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IOT BASED FLOOD DETECTION AND ALERTING SYSTEM

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Abstract - Floods, a calamitous natural menace, demand advanced warning systems. Existing methods lack real-time data and coherence. Our revolutionary Flood Detection System represents a paradigm shift in flood management, seamlessly integrating cutting-edge technologies such as Arduino, IoT, GSM, and GPS. Existing systems often rely on manual observations, resulting in a disjointed and delayed response to impending floods. In contrast, our system employs Arduino and IoT, with added GSM and GPS features. A network of sensors actively monitors critical parameters that are seamlessly transmitted to a centralized platform, facilitating the generation of precise flood predictions. Users receive alerts via a mobile app, enabling swift evacuation. This transformative feature ensures that individuals receive timely warnings, enabling proactive and efficient evacuation measures. By merging Arduino, IoT, GSM, and GPS technologies, our innovative system not only fortifies public safety but also enhances overall disaster readiness.

***Key Words*:** Arduino, Floods, IoT, GPS, GSM.

I. INTRODUCTION

Amidst the growing menace of floods, a formidable natural disaster, the need for sophisticated warning systems has become increasingly apparent. This flood detection and alerting system emerges as a cornerstone solution in the realm of disaster management, harnessing the prowess of technology to overhaul existing disaster management frameworks.

This paper centers on the prediction of floods and the timely alerting of residents and disaster relief teams to initiate evacuation operations.. The flood detection system is engineered using an Arduino Nano, consisting a diverse array of sensors and components such as GPS module, GSM module, ultrasonic sensor, float switch, buzzer, LED, and push button, all seamlessly integrated with the Arduino Nano microcontroller. Furthermore, the system is interconnected with the ThingSpeak cloud platform, facilitating IoT analytics and data visualization from the deployed sensors.

The microcontroller receives data from the ultrasonic sensor and float switch. If the readings surpass a predefined

threshold, the microcontroller triggers an alert mechanism. This alert is disseminated through a buzzer and an led for the local residents and an SMS via GSM module to the rescue teams and communication channels.

II. LITERATURE SURVEY

The idea of this paper is to design an automatic floodgate control and monitoring system based on IoT which is able to monitor and control the water level in real-time, through the reading of an ultrasonic sensor integrated with ESP 32 to control the floodgates control by a stepper motor with output values displayed on the serial. The analysis of the test from the reading of the IoT-based sensor produces a percentage error of 0% and time delay of sending data at a value of 2 seconds as shown by each experiment 20 times. [1]

This paper also incorporates communication of the information collected effectively by using ESP32 microcontroller, GSM and IoT (Blynk). The water level, water flow rate and the amount of rain is continuously monitored on the Blynk application once connected to the surrounding hotspot network. The values are as well displayed on the LCD display screen. For the threshold set, when the flow rate and the water level exceed the threshold then the yellow LED and the buzzer is turned on. This is a sign of alert condition and hence the alert along the values of the parameters and sent to the rescue authorities and to the registered phone numbers using IoT and the GSM respectively. [2]

The process of this system starts when an ultrasonic sensor measures the level of water in the river. The collected data from the sensor are gathered and will be forwarded to the microcontroller and data will be displayed at the web server. Then, data will be analyzed and compared. As a user, he/she can control the stepper motor and buzzer wirelessly. Flood status will be determined based on that collected data. Thus, water level status will display on LCD and web server. LEDs will be turned on to indicate the water level. Furthermore, the stepper motor will be turned on for the passage of excessive flood when it reaches the highest threshold value and the alarm will be triggered immediately to alert the public. [3]

This paper aims to make use of containers, where the ultrasonic sensors placed over the containers to detect the liquid level and compare it with the container's depth. It makes use of an AVR family microcontroller, Raspberry Pi, LCD screen, Wi-Fi modem for sending data and a buzzer. A 12 V transformer is used for power supply. The LCD screen and web server are used to display the status of the level of liquid in the containers. The buzzer starts ringing when the set limit of the liquid is crossed. [4]

In this article, they use the Arduino UNO R3 to measure the liquid level and monitor it using the smartphone based on the Bluetooth module which reads the output level on the I2C LCD screen. It can measure any type of liquid as they use an ultrasonic sensor. The Arduino receives the level information from the sensors and tracks the liquid level with predefined level indicators. The Bluetooth module receives the command from Arduino and the command will be transferred to the registered mobile phone via Bluetooth. In addition, they put a buzzer as an additional indicator. [5]

III. EXISTING SYSTEM

Traditional flood management systems relies on manual observations and lacks real-time data integration. Current systems struggle to provide timely and accurate flood warnings due to the absence of a unified data platform. Manual monitoring leads to delays, hindering effective disaster response and resource allocation.

IV. PROPOSED SYSTEM

Our Flood Detection System, utilizing Arduino, IoT, GSM, and GPS, revolutionizes flood management. Arduino and IoT technology enable real-time monitoring of water levels, rainfall, and weather conditions. The addition of GSM and GPS enhances the system's capabilities. Data from various sensors are transmitted to a centralized platform, facilitating precise flood predictions. Users receive instant alerts through a mobile app, ensuring timely evacuation and efficient resource deployment. This comprehensive system addresses the limitations of existing methods, improving public safety and disaster preparedness.

