ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 11, November 2018

Survey on IOT Based Bridge Monitoring System

Prof.N.W.Dangare[1], Ghadge Sonali[2], Khandge Tejas[3], Pathare Nisha[4], Patil Laxman[5]

Dept. of Computer Engg, keystone School of Engg, Savitribai Phule University, Pune, India[1,2,3,4,5]

ABSTRACT:Bridge monitoring system is significant to health diagnosis of bridges and flyovers. This report is proposed and developed a novel architecture for large span bridge monitoring. A 3-level distributed structure is adopted in the monitoring system, which includes central server, intelligent acquisition node and local controller. Acquisition nodes are located across the bridge. One local controller manages all the acquisition nodes. Every acquisition node has 8 channels, which can sample displacement, line of site and vibration of bridge. To get high precision data, a 10 bits A/D converter. Compare to the traditional method, the proposed architecture has two features. First, the acquisition node is a smart device based on powerful controller. Signals of field sensors are analysed and real time compressed in the acquisition node. Only the processing results are sent to local controller through IEEE 802.11 wireless network. This operation can relieve load of central server. The intelligent monitoring system has run on a large span bridge. Running results show that the proposed system is stable and effective.

KEYWORDS*:* IOT, Arduino, IR Sensor, Water Sensor, Wireless Sensor Network, Bridge Health Safety Monitoring, Alert Generation, Bridge Tracking Gadget (BMS), Harm Detection, Bridge Maintenance, Data Analysis.

I. INTRODUCTION

Bridge is one of the most important transportation infrastructures for social and economic activities of country which has long rivers.

Bridge monitoring system (BMS) provides previous indication to us where we can easily save too many lives and we can avoid the loss.BMS is a tool to improve the safety and maintainability of bridge. BMS provides real time and accurate information about the structural health condition. It is a process of nondestructive evaluations to detect location and extent of damage, calculate the remaining life, and predict upcoming accident.

Internet of Things (IOT):

The Internet of Thing is the network of physical devices, vehicles, home appliances, and other items embedded wit with electronics, software, sensors, actuators, and connectivity which enables these things to connect and exchange data, creating opportunities for more direct integration of the physical world into computer-based systems, resulting in efficiency improvements, economic benefits, and reduced human exertions.

II. LITERATURE SURVEY

This paper presents Bridge safety monitoring system which monitors and analyzes in real time the conditions of a bridge and its environment, including the waters levels nearby, pipelines, air and other safety conditions.

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 11, November 2018

Table 1: Literature Survey

Sr. No.	Author Name	Paper Name	Year	Conclusion
1	Ms.Arohi. D. Sonawane, Ms.Pooja. P. Vichare, Mr.Shubham. S. Patil and Mr.Nitin. P. Chavande	Bridge Monitoring System Using IOT	2018	In countries like India there is powerful focus on national infrastructure. New bridges are built each year and the maintenance of those bridges is frequently ignored. The present structures uses very complex and excessive fee wired network and it additionally required high upkeep for optical fiber machine. So the primary objective of this task is to build a cheap bridge tracking machine for developing international locations like India. This project aim to simplify the system for selecting bridge tracking devices. Many bridges within the India are obsolete or structurally deficient to safely increase the life of those bridges, inspection would be vital. Bridge engineers have many duties and it's far not possible to expect one to know. Our device will sense the crack inside the bridge and signal might be given to govern room immediately to stop cars.
2	VarshaKusal, Amrita Argade, SanikaChiplunkar, RohiniKumbhar, Swati A. Khodke	Bridge Monitoring and Alert Generation System Using IOT	2017	Many of the bridges in cities built on the river are subject to deterioration as their lifetime is expired but they are still in use. They are dangerous to bridge users. Due to heavy load of vehicles, high water level or pressure, heavy rains these bridges may get collapse which in turn leads to disaster. So, these bridges require continuous monitoring. So we are proposing a system which consists of a weight sensor, water level point contact sensor, Wi-Fi module, and Arduino microcontroller. This system detects the load of vehicles, water level, and pressure. If the water level, water pressure and vehicle load on the bridge cross its threshold value then it generates the alert through buzzer and auto barrier. If it is necessary, then the admin assign the task to the employees for maintenance.
3	Amro Al-Radaideh , A. R. Al-Ali, SalwaBheiry , Sameer Alawnah	A Wireless Sensor Network Monitoring System for Highway Bridges	2015	As wireless smart sensor networks and geographical information systems (GIS) are evolving nowadays, applications of remote monitoring in wide spread geographical areas are becoming cost-effective and possible. An example of such applications is the structural health status monitoring of highway bridges that connect roads in both rural and urban areas. Many of these bridges are subject to deterioration due to external and internal factors. Online, real-time structural health monitoring is a resourceful complimentary tool to facilitate rapid field inspection. Bridge maintenance and infrastructure managers can easily use this application to safeguard the performance and safety of these vital structures. This paper presents an autonomous wireless sensor network system to monitor structural health in highways bridges. The

