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IOT Based flood Monitoring System

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Abstract:

Flood is one of the natural disasters that cannot be avoided. It happens too fast and affected so many lives and properties. Before this, most of the existing system that has been developed are only focus on certain areas. Other than that, majority of the public cannot monitor and have no idea when the flood going to be happened since they do not have any information and data about the weather condition. By having Smart IoT Flood Monitoring System, this will solve all the drawbacks of the existing system. The proposed system is suitable for cities and village areas. Furthermore, if the public has an internet access, they can monitor what is happening and predict if there is any upcoming flood at the web server. The proposed system is a low cost in design and easy for maintenance. This project will update the water level at the web server and the system will issue an alert signal to the citizens for evacuation so that fast necessary actions can be taken. In today's world, people get so busy in their work. So they do not have enough time for doing their all work. Everyone wants to accomplish their work on a fingertip. So, with the increase in the living standards, there is an immediate need for developing circuits that would change the complexity of life to simplicity.

Keywords - GSM,Node MCU (Node Microcontroller Unit), ICSP(Incircuit Serial Programming), LCD (Liquid Crystal Display), LED(Light Emitting Diode), SOC (System on Chip).

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1. INTRODUCTION

Internet is the most important requirement of today's world. With the help of internet, people can communicate with each other very easily and quickly. We can't say that internet is just connecting people but things can also communicate with other objects. This concept is called as "Internet of Things". In this IoT concept, object has the ability to transfer the data over internet without requiring the human or computer interaction. IoT is called as Internet of Things. IoT concept is used to make the device automated. Because, in market, various water pump motors are available. But to make that motor advanced and automated, IoT technology is used. Home automation is also done using IoT I.e. when we leave home, sometimes we forgot to switch off the lights and fans. So, by using our mobile we can operate all these home appliances and this can be

successfully done using the technology Internet of Things. To make these things into work, we can fix the sensors in particular area. When a person leaves that area then the appliances like fan and lights get automatically off. The electricity consumption get automatically reduced and it is our duty to use electricity very carefully without doing the wastage of it. This automation is very helpful to those which are physically disable and for the elder people. Because it reduce the efforts of going to that place for doing that switching activities. From our comfort zone we can operate the devices. Nowadays, there are various automated devices available in the market, but some of these are highly expensive hence all the people cannot afford it. It is today's need to design the device which are pocket friendly so that all needy people can easily buy it. And all these advanced automations we are doing is due to IoT i.e Internet of Things. It is becoming the major part of our life. It plays a very important role. So the device "Water Pump Controller Using IoT "made by using hardware as well as software. To reduce the human efforts and to reduce the wastage of energies i.e. water and electricity this device is very beneficial. So the structure of this device is shortly explained as follows. The circuit contains 16*2 LCD display which shows the instructions that we will give to the device, potentiometer which is used to set the brightness of LCD display, Node MCU, Jumper Wires for connections, Switch, Ultrasonic sensor to sense the water level (Ultrasonic sensor contains 2 types i.e. echo and trigger from which one get the input waves and another sensor gives the output that means it shows the water level from the tank), then it contain relay, motor of 1hp or half hp. The Node MCU is a development board based on the ESP8266 microcontroller that provides wifi connectivity. Using the Node MCU as a power pump controller, there is need to write a program that runs on microcontroller and power supply of the pump get controlled. For operating the device, first of all, wifi connection is necessary. From mobile phone we can operate the device. Only search the website "Adafruit io", it shows the water level in tank and there is one button from which we can ON and OFF

the motor. If sometimes we forgot to OFF the motor, then the motor gets automatically get off after filling the tank. Because one sensor is present in tank, when water level is near to that sensor at a particular distance then motor get automatically off. Or if the water level of the tank get down then also automatically the motor gets switch ON. Whenever anyone buy this device, then they have to do some changes in the program, as per the height of tank some of the values they have to change for the perfect working and result. There are different types of water pumps on the basis of their applications and the material from which they are constructed.

2.OBJECTIVES

The main objective of this project is to develop and design a flood detection system that will detect flood automatically and send data to the Local Government Unit and to residents using an Arduino.
Specific Objectives
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 four levels.
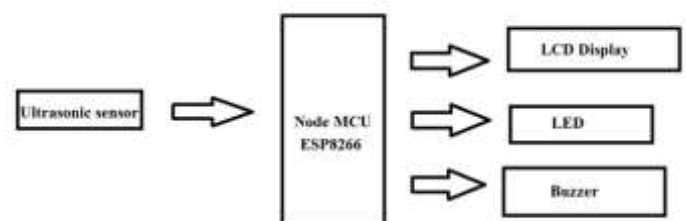To warn residents of about the flood water level.

