PROJECT DOCUMENTATION

SMART TYRE PRESSURE MONITORING SYSTEM

Submitted To:

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BACHELOR OF SCIENCE IN COMPUTER SCIENCE

5th Semester Project

National Textile University, Faisalabad Campus

Project Title:

Smart Tyre Pressure Monitoring System

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Problem Statement:

Many road accidents occur due to the reason people forget to regularly check their tyre pressure and temperature .The low tyre pressure and high temperature can lead to imbalancement between the tyres which can eventually led to bursting of tyres and loss of vehicle control ,resulting in serious accidents. A Tyre Pressure Monitoring System can help in preventing such accidents by regularly checking the Tyre pressures and temperature and providing timely alerts

Objectives:

- To develop and design an Embedded-Iot based tyre pressure monitoring system.
- To continuously monitor the tyre pressure and temperature using pressure sensor as it effects the tyre safety .
- To detect unsafe pressure conditions based on predefined threshold.
- To alert the user using LED and buzzer when the pressure crosses the safe limit .
- To send the notifications to the user via Email.
- To display real time tyre pressure and temperature on the BLYNK application.

Tools And Technologies:

Hardware Components:

- ESP32 Dev Module.
- BMP 280 Pressure Sensor.
- SSD1306 OLED Display.

- LED and Buzzer For Alert.

Software Stack:

- Paltformio-VScode.
- Arduino IDE.
- Blynk Cloud .

Libraries:

- **Adafruit Bmp-280 :** For Pressure Sensor
- **Adafruit-GFX :** For Text Or Graphics Display on Oled
- **Adafruit-SSD1306 :** For Oled Display
- **Wifi.h :** For Connecting ESP-32 To Wi-Fi
- **BlynkSimpleEsp-32 :** For Connecting To Blynk App

Hardware Description:

The ESP-32 acts as a main-controller and it receives the data from the pressure sensor. The pressure sensor BMP 280 is used as it measures the Tyre pressure and temperature and sends the data to the ESP-32. The Oled is used which Displays the readings on it . The Led and Buzzer are used as they are activated when ever the pressure goes below the safe limit.

Software Description:

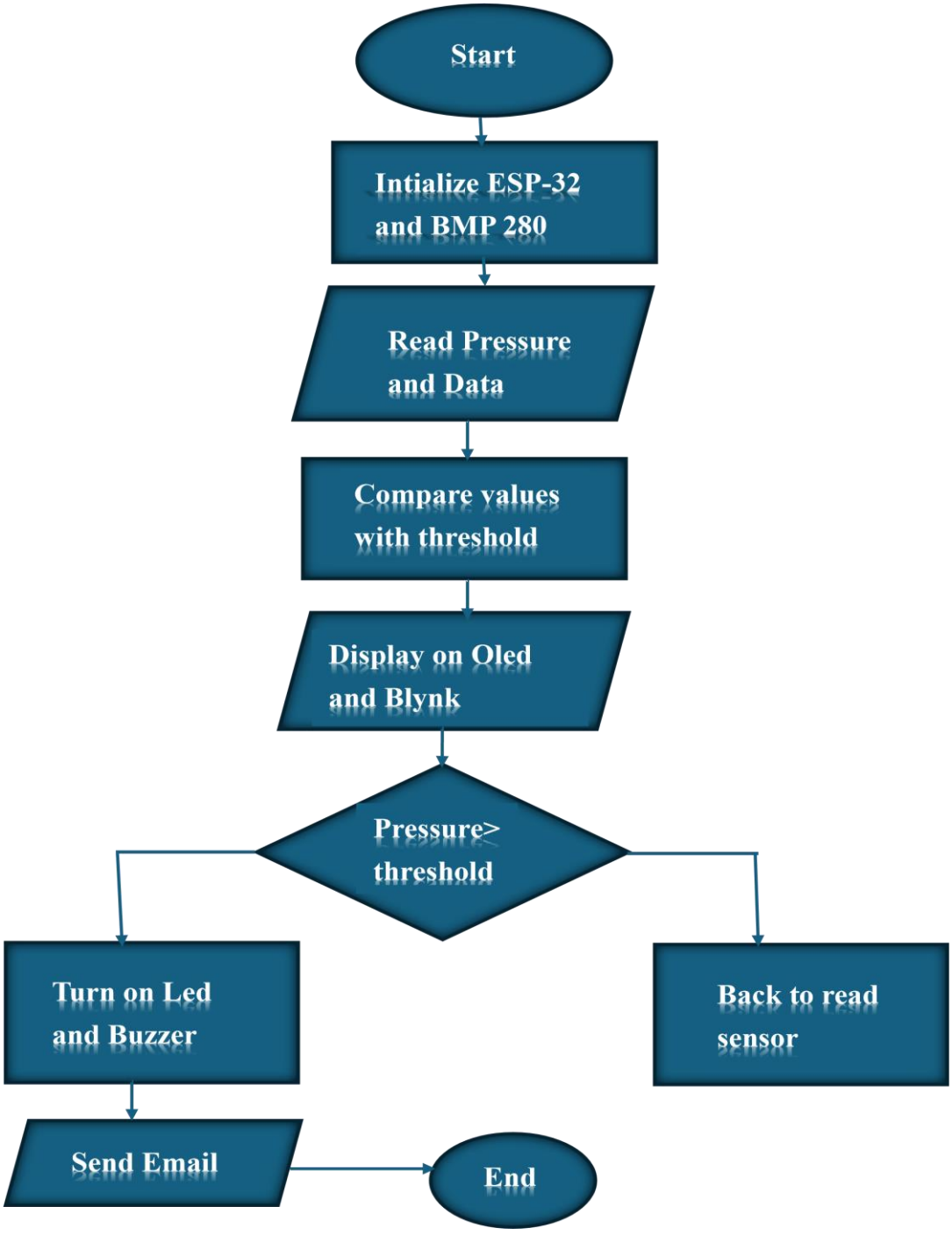
The PlatformIO and Arduino-IDE are software which are being used for coding and the ESP-32 is being used as it receives data from the Pressure Sensor ad sends it to the Blynk Cloud inorder to show the real time udates in the readings and to send notifications to the user through email during alerts (Pressure below safe limit)

