Live Coverage of Flood Alert System

J. Rajivgandhi AP/CSE,
A. Archana, P. Priyanka, C. Shanjana
UG Scholer,
G.Chandraleka/UG Scholer

***Abstract*:- Flooding is the most common worldwide natural disaster which is stylish throughout the year. There are various methods of alerts such as the email notifications, sirens etc. The design goal of this project is to monitor sudden floods can create a alert that will reach an end user through their mobile phone. Living in a very place that gets several warnings might create it troublesome to induce insurance. People might not hear or have access to warnings. Television and radio take time to get electronic sirens capable of reproducing warning signals and voice announcement. Information can be broadcast simultaneously through SMS. Here we propose to use such as Ultrasonic pressure, Node MCU, GSM module. The ultrasonic pressure will monitor the water level. The GSM modem is a device that can be either a mobile phone or a modem device that can be used to make a computer or any other processor communicate over a network. In addition, it requires a SIM card to be operated and operates over a network range subscribed by the network operator. It may be connected to laptop through serial, USB or Bluetooth connection..The advantage of this system is to monitor the sudden flood occur and then it will send the report immediately for protecting lives and livelihoods.**

Keywords: Flood Detection, Wireless Sensor Networks, SMS.

INTRODUCTION:

The importance of flood alerting systems for protecting lives and livelihoods. Communities across the country have created flood alerting systems to warn areas of flood danger. A communications system to collect and distribute information. FAS, however, require a high level of ongoing commitment and support beyond one-time installation costs. Those with the most success have proactive, energetic staff members; strong long-term operational funding and a good rapport with the local FAS forecast office. This manual provides guidance for working with local communities who want to develop, implement, and operate FAS. The basic good thing about an area flood warning program is Associate in Nursing inflated interval for watches and warnings at locations subject to flood risk. Organizations and people are given notice by the system so that they will defend themselves and their property. The basic parts of a flood warning program are: The FAS, including equipment, people, and procedures for recognizing an impending flood and disseminating warnings. A prepared plan of action to be taken before and during the flood. Arrangements for updating and maintenance of equipment and plans Local flood warning programs can be extremely effective. Local flood warning programs also have been credited with preventing unnecessary evacuations and other over reactions in cases when floods threatened but did not occur. Thousands of communities that are threatened by floods lack the elementary protection of a flood warning program despite the many success stories, the relatively low cost for their development, and the simplicity of their operation.

INTRODUCTION TO IOT:

Internet of Things (IoT) is that the networking of physical objects that contain natural philosophy embedded among their design so
as to speak and sense interactions amongst one another or with respect to the external environment. In the forthcoming years, IoT- based technology will offer advanced levels of services and practically change the way people lead their daily lives. Advancements in drugs, power, gene therapies, agriculture, smart cities, and smart homes are just a very few of the categorical examples where IoT is strongly established. Over nine billion 'Things'(physical objects) are presently connected to the net, as of now. In the close to future, this number is expected to rise to a whopping 20 billion. There are four main components used in IoT: Low- power embedded systems –Less battery consumption, high performance are the inverse factors play a significant role during the design of electronic systems. Cloud computing -data collected through IoT devices is very large and this knowledge must be keep on a reliable storage server. This is where cloud computing comes into play. The data is processed and learned, giving more room for us to discover where things like electrical faults/errors are within the system. Availability of big data –We know that IoT relies heavily on sensors, especially real-time. As these electronic devices unfold throughout each field, their usage is going to trigger a massive flux of big data. Networking affiliation: In order to speak, internet connectivity is a must where each physical object is represented by an IP address. However, there are solely a restricted range of addresses accessible per the science naming. Due to the growing range of devices, this naming system will not be feasible anymore. Therefore, researchers are trying to find another different naming system to represent every object. There are two ways of building IoT: Form a separate internetwork including only physical objects. Make the Internet ever more expansive, but this

requires hard-core technologies such as rigorous cloud computing and rapid big data storage (expensive).Characteristics of IoT: Massively scalable and efficient IP-based addressing cannot be appropriate within
the forthcoming future. An abundance of physical objects is present that does not use IP, so IoT is made possible. Devices typically consume less power. When not in use, they should be automatically programmed to sleep. A device that's connected to a different device without delay might not be connected in another instant of your time . Intermittent connectivity – IoT devices aren't always connected. In order to save lots of information measure and battery consumption, devices are hopped-up off sporadically once not in use.

