REAL TIME MONITORING OF PRESSURE AND TEMPERATURE IN VEHICLE TYRE USING I^2C PROTOCOL WITH BLUETOOTH MODULE

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Abstract: In our daily life safety of the person is quite common for making individual set peace and happy. In our routine life vehicles are the one of the essential means for travelling, it can be two wheeler or four wheeler (ie., bike or car), nowadays increasing number of the vehicle in the city is more and by that there are huge number of accident occur. Statistical says that accident rate of vehicles are increasing day by day. Generally, the pressure and temperature of the any material should be controlled in the maintaining capacity otherwise the things goes wrong or the material gets affected. In the vehicle the pressure of the tyre gets decreases means the quality of the tyre gets worse and accidents also occur because of the low pressure in the vehicle tyre. The paper monitor about the pressure and temperature of the vehicle tyres using sensor technologies to safeguard the person who drives the vehicle.

IndexTerms: Real Time Monitoring, Arduino UNO, Pressure Sensor, Temperature Sensor, bluetooth module , I^2C Protocol.

I. INTRODUCTION

In the vehicles there are various systems that protect and prevent from accident such as ABS technology, airbag system and so on. But one of the reason for the accident is that sudden air loss or puncture in the tyre while driving on the road. Here this paper represents the project that to monitoring the tyre continuously if there any changes in the air pressure or any variance in the temperature the system makes the buzzer turns on and we can also monitor the system with bluetooth module using I^2C protocol Here sensors are used for monitor the pressure and temperature. The system sends the data from the sensors through bluetooth module This paper represents the cost effective system and important precaution for the safe driving the vehicle.

II. EXPERIMENTAL SETUP OF THE SYSTEM

Generally in the vehicle, we can monitor the quantity of the petrol, speed of the vehicle and also can measure the kilometre of vehicle driven. In this proposed system we monitoring the pressure inside the tyre of the vehicle. In this system using the Arduino UNO module with the Atmega328p microcontroller. This module collects the data from the sensors then the information will transmit through serial communication. The sensor BMP180 module is used for calculating the pressure of the vehicle tyre and the temperature can calculate from the LM35 temperature sensor. Bluetooth module(HC-05) is used for transmit the data information from the microcontroller to the mobile. Buzzer is used for the alarm section.

III. SYSTEM ARCHITECTURE AND THEIR IMPLEMENTATION

In general, the system monitors the pressure and temperature conditions and stores the data to the Atmega328p microcontroller. there are various platforms are there to transmit the information of data here we using the bluetooth HC-5 module for transmitting the data from the microcontroller. By using the bluetooth module we can see the condition of the tyre pressure and the temperature of the engine. this system monitors continuously and whether any changes in the condition of the tyre automatically the buzzer gets turn on. we can also check simultaneously through the mobile. In this system the atmega328 microcontroller is connected with the BMP180 pressure sensor through the I^2C protocol. By this protocol we can communicate through the serial communication. By the protocol microcontroller is acts as a master for the pressure sensor. This protocol can acts as both master and slave mechanism. The following descriptions are the modules used in this proposed system.

a. ARDUINO UNO

An open source microcontroller board which is based on the Atmega328p controller is said to be the Arduino uno.This board having the feature which equipped with the set of analog and digital I/O pins. By using this pins only the sensors and the controller gets connected. There are 14 digital & 6 analog pins. This module is powered by the USB cable or via 9v power supply. 5v of power is used as the operating voltage of this microcontroller. In this microcontroller 32kb of flash memory in this 0.5kb is used for bootloader. As normal as other controllers it s also having the reset, power supply Vin and Vout .It also having the specialized functions namely UART, External interrupt pins, Pulse width modulation, Serial peripheral Interface I^2C Interface and AREF(Analog reference).

