Sensor Lab (Course Code: ITL603)

Rain Water Detection System

T. E. Information Technology

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CERTIFICATE

This is to certify that the project entitled "**Rain Water Detection System"** is a bonafide work of **"Vedant Kadam, Ethan Moreas, Josh Jestine, Akshat Oza, Pratham Gaonkar" Roll Nos. 01, 02, 03, 04, and 16** respectively submitted to the University of Mumbai towards completion of mini-project work for the subject of **Sensor Lab (Course Code: ITL603).**

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Examiners

1.----------

2.----------

Date:

DECLARATION

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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ABSTRACT

Management of water resources and proper usage has become increasingly important in recent years. Rain sensor senses rain and sounds an alert so that we can save water to use for other purposes later. For example, there are several methods for conserving water harvesting which means the process of collecting and storing rainwater instead of letting it wash off. Rainwater is collected from a roof-like surface and directed to a tank, cistern, deep pit (well, shaft, or borehole), aquifer, or reservoir via percolation, where it seeps down and replenishes groundwater. The level of groundwater can be raised by conserving groundwater and limiting water use. The rain alarm is an application that detects rainwater and sounds an alarm when it is detected. This thesis describes a simple and reliable sensor module that may be available in the market at a low cost. Everyone's life revolves around water. Water conservation and good use are important. Here is a 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 using rainwater detectors in irrigation, home automation, electronics, vehicles, and other fields.

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Chapter 1
INTRODUCTION

1.1 Introduction to Sensor Based Systems

The rain alarm is an application that detects rainwater and sounds an alarm when it is detected. This thesis describes a simple and reliable sensor module that may be available in the market at low cost. Rain Alarm Project is a simple but very useful project that detects Rain (Rain Water) and automatically triggers an alarm or buzzer. Water is a basic need in every one's life. Saving water and proper usage of water is very important. Here is a project which will give the alarm when there is rain, so that we can make some actions for rain water harvesting and also save the rain water for using it later. With the help of saving this rain water through rain water harvesting, we can increase the levels of underground water by using underwater recharge techniques.

1.2 Problem Statement and Objectives

The project's goal is to identify rainwater as soon as it begins to fall so that it can be stored and tested for water quality using a practical, affordable technology that can be applied for a wide range of environments.

The objectives of this project are:

- A: To support irrigation, , this sensor is connected to the irrigation system and serves as a water control unit, shutting down the system.
- B: Rain water harvesting

1.3 Proposed Solution

A rainwater detection system can be set up using a combination of sensors and a microcontroller. Rain sensors can detect the presence of rain and send signals to the microcontroller, which can then activate a water collection system or alert the user. Install rain sensors in designated areas to detect rainfall intensity and duration. Connect the sensors to a central control unit that activates a water pump to transfer the collected rainwater to a storage tank or irrigation system. Implement regular maintenance and testing to ensure proper functioning. The collected rainwater can be used for various purposes such as watering plants or flushing toilets, reducing water bills and conserving water resources.

Organization of the Report

The organization of the report is as follows. Chapter 2 reports the literature survey. The proposed system design is presented in Chapter 3. Chapter 4 discusses the result and implementation steps and finally the conclusion in Chapter 5 followed by references.

Chapter 2
LITERATURE REVIEW

Table 1 includes the survey results from the research paper referenced and studied.

