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Flood Tracking System in Urban Area using IoT

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ABSTRACT: Among the most common impact towards mankind, flooding is the most common natural disaster. Floods are known to cause widespread damage. There are many sophisticated systems widely in practice by the organizations and responsible authorities in monitoring the flood level in flood a high-risk area. Most of these devices are very costly to be used and maintained. In the proposed system, the information collected by the sensors such as temperature and humidity, water level, water flow and ultrasonic sensor can be sent to cloud by using IOT device and if threshold values of the environmental conditions increases, the warning message will be sent to responsible authorities and in turn will be intimated to the people living in the flood prone region.

KEYWORDS: Node MCU[ESP8266], DHT11 Sensor, Ultrasonic Sensor, Rainfall Sensor, IoT, Telegram.

I. INTRODUCTION

Natural calamities happen everywhere in the world, and which affects the human life and economy of the country. Economy and growth of any country depends upon the agriculture; hence the proper alert makes the farmers vigilant to protect the crop from flooding. In order to detect and avoid flood like disastrous calamities in a timely manner, current world technology plays a vital role. We can prevent natural disaster caused by flood, with the aid of an IOT based early flood related parameter monitoring and detection system and its avoidance using the Node MCU project, is proposed as a solution to the mentioned problem. The proposed model is very much utilized for monitoring of the water level, flow variations, humidity and temperature variation in the river and the same can be used at dam or reservoirs. The measured values are regularly updated on the web server which is very much useful to send flood alerts to authority and people for faster action. The entire system consists of five different Node MCU compactible sensors which are temperature, humidity, water level, flow and ultrasonic sensors. Also, it consists of a Node MCU controller, a Wi-Fi module, an LCD display an alarm and an IOT remote server-based platform. In this advanced system the initial stage indicates the level of water and the other parameters like flow rate temperature and humidity. Then this information is passed to the web server or the IOT via a Wi-Fi module, here the ESP8266 is used as Wi-Fi module. Which transmit and DHT11 is the temperature and humidity sensor, it is a basic low-cost digital temperature and humidity sensor. And HC-SR04 ultrasonic sensor used as the water level sensor, which works on the SONAR principle. In this paper the main objective is implement a system which covers both the IoT based system and the sensor network interfaced with both ESP8266 and the Node MCU board for detecting floods and for sending alert to organizations and the society. The LED and buzzer act as alerting system when there is rise in the water level and the associating parameters. Nowadays at most of the times the ordinary system notifies only the respective governed registered organizations, result in the slowdown of the process in rescuing citizens and also most of their belongings cannot be stored. In present condition it is necessary to develop the design of accurate smart flood monitoring system using sensors and IOT thus the system efficiency can be increased and can be imposed as the real time monitoring system. In this paper the main objectives are to implement a system which covers both ESP8266-based technology, sensor network components, IoT and web applications for detecting the floods for sending an alert to the organization.Although we can estimate rainfall or track cyclone paths with great precision using satellite images, having real-time monitored data such as flow, precipitation level, or water level is critical for making smart decisions regarding the actions that must be taken to prevent flooding. Flood damage costs are highly correlated with the amount of warning time provided prior to a flood event, making flood monitoring and forecasting vital to limiting flood damage costs. Different types of Floods are: Flash floods are rapid-moving waves that engulf everything in their path. They are brought on by strong rain or a quick thawing of the snow. Flash floods typically cover a short region and strike with little to no warning, lasting less than six hours. Large things like as automobiles, rocks, and trees can be moved by the rapid water torrents. Coastal floods or storms moving towards a coast during high tide cause coastal

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floods.Thearea is regularly inundated when high waves breach the dune or dike along the coast. The coastal regions with the fewest defense and the lowest elevations are the hardest hit. River floods are defined by progressive riverbank overflows caused by large amounts of water. The region flooded by river floods is controlled by the river's size and the volume of water in river precipitation. Although river floods rarely result in fatalities, they can cause significant financial damage. Urban flood events when a city's or town's sewage system fails to absorb water from intense rainfall. Flooding can also be caused by a lack of drainage system in a city. Water spills into the street, making driving extremely hazardous. Urban floods can wreak major damage even if the water levels are only a few inches deep. Pluvial floods occur in flat locations when the land is unable to absorb rainwater, resulting in pools and ponds. Pluvial flooding, which mostly occurs in urban areas, is similar to urban flooding, which mostly occurs in remote regions. Agricultural enterprises and properties in areas prone to pluvial flooding could be severely harmed. The " Flood tracking system in urban area using IoT" is a smart system that keeps track of a range of variables of natural occurrences in order to predict floods. Natural disasters such as flooding and other natural disasters can be severe, causing property damage and even death. The system identifies floods by analyzing a variety of natural parameters in order to eliminate or mitigate the flood's impacts. The obtained data may be accessed by government officials from anywhere using IoT because the system is Wi-Fi enabled. The system monitors a variety of natural elements, including rainfall, water level, and flow rate, to detect a flood. The system is made up of numerous sensors that collect data on individual characteristics in order to collect data on the natural components described above. Water level and water flow sensors are installed at various sites across the river and dam, collecting data onwater level and water flow from the dam and rivers. The occurrence of floods is predicted based on this information.

