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# Bridge Health Monitoring in Internet of Things

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## ABSTRACT

Bridges are the transportation links that can carry road and rail traffic. When bridge cracks, collapses it becomes tragic. Currently a wired sensor technology is applied on bridges that enable bridge maintenance engineers to monitor the condition of bridge in real time. However, advancements in sensor technologies one thing that has not been changed is that data passes through wires and optical cables. We are going to propose wireless sensor network based bridge health monitoring system.

**Keywords :** IOT – Internet of Things, ZigBee- Wireless Communication media acts as a transreceiver.

## I. INTRODUCTION

In this paper, I will give an overview about how IOT can be applied to solve real time problems such as we can propose real time applications using multiple types of available sensors and wireless technologies. We know the current incident of MAHAD bridge which was collapsed and so many people were became the victim of that disaster. So, regarding this problem we are going to propose this real time bridge health monitoring system as embedded software application.
Existing system uses a wired sensor technology which has certain disadvantages. These drawbacks include:

1. High installation cost of wires
2. Huge manpower
3. Complicated wiring
4. Hard to identify defects

These difficulties can be minimized if wireless sensor technology is used.

## II. METHODS AND MATERIAL

### A. Related Work

Paper[1] provides wireless networks have been used to avoid the high cost of traditional wired systems. The objectives of SHM are damage detection, damage localization, damage quantification, and assessment of the remaining lifetime of the structure.

The damage can be identified by a change in the modal parameters (eigenvectors and natural frequencies) obtained from measured time histories. This way, any incidence can be easily detected and evaluated, and corrective measures can be applied if necessary. Paper[2] provides information about ZigBee technology used as a transmission media which is transreceiver i.e. means it can be used to send and receive data from one ZigBee to another ZigBee.

Paper[3] provides the advantages include low cost of the sensors, ease of installation and maintenance, and ability to be applied to existing highway infrastructure. Paper[4] introduces The principle behind the impedance-based structural health monitoring technique is to apply high frequency ultrasonic excitations (typically higher than 30 kHz) to the structure through surface-bonded piezoelectric transducers. Therefore, changes in mechanical impedance, which is directly related to fundamental structural properties such as mass, stiffness, and damping, can be identified by monitoring the electrical impedance, which in turn indicates that structural damage has occurred.

### B. Proposed Work

Currently, a wired sensor technology is applied on bridges that enables bridge maintenance engineers to monitor the condition of bridge in real time. We have used three sensors : Float sensor, Vibration Sensor and Tilt Sensor. Tilt sensor will detect fault when Bridge cracks. Vibration sensor will detect fault when bridge vibrates due to some load or accidents happen on bridge. Float sensor activates when water level crosses a particular threshold level.

All these sensors will work one by one, senses environmental conditions and sends output to microcontroller. Microcontroller works as a decision making. If fault occurs, Microcontroller sends signals to Alarm and it will start form some milliseconds. As soon as, Alarm stops Gate will be close. Before closing gate IR sensor checks that if there is any obstacle present on the Bridge. The Gate will not be closed until the way on the bridge becomes empty.

When fault occurs, it is required to store this data to PC. This data can be stored to PC using a wireless communication medium ZigBee.

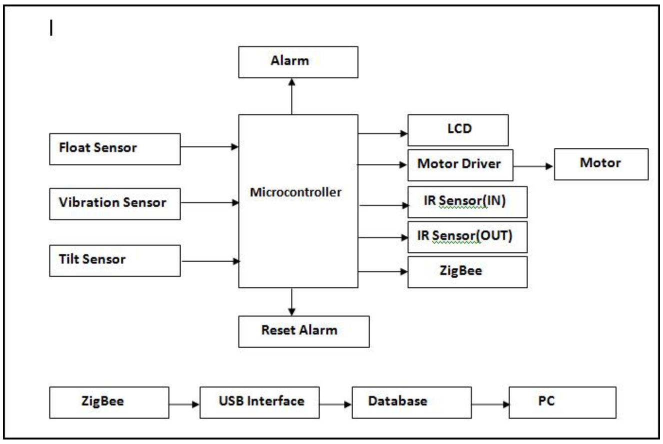


**Figure 1.** System Block Diagram

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