TIRE PRESSURE MONITORING SYSTEM

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PROJECT SUBMITTED BY

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Introduction

Project goals and objectives

A Tire Pressure Monitoring System is designed to monitor the pressure in the tires of the vehicle and warn the user when at least one or more tires are underinflated. Many serious accidents could have been avoided had drivers known their air pressure was low. The goal of the project is to build a working prototype of a TPMS.

The main purpose is to develop a prototype of TPMS under **$40**. There are couple of TPMS devices available on ecommerce websites but all exceed the budget cap provided by the professor.

Problem and motivation

The US government passed the Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act which requires that most vehicles sold in the United States since 2007 must include a TPMS of some kind.

Project application and impact

This project is intended to reduce the surge in accidents by providing notification to users when the tire(s) are under inflated using direct TPMS.

Project results and expected deliverables

The resultant product is a TPMS which consists of login, signup for user and a web portal where the user can check the air pressure of each individual tire. Also, the resultant product includes an android application which notifies the user when the pressure is low.

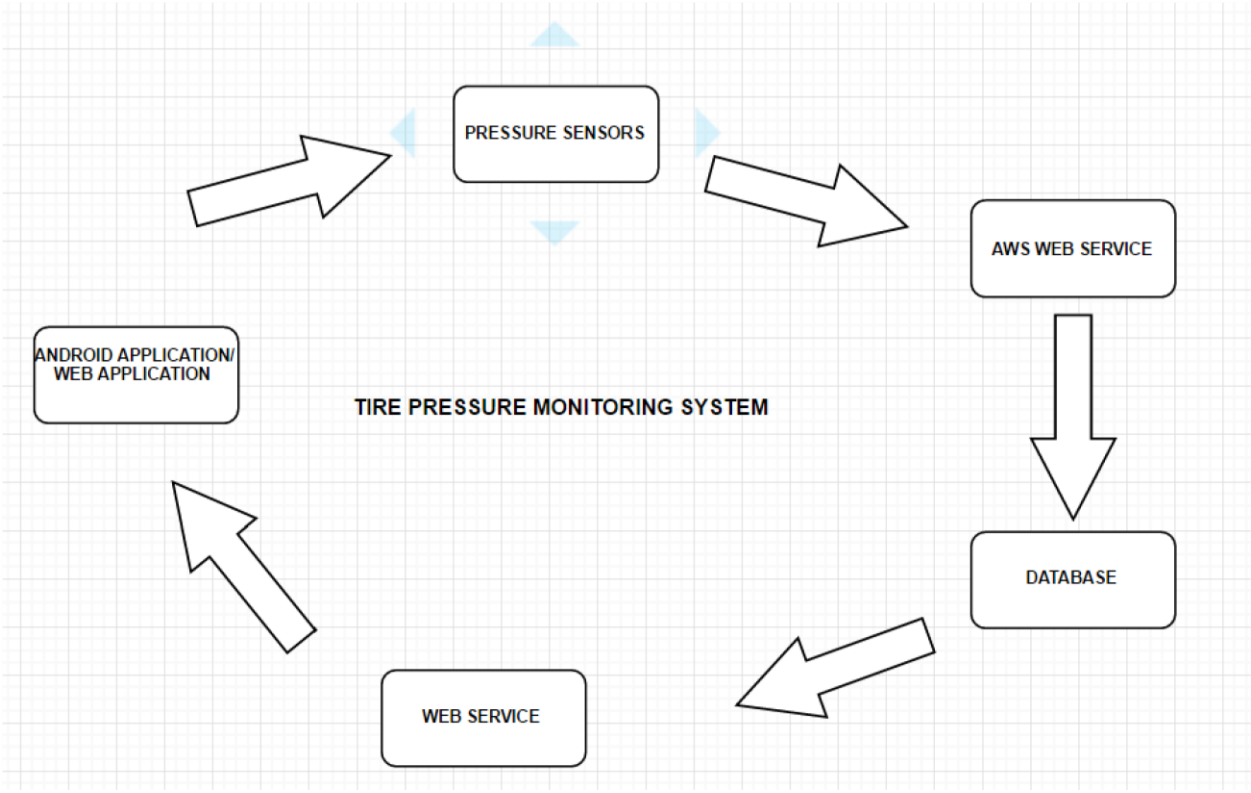
Market research

We tried searching for an existing product on amazon and other vendors to establish baseline for our project. We found below product as our competitor and our goal was to make a working prototype of a similar product.

