WEB APPLICATION FOR AUTOMOBILE SERVICES USING DATA SCIENCE WITH CLOUD

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Abstract: A vehicle breakdown is the mechanical failure of a motor vehicle in such a way that the underlying problem prevents the vehicle from being operated at all, or impedes the vehicle's operation so much, that it is very difficult, nearly impossible, or dangerous to operate. Vehicle breakdowns have various causes. Depending on the nature of the problem, the vehicle may or may not need to be towed to an automobile repair shop. To aid such inconveniences building an application that facilitates the user to contact the nearby mechanic shops and choose the services required is an optimal solution. The workshop must be able to display their services and cost on their profile. Users must be able to register and login to cart the required services. The users must then be able to confirm the location, service time slot and complete the checkout process. In case, the services aren't available the user must be able to view the nearby parking locations, towing options or book a cab.

Keywords: APIs, maps, mobile application, real time instant response.

I. INTRODUCTION

This paper discusses a mobile application that facilitates the user with immediate response in case their vehicle runs into an emergency situation by connecting them to nearby garages and services centres.

Existing System

The existing system assists the consumers with vehicle servicing. The interface facilitates real-time automation of service booking and customer engagement processes, right from the start of service booking to vehicle delivery including timely service updates. The bookings are done beforehand.

Proposed System

This is an application, tyred.in, that facilitates the user to contact the nearby mechanic shops and choose the services required is an optimal solution immediately. The workshop will list the services they provide and cost on their profile.

Users will register and login to confirm the location. The users are then asked to select the automobile type, two wheeler or four wheeler, and the model of their vehicle. Then the user can cart the services required, confirm service time slot and complete the checkout process.

II. SYSTEM ANALYSIS

System analysis is conducted for the purpose of studying a system or its parts in order to identify its objectives. It is a problem solving technique that improves the system and ensures that all the components of the system work efficiently to accomplish their purpose. Analysis specifies what the system should do.

Block Diagram:

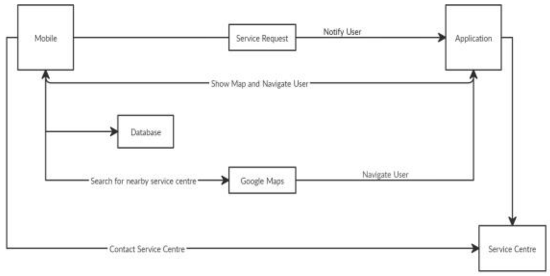


Fig 1: Block Diagram of Web Application for Automobile Services

The above figure 1 demonstrates the working of the application. In case of a vehicle breakdown the user logs in[1] their profile on tyred.in and mentions their vehicle model and the problem they're dealing with. The application detects the location and displays the list of nearby mechanic service shops/garages along with the services they provide and how much they charge for it. Once the user selects the kind of service, they book the time slot and checkout. If the service shops/garages are unavailable, nearby parking spots and alternate transport facilities are displayed.

The user's request is recorded in the database[1] along with their location. This is sent as a notification to the service[7] shops/garages they've selected. The service shop/garage sends their personnel who can help deal with the issue along with the necessary tools. The person is navigated to the user's location and provided with the user's contact information[6]. The user who has requested for a service is also sent the contact information of the service shop/garage and the mechanic they've sent. The real time location[3] of the mechanic can also be tracked by the user.

Mapping APIs:

To keep track[5] of the user's location, mechanic's location, location of the garages we make use of Maps APIs[2]. Here, I've made use of Mapbox. Mapbox is an open source location data platform for mobile and web applications. They provide building blocks to add location features like maps, search, and navigation[2] into any application.
The following APIs[2] are implemented:

1. MapBox Maps API:
   The Mapbox web services APIs allow for programmatic access to Mapbox map-related tools and services.

2. Mapbox GL API:
   Mapbox GL JS is a JavaScript library that uses WebGL to render interactive maps from vector tiles and Mapbox styles.

3. MapBox Directions API:
   With the Mapbox directions-related APIs, you can add routing with turn-by-turn directions to your map.

4. Geocoding API:
   The Mapbox Geocoding API provides worldwide forward and reverse geocoding.
   Features:
   • Endpoints
   • Data types
   • Forward geocoding
   • Reverse geocoding
   • Batch geocoding
   • Geocoding response object
   • Language coverage
   • Intersection search support
   • Point of interest category coverage
   • Geocoding API errors
   • Geocoding restrictions and limits

5. Vector Tiles:
   The Mapbox Vector Tiles API serves vector tiles generated from Mapbox Studio styles. (Personal Styling).

