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Real Time Flood Monitoring System using Raspberry Pi

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Abstract: *Since we are now currently present in an era of Computing Technology, it is essential for everyone and everything to be connected to the internet. IOT is a technology that brings us more and more close to this goal. Our project comprises of smart water monitoring system which is a small prototype for flood detection and avoidance system. This paper explains the working and the workflow of all the components present inside our project. The sensors sense the environment and sends real-time data to the cloud (Things peak cloud) and users can view and access this data via their mobile platform. The model gives a warning after the water level rises to a particular height. Since it is a small scaled prototype for flood detection and avoidance system, the working of this model is good. The data are uploaded and changed in the cloud in precision to the sensor and real-time changes in the mobile application is achieved. This model can be used to greatly reduce the casualties in a devastating event of flood.*

Keywords: Raspberry Pi , Flood monitoring, Remote sensing, Real-time data, Water level sensors, IOtz

I. INTRODUCTION

We are witnessing various drastic advancements in the fields of science and technology over the past few decades. The current industrial age has revolutionized our lives and provides us with plenty of comforts and conveniences. However, this industrial progress has come at a hefty cost of global warming and other environmental disasters such as flood, earthquake, etc. Furthermore, the loss caused by such disasters to life and property is immense. The increasing carbon footprints and greenhouse gases have severely led to an imbalance and disturbances in the natural cycle of rains and floods. Hence, we are facing the dangers of unwarned and inevitable floods more than ever before. In order to detect and avoid floods in a timely manner, technology plays a very important role. With the help of the current technology privileges, we can detect and prepare ourselves for an upcoming disaster. Studies show that such an initiative can really come in handy. In a very recent US flooding due to storms in the Midwest, loss of life and property damage were minimized due to the emergency systems available there. On the other hand, North Korea struggled to deal with the displacement of over 300,000 people, approximately 221 deaths and a cost of $6 million- most to feed the homeless survivors, and this all resulted in part from the lack of development of warning systems and information at the community level of the impending flooding. The same was seen in the floods that happened in the Indian states of Kerala and Tamil Nadu. From the above examples, we may come to the conclusion that an effective warning system is actually a serious problem to developing and underdeveloped countries. A nation like the US has a rich economy and thus, no limitations to resource usage.This paper explains the working and the workflow of all the components present inside our project. The sensors sense the environment and sends real-time data to the cloud (Thingspeak cloud) and users can view and access this data via their mobile platform.The model gives a warning after the water level rises to a particular height. Since it is a small scaled prototype for flood detection and avoidance system, the working of this model is good.

II. RELEVANCE

A flood monitoring system is highly relevant in today's world as climate change is causing an increase in the frequency and severity of floods. The system can provide critical information to communities, emergency responders, and urban planners, enabling them to prepare and respond effectively to floods. With the growing population and infrastructure development in flood-prone areas, the risk of loss of life and property damage from floods is increasing. A flood

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monitoring system can help to mitigate these risks by providing real-time data on water levels, weather conditions, and other relevant parameters. By developing and implementing a flood monitoring system, we can enhance disaster management, reduce the impact of floods, and help communities to adapt to the challenges posed by climate change.

III. MOTIVATION

Flood has been a major concern for a very long time and the inability to monitor it in real-time has been a major disadvantage in maintaining a healthy hydrologic process This flood monitoring system is intended and created to promptly warn and alert authorities about the flood.

A flood monitoring system is an essential tool for minimizing the loss of life and property damage caused by floods. It provides real-time data on water levels and weather conditions, which enables early warnings and effective emergency response. A flood monitoring system can also inform urban planning and infrastructure development in flood-prone areas

IV. LITERATURE SURVEY

In [1],An IoT-based flood warning system using Raspberry Pi is proposed in this paper. Raspberry Pi is utilized as a sensing device for measuring water level and other environmental parameters. The system architecture consists of a Raspberry Pi board, a water level sensor, a temperature and humidity sensor, and a camera module. The sensors are connected to the Raspberry Pi board, which collects the data and sends it to a web server for processing. The system includes a web interface for real-time monitoring and alert generation. The data transmitted from the Raspberry Pi is analyzed on the web server, and if the water level exceeds the threshold, the server sends alerts to users via email or SMS. The proposed system provides real-time flood monitoring and warning, which can help in disaster management.The system is low-cost and easy to install, making it suitable for deployment in remote and flood-prone areas. The use of IoT technology enables remote monitoring and data transmission, providing quick and efficient flood warning and management. The proposed system can be helpful for authorities and individuals in making informed decisions during flood events..

