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Smart Flood Detection System using IOT

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ABSTRACT: Floods are the most destructive and dangerous natural calamity in this world. On the event of flood, it can demolish the community and can affect many lives in different ways. It is very necessary to design a flood control device as a mechanism to reduce the flood. The application of this proposed structure is to remotely monitor and alert public user about the current flood conditions by continuously measuring the water level, rain fall reading and current temperature and humidity values. To accomplish this task various technologies are used such as messaging, live data feed via remote online platform named as Thing speak, video streaming & audio alerting etc. as we know messaging is most easy and convenient way to deliver messages using this advantage in appropriate possible way. This was fulfilled by using GSM Module making it more reliable & cost-effective system.For alerting rural area user an audio buzzer was used. Using such technologies gave us efficient results for monitoring and alerting purposes making our aim satisfactory. As this proposed system mainly deals with safety of the society & its people so they can take necessary precautions before disaster occurs.

KEYWORDS: Flood,monitoring, River, IOT, Safety, Alert

I. INTRODUCTION

The world's weather is changing rapidly due to effect from mankind activities such as pollutions, trees cutting, vehicle gas emission etc. Floods are the most usual damaging natural disaster that cause significant harm to life, property, and economy. Scientists estimate by 2030, if sea level rises by 4-Inches, it could potentially cause the severe flooding in many regions of the globe. This project implies a flood warning structure that can detect the water level and measure the speed of the increase in water level. To give the nearby peoples an earlier notification to evacuate before the water rises to the dangerously high level, the measured result is sent as an alert on a mobile through Short Message Service (SMS). This prototype is designed on a IOT platform, where data from the sensor is stored at the mini-processor and alert is generated & sent as SMS to a smartphone. This prototype system is implemented in an experimental setting in two different environments to test its effectiveness. And also, we can monitor the temperature and humidity for climate record.

The System Works In 3 Steps:

- Monitoring water level in Dam/River.
- Monitoring of rain & climate changes for info purpose.
- Display the measured data If the level of water increases above defined value SMS

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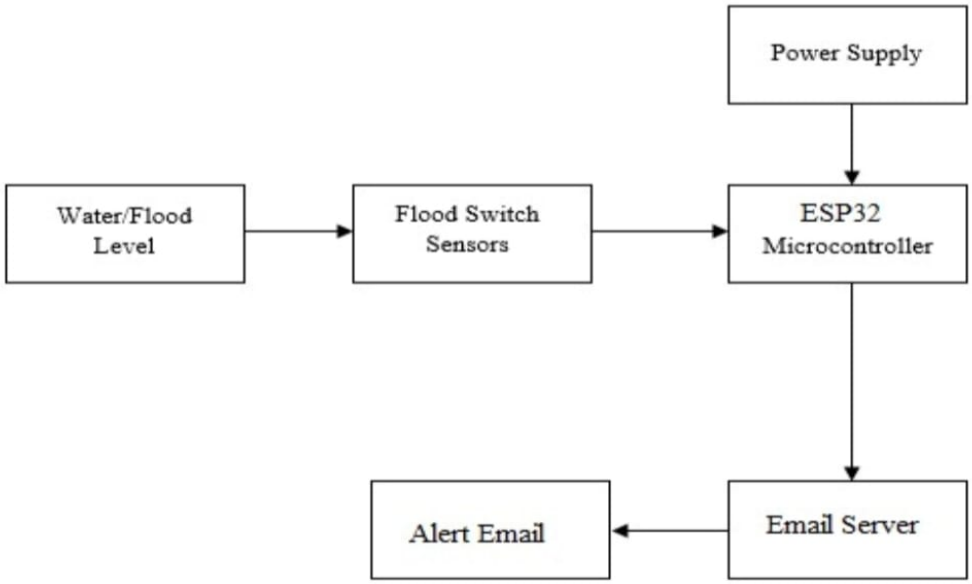
II. SYSTEM DEVELOPEMENT



III. PROPOSED METHODOLOGY

1. System Design:
- Define the architecture and components of the flood detection system, including water level sensors, ESP32 microcontroller, communication module, and mobile application.
- Develop a schematic diagram and layout plan for the hardware components, ensuring optimal placement and connectivity.

2. Sensor Deployment:
- Identify strategic locations for installing water level sensors along rivers and water bodies prone to flooding.
- Install sensors securely and calibrate them to accurately measure water levels at regular intervals.

3. ESP32 Programming:
- Write firmware code for the ESP32 microcontroller to interface with the water level sensors and process sensor data.
- Implement algorithms for real-time flood detection, analyzing sensor readings to identify potential flood events.