Methodology:

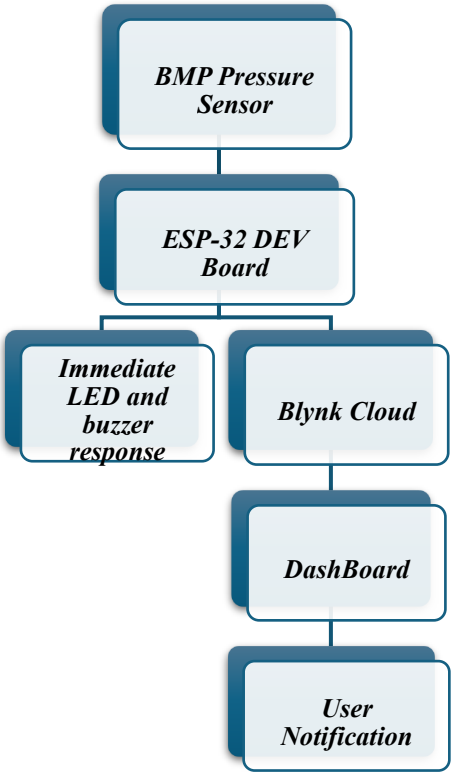
Our project is a Tyre pressure monitoring system in which we are using ESP-32 and BMP 280 Pressure Sensor.In the demo, the sensor is placed inside a half cut completely sealed plastic chamber in order to stimulate a Tyre pressure . This works when we place the complete pulled out syringe plunger on the straw and insulate it with tape also. Then all we have to do is wait First the pressure rises on its own due to the Physics Law **PV= nRT** . Then after some time it began to reduce and the led ad buzzer are activated if the pressure reaches below the safe

limit and email notification are send if it remain below safe-limit for more than 3-minutes.

FlowChart:



System Architecture :



Features:

- Real Time Tyre monitoring for tyre pressure .
- LED and buzzer alerts for the unsafe pressure conditions.
- Data being displayed on the BLYNK App.
- Email Notification for instant alerts.
- Easy to be introduced with the help of sealed chamber and syringe.

