



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJIRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 5, May 2023

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

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# Flood Detection and Early Warning System

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**ABSTRACT:** Flooding is usually brought on by an increased quantity of water in a water system, like a lake, river overflowing. On occasion a dam fractures, abruptly releasing a massive quantity of water. The outcome is that a number of the water travels into soil, and flooding the region. Rivers involve river banks, in a station. Aside from lack of products and house and office property, streets infrastructure flood water consists of bacteria and sewage flow of waste sites and chemical spillage which leads to a variety of diseases afterwards.

The system makes use of a LoRa module and ESP 8266 with water sensors, rain sensors to predict floods and alert respective authorities and sound instant alarm in nearby villages to instantly transmit information about possible floods using IoT. The water sensors are used to measure water level of 3 different locations. Also rain sensor and ultrasonic sensor are used to measure the rain level of those 3 areas. These sensors provide information over the Virtuino (Android app) using the LoRa module and ESP 8266. On detection of conditions of flooding the system predicts the amount of time it would take to flood in a particular area and alerts the villages/areas that could be affected by it.

**KEYWORDS:** Raspberry Pico, Temperature and Humidity sensor, Ultrasonic sensor, flow sensor, Wifi module, LoRa Module, LCD.

## I. INTRODUCTION

As all know that Flood is one of the major well known Natural Disasters. When water level suddenly rises in dams, riverbeds etc. A lot of Destruction happens at surrounding places. It causes a huge amount of loss to our environment and living beings as well. So, in this case, it is very important to get emergency alerts of the water level situation in different conditions in the riverbed. Aside from lack of products and house and office property, streets infrastructure flood water consists of bacteria and sewage flow of waste sites and chemical spillage which leads to a variety of diseases afterwards.

As the frequency and intensity of extreme weather events increase due to climate change, the need for effective flood detection and early warning systems becomes paramount. A flood detection and early warning system is designed to provide timely and accurate information about impending floods, enabling communities to take proactive measures to mitigate risks and minimize the impact of flooding. The primary objective of a flood detection and early warning system is to monitor and analyze various hydrological parameters to identify potential flood events. These parameters include rainfall intensity, river water levels, streamflow rates, soil moisture content, and weather forecasts. By continuously monitoring these factors, the system can detect abnormal patterns or thresholds that indicate an imminent flood.

Flood is the most prevalent and costliest natural disaster in the world which devastates both life and economy to a large extent. Extreme flooding events are not relegated to the least developed nations, but can also devastate and ravage the most economically advanced and industrialized nations. The effective and long lasting strategy not only involves structural and non-structural measures but also some important measures like river rejuvenation, watershed development, land use planning, tree horticulture along the banks of the rivers, creation of lakes and wetlands in both rural and urban areas for flood management and water security. Flood detection and early warning system is an essential tool for reducing the impact of floods on human lives and infrastructure. By leveraging advanced technologies and real-time data analysis, these systems enable communities to respond proactively to potential flood events, saving lives and minimizing damages.

II. RELATED WORK

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. Warning communities of the incoming flood, therefore, is an expensive proposal given the limited resources of the countries.

The current methods demand for expensive equipment's and centralized, computationally difficult flood detection schemes. This therefore provides an opportunity to use the latest work in information communication technology and sensor networks to solve this problem in such a manner that the overall system balances the minimal cost requirement and limited computational power with the need for high reliability of both the system and the computation. This is where the Internet of Things (IoT) proves to be a very efficient approach. Internet of Things or IoT basically refers to the wireless network between objects embedded with some electronics, software and sensors with the internet, enabling them to collect and exchange data, and can be remotely monitored and controlled.