II. RELATED WORK

IoT Enabled Water Monitoring System IEEE Explore In this paper 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. A cloud server was configured as data repository. The measurement of water level is displayed in remote dashboard. The proposed solution with integrated sensory system that allows inner monitoring of water quality. Alerts and relevant data are transmitted over the internet to a cloud server and can be received by user terminal owned by consumer. The outcome of water measurement is displayed in web based remote dashboard. Syed NazmusSakib; TanjeaAne; NafisaMatin; M. Shamim Kaiser This paper sensor network. The distributed sensor nodes use IEEE 802.15.4 protocol, also called low-rate wireless personal area network, to collect the sensor information such as water level data from the river, rainfall, wind speed and air pressure data from a selected site. In order to validate the proposed flood monitoring system, Chandpur, a flood prone district of Bangladesh, has been considered as selected site. The sensors information is sent to the distributed alert center via Node MCU microcontroller and the XBee Transceivers. At the distributed alert center, XBee Transceiver and a Node MCU microcomputer are used to generate flood alert based on sensor information and two- decade flood data and these data are stored in a database. Sensor information is analyzed by the intelligent neuro-fuzzy controller used in Node MCUmicrocomputer to announce the flood alerts. The wireless sensor network is connected as mesh topology which can send signals over far distance. The performance evaluation reveals that the proposed system accurately detects flood alert compared to the existing flood alert system.

III. PROPOSED ALGORITHM

In this system we make use of an NodeMCU with sensors to predict flood and alert respective authorities through the telegram application and sound instant alarm in nearby villages to instantly transmit information about possible floods using IoT. Different sensors namely Rainfall, ultrasonic, temperature, humidity sensors are used to monitor the water level. The main idea in our project is to integrate two platforms android and IoT in order to realize a system that is dependable of easy to access at the same time. We use Node MCU and different sensors in order to collect and upload the data to a real time database and android to use this data for monitoring purpose. Different hardware used in our projects are:

i) Node MCU.

ii) Ultrasonic sensor.

iii) Rain Fall sensor.

iv) Dht11(Temperature and humidity sensor).

v) Buzzer.

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vi) ThingSpeak.

vii) Telegram.

IV. SIMULATION RESULTS

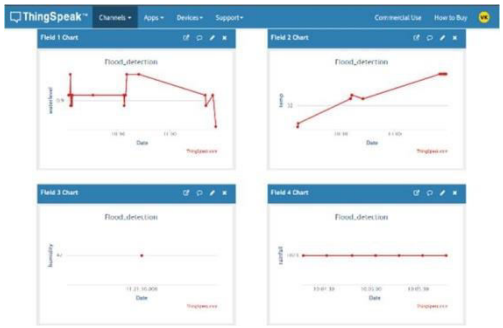

Fig.1 Dataresultin chart

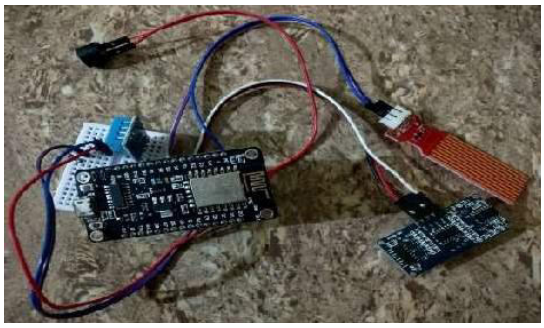

Fig.2 Project Implementation

The Fig.1 and 2 is a Flood tracking system in urban area has been proposed adapt new techniques successfully, could reduce the chances of losses of human lives as well as damage. This section shows some test results gathered during the experiments. Figure shows a real-time domain plot from the ThingSpeak.

V. CONCLUSION AND FUTURE WORK

This project highlights the possibility to provide an alert system that will overcome the risk of flood. As the project is enabled with IoT technology and hence the sensor data can be monitored from anywhere in the world. More sensors can be integrated into the system in order to create more accurate and efficient flood detection system. It can also contribute to multiple government agencies or authority that ultimately help the society and mankind about the flood like hazardous natural disaster. It will monitor each and every aspect that can lead to flood. If the water level rises along with the speed, it will send an alert immediately. It also ensures increased accessibility in dealing and reverting to this catastrophic incident. In summary, it will help the community in taking quick decisions and planning against this disaster mankind about the flood like hazardous natural disaster. The Future scope of the project is , flood can also be related to the intensity of rainfall, which is the height of the water layer covering the ground in a period of time. Hence the development of a rainfall forecasting sensor eventually turns up to the early flood monitoring and detection, Scholarly studies are ongoing and can be implemented to our existing system in future.

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