Survey on Bridge Monitoring System

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ABSTRACT—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 GSM module, and micro controller. 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. This paper also introduce live photo capture and location access If the authority need the live picture near the bridge for any purposes at anytime he can capture by using IOT application. For every alert from the bridge we will play the voice messages regarding the events which exceeds the threshold value from any bridge. If it is necessary, then the admin assign the task to the employees for maintenance.

Keywords— weight sensor, water level point sensor, GSM, photo capture, location access.

I. INTRODUCTION

Bridge is structure that provides passage over obstacles such as river, valleys or rough terrain. Bridges are of various types like arch bridge, Beam Bridge, cable-stayed bridge, cantilever bridge, continuous span bridge, movable bridge etc. Bridges affect day to day life of people. Bridges are affected by environment and with their own weight. The performance of the bridge is dependent on the strength and durability of its components. Since bridges cannot resist indefinitely all the natural forces and hazards including time-related degradation of materials, these structures have limited service life. The bridges have to maintain in order to have better and longer service life and in order to prevent premature failure. The service life expectancy of a bridge may generally be about 70 years for superstructure and about 100 years for substructure. But many bridges fail before service 20 year life term due to lack of maintenance.

Engineering is typically approximately warding off screw ups and investigating the failure and methods to restore the failure. There's a want to recognize the situations giving upward push to failure that came about withinside the beyond and methods to keep away from such disasters in order that lack of lot lives may be minizied. The conduct and failure mechanism of bridge each of the time scouring of basis of the bridge the fundamental motive of bridge

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Internet of Things (IoT) is an system that is inter linked, Internet-connected objects that can gather and move information without human mediation, over a wireless remote organization. The individual or business prospects are vario

An IOT framework consists of good hardware components that allow use of embedded systems such as processors. Sensors and communication devices, to gather, transmit and act on theinformation they receive from their surroundings.

IOT devices sends the sensors data that are cumulated by coupling them to an IOT gateway or it might be any edge devices where that data can be sent to the cloud for further analyzation.

This paper gives a introduction about bridge monitoring system which monitors the bridges though various sensors and generates the immediate alert. It mainly focused on aging bridges.

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Sensors: According to (IEEE) sensors can be defined as andigital tool that produces electrical, optical, or virtual facts derived from a bodily circumstance or event. Data made from sensors is then electronically trans-formed, viaway of means of any other tool, into information (output) that is beneficial in choice making carried out via way of means of wise gadgets or individuals (people) .

There are mainly three IOT layers:

● Sensor Layer:mainly responsible for sensing the pressure of water, level of water in the river and load on bridges.
● Network Layer: It is mainly responsible for transmitting data from the sensor to bridge monitoring system.
● Application Layer: It is mainly responsible for data transmitting from Bridge Monitoring System to Admin.

II.   RELATED WORK

IOT for long and short distance wireless data communication. This system also uses sensors and interface LCD (Liquid Crystal Display) for displaying output of all the sensors.

Design of login interface using which user can login to system. Arduino is to be connected with sensors using TCP/IP protocol and by using Wi-Fi module it will send real time monitor data to cloud server as well as to system server for backup purpose, in case of failure of cloud server.[1]

An idea of bridge monitoring system using wireless is proposed. For short distance (among sensors in the bridge) Zigbee is used as wireless network, and GSM is used for long distance (between the bridge and the management centre) data communication. This technology can be known as MBM (Monitoring Based Maintenance) that permits the bridge protection engineers reveal the circumstance of the bridge in actual time.[2]

Putty software is to configure RaspBerry Pi3.(PuTTY is a free and open-source terminal emulator). the readings taken from various sensors are sent to the server room. One can determine characteristics of bridge by their threshold values.

The system sends real-time monitored data to cloud server as well as to system server for backup purpose.ZigBee is used for communication. Bridge overflow is detected using Water Level Sensors. Crack detection is done using Image Processing. [3]

Bridge monitoring using wireless smart sensors is monitoring system can estimate the bridge's various physical states. For example, the model properties such as natural frequencies, mode shapes. types of sensor boards, ISM400 sensor boards (measuring acceleration, temperature, humidity) and one SHM sensor board measuring wind speed and direction.[4]

Now days the structural stability of the bridge is monitored by manually and also the traffic control of heavy duty vehicles over the bridge are also done manually. Rather the traditional structure monitoring system can be done using wired technology. Manual control of bridge leads to wastage of manpower and will not be effective during the time of calamities. Also wired system is too expensive, power hungry and difficult to implement and maintain. In this method, the same pattern of the bridge has been designed with the same composition of material as that the one used in the bridge. And by performing several tests like destructive testing on the bridge model, the strength and the life time of the bridge has been calculated. Ultrasonic C-scan imaging is done by sending out ultrasonic waves into a material. The reflections of these waves are read by a transducer and sent to a computer program. This program processes the data and creates a two-dimensional map of the bridge components[5]

Based on NI data acquisition hardware and related software, bridge health monitoring system has been set up. This system not only meets the functionality requirements of the monitoring task, but also endures the severe environmental conditions that a bridge usually faces. This article discusses the fundamentals of structure health monitoring (SHM) and describes how the Shanghai JUST ONE Technology company implements SHM on the Donghai Bridge, China's first sea-crossing bridge.[6]

The paper describes the motive of the device and the necessitiesit'll fulfil, and gives the

overall device layout, an outline of the device and the technical answer for information transfer. A unique recognition is given to the situation of information management, which incorporates the archiving, evaluation and presentation of the recorded information. In addition to the obligatory manipulate room devices, the device will encompass a person interface which allows permitsstable net get entry to the tracking information and results, from any region at any time.[7]

III. CONCLUSION

In this paper we introducing bridge monitoring system and alert generation 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. Hence, this system can save the lives of many people.

IV. FUTURE SCOPE

➢ Web camera can be fitted so that the density of the vehicles can be know by the people who enter the bridge.This can be using MATLAB.
➢ Instead of using IR sensor,we can use UV sensor and more advanced sensor,which has high sensitivity.
➢ This project can be implemented in a two-way road bridges.But the complexity of the project.
➢ The satellite communication can be adopted in future to avoid network issues.

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