Disaster Management using Wireless Sensor Network

Kiran Ingale[1], Prasad Nikole[2], Advait Patil[3], Krushna Aghav[4], Ritikesh Nayak[5], KedarTonge[6]

[1]Professor, [2-5]UG Scholar, Department of E&TC Engineering, Vishwakarma Institute of Technology, Pune, MH, India

[1]kiran.ingale@vit.edu,[2]prasad.nikole16@vit.edu,[3]advait.patil16@vit.edu,[4]krushna.aghav16@vit.edu,[5]ritikesh.nayak16@vit.edu,
[6]kedar.tonge16@vit.edu

Abstract: Changes in Global climate is increasing the occurrence of extreme climate phenomenon with increasing severity, both in terms of human casualty as well as economic losses. Authorities need to be better equipped in order to face these disasters. An efficient disaster detection and alerting system can help in reducing the loss of life and properties. A wireless sensor networks play a crucial role in wireless data transmission and helps very much in this regard. Using Wireless sensor networks we can reduce the disaster effect of natural calamities such as floods, tsunami, hurricanes, etc. and can provide the rescue operation immediately. This paper aim to review technological solutions for disaster management using Wireless Sensor Network(WSN) via disaster detection and alerting system using wireless sensor(Bluetooth). The use of WSN can replace the traditional network for disaster management which involves a huge hardware circuitry such as landline and optical cable network. Wireless networks are easy to maintain and cost effective and have lot of advantages compared to traditional wired networks.

Keywords: Sensing Node, Intermediate Node, Coordinating Node, Wireless Sensor Network (WSN).

I. INTRODUCTION

At present timeone of the biggest challenge the mankind is facing is from natural calamities like floods, Tsunami, hurricanes, etc which are occurring frequently due to several reasons like deforestation, land sliding and global warming. Hence to prevent these situations required steps are needed to be taken by pre determining the causes of these disasters and providing quick rescue measures once the disaster occurs. The wireless sensor networks play a crucial role in wireless transmission of data. The use of Wireless sensor networks can help us to reduce the disaster effect and can provide the rescue operation immediately. A Wireless Sensor Networks (WSN) helps in disaster detection and alerting system for search and rescue operations. Use of WSN can replace the traditional network for disaster management which involves a huge hardware circuitry such as landline and optical cable network. wireless networks are easy to maintain and cost effective and have lot of advantages compared to traditional wired networks. After implementation of WSN networks in disaster management system the system has become more fast, accurate and efficient and this is because of the proper placement of the sensors and all nodes like Sensing node, Intermediate Node and Coordinating node.

Now for sending the data from one node to another we need two devices which could transfer the data or simply we need a wireless communication networks. And there are many such devices like

1. Bluetooth
2. Zigbee
3. Wi-Fi
4. GPRS

Any of these devices can be used to send information from one node to another. This proposed system is Bluetooth based networks which can exist up to 10m, has low power consumption and it is cheaper, easily available.

II. RELATED WORK

1. Real-Time Forest Fire Detection with Wireless Sensor Network: It includes a wireless sensor network paradigm for real-time forest fire detection and data transmission. The wireless sensor network can detect and forecast forest fire more promptly as compared to the the traditional satellite-based detection approach.

2. Deployment of Wireless Sensor Network on an Active Volcano: The WSN can be useful in easy installation of a sensor array in an area of tens of thousands of m^2, allowing the location of the magma movements thus causing the seismic tremor to be calculated. This WSN can be used to record the data locally for later analysis or by continuously transmitting it in real time to a remote laboratory for real-time analyses

3. Ad Hoc Wireless Sensor Network Architecture for Disaster Survivor Detection: A model for the Disaster survivor detection based on extremely critical Disaster situation where this energy efficient architecture can be useful to trace and locate thousands of people in critical circumstances.

III. SYSTEM OVERVIEW

The proposed system contains three nodes called sensing node placed inside the ground (in a protective box), intermediate node in a certain area and coordinating node placed in base station respectively. Both sensing node and intermediate node sends data signals to coordinating node, the coordinating node sends the data to the base station. The block diagram of WSN consists of 3 parts:

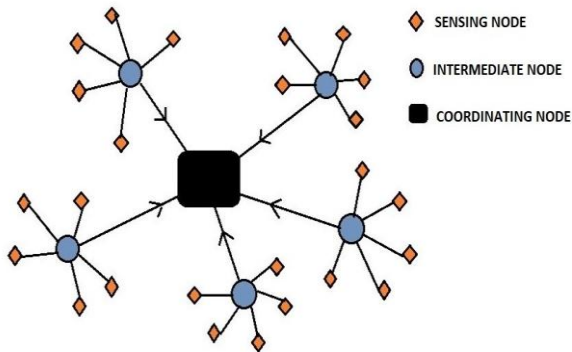- Sensing Node
- Intermediate Node
- Coordinator Node