4. Communication Setup:
- Configure the communication module to establish wireless connectivity between the flood detection system and mobile devices.
- Develop protocols for transmitting flood alerts and status updates to end-users via SMS messages or push notifications.

5. Mobile Application Development:
- Design and develop a user-friendly mobile application for Android and iOS platforms.
- Integrate features for receiving flood alerts, monitoring water levels, and accessing real-time flood data.
- Implement interactive maps and visualizations to enhance user experience and situational awareness.

6. System Integration and Testing:
- Assemble the hardware components and integrate them with the ESP32 microcontroller and communication module.
- Conduct comprehensive testing to ensure the functionality, reliability, and accuracy of the flood detection system.
- Perform field testing in simulated flood scenarios to validate the system's performance under real-world conditions.

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7. Deployment and Evaluation:
- Deploy the flood detection system in target locations identified for flood monitoring and early warning.
- Monitor system performance and collect feedback from end-users to evaluate the effectiveness and usability of the system
- Iterate on the system design and functionality based on feedback and lessons learned from deployment.

8. Maintenance and Updates:
- Establish protocols for system maintenance, including regular sensor calibration, firmware updates, and troubleshooting procedures.
- Continuously monitor system performance and address any issues or malfunctions promptly to ensure uninterrupted operation.

By following this proposed methodology, we aim to develop a robust and reliable flood detection system that leverages cutting-edge technology to enhance early warning capabilities and mitigate the impact of flooding on vulnerable communities

