A Conceptual Study Of Bridge Break Safety Alarm System

Prof. Omkar joshi[1], Ritik Aayare[2], Tafsir Ansari[3], Neeraj Ayare[4]
[1, 2, 3, 4] Dept of Mechanical Engineering
[1, 2, 3, 4] Viva Institute of Technology, Virar

Abstract- *A wireless technology-based bridge safety monitoring system has been created. The monitoring devices located in the bridge environment, the communication devices that link them to the cloud-based server, and the cloud-based server that computes and analyses the data transmitted from the monitoring devices make up this system. The circumstances of a bridge and its surroundings, such as the water level, force levels in the area, vibration, and other safety conditions, can be tracked and analysed by this system. With the use of mobile communications devices, users can monitor the state of the bridge in real-time thanks to the transmission of the detected data to the server and database. There are several riverside bridges in cities, most of which are in poor shape because they were built a long time ago. Which need to be maintained on regular basis. These bridges could collapse as a result of a significant car load, high water flow, or intense rain. Therefore, these bridges need to be constantly monitored. So, this study suggests a system made up of vibration sensors, force sensors, and other sensors. This system monitors the weight of the cars and generates an alarm if the value exceeds a predetermined level. The alarm allows the responsible authority to allocate the work to the personnel for maintenance.*

Keywords- Safety, Analyze, Vibration, Telecommunication, Collapse.

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 non-destructive evaluations to detect location and extent of damage, calculate the remaining life and predict upcoming accident. Bridges and flyovers are critical in many regions, being used over several decades. It is critical to have a system to monitor the health of these bridges and report when and where maintenance operations are needed. Advancements in sensor technology have brought the automated real-time bridge monitoring and alert generation system. Many long span bridges in Korea and in Japan have adopted this real-time health monitoring system. However current system uses complicated and high cost wired network amongst sensors in the bridge and high-cost optical cable between the bridge and the management centre, which increases the overall cost of installation and maintenance cost of monitoring system.

II. LITERATURE SURVEY

Lijuan Yao, Xiandong Li 2022 [1]

Have done the long-term operation of super large bridges, according to them the overall performance will inevitably deteriorate to a certain extent. However, the frequent inspection of bridges is mainly visual, so it is difficult to find the variation of the stresscondition of the bridge. In particular, some boundary condition changes that may cause greaterstructural risks, and the means of health monitoring can make up forsuch shortcomings. Takingthe concrete-filled steel tubular half through catenary arch bridge as an example, this paper expounds the data collection of large- scale bridges, and analyzes the contents and elements ofits key point data.

Di Yang, Lianfa Wang, April 2022[2]

Have proposed the health monitoring system platform for cross-river bridges based on big data. The system can realize regionalized bridge operation and maintenance management. The system has functions such as registration modification and deletion of sensor equipment, user registration modification and deletion, real-time display and storage of sensor monitoring data, and evaluation and early warning of bridge structure 4 safety. The sensor is connected to the lower computer through the serial port, analog signal, fiber grating signal, etc. The lower computer converts a variety of signals into digital signals through the single-chip A/D sampling and demodulator, etc., and transmits it to the upper computer through the serial port. The upper computer uses ARMCortex-A9 Run the main program to realize multi-threaded network communication. The system platform is to test the validity of the model, and a variety of model verification methods are used for evaluation to ensure the reliability of the big data analysis method.

B Dhanalakshmi, A Prakadeesh, R Roshan Kumar, April2020 [3]

Have done research on bridge health condition monitoring in real time which was very popular issue. The sensor technology is continuously and condition monitoring has never been accurate and easier before. With the help of wireless technology and water level sensor, smart system was developing for securing bridges. This system checks the water level and the position of bridge for safety purpose. In the emergency conditions like earthquake, flood, etc. the facility of broadcasting the message was added. That System was unique in its ability to monitor the bridge environment, it transmits environmental data through wireless.

Leela Sravanthi, M. Sushma 2019 [4]

Carried out research on the bridges and according to them most of the bridges cross the worldbuild rivers and oceans, which are subjected to maintain it for the life time but at a certain timeit is going to expired. Though it is dangerous but they are still in use. Due to rapid occurrence of cyclonic conditions or heavy vehicle loadsthese bridges may collapsed where the water levelis increased and leads to destruction. This may harm the users. So, these bridges required a special care without manual network. So, these bridges require a weight sensor, water level point sensor and WIFI module. This system protects from heavy loads, water level and pressure.If any issue takes place, then it generates the signals (alarm) through buzzer with IOT device and auto barriers which is connected to the serve. The achievements have brought a real time monitors systems by using IOT.