Table 1 : Literature Review

REF. NO.	METHODOLOGY	ADVANTAGES	GAPS IDENTIFIED
[1]	1: When the Rain Water Sensor detects the Rain, it sends a signal to the 555 Timer. The 555 Timer IC, which is configured in its Astable Mode, will then activate the Buzzer.	Versatility: Water detection systems can be installed in a variety of environments, including commercial buildings, data centers, warehouses, and more. This versatility makes them a valuable asset for any business or organization.	Limited coverage: Water detection systems typically cover a limited area, and may not be suitable for large industrial spaces or outdoor environments.
[2]	2: The rain sensor works by using a collection cup where rainwater is collected and weighed. The weight of the rain water in the collection cup will then break the electrical connection to the pump or sprinkler valves of your lawn irrigation system.	Remote monitoring: Many water detection systems can be remotely monitored, allowing for real-time alerts and notifications in the event of a water leak or spill.	Limited functionality: While water detection systems are effective at detecting water leaks or flooding, they may not provide additional features such as monitoring of temperature or humidity levels.
[3]	3: In this an electrode is used to measure the amount of rainwater, connected to a Resistive rain sensor kit with 5V Relay Module Using Jumper Wires by Soldering. Then We connected the Buzzer with the Rain sensor and 5V Relay Module Since buzzer used to alert. At last we connected 9V battery using wires	Cost savings: By detecting water leaks and spills early, water detection systems can help businesses save money on repairs, reduce downtime, and avoid costly damage to equipment or inventory.	Installation complexity: The installation of water detection systems can be complex, requiring wiring and sensors to be properly installed and configured. This can increase the cost and time required for installation.

[4]	4: Detection by using an expansion disc made of cork. When enough rain hits the cork, it expands and triggers the break mechanism of the rain sensor preventing electricity from running into your lawn irrigation system.	Reduced Downtime: By quickly detecting and addressing water intrusion, water detection systems can reduce downtime and prevent costly repairs or replacements.	Maintenance requirements: Water detection systems require regular maintenance to ensure they continue to function properly, including calibration of sensors, testing of alarms, and replacement of faulty components.

Chapter 3
SYSTEM DESIGN

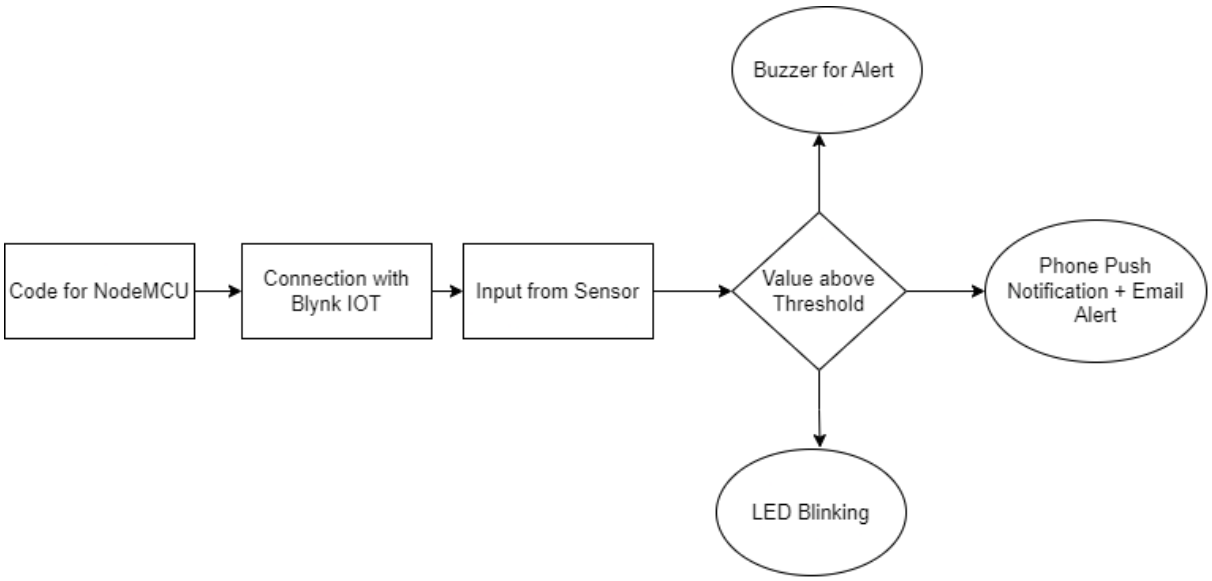


Fig 3.1: System Design

The block diagram depicted in Fig 3.1 presents the system design which shows the transmitter and receiver sections of the proposed system.