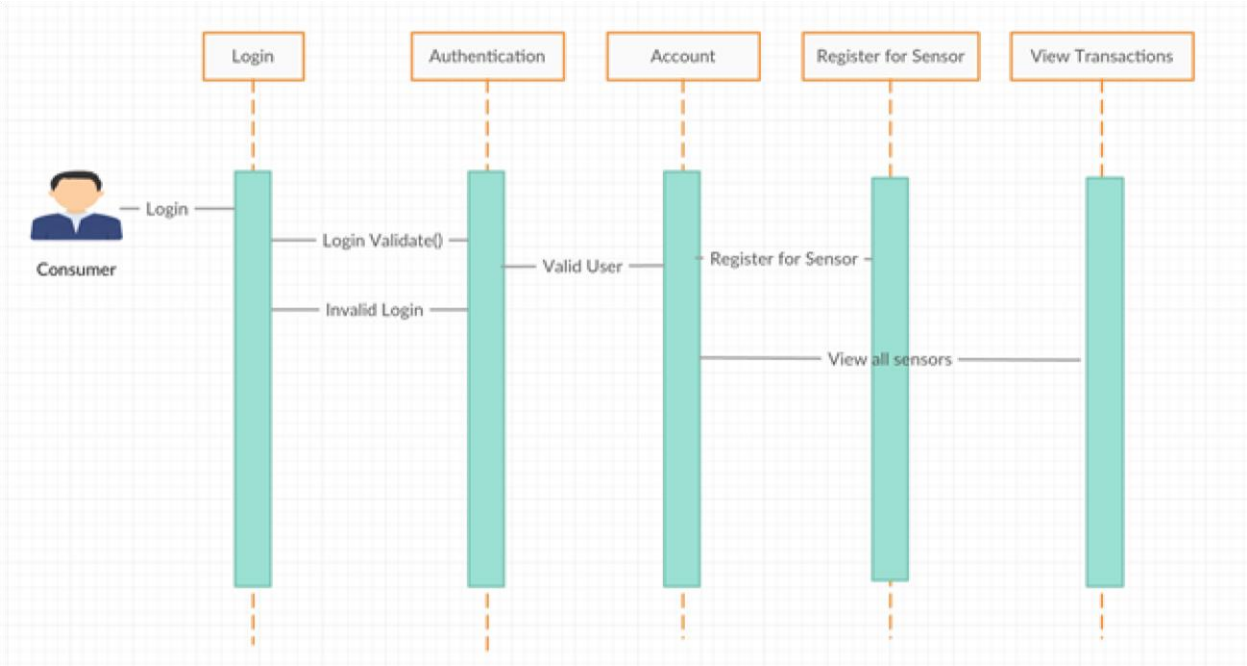
System Design

We have simulated the virtual sensors and data from that application is being stored in Database. We have also created a RESTFUL API for login and for checking the previous data for the user. There is one more API which sends push notification to the mobile application using GCM servers.

FLOW DIAGRAM:



SEQUENCE DIAGRAM:

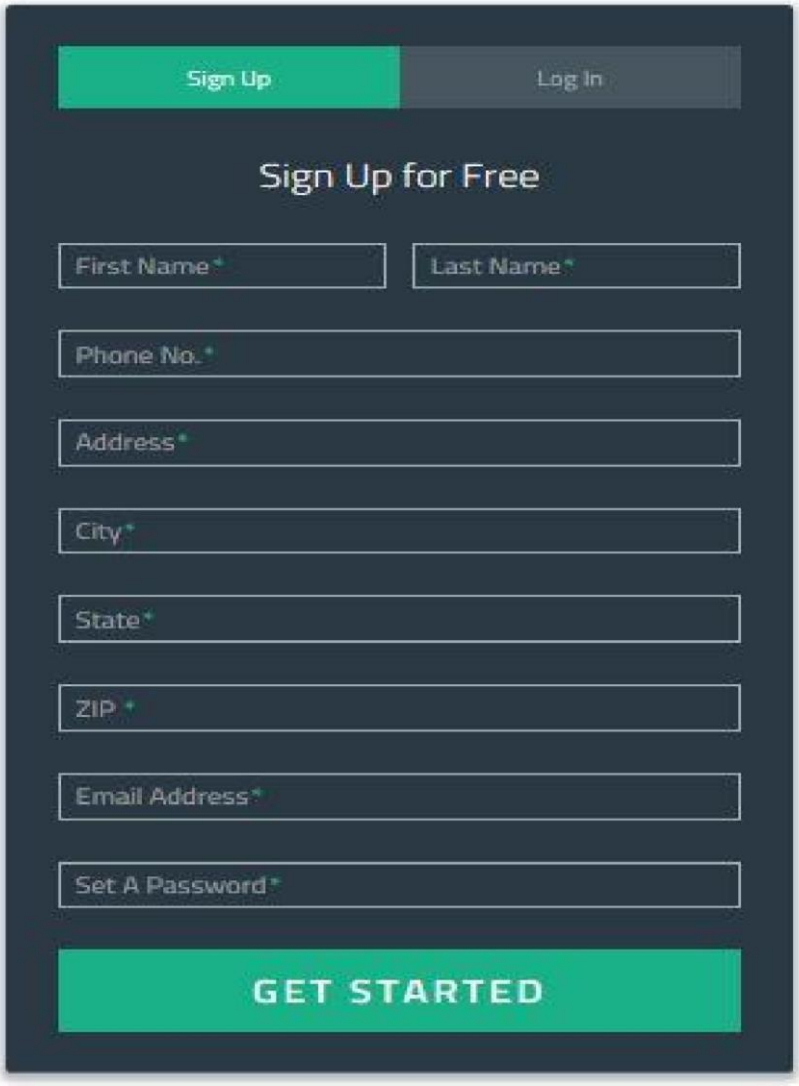


GUI Design

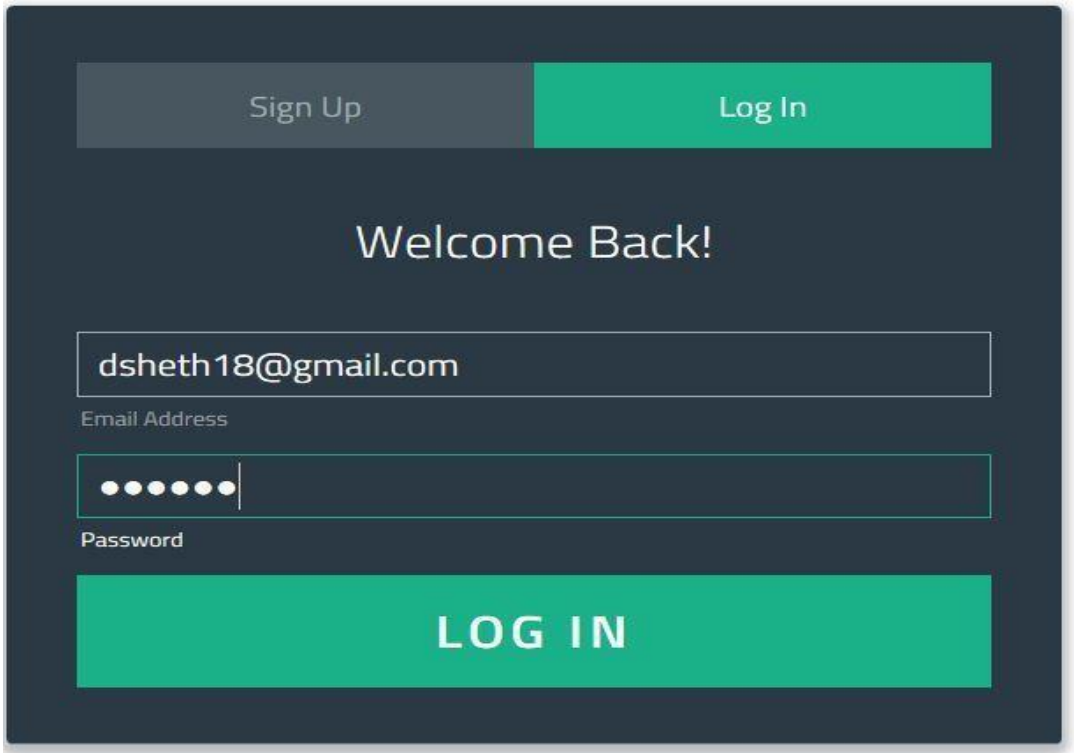
The project includes development of a web application as well as an android app for ease of user.

The web application design is as follows :

Initially, the user(persona : car owner who needs to monitor tire pressure) has to sign up.

