

A REVIEW ON FLOOD MONITORING AND PREDICTION BY USING WSN

¹SIMRAN CHAUS, ²LALIT WAGH, ³PRATHMESH DUBEY, ⁴DURGESH KARPE, ⁵Dr.K.C.NALAVADE

^{1,2,3,4}BE COMPUTER ENGINEERING, ⁵PHD
COMPUTER ENGINEERING,
SANDIP INSTITUTE OF ENGINEERING & MANAGEMENT, NASHIK, INDIA

Abstract: Floods are one of the most common natural disasters, there are many sophisticated systems for monitoring flood level in flood-prone regions, but the system which are already implemented are not cost effective. The system we propose will be using Wireless Sensor Network which consists of sensors like ultrasonic sensors and radio transmitters for communication between the sensors. The sensors will sense the current level of water and sends the data to the coordinating node using ZIGBEE protocol and the coordinating node sends the data to the cloud server over the internet, the cloud does the computation and after computation the final results are checked with the threshold if the threshold value is reached then the warning notifications are sent to the government authorities in the flood prone areas. Our proposed System helps both government and private organizations to work on evacuation and helping people to move to a safer place.

Index Terms: Wireless Sensor Network, Cloud, Zigbee, Ultrasonic sensor, Flood Prone Areas.

I. INTRODUCTION

One of the natural disasters that occur around the world is floods. To prevent flooding there are some parameters that we need to consider so that we can make a reasonable decision like having real time data of water level and precipitation level. Currently the alerts or the warning of the flood are late which end up flood taking lives of many citizens and animals and it affects the economy as well, this makes monitoring and alerting about the flood very crucial. In a country like India, where the population is massive even small floods inflict a huge amount of damage to the economy as well as the citizens. We have seen past incidents like in the month of august flood affected over 2.85 hundred thousand people who resided in 5 districts in Maharashtra. In the same month last year flood affected hundreds of thousands of people in the state of Kerala. Such incidents have also been seen in Delhi, Bihar, Assam, Mumbai, UP, Punjab.

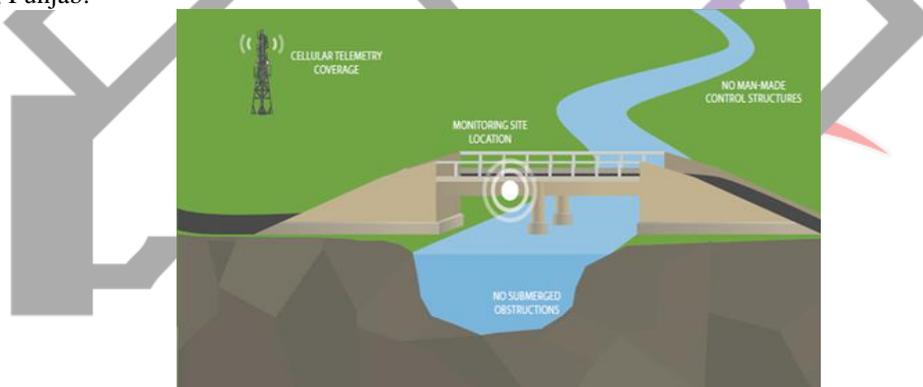


FIGURE 1. FLOOD MONITORING SYSTEM [SOURCE : [FONDRIEST ENVIRONMENTAL](#)]

II. LITERATURE SURVEY

1. Real-time WSN Based Early Flood Detection and Control Monitoring System Author: Tibin Mathew Thekkil ; Dr.N.Prabakaran

The downstream flooding from dams due to environmental disasters leads to failure of evacuation of nearby staying people cause high mortality rates and casualties. It is essential to record the height reached by the water and leak of water through the walls of dams in real time to avoid flooding and thereby casualties. The traditional manual monitoring are discommodious and scattered nowadays .It has also certain shortcomings that includes high cost and poor network connectivity. This paper presents a real time Wireless sensor network based early flood detection and control monitoring system designed with a function of real time monitoring ,guaranteeing connectivity in low cost. This system collects data as images from CMOS image sensors through wireless sensor nodes which transmit these images to remote monitoring centre via Zigbee network and GSM network. The remote centre will process the data by analyzing it and give necessary alert to clients. Simulation results show this system is cost effective and reliable for early detection of flood.[1]

