IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

IOT Based Tyre Pressure Monitoring System

Mr. Surya Jillidimudi [*1], Dr.B.Prasad[*2]

[1]MCA Student, Department of Master of Computer Applications,
Vignan's Institute of Information Technology(A), Beside VSEZ,Duvvada,Vadlapudi Post,
Gajuwaka, Visakhapatnam-530049.
[2]Associate Professor, Department of Information Technology,
Vignan's Institute of Information Technology(A), Beside VSEZ,Duvvada,Vadlapudi Post,
Gajuwaka, Visakhapatnam-530049.

Abstract:

This project introduces an Internet of Things (IoT) based pressure monitoring system utilizing the BMP085 sensor. The primary objective is to measure and monitor atmospheric pressure, offering real-time data visualization through the Blynk IoT platform. The Adafruit BMP085 sensor is employed for measuring temperature, pressure, and altitude, with an Arduino microcontroller and an ESP8266 Wi-Fi module facilitating wireless connectivity.The system leverages the Blynk library to establish a connection between the Arduino and the Blynk platform. Through the Blynk app, users gain remote access to pressure readings and receive alerts based on predefined thresholds. Additionally, the system controls an output pin, enabling the activation of a buzzer or external device in response to detected pressure levels.The implementation involves initializing the BMP085 sensor, configuring Wi-Fi credentials, and establishing a seamless connection with the Blynk platform. Sensor readings are then acquired and transmitted to the Blynk app, where they are visually displayed on a virtual terminal. Continuous monitoring of pressure levels provides visual feedback on both the Blynk app and the serial monitor.The proposed IoT-based pressure monitoring system boasts various advantages. It offers real-time data visualization, allowing users to remotely monitor atmospheric conditions. Integration with the Blynk platform enables the customization of alerts and notifications based on user-defined pressure thresholds. Moreover, the system exhibits flexibility for expansion, accommodating additional sensors or actuators to cater to more complex applications.

Keywords: Tyre Pressure Monitoring System,Internet of Things(IoT),Blynk Platform,Data Visualization,Pressure Thresholds.

1. INTRODUCTION

The Internet of Things (IoT) represents a network of physical objects, such as appliances, vehicles, and machinery, enhanced with sensors, connections, and software to gather and share data. This interconnected ecosystem allows for remote monitoring, management, and interaction with these devices through the internet. The transformative potential of IoT across various sectors has garnered significant interest due to its ability to reshape daily life experiences.

The focus of this IoT project revolves around connecting physical devices, sensors, and actuators to the internet. This connectivity enables the collection and exchange of data, facilitating remote monitoring, control, and automation. The project aims to harness IoT capabilities to create a seamlessly functioning network of devices, fostering real-time information sharing and insights.The primary objective of the IoT project is to define the core purpose or goal it aims to achieve. This may involve improving operational efficiency, enhancing safety and security measures, optimizing resource management, or addressing specific needs aligned with the project's goals.

Throughout the project lifecycle, a combination of hardware, software, and communication technologies will be utilized to construct a robust and scalable IoT system. This involves employing sensors to collect data from the physical environment, micro-controllers or edge devices to process and transmit data, and leveraging cloud platforms or local servers to store, analyze, and visualize the collected data.

Key Components:

1. Sensors: Deployed to gather data from the physical environment, these sensors play a crucial role in the data acquisition process.

2. Micro-controllers or Edge Devices: Responsible for processing and transmitting data, these devices form the backbone of the IoT system, ensuring seamless communication between the physical world and the digital realm.

3. Cloud Platforms or Local Servers: These platforms are utilized to store, analyze, and visualize the collected data, providing a centralized hub for managing and interpreting information.

2. LITERATURE SURVEY

A Tire-Pressure Monitoring System (TPMS) is a computerized device designed to monitor air pressure within pneumatic tires of various vehicles, providing real-time tire-pressure information to the driver. This survey aims to explore the key aspects, types, classifications, and objectives of TPMS, considering both direct (dTPMS) and indirect (iTPMS) systems.