Results:

- The Smart Tyre Pressure Monitoring System successfully measured and monitored the Tyre Pressure and Temperature
- The syring demo was successful as when the pressure went below the safe limit it activated led and Buzzer

- Furthermore, it also provided the real time readings on the Blynk App and Dash board
- More Over , it was able to provide email notification for stable and low pressure if that condition still maintained upto 3-minutes

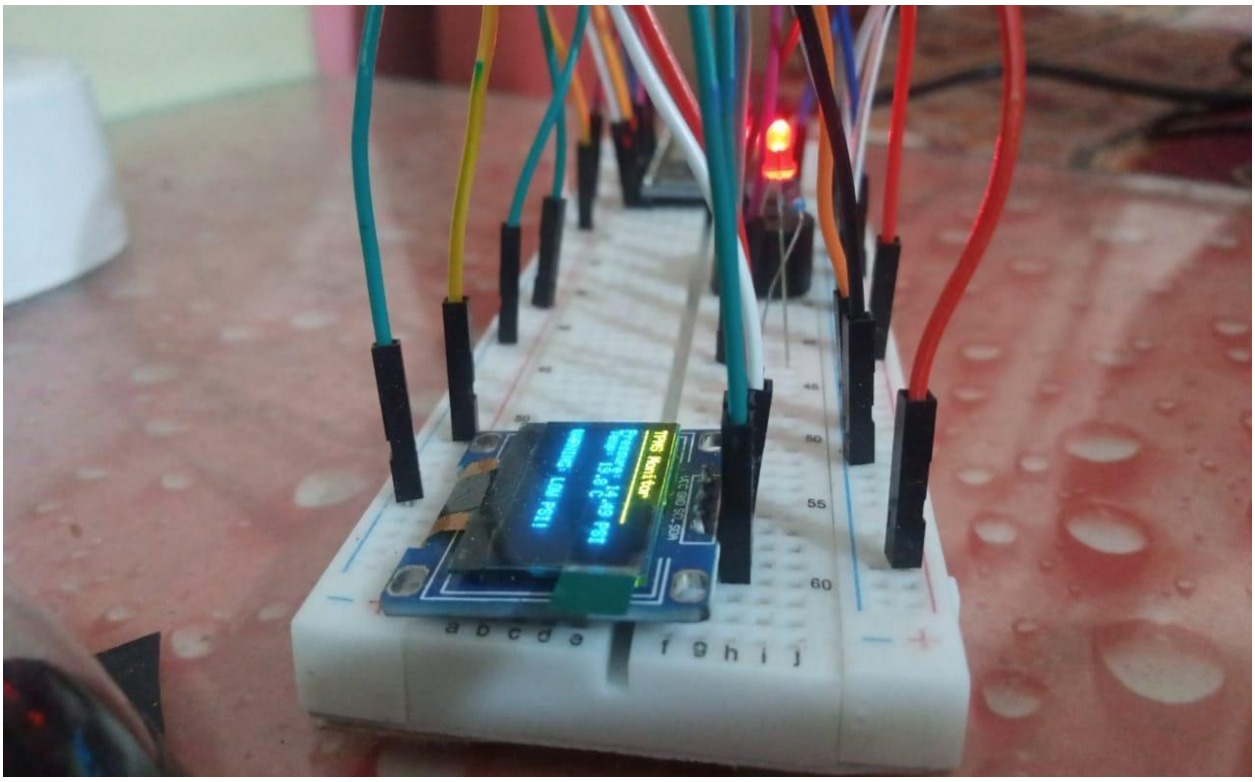
Conclusion:

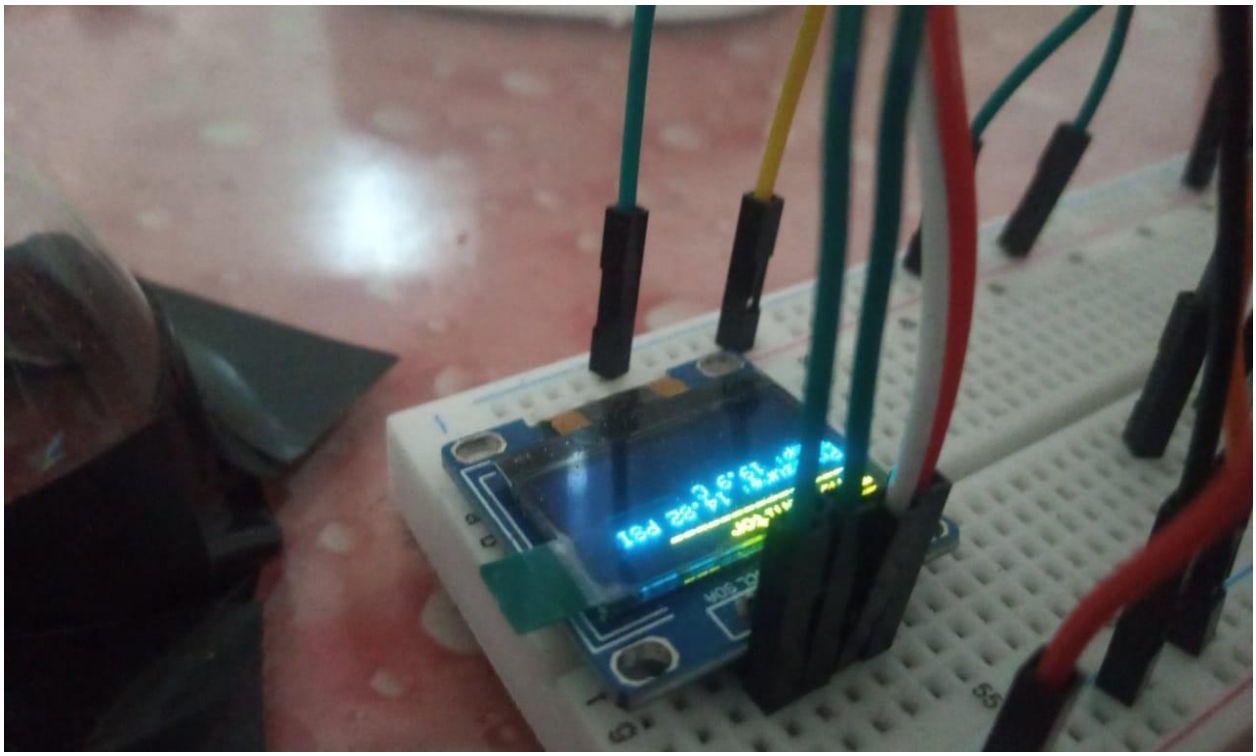
- The Tyre Pressure Monitoring System efficiently monitors the tyre pressure
- It alerts the user immediately if the tyre pressure is below normal range with the help of Led, Buzzer and Blynk app
- Real time data readings are being displayed on the Oled and in the Blynk app in the form of Graphs
- The system is simple, effective, easily-understandable and accessible and helpful for preventing tyre related accidents

Future Scope:

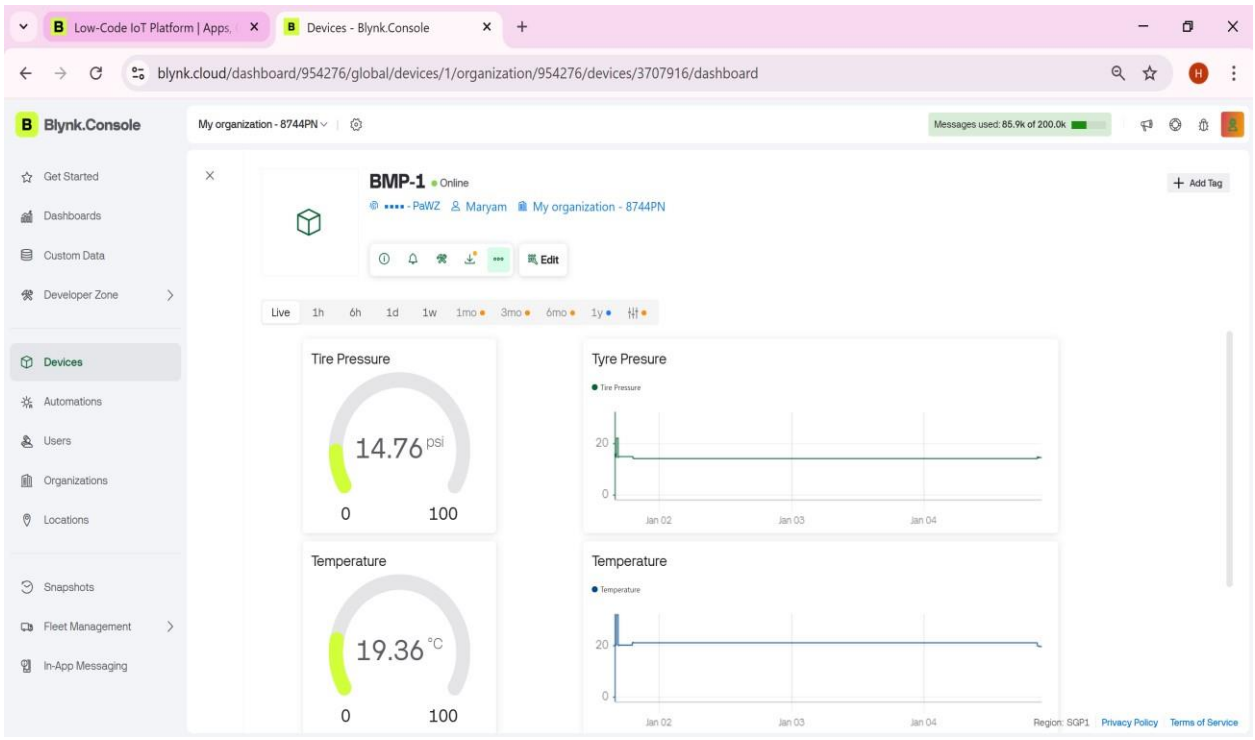
- This System can be installed in real vehicles to monitor the tyre pressure continuously
- It can be further expanded to all type of tyres not only one tyre so it can be used for multiple different types of vehicles
- It can be further enhanced by using online or offline both type of laert notifications which can help in preventing tyre bursting and accidents.