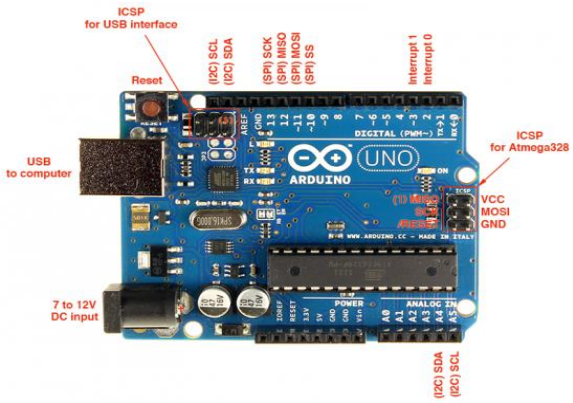


Figure 1 - Arduino UNO

b. BLUETOOTH MODULE

The module which having the transparent wireless serial connection is said to be Bluetooth HC-05 module. It having the feature of both slave and master configuration setup. bluetooth module is used here for the wireless communication. This module is very qualified V2.0+EDR(enchanced data rate) 3mbps modulation with complete 2.4 ghz radio baseband and transceiver. In this bluetooth module uses the CSR bluecore 04 external chip rluetooth system with the CMOS technology as well as having the feature of adaptive frequency hopping. In this module, having the default setting as the slave mode we can change according to the application. this module having the baud rate of 9600 bps. It permits the pairing devices to connect as the default and it having the default code for pairing device is "1234".It having the transmit power of radio frequency up to 4dbm. this bluetooth module can be accessible with the range of 10 metres. Here in this paper we using the bluetooth HC-05 module for transmit the data's from the microcontroller.

Figure 2 - Bluetooth Module

c. BMP180 PRESSURE SENSOR

The Sensor which consists of piezo-resistive sensor, an analog to digital convertor and a control unit is the BMP180 pressure sensor. The name BMP180 pressure sensor, abbreviation of BMP denotes the barometric pressure sensor. In this sensor, the system communicates with the pressure sensor via Inter-integrated Circuit (I^2C) protocol. In this sensor there are five pins allocated for the connection purposes. Two pins used for power supply to the sensor another two pins are the pins which used for the synchronized data and synchronized clock for transmits data from the sensor to the microcontroller. Remaining pin is mentioned as the unused condition. this sensor generally used to calculate barometric pressure of the particular location or particular material. BMP085 is the previous version of the BMP180 pressure sensor which are manufactured and designed by the BOSH. The 3V power supply is used enough to operate the sensor module.

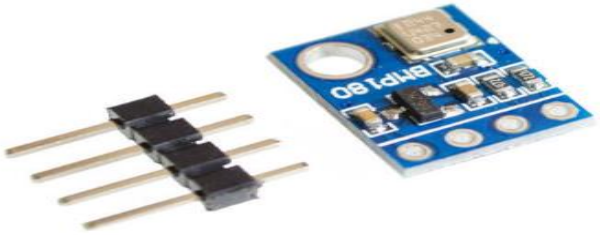


Figure 3 - BMP180 Pressure Sensor

d. LM35 TEMPERATURE SNSOR

In this system we used another sensor module to sense the temperature of the engine which is said to be LM35 temperature sensor. The LM35 temperature sensor device which is the precision integrated circuit and the sensor output will be linearly propositional to the centigrade temperature, so that it is very flexible to accurate the data information from this temperature device. There is no need of any external calibration or trimming to provide the typical accuracies of 1/4˚C at normal room temperature and only 60µa needed for the device to communicate with the system. The range of this particular sensor is -55˚C to 150˚C. Generally self heating is the major interference of the other sensors but this sensor has a very low self heating which is 0.1˚C. It is very suitable for the remote applications and it is a low impendence output, 0.1Ω for 1ma load. It is the one of the device which is more reliable, cost effective and more accuracy.

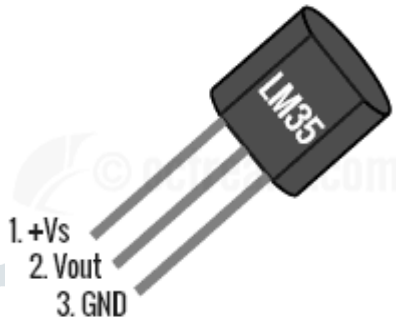


Figure 4 – LM35 Temperature Sensor

e. I²C PROTOCOL

Philips semiconductor invented the concept of I²C protocol (Inter-integrated circuit). This serial communication protocol is uses two pins only to transmit the data namely SDA (Synchronized data) and SCL(synchronized clock)which both the buses are bidirectional. In this protocol we can manage multiple masters and multiple slaves. Buses which are having the unique address to communicate with the computer this unique address is used to by the master to communicate with the particular slaves. This protocol is always starts with the masters only not by the slaves.

