RAIN DETECTION SYSTEM

Electrical Measurements
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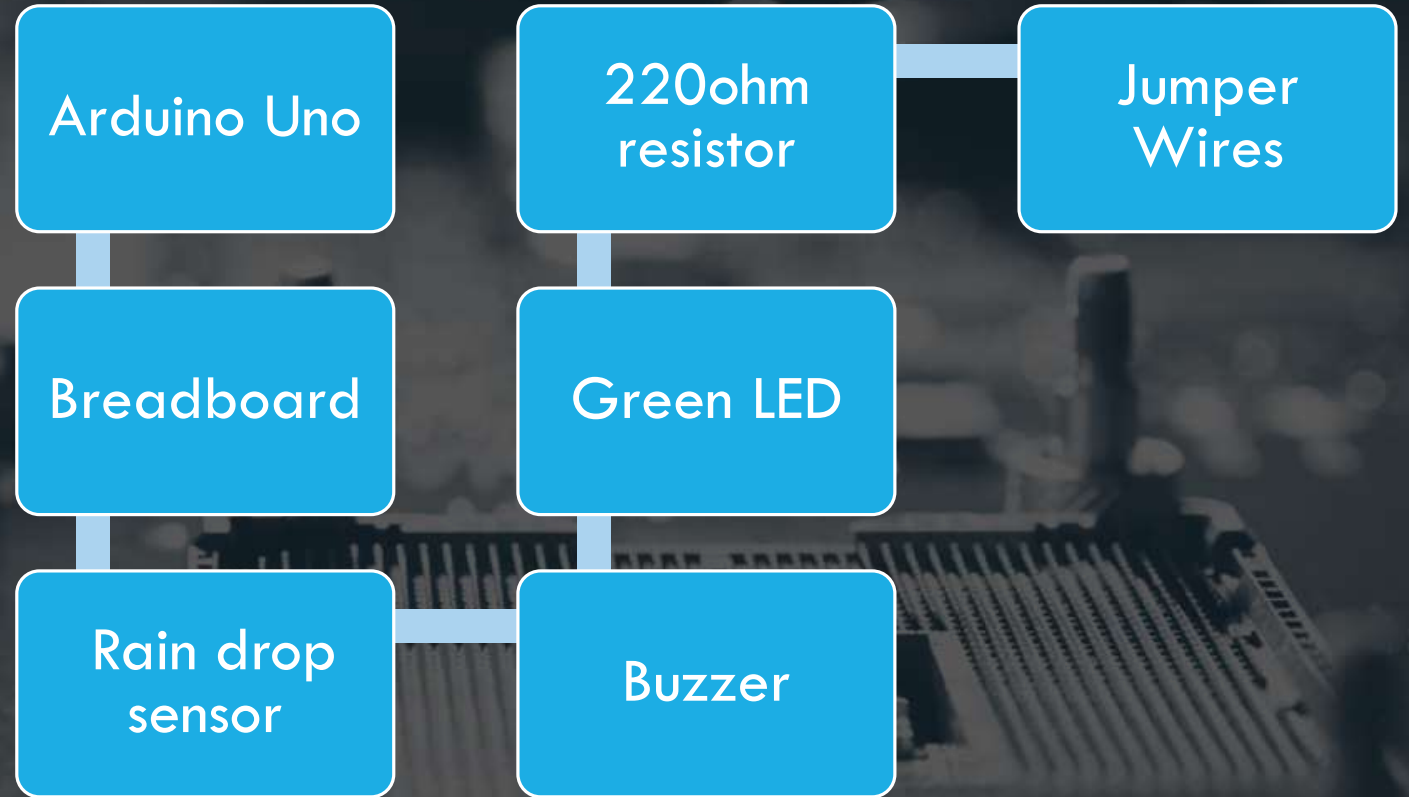
INTRODUCTION

A simple rainfall Detection System can be easily built by interfacing an Arduino with Rain drop Sensor. The sensor will detect any water falling on it and the Arduino board will sense it and can perform required actions.