III. METHODOLOGY

Block Diagram:

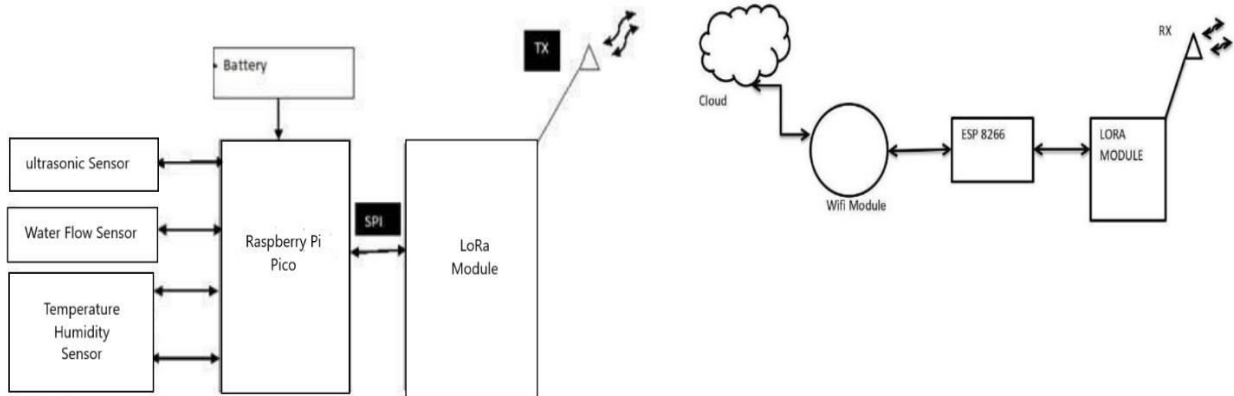


Fig 1 Block diagram of proposed System

The above block diagram involves raspberry pi that is interfaced with water flow, water level and humidity sensor for data gathering and a Wi-Fi module to transfer the data to the remote server and to provide notification. Above block diagram of a flood monitoring and early warning system provides a visual representation of the different components



and their interactions within the system, the block diagram of a flood monitoring and early warning system demonstrates the flow of data and information from monitoring stations to decision-making entities, enabling timely and effective response to flood events. It highlights the integration of data acquisition, processing, analysis, decision support, and communication components to enhance flood preparedness and response measures.