Jin-Lian Lee, Yaw-Yauan Tyan, 2017 [5]

Have learned about intended to develop a bridge safety monitoring system that integrates the technologies of IoT, ZigBee, PV power generation and monitoring sensors. This system is unique in its ability to monitor the bridge environment, transmit the environmental data through wireless communication and send alerts to the bridge management staff in real time for prompt reactions. This system can enable 24x7 bridge safety 5 management as well as prompt and appropriate responses to emergency incidents. All the collected environmental data sent to the server in the system can be used for big data analysis or follow-up research. In addition, solar power is used as a supplementary power source for the system and lamps on the bridge, which helps to conserve energy and reduce carbon emissions. The system developed in this study is a preliminary exploration. Future research is needed to improve the system by analyzing data collected by the system and developing more advanced computing models and operational practices for the system.

III. PROBLEM STATEMENT

Flyovers and highway bridge systems are critical in many regions, being used over several decades. It is critical to have a system to monitor the health of these bridges and report when and where maintenance operations are needed and various accident occurred in bridge. Current situation is because of delays of project and less deadline of project they avoid safety factors so accidents are occurred Advancements in sensor technology have brought the automated real- time bridge health monitoring system.

IV. DESIGNE AND WORKING

The block diagram consists of Arduino Uno microcontroller which received the data from the sensor and transfer the data to the GSM Module. GSM Module is used for long distance data communication between the bridge and the management center. The sensor which we have used in this model is Piezoelectric accelerometer, Load cell and Pressure sensor. The sensor installed in various parts of the bridge monitors the traffic weight of the vehicles, pressure of water etc.In this model we have firstly measured the natural frequency of the bridge, the pressure which bridge can withstand and the load carrying capacity of the bridge. At any point of time if any of these parameters cross their threshold value the communication system informs the management system giving an alarm for taking precautionary measures.

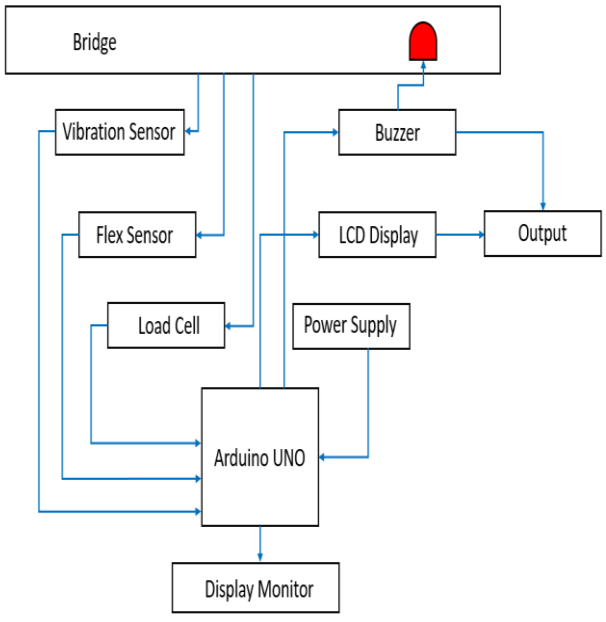

Fig. 1 Block Diagram

V. RESULT

Here we have discussed the different methods used by the researcher to monitor the bridge condition. Such a system will help to control the dynamic parameters of the bridge for preventing it from the disaster which can save the many lives and also wealth. This system is unique in its ability to monitor the bridge environment, transmit the environmental data through wireless communication and send alerts to the bridge management staff in real time for prompt reactions. This system can enable 24x7 bridge safety management as well as prompt and appropriate. Responses to emergency incidents. The system continuously monitors the bridge parameter value and judges whether the bridge is safe or not for traveling. In case the parameter values are beyond the threshold values then an alert sound is given to the people. The implementation is greatly useful.

VI. CONCLUSION

Bridge Monitoring and alert generation system using IOT, to alert using buzzer 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. It generates the when vibration of bridge goes above the set frequency or just below the natural frequency that time system gives the alert Quick action and response 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 routedprior of Bridge collapse as alert of extreme levels are continuously monitored on system and also Early damage detection can be done. This all can be done by implementing this project.

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