IV. RESULT

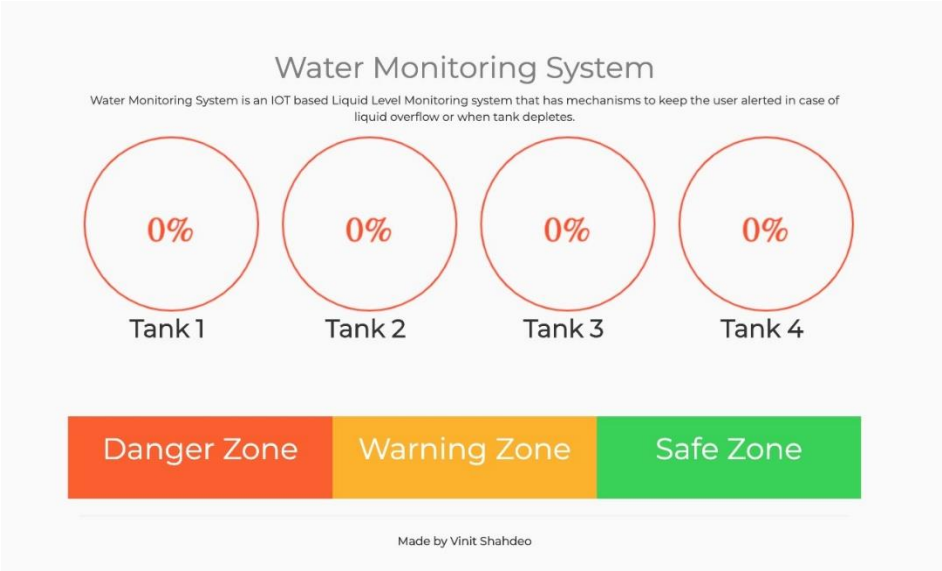

Fig. 2. Web Application before Flood alert

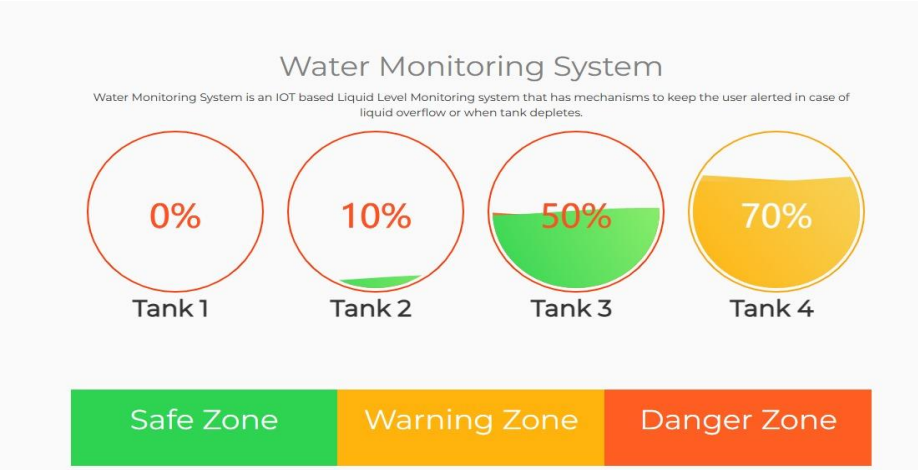

Fig. 3. Web Application After Flood Alert

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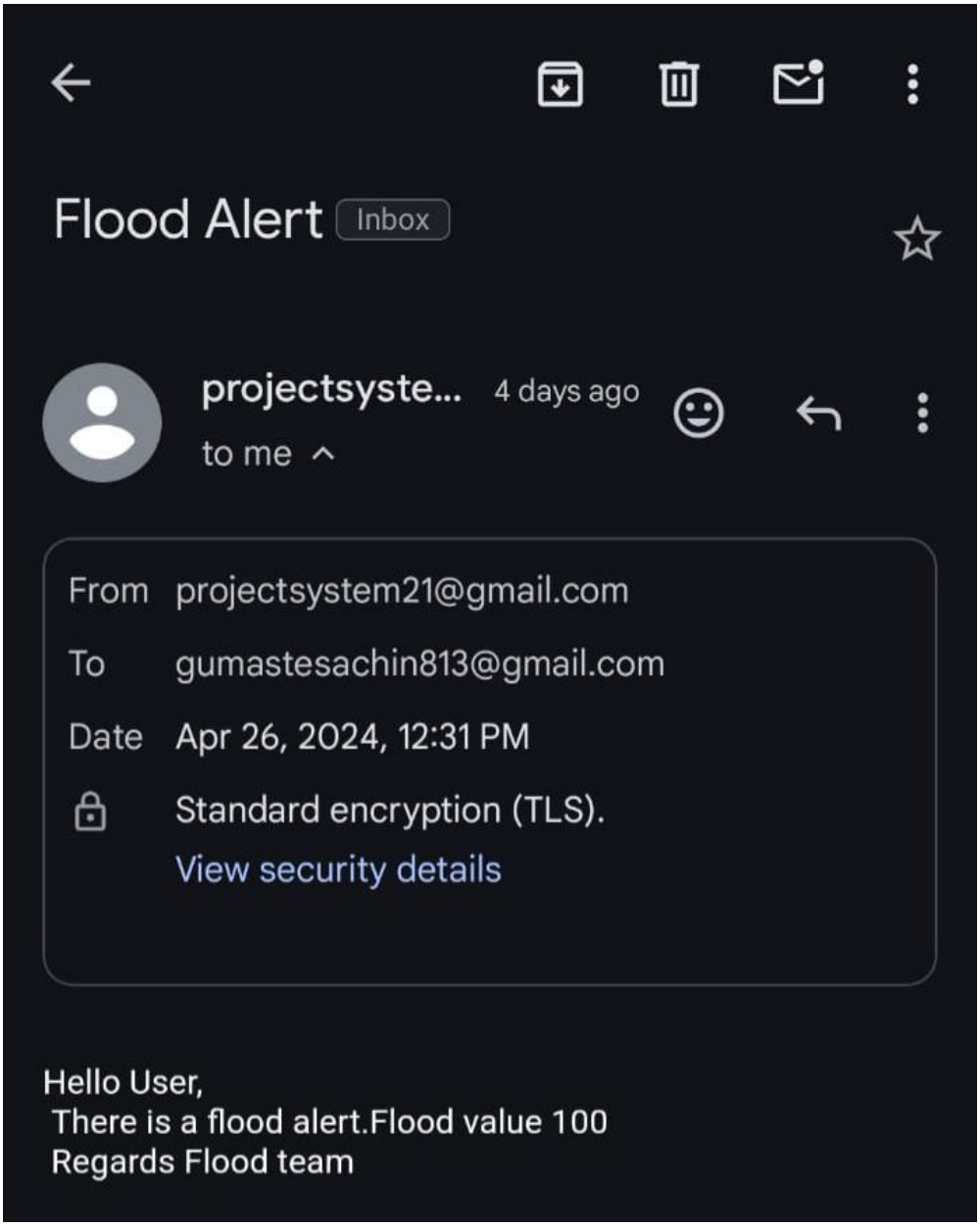

Fig.4. Mobile Email Message

V. CONCLUSION

The development and implementation of the Smart Flood Detection System represent a significant advancement in disaster management and early warning systems. By harnessing the power of technology, particularly water level sensors, ESP32 microcontrollers, and mobile applications, we have created a comprehensive solution for monitoring and detecting floods in vulnerable areas.

Through our innovative approach, we have addressed the critical need for early flood detection in regions prone to flooding, especially in developing countries where traditional monitoring methods may be inadequate. By deploying a network of water level sensors and integrating them with ESP32 microcontrollers, we can accurately measure water levels in real time and analyze data to identify potential flood events.

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