V. SYSTEM ARCHITECTURE

Figure.1 illustrates the flood detection system. It comprises an ultrasonic sensor and a float switch whose readings are captured as input by the Arduino Nano microcontroller. These readings are then transmitted to the ThingSpeak cloud platform. If the readings exceed a predefined threshold value, the flood alert is activated by the device. Additionally, a buzzer and an LED are utilized to alert local residents, while a message alert is dispatched via the GSM module to notify rescue teams to commence their operations.

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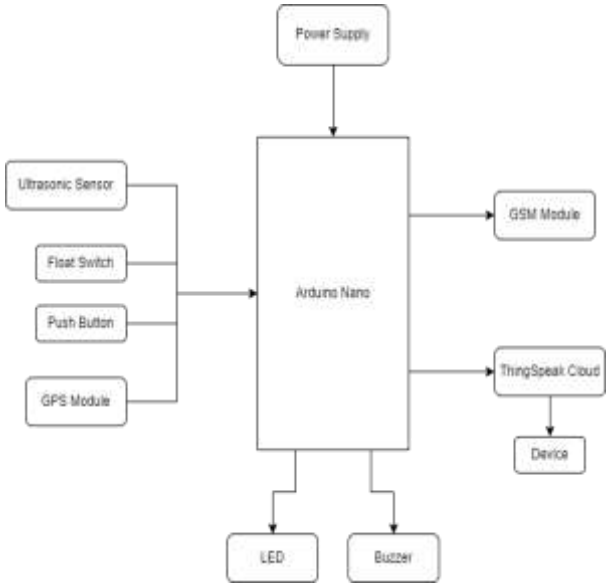

Figure. 1: Block Diagram of Proposed System

VI. RESULTS AND ANALYSIS

The flood detection and alert system project effectively monitored water levels and provided timely warnings to both local residents and relief teams in flood-prone areas. By utilizing water level sensors and integrating GPS technology, the system accurately detected rising water levels and promptly sent SMS alerts containing precise GPS locations to relief teams, enabling swift response and deployment. Additionally, local alert mechanisms, including buzzer sounds and LED indicators, enhanced awareness among nearby residents, contributing to community resilience. The project demonstrated reliability in operation and scalability for deployment in various regions. Overall, the system serves as a crucial tool in mitigating the impact of floods, empowering communities to prepare for and respond to natural disasters effectively.

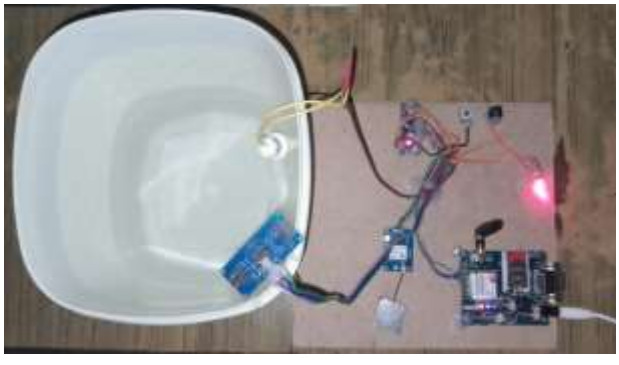

Figure 2: Hardware Implementation of the System

Figure 3: Graphical visualization of data in cloud

Figure 4: SMS Alert

VII. CONCLUSION

In conclusion, the development and implementation of flood detection and alerting system represent a pivotal advancement in disaster management strategies. By leveraging the capabilities of modern technology, particularly through the integration of sensors, microcontrollers, and communication modules, this system stands as a beacon of hope in the face of increasingly frequent and severe flood events. Through meticulous integration of components like ultrasonic sensors, float switches, GPS modules, GSM modules, and cloud connectivity via platforms such as ThingSpeak, it facilitates real-time monitoring, data analysis, and visualization, empowering informed decision-making and optimizing response efforts.

VIII. REFERENCES

[1] YuliarmanSaragih, Jandoni Horas Prima Silaban, Hasna Aliya Roostiani, Agatha Elisabet S, “Design of Automatic Water Flood Control and Monitoring Systems in Reservoirs Based on Internet of Things (IoT)”, IEEE, 2020.

[2] Shivashankar, Jijesh J J, Dileep Reddy Bolla, Mahaveer Penna, Sruthi P V, Alla Gowthami, “EARLY DETECTION OF FLOOD MONITORING AND ALERTING SYSTEM TO SAVE HUMAN LIVES”, IEEE, 2020.

[3] Shahirah Binti Zahir, PhaklenEhkan, Thennarasan Sabapathy, Muzammil Jusoh, Mohd Nasrun Osman, Mohd Najib Yasin, Yasmin Abdul Wahab, N.A.M Hambali, N.Ali, A.S.Bakhit,F.Husin,M.K.Md.Kamil,R.Jamaludin, "Smart IoT Flood Monitoring System", International Conference Computer Science and Engineering, 2019.

[4] Priya J, Sailusha Chekuri, "WATER LEVEL MONITORING SYSTEM USING IOT", International Research Journal of Engineering and Technology, 2017.

[5] Said Sulaimn Ambu Saidi, Khalid Hamed ALabri, Ismail Salim AL Azwani, Saif Azan Ali AL-Shaibani, Dr. Annamalai Muthu, "Arduino Based Smart Phone Liquid Level Monitoring System Using Ultrasonic Sensor", International Journal of Engineering Research and Applications, 2021.