IOT Based Flood Warning System Using Raspberry Pi

Mr. Manjunath H R[1], Shruthi HK [2], Shwetha HD[3], Shalini KH[4], Gowthami B[5]
[1]Asst. professor Dept of CSE, [2345]UG student, Dept of CSE, BGSIT,

Abstract: This project describes the design and implementation of a wireless sensor network for Flood warning system using Raspberry pi with the involvement of IOT. The sensor network was deployed in a water source or near the sea shore. The sensor node was developed using off-the-shelf components and consists of sensors like water level and Raspberry pi powered with IOT. Real- time data enabled the operators to characterize the operating parameters at the seashore and also to respond immediately to any changes in the controlled parameters.

keywords: IOT, Raspberry – pi

1. INTRODUCTION

The Internet of Things (IOT) is an important topic in technology industry, policy, and engineering circles and has become headline news in both the specialty press and the popular media. This technology is embodied in a wide spectrum of networked products, systems, and sensors, which take advantage of advancements in computing power, electronics miniaturization, and network interconnections to offer new capabilities not previously possible. An abundance of conferences, reports, and news articles discuss and debate the prospective impact of the "IoT revolution"—from new market opportunities and business models to concerns about security, privacy, and technical interoperability.

The large-scale implementation of IoT devices promises to transform many aspects of the way we live. For consumers, new IoT products like Internet-enabled appliances, home automation components, and energy management devices are moving us toward a vision of the "smart home'', offering more security and energy efficiency. Other personal IoT devices like wearable fitness and health monitoring devices and network enabled medical devices are transforming the way healthcare services are delivered. This technology promises to be beneficial for people with disabilities and the elderly, enabling improved levels of independence and quality of life at a reasonable cost.1 IoT systems like networked vehicles, intelligent traffic system, and sensors embedded in roads and bridges move us closer to the idea of "smart cities'', which help minimize congestion and energy consumption. IoT technology offers the possibility to transform agriculture, industry, and energy production and distribution by increasing the availability of information along the value chain of production

using networked sensors. However, IoT raises many issues and challenges that need to be considered and addressed in order for potential benefits to be realized.

Fundamentally, the Internet Society cares about the IoT as it represents a growing aspect of how people and institutions are likely to interact with the Internet in their personal, social, and economic lives. If even modest projections are correct, an explosion of IoT applications could present a fundamental shift in how users engage with and are impacted by the Internet, raising new issues and different dimensions of existing challenges across user/consumer concerns, technology, policy and law. IoT also will likely have varying consequences in different economies and regions, bringing a diverse set of opportunities and challenges across the globe.

This overview document is designed to help the Internet Society community navigate the dialogue surrounding the Internet of Things in light of the competing predictions about its promises and perils. It provides a high-level overview of the basics of IoT and some of the key issues and questions that this technology raises from the perspective of the Internet Society and the core values we promote. It also acknowledges some of the unique aspects of the Internet of Things that make this a transformational technology for the Internet. As this is intended to be an overview document, we do not propose a specific course of action for ISOC on IoT at this time. Rather, we see this document as an informational resource and starting point for discussion within the ISOC community on IoT-related issues.

The term "Internet of Things" (IoT) was first used in 1999 by British technology pioneer Kevin Ashton to describe a system in which objects in the physical world could be connected to the Internet by sensors. Ashton coined the term to illustrate the power of connecting Radio-Frequency Identification (RFID) tags used in corporate supply chains to the Internet in order to count and track goods without the need for human which Internet connectivity and computing capability extend to a variety of objects, devices, sensors, and everyday items.

II. SYSTEM ANALYSIS

i. Existing system

Previous work covers a wide variety of topics including sensor networks for environmental monitoring, sensor networks for flood detection, and operational flood detection systems. Sensor Networks for Environmental Monitoring Several sensor network systems have been designed for outdoor monitoring purposes especially animal monitoring. While this work does not directly relate to ours, implementations sharing some interesting characteristics include cattle ranch monitoring ,cattle control sheep monitoring, zera herd monitoring seabird nests and frog vocalizations. Of greater relevance is work in environment monitoring where several projects have implemented related systems.

. Detection of recordable signals did occur on the system, but no further data analysis occurred within the network. While the systems do share some characteristics to the system and problem we describe, none envision the level of heterogeneity our system requires, the minimalistic number of sensors available for the extensive network area, the real-time need for the data, or the computational autonomy and complexity necessary to perform the prediction operation.