6. MapBox Matrix API:
   The Mapbox Matrix API[2] returns travel times between many points.For example, given three locations A, B, and C, the Matrix API will return a matrix of all travel times in seconds between the locations.
   The Matrix API[2] will always return the duration or the distance on the fastest route for each element in the matrix, where an element is an origin-destination pair in the matrix. The Matrix API[2] returns durations in seconds and distances in meters. It does not return route geometries. Durations or distances between points may not be symmetric, since the routes may differ by direction due to one-way streets or turn restrictions. For example, A to B may have a different duration than B to A.
   The Matrix API[2] allows you to efficiently check the reachability of coordinates from each other, filter points by travel time, or run your own algorithms for solving optimization problems.

Additional Features:
1. Generate and add a missing icon to the map.
2. Add an icon to the map.
3. Add a stretchable image to the map.
4. Display a map with a custom style.
5. Render world copies.
6. Measure distances.
7. Get coordinates of the mouse pointer.
8. Highlight features containing similar data.
9. Select features around a clicked point.
10. Get features under the mouse pointer.
11. Restrict map panning to an area.
12. Create a time slider.
13. Toggle interactions.
14. Fit to the bounds of a LineString.
15. Locate the user.
16. Swipe between maps.
17. Display driving directions.
18. Show drawn polygon area.
19. Add a geocoder.
20. Add a marker using a place name.

21. Accept coordinates as input to a geocoder.
22. Limit geocoder results to a named region.
23. Place the geocoder input outside the map.
24. Localize the geocoder to a given language.
25. Use a custom camera animation with a geocoder.
26. Set a point after the Geocoder result.
27. Supplement forward geocoding search results from another data source.

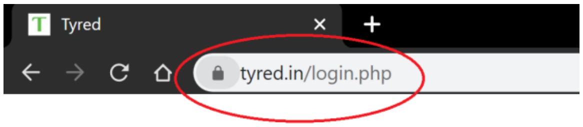
Each Feature is an individual JS API.

Chatbot:

Sometimes when a vehicle breaks down, the user may not know as to what the problem could be, which makes it difficult for them to select the services to be appointed. In Order to avoid this we can make use of chatbots. For this project, I've made use of a chatbot provided by Drift. A.I. Chatbots use artificial intelligence & natural language processing technology to understand sentence structure, then process that information & progressively get better at answering the question at hand.Instead of relying on a predetermined outcome designed by a human, AI chatbots first understand what your question is. Then once they understand your intent, they deliver an answer that they think is the right answer based on existing data. Over time, and by observing correct & incorrect answers, the machine gets better at understanding what the 'right' answer is.

Security:

This application provides its users with SSL Security. SSL stands for Secure Socket Layer which is one of the most important components of online business is creating a trusted environment where potential customers feel confident in making purchases. SSL certificates create a foundation of trust by establishing a secure connection. To assure visitors their connection is secure, browsers provide special visual cues that we call EV indicators.



Screenshot 1: Extended Validation SSL Certificate Icon

When you're on tyred.in, you can view the padlock icon on the address bar. You can click on it and view further information regarding the security.

Certification Authorities
WebTrust
Certification Authorities
WebTrust
Certification Authorities
WebTrust
Certification Authorities
WebTrust

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Screenshot 2: Security Certificates from GoDaddy Repository

SSL certificates have a key pair: a public and a private key. These keys work together to establish an encrypted connection. The certificate also contains what is called the "subject," which is the identity of the certificate/website owner.

To get a certificate, you must create a Certificate Signing Request (CSR) on your server. This process creates a private key and public key on your server. The CSR data file that you send to the SSL Certificate issuer (called a Certificate Authority or CA) contains the public key. The CA uses the CSR data file to create a data structure to match your private key without compromising the key itself. The CA never sees the private key.

Once you receive the SSL certificate, you install it on your server. An SSL Certificate issued by a CA to an organization and its domain/website verifies that a trusted third party has authenticated that organization's identity. Since the browser trusts the CA, the browser now trusts that organization's identity too. The browser lets the user know that the website is secure, and the user can feel safe browsing the site and even entering their confidential information.