2. Development of Flood Monitoring System using WSN and IoT based on Cloud Author:Pallavi C B1; Chandrakala

The impact towards mankind Flooding is the most common natural disaster. Floods have been known to do significant damage. There are many sophisticated systems widely in practice by organizations and responsible authorities in monitoring flood level in flood prone regions. Most of these devices are very costly to be used and maintained. The proposed system using N-mote and N-gateway, sensor data such as temperature, humidity, rainfall rate and water level can be sent to cloud and if threshold values of the environmental conditions increases, the warning message can be sent to the responsible authorities and people lives in a flood prone region. Such a system enables both private and government organizations to work on their emergency evacuation and mitigation plans for a safer move before the flood situation get worse.[2]

3. Flood Detection using Sensor Network and Notification via SMS and Public Network Author: Mohamed Ibrahim Khalaf alfahadiwy ;Azizah suliman

This paper presents a description of an alert generating system for flood detection. This paper focused on the development of the system which will determine the current water level by means of sensors and by using wireless sensor network will then provide notification via GSM modem. The system however does not just stop there but proceed to also send notification through popular social media platforms Facebook and Twitter. It is felt that notification system such as flood warning system should be carried a step further in notifying the public. Since social networking is at the moment one of the most popular medium of communication, sending an alert through it would hence reach a larger audience. A prototype of the proposed system is discussed in this paper and the results of the testing phase is also elaborated. The architecture of the system can be expanded further to a fully functioning system in alerting the public of an impending disaster caused by flood.[3]

4. Flood Detection System Using Wireless Sensor Network Author:Abhijeet A Pasi;Uday Bhawe

Environmental monitoring using Wireless sensor network (WSN) is one of the most challenging bustles handled by the research community. Hence it is decisive to employ the contemporary sensing and communication equipment to observe and identify flood incidences. Terrestrial wireless sensor networks are subject to extensive research and development. Numerous applications take advantage of low-cost, small-sized, easily configurable and scalable TWSN nodes to monitor, detect, and track various environmental phenomena and events. The recent advancement in electronics and sensor miniaturization and low power technologies enabled TWSNs to extend their reach to underwater applications. The role of the designed Flood Monitoring and Evasion System based on WSN is to continuously monitor, detect and report the environment's status to a control unit using relative water level, thrust and intensity of water as flood indicators, whose values are gathered by sensors in the sensor field. The flood monitoring and evasion system monitors and compute the status of floods and sends flood notification message to the base station of such zones for necessary action. The system is composed of three major modules which are the sensor module, observation module and the transponder module. The developed system is stout and gives well-timed alert of flood occurrences and controls the flood gate to avoid flood in coastal area.[4]

5. A New WSN Paradigm for Environmental Monitoring and Data Collection Author:Eric Dines, Hassanain Al-Majeed, Asanka Fernando, Mutaz Abdalla, Jaydeepsinh Gohil

Data collection of environmental phenomena has traditionally been a very manual process. Even the advent of electronic data logging instruments has not significantly reduced the workload for managing instruments in the field. Recently however, low-cost microcontroller systems with wireless connectivity, called wireless sensor networks (WSNs) have been developed. With the proliferation of low-cost sensing elements, WSNs should be transforming environmental monitoring, but certain shortcomings in the current WSN paradigm have conspired against widespread field deployment. These are: battery capacity limitations; specialized wireless protocols that exclude WSNs from direct integration into existing data networks; and closed rather than open and extensible designs. In this work we investigate the effectiveness of a new paradigm for remote data collection systems; employing alternative power sources to significantly extend the service interval, WiFi wireless communications to simplify remote management, and open-sourced design to enable customization and extensibility. We conduct a direct in situ comparison of WiFi and similar ZigBee radios, evaluating signal range and battery utilization under various sensor and radio configurations.[5]

III. PROPOSED SYSTEM

All the systems which are already present are either not efficient or they are very costly for practically use, our system uses collection of ultrasonic sensor to measure the water level, ultrasonic sensor are very efficient and cost effective.

