

Sewage/Flood Overflow Monitoring and Alerting System

Sumangala Gejje ¹, Abishek M, Sampath M.P

Sharath P & Yathish G

¹Assistant Professor,

Department of Electronics & Communication,

Engineering Jyothy Institute of Technology, Bangalore, Karnataka, India.

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Abstract - Flooding is a natural calamity that is becoming increasingly frequent and has a severe impact on people's quality of life. This study highlights the use of IoT and Arduino to develop a flood monitoring system that can track the conditions near a reservoir [1]. The system utilizes compatible sensors such as level, temperature, humidity, and flow, which are accurately measured and displayed on an LCD screen. The data is then transmitted via a Wi-Fi module (ESP8266) to an IoT web application, where it is stored in a private channel. In the event of a flood, the web application alerts the relevant authorities and people [5]. Floods are well-known natural disasters that can cause significant destruction in the surrounding areas when water levels suddenly rise in dams and river beds. The damage caused by floods can have a devastating impact on both the environment and living beings. It is critical to receive emergency alerts regarding water level situations in various conditions in the river bed to minimize the damage caused by floods [9].

Keywords: Water levels, Sensors, Early warning, Disaster management, Internet of Things (IoT).

I INTRODUCTION

Natural disasters have a significant impact on both human life and a country's economy, as agriculture is a key factor in a country's growth. Therefore, it is essential to provide farmers with timely alerts to protect their crops from flooding [3]. The use of modern technology plays a vital role in detecting and preventing disastrous calamities like floods. To address this issue, an IoT-based early flood parameter monitoring and detection system using the Arduino project is proposed. This model is effective in monitoring water level, flow variations, humidity, and temperature variation in rivers, dams, or reservoirs [2]. The system consists of five different Arduino compatible sensors, including temperature, humidity, water level, flow, and ultrasonic sensors, along with an Arduino controller, a Wi-Fi module, an LCD display, an alarm, and an IoT remote server-based platform [8]. The measured values are regularly updated on a web server, which can quickly send flood alerts to authorities and people for faster action. The LED and buzzer serve as alerting systems when there is a rise in the water level and other associated parameters. Traditional systems often only notify registered organizations, resulting in slow rescue processes for citizens and their belongings. Therefore, it is necessary to develop an accurate smart flood monitoring system using sensors and IoT to increase system efficiency and enable real-time monitoring. This paper's main objective is to implement a system that covers ESP8266-based technology, sensor network components, IoT, and web applications to detect floods and send alerts to organizations [10].

II METHODOLOGY

The main objective of this project is to detect water levels in river beds and issue alerts to people when they exceed normal conditions, through LED signals, buzzer sounds, SMS and Emails. The system uses a float sensor to monitor the water level, which works by opening and closing circuits as the water levels rise and fall [4]. A flow sensor is also present in the system to monitor the flow of water. An HC-SR04 Ultrasonic Range Finder Distance Sensor is also part of the system, which works on the principle of SONAR to measure distances using ultrasonic waves. All sensors are connected to the Arduino UNO, which processes and stores the data. The system is equipped with Wi-Fi for remote access to the data over IoT, and LED lights indicate the water level, triggering SMS alerts to users as soon as it exceeds the intermediate range [7].