Hardware and Software Requirements

Software:

- Blynk IOT platform

Hardware:

- Nodemcu Esp 8266
- Buzzer
- Led
- Rainwater sensor
- Jumper wires
- Breadboard
- USB cable type A/B

Table 2: Component list

S. No.	Name of Component	Price per unit (INR)	No. of units	Total Price (INR)
1	nodemcu Esp 8266	419	1	419
2	Buzzer	96	1	96
3	Led	2	1	2
4	Rainwater sensor	130	1	130
5	Jumper wires	1.5	10	15
6	Breadboard	65	1	65
7	USB cable type A/B	30	1	30
	TOTAL			**887**

Circuit Diagram:

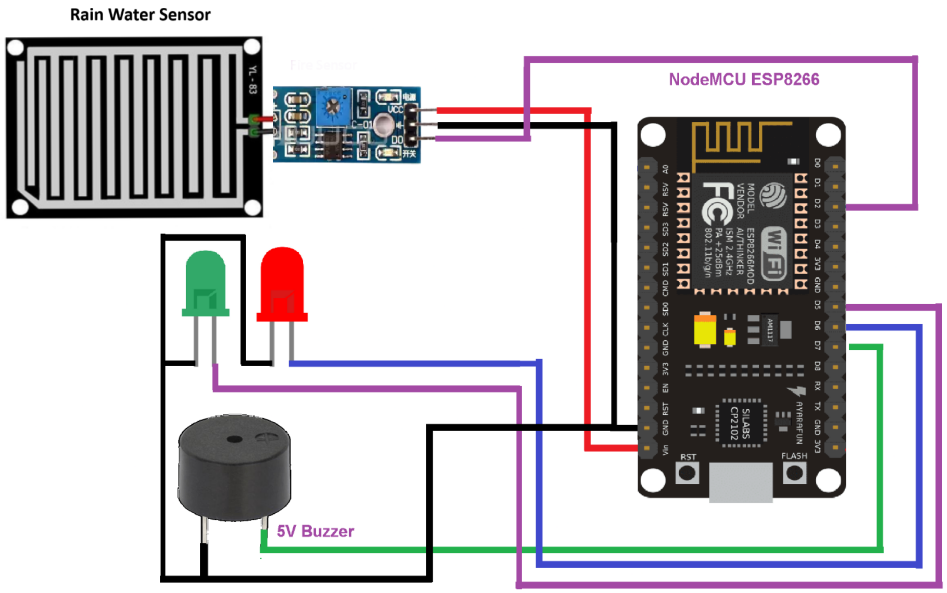


Fig 3.2: Circuit Diagram

Application Areas:

- **Agriculture**: Farmers can use rainwater detection systems to monitor rainfall and optimize irrigation schedules for crops. By knowing when and how much rain has fallen, they can reduce water usage and save money on irrigation costs.

- **Flood monitoring**: Rainwater detection systems can be used to monitor rainfall in areas prone to flooding. This can help authorities issue early warnings and take necessary measures to prevent or mitigate flood damage.

- **Water management**: Rainwater detection systems can be used to monitor rainfall in reservoirs, rivers, and lakes to manage water levels and maintain the quality of water.

- **Weather monitoring**: Rainwater detection systems can be used in weather stations to monitor rainfall and provide accurate weather forecasts.

- **Home automation**: Rainwater detection systems can be integrated into smart home automation systems to trigger actions such as closing windows, retracting awnings, or turning off sprinklers when it starts raining.

- **Environmental monitoring**: Rainwater detection systems can be used to monitor rainfall in remote locations, such as forests or nature reserves, to study the impact of rainfall on the environment.