Introduction to Node MCU:
Node MCU is AN open supply IOT platform, It includes code that runs on the ESP8266 Wi-Fi SOC from categorical if Systems, and hardware that relies on the ESP-12 module. The term "Node MCU" by default refers to the code instead of the event kits. The code uses the Lua scripting language. It is based on the Lua project, and built on the Express if Non-OS SDK for ESP8266. It uses several open supply comes, like lua-cjson and SPIFFS.
Chapter 1 deals with the brief introduction to flood alerting system ,IOT and Node MCU.
Chapter 2 explains about the literature survey.
Chapter 3 briefly describes the system analysis for existing system and proposed system.
Chapter 4 gives the system specification for hardware and software components.
Chapter 5 shows the system implementation for block diagram, circuit diagram, flow diagram and also the modules of the proposed system.
Chapter 6 gives the conclusion for the project and gives the idea for future works that can be added to improve the performance.

Literature survey:
Aziz, I. A. Hamizan, N. S. Haron and M. Mehat, "Cooperative flood detection using GSM via SMS",2008(This project focuses on monitoring water level remotely using wireless sensor network).
E.Kuantama, L.Setyawan and J.Darma, "Early Flood alerts using short message service(SMS)",2012(Early flood alerts system is use to create a tool to measure water level, which powered by solar cell panel).
Johor Bahru,"UTM SMS Based Flood Device Minimizes", 2015(Flood warning device that alerts people through Short Message System (SMS) once the water level nearby starts to rise).
L.S.T. Molina, E. W. Harmsen and S. Cruz-Pol, "Flood alert system using rainfall forecast data in western puerto rico",2013(Flooding due to sudden, extreme rainfall events, some of which fail to be detected by radar).
Bartholmes. J .C, Thielen. J, Ramos. M. H, & Gentilini. S,",The European Flood Alert System EFAS & ndash; Part 2: Statistical skill assessment of probabilistic and deterministic operational forecasts",2008(This is achieved by providing complementary, added value information to the National hydrological services and by keeping the European Response and Coordination Centre informed about ongoing floods and about the possibility of upcoming floods across Europe).

EXISTING SYSTEM:
There have been many successful solution on flood alerts using SMS, yet most count on either having a constant power source or which rely completely on solar energy as their main source of power. In the existing system a sensing unit is built using a GSM module and a PIC18F452 micro controller with 3 different liquid level sensor as input. The system defines a level threshold and sends one SMS text alert via GSM. Once the levels start receding it will also alert the user on said event. The drawbacks of this design are that the sensing and alert system are concentrated into one unit. Also, the system is designed to be only be triggered by the levels and does not store historical data. Finally, the system is supplied constant power through a 15V power supply, having the necessity of being tethered to the power grid. The use of the ultrasonic sensor allows the system to get an accurate reading on the water level and to be able to measure up to four meters; it also allows the zero point height to be changed, making the system adaptable to various flood prone areas. However, the system can only be used by two users at a time, which input their phone numbers to the system and receive three alerts per threshold reached. This design relies on solar power as its only energy source, making it unsuitable for twenty-four hour operation.

PROPOSED METHODOLOGY:
The proposed system is an enhanced technique for monitoring the water level and to alert the end user. It uses such as Ultrasonic sensor, Node MCA, GSM module. The ultrasonic pressure will monitor the water level. The GSM modem is a device that can be either a mobile phone or a modem device that can be used to make a computer or any other processor communicate over a network. In addition, it requires a SIM card to be operated and operates over a network range subscribed by the network operator.
It will be connected to a pc through serial, USB or Bluetooth affiliation.
The advantage of this system is to monitor the sudden flood occur and then it will send the report immediately for protecting lives and livelihoods.

MOBILE UNIT:
The retrieved information about the fault occurrence location has to be conveyed to the concerned authorities through SMS enabled by GSM module. The information is received through the mobile unit which holds the registered number

SOFTWARE FLOW:

The below flowchart explains the working principle of the project. The software in a loop basis checks for the change in the position. If there is any change then the acquired GPS data is Sent as a SMS with the link to the location.