THE COMPONENTS OF THE PROJECT

Arduino Uno

Breadboard

Rain drop sensor

220ohm resistor

Green LED

Buzzer

Jumper Wires

THE REAL USES OF THE SYSTEM

1-Rainfall detection can be used to automatically regulate the Irrigation process.

2-Continuous rainfall data can help farmers use this smart system to automatically water the crop only when absolutely required.

3-In the automobiles sector windshield wipers can be made fully automatic by using the rain detection system.

4- The Home Automation Systems can also use rain detection to automatically close windows and adjust room temperature

WATER SENSOR
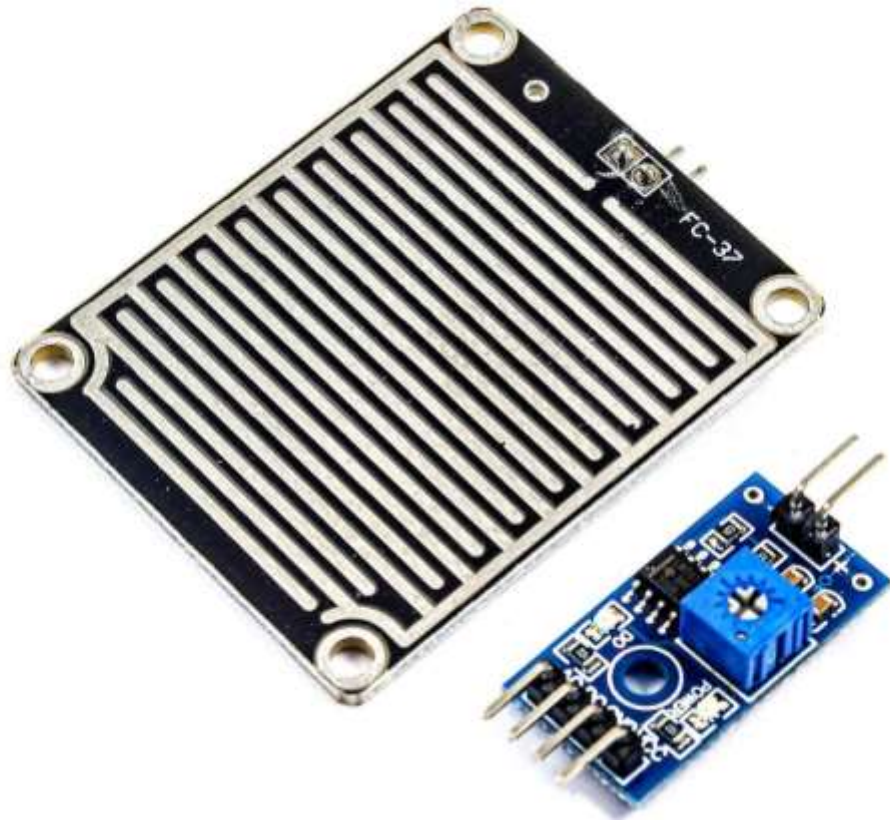
THE STRUCTURE OF RAIN SENSOR

Rain sensor is a sensor that is used to notice the water drops or rainfall. This kind of sensor works like a switch.

This sensor includes two parts:

1-Sensing pad

2-Sensor module

Whenever rain falls on the surface of a sensing pad then the sensor module reads the data from the sensor pad to process and convert it into an analog or digital output. So the output generated by this sensor is analog (AO) and digital (DO).