Types of TPMS:

1. Direct TPMS (dTPMS):

- In dTPMS, sensors are directly mounted on each tire to measure and transmit real-time pressure information. This direct approach offers precise and accurate data, enabling timely responses to pressure variations.

2. Indirect TPMS (iTPMS):

- iTPMS relies on the vehicle's onboard systems to indirectly infer tire pressure based on factors like wheel speed and rolling radius. While cost-effective, iTPMS may exhibit lower accuracy compared to dTPMS.

Implementation Variants:

1. Original (Factory) Solution:

- TPMS is often integrated as an original solution during vehicle manufacturing. This factory-installed system ensures seamless integration and compatibility with the vehicle's architecture.

2. Aftermarket Option:

- TPMS is also available as an aftermarket option for vehicles lacking factory-installed systems. These aftermarket solutions provide retrofitting capabilities, allowing users to upgrade their vehicles with TPMS functionalities.

1. Accident Prevention:

- The primary goal of TPMS is to enhance road safety by preventing accidents caused by under-inflated tires. Real-time monitoring allows early detection of pressure deviations, reducing the risk of blowouts and accidents.

2. Improved Fuel Economy:

- Maintaining optimal tire pressure contributes to better fuel efficiency. TPMS aids in detecting and addressing under-inflation promptly, ensuring vehicles operate with optimal fuel consumption.

3. Reduced Tire Wear:

- Under-inflated tires experience increased wear and tear. TPMS helps in identifying and rectifying tire pressure issues early on, leading to reduced tire wear and extended tire lifespan.

Monitoring and Warning Systems:

1. Display Options:

- TPMS communicates tire-pressure information to drivers through various display options, including gauges, pictogram displays, or interactive displays. These visual representations enable quick and intuitive understanding of tire status.

2. Warning Lights:

- Low-pressure warning lights are integral to TPMS, alerting drivers to potential issues with tire pressure. This immediate visual cue prompts timely corrective action, mitigating safety risks.

Challenges and Future Directions:

1. Sensor Technology Advances:

- Ongoing advancements in sensor technology aim to enhance TPMS accuracy, reliability, and cost-effectiveness, addressing challenges associated with sensor longevity and battery life.

2. Integration with Vehicle Networks:

- Future research explores improved integration of TPMS with vehicle networks, enabling seamless communication with other onboard systems for enhanced vehicle performance and safety.

3. EXISTING SYSTEM

The constant improvement of vehicle safety and lifespan has led to the development of tire monitoring and self-inflating systems. Maintaining proper tire pressure and temperature is crucial for vehicle safety and performance. A drop in tire pressure can result in reduced gas mileage, tire life, safety, and overall vehicle performance. To address this issue, we propose an automatic tire monitoring system utilizing the BMP180 sensor as an air pressure and temperature device, which communicates with the Arduino Uno micro-controller distributed by the Node MCU with a Wi-Fi module. The Blynk application displays real-time data on a Smartphone using IoT technology.Our system aims to improve gas mileage, reduce tire wear, and increase tire handling and performance in various conditions. The system addresses the growing concern of environmental issues and the recent oil price hikes by promoting fuel efficiency. The proposed system is an innovative solution to address the shortcomings of traditional tire pressure monitoring methods, and the IoT-based system allows for remote monitoring and real-time data collection. Overall, our system aims to provide a reliable and efficient way of maintaining optimal tire pressure and temperature for safe and improved vehicle performance.

Limitations of the Existing System:

1. In the previous project, it was not suitable for some vehicles, whereas it will only suit ordinary air vehicles.
2. The vehicles which are heavily loaded then the existing system fails for it.
3. The existing project will be set up separately; it will be maintained by another mechanism.

4. PROPOSED SYSTEM

The proposed system leverages the Internet of Things (IoT) along with advanced components to create an innovative Tire Pressure Monitoring System (TPMS). The integration of IoT technology ensures accurate and real-time monitoring of tire pressure, contributing to enhanced safety, fuel efficiency, and overall vehicle performance.