3.BLOCK DIAGRAM

fig 1:Block diagram

4. Hardware

16x2 LCD display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on . A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data to be displayed on the LCD. Click to learn more about internal structure of an LCD The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character

Ultrasonic HC-SR04 Sensor

Ultrasonic sensors work on the principle of ultrasound waves which are used to determine the distance for an object. An Ultrasonic sensor generates high-frequency sound waves. When this ultrasound hits the object, it reflects as the echo that the receiver sense. We can calculate the distance to the target object using the time required to reach the receiver for Echo. Ultrasonic distance sensors are of two ultrasonic transducers. One of them acts as a transmitter that converts the electrical pulse of the microcontroller into an ultrasonic sound pulse and is received by the receiver for transmitted pulses. If it receives them, then it produces an output pulse whose time period is used to determine the distance from the object

NodeMCU ESP8266

The NodeMCU (Node MicroController Unit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (WiFi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds

5. Working

When water level is at Min/Normal level. That resembles 'Green Alert'. This means that water is at normal position and no sign about flood condition. Also green led will glow and it will also show green alert in Lcd display with water level.
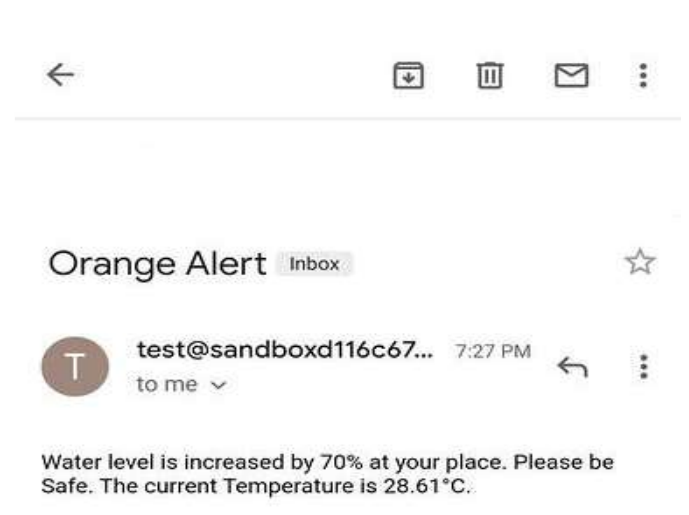
When water level crosses the Intermediate level. That resembles 'Orange Alert'. This means that water has crossed the 55% mark and there can be chances of flood condition at that place. With increase in water level the system sends SMS and Email alerts to the authority or registered user from Mail Services respectively

When water level crosses the Max Level. That resembles 'Red Alert'. This means that water level has crossed the 80% and flood situation has occurred at that place. With increase in water level the system sends SMS and Email alerts to the authority or registered user from Mail Services respectively. Also red led will glow and buzzer will buzz for two times. It will also show red alert in Lcd display. Also Email is send to registered user with proper message and current temperature of that place.

Also, orange led will glow and buzzer will buzz. It will also show orange alert in Lcd display Also SMS and Email is sent to registered user with proper message and current temperature of that place.

7. ADVANTAGES AND DISADVANTAGES
7 .1 ADVANTAGES
- It senses the appropriate water-level distance and sends Sms/Email alerts when the water-level crosses the intermediate level or max level.
- High reliability as data is sent in real-time
- Timely detection of flood risks

7.2 DISADVANTAGES
- Some people may not be able to access the warnings. Flash floods may happen too quickly for a warning to be effective. They do not stop land from flooding they just warn people that a flood is likely.

8. CONCLUSIONS
Nowadays the Internet Of things (IoT) is broadly used in worldwide, this system will display the data of the water level measured on lcd display. This project can be very helpful to the Meteorological Department to continuously monitor the dams and river beds water level. With this project it can save many people lives by giving alerts when the water level crosses beyond the limit. This project is very cost-effective, flexible and productive in areas where flood conditions happens everytime

9. FUTURE WORK
It has ultrasonic sensor 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 livestream. It includes Serial Communication to send warning text message with the content of date, time, water level and road accessibility. The system has three 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 ultrasonic waves and 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 with 80, 000 Ampere Ampere-Hour (mAh) for the benefit of continuous operation of water flood height detection and network data transmission.

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