III. DESIGN & METHODOLOGY

Design is the first step in the development phase for any techniques and principles for the purpose of defining a device, a process or system in sufficient detail to permit its physical realization.

Once the software requirements have been analyzed and specified the software design involves three technical activities - design, coding, implementation and testing that are required to build and verify the software.

The design activities are of main importance in this phase, because in this activity, decisions ultimately affecting the success of the software implementation and its ease of maintenance are made. These decisions have the final bearing upon reliability and maintainability of the system. Design is the only way to accurately translate the customer's requirements into finished software or a system.

Design is the place where quality is fostered in development. Software design is a process through which requirements are translated into a representation of software. Software design is conducted in two steps. Preliminary design is concerned with the transformation of requirements into data.

UML Diagrams:

Introduction: A software development method consists of a modeling language and a process. The Unified Modeling Language (UML) is called a modeling language, not a method. The modeling language is the notation that methods used to express designs. The process describes the steps taken in doing a design. The Unified Modeling Language (UML) is developed as a graphical language for visualizing, specifying, constructing, and documenting the artifacts of a software- intensive system.

3.1. Use Case Diagram:

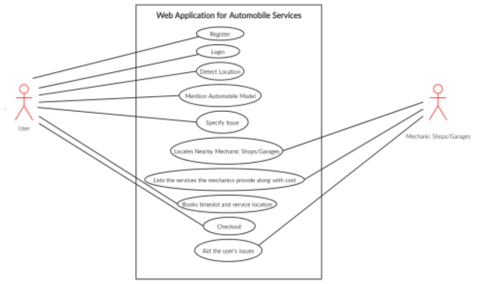

Web Application for Automobile Services
User
Mechanic Shops/Garages
Register
Login
Detect Location
Mention Automobile Model
Specify Issue
Locates Nearby Mechanic Shops/Garages
Lists the services the mechanics provide along with cost
Books timeslot and service location
Checkout
Aid the user's issues

Fig 3.1: Use Case Diagram of Web Application for Automobile Services

A use case diagram at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. A use case diagram can identify the different types of users of a system and the different use cases and will often be accompanied by other types of diagrams as well. The use cases are represented by either circles or ellipses. The actors in the use case diagram fig. are:

1. Users and 2. Mechanic Shops/Garages

- The user and the mechanic shops/garages have to install the application on their device
- They have to register and login.
- The user has to enter their automobile model details and the issue they are facing.
- A list of nearby mechanic shops/garages are displayed along with the services they provide and how much they charge for each of them.
- The user can select the service and the timslot, and checkout.

3.2. Class Diagram:

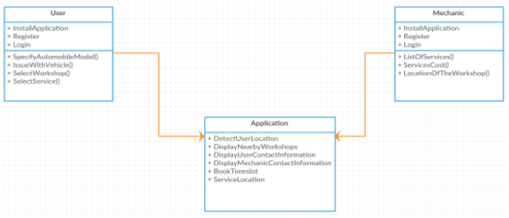


Fig 3.2: Class Diagram of Web Aplication for Automobile Services

A class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects.

Classes:

1. User
2. Mechanic
3. Application

Relationship:

The user has to install the application and register. On logging in the application detects the user’s location. The user is asked to enter the vehicle model and the issue faced. The application lists the nearby mechanic shops/workshops and the services they provide. The user has to select the service and checkout.

3.3. Sequence Diagram:

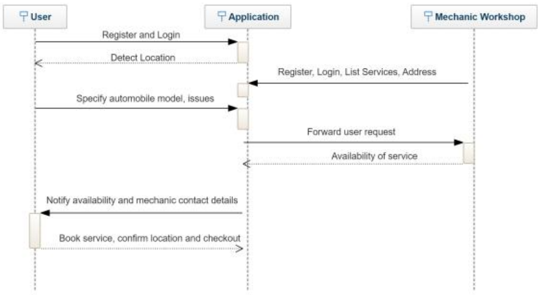

User
Application
Mechanic Workshop
Register and Login
Detect Location
Register, Login, List Services, Address
Specify automobile model, issues
Forward user request
Availability of service
Notify availability and mechanic contact details
Book service, confirm location and checkout

Fig 3.3.1: Sequence Diagram of Web Application for Automobile Services

Scenario 1: When Services Are Available

A sequence diagram shows object interactions arranged in time sequence. It depicts the objects and classes involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario.

