Arduino with Rain Sensor

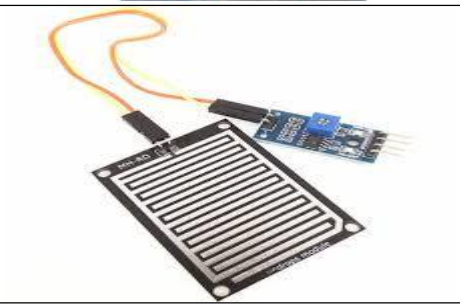
Introduction:

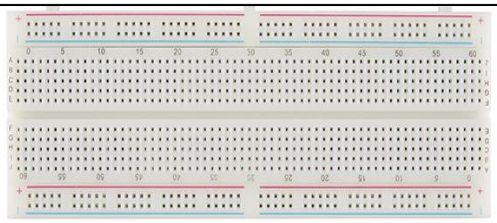
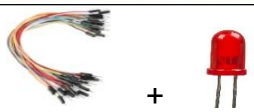
- A rain sensor is an important tool in DIY with Arduino Uno. It detects the presence of water, making it useful for a variety of weather-related projects and applications.

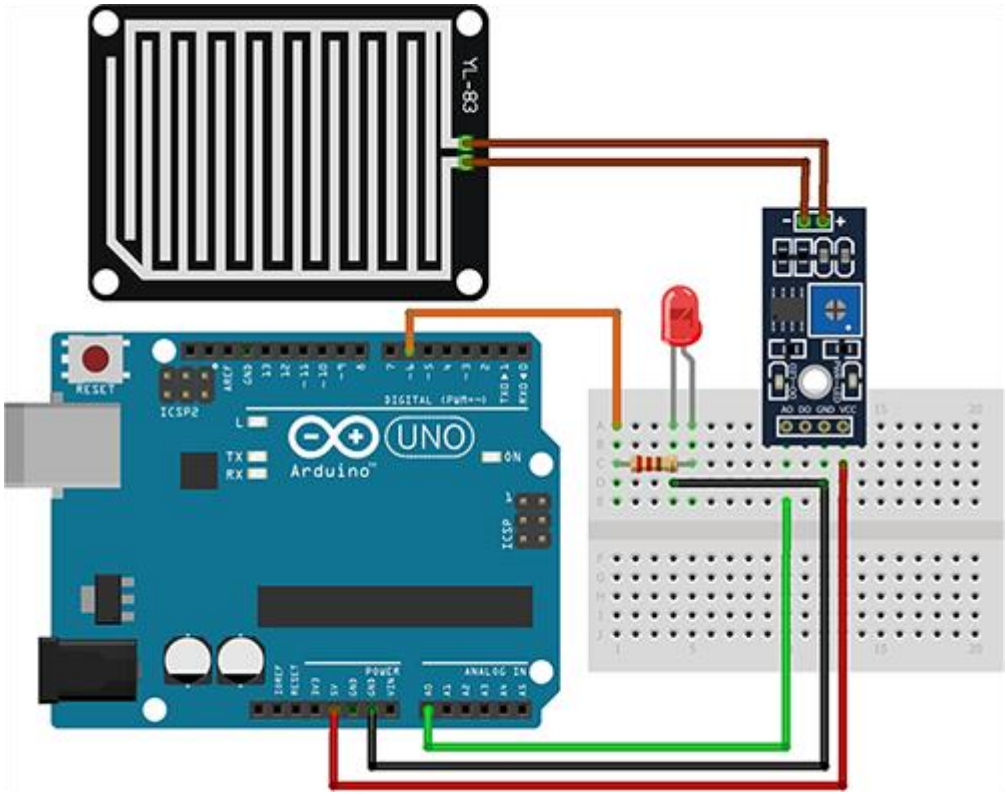
- When it comes to detecting certain changes in weather conditions, it's pretty unpredictable, and rainfall is one of the most unexpected parameters of weather. So in this article, we decided to **Interface the Rain Sensor with an Arduino**

- The **raindrop sensor** also known as **rain detector sensor** is an easy-to-use device that can detect rainfall. It acts as a switch when raindrops fall on the sensor, other than that with slight tweaks in the code, it can also measure the intensity of the rainfall.

Parts required:

Sl.no	Description	Image	Quantity
1	**Arduino UNO Board**		1
2	Rain sensor		1
3	**Connecting Power cable**		1

4	**BreadBoard**		1
5	**Connecting wires and led**	 +	1



Hardware connections:

1. Connect the wire between the Arduino UNO board and rain sensor as given below

Module Pin	Arduino Pin
LED	pin6
GND	LED
5V	VCC
GND	GND
AO	AO

2 . VCC is the power supply pin of the Rain Detection Sensor that can be connected to 3.3V or 5V of the supply. But do note that the analog output will vary depending upon the provided supply voltage.

