# DEVELOPMENT OF AN IOT-BASED SYSTEM FOR ENHANCED FLOOD MANAGEMENT IN DAM OPERATIONS

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IoT Early Flood Detection & Avoidance System" is an intelligent system which keeps a close watch over various natural factors to predict a flood. So we can embrace ourselves for caution and minimise the damage caused by the flood. Natural disasters like flood can be devastating leading to property damage and loss of lives. to The system uses various natural factors to detect flood so as to eliminate or lessen the impacts of the flood. The system has a wifi connectivity. Thus it's collected data can be accessed from anywhere quite easily using IoT.
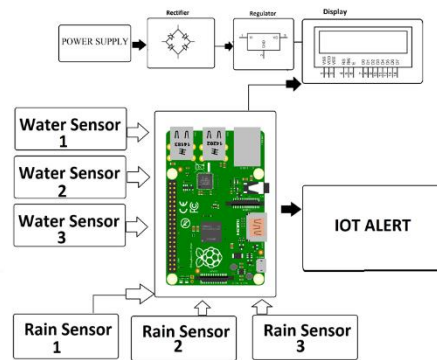
## 1. INTRODUCTION

Flooding is usually brought on by an increased quantity of water in a water system, like a lake, river overflowingand 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. Aside from lack of products , 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.Flood predictions need information like:The speed of change in river stage on a realtime basis, which may help indicate the seriousness and immediacy of this threat.Understanding of the form of storm generating the moisture, such as length, intensity and areal extent, which is valuable for discovering potential seriousness of the flood.In this system we make use of a raspberry pi with water sensors and rain sensors to predict flood 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 and 3 different rain sensors are used to measure rain level of those 3 areas. These sensors provide information over the IOT using Raspberry Pi. 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. The system also calculates the time it would take for flood to reach them and provides a time to people so that they can evacuate accordingly.

## 2. IMPLEMENTATION

The flow sensor on the system keeps eye on the flow of water and the water flow sensor consists of a plastic valve body, a water rotor, and a hall-effect sensor. When water flows through the rotor,the rotor rolls and its speed changes with different rate of flow.

The system also consist of a HC-SR04 Ultrasonic Range Finder Distance Sensor which works on the principle of SONAR. It is designed to measure the distance using ultrasonic wave, of an object from the sensor. All the sensors are connected to Arduino UNO which processes and saves data. The system also has a wifi feature, which  helps to access the system and its data over IoT.

**A.      Block diagrams:**

In this system following hardware are used,

- Water level sensor:Used to detect and identify amount of water and water level.

The fig. 2 shows the water level sensor we use in the dam system.



Fig.2Water Level Sensor                    Fig. 3 UltrasonicSensor

Ultrasonic Sensor: Measure *water* depth rather than *water level* with an *ultrasonic sensor*, we must submerge the *sensor* in *water*.
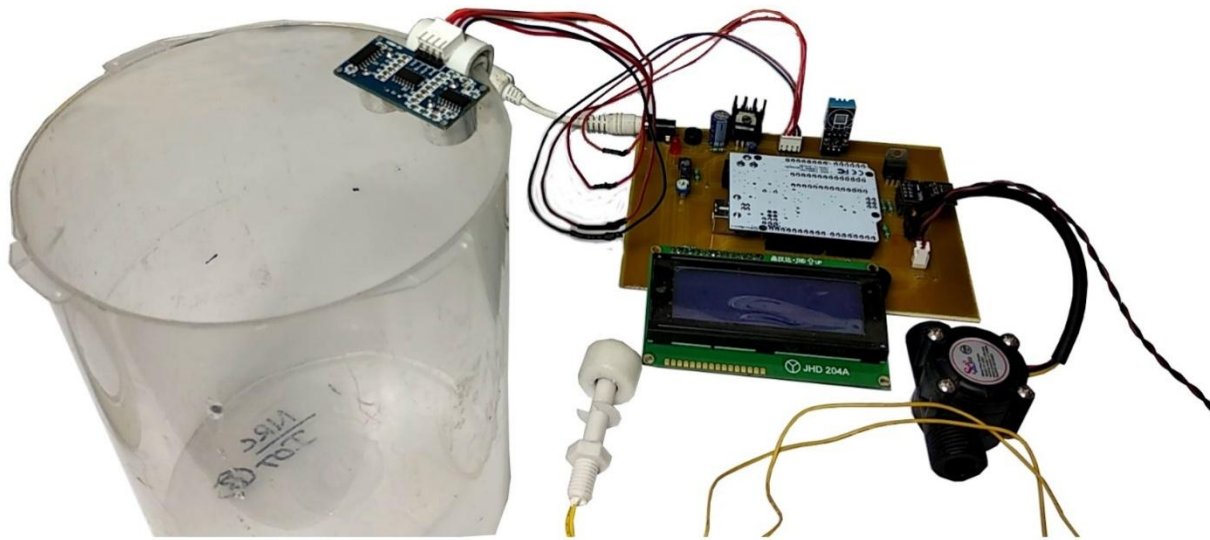
[1] Wi-Fi Module: The ESP8266 *WiFi Module* is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network.



Fig. 4 Wi-Fi Module

**B.Software:**

- Arduino Compiler
- MC Programming Language: C
- IOT Gecko

**Prototype of DAM MANAGEMENT SYSTEM**



*Fig. 5 Prototype of Dam Management System*

### 3. FUTURE SCOPE

Flood is one among the natural calamity that is unpredictable. Origin of flood cannot be précised by anyone. The damage due to this flood can be tremendously dangerous. Reservoir is the most efficient tool to contain and save the water. Flood Limiting Water Level is an important parameter for predicting the safety of the people and thereby making the people to safe areas. This proposed system acts as an alert to the people letting them know about the water level in the dam. The existing dam control is mainly based on the manual control of action. By the use of this IoT based dam management system the control of shutter can be made in automatic thus by reducing the man power and by reducing the time for the action. Usage of IoT can make the system speedily respond to the sensor action .Monitoring the water level continuously and alerting the people by mobile messages will make the people aware about the flood condition and people make the time effectively for evacuation .

### 4. APPLICATIONS

1 .Manual Control System is readily replaced by Automatic Control System.
2. Efficient Alert System can be implemented via Mobile SMS.
3. Continuous pressure variation is measured.
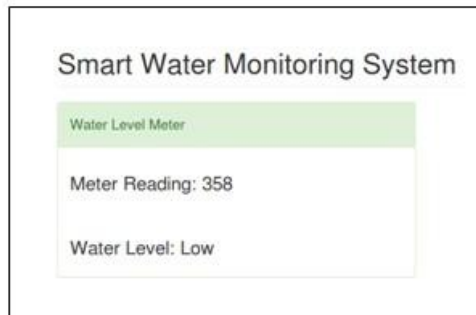
### 5. RESULT
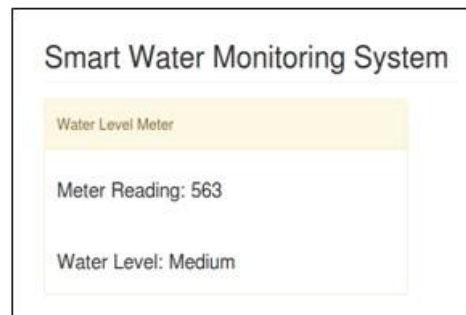
Fig. 6 (a) Low water level alert
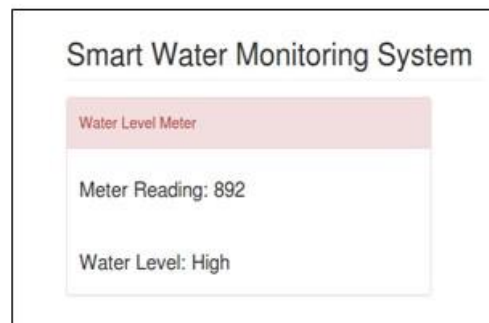


Fig. 6 (b) Medium water level alert



Fig. 6 (c) High water level alert

## 6. CONCLUSION

Internet Of Things, as a technology is trending now which allows the sensors used to communicate efficiently with the help of Internet. Usage of IoT in Dam will provide more efficiency than the manual controlling system which would significantly reduce the damage .The proposed system continuously check the waterlevel and the pressure variations and the alert is given to the authorities via mobile SMS. Thus the authority can aware the people for efficient evacuation.

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