The above figure shows the sequence of object interactions of the application when the services are available. Here, the user and the mechanic have to install the application and register. On logging in the application detects the user's location. The user is asked to enter the vehicle model and the issue faced. The application lists the nearby mechanic shops/workshops and the services they provide. The request is forwarded to the selected mechanic workshop, they reply if they can fulfill the request or not, if the service can be fulfilled, the user can select the service and checkout.

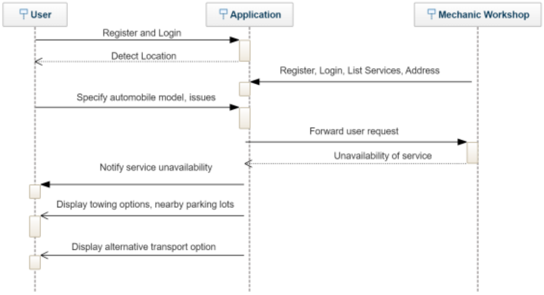

User
Application
Mechanic Workshop
Register and Login
Detect Location
Register, Login, List Services, Address
Specify automobile model, issues
Forward user request
Unavailability of service
Notify service unavailability
Display towing options, nearby parking lots
Display alternative transport option

Fig 3.3.2: Sequence Diagram of Web Application for Automobile Services

Scenario 2: When Services Are Unavailable

The above figure shows the sequence of object interactions of the application when the services are unavailable. Here, the user and the mechanic have to install the application and register. On logging in the application detects the user's location. The user is asked to enter the vehicle model and the issue faced. The application lists the nearby mechanic shops/workshops and the services they provide. The request is forwarded to the selected mechanic workshop, they reply if they can fulfill the request or not.

If the service cannot be fulfilled, the application displays the following options available in the user's vicinity:

1. Towing Services
2. Parking lots
3. Alternate transport options

IV. TESTING & RESULT ANALYSIS

4.1. Testing:

Testing is the process of detecting errors. Testing performs a very critical role for quality assurance and for ensuring the reliability of software. The results of testing are used later on during maintenance also. The aim of testing is often to demonstrate that a program works by showing that it has no errors. The basic purpose of the testing phase is to detect the errors that may be present in the program. Hence one should not start testing with the intent of showing that a program works, but the intent should be to show that a program doesn't work. Testing is the process of executing a program with the intent of finding errors. The main objective of testing is to uncover a host of errors, systematically and with minimum effort and time.

4.2. Testing Methodologies:

4.2.1. Unit Testing:

Unit testing focuses verification efforts on the smallest unit of software design, the module. This is also known as "Module Testing". The modules are tested separately. This testing is carried out during the programming stage itself. In this testing each module is found to be working satisfactorily with regard to the expected output from the module.

4.2.2. Integration Testing:

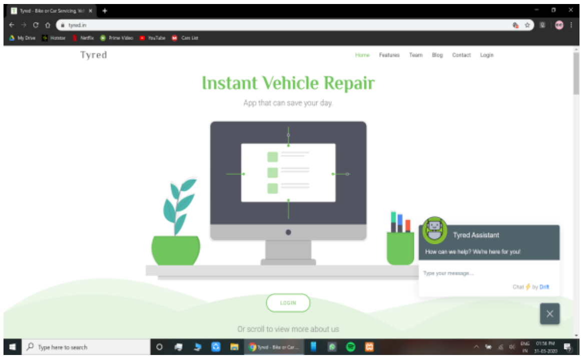
Data can be grossed across an interface; one module can have adverse effects on another. Integration testing is a systematic testing for constructing the program structure while at the same time conducting tests to uncover errors associated with the interface. The objective is to take unit tested modules and build a program structure. All the modules are combined and tested as a whole. Here correction is difficult because the isolation of cause is complicated by the vast expense of the entire program. Thus in the integration testing stop, all the errors uncovered are corrected for the text testing steps.

4.3. Result:

4.3.1. Chatbot Output:

Sometimes when a vehicle breaks down, the user may not know as to what the problem could be, which makes it difficult for them to select the services to be appointed. In Order to avoid this we can make use of chatbots. For this project, I've made use of a chatbot provided by Drift. A.I. chatbots use artificial intelligence & natural language processing technology to understand sentences structure, then process that information & progressively get better at answering the question at hand.

Instead of relying on a predetermined outcome designed by a human, AI chatbots first understand what your question is.Then once they understand your intent, they deliver an answer that they think is the right answer based on existing data. Over time, and by observing correct & incorrect answers, the machine gets better at understanding what the 'right' answer is.