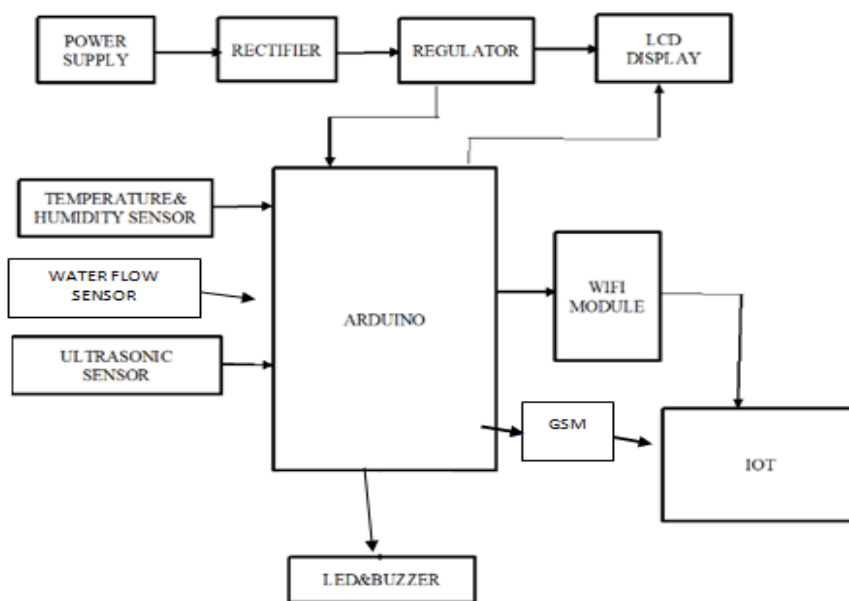


Figure 1: Block Diagram

2.1 Flow Chart

The water level in a tank is measured using an ultrasonic sensor, which provides the measurement in meters and centimeters. This measurement is converted into a percentage using Arduino code, which is used to make important decisions. The collected value is sent to the Arduino UNO and subjected to three conditions: if, else-if, and else [6]. Under the first condition, if the water level is above 80%, the red LED will turn on, and the buzzer will sound, indicating that the water level has exceeded the maximum level. If the water level is between 65% and 80%, the orange LED will turn on, and the buzzer will sound, indicating an intermediate level. If the water level is less than 55%, the green LED will turn on, indicating that the water level is at a minimum level, and there is no risk of flooding [1]. The Arduino UNO will then send instructions to the 16*2 LCD display. The temperature sensor will provide temperature information to the Wi-Fi module, which will also operate under three conditions: if, else-if, and else. Under the first condition, if the water level is above 80%, an SMS and email alert will be sent to the respective authorities. If the water level is between

65% and 80%, an SMS and email alert will be sent as an intermediate alert. If the water level is normal, no alert will be sent [12].

