FLOOD MONITORING SYSTEM

Project Definition

Natural calamities happens everywhere in the world, and which affects the human life and economy of the country. Economy and growth of any country depends upon the agriculture, hence the proper alert makes the farmers vigilant to protect the crop from flooding.

In order to detect and avoid flood like disastrous calamities in a timely manner, current world technology plays a vital role. We can prevent natural disaster caused by flood, with the aid of an IOT based early flood related parameter monitoring and detection system and its avoidance using the Arduino project, is proposed as a solution to the mentioned problem.

The proposed model is very much utilized for monitoring of the water level, flow variations, humidity and temperature variation in the river and the same can be used at dam or reservoirs. The measured values are regularly updated on the web server which is very much useful to send flood alerts to authority and people for faster action.

In this advanced system the initial stage indicates the level of water and the other parameters like flow rate temperature and humidity. Then these information is passed to the web server or the IOT via a Wi-Fi module, here the ESP8266 is used as Wi-Fi module. Which transmit and DHT11 is the temperature and humidity sensor, it is a basic low cost digital temperature and humidity sensor. And HC-SR04 ultrasonic sensor used as the water level sensor, which works on the SONAR principle. In this paper the main objective are implement a system which covers both the IOT based system and the sensor network interfaced with both ESP8266 and the Arduino Uno R3 board for detecting floods and for sending alert to organizations and the society. The LED and buzzer act as alerting system when there is rise in the water level and the associating parameters.

The system is much advantaged for protecting the lives of people and animals. This system is very much utilized for monitoring of the water level, flow variations in rivers and the same can be used for measuring of the water level at Dam/ Reservoirs. The measured values are regularly updated on the web server which is very much useful to send flood alerts to consistent authority and people for faster action. This constitute a wireless sensor nodes which called as a mote and the motes are placed along the river beds to monitor water condition. Each Node is connected with a GSM module. The measured parameters are processed by the Raspberry pi3 which contains 64-bit ARM Cortex A53 processor.

Design thinking

1.Project objective:

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Real time flood monitoring: Floods can be predicted in advance with the help of emerging technologies, such as the Internet of Things (IoT). So, a real-time application is required that can provide an early flood warning based on the seamless data received from IoT devices about various parameters. As rivers have dynamic geographical features, measuring the total discharge of water becomes a complex task. To address this vulnerability, a novel approach for determination of water discharge using water flow, sectional area width, and sectional average depth is proposed. In addition, the difficulties in measuring the total amount of rainfall due to the erratic behavior of the weather conditions of the unique geographical location have been addressed.

Early warning issuance: Flood warning and response systems are essential components of risk reduction strategies with the potential to reduce loss of life and impact on personal assets. However, recent flood incidents have caused significant loss of human lives due to failures in current flood warning and response mechanisms. These failures are broadly related to policies concerning, and governance aspects within, warning generation, the behavior of communities in responding to early warnings, and weaknesses in associated tools and technologies used in communicating early warnings and responding. Capturing critical failure factors affecting flood warning and response systems can provide opportunities for making corrective measures and for developing a more advanced and futuristic system for early flood warnings.

Public safety: The use of the IOT in public safety can help to improve safety for citizens. IOT-connected devices can be used to monitor public spaces and alert emergency personnel if there is a potential threat. This can help to prevent dangerous events from occurring before they begin and can help to protect citizens from harm.

Emergency response coordination: Emergency response organizations works with the best communication channels to reach the affected citizens.

2. IOT sensor network design:

In this work, we have developed an IOT-based prototype to collect hydrological data of rivers, such as water flow, water level, and water discharge. The proposed system is also able to collect meteorological data, such as temperature, humidity, wind speed, and wind direction. Furthermore, the collected data have been analyzed and classified by using the long short-term memory (LSTM) model with water discharge, water level, rainfall, and temperature as input parameters. The LSTM model then classified the flood events either into "no alert," "yellow alert," "orange alert," or "red alert." The system is found to accurately predict the flood event state with F1-score of 97% for "no alert," 97% for "yellow alert," 96% for "orange alert," and 98% for "red alert."

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3. <u>Early warning platform:</u>

Technological innovation and digital empowerment are effective ways to Improve the level of flood and drought disaster prevention. To scientifically And effectively respond to changes in the natural environment, geological Disasters, and flood disasters, Ranke has independently developed a flood Monitoring system in response to government requirements. The system Consists of a data acquisition system, a solar power supply system, an all-Weather protective box, a weather observation bracket, a video monitoring System, and an environmental monitoring platform. Through the deployment of sensor collection terminals, intelligent data collection and Integrated uploading are realized, combined with the back-end environmental monitoring platform, the flood prevention and disaster reduction monitoring system is improved, analysis and judgment are strengthened, and warning information is released in time to provide comprehensive and comprehensive guarantee for its safe and stable operation. Among them, water level monitoring and rainfall monitoring are the key parts of the flood monitoring system. Through the monitoring of water level, Total rainfall, instantaneous rainfall, daily rainfall, current rainfall and other data, it provides timely services for the integrated management of floods and water resources.

4. <u>Integration approach:</u>

An effective flood monitoring system should be based on the real-time collection of local rainfall, river level, and flow data. This can be achieved by arranging corresponding liquid level sensors and rain gauge sensors. The operator can remotely grasp the water level and rainfall of the monitoring site, and can set a fixed water level or rainfall alarm value through the data platform. Once the rainfall in the area exceeds the alarm value, or the water level of the river exceeds the set water level, an alarm will be triggered and the staff will be notified via emails and text messages. The staff can analyze and take measures in time.