Chapter 4
IMPLEMENTATION AND RESULTS

Flowchart

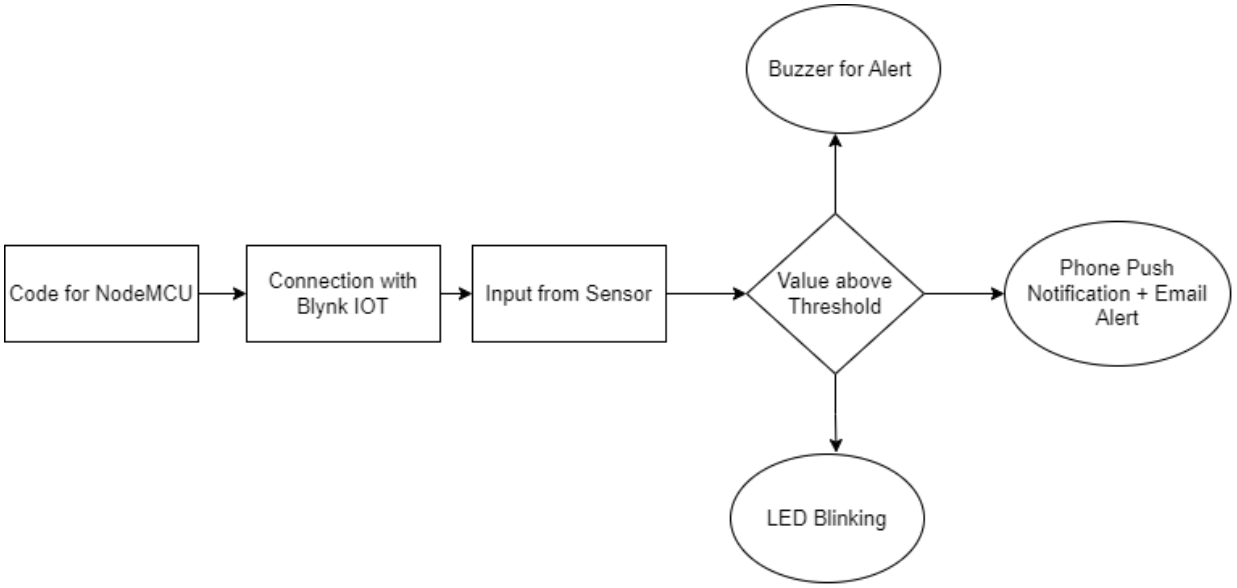
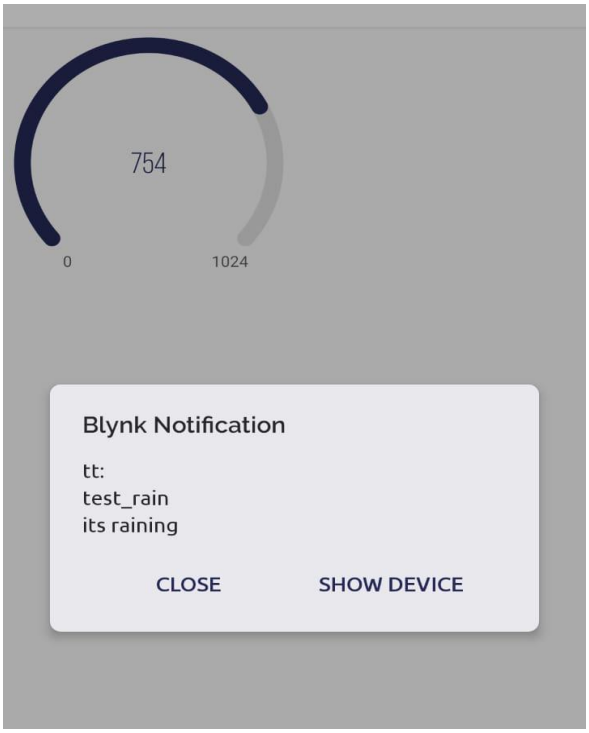


