

# Arduino-based Rain Water Alarm

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**Abstract** - The project is to designed detect vehicle movement on highways to switch ON only a block of street lights ahead of the vehicle, and to switch OFF the behind lights to save energy. During night all the lights on the highway remain ON for the vehicles, but lots of energy is wasted when there is no vehicle his movement. This proposed system provides a solution for energy saving. This is achieved by sensing an approaching vehicle and switches ON a block of street lights ahead of the vehicle. As the vehicle passes by the behind lights switch OFF automatically. So when there are no vehicles on the highway, then all the lights remain OFF. Sensors used on either sides of the road send logic commands to microcontroller to switch ON/OFF the LEDs. Intensity control is also possible by Pulse Width Modulation (PWM) generated by the microcontroller. Thus this way of dynamically changing intensity ON/OFF helps in saving a lot of energy.

**Keywords** - . Microcontroller, Sensor, Street Light.

## I. INTRODUCTION

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.

## II. PRINCIPLE OF OPERATION

The sensor is a resistive dipole that shows less resistance when wet and more resistance when dry. When there is no rain drop on board it increases the Resistance so we gets 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.

Specifications

- Adopts high quality of RF-04 double sided material.
- Area: 5cm x 4cm nickel plate on side,
- Anti-oxidation, anti-conductivity, with long use time;
- Comparator output signal clean waveform is good, driving ability, over 15mA;
- Potentiometer adjust the sensitivity;
- Working voltage 5V;
- Output format: Digital switching output (0 and 1) and analog voltage output AO;
- With bolt holes for easy installation;
- Small board PCB size: 3.2cm x 1.4cm;
- Uses a wide voltage LM393 comparator

## III. RESULTS AND DISCUSSION

Rain Sensor Module

Pin Description

Vcc +5 Volts Power Source

GND Ground or negative power source

D0 Digital Output. Goes low when moisture exceeds set threshold.

A0 Analog Output – Zero to five volts. The lower the voltage, the greater the moisture

POWER LED Indicates that power is applied

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OUTPUT LED Illuminates when moisture has exceeded threshold set by sensitivity adjustment.

Sensitivity Adjustment Clockwise is more sensitive. Counterclockwise is less sensitive.

Connecting with Arduino

Arduino Rain Sensor – Circuit Diagram

Source Code

Arduino Code

```
const int sensorMin = 0;
const int sensorMax = 1024;
void setup()
{
  Serial.begin(9600);
}
void loop()
{
  int sensorReading = analogRead(A0);
  int range = map(sensorReading, sensorMin, sensorMax, 0, 3);
  switch (range)
  {
    case 0:
      Serial.println("RAINING");
      break;
    case 1:
      Serial.println("RAIN WARNING");
      break;
    case 2:
      Serial.println("NOT RAINING");
      break;
  }
  delay(1000);
}
```

Code Explanation

Initialize the lowest and highest sensor readings with type as an integer and variable name.

```
const int sensorMin = 0; // sensor minimum
```

```
const int sensorMax = 1024; // sensor maximum
```

The setup() routine runs once when we reset it or power the board. Here we are initializing serial communication at 9600 baud rate.

```
void setup()
{
  Serial.begin(9600);
}
```

The loop function runs over and over again forever. Firstly this code reads the analog signal at A0 pin from Rain sensor and maps those measured value with initialized values.

```
void loop()
{
  int sensorReading = analogRead(A0);
  int range = map(sensorReading, sensorMin, sensorMax, 0, 3);
```

Checks the measured value with pre-stored condition and displays the weather condition like RAINING, RAIN WARNING & NOT RAINING.

```
switch (range)
{
  case 0: // Sensor getting completely wet
    Serial.println("RAINING");
```

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```
break;
case 1: // Sensor getting partially wet
  Serial.println("RAIN WARNING");
  break;

case 2: // Sensor dry
  Serial.println("NOT RAINING");
  break;
}
delay(1000);
}
```

#### Working

Make connections according to the above circuit diagram.

- Connect VCC pin of sensor to 5V power supply of Arduino,
- Connect GND pin of sensor to GND of Arduino and
- Connect Analog output pin of sensor to A0 pin of Arduino.

Upload the above code into Arduino IDE and test the result on Serial Monitor by soaking the rain sensor into water.

#### IV. CONCLUSION

In Proposed The serial monitor displays the below result based on the amount water drop on the rain sensor module.If the Rain Sensor Board is completely soaked; “case 0” will be activated and “RAINING” will be sent to the serial monitor.If the Sensor Board has water droplets on it; “case 1” will be activated and “RAIN WARNING” will be sent to the serial monitor. If the Sensor Board is dry; “case 2” will be activated and “NOT RAINING ” will be sent to the serial monitor.

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