3 . GND is the ground pin of the board and it should be connected to the ground pin of the Arduino.

4 . DOUT is the Digital output pin of the board, output low indicates rain is detected, and high indicates no rain condition.

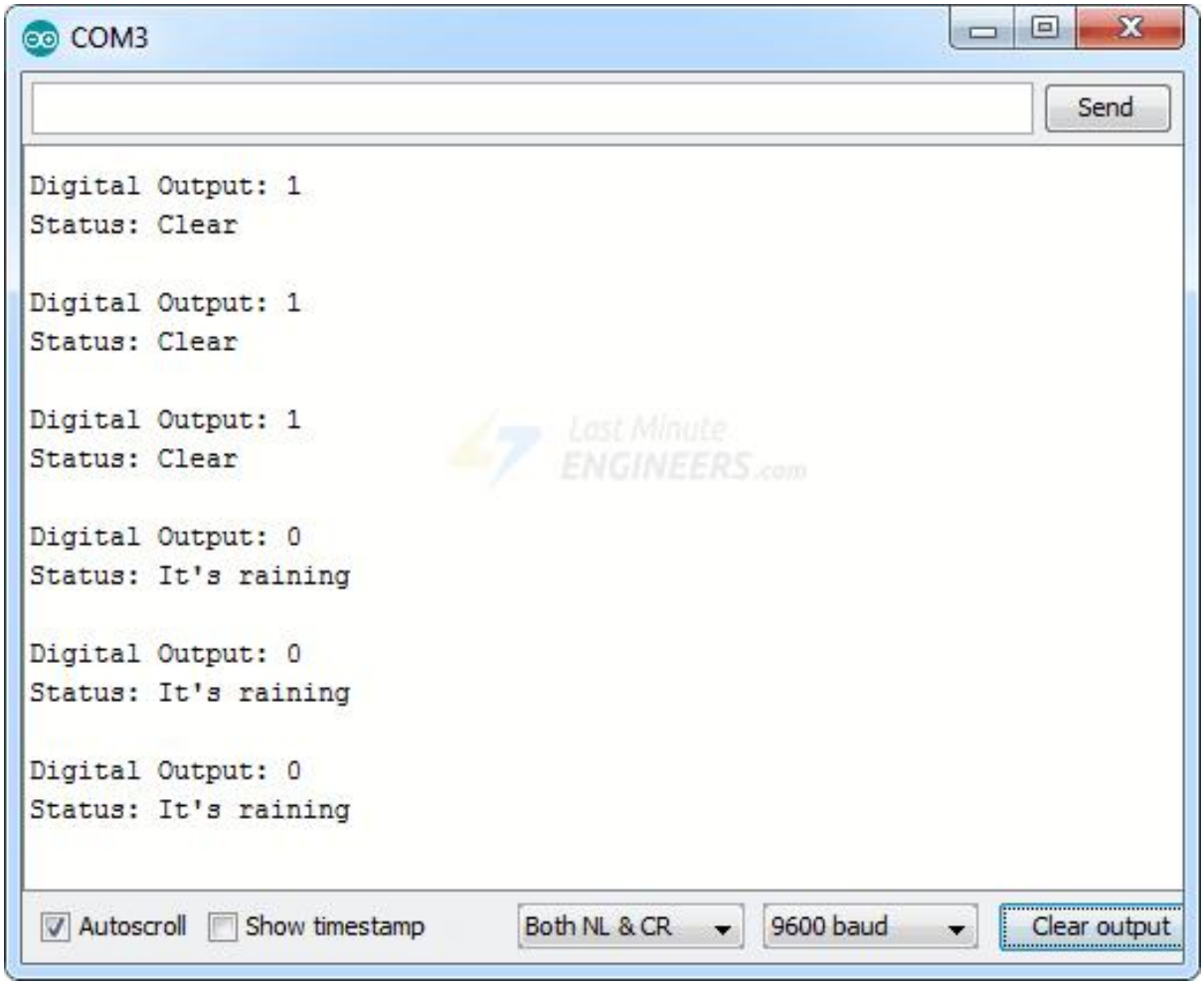
5 . AOUT is the Analog output pin of the board that will give us an analog signal in between vcc and ground.