THE RAIN SENSOR WORKING PRINCIPLE

The sensing pad includes a set of uncovered copper traces which mutually work like a variable resistor or a potentiometer. Here, the sensing pad resistance will be changed based on the amount of water falling on its surface. So, here the resistance is inversely related to the amount of water. When the water on the sensing pad is more, the conductivity is better & gives less resistance. Similarly, when the water on the surface pad is less, the conductivity is poor & gives high resistance. So the output of this sensor mainly depends on the resistance.
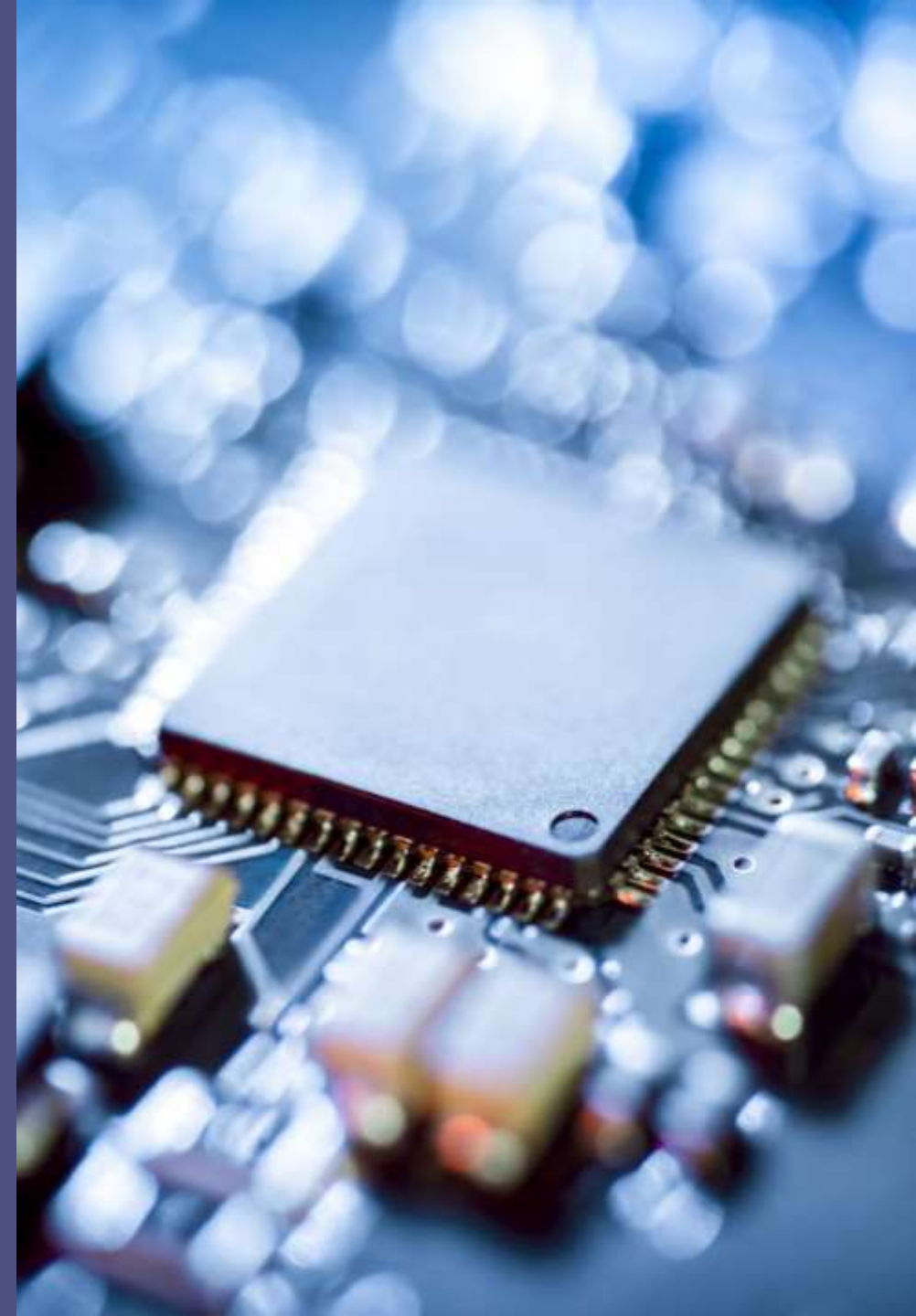
RAIN SENSOR PIN CONFIGURATION
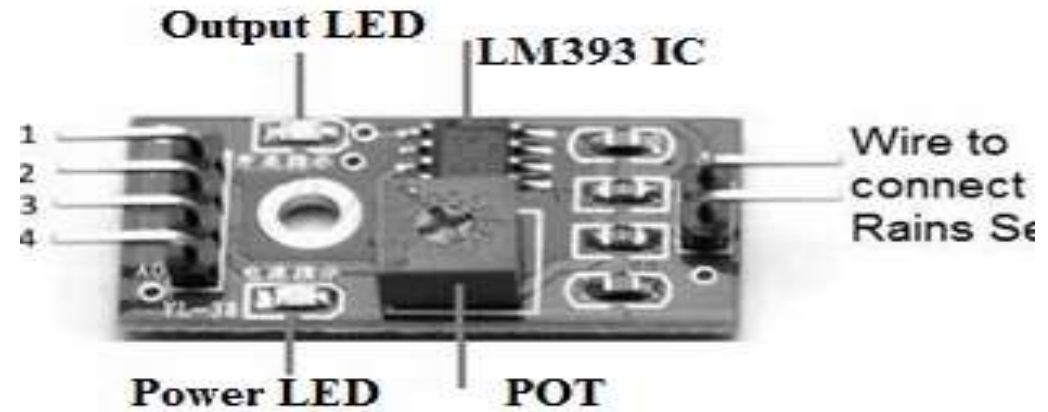
1-Analog Output (AO) Pin: This pin gives an analog signal between the voltage supply from 5V to 0V.