Key Components:

1. IoT Connectivity: Utilizing IoT protocols and connectivity, the system enables seamless communication between the tire pressure sensors and a central monitoring platform.

2. Advanced Sensors: Incorporating state-of-the-art sensors to measure not only tire pressure but also temperature with high precision.

3. Wireless Transmission: Employing advanced wireless transmission technologies to relay real-time data from the sensors to the central monitoring platform.

4. Cloud-Based Analytics: Utilizing cloud-based analytics for processing and analyzing the collected data, allowing for advanced insights and trend monitoring.

Advantages of the Proposed System:

1. Accuracy and Precision:

- The system utilizes advanced sensors to provide highly accurate and precise measurements of tire pressure and temperature. This ensures that the data presented to the driver is reliable for making informed decisions.

2. Real-Time Monitoring:

- Offering real-time monitoring capabilities, the proposed system allows drivers to receive instant updates on tire pressure and temperature. This immediate feedback enables timely adjustments, promoting safety on the road.

3. Enhanced Safety:

- Proper tire pressure is critical for safe driving. By providing real-time data, the system helps drivers maintain optimal tire conditions, reducing the risk of accidents associated with tire failure or under-inflation.

4. Improved Fuel Efficiency:

- The system contributes to improved fuel efficiency by alerting drivers to any deviations in tire pressure. Keeping tires properly inflated helps optimize fuel consumption, leading to cost savings and reduced environmental impact.

5. Extended Tire Lifespan:

- Monitoring and maintaining the correct tire pressure levels contribute to a longer lifespan for tires. This can result in cost savings for vehicle owners through reduced tire replacements.

6. Reduced Accident Risk:

- By preventing accidents caused by tire failures, the system acts as a proactive safety measure. This reduction in accident risk not only enhances safety for occupants but also minimizes the likelihood of collisions involving other vehicles.

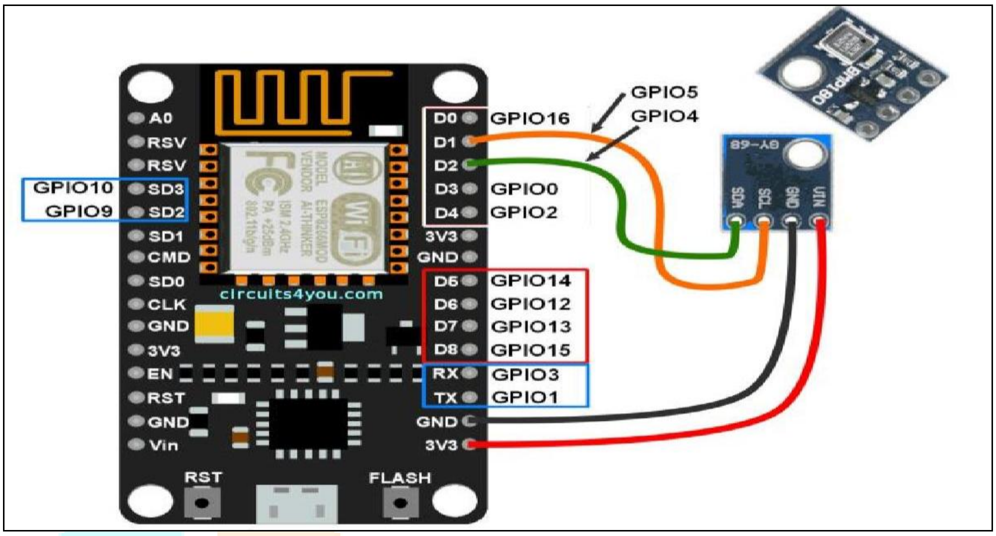
7. Game-Changer for Automotive Industry:

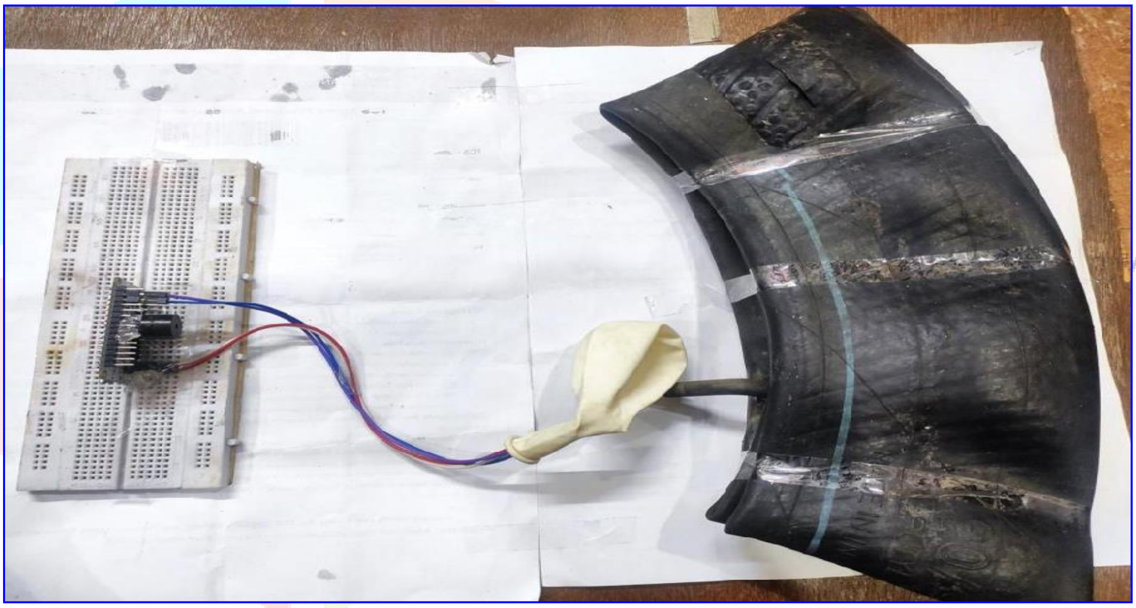
- The proposed IoT-based tire pressure monitoring system represents a significant advancement in the automotive industry. It has the potential to revolutionize how vehicles are maintained and operated, emphasizing safety, efficiency, and sustainability.

5. EXPERIMENTAL RESULTS

From the below figures it can be seen that proposed model is more accurate in order to prove our proposed system.

Main Window:





6. CONCLUSION

The IoT-based TPMS project demonstrates the potential of integrating sensors and IoT platforms to build intelligent applications. This project could be used as a foundation for building more sophisticated TPMS systems in the future.Ordinary, the temperature and stress monitoring system provided on this challenge demonstrates the capability of integrating sensors and iot platforms to build sensible programs. This device could locate In the course of the challenge, we encountered challenges and possibilities for further development.Calibration of the sensor and excellent tuning of the alert thresholds may decorate the accuracy of the device. Moreover, increasing the application to consist of information logging and lengthy-time period analysis will be considered for destiny iterations.

References

[1]Abhishek S Shelar, Renuka U Urane, Pooja S Gitte, Amit P Ingale , " Central TyreInflation System For Four Wheeler," The International Journal of Scientific Development andResearch (IJSDR) Volume IX, Issue VI, JUNE/2020'

[2] K. Rathi, A.Shitole, A.Shelke,S.Kalhapure, B. R. Pujari , "Automatic Central Air
Inflation System,"Research and development in medical education 6th National ConferenceRDME 2017,

[3] Ibrahim S, Ganesh L, Amirsoyal Kokani, Parashuram H C, Vijee Kumar , "AutomaticTire inflation system," The International Journal of Emerging Technologies and InnovativeResearch (JETIR), Volume 8, Issue 9 September 2021.

[4] Vishweshver. J, Salman Haider. B, Ranganath. S, Sahadev. G. N , "Auto Tyre PressureInflation System ," The International Journal of Scientific Development and Research ISSN2321 3361©IJESC Volume 10 Issue No.8 2020.