

FLOOD MONITORING AND EARLY WARNING



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ABSTRACT

Flooding is considered one of the most destructive natural disasters in the world. In countries like India with climatic conditions occurrence of heavy rain fall and subsequent discharge of water leads to Flood. Flooding creates major damages to life, their habitats and the economy by installing of flood alerting systems near major waterways vital information can be provide so that lives and property can be protected. Normal Weather monitoring and alerting systems are not quick and accurate enough to predict floods in time to prevent personal or environmental damages.

The government has to spend tons of money in flood mitigation plans to help the victims and also to reduce the number in the long run damages that can occur after flooding. Since Most of the flood alerting systems involves high cost they are deployed on select locations based on priority. In this project we make use of a cost effective system using raspberry pi board and sensors, to measure rise of water level in rivers and water bodies and alert government authorities and people instantly by transmitting information using IOT. In the present work we have used thing speak-IOT platform and GSM module. The data can be accessed from android smart phones using things View mobile application at anytime from anywhere in the world where GSM module is used to send the alert message to the people.

PROBLEM DEFINITION

Through the use of the Internet of Things technology, the victim could get accurate data on the flood in real time. It develops a real-time flood monitoring and early warning system for flood-prone areas using wireless sensor nodes. The system is based on NodeMCU technology integrated with Blynk.

DESIGN THINKING

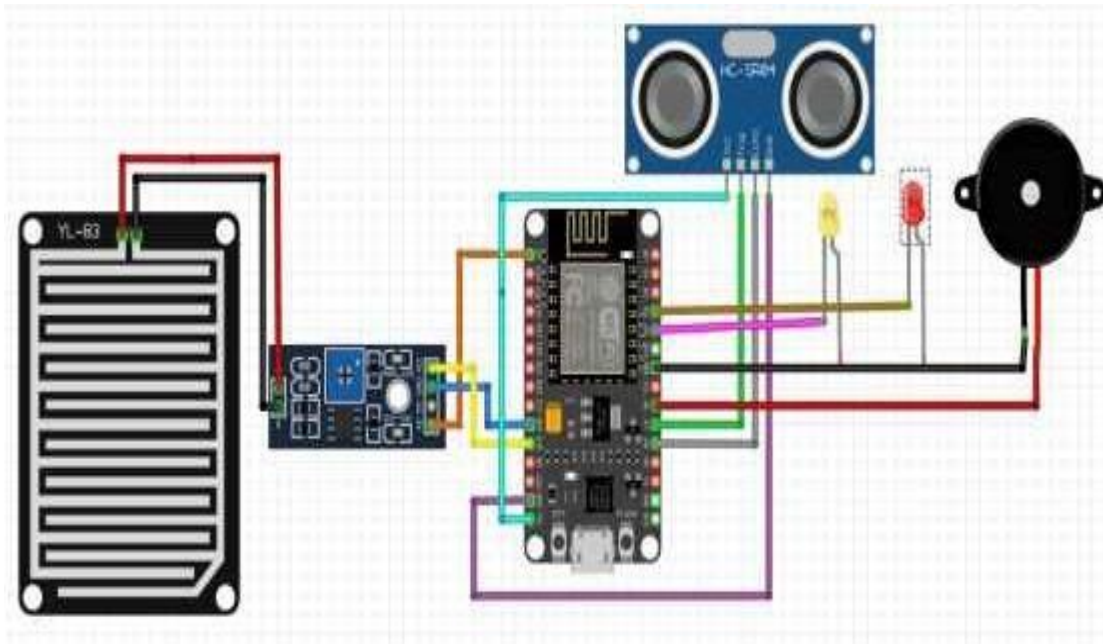
LITERATURE SURVEY

- Flood Detector Emergency Warning System: On Floods so far, Several literature studies have been conducted in order to gain the understanding and the knowledge to implement an advance flood monitoring system. L. Siew Khaun et al. developed a system that can detect water depth over a standard level determined by the sensor. The project was then placed in an area that is always prone to flooding. This project had the ability to use the flashlight as a warning and also inform the control room. In this project Radiofrequency transmitter and receiver were used for information communication [4]
- A River Water Level Monitoring System Using Android-Based Wireless Sensor Networks for a Flood Early Warning System: In this project, the water level monitoring was done using the android smart and ultrasonic sensors. A mobile application would be developed to provide information about flooding in this project. This system had an error rate of 1.121% [5].
- Flood Detector System using Arduino Uno: This project used the same ultrasonic sensor for monitoring floodwater levels but had no GUI application and no control room was there. This project was developed using Arduino Uno and GSM [6]