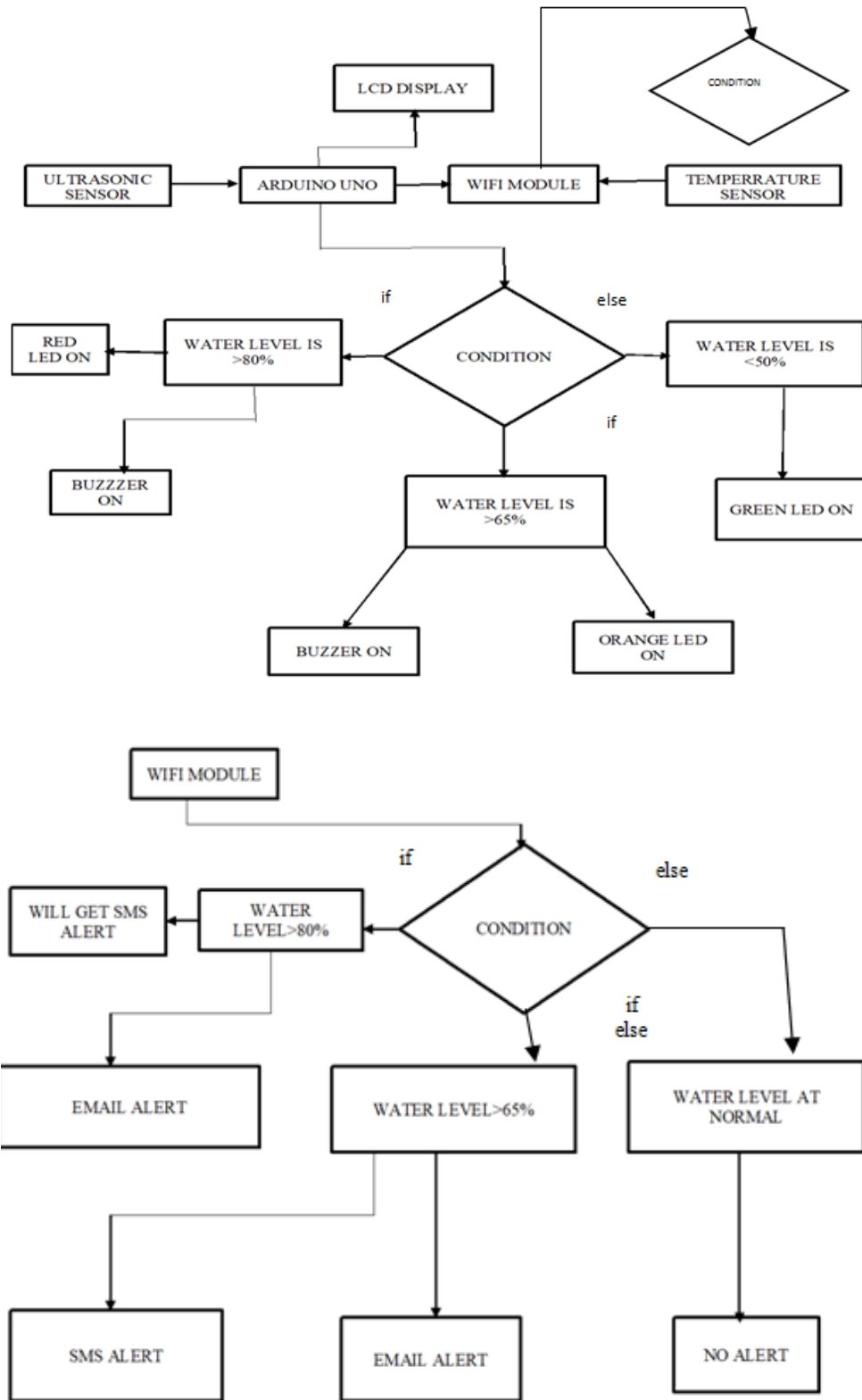


Figure 2: Flow Chart

III RESULTS AND DISCUSSION

The flood monitoring system has different alerts depending on the water level. When the water level is normal, indicated by a green LED and LCD display, there is no sign of flood condition. When the water level crosses the intermediate level, indicated by an orange LED, buzzer, and LCD display, which means the water has crossed the 55% mark and there are chances of flood conditions. The system will send SMS and Email alerts to registered authorities [11]. When the water level crosses the max level, indicated by a red LED, buzzer, and LCD display, which means the water level has crossed 80% and flood situation has occurred. The system will send SMS and Email alerts to registered authorities, and the red LED will glow while the buzzer buzzes twice [5].

3.1 Sub Section 1

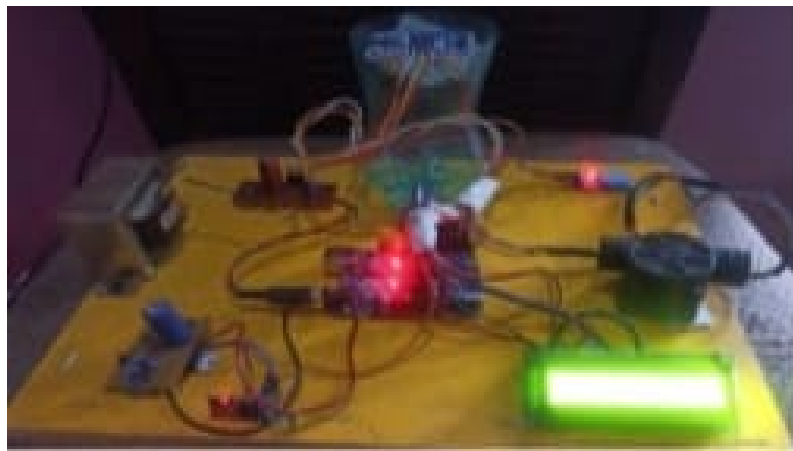


Figure 3: Hardware Implementation

In Figure 3 Demonstrates the practical implementation and interconnection of all hardware components included in this setup. All specified hardware components are present and accounted for [1].

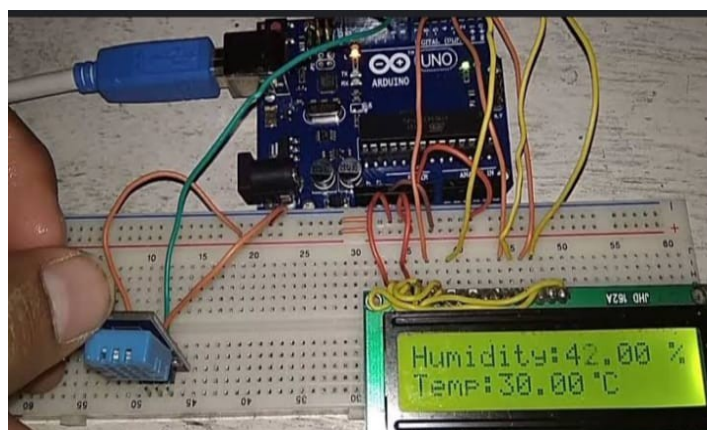


Figure 4: Temperature and Humidity Sensor Display

Figure 4 shows DHT11 Temperature and Humidity Sensors utilized to measure and display the humidity level as a percentage and the temperature in degrees Celsius [5].