#### IV. EXPERIMENTAL RESULTS

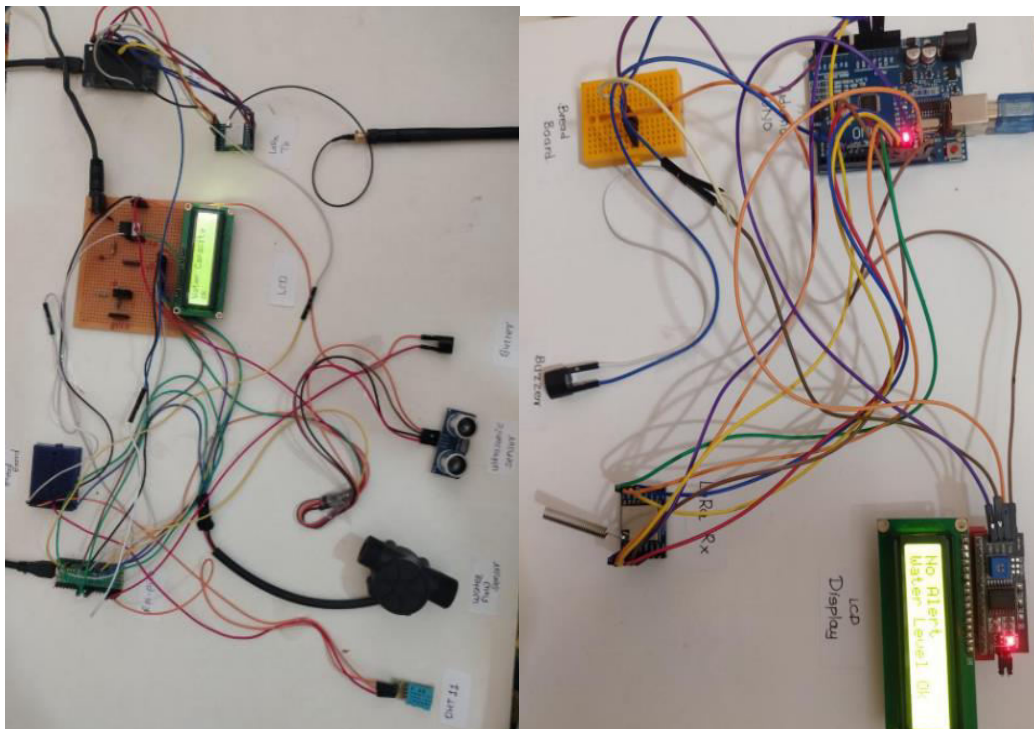


Fig 2 (a) Transmitter End (b) Receiver End

#### Webpage Result:

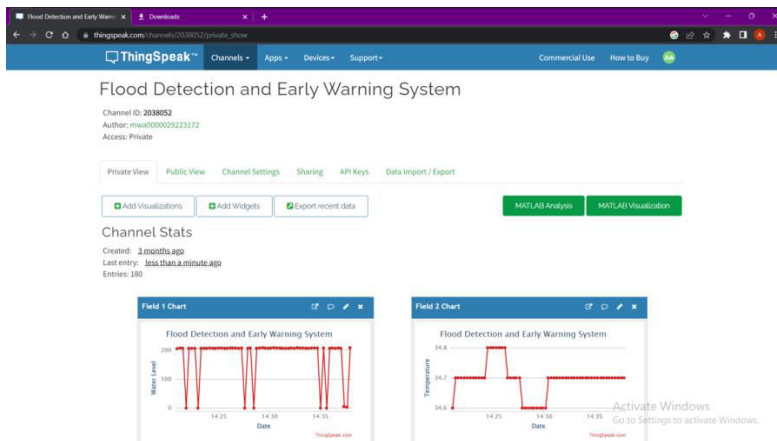


Fig 3 Thing speak Webpage Result

**Virtuino App:**

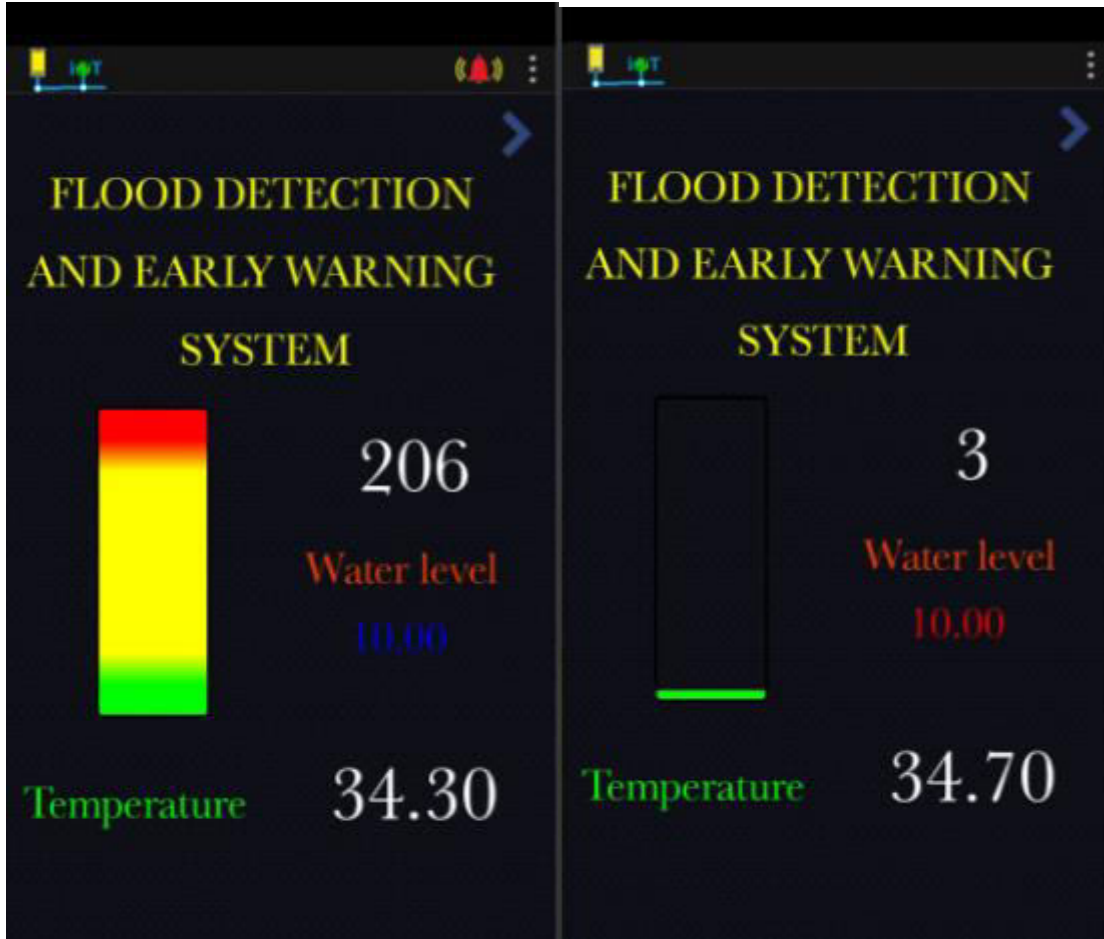


Fig 4 Mobile App Result

**V. CONCLUSION**

Flood Detection and Early Warning System plays a crucial role in mitigating the risks and impacts associated with floods. By focusing on early detection, timely warning dissemination, and community engagement, these systems aim to reduce the loss of life, protect infrastructure, and enhance emergency preparedness. The key objectives of such a system include risk reduction, early detection, timely warning dissemination, emergency preparedness, community engagement, and continuous monitoring and improvement. Continuous monitoring and improvement of the system ensure its effectiveness and adaptability to changing conditions. By collecting feedback, evaluating system performance, and incorporating technological advancements, the system can enhance its accuracy, reliability, and response time, thereby increasing its overall efficiency in detecting floods and issuing timely warnings.

**REFERENCES**

- [1] Mattia Ragnoli , Gianluca Barile , Alfiero Leoni , Giuseppe Ferri and Vincenzo Stornelli “An Autonomous Low-Power LoRa-Based Flood-Monitoring System” by Department of Industrial and Information Engineering, University of L’Aquila, 67100 L’Aquila, Italy, may 2022.