Instant Vehicle Repair

App that can save your day.

Tyred Assistant

How can we help? We're here for you!

Type your message...

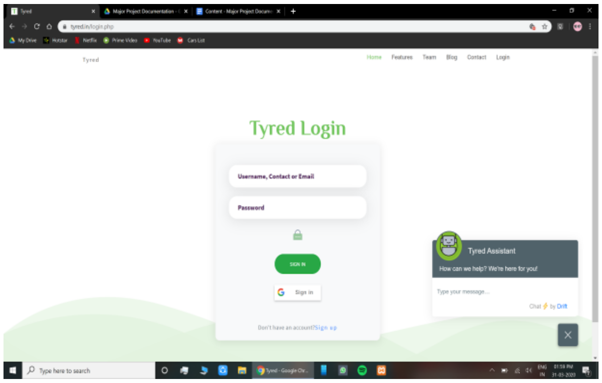
Chat ⚡ by Drift

Or scroll to view more about us

Screenshot 3: Chatbot Displayed on the Home Page

4.3.2. Login Page Output:

The following page is displayed when the user wants to login/register on tyred.in .



Tyred Login

Username, Contact or Email

Password

Don't have an account?Sign up

Tyred Assistant

How can we help? We're here for you!

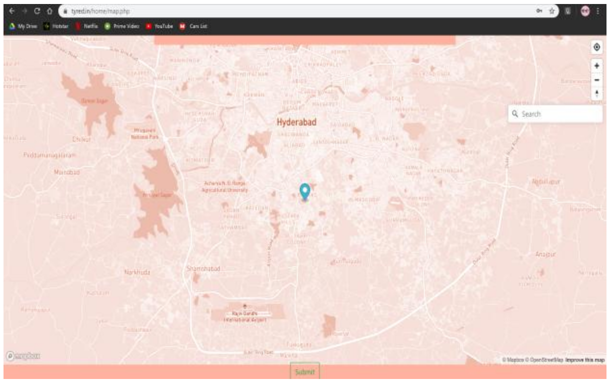
Type your message...

Chat ⚡ by Drift

Screenshot 4: Login/Registration Page

4.3.3. Login Landing Page Output:

The following page is displayed when the user is logged into their account where the user can pin their location on the map.

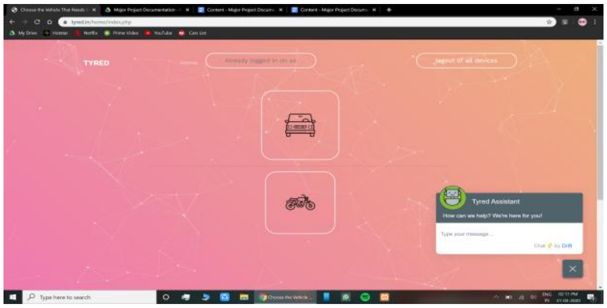


Screenshot 5: Map Displayed on Logging in

The user has to pin their location of service in order to load the nearby garages and avail the services they provide.

4.3.4. Vehicle Type Output:

The user needs to choose the kind of vehicle they have i.e., two-wheeler or four-wheeler.



Tyred Assistant

How can we help? We're here for you!

Type your message...

Chat ⚡ by Drift

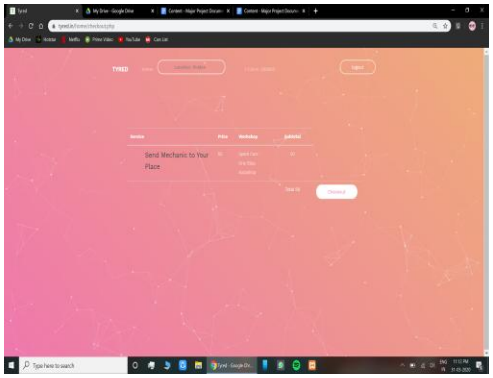
Screenshot 6: Choice of Vehicle Type

4.3.5. Garage Selection Output:

In the following screenshots, the user has chosen to fix their four-wheeler. The user has to specify the vehicle brand, model and the number plate details.

4.3.6. Checkout Page Output:

After the user enters the required details and carts the services required, the following page is displayed where the Service, Price, Workshop Name and Total are listed.

