# PROJECT INNOVATIONS IN DISTRIBUTED COMPUTING AND INTERNET TECHNOLOGY

Proceedings of 8th PIC 2019 (A sister concern activity of 15th ICDCIT)

Bhubaneswar, India, January 10-13, 2019

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# SMART FLOOD MONITORING SYSTEM USING IOT AND WSN

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*Abstract-*While some areas are more prone to flooding than others, the establishment of flood warning systems near any major waterway or body of water provides critical information that can protect property and save lives. Of course, the most effective flood warning methods extend beyond the installation of and telemetry equipment and employ qualified staff and carefully designed procedures to provide the earliest warning about whether a flood should be expected, when it will occur, and how severe it will be. Nowadays, there is no idea about when flood will occur so there is need to aware people who are near the flooded area. Hence we are design this system to inform the people about the upcoming flood through notification and alert messages. For that purpose we are going to use some sensors which will helpful to give information about the flood. As well as we are going to give all safe places near the user location where user can migrate. Always we are using map for trace safe location. This project report offers exact implementation to individuals, communities, and organizations interested in establishing and operating flood warning systems.

*Index Terms-* Android application, Flood Monitoring, Node MCU ESP 8266, Sensors, Web application

## I. INTRODUCTION

To develop a Real Time Solution to Flood Monitoring Using IoT and Wireless Sensor Network. Developing a flood warning system requires attention to three basic factors: Data collection via gaging, data processing, and the hardware and software required, and the dissemination of flood warning information. While automated flood warning systems are often surprisingly inexpensive to implement, the primary factor determining cost for any such system is the number of gage site locations.

While some areas are more prone to flooding than others, the establishment of flood warning systems near any major waterway or body of water provides critical information that can protect property and save lives. Of course, the most effective flood warning methods extend beyond the installation of gages and telemetry equipment, and employ qualified staff and carefully designed procedures to provide the earliest warning about whether a flood should be expected, when it will occur, and how severe it will be. This project report offers exact implementation to individuals, communities, and organizations interested in establishing and operating flood warning systems.

## II. BASIC CONCEPTS/TECHNOLOGY USED

**Hardware Module**

In this project, hardware used that is Microcontroller, sensors, components required for power supply. The Hardware collects the water level, Pressure of water, Rainfall measure to detect the levels of the flood. The hardware consists of Wi-Fi enabled controller which connects to the server and allows sharing the data to through internet.

**1. Microcontroller**- This does the controlling with processing .Microcontroller will take the information from the sensor .This information will sent to the admin through the database

**2. Sensors**-This will collect the information from the particular nodes which are located at certain site. There are four sensors we are going to use in this project. They are as follows:

i)    **Water level measurement**: This sensor is used to measure the water level height. For that we are going to use **Ultrasonic sensor** which emits short, high frequency sound pulses at regular intervals. If they strike an object, then they are reflected back as **echo** signals to the sensors.

ii)   **Rainfall measurement**: This sensor is used to measure the average rainfall. For that we are going to use same ultrasonic sensor. **Ultrasonic sensor** is 4 pin sensor. Those are ground connection (GND), Trigger, echo and last current (VCC).

iii)  **Temperature and Humidity**: This sensor is used to measure change in atmospheric temperature and humidity. For this we are using **DHT11** sensor which works on one wire protocol and gives digital output.

iv)   **Pressure measurement**: This sensor is used to determine the atmospheric pressure. For this we are going to use **Barometer**.

**3. Power Supply**- In real time we get 230v AC, in actual project we do not need this amount of power supply so we convert this AC power supply to DC power supply.

**Software Module**

In this module, we have done an android application as well as the Website application for this project. Admin web page will contain and display the information like Login, Registration, Number of users registered to the app, status of the sensor, safe places near flood affected area where people can migrate and that places are shown on the Map.

The Android application will be used by the users who are register. After registration the user can login with a unique username and password. And then user can access all facilities provided by application. Application is provided the information like current status of water level and temperature etc. This app contain map which are show the safe places near the user and also the current place where the user is.

**Database Module**

Microcontroller will send the values measured by the sensors to the server. This will contain the number of users registered to App; this will also show the safe places through the Map. The data uploaded on server is stored on the database. The stored data is then routed to the front end web applications and mobile application

For implementation of this project we have used PHP, MySQL, Android Studio, Arduino IDE technologies.

### III. LITERATURE REVIEW

Existing system refers to the system is to develop a local real-time river flood monitoring and warning system for the selected communities near river. This study focuses only on the detection and early warning alert system (via website and/or cell phone text messages) that alerts local subscribers of potential flood events. For this project, we have referred some IEEE papers and what we have studied in these papers is shortly described as follows:

In paper [1], proposed an IoT based water monitoring system that measure water level in real time. The prototype is based on idea that the level of water can be very important parameter when it comes to the flood occurrences especially in disaster prone area. A water level sensor is used to detect the desired parameter and if the water level reaches the parameter the signal will be freed in real time to social network like Twitter.

In paper [3], presents a neuro-fuzzy controller based on flood monitoring system using wireless sensor network. The distributed sensor nodes used IEEE 802.15.4 protocol, to collect sensor information such as water level data from the river. The Sensor information is send to distributed alerts center via Arduino microcontroller and Xbee Transceiver.

### IV. PROPOSED MODEL/TOOL

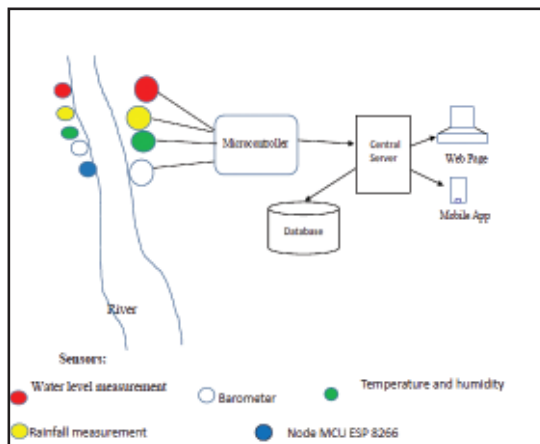Following is the system architecture diagram of project



**Figure 1:**  Proposed System Architecture

**Description of architecture:**

1. There will be a node as shown in above diagram.

2. This node is the independent flood monitoring node equipped with necessary sensors and connectivity modules.

3. It has three major stages, Including Sensors, Controller, Wi-Fi interface to upload the information on server.

4. Data from various sensors are collected by the ESP and is then computed and uploaded on the server.

5. The data uploaded on server is stored on the database.

6. The stored data is then routed to the front end web applications and mobile applications.

**Modules Description:**

The overall system consists of 3 main stages:

1] Hardware nodes   2] Cloud Architecture   3] Front end clients (mobile app)

The Hardware collects the water level, Pressure of water, Rainfall measure to detect the levels of the flood. The hardware consists of Wi-Fi enabled controller which connects to the server and allows to share the data to through internet .The architecture contains Server and database which handles the data coming from the devices and saves it in the database. The Front end apps will have http client to establish connection to device and backend. The app will collect the data from backend and represent it on the map. All these communication will be done over the internet though http protocol.
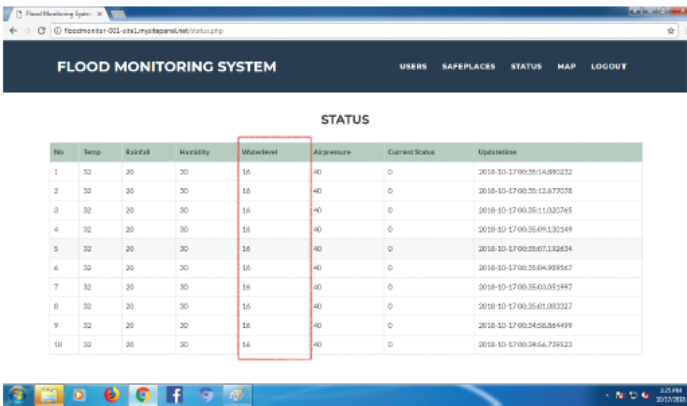
## V. IMPLEMENTATION AND RESULTS

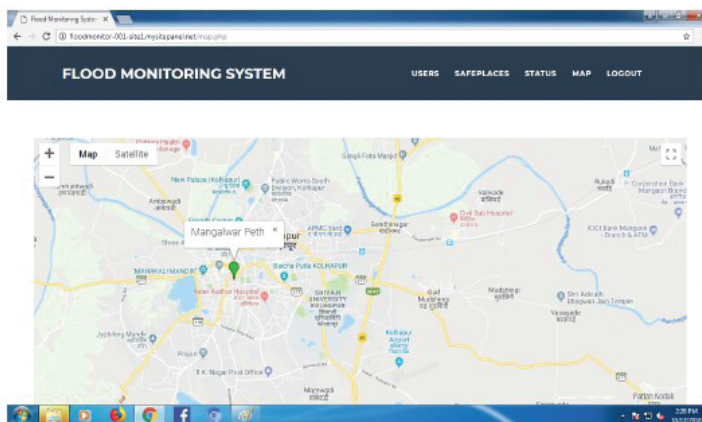Following are few snapshots of project implemented:
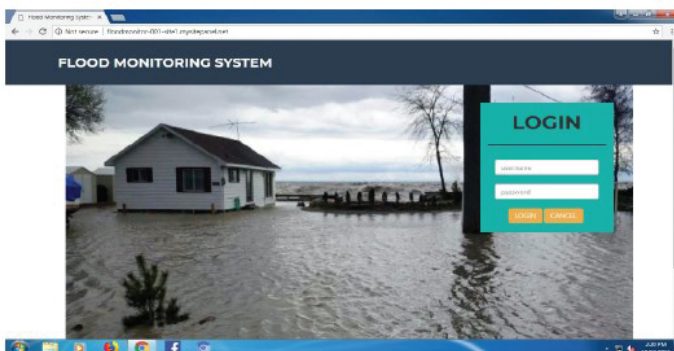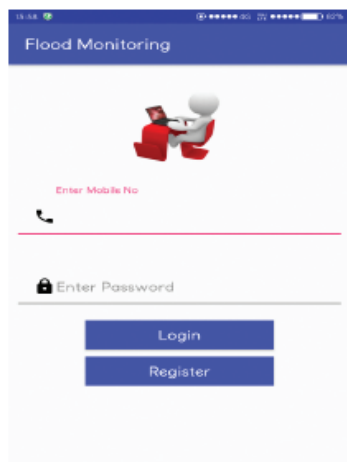


Website: Login page
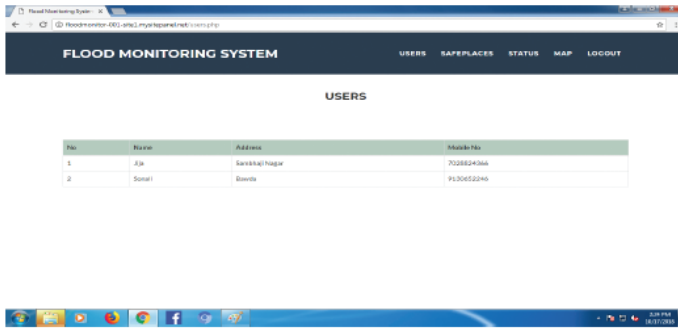
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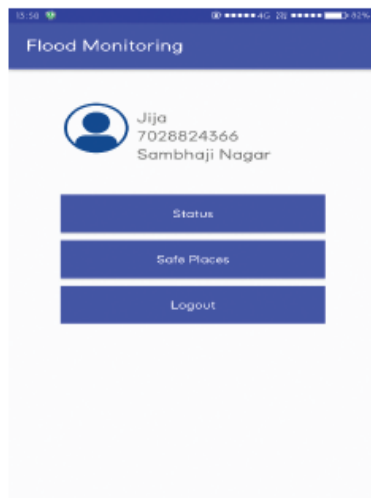


Website: Status



Website: Map

**Snapshot of Android**



Android: User Login



Android:Logged in page

## VI. CONCLUSION

As India faced recent devastating flood in Kerala, there arise a need of efficient flood monitoring systems. Flood forecasting and the issuing of flood warnings are effective ways to reduce damage. The proposed system will be efficient because it has better coordination of monitoring, communication and transmission technologies which are adaptable to background condition. The proposed system also ensures increased accessibility for assessment of emergency situations and enhances effectiveness and efficiency in responding to catastrophic incidents. In summary, the proposed system would be beneficial to the community for decision making and evacuation planning purposes.

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