BLOCK DIAGRAM:

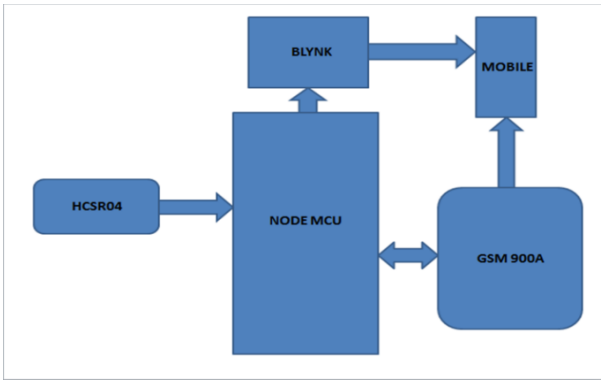


Fig. 1 Block diagram of the proposed system

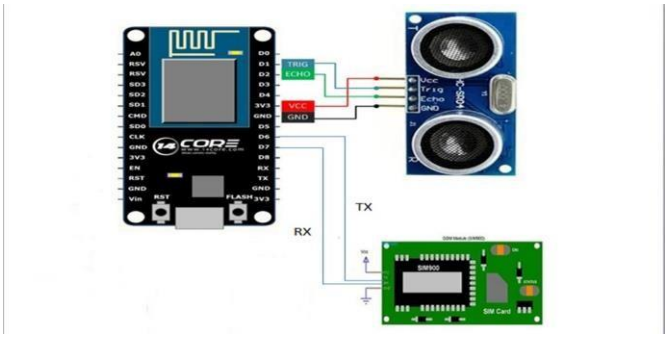


Fig. 2 Circuit diagram for the flood alerting system

MODULES:

- Ultrasonic sensor
- Node MCU
- Blynk
- GSM

ULTRASONIC SENSOR:

An inaudible device may be a device which will live the gap to associate degree object by victimization sound waves. It measures distance by causation out a acoustic wave at a particular frequency and listening for that acoustic wave to heal. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sonar sensor and the object.

NODEMCU:

Node MCU is an open source iot platform. It includes computer code that runs on the ESP8266 Wi-Fi SoC from Express if Systems, and hardware which is based on the ESP-12 module. The term "Node MCU" by default refers to the computer code instead of the event kits. The firmware uses the Lua scripting language. It is supported the eLua project, and built on the Express if Non-OSSDK for ESP8266. It uses many open source projects, such as lua-cjson and SPIFFS Node MCU is an open source LUA based firmware developed for ESP8266 wifi chip. By exploring practicality with ESP8266 chip, Node MCU firmware comes with ESP8266 Development board/kit i.e. Node MCU Development board Since Node MCU is open source platform, their hardware design is open for edit/modify/build. Node MCU Dev Kit/board include ESP8266 wireless
fidelity enabled chip. The ESP8266 is a low-cost Wi-Fi chip developed by Express if Systems with TCP/IP protocol.

BLYNK:

Here blynk app is used to notice the sensor measurement and also the water level then it will inform the end user through SMS or email or sirens. It will management hardware remotely, it can display sensor data, it can store data, vizualize it and do many other cool things. There are three major components in the platform but we use blynk app only. It is used to allow you to create amazing interfaces for your projects using various widgets we provide.

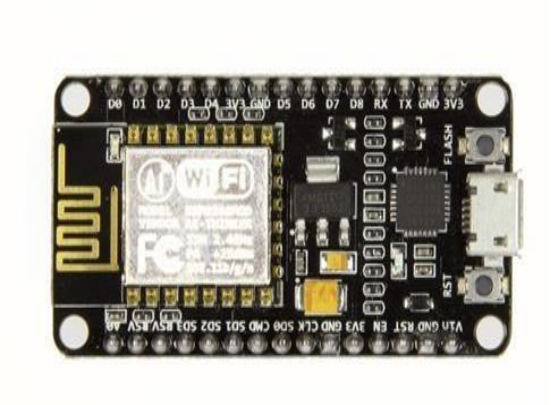
GSM:

A GSM module or a GPRS module may be a chip logicgate thatmay be accustomed establis h communication between a mobile device or a computer and GSM or GPRS system. The modem (modulator-demodulator) is a critical part here. These modules include a GSM module or GPRS electronic equipment high- powered by an influence provide circuitand communication interfaces (like RS-232, USB 2.0, and others) for computer. A GSM electronic equipment will be an ardent electronic equipment device with a serial, USB or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities. They can feature all the functionalities of a portable through pc like creating and receiving calls, SMS, MMS etc.
These are chiefly utilized for pc based mostly SMS and MMS services. The GSM/GPRS module demonstrates the employment of AT commands.

