Construction Material Prediction And Structural Health Monitoring of Bridges

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Abstract- *The heavy floods can be so disastrous that the infrastructure is washed away, the people and the animals drown, and the people can be stranded for long periods. The society and the economy of the country will suffer in many ways after the flood .The loss of the lives, the vegetation, and the infrastructure. In this system real-time safety evaluation of bridges includes the following components: (1) real-time analysis of flood (2) real-time detection of cracks (3) real time analysis of Water level (4) material estimation for bridge size.*

Keywords- Sensor, Early Warning System, Monitoring, GSM.

I. INTRODUCTION

Traditional methods of bridge safety management have the following problems: failure to collect data or monitor on-site conditions in real time and failure to comprehensively record or analyse the collected data of on-site conditions in real time, resulting in poor disaster rescue efficiency; and data collection through visual assessments or use of large-size electronic equipment, often resulting inaccurate monitoring results or higher costs and higher power consumption. Real-time water watching system exploitation the image process technology and also the water level recognition and also the surface rate recognition.. Using this image processing technology take long time to detect the condition of flood and this process is difficult to detecting flood. Where this structural health monitoring system monitors water level and cracks on bridges with the help of water level detection sensor and crack detection cable which is placed on bridge. This system also provides material estimation for construction of new bridges.

Objectives:

- To provide security to all the users who are using it.
- To provide reliability to the users.
- Smart city mission.
- To save the many lives.

II. LITERETURE SURVEY

Structural health monitoring system using WSN for bridges. In this paper a complete iot SHM platform is proposed, this platform consist of sensing node(ultrasonic sensor for detect and measuring the water level and accelerometer sensors are used to detect the tilting angle of bridge pillar).signal processing module(consist of two part which is single conditioning and high resolution A/D. Signal condition is consist amplification, filtering, range matching converting and with A/D convertor that data into digital form or digital signal)Microcontroller and RF Zigbee unit microcontroller PIC16F877A RF(Radio frequency) work at 433MHzISN[1].

Development of an IOT –based Bridge safety monitoring system - In this paper IOT based bridge safety monitoring system is developed using the Zigbee technology. This system will monitor and analyse in real time the condition of bridge and its setting together with the water level near pipelines air and alternative safety condition.. The detected data and images are transmitted to the server and databases for users to have real-time monitoring of the bridge condition via mobile telecommunication devices bridge safety monitoring server system [2].

Bridge-mounted river stage sensors (BMRSS) System- This system is based on robust sensor which is mounting on bridge over river and stream. Study by the level of river stage and use the river stage sensor to detect the water level for every 5min. BMRSS units incorporate associate voiceless distance activity module, a electrical device /battery /charge controller, and a GPS receiver.BMRSS used to data transmission. In data transmission they used network GSM, GPRS data services. BMRSS used to system for health and metadata and its purpose by to obtain river stage measurement. It is used accustomed study by measure of performances like temperature effect, internal pressure [3].

Design of early warning flood detection system for developing countries.- In this paper we are study the early warning flood detection. If water level is increased then warning message are send as early as possible from server. In

this paper previous work are to senor network for flood detection and current operational system for flood detection [4].

A Review on flood monitoring design implementation and computational modulus.-This system is composed of pressure sensor, Flood gauges, and bubble gauges, non contact radar gauges [5].

Wireless sensor network using flood monitoring-In wireless sensors there is variety of potential application.WSN used for flood monitoring, structural health monitoring. In flood measurement and WSN is small size and low paper consumption. A main advantage is avoiding loss to life and property [6].

Application of image recognition for real time water level and surface rate- In this system there is an two types water level recognition and surface velocity recognition. This system has two high resolution camera on the inside bridge site to get real time water level and surface velocity image. For monitoring the real time bridge it can use two cameras. To avoid the rain to affect the image quality the wiper was installed outside the camera. They used edge detection method to identify the water lives between the edge and the water live and water gauge. For finding actual water height it can use the vertical direction of the median filter. Smooth horizontal scale line in gray scale image. To overcome inside problem IR spotlight device in effective of right[7].