PROPOSED SYSTEM

- The Proposed system consists of Rain Sensor, Ultrasonic Sensor, Power Source, NodeMCU ESP8266, Buzzer and LEDs and finally Blynk App. This Wireless Sensor Node is Kept in desired location Like dam, Bridge. etc. and Blynk App is downloaded by victims near the flooding area. The Schematic Diagram of the proposed flood forecasting and Monitoring System is shown in fig.
- The proposed system will help in predicting the flood with the factors of water level change and rain fall intensity. The wireless sensor node consists of rain sensor which is used to measure the rain intensity.
- When there is no rain fall the intensity is "0" and if rain fall starts the intensity starts increasing and the speed the rain fall the intensity increases. The intensity is sent to NodeMCU which checks the value which is defined in code. the checked value with threshold. if more than threshold then there will be a alert to victims as flood is predicted. Even when the water level changes based on given threshold values it checks and send alerts. The warning is in three stages Safe level, Warning Level, Critical Level. The alert can of 2 types one way is send notification to victims and other one way is buzzer sound.
- For Sending Notifications The victims should have Blynk App in Mobile phone. The LEDs are also displayed according to the water level, green, yellow, red. The connections of devices are done using jumper wires. The code is Written in Arduino ide and dumped into NodeMCU. The

sending of information from NodeMCU to Blynk app is with the help of Esp 8266. The ESP8266 is Wi-Fi module which is in built in NodeMCU.



Circuit Diagram of Proposed System

RESULTS AND CONCLUSION

RESULTS

- The prototype works accordingly, an experiment was conducted to test the measurement of water detected by wireless sensor node.
- Buzzer and LED started to trigger when the water level reached 40 until it reaches critical level (62) in the gauge, a notification sent to victim through Blynk and email. Rain sensor detects the rain intensity and sends an alert when rain heavily started.
- There are two interface tabs mode displays on the screen of the smartphone. It displayed the water level and rain intensity to alert victims in a high prone area of flood.
- The distance of the water is also displayed on the widgets which used gauge as the indicator and also the show the value in labeled value widget. This history graph can be used to track the flood level in real time condition.
- There will be two stages which are level 1, level 2 to give alarm to the people. The data sensed by the sensor was displayed on the Blynk's interface reflecting the level indicator as well as the distance.
- Once the data being received, LED started to trigger when level 1 of flood level detected. Then, at level 2 white LED turn on, as well as the buzzer. Once the water

level reached 40, 62 in gauge , the system will send the alert warning and critical notification to the user via email and Blynk push notification.



INTERFACE OF FLOOD AND RAIN INTENSITY

- The level of rain intensity which is in Blue colour shows that the rain just started to fall. This indicates that the people who live nearby should alert as they know their place will get a very disastrous disaster if the rain started heavily. The user receives a "Rain Warning!!" warning in order to alert them.
- The victims who frequently experience flooding in their neighborhood must take the rain intensity into consideration because it as reached a certain point. The reason for this is because as the rain began to pour steadily, there was a great likelihood that a flood might happen at that location at any time. "Rain is falling heavily!" is the message that the system sends.



LOW & HIGH RAIN INTENSITY

MEDIUM& CRITICAL LEVEL 0



NOTIFICATION IN BLYNK APP

CONCLUSION

- This project is built on creating a smart flood monitoring system with NodeMCU and Blynk application utilizing ultrasonic sensors. Flexibility, efficiency, and cheap cost are provided by the outcomes. A suitable platform for monitoring flash floods and issuing early warnings is a wireless sensor node based on the Blynk platform. In order to detect and give precise sensing data for monitoring and alerting purposes, ultrasonic sensors and a rain sensor connected with NodeMCU are able to work. Hence, the system shows that it may be utilized for flooding area detection, monitoring, and community warning.
- This prototype is only uses a small scale of sensor detection within 20cm. If the system is placed at the riverside to detect flood, it must detect the flood for around 1 to 2 meters in the real world. Also, this prototype needs to have better water-resistant features so that when it starts to rain, the sensor node won't be harmed. The system must be installed correctly before it can be placed on any surface to prevent collapse when the water level rises. Hence, if further work could be done on the system, it may save the lives of a great number of victims.