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FLOOD MONITORING AND ALERTING SYSTEM BASED ON IOT

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Abstract - In any water system, when there is an increased quantity of water, it causes flooding, like a river or lake overflowing. Flooding is a natural disaster occurs in many countries. Many occasions are responsible for flooding such as heavy rainfall or dam fractures. In case of flooding or dam fractures, it rapidly releases a huge quantity of water and floods the river banks and surrounding areas. It causes loss of life and property also. Flood monitoring and alerting systems are helpful for monitoring and to reduce the losses faced by the society. This paper gives an overall survey on the various flood monitoring and alerting systems in the different flood prone areas around the world

Key Words: GSM, ESP32 Microcontroller, Wi-Fi, etc.

1. INTRODUCTION

Authors here discuss about the Flooding is usually brought on by an increased quantity of water in a water system, like a lake, river overflowing. 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. Rivers are involving river banks, in a station. A side from lack of products and 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. Food prediction need information like: The speed of change in river stage on a real time 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 ESP32 with water sensors, 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. Also 3 different rain sensors are used to measure rain level of those 3 areas. These sensors provide information over the IOT using ESP 32. 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. Usually, the flooding cannot be abandoned but the early detections can be made i.e., early alerting system with help of continuous monitoring can be used to reduce the losses faced by the society

PROBLEM STATEMENT:

The purpose of this project is to sense the water level in river beds and check if they are in normal condition. If they reach beyond the limit, then it alerts people through LED signals and buzzer sound. Also it alerts when the water level reaches beyond the limit. Flood occurs when water overflows from the river, lake or from heavy rainfall and it can happen at any time of the year. Flooding can be very dangerous, when floods happen in an area that people live, the water carries along objects like houses, cars, furniture and even people. It can wipe away property, trees and many more heavy items. For years, flooded roads have been a problem in Metro Mumbai. It causes heavy flow of traffic. Both motorists and commuters are getting stuck in a flooded areas and getting lost in finding possible routes just to go to their destinations. When traffic happened, people's money, time and effort are wasted. Through the local government unit flood control has been extending their efforts to inform the commuters regarding the situation in flooded areas during rainy season, still the dissemination of information to the locals are not enough. For this reason, the "ESP32 Flood
Detector System" is been develop, to help the road user to avoid this problem happened. It was invented based on problem faced by motorists and commuters when flood occurred. This will avoid the traffic jam because the users have a time to find a possible routes before they are going to be stuck at the flood area. The system will function when the admin activate the system and when water along the road detected by distance over ultrasonic sensor

METHODOLOGY:

After going through literature survey and various research papers we finalised our hardware and software1requirements;

1. Various natural factors, which includes humidity, temperature, water level and flow level are observed by system to detect flood. Our system consists of different sensors which helps to collect data for individual parameters. 1. For detecting changes in humidity and temperature the system has a DHT11 Digital Temperature Humidity Sensor. It is a sensor which detects humidity and temperature.

2. The water level is always under observation by an ESP32 Microcontroller, which works by constantly monitoring as water levels rise and fall. Once the water level increases beyond threshold, a trigger is generated which sends an Email Alert indicating the rise of Water and possibility of Flood.

3. The Flow sensor on the system keeps eye on the flow of water. The speed changes when water falls on rotor which makes it to rotate.

After the successful completion of hardware setup, we move towards software setup and using Arduino IDE Code. We created a Project Email for sending EmailAlerts.

BLOCK DIAGRAM AND DESCRIPTION:

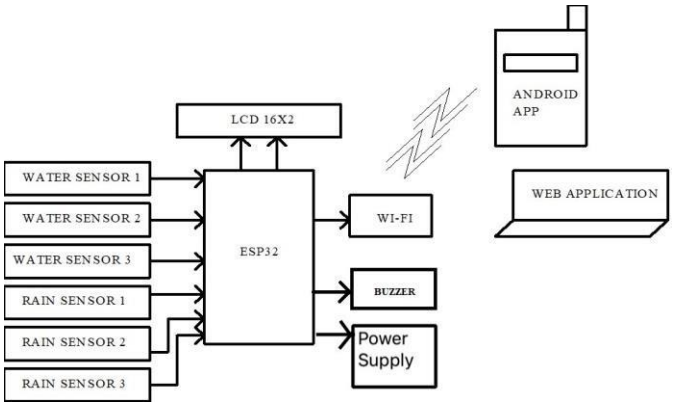

Fig.1 Proposed block diagram

Our proposed methodology includes ESP32 with water and rain sensors to reckon flood symptoms and alert official authorities with notification. In this project, measurement of water level is done by utilising water
sensors. In addition, rain sensors also employed to assess the level of rain in particular area. Later, these sensors send the information regarding water and rain measurements to ESP32 over IoT. The seriousness of rain will detect from this sensor it measures the rain quantity and also alerting done by this sensor which predict the seriousness of flood via rain level sensor display on LCD 16x2.

A. ESP32 Microcontroller

ESP32 Development board is based on the ESP WROOM32 WIFI + BLE Module. This is the latest generation of ESP32 IoT development module. This development board breaks out all ESP32 modules pins into 0.1" header and also provides a 3.3 Volt power regulator, Reset and programming button and an onboard CP2102 USB to TTL converter for programming directly via USB port.

Fig.2 ESP32 microcontroller

B. LCD 16x2 (Liquid Crystal Display)

Alphanumeric displays commonly called as LCD Displays are pretty easy to use. Use them for numbers, use them for letters, or both. They are a good size and brightness for easy reading. The decimal digits aren't connected, so keep that in mind when ordering.

Fig.3 LCD display

C. I2C Module

This board has a PCF8574 I2C chip that converts I2C serial data to parallel data for the LCD display. There are many examples on internet for using this board with Arduino. Do a search for "Arduino LCD PCF8574". The I2C address is 0x3F by default, but this can be changed via 3 solder jumpers provided on the board. This allows up to 3 LCD displays to be controlled via a single I2C bus(giving each one its own address).

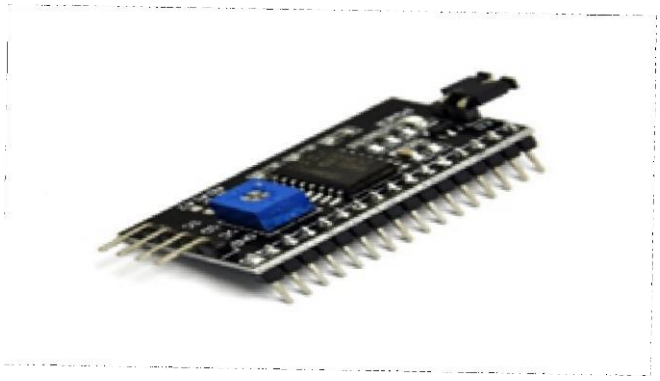

Fig.4 I2C Module

D. Water level Sensor

This is sensor utilised to detect the level of water, rainfall sensing and even the liquidate leakage. This water level sensor module has a series of parallel exposed traces to measure droplets/water volume in order to determine the water level. Very Easy to monitor water level as the output to analog signal is directly proportional to the water level.

Fig.5 water Level Sensor

E. Rain Sensor

It can be used as a switch when raindrop falls through the raining board and also for measuring rainfall intensity. The module features, a rain board and the control board that is separate for more convenience, power indicator LED and an adjustable sensitivity though a potentiometer. The analog output is used in detection of drops in the amount of rainfall. Connected to 5V power supply, the LED will turn on when induction board has no rain drop, and DO output is high.

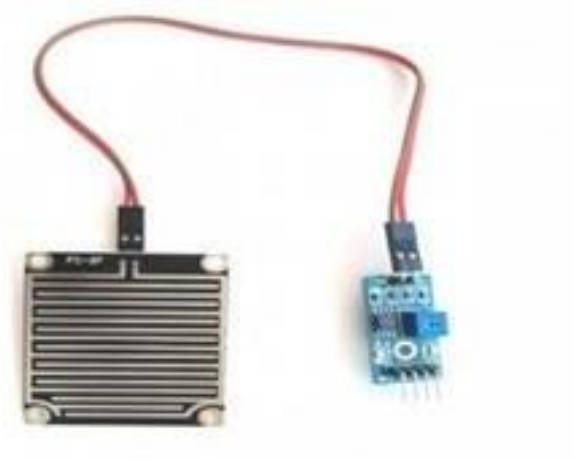

Fig.6 Rain Sensor

RESULT:

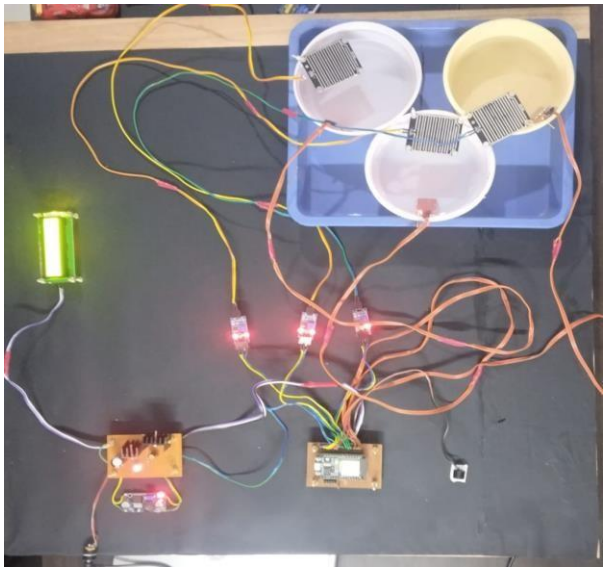

Fig.7 Model of flood monitoring and alerting system

Fig.8 Mobile application dashboard

CONCLUSION:

The study is all about detecting the level of the flood. Based from the existing way of reporting flooded roads in India have concluded that the Flood Detector System using Arduino can measure the height of the flood; and measurement data can be distributed to officer in charge and to the residents. The system also indicate passable and impassable road that will help commuters to avoid getting stuck in an impassable road. The systemalso provides camera to easily monitor the flood

FUTURE SCOPE :

This study is conducted to solve the problems brought about by floods. The device shall contain with the following features: It has to sense the distance of water
level of flood on the road. The system provided a camera that will display the real-time image of the flood that can view via live stream. It includes Serial Communication to send warning text message with the content of date, time, water level and road accessibility. The system has three (3) modules which are Users, Logs, and Contact Numbers. It can be modify by the admin. The unit containing the sensor is suggested to be place in front of our system. The position of the sensor must be placed perpendicular to the flood water; otherwise, there will be an imperfect reflection of cause measurement errors. The sensor is suggested to be placed on a pole with a height of about 3 to 3.5 meters. The flood sensors and microcontrollers will be powered by a Solar Power Bank for the benefit of continuous operation of water flood height detection and network data transmission.

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