ALERTING PEOPLE ABOUT FLOODS

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Abstract
Flood is one of the most occurring natural disasters and it is one of the severe problems as it has a destructive power and also sweeps away whatever comes in the course of their flow. The most important thing before, during and after a disaster is to collect the information and also the usage of devices that could be enabled by IOT which helps them in facing the disaster. In this paper, we use a water level sensor for measuring the water level of rivers, lakes, lagoons. We measure the three threshold values of the water level sensor and they are associated with three different colored LED's for easy identification. We also use a NodeMCU board which has inbuilt wi-fi within it. The information from water level sensor is transmitted via wifi to a laptop, and then this information is also seen in smart phones, where users can see the water level in rivers. Finally, this prototype is tested under controlled environment and the obtained results are also satisfactory.
Keywords: IOT, NodeMCU, Water Level Sensor, Wifi

I INTRODUCTION

Floods may occur when there is water due to heavy rains and also due to the sudden breakdown of rivers or such kind of water bodies when the water bodies exceed their carrying capacity. Floods are very dangerous, when floods happen in an area where people live; they cause severe damage to the lives and properties of people. The motivation for this work is based on all the damages caused due to the flood.

Though the local government unit floods 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.

Tragic floods happened in Tabasco, Mexico in 1999 and 2007. In 2007, the homes of as many as half million people were destroyed and damaged by massive floods.

There exist many kinds of solutions existing to rescue operations. A variety of options have been emerged for creating systems capable of warning vulnerable populations about an imminent threat of floods. However, the above brings deficiency in the measurement process because the data may not have been accurately captured and brought to where this information could be too late for help or planning a rescue strategy.

II OBJECTIVE OF THE STUDY

The main objective of this paper is to develop and design a flood detection system that detects flood automatically before its occurrence and send this information using a NodeMCU to the respective local government and to the residents of the flood occurant areas.

- The specific objectives include:
- To design a circuit and create a programming code using the microcontroller.
- To apply the Serial Communication in transmitting the data from one place to another place.
- To detect the current level of the flood where the system sensor will be divided into three levels.
- To warn residents of flood occurant areas.

III LITERATURE SURVEY

In the previous papers the information to central monitors systems which processes the raw data and make some approximations regarding the rise of water level and occurrence of floods. This is bit complicated as it involves the Wireless network systems. There are other

papers which involve Arduino and GSM modules which when needed an active internet connection must be connected to an external circuitry which adds complexity to the design. Very recently Internet of Things (IOT) has emerged in the field of Wireless Technology. By the help of IOT, variety of devices such as sensors, actuators, microcontrollers and smart phones can be connected within the existing internet infrastructure. In this paper we create our prototype using IOT.

Water Level Meters:

The different types of water level meters used in industry and research in that few are as shown in figures 1 and 2.

1. Limnimeter Rule Meter: Rule for graduating that is set in a river and used to read the fluctuations of the water levels. (See figure 1)

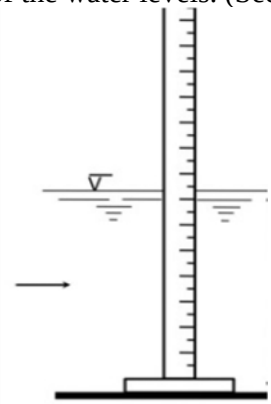

Figure 1. Limnimeter rule

2. Rain Gauge: It is an instrument used by meteorologists and hydrologists to gather and measure the amount of liquid precipitation over a set of period. Rainfall is generally measured in millimeters or inches.

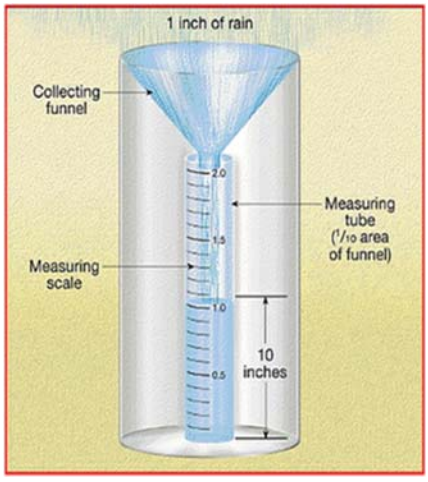

Figure 2.Rain Gauge

The standard rainguage instrument generally consists of a funnel connecting to a graduated cylinder which is marked in millimeters.

IV BLOCK DIAGRAM

The block diagram for designing our prototype is as shown in below figure.

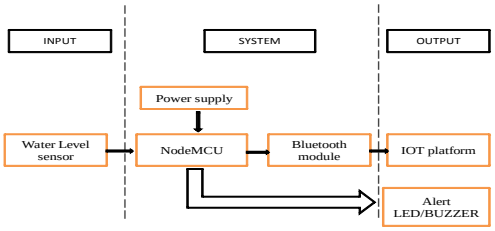

Figure 3.Block diagram

The input is given from water level sensor, it is use to read the different water levels according to rise and fall of water. The Microcontroller used in this paper is NodeMCU. It is provided with a power supply of 3.3v, if it is provided with a voltage of 5v, the board gets damaged. It is used for interfacing all the components that are used in the project. The output is displayed on the screen using the serial monitor. The data from the serial monitor is transferred to the serial monitoring app using a bluetooth module which helps in converting the obtained text to speech. The output is shown either by using LED's or buzzer.