Hardware Requirements: Ultrasonic Sensor:

IoT supersonic sensors are designed for non- contact detection of solid and liquid objects.
These sensors are used for a large sort of functions from observance the extent of water in a very tank to fluid identification/concentration, to police investigation object proximity. Ultrasonic sensors became indispensable for IoT delivery and are wide used for building good, connected product.Understand a lot of concerning the various kinds of sensors, however they work, and their applications for everything from good automotive reversal systems to good waste bins. Ultrasonic transducers convert ultrasound waves to electrical signals and contrariwise. These devices work on a principle kind of like that employed by transducers in measuring system and echo sounder systems, that measure the attributes of the target object by process the echo signals from radio or sound waves, respectively.
Ultrasonic sensors carries with it 2 parts: a transmitter and receiver, that produce a electrical device that converts ultrasound waves into electrical signals (A/C) or contrariwise.

NODE MCU:



Node MCU is an open source IOT platform. It includes computer code that runs on the ESP8266 Wi-Fi SOC from Express if Systems, and hardware, that relies on the ESP-12 module. The term “Node MCU” by default refers to the firmware rather than the develop kits. The firmware uses the Lua scripting language. It is based on the Lua project and built on the Express if Non-OS SDK for ESP8266. It uses several open supply comes, such as Lua-cjson and spiffs.
Features: Wi-Fi Module – ESP-12E module kind of like ESP-12 module however with six additional GPIOs.
USB – small USB port for power, programming and debugging
Headers – 2x 2.54mm 15-pin header with access to GPIOs, SPI, UART, ADC, and power pins Misc – Reset and Flash buttons
Power – 5V via micro USB port.

Technical Specification of Microcontroller ATmega328

Operating Voltage
Input Voltage (recommended) Input Voltage (limits)

Digital I/O Pins

Analog Input Pins 6

DC Current per I/O Pin

DC Current for 3.3V Pin

Flash Memory 32 KB of which 0.5 KB used by boot loader
SRAM 2 KB
EEPROM 1 KB
Clock Speed 16 MHz

GSM:

Fig 4. GSM Modem-RS232

GSM Modem-RS232 is constructed with twin Band GSM engine- SIM900A, works on frequencies 900/1800 Mhz. The electronic equipment is returning with RS232 interface, which allows you connect PC as well as microcontroller with RS232 Chip(MAX232). The information measure is configurable from 9600-115200 through AT command. The GSM Modem is having internal TCP/IP stack to enable you to connect with internet via GSM. It is appropriate for SMS, Voice as well as DATA transfer application in M2M interface.The on board Regulated Power offer permits you to attach wide selection unregulated power offer.

FEATURES:

1.Dual band GSM 900/1800MHz.
2.Configurablebaudrate.
3. SIMcardholder.
4. Built in network status LED. Inbuilt powerful
5.

APPLICATIONS:

Access control device. Apply chain management.
Specifications:

Parameter	Value
Operating voltage	+12v DC
Weight	<140g

Pin Specification:

Pin	Name	Details
1	GND	Power supply ground
2	Tx	Transmitter
3	Rx	Receiver
4	Line_ r & Line_ l	Line input
5	DTR	Data terminal ready
6	CTS	Clear to send
7	RTS	Request t o send

WORKING:

Mode Function Normal operation

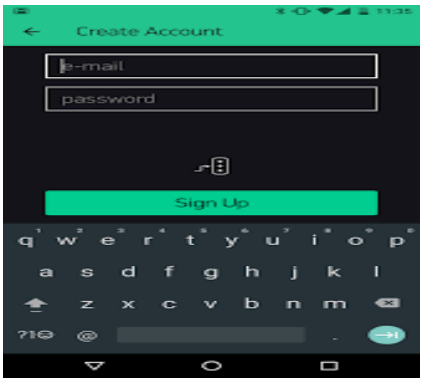
Software Requirements: Arduino:

The arduino Integrated Development setting - or Arduino package (IDE) - contains a text editor for writing code, a message space, a text console, a toolbar with buttons for common functions and a series of menus.

It connects to the Arduino and Genuino hardware to transfer programs and communicate with the file extension ino. The editor has options for cutting/pasting and for searching/replacing text The console displays text output by the Arduino package (IDE), together with complete error messages and different information. The bottom right hand corner of the window displays the configured board and serial port. The blynk is used for alerting the flood through sms,email and sirens. The toolbar buttons permit you to verify and transfer programs, create, open, and save sketches, and open the serial monitor. Arduino is associate ASCII text file physics platform supported easy-to-use hardware and package. Arduino boards area unit ready to scan inputs - light-weight on a device, a finger on a button, or a Twitter message- and switch it in to associate output activating a motor, turning on associate light emitting diode, business enterprise one thing online. You can tell your board what to try and do by causation a group of directions to the microcontroller on the board. To do therefore you employ the Arduino artificial language (based on Wiring), and also the Arduino package (IDE), supported process. Over the years Arduino has been the brain of thousands of comes, from everyday objects to complicated scientific instruments.

