

Early Flood Detection Using IOT

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Abstract:- In several places flood results in massive loss of life and property. Hence it is necessary to alert the people in advance. As a solution, in this paper, the flood detection system based on IOT has been developed. This system consists of a flood warning station powered by battery, a flood monitoring center, and a notification system. The flood warning station consists of water level sensor, water flow sensor and a humidity sensor. The data received from sensors, will be stored in arduino and transmitted through Wi-Fi module to the notification center. It will also be displayed in the LCD display for the nearby residents. When the received data is above the threshold level, message will be sent via notification system to the user. This is a simple and an effective system which is equipped with a buzzer to monitor and alert the residents of flood prone areas.

Keywords:- Flood alert system, Internet of things, Sensors, Microcontroller.

I. INTRODUCTION

Climate change has been one of the most important cause of occurrence of flood throughout the world. Flood has happened more frequently in many regions and caused devastating impacts on human lives and livelihoods. The impacts include loss of water treatment systems and supply facilities resulting in water contamination and loss of waste water disposal facilities. Addition of unclean water with human sewage along with flood waters increases the risk of spreading the waterborne diseases such as typhoid, cholera etc. The entry of flood water into the land makes the farm land unworkable and prevents the crops from being planted and harvested leading to shortage of food to living beings. Property, shelter and lives of individuals who are nearer to the flood prone areas will eventually get affected. The damages that are caused to the roads and other transport infrastructures might make it difficult to mobilize aid to those affected or to provide emergency treatment.

Entire harvests for a rustic will be lost in extreme flood circumstances. Floods are the major reason for natural disaster deaths worldwide and have resulted in nearly 6.8 million deaths within the 20th century. In the last quarter of 20th century about 50% of flood related damage has happened in Asia and has come under most flood affected region. Weather factors includes precipitation, melting snow or positive storm surge from cyclones whereas the human factors include failures of dam, alternating absorptive land cover with impermeable surfaces and insufficient drainage systems. Thus it's necessary to predict the flood before its occurrence and to take necessary measures before damage.

Several warning systems for flood have been developed and installed in developed countries but the manufacturing cost is too high to be practical in developing countries. Therefore, building an efficient flood warning system while maintaining reasonable cost has been a meaningful mission for several researchers and manufactures. This paper provides a plan to detect flood and supply alert at an earlier stage by making use of Arduino controller, water level sensor, pressure sensor and humidity sensor and sending notification through Internet of things technology which is capable of sending and receiving data anywhere anytime through network with none human intervention.

II. LITERATURE SURVEY

The main concern is to build a reliable model which is capable of fighting against flood in developing and under developed countries. There are various models, energy efficient systems, different networking arrangement of wireless sensor networks that has been built for flood detection. Some of those works that we considered for our survey are listed below:

M.Madhumathi et al. [1] has proposed the design of flood observatory system which provides alert to the surroundings when the water level increases the normal capacity by making use of ultrasonic and water level sensor.

Mahendra saluke et al. [2] provided a survey on urban flood prevention management system by monitoring the urban drainage capacities.

B. Kanaka Durga et al. [3] proposed a flood warning system by monitoring the rising water level and providing alert in case of danger through GSM technology.

Wahidah Md. Shah et al. [4] provided an idea of implementing flood alert system by making use of measuring sensors.

Gadade Megha et al. [5] proposed a method of flood alert by monitoring the jack well that are situated near the river. Inspired by the literature, this work aims to provide an early flood detection system using IOT.

III. OBJECTIVE

The objective of this project is to design a system which can reduce the impact and cost of the flood damage by providing warning, monitoring and detection of local flooding for people.

IV. PROPOSED SYSTEM

The proposed system involves water level sensor, flow sensor, humidity sensor, arduino and a Wi-Fi module. The sensors which are interfaced with arduino controller keeps on sensing the water level, flow rate and the humidity and does data processing. Arduino keeps on collecting, monitoring the data collected from the sensors and if any of the sensors reaches a threshold value then the system creates an alert and also transfers the information to the webserver by means of Wi-Fi module through which message notification are sent to the registered contacts. The residents may be alerted by means of buzzer alert and can also monitor the value by means of LCD. Thus by means of the proposed method the alert can be provided at an earlier rate and also to the rescue team. The use of pressure sensor in this system provides more accurate results than the existing system. Such a system enables both private and government organization to work on their emergency situations and mitigation plans for a safer move before the situation gets worse.