Fig. 1. WSN System

A. Sensing Node:

It has earthquake sensor, and Bluetooth. These sensors sense the earthquake vibrations and convert those vibrations into voltage signal, these values of signal given to the microcontroller which will transmit this data to the intermediate node through Bluetooth. Signal is transmitted only in the case when then generated signal has the value greater than the threshold value otherwise the sensing node remains inactive.
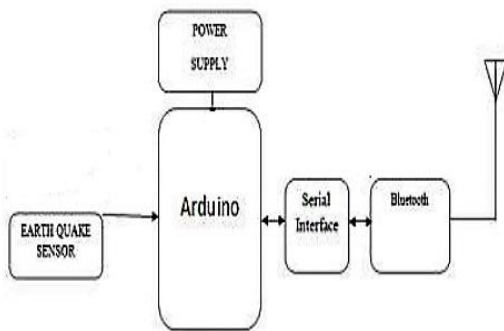

Fig. 2. Sensing Node

B. Intermediate Node:

It consists of Arduino and Bluetooth. So the information which was send by the sensing node will be transmitted to the intermediate node of that area. This node acts as a medium between the sensing node and the coordinator node. The main aim of this node is to transmit the received data from sensing node to the coordinator node.
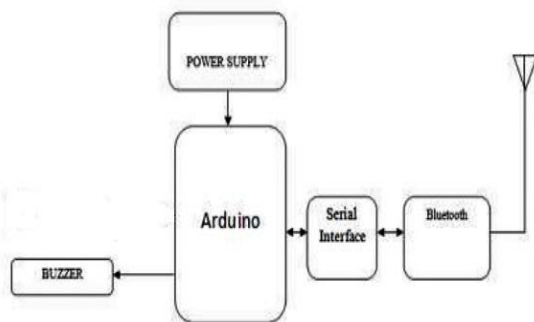

Fig. 3. Intermediate Node

C. Coordinating Node:

It consists of Arduino and Bluetooth. So that it will receive the data from the intermediate node. With this data the base station will get an alert and rescue operation will start.
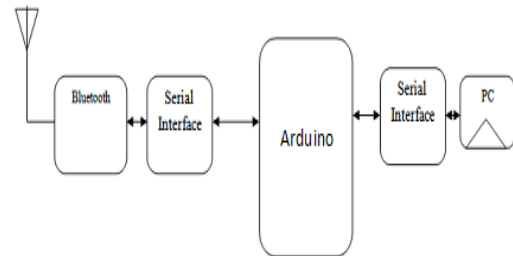

Fig. 4. Coordinating Node
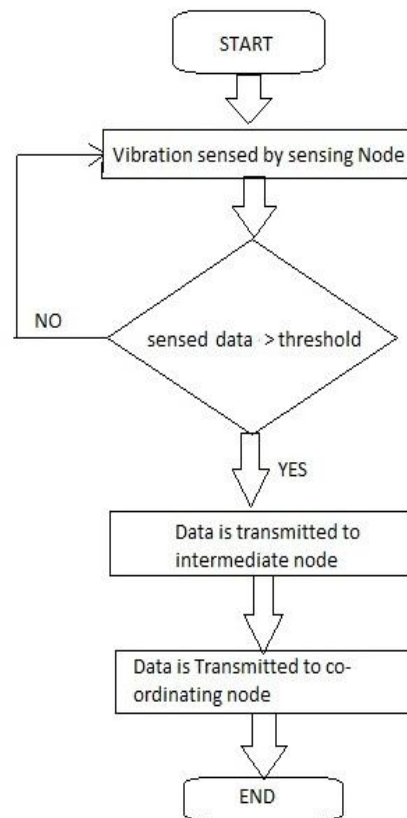
IV. WORKING OF THE SYSTEM

Fig. 5. Flowchart of Working of the System

Now for detecting any disastrous activity we have to be certain about the placement of the sensors or the sensing nodes. All the sensing nodes forms a cluster of nodes which takes the information from one node to another and at the end gives it to the base station or intermediate node. A sensing acts as a slave and transmits the sensed data to the intermediate node. The intermediate node then receives the data from the sensing node and further transmits the data to the coordinating node which is at the base station. At the

base station the data gets processed and the alert signal is generated by the system.

V. CONCLUSION

Wireless sensor networks (WSNs) have attracted a significant attention over the past few years. As technology is evolving, WSN is coming to spotlight because of its unattained potential and significance. This project describes about the implementation of Disaster management system by using wireless sensor networks (WSN).The wireless sensor network architecture thus helps us a lot in predetermining the causes of the natural as well as man-made disasters and providing rescue and preventive measures if somehow any area is struck by the disasters. Thus it helps in protecting many precious human as well as animal lives that would have been destined to perish from the effects caused by these disasters. Implementation of WSN reduces the cost and human efforts. This system helps us to increase the speed of disaster management and can reduce loss of property and loss of lives to a great extent.

The wireless sensor network system was successfully implemented. A sensing node sends data to the base station via intermediate node and there is any occurrence of disaster then the base station will get alerted and the proper measures can be taken to reduce the post effects of the disaster.The Bluetooth Wireless Sensor Network system is very quick, simple and efficient system which gives accurate results and because of this system we can help many people from disaster.

ACKNOWLEDGMENT

VI. REFERENCES

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