Walchand Institute Of Technology, Solapur
Electronics and Telecommunication Engineering

TIRE PRESSURE MONITORING SYSTEM FOR TWO-WHEELERS

Presented By:

- Khushi Kasliwal (Roll No: B_23)
- Vaishnavi Gramopadhye (Roll No: B_14)
- Prerna Dawada (Roll No: B_12)

Project Guide:

Mr. M. V. Mylavarapu

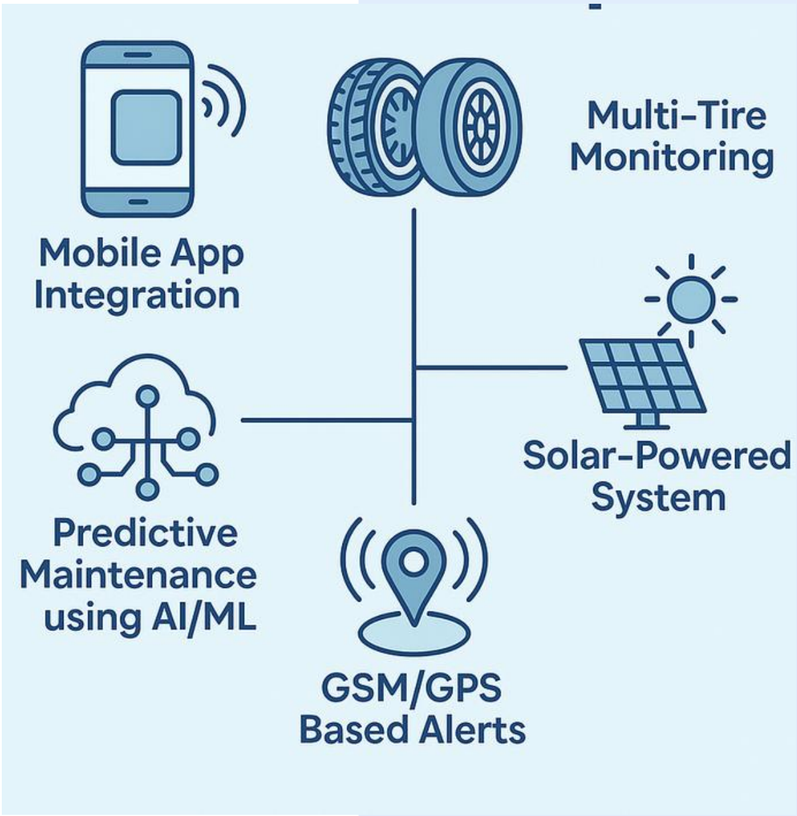
Introduction

- The project introduces a Tire Pressure Monitoring System (TPMS) that provides live pressure readings for two-wheelers, improving rider awareness and safety.
- Proper tire pressure reduces the risk of accidents caused by under-inflated or over-inflated tires, especially at high speeds or on uneven roads.
- Maintaining the right pressure leads to better mileage and longer-lasting tires, reducing maintenance costs.
- Traditional methods are time-consuming, unreliable, and don't provide pressure data while riding.
- The system uses ESP8266 and HX710B sensor, making it a low-cost, compact, and easy-to-integrate solution for two-wheelers.