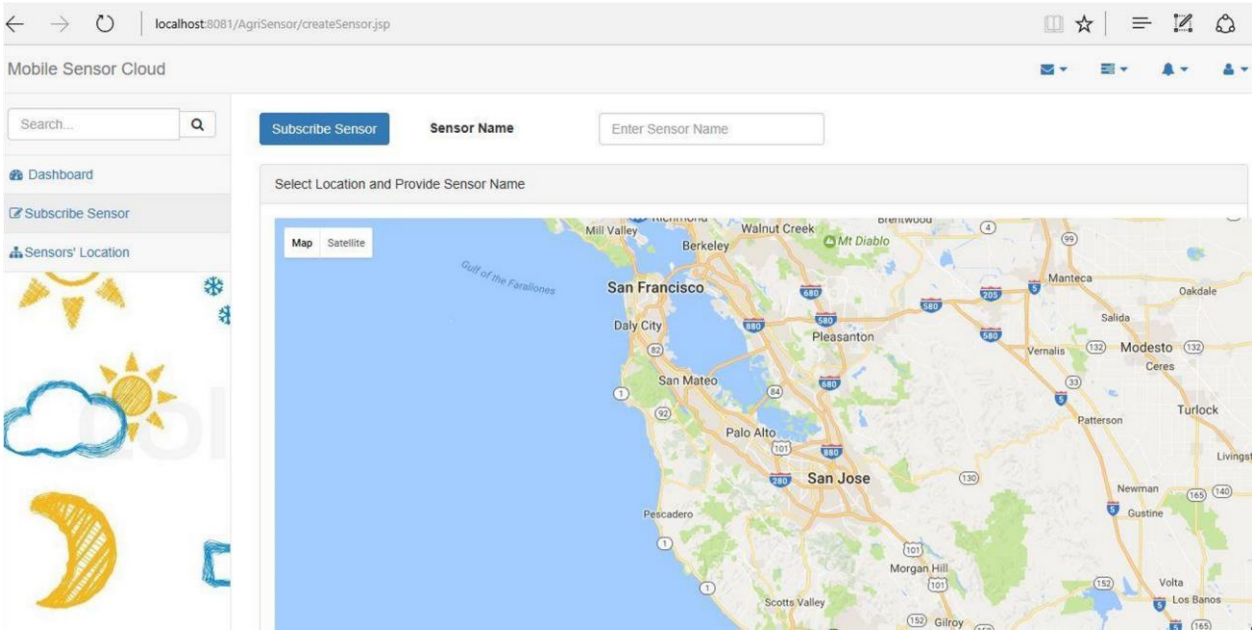


After signing up, the user is allowed to login.

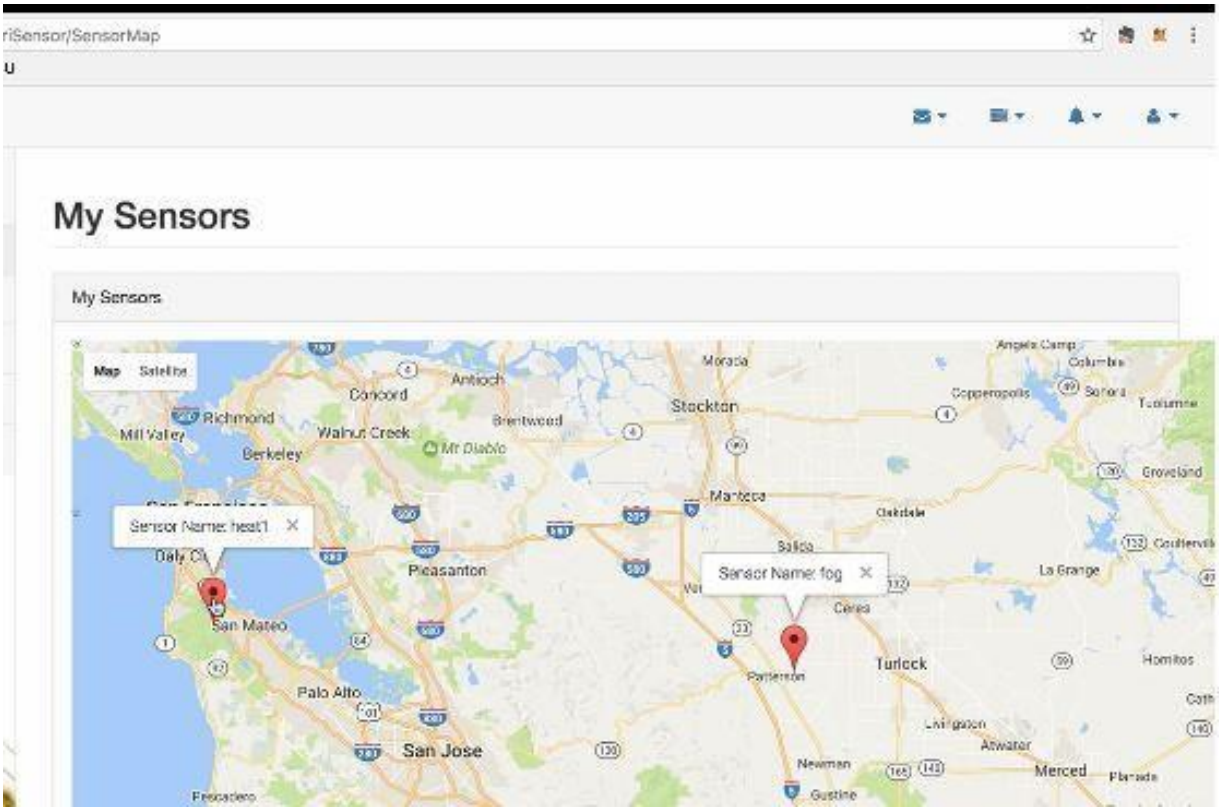


After logging in, the user is facilitated to subscribe to sensors as under. The user selects location of his sensor (latitude and longitude),names the sensor and subscribes to it.