- [2] Jose cecilio, pedroferrara and antonio casimire “Evaluation of LoRa Technology in Flooding Prevention Scenarios” by LASIGE, Faculdade de Ciências, Universidade de Lisboa, 1749-016 Lisboa, Portugal, 20 July 2020.
- [3] Nikhil Binoy C, Arjun N, Keerthi C, Sreerag S, Ashwin H Nair “Flood Prediction Using Flow And Depth Measurement With Artificial Neural Network In Canals.” by Proceedings of the Third International Conference on Computing Methodologies and Communication Palakkad, India, ICC WC 2019.



**|| Volume 12, Issue 5, May 2023 ||**

**| DOI:10.15680/IJIRSET.2023.1205424 |**

- [4] Mohammed Khalaf1, Abir Jaafar Hussain, DhiyaAlJumeily, Thar Baker, Robert Keight, Paulo Lisboa, Paul Fergus, AlaS. Al Kafri “A Data Science Methodology Based on Machine Learning Algorithms for Flood Severity Prediction.” UK,IEEE 2018.
- [5] Swapnil Bande, Prof. Dr. Virendra V. Shete “Smart flood disaster prediction system using IoT & Neural Networks” by Institute of Electrical and Electronics Engineering , India , IEEE 2017.
- [6] Pallavi C B, Chandrakala V “Development of Flood Monitoring System using WSN and IoT based on Cloud.” by International Research Journal of Engineering and Technology (IRJET), Karnataka, India, May -2017.



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SJIF Scientific Journal Impact Factor  
**Impact Factor: 8.423**



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