3.2 Sub section 2

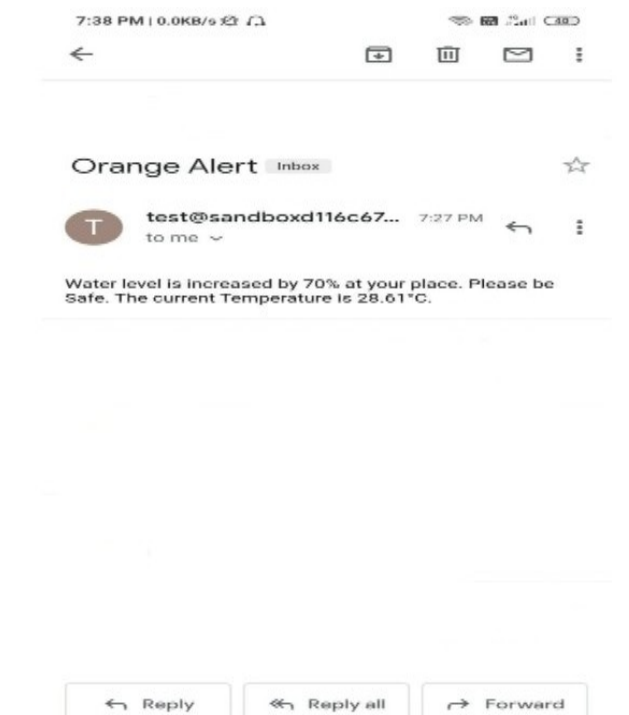


Figure 5: Email Alert

Figure 5 shows With Increase in water level the system sends Email alerts to the authority or registered [2].

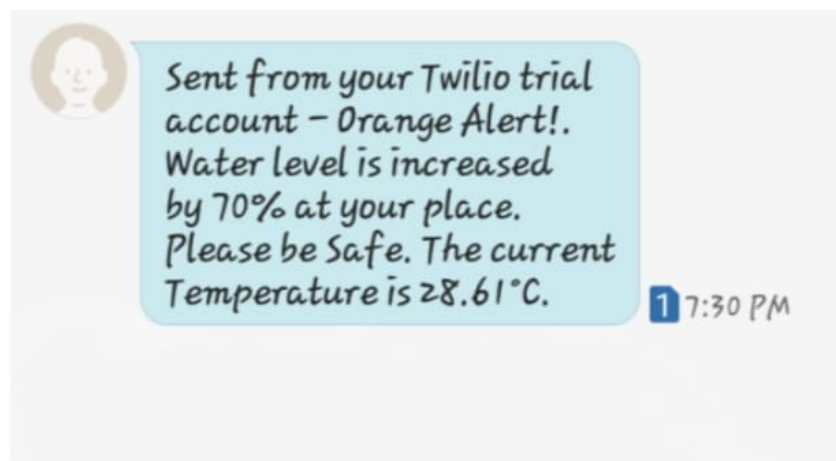


Figure 6: SMS Alert

Figure 6 shows With Increase in water level the system sends SMS alerts to the authority or registered [7].

IV CONCLUSION & FUTURE SCOPE

The Flood Detection System has been designed to ensure that people from various walks of life, including farmers, industries, and residents, are well-informed about potential

damages. As this natural calamity can occur without warning, it is crucial to take precautions to safeguard ourselves [9]. The proposed method involves monitoring the water level in a specific water body, but in the future, it could be enhanced to monitor several locations simultaneously. Furthermore, the web page should be able to present information based on the selections made by relevant authorities [12].

Future Scope

In the future, the project could be expanded to include flood monitoring and detection, as floods can be closely tied to the intensity of rainfall, which determines the depth of water covering the ground over a given time period. By incorporating a rainfall forecasting sensor, the system could potentially predict and identify floods at an earlier stage [8]. Ongoing scholarly research could be applied to enhance the existing system in the future.

By incorporating solar power into the system, power conservation can be achieved while also facilitating usage in remote areas. In the future, the system can be expanded to simultaneously monitor multiple locations, and the web page can be designed to display information based on the selection made by the relevant authorities [4].

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