A worldwide community of manufacturers - students, hobbyists, artists, programmers, and professionals - has gathered around this open- source platform, their contributions have added up to an incredible amount ofaccessible data that may be of nice facilitate to novices and specialists alike.

BLYNK:



Blynk may be a Platform with IOS and mechanical man apps to manage Arduino, Raspberry Pi and the likes over the Internet.

It's a digital dashboard wherever you'll be able to build a graphic interface for your project by merely dragging and dropping widgets.

There are three major components in the platform:

Blynk App - permits to you produce wonderful interfaces for your comes victimization numerous widgets we offer. Blynk Server - liable for all the communications between the smartphone and hardware. You can use our Blynk Cloud or run your non-public Blynk server regionally.

It’s ASCII text file could be easily thousands of devices and can even be launched on a Raspberry pi. Blynk libraries for all the favored hardware platforms modify communication with the server and method all the incoming and out coming commands. Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things.

CONCLUSION AND FUTURE WORK:

The project proposed is a simple technique which can be easily implemented and cost effective for the flood alerting system. The idea has been implemented as a prototype and verified successfully. The results shows that immediate report will be given to the concerned authority which helps in immediate remedial measures. In future the other parameters measuring can be included and remedial measurements may be added. The idea proposed is now concentrates on flood alerting system and the same can be used to other types of flood alerting also. Here blynk app is used to notice the sensor measurement and also the water level then it will inform the end user through SMS or email or sirens.

REFERENCE:

[1] E. Kuantama, L. Setyawan, and J.Darma "Early flood alerts using short message service(SMS)," in 2012 (Early flood alerts system is use to create a tool to measure water level, which powered by solar cell panel).

[2] M. S. Baharum, R. A. Awang, and N. H. Baba, "Flood monitoring system (MYMFS)," in 2011 pp, IEEE 06 2011.

[3] L. S. T. Molina, E. W. Harmsen, and S. Cruz- Pol, "Flood alert system using rainfall forecast data in western puerto rico," in 2013 (Flooding due to sudden, extreme rainfall events, some of which fail to be detected by radar).

[4] I. A. Aziz, I. A. Hamizan, N. S. Haron, and M. Mehat, "Cooperative flood detection using GSM via SMS," in 2008 (This project focuses on monitoring water level remotely using wireless sensor network).

[5] Johor Bahru,"UTM SMS Based Flood Device Minimizes" 2015(Flood warning device that alerts people through Short Message System(SMS) once the water level nearby starts to rise).

[6] Wu, H., Adler, R. F., Hong, Y., Tian, Y., & Policelli. F, "Evaluation of Global Flood Detection Using Satellite-Based Rainfall and a Hydrologic Model",2012(The purpose of this paper is to evaluate the performance of this new version of the GFMS in terms of flood event detection against flood event archives to establish a baseline of performance and directions for improvement).

[7] Alfieri, L., Velasco, D., & Thielen, J, "Flash flood detection through a multi-stage probabilistic warning system for heavy precipitation events",2011(This paper contributes to flash flood early warning by proposing a multi-stage warning system for heavy precipitation events based on threshold exceedances within a probabilistic framework).

[8] Yamada, Y, "Flood extent detection in paddy area and future plan of disaster information sharing platform in rural areas",2011(The author also tried to make a disaster information sharing platform, 'GeoWeb', using open source software and the ISO orOGC standards).

[9] Fang, S., Xu, L., Zhu, Y., Liu, Y., Liu, Z., Pei, H., … Zhang, H."An integrated information system for snowmelt flood early-warning based on internet of things",2015(This paper presents an integrated approach to snowmelt floods early warning based on geo informatics (i.e. remote sensing (RS), geographical information systems (GIS) and global positioning systems(GPS)),Internet of Things(IoT) and cloud services).

[10] Bartholmes, J. C., Thielen, J., Ramos, M. H., & Gentilini. S,"The European Flood Alert System EFAS – Part 2: Statistical skill assessment of probabilistic and deterministic operational forecasts",2008(EFAS aims at increasing preparedness for floods in trans-national European river basins by providing medium-range deterministic and probabilistic flood forecasting information, from 3 to 10 days in advance, to national hydro-meteorological services).