Tyre Pressure Monitoring System

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Abstract: The aim of this paper is to develop a system proposing a new design method for scrutinizing the air density content in the tyre along with a display module in an automobile supported by a mobile application. It computes the air density content in the tyre, whose calculated value is directed to an application running on a mobile and it is displayed on the scrutinizing device so that the driver can keep a track of it while driving. The prototype regularly demonstrates the amount of density in the tyre so that it can help in avoiding blowout of the tyre. As the driver is aware of the information on a regular basis about the amount of air density, the unfortunate tyre punctures can be circumvented.

Index Terms: Node MCU, Pressure sensor (SPD015AA), Mobile Application, LCD Display, Relay.

I. INTRODUCTION

The proposed prototype comprises of three foremost sections namely the sensor to measure the density of the tyre (SPD015AA), the application created using android and NODE MCU (ESP8266) which is the Wi-Fi module responsible for interaction of information in between the application and the sensor. To exhibit the density of tyre, the LCD display is vital so that the driver can monitor the real time data related to the density content. The system is designed to continuously scrutinize the tyre density and the instant it exceeds the threshold level or drops down below a pre-determined value, it will be shown on the LCD as well as the mobile application. The link between tyre density and user application is established through NODE MCU (ESP8266) which is nothing but a Wi-Fi module for high speed data transference.

II. EXISTING SYSTEMS

The controlling device of the module is the Nuvoton microcontroller. It belongs to the Numicro pro family which resembles a 32bit controller. The module is divided in two parts viz. the input section and output section. The source side gives the statistics of temperature and pressure of tyre continuously through ZigBee protocol. The Zigbee transceiver is used which will transmit and receive the data content. The information received by the Zigbee transceiver will be converted into CAN protocol format so that real time data will be employed. The prototype will provide alert in case of improper tyre density. Waking circuit is used so that whenever data needs to be sent, it will wake up the circuit and transference of data will take place. When pressure is low the warning is sent to owners' mobile through GSM system. A star topology or configuration is used between the network.[1]

The practice of supervising the density content in the tyre can be basically done in two ways. First is the module based on observing the speediness of the wheel which is also called as the Indirect TPMS. It observes the real time speediness of the wheel with the help of the sensors used for estimating the wheel speediness. Whenever there is a change in the diameter or radius of the tyre it will provide alert related to the present density in the tyre and the same will be displayed. But the system can be termed as inefficient as it will not provide data continuously. Hence, another method which is known as direct TPMS is an efficient way of measuring and sensing the real time pressure in the moving wheel. In this method, two sections of transmitter and receiver play a major role. transmitter section consists of pressure sensor (SPD015AA), temperature sensor (LM35), Arduino Board (ATMEGA 328) and RF transceiver. The information is transformed into digital bits by Arduino board and it is transmitted by RF transmitter the information received will be forwarded to ATMEGA 328 on receiver side which will display the value on LCD and buzzer is offered for alerting the driver when failure circumstances arrive. [2]

The direct TPMS lacks in caliber of as four different circuit will be necessary for four tyres to monitor its density and there is absolutely no way to provide detailed value of each tyre. Hence this limitation is eliminated by hybrid tyre module which comprises of sensors for measuring the density of tyre and the speediness of the wheel, LF transmitter, RF receiver and display module. System wants the driver to get alerted when the density is abnormal. When the vehicle starts it will observe the speediness of vehicle through ABS and send the data content to host storage. It will act normal when the air density is under control the host will awake the LF transmitter the sensor starts to work. The measured data will be transferred through RF circuit and the readings from the both sensors get displayed on LCD and alarm is provided to ensure the safety of vehicle.[3]

III. METHODOLOGY:

BLOCK DIAGRAM: -

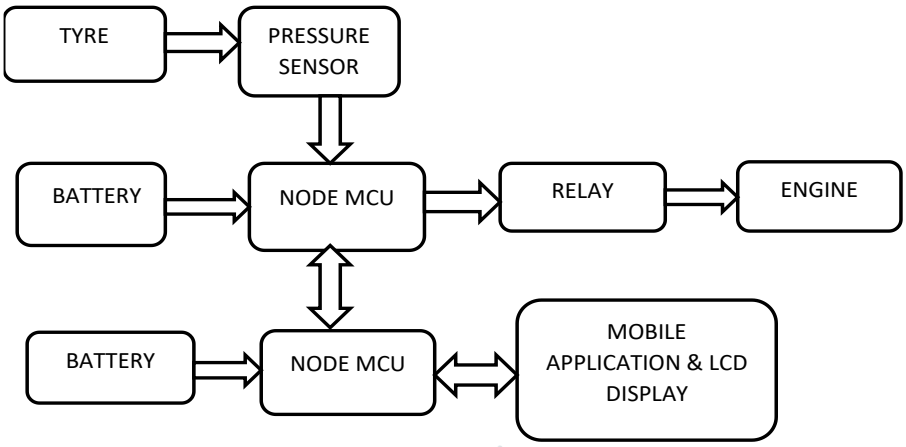

Figure 1: Block diagram of Tyre Pressure Monitoring System

DESCRIPTION: -

A typical and standardized edifice of components is referenced here. The core or the heart of the system will be the NODE MCU modules which will be placed at both the source and receptor sections. These modules serve the basic purpose of monitoring the amount of air density in the tyres. The SPD015AA measures the air density in the tyre and transfers the content via NODE MCU to the mobile application and readable device. Relay acts as a key in this entire procedure. It switches on or off according to the density of the tyre through NODE MCU when the tyre density is above or below the preceding value. The transference section is placed at the valve of tyre. So, to minimize the circuitry, battery is used instead of power supply.

BRIEF WORKING:

The proposed prototype implies a density measurement sensor SPD015AA which is used to measure the amount of density in the tyre. This is used in transmitter section whose measured data will be given to NODE MCU. NODE MCU is the WIFI module which is used for transmitting data measured by SPD015AA. The measured tyre density is transmitted to the receiver section through NODE MCU. It consists of NODE MCU, relay, LCD along with a mobile application. The measured air density will be received by NODE MCU on the receiver section. Accordingly, if the system finds that pressure is normal then the system will work normally. But when the system finds that the density is above or below the preceding range then the measured density is sent to the mobile application and also it displays the information on the LCD display. Relay is provided for controlling action so that engine doesn't stop while the car is running on highway. A bypass command is sent from mobile application for controlling the off status of the engine. NODE MCU on the receiver side is basically used for communication so that data can be send easily to mobile application and LCD display.

IV. OUTPUT RESULTS

The experiment for observing success of the developed prototype was carried out and the results were more than satisfying. The measured tyre pressure is displayed on the LCD and mobile application. Whenever tyre pressure goes beyond the preceding range, the car will tend to stop to prevent this bypass command is provided.

V. FUTURE SCOPE

With further modifications and upgradations, this expertise can be taken to another level so that the pressure displayed on the LCD can be displayed on Dashboard. This prototype can serve as a base for the upcoming trends in the field of Automobile industry. This method can assist as a stepping stone for developing a well-defined edifice for tyre pressure scrutinizing system.

VI. CONCLUSION

This prototype has been successfully tested and driven according to the predefined objectives and goals and it gives satisfactory results for the same. In our system we have provided range from 1 to 10 Pascal. If the pressure value goes beyond preceding range then the car tends to stop which is unacceptable on highway so to prevent the car from this malfunctioning bypass command is provided by mobile application.

VII. REFERENCES

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