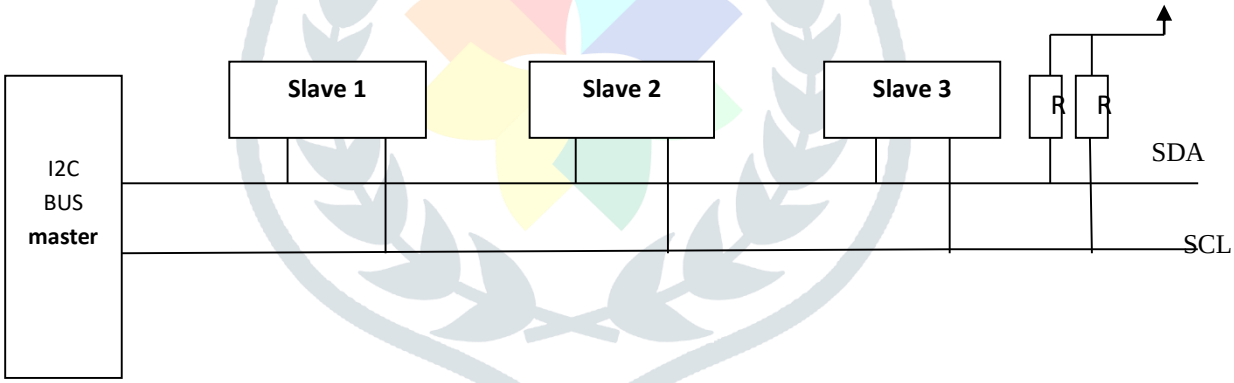


Figure 5 Architecture of I2C protocol

f. BUZZER

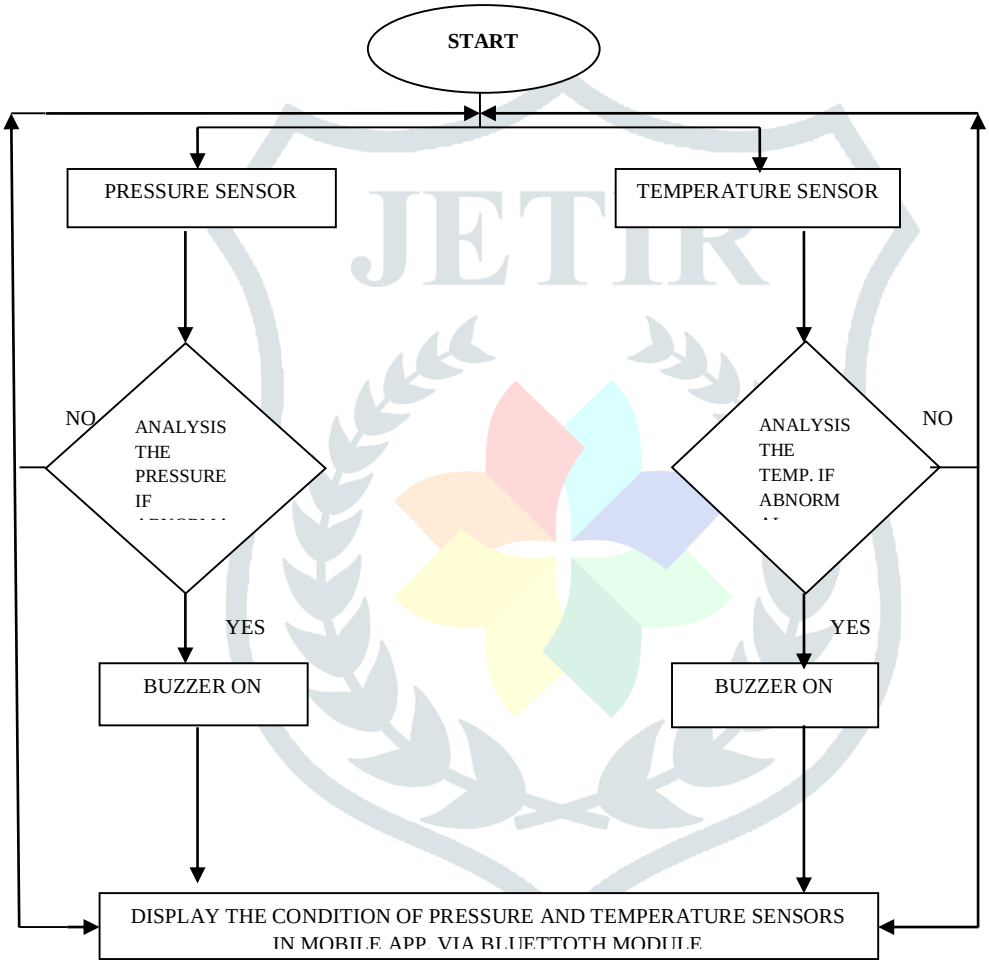
The buzzer is the one of the output indicator in this proposed system. Buzzer also called as beeper, it is a audio signalling device which indicates any changes in the system it automatically turns on. In the mechanism of buzzer there are various types namely mechanical, electromechanical or piezoelectric buzzers.