Thus, the sensor gets associated to the user.

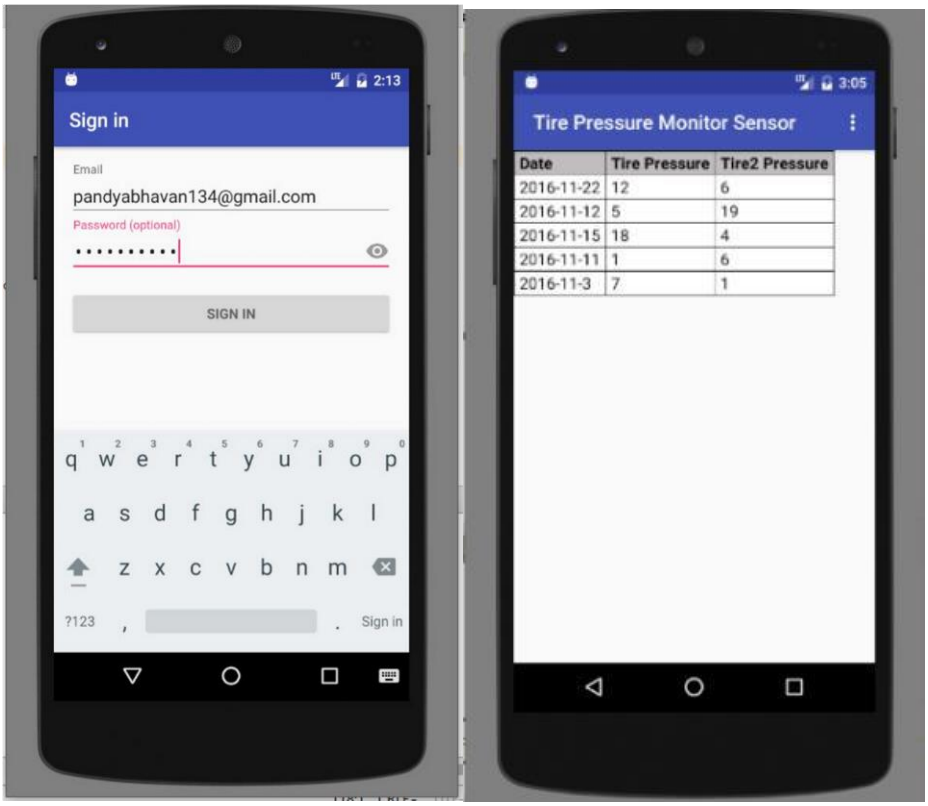

localhost:8081/AgriSensor/createSensor.jsp
Mobile Sensor Cloud
Search...
Dashboard
Subscribe Sensor
Sensors' Location
Subscribe Sensor
Sensor Name
Enter Sensor Name
Select Location and Provide Sensor Name
Map
Satellite
San Francisco
Berkeley
Walnut Creek
Mt Diablo
Mill Valley
Daly City
Pleasanton
San Mateo
Palo Alto
San Jose
Pescadero
Morgan Hill
Scotts Valley
Gilroy
Manteca
Oakdale
Salida
Vernalis
Modesto
Ceres
Turlock
Patterson
Newman
Gustine
Volta
Los Banos

Now onwards, the user can track the sensor as well as view its current pressure value.



Android app is much more convenient for the user to use. Hence, after signing up once, the user can now use the android app to view the history of all subscribed tire sensors.

The mobile app shows the user data of past 5 days on logging in as under.



Along with displaying the past data of user, the android app is designed to push notifications to the user when the pressure level of any subscribed sensor goes below a certain threshold.

CONCLUSION

This project has been designed keeping in mind the common problem faced by common man. As it is difficult to attach monitors by the steering in a car, it is easier and convenient to push notifications to the user's mobile app.

Hence this project, as a whole, would solve the problem faced by a majority of the car owners who own cars dated before 2007 and on the whole would help decrease the rate of accidents that occur due to underinflated or overinflated tires.