2-Digital Output (DO) Pin: This pin gives digital o/p for the internal comparator circuit & it can be connected to an Arduino otherwise to a 5V relay.

3-Ground Pin: It is a ground connection.

4-VCC Pin: This pin provides a voltage supply to the rain sensor that ranges from 3.3V to 5V. Here, the analog output will change based on the voltage provided to the sensor.

WORKING OF THE RAIN SENSOR

At first, the sensing pad has to connect to the sensor module using a jumper wire. Now, both the pins of rain sensor modules like GND & VCC are connected to a 5V power supply pin. After that, fix the threshold voltage at the Non-Inverting terminal of the LM393 IC in the dry state of the pad by turning the knob of the potentiometer to fix the sensitivity of the rain sensor.

the volume of raindrops on the surface of the pad increases then its conductivity increases & resistance decreases. After that from the pad, a less amount of voltage can be provided to the Inverting input terminal of the LM393 IC. Then this IC evaluates this voltage through the threshold voltage. In this state, the input voltage is low as compared to the threshold voltage, as a result, the output of the rain sensor goes LOW.

When no rain falls on the surface of the pad then it has high resistance & less conductivity. After that, the high voltage will be assigned across the pad. Thus, the high voltage from the pad can be provided to the Inverting input of the IC. Once more the integrated circuit evaluates this voltage by using the threshold voltage. So, in this state, this input voltage is higher as compared to the threshold voltage. As a result, the output of the sensor module goes high.