Sensor Networks for Flood Detection Previous work on sensor networks for flood detection is sparse with only two different examples discovered in the literature. Castillo-
Geffen suggests an architecture for a system, but is unclear on the basin characteristics and no hardware details are suggested which describes a flood-predicting sensor network that uses Gumstix sensor nodes, which require significant power but allow for a Linux operating system to run on the node. As described, the system had been tested in the lab, but no field tests were performed by time of the paper. Given lack of information on the flood prediction side, the known details of the hardware platform dismiss it as an immediate solution to the problem introduced here as it has limited geographic range, high cost, and power requirements that may be, in the long-term, unsustainable.

Current Operational Systems for Flood Detection While not specifically sensor network installations, understanding the current operational systems helps clarify the problem space in which we are working. The lack of published information on operational flood systems makes generalizations difficult, but three systems seem to summarize the approaches currently taken. One type involves a highly technical solution with significant resource support such as seen in the US. For this system, companies develop sensor, communication, and computation technology based on the ALERT protocol, which defines the data structure and polices of environmental monitoring systems.

Disadvantages of existing system:

The crystal frequency was less and response time was more so its not suitable for real world. It cannot run X86 operating system. In the existing system the water level sensor has less frequency so its changes from the affect of noises and air turbulences. We require different languages like PHP, mysql, phyton and html.

ii. proposed system:

In this section we describe a model and an efficient algorithm for flood prediction that uses data from the nodes of a spatially distributed sensor network. This approach is computationally leaner than conventional approaches to flood modeling and prediction, utilizing real-time data from multiple sensor nodes. Rainfall driven floods1 are the most common seasonal events. They occur when the soil no longer has the capacity to absorb rainfall. To predict flooding, a model requires knowing how much rain falls and what the soil's time dependent response to the rainfall will be.

Advantages of proposed system:

In our project we are using raspberry-pi3, the crystal frequency is 1.2GHz so the response time is very less. It support for maximum OS that is Linux, windows etc. It can work as a personal computer. The water level sensor have 40KHz frequency it gives fast update so that lives can be saved. In our project only used language is python and html. For creating pages we used flask in python that is the main advantage for our project for update the information on the page. Since we are using raspberry-pi3 it has its own ip address can easily make it as client and update to the server. Internal defects can be detected and sized when a validated procedure is applied of the water level sensor. Access to only one side of the component is needed in water level sensor. Using the voice module we can alert the nearby people so that they will not effected from the disasters. Using voice module we can record 8 different voices like alert, danger, run etc…

III. SYSTEM ARCHITECTURE

Raspberry pi3 controls the hardware devices connected to it and monitors the condition.

APR32a2 is connected to raspberry pi3, It is input device, used to record voice message. Ultrasonic sensor is connected to raspberry pi3, it sense the water level and sends output to the raspberry pi3. Water float switch is connected to raspberry pi3,and it sense the level of water , if water level rises are falls, the float will come closer to the leads can come to know flood is there are not in web application.

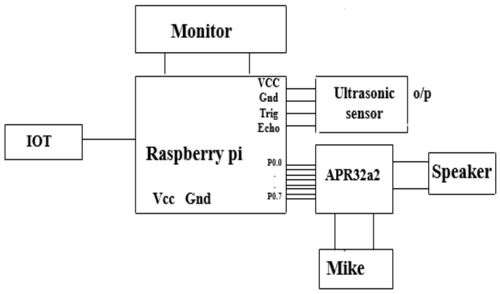

Fig 3.1 System Architecture

Monitor can view the work and the input we are giving. Speaker- is the output device, it is connected to raspberry pi3, we can hear the stored voice message when water level raises.

IV. IMPLEMENTATION

Implementation is the stage of the project when the theoretical design is turned out into a working system thus it can be the most critical stage in achieving a successful new system and in giving the user, confidence that the new system will work and be effective. The implementation stage involves careful planning, investigation of the existing system and it's constraints on Implementation, designing of methods to achieve changeover and evaluation of changeover methods.

