Smart Interactive Flood Early Warning System using Arduino-Raspberry Pi

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***Abstract*: - From a national economic viewpoint, floods, both riverine and coastal, falls under the most destructive category of natural hazards in India. Causing economic losses to homes and personal property, to crops, business facilities and stocks, utilities. India due to its unique geography is highly vulnerable to floods, understanding this issue there is an urgent requirement for development and installation of enhanced flood forecasting systems in various flood prone areas. In this paper, we describe the design and implementation of an embedded system for flood management. The paper is mainly concerned on how the data of the flood is being used and analyzed for future forecasting. We are using many types of electronic devices such as Water level sensor, Raspberry Pi and Aurduino nano many other to be deployed at locations, wherever mobile network is available. Collection of data occurs at user defined intervals of time and is uploaded to the database .The information acquired from the database can then be easily viewed from anywhere , used for further analysis . The water level mechanism is used to detect and indicate the level of water in the Dam. Also system provide timely automated voice based alert to the flood prone areas. This enables the public to be warned en masse so that actions can be taken to reduce the adverse effects of the event. As such, the primary objective of a flood warning system is to reduce exposure to coastal flooding.**

Keywords: Raspberry pi, Arduino nano, float sensor.

I.   INTRODUCTION

From 8 August 2018, India's southern state of Kerala faced a serious problem of flooding due to unusually high rainfall during the monsoon season, with more than one million people displaced and more than 400 reported deaths. All 14 districts of the state were placed on red alert. Thirty five out of thirty four dams within the state were fully or partially opened for the first time . It was the worst flood in Kerala's recorded history.

 Flood warning system is a way of detecting the threat in advance. With an aim to prevent loss of life and extensive damage due to floods, we designed a flood warning system that will predict the possibility of floods in advance .The main parts of this system are raspberry pi and arduino nano. The raspberry pi is minicomputer and the arduino nano is a small, complete and breadboard- friendly board based on ATmega328P. The working of the system depends on water level in the dam and temperature variation in nature. When the water level reaches the predefined level, automatically the message or alert is passed to the authorities and at the same the message is also passed to the society, it helps to avoid the time lag.

The system provide voice based alert to flood prone area, it helps the differently abled people for understanding the alert. The effective flood warning system is useful for early warning and disaster prevention.

II.   PROPOSED MODEL:

Here we propose smart interactive flood warning system, it discuss about the design and implementation of an embedded system for flood management. This method used to reduce or prevent the detrimental effect of flood water.
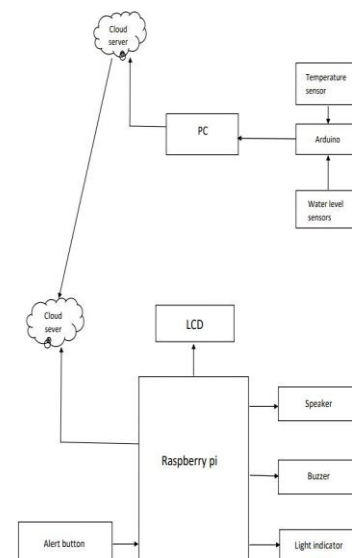

Fig1: Block diagram:

III.   WORKING:

 In this paper we discuss about the design and implementation of an embedded system for flood management. It consist of mainly two devices, Raspberry pi and Arduino nano. Raspberry pi is the main part of this project, it is a low cost, mini-computer that plugs into a Computer monitor or a TV and uses a standard keyboard and mouse. The peripherals of the Raspberry pi are LCD, LED, buzzer, speaker and button. Raspberry pi device which is placed in every house. Water level sensor and temperature sensor are placed in the dam. Water level sensor is used to detect the level of water in the dam. Initially predefined the three levels corresponding to yellow

alert, orange alert and red alert. When water level reaches corresponding points then the corresponding alerts are send instantly to authorities and at the same time the information or alert passed to every home where the raspberry pi is placed. The Arduino board is master controller which can only be accessed with the concerned authorities. The working of this device depends on the water level reaching the predefined level and temperature variations in the nature., it sends the message or information that to be prepared getting alert at the same time to the authorities and society it helps to avoid the time lag and it more helps to take precautions.

For programming, the python language is used. When the information is passed to society it contains also a voice message and the LED combinations which shows corresponding lights of the disaster level, it helps differently abled for understanding the alert. If we need any help, the device is provided with SOS button that sends a message to authorities. The request button more useful and advanced device to improve the safety.
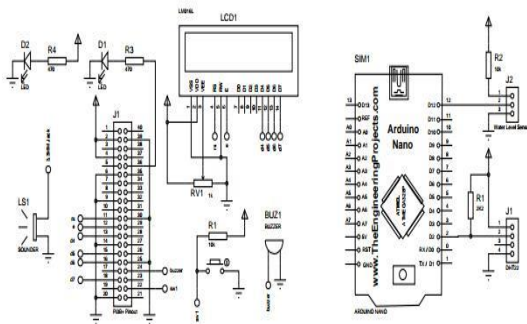

Fig 2 : Circuit Diagram

IV. CIRCUIT IMPLEMENTATION:

In this circuit, Raspberry pi and Arduino nano board bare the main part of this paper. , Raspberry Pi 3 Model B+ is faster and more powerful than its predecessors. It has improved power management to support more powerful external USB devices and now comes with built in wireless and Bluetooth connectivity. To take full advantage of the improved power management on the Raspberry pi 3 and provide support for even more powerful devices on the USB ports, a 2.5A adapter is required. 40 pin extended GPIO-4 x USB2 ports. 4 pole stereo output and composite video port. A 16×2 LCD display is very basic module is placed in the raspberry pi board. 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. This is a 16 character by 2 line display yellow and green backlight. A Micro SD port is used for loading operating system and storing data. Arduino Nano is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. The main peripherals of the Arduino board are LED, Buzzer and Button. Float sensor is placed in the Arduino board, and is used for detecting the water level of the dam. The Arduino nano is connected in the computer with the help of USB adapter.

V. CONCLUSION:

In this paper, a system is designed to detect and forecast floods so that the public can be alerted in advance and can undertake appropriate measures to minimize the impact of the event. It is possible to implement flood warning systems together with other adaptation measures, as part of an integrated flood risk management plan. And the proposed embedded system will be efficient for monitoring and forecasting flood. The system is used to provide timely automated voice based alert to the flood prone areas.

VI. FUTURE SCOPE:

The project can be extended to detecting flash floods by integrating with whether satellites. By measuring the wave heights the system can be transformed into a tsunami detection system.

ACKNOWLEDGMENT

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