Output:

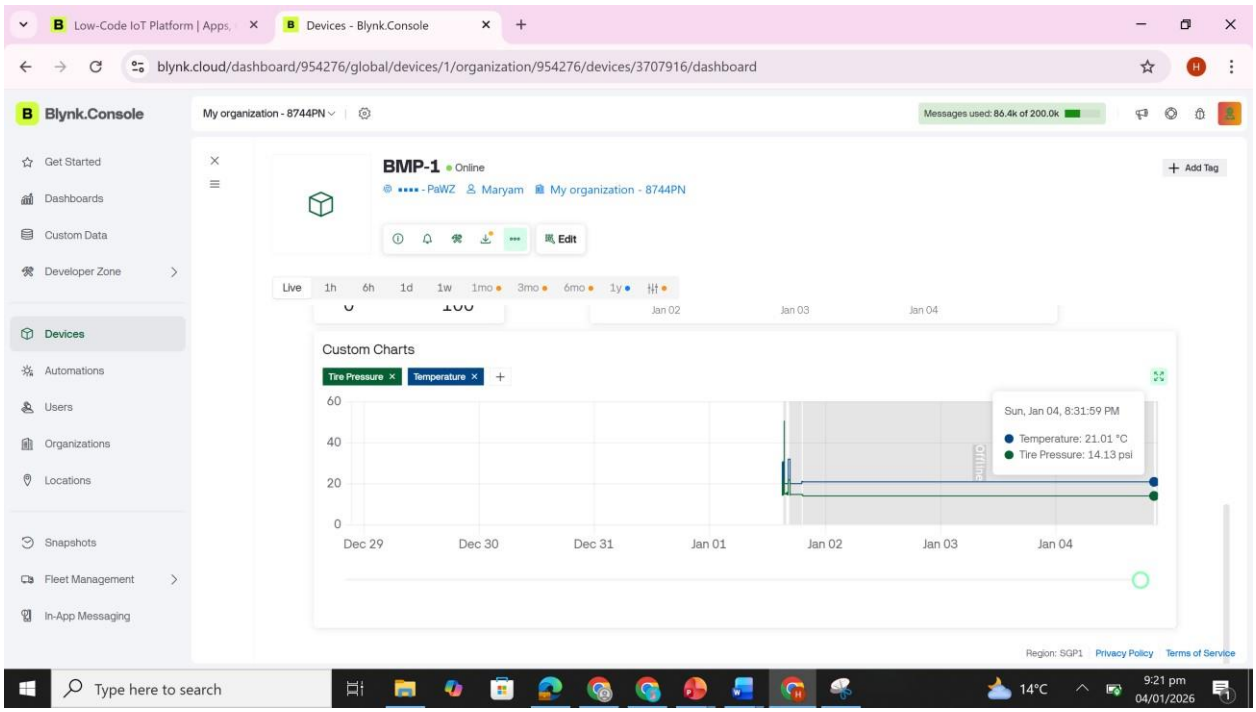