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 11, November 2018

				proposed system consists of a wireless Data Acquisition Unit (DAQ), a mobile public network, a structural health data evaluation, a management middleware, a GIS and graphical user interface module. The sensors in the DAQ gather the bridge health signs and transmit them promptly via the public mobile networks to the management and evaluation middleware for further processing. Based on the national bridge inventory rating scale, an early warning fuzzy logic based engine is developed to process the status of a given bridge and alert the concerned operator/s regarding any abnormality. Furthermore, an interactive Google map is used to show the status of each bridge along with its exact location. A prototype was built in the laboratory to validate the proposed system. Analysis of testing results and comparisons with existing monitoring systems are also discussed. Operators can access the bridge real-time data through mobile phone. The system is cost effective and user friendly.
4	SnehalSonawane, Nikita Bhadane, SayaliZope, AshitoshPangavhane and V. S. Tidake	Design of Bridge Monitoring System based on IoT	2018	Bridges may get collapsed or tilted due to flooding or some concrete problem, natural calamities. So there is a need to design a system which will continuously monitor condition of bridges. It is useful for public safety and reduction in human losses. Such system will help in disaster management and recovery. IoT-based bridge safety monitoring system is developed using the WSN Technology. This system is composed of: Monitoring devices installed in the bridge environment, communication devices connecting the bridge monitoring devices and the cloud based server, a dynamic database that stores bridge condition data, cloud based server calculates and analyzes data transmitted from the monitoring devices. This system can monitor and analyze in real time the condition of a bridge and its environment, including the water levels and other safety conditions. This paper presents a comprehensive survey of SHM using WSNs outlining and algorithm like damage detection and localization, network design challenges and future research direction.

III. PROPOSED SYSTEM

The system collects the data from sensors and the status is collected by the controller and is transferred to wireless network. This data at transmitter is sent to the receiver and is analysed by the Arduino. Analysed data is sent to the management center and an alert message is sent to the operator mobile number.

We will use sensors like weight sensor, water level point contact sensor as sensing de-vices. Thesesensors will be responsible for sensing the load on the bridge, pressure of the water, level of the water rising in the river. The datasensed by sensors will get converted into an electrical signal. The devices which generate output are generally called as actuators(sound buzzer). Both sensor and actuator are collectively called as a transducer. The electrical signal will gettransmitted to the Arduino.

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 11, November 2018

The server will receive data from a microcontroller using Wi-Fi module, then it will transfer the data further to the web application using a servlet.

A servlet is a small Java program that runs within a Web server. Servlets receive and respond to requests from Web clients, usually across HTTP, the Hyper Text Transfer Protocol.

In this way, the admin will get the data and alert will be generated through buzzer and auto barrier on the bridge. If it is necessary then the admin assign the task to the employees for maintenance.

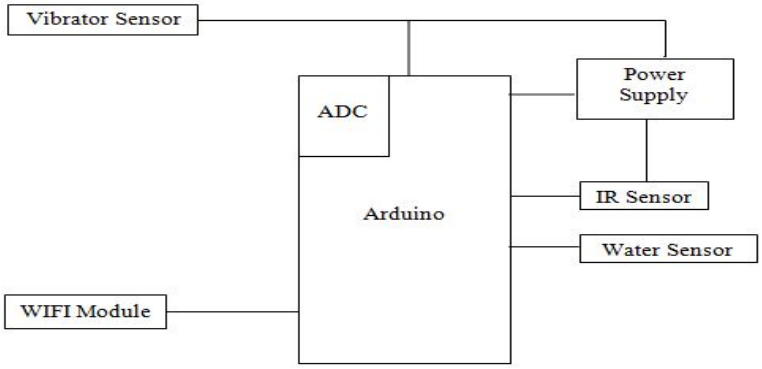

Fig 1: Block diagram of IOT using Bridge Monitoring System.