A. Architecture

The architecture of the proposed design is shown below.

The architecture involves microcontroller chip that are interfaced with water flow, water level and humidity sensor for data gathering and a Wi-Fi module to transfer the data to the remote server and to provide notification.

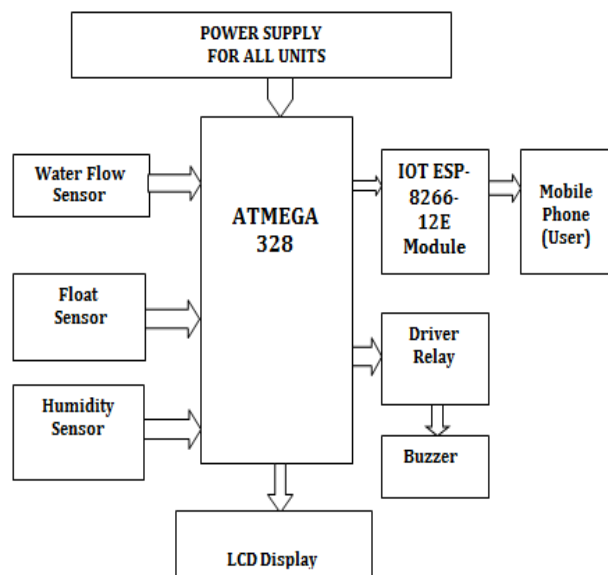


Fig 1:- Proposed system for flood detection

B. Hardware and Software Requirements

The hardware requirements involved in the system are mentioned below:

➤ Arduino

Variety of microprocessors and microcontrollers are required for the design of arduino boards. The boards consist of a set of analog and digital input and output pins that can be interfaced to various other circuits. Using a

dialect of features from the programming languages such as c and c++, the microcontroller is programmed.

➤ Wi-Fi Module

The ESP8266 computer network Module can be a self-contained SOC with integrated TCP/IP protocol stack that may offer any microcontroller access to your computer network. Each ESP8266 module comes pre-programmed with degree AT command set coding system. Its high degree of on-chip integration permits for marginal external equipment, still because the front-end module, is supposed to occupy marginal PCB area.

➤ Water Flow Sensor

Water level sensor is a device used to measure the rate and amount of water flowing. It works on the principle of Hall Effect by means of sensing the rotation of the rotor present in sensor.

➤ Float Sensor

Float sensor is a device used to detect the level of water by employing a float with a magnet along with reed switch the level of the water is measured by monitoring the motion of the float.

➤ Humidity Sensor

Humidity sensor is used to the measure the amount of water vapor present in the air. Change in resistivity value of the material used in sensor helps to measure the change in humidity.

➤ Liquid Crystal Display

A liquid-crystal display (LCD) is an electronically modulated optical device that employs the light modulating properties of crystals along with the polarizers. They do not emit light directly instead it uses reflector to produce images in color.

➤ Buzzer

A buzzer is an electronic signalling device, which consists of a number of sensors connected to a control unit that determines whether to produce a warning in the form of a continuous or intermittent beeping sound.

The software requirements involved in system design are Arduino IDE, which is coded on Embedded C language. Arduino IDE is an integrated development environment to program the controller and it is an open platform for ESP module. The sensors interfaced with the controller monitor and detect the state of flood and programmed to warn the surroundings.

