLUSION

CONCLUSION

The rain water detector-alarm system will be useful in both domestic and industrial applications. It alerts the users of the presence of rain when itis just about to rain as even the minutest droplets of water triggers it ON thereby giving the user ample time to retrieve possessions, shut windows, and in some cases prepare to harvest rain water. The device when properly placed to receive the first set of droplets of rain water can save the user from damaging possessions that were being sundried/prevent rain from entering homes, offices and many industrial areas. The rain sensor can be made so sensitive that it can detect even the smallest drop of water and triggers the buzzer which is proved to be quiet reliable and consistent.