Fig 4.1: Flowchart of the system

RESULTS



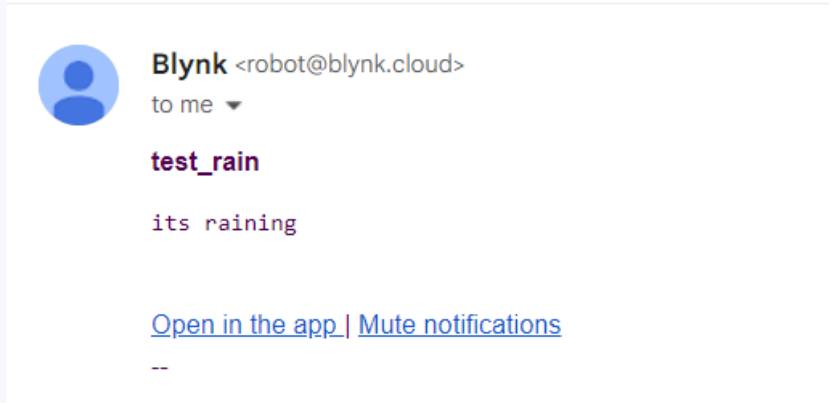


Fig 4.2: Output of Notifications

Master Node:

```
#define BLYNK_TEMPLATE_ID "TMPL3LR3kMsSp"
#define BLYNK_TEMPLATE_NAME "tt"
#define BLYNK_AUTH_TOKEN "q5cg2y2R-MYkSXAIieZ8niCs0jhiAIAD"

#define BLYNK_PRINT Serial
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>


// #define BLYNK_TEMPLATE_ID "TMPL3eXEpGuXy"
// #define BLYNK_TEMPLATE_NAME "test"
// #define BLYNK_AUTH_TOKEN ""

char auth[] = "q5cg2y2R-MYkSXAIieZ8niCs0jhiAIAD";//Enter your Auth token
char ssid[] = "Vedant";//Enter your WIFI name
char pass[] = "9702547918";//Enter your WIFI password

BlynkTimer timer;

#define RAIN_SENSOR_PIN A0
#define RAIN_SENSOR_THRESHOLD 800 // adjust this value based on your sensor
const int ledpin = D3;
const int buzpin = D5; // change this to a different pin if necessary
int flag = 0;

#define ON HIGH
#define OFF LOW

void setup()
{
  Serial.begin(115200);
  Blynk.begin(BLYNK_AUTH_TOKEN, ssid, pass);
}

void loop()
{
  int sensorValue = analogRead(RAIN_SENSOR_PIN);
  Serial.print("Rain sensor value: ");
  Serial.println(sensorValue);

  if (sensorValue < RAIN_SENSOR_THRESHOLD) {
    Blynk.logEvent("test_rain");
```

```
    digitalWrite(ledpin, HIGH);
    tone(buzpin, 50);
    flag = 1;
  }
  else {
    flag = 0;
    noTone(buzpin); // make sure this function is called
    digitalWrite(ledpin, LOW);
  }

  Blynk.virtualWrite(V0, sensorValue);

  Blynk.run();
  delay(1000);
}
```

Chapter 5
Conclusion

- In conclusion, a rainwater detection system using ESP8266 is a feasible and effective solution for monitoring rainfall in real-time. The system can be easily implemented using readily available components and can provide accurate data on the amount of rainfall in a particular area.

- The system can be configured to send alerts or notifications to users when a certain amount of rainfall is detected, making it useful for a wide range of applications, from agriculture to weather monitoring.

- Overall, a rainwater detection system using ESP8266 is a great way to automate the process of monitoring rainfall and provide accurate data for a variety of purposes.

- With the availability of open-source libraries and resources, it is easy to develop and customize this system to meet specific needs and requirements.

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RESEARCH PAPER

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[4] "Rainfall estimation using microwave links from cellular communication networks" by M. Tsukamoto, T. Kawanishi, and H. Hanado, Atmospheric Measurement Techniques, Volume 11, Pages 3247-3262, 2018.

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[6] https://youtu.be/H62xzxI-4A0

[7] https://youtu.be/jkAPzDJlxwk

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