C. Flow Diagram

The flow diagrams related to this project will be shown below:

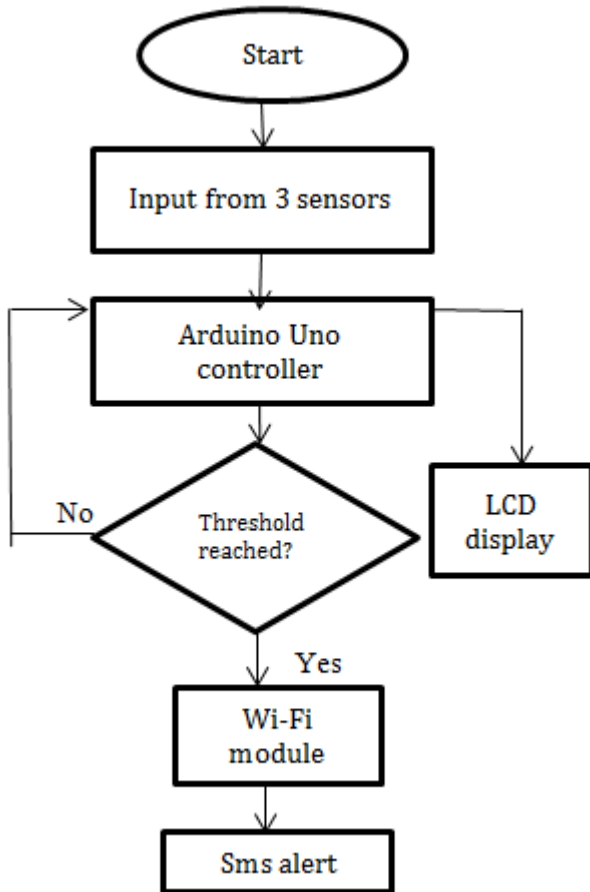


Fig 2

V. PERFORMANCE RESULTS

The output for the early flood detection system is been attached below,

- Once the water level, water flow, humidity level is been increased and sensed by the sensor, it shows the data in cayenne app.

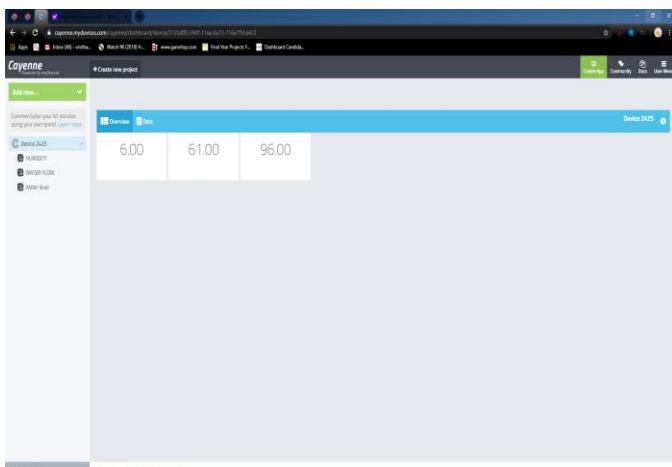


Fig 3:- Threshold values shown in cayenne app

This app is mainly used to monitor the level of the water flow, pressure and humidity level caused due to the increase in water level. The above screenshot displays the level.

- The LCD displays the same data in the screen which is easy to monitor the increase in the water level. The devices are been connected to a buzzer where the buzzer sounds during the increase in the water level so that the people who are nearer are alerted.

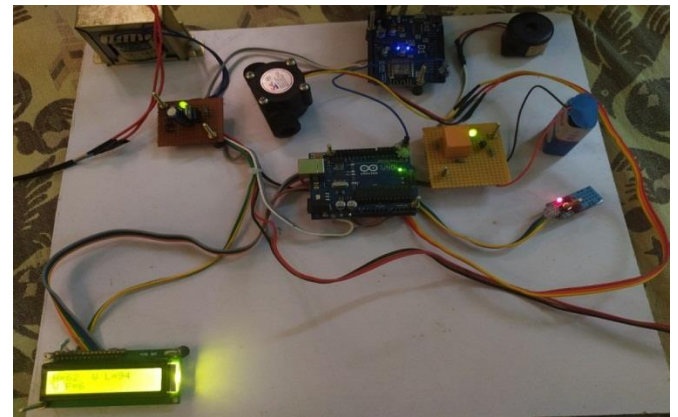


Fig 4:- Attainment or increase in the threshold values

- The next output shows the number of triggers for the notification system we used using the cayenne app. This is used to send a notification message to the phone numbers those are been connected through the app and sends an alert message to the numbers regarding the increase in the water level.