The system architecture of the system we are proposing is given below

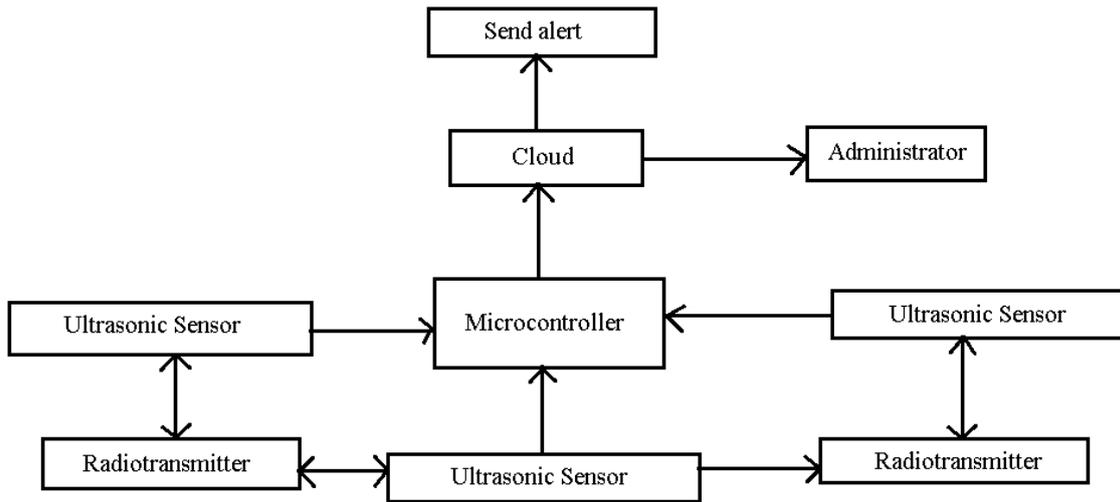


FIGURE 2. SYSTEM ARCHITECTURE

We are proposing a system in which we are making use of Wireless Sensor Network (WSN) to gather the data from multiple sensors like ultrasonic sensors that will be deployed on site. The sensors will sense the data and the data will be sent to the coordinating node. At this node the data will be collected and then sent to the cloud. The admin will take the current values of the flow and water level from the cloud and then compare it with the threshold values that will be already stored on the server. According to the comparison we will be sending 3 different alerts. These alerts will be sent from the cloud that is attached to the system. The first one will be to know that the water level is increasing at more than the normal rate. The second will be for the government agencies and the public to prepare to evacuate. And the last one will be for the public to immediately evacuate.

IV. FUTURE SCOPE

With further improvement to the system we will be able to predict even more accurately and reduce the amount of false alerts. Adding to that with further modification we will be able to predict how much area around the river bank will be affected due to the water level which will be crucial so that the resident of that area could be evacuated to a safe place before flood actually causes any damage.

V. CONCLUSION

The system that we are proposing will be able to detect and monitor the flood for the flood prone areas. The system uses ultrasonic sensor in order to sense the level of the water at different areas. Our System consists of major components like Sensor Networks, transporting module and cloud server. The sensor network will sense the current level of water and then send it to the coordinating node of the Wireless Sensor Network which will send the data to the cloud which implements a Regression Algorithm which will help to predict the future course of in terms of level of water. Based on the final calculation warning will be issued to the nearby people. We used WSN nodes due to their tiny size, low power consumption and cost effective.

Our system will play a vital role in providing warning to the people which are living in the flood prone areas. Our system will be able to accurately predict the danger of flood however in order to enhance the efficiency of the system we can increase the number of sensors we deployed in the geographical areas.

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