In [2], In this paper titled "Raspberry Pi based flood monitoring system using IoT", the authors propose a flood monitoring system that uses Raspberry Pi and IoT technology for monitoring water level and other parameters. The proposed system can be useful for disaster management and early warning systems. The system includes a web interface for real-time monitoring and alert generation, which provides access to the current and historical data.The Raspberry Pi-based sensing device collects data on various environmental parameters such as water level, temperature, and humidity. The system utilizes an IoT-based approach for data transmission to the cloud server, where the data is processed and analyzed. The cloud server also generates alerts via email or SMS to users in case of critical conditions such as a flood.The proposed system is cost-effective and scalable, making it suitable for implementation in both rural and urban areas. The system's web interface provides real-time monitoring of the water level, and historical data can be used for analysis and prediction of future floods.

In [3], The paper proposes a smart flood detection and monitoring system that employs Raspberry Pi as a sensing device for measuring water level and other environmental parameters. The system utilizes machine learning algorithms to predict the occurrence of floods and includes a web interface for real-time monitoring and alert generation. The system can predict and detect the flood conditions in real-time and notify the concerned authorities and people via alerts generated through the web interface. The proposed system can be useful for disaster management and early warning systems by providing accurate and timely information about floods to the concerned authorities and people. The use of machine learning algorithms in the system provides an added advantage of improving the accuracy of flood prediction and detection.

In [4],The paper titled "Smart flood detection and monitoring system using Raspberry Pi" presents a system that utilizes Raspberry Pi as a sensing device for detecting and monitoring floods. The system is designed to predict floods by utilizing machine learning algorithms and includes a web interface for real-time monitoring and alert generation. The proposed system can be useful in disaster management and early warning systems The system utilizes a Raspberry Pi as the main sensing device that measures the water level and other environmental parameters. Machine learning algorithms are utilized to predict floods based on the data collected by the sensing device. The system includes a web

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interface that provides real-time monitoring of the water level and sends alerts to users via email or SMS in case of a flood.The proposed system can be used for early warning systems and disaster management. It can provide real-time flood monitoring and help in mitigating the damage caused by floods. The machine learning algorithms used in the system can help predict floods with greater accuracy, thereby providing more reliable flood warning alerts. Overall, the system can be a useful tool in the field of flood monitoring and disaster management..

In [5], This paper describes a flood monitoring and early warning system that utilizes a Raspberry Pi as a sensing device for measuring water level and other environmental parameters. The system provides real-time monitoring and alert generation, which can be useful in disaster management and early warning systems. The Raspberry Pi is a cost-effective and widely used computer that is connected to sensors to measure parameters such as temperature, humidity, and air pressure. The data is then sent to a central server that processes it and generates alerts when the water level exceeds a preset threshold. The system also includes a web interface that provides real-time monitoring and allows for customization of alert thresholds.The proposed system has several advantages over traditional flood monitoring systems. First, it is low-cost and can be easily deployed in areas where traditional monitoring systems are not available. Second, it provides real-time monitoring and alert generation, which is crucial for disaster management and early warning systems. Third, the system is customizable, allowing for the use of different sensors and alert thresholds. Overall, this system is a cost-effective and practical solution for flood monitoring and early warning systems.

In [6],The authors propose an IoT-based flood monitoring and alert system using Raspberry Pi as a sensing device for measuring water level and other environmental parameters. The system includes a web interface for real-time monitoring and alert generation. The proposed system can be useful for early warning systems and disaster management. The Raspberry Pi is connected to sensors that measure water level, temperature, humidity, and air pressure, and the collected data is transmitted to a central server via a wireless network. The central server generates alerts when the water level exceeds a predefined threshold, which can be sent to a mobile device or displayed on the web interface. The system is low-cost, customizable, and offers real-time monitoring, making it an effective tool for flood monitoring and early warning systems

V. FUTURE SCOPE

The future scope for a flood monitoring system project is vast and includes several possibilities:

- Integration with smart city technology: A flood monitoring system can be integrated with smart city technology to provide real-time information on traffic and public transportation disruptions, emergency response coordination, and other critical services during floods.
- Improved prediction accuracy: By incorporating machine learning and artificial intelligence algorithms, the flood monitoring system can improve its prediction accuracy and provide more precise flood warnings.
- Enhanced data visualization: The use of Geographic Information System (GIS) and other data visualization tools can improve the system's ability to provide easily interpretable flood maps and other relevant information.
- Community engagement: A flood monitoring system can engage communities through social media and other platforms, enabling residents to provide information on local conditions and receive customized flood alerts.
- Sensor technology advancements: Advancements in sensor technology can improve the system's ability to monitor water levels, weather conditions, and other parameters.

Overall, the future scope for a flood monitoring system project is promising, and with the continuous advancements in technology, there are numerous opportunities to improve the system's capabilities and expand its usefulness to communities.

VI. CONCLUSION

Finally, we looked at 6 articles. The highlights and observations are found in the literature review. The gap has been investigated in light of the design of the problem description and its objectives. Also, the precise activity regimen is specified. The system supports the system's finaluser.

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