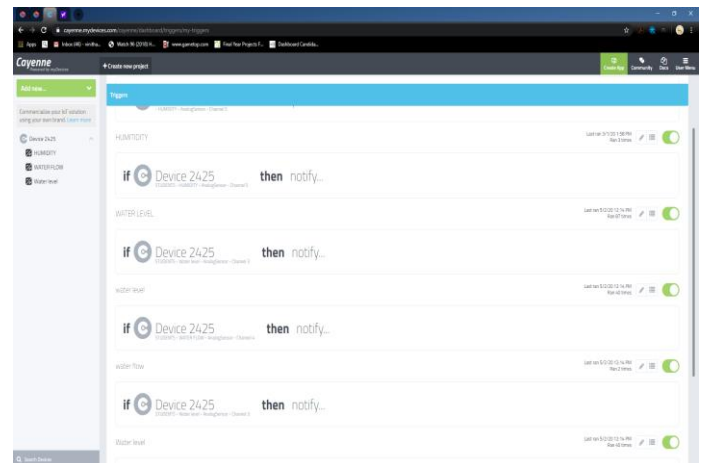


Fig 5:- Triggers created for giving alerts

- The below screen shot shows the alert message sent as notifying the increase in the water level. This is easy for the people surrounding and the responsible person to know about the increase in the water level.

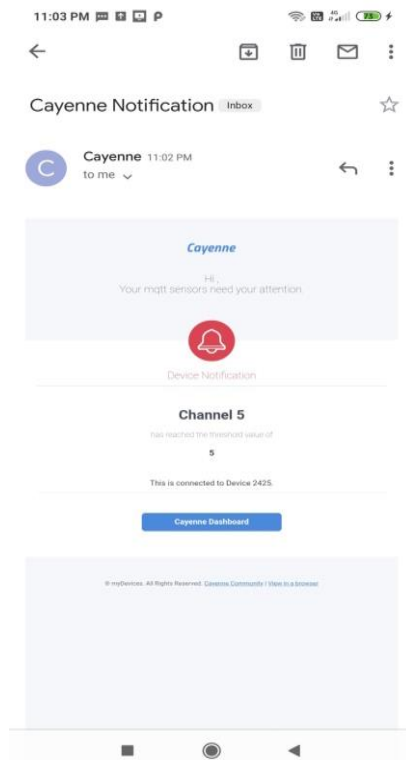


Fig 6:- Warning messages sent through email

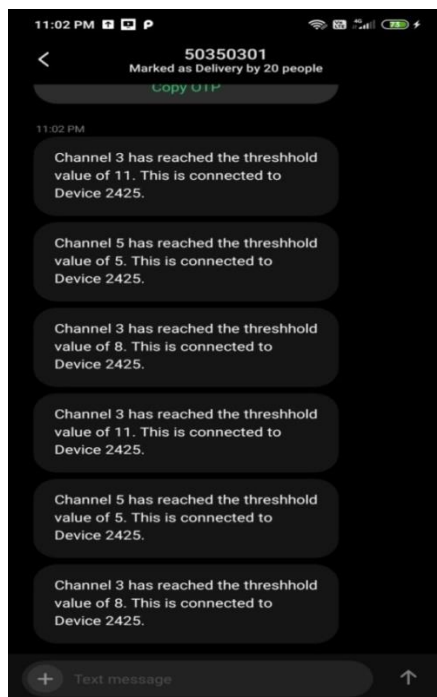


Fig 7:- Alert messages sent through phone

VI. CONCLUSION

Thus an earlier and efficient flood detection system using Iot is done and implemented to save the lives of the surrounding people by providing the alert at an earlier stage and reducing the impact of flood before its occurrence. The future scope of this project is to build a flood prevention mechanism, which will consist of an emergency switch, which when pressed, will send the GPS coordinates of the

location with a “HELP” message to the nearest control room and Using cameras for image display and ultrasonic sensor to detect the increase in the water level immediately.

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