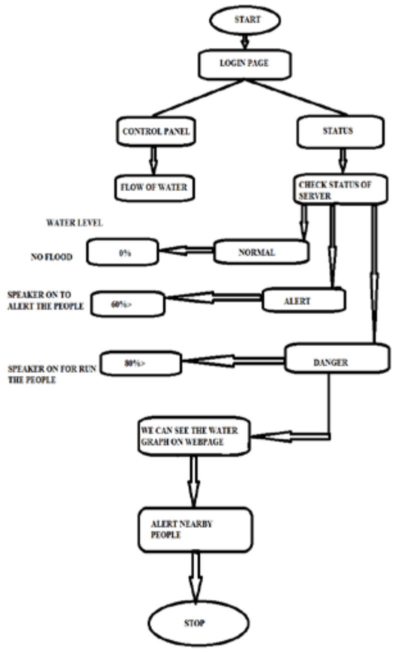

Fig 4.1 Work Flow Diagram

- System administrator Login, Change password, edit
- User Login, can see sea status

  Here the user can open the web application and can login using user id and password if user id and password is valid it will successfully get logged in are back to user id and password.

V.RESULTS

The web application that can be see in computer are mobile browser

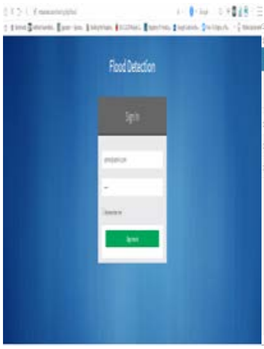
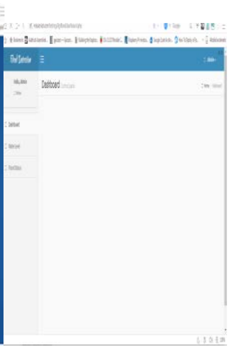

Fig: 5.1 login in web application   Fig:5.2 display of dashboard

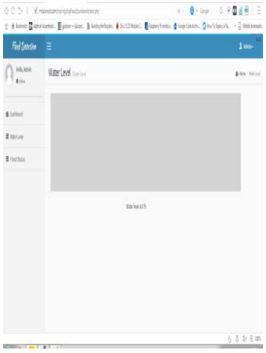


Fig: 5.3 No Flood Fig:5.4 Run (water level 80%)

The web application is created by the admin using particular server and giving access to all people using the URL "mission.com/testing/digiflood/". It can be viewed in any mobile are computer browser. After clicking to particular URL will get above page. It is before login page contains sign in icon and boxes to type user name and password, and sign me in icon.

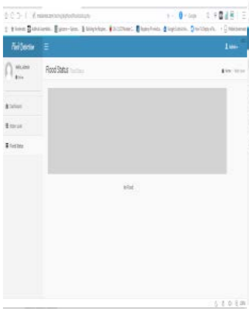
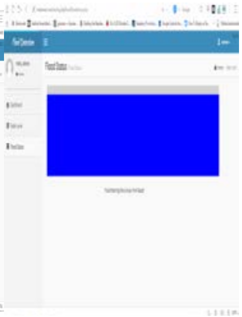

Fig: 5.5 No Flood Fig: 5.6 Flood move away from sea

VI. CONCLUSION

We described in this paper an architecture for predictive environmental sensor networks over large geographic areas. These systems are node-limited due to region size and cost constraints. They also have significant system requirements due to the real-time need for the data, destructive events, and long operational lifetime. Our sensor network solution addresses these requirements, consisting of two communication tiers, four node types, and support for a variety of sensor types. We focused on the event of river flooding, specifically in Honduras. The paper describes our work on the flood prediction algorithm that will eventually run on the system and the implementation of the sensor network architecture for this application. Locally, we installed 3 nodes on the upper Charles river at Dover and gathered 5 weeks of data, which we ran through our prediction algorithm, demonstrating both our system functionality and algorithmic functionality. In Honduras, we built several key pieces of infrastructure, including the radio antenna towers, and tested several system components.

VII. FUTURE SCOPE

Future work involves adding the flood prediction algorithm to the network and connecting the Dover sensors through the computation nodes to MIT. This will provide a su fficient enou comfortably plan a permanent system installation in Honduras, a further test of the practicality and robustness of the system. Though the developed system is very efficient but still there exist few disadvantages which can be improved. First , we are using wired ultrasonic sensor this can be overcome by using wireless ultrasonic sensor which is capable of placing in middle of the sea . And we are using ultrasonic sensor which sense the

Obstacles including birds etc..which comes near. We can overcome from it by using image processing technology which the ultrasonic sensor can sense particular objects like birds or water and send message only if it sense water level nearby sensor.

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