Equipment and Materials

In order to design the prototype the following materials and equipment were used. All parts and elements

1) wi-fi connection- To wireless communication.
2) Water Container. - It enables to emulate a controlled.

HARD WARE COMPONENTS:

1) LED colors - three colors (color code)
• Green: lowest Alert
• Yellow: intermediate Alert
• Red: highest Alert

2) Bluetooth module HC-05:- HC-05 module is an easy to use bluetooth spp(serial port protocol) module . The HC-05 bluetooth module can be used in a master or slave configuration, making it a grate solution for wireless communication.

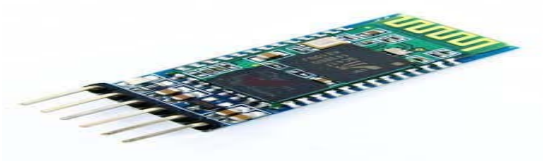

Figure 4: bluetooth module HC-05

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3) Water level sensor: - Level sensors are used to detect the level of substance include liquid, powders etc. such measurements are used to determine the amount of the flow of water in open channels.

Figure5: water level sensor

5) Esp866 module: - NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi soc from Expressive systems, and hardware which is based on the esp-12 module.

Figure 6: NodeMCU

SOFTWARE:

1) Arduino software:-An Arduino is an open-source microcontroller development board. In plain English, we can use the Arduino to read sensors and control things like motors and lights. This allows us to upload programs to this board which can then interact with things in the real world.

Figure 7: arduino software

2) ThingSpeak: - According to its developers, "Thing Speak" is an open source Internet of things (IOT). Thing speak enables the creation of location tracking applications and social networks of things with status updates.

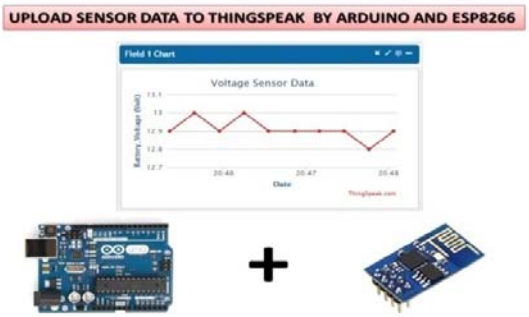

Figure 8: Thingspeak

3) Serial monitoring for android app:-The Arduino IDE (Integrated Development Environment) has a feature that can be great helping debugging or controlling Arduino from you computes keyboard.

Figure 9.Serial Monitoring

V ARCHITECTURE DESCRIPTION

Our water level measurement architecture is shown in Figure below, all parts are integrated and put it all together. In our design, we place a water level sensor in a container and three levels are measured at three different ranges. This water level sensor is located in different heights allowing water to determine three levels, it is assigned a color to each level to identify more clearly, where the LED in yellow color is the lowest level, green LED is intermediate and red LED is the highest one and it is given to the NodeMCU to process all the data and these circuits go through a breadboard where connections are organized. NodeMCU is also connected with a bluetooth module which is used to connect to the serial monitor app that converts text to the speech so that even uneducated person can come to know through the voice that the disaster is about to occur. The output is taken from the LED's or buzzer.

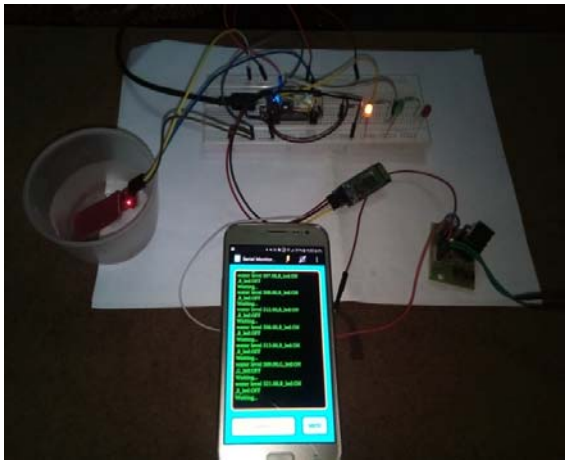

Figure 10.Architectural Design

Measurement and interpretation of obtained values during sensing:

The water level is measured by means three phases or layers, that is, green alert, yellow alert, and red alert.

1) A device emits a signal to the respective sensor to measure the water level.
2) The value obtained from the sensor becomes in alert levels.
3) In case of failure to comply with the higher criterion than one (> 1), return to step 1.
4) Using a dynamic IP address AP with mobile devices where readings transmitted data is connected.
5) A measurement in degrees is added, together the date and time when transmitting a signal to the sensor.
6) It is stored into the memory card.

VI ADVANTAGES

- The risk of life to be minimized.
- Resident to move assets to safe location.
- Timely operation of flood control structures to prevent inundation of property and land.
- Installation of flood resilience measures.

VII DISADVANTAGES

- It needs an active internet connection

VIII APPLICATIONS

- Can be used to measure water level in reservoirs/dams.
- Can be used in any water bodies when there is heavy rainfall.

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