III. PROPOSED SYSTEM

In our project we are work on Monitor Bridge in real time.

1) **Monitoring Real Time Water Level**

We are using water level detection sensor for monitor the water level for flood detection.Water Level Detection Sensor works on the basic principle of conduction through the water. Water level sensors monitor level of water. Whenever water level increase and water touches the sensor the resistance is decreases and current will flow Due to water attach with water sensor wire then current will be flow and signal send to microcontroller.System send alert message to the user. And barrier gate close.

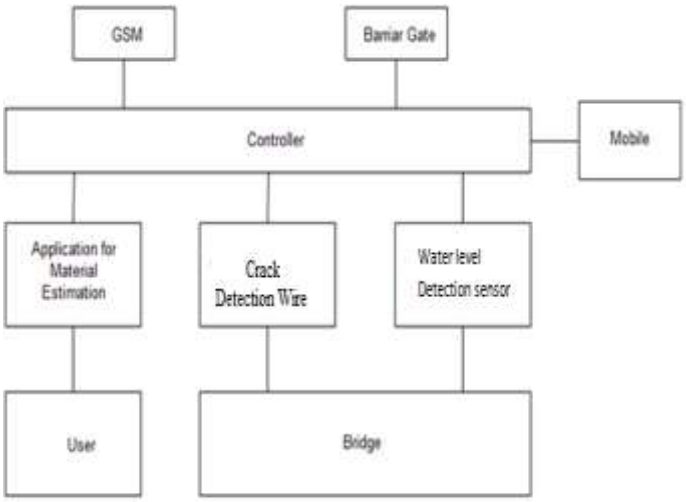

Fig 1 Block diagram of sensor node

2) **Detect Crack**

We are using crack detection wire for detecting cracks on bridge. Crack detection wire placed on bridge. Continuous current flow through the wire. Due to distract current, Signal going to microcontroller. Crack will be detect.

3) **Material Estimation**

Data entered by user for bridge height and width in application. Material estimation information will be displayed for that particular size of a bridge. Now a days for finding the appropriate material for construction of bridge constructor can find it by using pen and paper. By using this pen paper method they suggestion from the various engineer or sources. It takes to much time to get exact idea about the material. Estimation software, where constructor and engineer can login and predict the material. Constructor can send request of bridge material by giving information height of bridge, length of bridge, width of bridge etc. Engineer can give the response to the constructor, request of material, they can give all material detail by predication. So it can reduce the constructor time for material estimation.

4) **Microcontroller**

Microcontroller is main important part in the wireless sensor node. We have to use Arduino UNO for Monitoring bridge condition. Arduino Uno is a microcontroller board based on the ATmege328P. Arduino Uno consists of USB interface, 14 digital I/O pins, 6 analog pins and Atmega328 microcontroller. It also supports serial communication using Tx and Rx pins.

5) **GSM**

Structural Health Monitoring of Bridge:

In our structural health monitoring system we are continuously monitoring the water level of the bridge crack which can damage the bridge .For monitoring, flood detection and crack detection sensor are used. For continuously monitoring the water level or flood detection ultrasonic sensor are used and for crack detection crack sensor are used. In this system if flood or crack can be detected then it can send the information like what in current water level? Where can be crack for to the cloud unit. For transforming the data or information it can used the GSM (Global system for mobile communicate)GSM can transfer the data through to the internal then that all data is transfer to the gateway from where all the authorized user can get that data and provided the solution.

IV. FUTURE SCOPE

The flood alert information's may be showed on junction rectifier display boards for road users and for safety reasons might be placed at strategic locations. Such information's should be in real time and for safety reasons may well be placed at strategic locations.

V. CONCLUSION

This system will continuously monitor water level and crack on bridge .The main aim of this project is to minimize the structural damages and prevent the life and property. In this Bridge safety and flood detection system we monitor bridge condition and give alert message to user. This system also provides the material estimation information of bridge size required by user. Advantages of this project are to save lives and property .Take real time information of bridge.

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