

## *A Review on Bridge Health Monitoring System Using Andrioid App*

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**Abstract-:** *In 21st century construction of bridges and flyovers increases, there are more and more bridge accidents happened in India. The reason why most of bridge accidents occurred is lack of effective monitoring. Bridge monitoring system is significant to health diagnosis of bridges and flyovers. This system 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. Compare to the traditional method, the proposed architecture has two features. First, the acquisition node is a smart device based on powerful digital signal processor. Second, 4G wireless network is utilized to provide enough bandwidth for real-time data transmission between local controller and central server. In this paper, we review existing systems compare to our proposed system.*

**Keywords:** *: Bridge, Arduino, overload, wifi, servo motor, Android app,*

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### I. INTRODUCTION

In recent years, with the development of society, bridge health monitoring system has been playing an increasingly important role in our daily life. Firstly, the system can make sure the security of the bridge and prevent accidents [1]. What's more, the relevant departments will get feedback of the condition of bridge with the help of the system [2]. In addition, it can provide technical support for management and bridge maintenance [3]. Lei et al. [4] presented three different frames of bridge health monitoring system: long-term online health monitoring system, terminal offline health monitoring system, and terminal maintenance health monitoring system. They came up with the concept of super sphere (the mapping relationship of vast of data sample). However, there are some problems and disadvantages in their scheme, for example, the difference of bridge structures and geographical environments, and the difference of the purpose of design and investment. Chen et al. [5] used wavelet analysis to solve some special problems in bridge health monitoring system. They presented a four-step method for structural damage identification by wavelet analysis, including an early warning system, confirmation of damage, position of damage, and quantity of damage. However, this work is too complicated for applications and projects, and it needs to be further research in the future. Compared with traditional monitoring concept, Ittipong et al. [6] presented a

new concept of bridge health monitoring, including structure monitoring and assessment, design verification, and research and development.

Bridges area unit incessantly subject of harmful effects of fabric aging, widespread corrosion of reinforcing bars in concrete structures, corrosion of steel structures and parts, increasing traffic volume and over-loading, or just overall deterioration and aging. These factors, combined with de-fects of design and construction and acci-dental harm, prompt the deterioration of bridges and end in the loss of load carrying capability of bridges. The state of intensely utilized urban extensions is surprisingly more terrible. A significant range of those structures would like strengthening, rehabilitation, or replacement, however public funds area unit not usually obtainable for the desired replacement of existing structures or con-struction of latest ones.

## II. LITERATURE SURVEY

Paper (1). Application of Damage Detection for Bridge Health Monitoring. 2015. Amira Zrelli, Hacem Khlaifi and Tahar Ezzedine proposed a novel application of WBHM using IoT and optical sensor. So to detect and measure damage in bridges, there are many techniques and algorithms used by mechanic and civil engineer, among these methods Mean Normalized Curvature Difference of Waveform Jerk Energy MCDWJE and Curvature Difference Probability waveform Jerk CDPWJE.

Paper(2). Bridge Vibration Monitoring System Based on Vibrating-Wire Sensor and ZigBee Technologies 2016 Qiang Fu and Bing Han proposed A bridge vibration monitoring device with the vibrating-wire sensor as the basic measuring device is designed to solve some problems in the application of the traditional engineering vibration measuring technologies into bridge monitoring, and a remote monitoring system is established with the wireless network technology, with hardware and software design integrating the single chip, ZigBee and GPRS.

Paper(3). Consumer buying decisions models: A descriptive study, 2016 Melvin Gutierrez and Cesar Garita proposed This work describes the process of prototype design and development of a wireless embedded system that uses specific accelerometer sensors to generate data relevant to health monitoring of bridges. This paper includes there requirement analysis, design and implementation of a system prototype using mainly free or low-cost technologies.

Paper(4). Bridge Structural Monitoring and Warning System Application in Thailand Experiences Learned, 2017 Ittipong Khemapech proposed Engineering structures have been regarded as a one of the crucial foundations of societal and economic development of the nation. As significantly impact life quality and safety, monitoring and warning mechanisms are required. Structural members are considerably affected by several loadings imposed by normal operation, disaster and environment.

## III. PROBLEM STATEMENT

Flyovers and highway bridge systems are critical in many regions, being used over several decades. It is basic to have a framework to screen the strength of these extensions and report when and where support activities are required. Headways in sensor innovation have brought the computerized ongoing scaffold wellbeing checking framework. However, current system uses complicated and high cost wired network among sensors in the bridge and high cost optical cable between the bridge and the management center. The confounded wiring additionally makes the establishment and repair/substitution process troublesome and costly.

### Goals and Objectives

The objective of Bridge Health Monitoring System is to provide the necessary information of the structural condition and possible damage in Bridge in order to provide the documented basis for decisions concerning these matters. The overall aims for Bridge Health Monitoring systems are too. 1. Ensure safe structures. 2. Monitoring Structural Performance and Applied Loads. 3. Facilitating the Planning of Inspection and Maintenance. 4. Validating Design Assumptions and parameters. 5. Updating and Revising Design Manuals and Standards. 6. Attain safe economic operation.

#### IV. EXISTING SYSTEM

A basic engineering of WSN application for extension wellbeing checking; we are intrigued on Rades La Goulette Bridge in Tunisia. The extension of Rades in Tunisia is under the provincial course of gear serve, this scaffold has three ranges of 2x2 paths, two middle of the road arches and two heaps at the finishes. The focal range has a scope of 120m and the two ranges of banks are of ranges 70m each. The stature of the deck is 20m as for the level of the ocean and the tallness of the arches is of 20m. To screen and distinguish harm we use in our application DHT11 to recognize temperature variety, ADXL, to identify vibration string CV, etc. In this extension, we will actualize our application to acquire genuine estimations esteems. A few components are utilized in this application (sensors, server, database, raspberry and Arduino trucks, and so on), these components have distinctive jobs. Here we portray our proposed design which had been utilized to screen different parameters in Bridge Rades La Goulette. formalized definition for it. Raspberry Pi: it very well may be utilized for some IoT application, along these lines it's ready to supplant numerous capacities and it's utilized to recognize numerous parameters (gases, vibrations, temperature, mugginess, pressure, etc). At most Raspberry Pi is utilized as a smaller scale Controller.

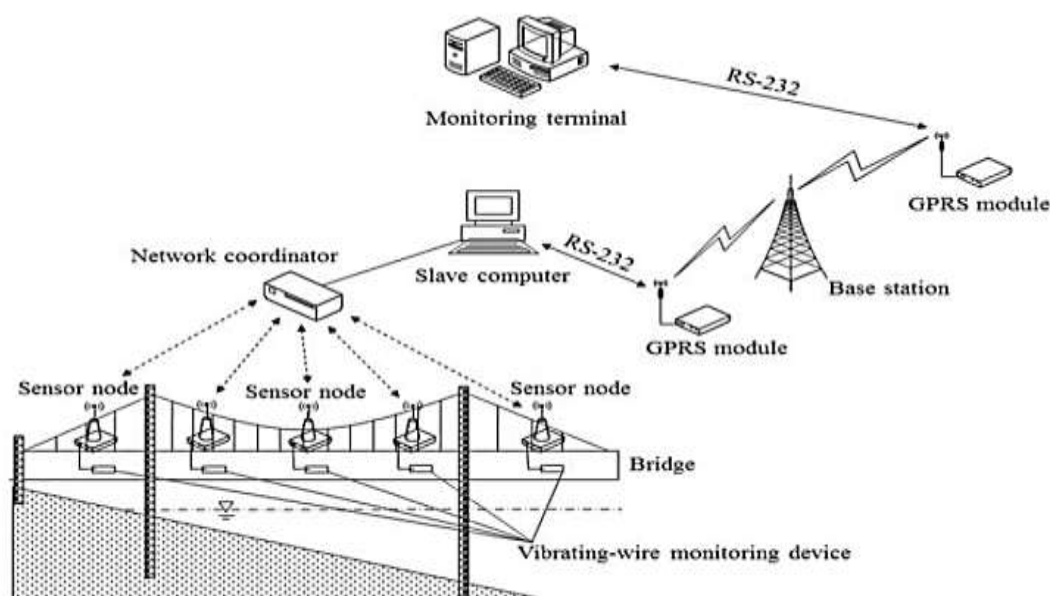


Figure-1: Existing System Architecture

#### V. PROPOSED SYSTEM

In this proposed system, we will use sensors like weight sensor, water level point contact sensor, vibration sensor, wifi sensor as sensing devices. These sensors will be responsible for sensing the load on the bridge, pressure of the water, level of the water rising in the river. The data sensed by sensors will get converted into an electrical signal. The devices which generate output are generally called as actuators (sound buzzer, auto barrier). Both sensor and actuator are collectively called as a transducer. The electrical signal will get transmitted to the Arduino Microcontroller. Architecture of Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

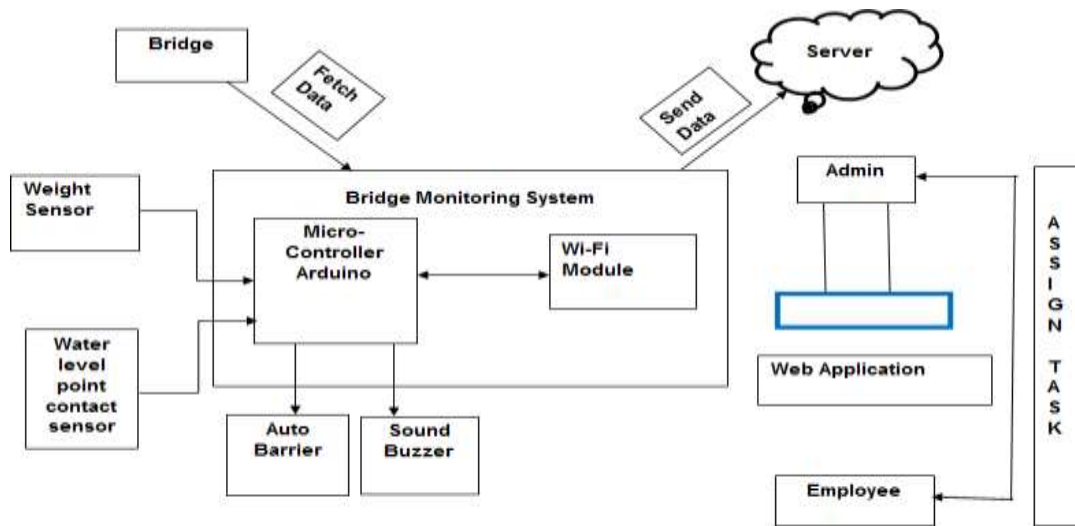


Fig: 2-System Architecture

**Algorithm-:**

- 1:Initialize.
- Step 2:Measure the impact/vibration on bridge .
- Step 3:Detect movement of bridge.
- Step 4:Send data to android app server.
- Step 5:Detect the water level.
- Step 6:Notify user about flooding
- Step 7:Send data to android app server.
- Step 8:Measure the weight put on bridge.
- Step 9:Send data to android app server.
- Step 10:Create one to one connection to send data from sensors to Arduino.
- Step 11:Send information to Arduino
- Step 12:condition is given.
  - 1.If weight capacity increase at high risk then entry door will close
  - 2.If vibration increase at high risk then entry and exit door will close
  - 3.If water level increase at high risk then entry and exit door will close

**CONCUSION**

We used this system to monitor the real time condition of bridge and take precautions from damage and avoids the accident. This system helps the government unit to do the maintenance of the bridge time to time. Bridge health condition monitoring in real time has been popular issue. The sensor technology is continuously advancing and condition monitoring has never been accurate and easier before. With the help of the wireless technology many problems due to data cables and expensive optical cable are now minimized and eliminated. The sensing capabilities of these nodes satisfies the immediate requirements for economic, low-maintenance load ratings and short-term dynamic measurements in addition to providing the hardware functionality for development of a long-term continuous bridge monitoring system. Such emerging technology is now capable of performing the bridge monitoring tasks that have been highly proposed and promised, though seldom demonstrated.

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