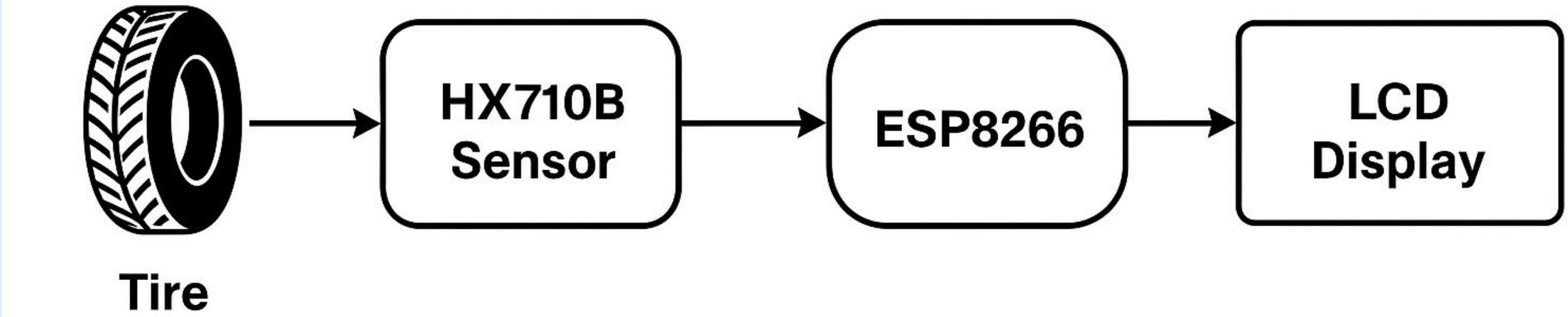
Purpose of the Project

The main purpose of this project is to develop a real-time Tire Pressure Monitoring System (TPMS) specifically for two-wheelers, using the ESP8266 microcontroller and HX710B pressure sensor. This system is designed to:

- Continuously monitor tire pressure while the vehicle is in motion.
- Alert the rider about under-inflated or over-inflated tires to prevent accidents.
- Provide a low-cost and efficient solution to replace traditional manual tire checks.
- Improve vehicle safety, fuel efficiency, and tire lifespan through timely pressure maintenance.
- Make the technology accessible and practical for regular two-wheeler users in both urban and rural settings.



System Description



- The system uses the HX710B pressure sensor to detect tire air pressure, which is interfaced with the ESP8266 microcontroller for data processing and wireless communication.
- The measured pressure values are displayed in real-time on an LCD screen, allowing the rider to continuously monitor tire health during operation.
- The setup is designed to be lightweight, affordable, and easily mountable on two-wheelers, with potential for future upgrades like mobile app integration and multi-tire support.

Working Principle

The Tire Pressure Monitoring System works on the principle of sensing and transmitting air pressure data from the tire to the user in real-time:

Pressure Detection:

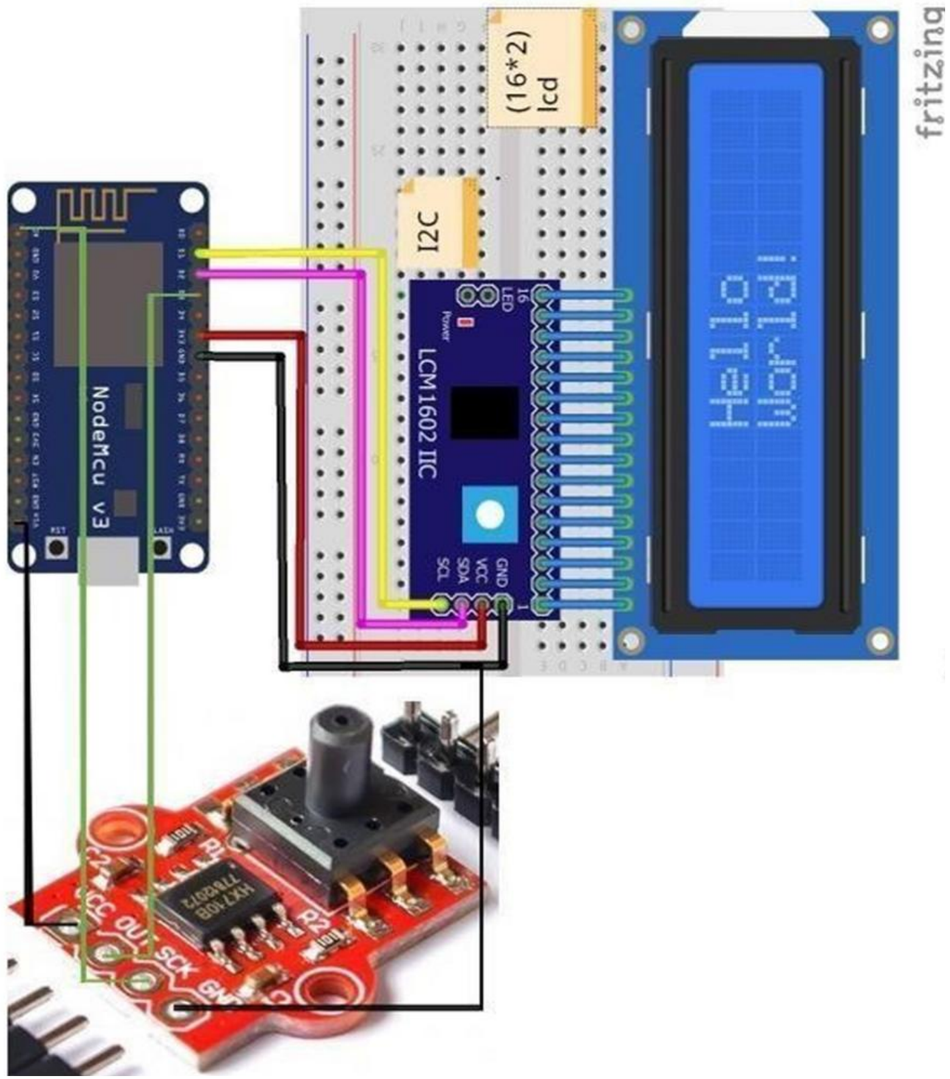
The HX710B pressure sensor senses the air pressure inside the tire. It converts the pressure into an analog electrical signal.