Figure 6 - Buzzer

IV. WORKING METHODOLOGY OF THE SYSTEM

Generally, various programming languages are there in the platform namely C, C++,Python. Here in this project we using the C program as a programming language. After the programming code is developed. The program code can be upload to the ATmega 328 microcontroller using the Arduino IDE. Arduino IDE is the platform to write the program code to the microcontroller chip. It is used to run on the computer and also helps to upload computer code to the physical board. By using the complier the program code is fetched with the Arduino Atmega 328p microcontroller. After uploading done as per the program coding the system sensors turns on to measure the temperature and pressure of the particulars. Pressure sensor measures the pressure in the vehicle tyre and the data will sends through the I^2C protocol. SDA,SCL pins in the pressure sensor should connected to the Arduino A5 and A4 pins respectively. If there any changes in the pressure measurement or if reached the abnormal state automatically the buzzer will turns ON and simultaneously we can see the updates of the data in mobile app using bluetooth HC-05 module. as like pressure sensor , temperature sensor also measures the heat produced by the engine. If there any increase in the temperature or goes to the abnormal state automatically the buzzer turns on and we can also check the whole data information from the mobile app via bluetooth module.

V. FLOW CHART OF PROPOSED SYSTEM



VI. RESULTS

The following figure represents the results of the pressure and temperature using Atmega 328p microcontroller. The figure represents whether the tyre is in normal state or in abnormal condition which demonstrated using the pressure sensors and also shows the condition of the heat dissipation of the engine using LM35 temperature sensor. The data collected from the sensors and the bluetooth module transmitted the information to the mobile.

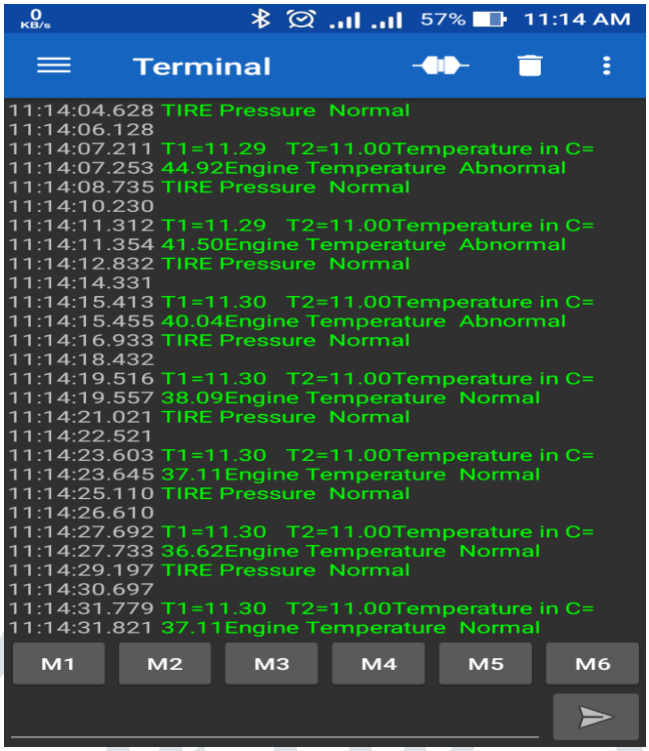


Figure 7 – Data collection of the sensors

VII. CONCLUSION

This real time monitoring system of pressure and temperature in vehicle tyre provides a reliable and efficient system. This system helps us to prevent from unwanted accidents. If we implement this proposed system in the vehicle, the tyre will have the extended life, decrease down time and maintenance. It also help us to maintain the fuel economy and improves the safety of the system. The main objective of this proposed system to maintain the pressure and temperature from the vehicle tyre and the engine and safeguard from the unwanted accidents. This system must be a mandatory one added to the vehicle and it supports all type of vehicle. This real time monitoring system can uses in vast areas in various parameters which is more accuracy and cost effective.

VIII. REFERENCES

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