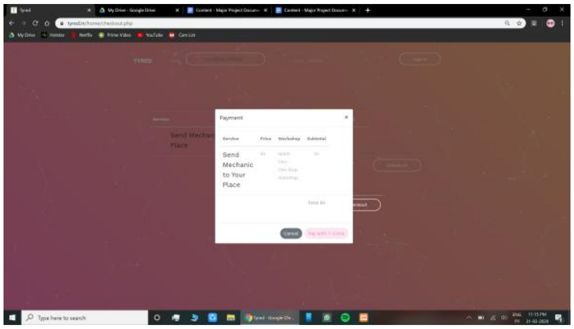


TYRED

Service	Price	Workshop	Subtotal
Send Mechanic to Your Place			

Screenshot 8: Checkout Page

4.3.7. Payment Page Output:
Here the user can make a payment for the booking.



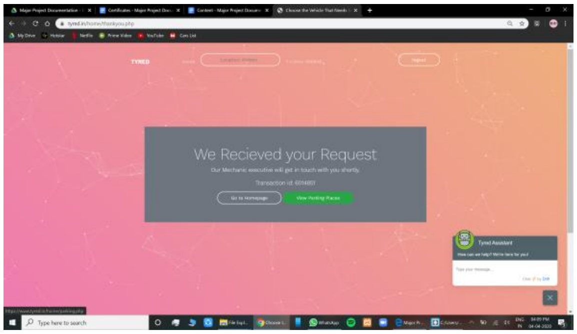
Payment

Service	Price	Workshop	Subtotal
Send Mechanic to Your Place			

Screenshot 9: Payment Page

5.3.8. Transaction ID Output:

A transaction ID is provided for each booking for future reference.



TYRED

We Recieved your Request

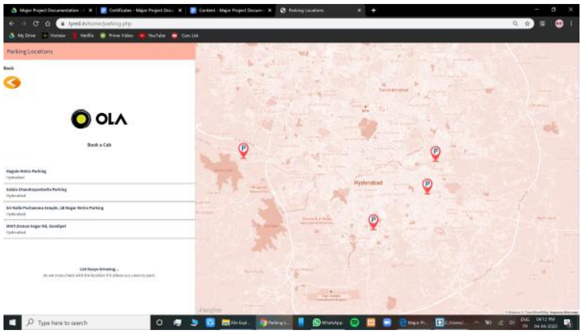
Our Mechanic executive will get in touch with you shortly.

Transaction id: 6014807

Screenshot 10: Transaction ID

5.3.9. Parking Areas and Cab Booking Output:

The following page is displayed when the user chooses to browse through the nearby parking location or wants to book a cab.



Parking Locations

Book a Cab

Nagole Metro Parking
Hyderabad

Sri Nalla Pochamma temple, LB Nagar Metro Parking
Hyderabad

MGIT,Osman Sagar Rd, Gandipet
Hyderabad

List Keeps Growing...
As we cross check with the location if it allows our users to park.

Screenshot 11: Parking Areas and Cab Booking

VI. CONCLUSION & FUTURE SCOPE

This application is an advanced solution for tedious and tough situations when a vehicle breaks down. The users don’t have to be stuck stagnant and wait for help. Instant assistance and help will be provided from verified garages. Even when there are no garages nearby the user can switch to an alternate solution and get going with their day. In future the application can be further integrated to track the user’s vehicle servicing cycles where Users can be able to upload a softcopy of their licence, RC and insurance documents for emergency situations and Users can even track their vehicle health and notify them about the next vehicle inspection.

REFERENCES

[1] Alan Forbes - The Joy of PHP Programming: A Beginner's Guide.

[2] Daniel Jacobson, Greg Brail and Dan Woods - APIs: A Strategy Guide: Creating Channels with Application Programming Interfaces - 1st Edition.

[3] Michał Konarski and Wojciech Zabierowski - “Using Google Maps API along with technology”, 2010 International Conference on Modern Problems of Radio Engineering, Telecommunications and Computer Science (TCSET), April 2010.

[4] Mazda Company - “MyMazda” application, Launched in 2012.

[5] Shilpa Chavan Saket Adhav, Rushikesh Gujar, Mayur Jadhav, Tushar Limbore - “Automobile Service Center Management System”, International Journal of Scientific and Research Publications, Volume 4, Issue 3, March 2014.

[6] Karthik Venkateshwaran - “GoBumpr” application,
Launched in October 2015.