IV. SYSTEM ARCHITECTURE

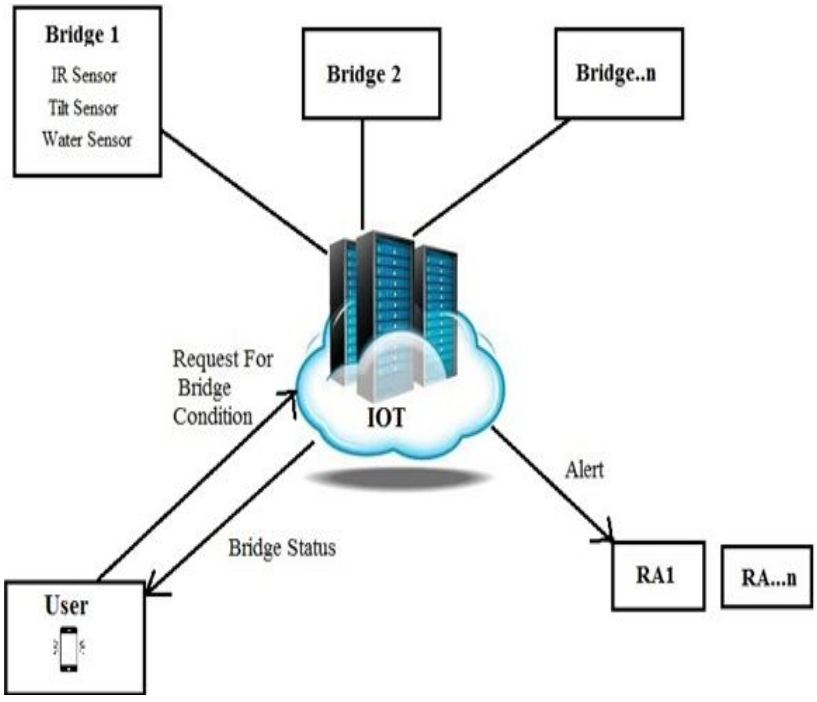

Fig 2: System architecture of IOT using Bridge Monitoring System

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 11, November 2018

V. ADVANTAGES

- Proposed system will avoid death of people due to bridge collapse.
- We can determine which bridge requires repairing before it gets break.
- Traffic can be routed prior of Bridge collapse as alert of extreme levels are continuously monitored on IOT server.
- It generates the alert if flow, water level, and the load are increased.
- It saves the life of people.
- It provides live data of the load, water level, and pressure.
- Early damage detection, Quick action and responses.

VI. APPLICATION

System can be implemented on any bridge for monitoring but specially design for old constructed bridges.

VII. CONCLSION

Bridge Monitoring and alert generation system using IOT, to alert using buzzer and auto- barrier when there are signs of collapsing the bridge. This system will help to reduce big disasters in future. This system can save the lives of many people.

VIII. FUTURE SCOPE

System can be implemented at global level in which different countries can manipulate data of their bridges at a single government server.

REFERENCES

[1] Ms.Arohi. D. Sonawane, Ms.Pooja. P. Vichare, Mr.Shubham. S. Patil, and Mr.Nitin. P. Chavande, “Bridge Monitoring System Using IOT”, Journal of Advances in Electrical Devices Volume 3, Issue 2, 2018.
[2] VarshaKusal, Amrita Argade, SanikaChiplunkar, RohiniKumbhar, Swati A. Khodke, “Bridge Monitoring and Alert Generation System Using IOT”, International Journal of Advance Research, Ideas and Innovations in Technology, 2017.
[3] Amro Al-Radaideh, A. R. Al-Ali1, SalwaBheiry, Sameer Alawnah, “A Wireless Sensor Network Monitoring System for Highway Bridges”, IEEE, International Conference on Electrical and Information Technologies ICEIT, 2015.
[4] SnehalSonawane, Nikita Bhadane, SayaliZope, AshitoshPangavhane and V. S. Tidake, “Design of Bridge Monitoring System based on IoT”, MVP Journal of Engineering Sciences, June 2018.
[5] Jin-Lian Lee, Yaw-YauanTyan, Ming-Hui Wen1, Yun-Wu Wu, “Development of an IoT-based Bridge Safety Monitoring System”, IEEE, International Conference on Applied System Innovation, 2017.
[6] Christian Lazo, Paulo Gallardo, and Sandra Cespedes, “A Bridge Structural Health Monitoring System Supported by the Internet of Things”, IEEE COLCOM, 2015.