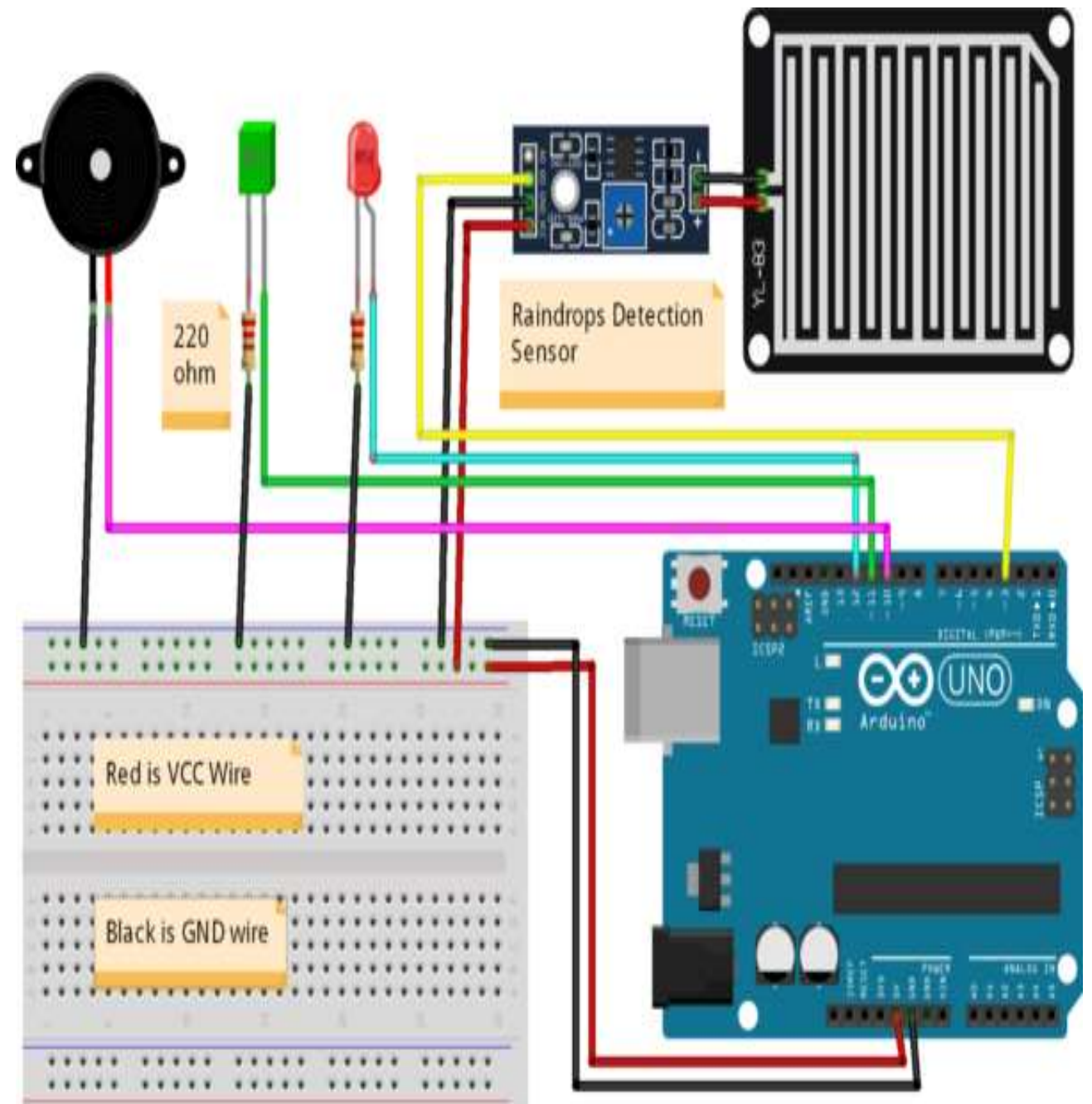Rain → Rain Sensor → ↓ Lower Output Voltage

Sun → Rain Sensor → ↑ Higher Output Voltage

THE DIAGRAM OF THE SYSTEM

1- A0 at sensor module connected to pin (3) at Arduino

2- VCC at sensor module connected to 5V pin at Arduino

3- GND at sensor module connected to GND pin at Arduino

4- Buzzer connected to pin (10) at Arduino

5- LED connected to pin (11) at Arduino

SOFTWARE CODE OF THE SYSTEM

1- Void setup

Set sensor as an input pin

Set buzzer as an output pin

Set LED as an output pin

2- Void loop

If rain sensor input = 0 (there are water found)

The buzzer and LED turn on

If sensor input = 1(there is no water found)

The Buzzer and LED turn off

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```
int LED = 11;
int Buzzer = 10;
int Rain_sensor = 3;
int Rain_detected;
void setup()
{
  Serial.begin(9600);
  pinMode(LED, OUTPUT);
  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 immedi
    digitalWrite(LED, HIGH);
    digitalWrite(Buzzer, HIGH);
  }
  else
  {
    Serial.println("No Rain detected. stay cool");
    digitalWrite(LED, LOW);
    digitalWrite(Buzzer, LOW);
  }
}
```