Signal Processing:

ESP8266 microcontroller receives this signal and converts it into digital data. It processes the values and checks whether the pressure is within a safe range.

Data Display & Alerts:

The processed pressure value is displayed on an LCD screen. If the pressure falls below or exceeds a predefined limit, the system can trigger a visual or sound alert to warn the rider.



Key Highlights

Advantages

- Real-time pressure monitoring
- Enhances rider safety
- Affordable solution for two-wheelers
- Improves tire life and fuel economy
- Compact and easy to install

Disadvantages

- Sensor requires periodic calibration
- Needs continuous power supply
- Limited functionality without internet
- Prototype supports only one tire

Applications

- Helps riders maintain proper tire pressure, reducing the risk of accidents due to under- or over-inflated tires.
- Ensures optimal tire pressure, which reduces rolling resistance and improves fuel economy.
- Prevents uneven tire wear, increasing the lifespan of tires and reducing maintenance costs.
- Detects slow pressure drops, allowing riders to address issues before they lead to breakdowns.
- Can be integrated into digital dashboards of modern bikes for seamless real-time tire pressure visibility.
- Eliminates the need for manual checks and offers hassle-free, continuous monitoring of tire pressure.

Future Scope

- Develop a dedicated Android/iOS app to display real-time pressure readings and alerts directly on the rider's phone.
- Extend the system to monitor both tires (front and rear) simultaneously with individual alerts and readings.
- Implement AI algorithms to analyze pressure patterns and predict potential tire issues like punctures or slow leaks before they occur.
- Add GSM and GPS modules to send SMS alerts and track tire status remotely—especially useful for long-distance riders or fleet management.

Conclusion

We successfully built a prototype that provides accurate pressure readings and displays them on an LCD screen, with the potential for wireless monitoring via Wi-Fi.

This system not only improves rider safety but also promotes fuel efficiency and tire longevity by ensuring that tire pressure remains within optimal levels. The project demonstrates the practical application of IoT and embedded systems in solving real-world problems.

Overall, the system holds great promise for real-world deployment with further enhancements like mobile app integration, multi-tire monitoring, and smart alerts, making it a valuable innovation for the automotive safety sector.

THANK YOU!