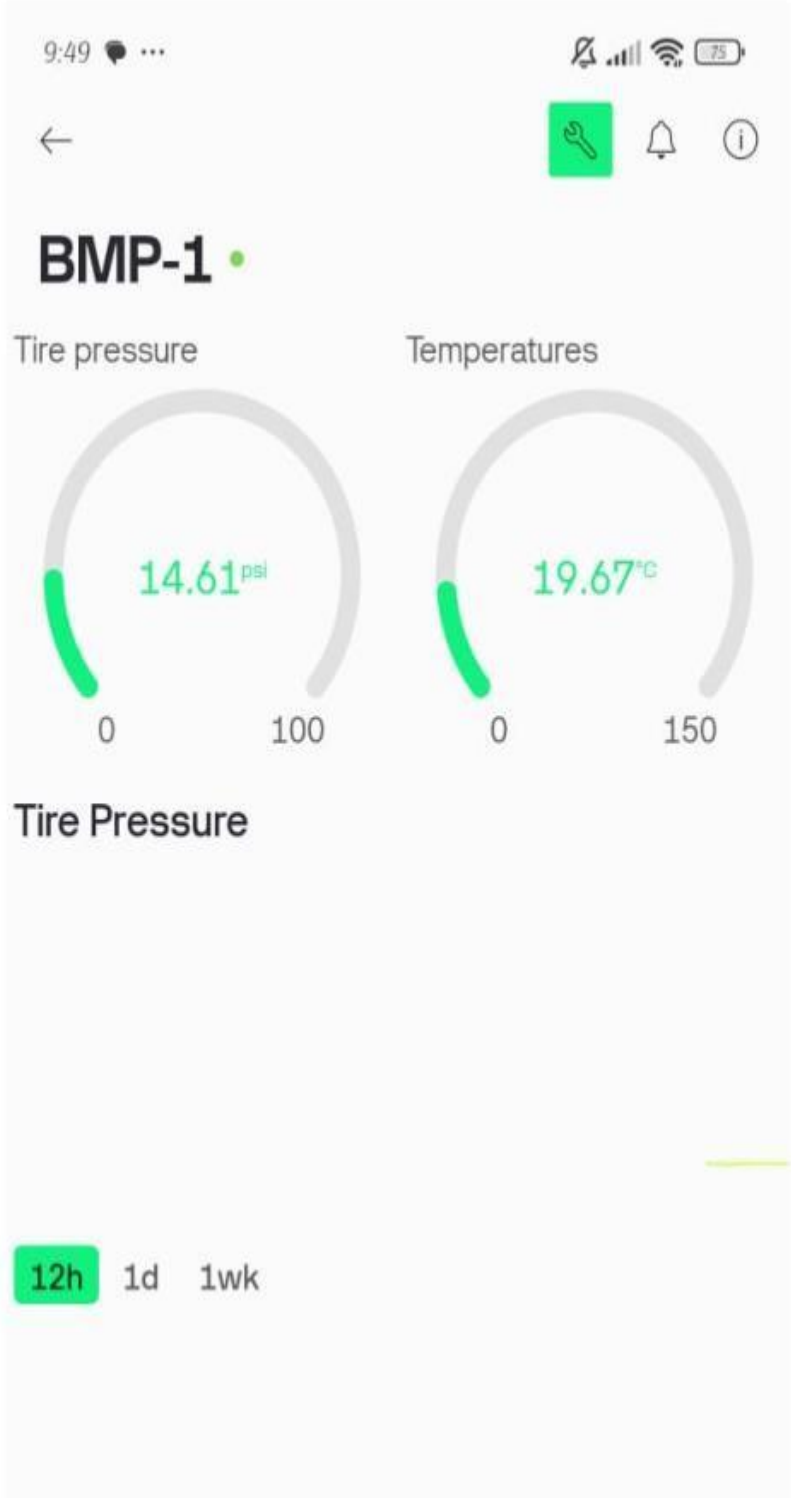
Blynk App:

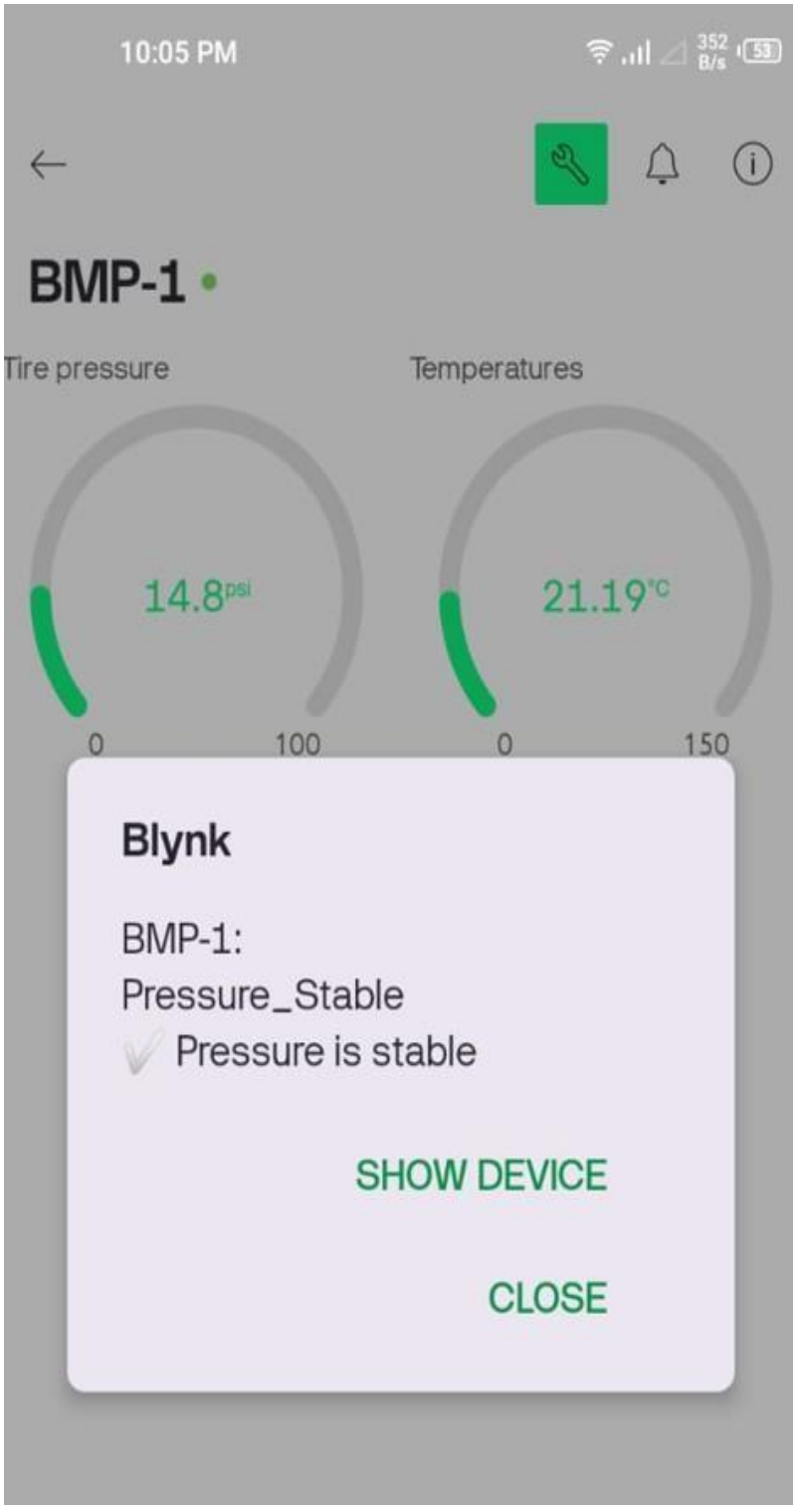


Comparison Between Pressure and Temperature:



Mobile Dashboard:


9:49
BMP-1
Tire pressure
Temperatures
14.61psi
19.67°C
0
100
0
150
Tire Pressure
12h
1d
1wk


10:05 PM
BMP-1
Tire pressure
Temperatures
14.8psi
21.19°C
0
100
0
150
Blynk
BMP-1:
Pressure_Stable
Pressure is stable
SHOW DEVICE
CLOSE

Email Alerts: