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IoT Based Early Flood Monitoring, Detection and Alarming System

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Abstract: *Flooding is one of the major disasters occurring in various parts of the world. The system for real-time monitoring of water conditions: water level; flow; and precipitation level, was developed to be employed in monitoring flood in Nakhon Si Thammarat, a southern province in Thailand. The two main objectives of the developed system are to serve 1) as information channel for flooding between the involved authorities and experts to enhance their responsibilities and collaboration and 2) as a web-based information source for the public, responding to their need for information on water condition and flooding. The developed system is composed of three major components: sensor network, processing/transmission unit, and database/ application server. These real-time data of water condition can be monitored remotely by utilizing wireless sensors network that utilizes the mobile General Packet Radio Service (GPRS) communication in order to transmit measured data to the application server. We implemented a so-called VirtualCOM, a middleware that enables application server to communicate with the remote sensors connected to a GPRS data unit (GDU). With VirtualCOM, a GDU behaves as if it is a cable directly connected the remote sensors to the application server. The application server is a web-based system implemented using PHP and JAVA as the web application and MySQL as its relational database. Users can view real-time water condition as well as the forecasting of the water condition directly from the web via web browser or via WAP. The developed system has demonstrated the applicability of today's sensors in wirelessly monitor real-time water conditions.*

Keywords: Internet of Things, Node MCU ESP 32, Rain Sensor, Ultrasonic Sensor, DHT11.

I. INTRODUCTION

This document is a template. An electronic copy can be downloaded from the website. For questions on paper guidelines, please contact the International Journal committee as indicated on the Journal website. Information about final paper submission is available from the website. 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 "Arduino 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 route before they are going to be stuck at the flood area. The system will function when the admin activates the system and when water along the road detected by distance over ultrasonic sensor. When the flood occur, the ultrasonic sensor will sent signal to the microprocessor circuit and the sense water level will be display in the user interface and it will automatically send a Short Message Service (SMS) to those recognized residents and it will continue update until the water level detected returns to normal. The process repeats as the water level continuous to rise. The idea of an SMS based warning system was proposed because mobile phones have become a popular communication device among people all over the world.

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All mobile phone are able to communicate because it comprises of a GSM. This system used to detect the current water level of flood around the road and will give real-time information to the motorists or commuters that has still not passing through the flooded areas to avoid problem.

II. METHODOLOGY

2.1 Proposed System

The proposed system should be able to;

1. Read temperature and relative humidity in the flood store.
2. Sense the intensity of light in the flood store.
3. Detect the emission of ethanol type of gases.
4. Collect data from all the sensors and pass to LCD for display.
5. Monitor the sensor data visually online.

2.2 Block Diagram

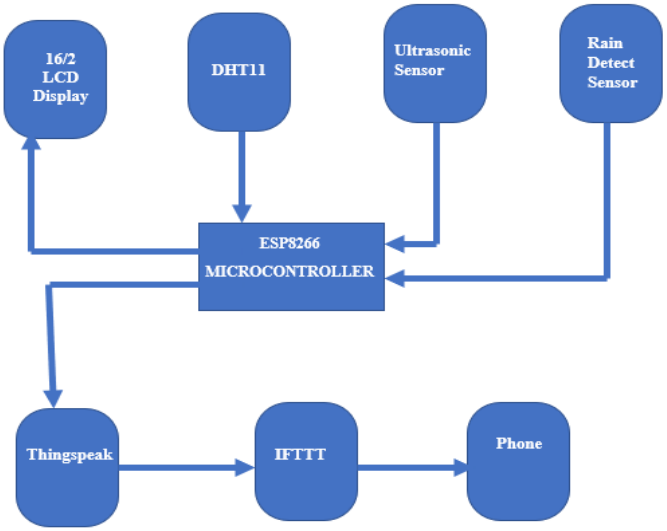

Fig. 1. IOT Based Monitoring Block Diagram

2.3 Flow Chart

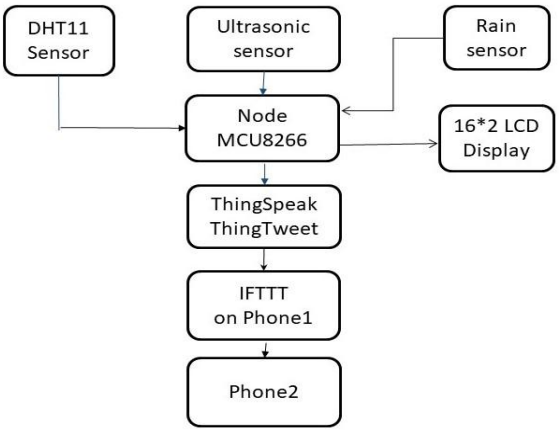

Fig. 2. IOT Based Monitoring Flow Chart

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2.4 Working

1. The DHT11 is a basic, ultra-low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed).
2. NodeMCU is a low-cost open source IoT platform. It initially included firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which was based on the ESP-12 module. Later, support for the ESP32 32-bit MCU was added.
3. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines.
4. An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity.
5. An infrared light beam at a 45-degree angle on a clear area of the windshield from the sensor inside the car. When it rains, the wet glass causes the light to scatter and lesser amount of light gets reflected back to the sensor.
6. First of all the value of temperature and humidity will be sent to the nodeMCU 8266 from the DHT11 sensor and this value will get printed on 16by2 LCD display
7. After this the status of the rain from the value of rain sensor will get printed on the LCD display.
8. Now the value of the water will get determine from the Ultrasonic sensor HCSR04 and it will then be sent to the node MCU 8266. after that if the value of the water level is above the safe level (which we have specified in the program) then it will trigger the thing speak thing tweet.
9. If the thing tweet get triggered then it will post a tweet from a twitter ID which we have add in it & it will alert all the twitter user.
10. After that we have linked the above twitter ID with the IFTTT platform and when any new tweet will get post from the ID then it will send an alert Android SMS in the phone number which we have specified.

III. 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 indicates passable and impassable road that will help commuters to avoid getting stuck in an impassable road. The system also provides camera to easily monitor the flood.

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