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Iot Based Early Flood Detection and Destruction Avoidance System

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Abstract-Flooding is a natural disaster which is seeking the global attention as a negative impact on the society, the flood events change unlikely, the reduction of its impact on our society must be made. This project focuses on early detection of floods and destruction avoidance by providing the warnings like SMS alert. The system uses various natural factors to detect and avoid the destruction causing in the society for collecting the data of natural factors, this systemconsists of different sensors which collects the data of individual parameters. The system works by measuring the rate of water flow in the particular area. This system involves the NodeMCU board. A NodeMCU acts as a transmitting unit which is connectedto an ultrasonic sensor which is used for the detection of water level and rain drop sensor is also connected to the NodeMCU as well for the detection of rain-fall level. When the data or water level exceeds the maximum level, the data rates will be sent to the surrounding people as an SMS alert in the society.

Introduction:

IOT Based early flood detection and destruction avoidance system is a system which keeps close watch over natural factors to predict flood. So, we can be caution for ourselves and others. In recent years, flooding became the major natural disasters which is occurring in India.

- In 26 July 2005, Maharashtra including large areas of Mumbai received heavy floods about 1094 people lost their lives, the city faced critical situation.
- In June 2015 Gujarat flood, 70 people were dead.
- In July 2016, Assam floods,100 people were dead.
- In August 2019 Kerala floods, Madhya Pradesh, Karnataka and most parts of India.

These floods resulting in most of the people's life, loss of wildlife, natural loss, many people lost their property etc. There are different types of floods:

1. **Coastal flooding:** Coastal flood causes when sea level increases, resulting in coastal flooding. Like low-lying sea-side areas which have defense against the water, which may be man-made defenses or barriers like sand dunes.
2. **River Flooding:** River flooding is the most common type of flood causing near the coast, the main cause of this flood is high rainfall.
3. **Flash Flooding:** This flood causes when ground cannot absorb the rainwater as quickly as it falls.
4. **Urban flooding:** Urban Flooding causes due to the lack of drainage in urban area.
5. **Ponding:** Ponding is a type offlood which occurs usually in relatively flat areas.

Usually, the flooding cannot be avoided but the destruction causing can be avoided by detecting the flood at the earliest by the system which monitors the water flow continuously. This system involves the water level indicator such as an ultrasonic sensor which indicates the level of water, the water level will be displayed in the application. But when the water level exceeds the maximum level, soon the alerting system activates by sending an alert message through the application called blynk and also immediately sends the SMS to the surrounding people over there. For sending the SMS, the system uses GSM module and the real-time flood monitoring system uses wireless sensor networks which monitors the alerting and real-time data of river conditions. In this paper, the main aim is to implement a system which covers both NodeMCU technologies and ultrasonic sensor network components for the detection of floods for sending an alert to the surrounding people. Ultrasonic sensors are used for sensing the water level and NodeMCU for communication protocol for transmission.

Keywords:*NodeMCU, Ultrasonic sensor, GSM module, SMS, Alert.*

Related work:

Sonali Patil [1] Existing system refers to the system which works on the local real-time flood monitoring and detection system. This study focuses only on the river's water level monitoring and detection, so we have referred some IEEE papers which are mentioned in the references below. Our system has some development where the floods will not only be monitored but it can also be detected and the destructions will also be avoided.

Dolly Kumari [2] In this project, the main electronic components are used. They are:

- NodeMCU ESP8266 (Wi-Fi Module)
- GSM Module
- Humidity or temperature sensor
- Ultrasonic Sensor (HC-SR04)
- Rain drop sensor

S Vara Kumari [3] For processing of the data, the latest version of NodeMCU has been used. It has to be sure that ultrasonic sensor is having the5Volt supply, but NodeMCU is having only the 3V3 supply as the output voltage. Here, NodeMCU itself includes the Arduino in it. So, the use of Arduino is not required. But in other systems which we have referred Arduino system is involved which is used as a main component. The output data will also be displayed on the blynk application always. This application will be handled by the higher authority to ensure the wellness of the society.

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Proposed methodology:

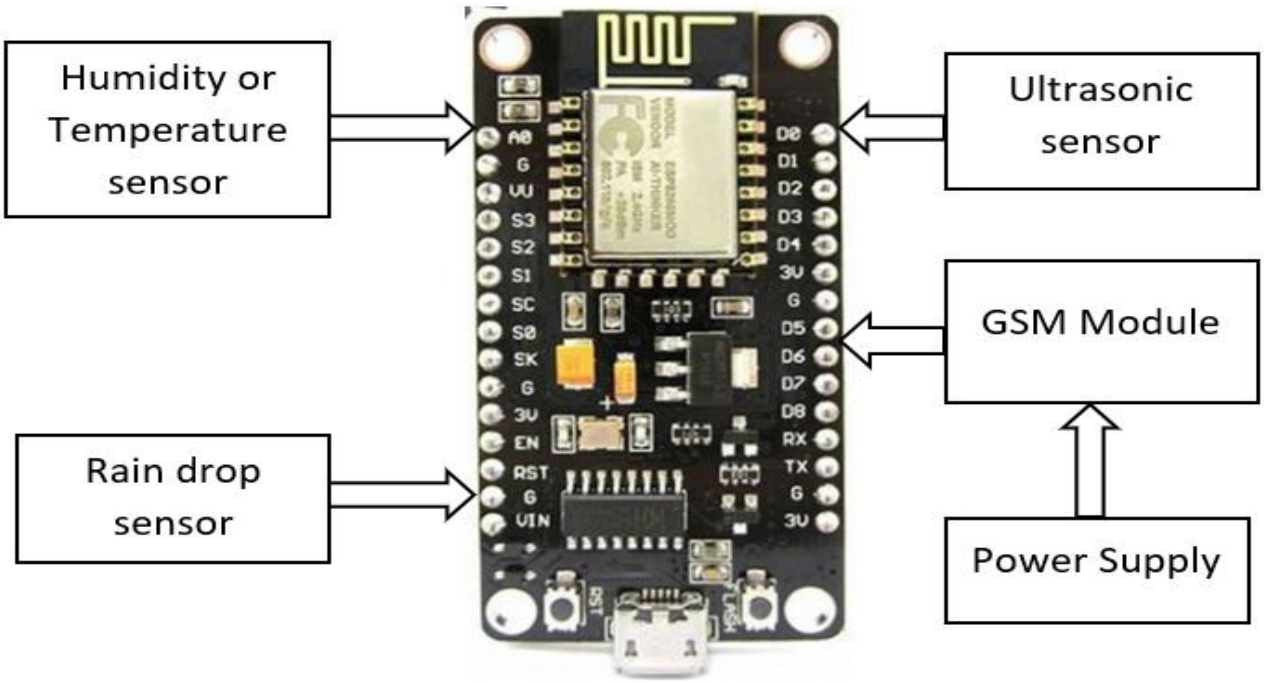

fig 1: block diagram of flood detection and destruction avoidance system

Fig. 1 shows the block diagram of our early flood detection and destruction avoidance system which imposes the methodology where the NodeMCU acts as a main component and the humidity or temperature sensor, rain-flow measurement sensor, GSM module, ultrasonic sensors are connected to the NodeMCU itself. Temperature or humidity sensors measure the humidity and temperature of the current atmosphere whereas the rain-flow measurement sensor measures the level of the rainfall whenever the rainfall occurs, whenever the rainfall level exceeds the maximum level, the alarm will be activated. Ultrasonic sensor measures the water level through the distance which has been set to the accurate level and whenever the water level and the rain-fall level exceeds the level which has been set, the SMS alert will be sent to the localized network through the GSM module.

Flowchart:

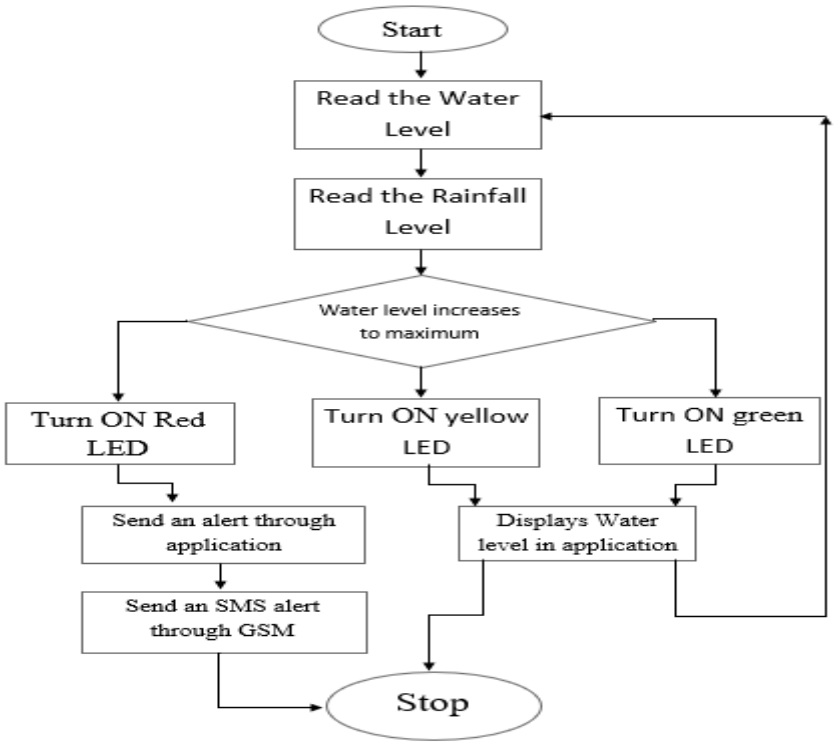

fig 2: flow chart of an early flood detection and destruction avoidance System

Fig. 2 shows the flowchart, i.e., the working procedure of the Early Flood Detection and Destruction Avoidance System where:

- First step is to start the process.
- Then read the water level through ultrasonic sensor.
- After reading the value from ultrasonic sensor, the data will be read from the rain drop sensor for measuring the rain fall in the dam.
- Checks the water-level whether it is increasing or in the low level.
- If the values which has been read from the ultrasonic sensor or rain drop sensor exceeds the maximum level, an alert notification will be sent through the application as well as SMS.
- If the value of water-level from ultrasonic sensor is in moderate level, displays the water level in the application.
- If the value of water-level from ultrasonic sensor or rain drop sensor is low, the water-level will be displayed in the application.
- The process again repeats.

Results:

The system was checked after the completion of the setup of the hardware, the results were as expected and whenever the water-level exceeded the maximum level, the SMS was sent to the number which was stored in the program. When the water level was in the minimum level, the data was being displayed on the application.

Table 1: Rain drop Sensor

Range	Output	LED condition
Less than 600cm	Low rain	Green LED turns ON
Greater than 600cm	Heavy rain	Red LED turns ON

Table 2: Ultrasonic Sensor

Range	Output	LED Condition
2cm – 25cm	Dam has low water	Green LED turns ON
25cm – 50cm	Dam has filled half	Yellow LED turns ON
50cm – 80cm	Dam is full	Red LED turns ON

Table 3: Temperature and Humidity sensor

Sensor	Range	Output
Temperature sensor	0□ - 100□C	It detects the change in temperature in the individual's body and gives the output in the form of analogue voltage.
Humidity sensor	0□ - 100□C	It detects the change in humidity in the individual's body and gives the output in the form of analogue voltage.

fig 3: water-level is low

fig 4: water-level is in moderate level

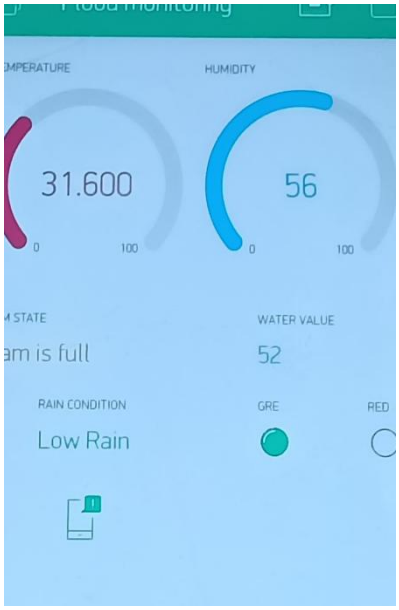

fig 5: water level is full

fig 6: when there is no rain

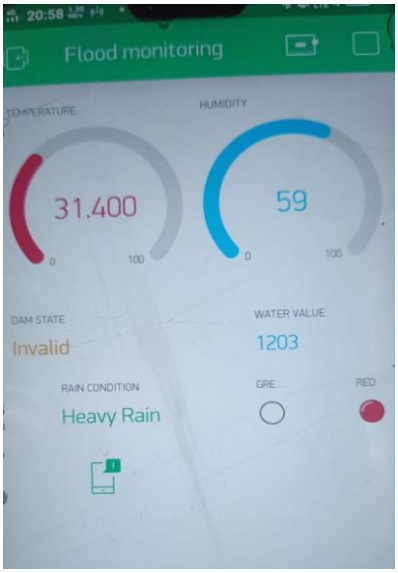

fig 7: when there is heavy rain

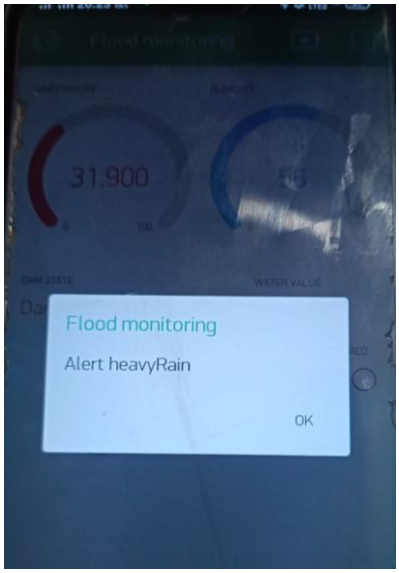

fig 8: alert through application when there is heavy rain

fig 9: alert through application when dam is full

fig 10: sms alert when the dam is full

fig 11: sms alert when there is heavy rain

Conclusion:

After the task had been completed, the undertaking had been tried. The people who didn't have mobile data will also be able to collect the information of the exceeding waterflow level whenever the heavy rain occurs in the place where system is placed. People around that area can get the information through the SMS alerts through GSM.

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