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Bridge Safety and Flood Detection System

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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 project 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.**

1. 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 monitoring system using the image processing technology and the water level recognition and the surface velocity recognition. Using this image processing technology take long time to detect the condition of flood and this process is difficult to detecting flood. In our project we use three sensors for monitoring bridge condition and detecting flood and detecting high weight on bridge.

A. Objectives

- To provide security to all the users who are using it bridge.
- To provide reliability to the users.
- To maintain integrity of already built and old bridges in India
- To help India for making it digitized.
- Smart city mission.
- To save the many lives.

2. Literature survey

IoT-based bridge safety monitoring system is developed using the ZigBee technology. This system is composed of:

1) Monitoring devices installed in the bridge environment;
2) Communication devices connecting the bridge monitoring devices and the cloud-based server;
3) A dynamic database that stores bridge condition data; and
4) a cloud-based server that calculates and analyzes data transmitted from the monitoring devices. This system can monitor and analyse in real time the conditions of a bridge and its environment, including the waters levels nearby, pipelines, air and other safety conditions. The detected data and images are transmitted to the server and database for users to have real-time monitoring of the bridge conditions via mobile telecommunication devices [5]. Two types of the real-time water monitoring system using the image processing technology the water level recognition and the surface velocity recognition. According to the bridge failure investigation, floods in the river often pose potential risk to bridges, and scouring could undermine the pier foundation and cause the structures to collapse [3]. Internet of Things (IoT) can be used, which would provide flexibility to monitor structures (building, bridge) from anywhere. In this paper, a complete IoT SHM platform is proposed. The platform consists of a Raspberry Pi, an analog to digital converter (ADC) MCP3008 and a Wi-Fi module for wireless communication. Piezoelectric (PZT) sensors were used to collect the data from the structure. The MCP3008 is used as an interface between the PZT sensors and the Raspberry Pi [1].

3. Proposed System

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

A. Monitoring real time water level

We are using ultrasonic sensor for monitor the water level. Sensor detects the flood then it will send the signal to Arduino controller. System send alert message to the user. And barrier gate close.

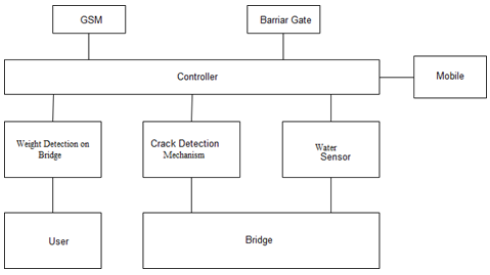

Fig. 1. Architecture diagram of sensor node

B. Detect crack

In this system If crack is detect on bridge alert message send to user and barrier gate will be close.

C. Weight Calculation

Sometimes due to overloading most of the bridges collapse. To avoid this, we will be using load cell to measure weight that is present on the bridge. If this weight is beyond the capacity of the bridge then the baricates will stop the further traffic until the weight becomes normal again.

4. Feasibility Study

A. Software Feasibility

1. Embedded C
2. Arduino Id

B. Hardware Feasibility

1. Water Sensor
2. Crack detect mechanism (Suspension Wires)
3. Android mobile
4. GSM
5. Load Cell

5. Result and future scope

To implement all the features mentioned above, we have developed a system using Arduino and sensors. To demonstrate them we developed a wooden bridge as shown in fig. 2.

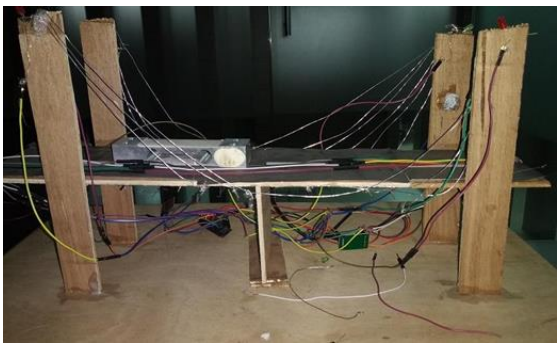

Fig. 2. Proposed Model

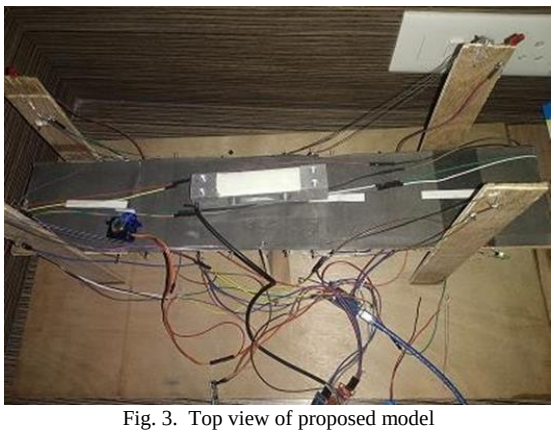

Fig. 3. Top view of proposed model

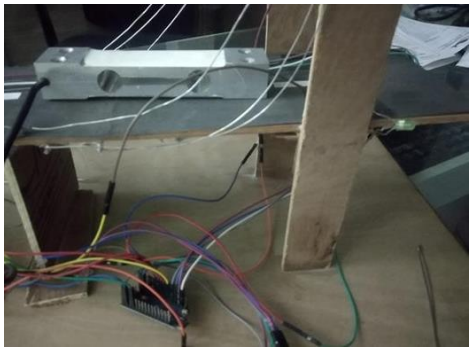

Fig. 4. System deployed on bridge

6. Future Scope

The flood alert information's can be displayed on LED display boards for road users and for safety reasons could be placed at strategic locations. Such information's should be in real time and transmitted wirelessly from the measured location.

7. Conclusion

In this project it will continuously monitor for Water level and crack and high weight 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.

References

[1] M. A. Mahmud, K. Bates, T. Wood, A. Abdelgawad and K. Yelamarthi, "A complete Internet of Things (IoT) platform for Structural Health Monitoring (SHM)," *2018 IEEE 4th World Forum on Internet of Things (WF-IoT)*, Singapore, 2018, pp. 275-279.

[2] Priya Menon K, Kala L, "A Review on Flood monitoring: Design, Implementation and Computational Modules," in International Journal of Innovative Research in Computer and Communication Engineering, Vol. 5, Issue 2, pp. 2354-2359, February 2017.

[3] F. Lin, W. Chang, L. Lee, H. Hsiao, W. Tsai and J. Lai, "Applications of Image Recognition for Real-Time Water Level and Surface Velocity," *2013 IEEE International Symposium on Multimedia*, Anaheim, CA, 2013, pp. 259-262.

[4] E. Basha and D. Rus, "Design of early warning flood detection systems for developing countries," *2007 International Conference on Information and Communication Technologies and Development*, Bangalore, 2007, pp. 1-10.

[5] J. Lee, Y. Tyan, M. Wen and Y. Wu, "Development of an IoT-based bridge safety monitoring system," *2017 International Conference on Applied System Innovation (ICASI)*, Sapporo, 2017, pp. 84-86.