CODE:

```
  // Sensor pins pin D6 LED output, pin A0 analog Input

#define ledPin 6

#define sensorPin A0

void setup() {

  Serial.begin(9600);

  pinMode(ledPin, OUTPUT);

  digitalWrite(ledPin, LOW);

}

void loop() {

  Serial.print("Analog output: ");

  Serial.println(readSensor());

  delay(500);

}

//  This function returns the analog data to calling function

int readSensor() {
```

```
  int sensorValue = analogRead(sensorPin);  // Read the analog value from sensor

  int outputValue = map(sensorValue, 0, 1023, 255, 0); // map the 10-bit data to 8-bit data

  analogWrite(ledPin, outputValue); // generate PWM signal

  return outputValue;             // Return analog rain value

}
```

Output :



Application of Rain Sensor :

Irrigation Systems: One of the most common applications of rain sensors is in irrigation systems. By detecting rainfall, the sensor can automatically shut down the sprinklers, preventing them from watering your lawn or garden when it's not needed. This can save a significant amount of water, especially in areas with frequent rainfall.

Automobile Windshield Wipers: Rain sensors are also used in automobiles to control windshield wipers. The sensor detects rain on the windshield and automatically activates the wipers at an appropriate speed. This can improve driver visibility and safety in wet weather conditions.

Satellite Communications: Rain sensors can be used to activate rain blowers on satellite dishes to remove water droplets that can interfere with the signal. Water droplets can attenuate (weaken) the signal, reducing the quality of the communication.

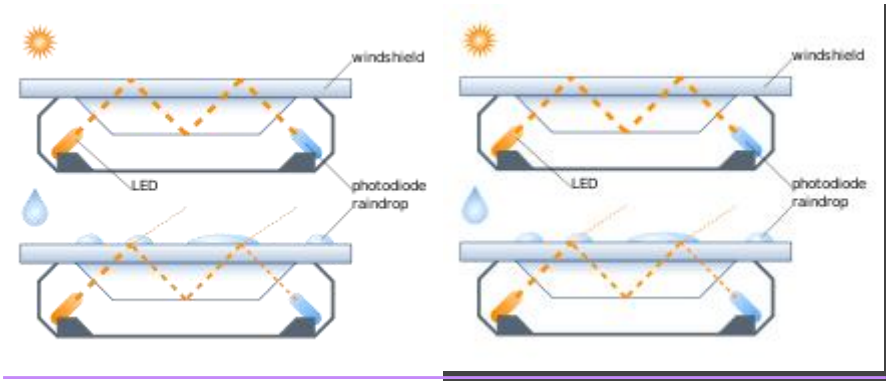
Building Automation: Rain sensors can be used to control awnings, windows, and other building features in response to rainfall. For example, a rain sensor can be used to automatically close a retractable roof or awning to protect furniture or electronics from getting wet.

Weather Monitoring: Rain sensors can be used as part of weather stations to collect data on rainfall amount and intensity. This data can be used to track weather patterns and forecast future precipitation events.

How is the Rain Sensor woorks :

Resistive method: This type of sensor uses a PCB (printed circuit board) with exposed nickel or copper traces that act like electrodes. When it's dry, these traces don't conduct electricity very well, resulting in high resistance. But when rain falls on the sensor, the water creates a conductive path between the traces, lowering the resistance. An electronic circuit within the sensor monitors this change in resistance and triggers a signal when it reaches a threshold, indicating rain is present.

Optical method: This type of sensor uses infrared light and a special lens. When it's not raining, the light beam travels through the lens and reflects internally back to a detector within the sensor. But when rain creates water droplets on the lens, some of the light is scattered or absorbed, disrupting the internal reflection. The sensor detects this change in the light signal and triggers a response.



Components of Rain Sensor :

Rain Detection Board: This board is directly exposed to rain and has the parts that sense the presence of water. There are two main designs for this board:

Resistive Tracks: This design uses a PCB with exposed traces made of nickel or copper. These traces act as electrodes.

Light Emitting and Detecting Components: This design uses an infrared light emitter, lens, and light detector.

Control Module: This module interprets the signal from the rain detection board and provides an output signal. Here are some common components found in the control module

Comparator: This compares the signal from the rain detection board to a preset threshold.

Potentiometer: This allows you to adjust the sensitivity of the sensor (for the resistive type).

Analog-to-Digital Converter (ADC) (optional): This converts the analog signal from the rain detection board (resistive type) into a digital signal for the comparator.

Output Circuitry: This provides an output signal, which can be digital (high/low) or analog, depending on the sensor.

Additional Components: Other components you might find include resistors, capacitors, and LEDs (for power and status indication).