



International Journal of Recent Development in Engineering and Technology  
Website: www.ijrdet.com (ISSN 2347-6435 (Online) Volume 15, Issue 04, April 2026)

# IoT-Based Smart Bridge Health Monitoring System Using Sensors

Swarup Jawne<sup>1</sup>, Pooja Harale<sup>2</sup>, Laxmi Kumbhar<sup>3</sup>

Guide: Sanjiwani Deshmukh

*1,2,3Alard College of Engineering and Management, Pune, India*

**Abstract** — The Bridge Monitoring System integrates advanced sensor technology and communication modules to ensure the safety and structural integrity of bridges. An ATmega328 microcontroller is used as the central processing unit to collect and process data from various sensors such as DHT11, water level sensor, continuity sensor, and ADXL345 accelerometer. The system monitors environmental and structural parameters including temperature, humidity, vibration, tilt, and water level. Real-time data is displayed on a 16x2 LCD for on-site monitoring, while alerts are sent through a GSM module using SMS notifications. The ESP8266 Wi-Fi module transmits data to the Thing Speak IoT platform for remote monitoring and analysis. The system is powered using a 12V battery with a DC-DC converter to regulate voltage. This system enables early detection of structural issues and supports preventive maintenance, improving bridge safety and reliability through IoT-based monitoring.

**Keywords**—Bridge Monitoring, IoT, Sensors, Structural Health, ESP8266

## I. INTRODUCTION

Bridges are important structures that require continuous monitoring to ensure safety. Traditional inspection methods are manual and may fail to detect early damage. This project provides an IoT-based solution for real-time bridge monitoring.

## II. METHODOLOGY

Sensors like DHT11, water level sensor, continuity sensor, and ADXL345 accelerometer collect data.

The ATmega328 processes this data and sends alerts using GSM and Wi-Fi modules.

## III. SYSTEM COMPONENTS

1. ATmega328 Microcontroller
2. DHT11 Sensor
3. Water Level Sensor
4. ADXL345 Accelerometer
5. GSM Module
6. ESP8266 Wi-Fi Module
7. LCD Display

## IV. RESULTS AND DISCUSSION

The system monitors data in real-time and generates alerts during abnormal conditions.

## V. CONCLUSION

The system improves safety and reduces manual inspection using IoT technology.

## REFERENCES

- [1] IoT Based Monitoring System, 2020
- [2] Bridge Safety Systems, 2019
- [3] Wireless Sensor Networks, 2018
- [4] Smart Infrastructure Monitoring, 2021