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Vehicle Service Automation

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Abstract: *The purpose of this paper is to be able to provide a platform for local service centers that will prove more efficient in searching for maintenance and service shops for cars and two-wheelers. Hence, we provide a Web Application that has a website for online recommendations and booking of nearby service centers. The system will allow the users to search and communicate for nearby service centers as well as book a service with them. The web application will give the best recommendation using the user's location, rating, and reviews as well as send reminders for pending car service or for updating PUC details. The system will use Firebase for database and also for hosting, at a nominal rate. Firebase ML kit helps in integrating recommendation algorithms for faster search. Firebase is a Google service available at a nominal rate. The front-end for the web -app will be done using React for better scalability..*

Keywords: Firebase, React Framework, npm-Node.Js, Stripe payment portal, Machine Learning, Recommendation System.

I. INTRODUCTION

As we know, the population is growing exponentially day by day and according to certain surveys conducted in the past years, it will keep on growing. With the increasing population, the need for vehicles is predicted to increase. This would put a load on the servicing centers to provide service for the vehicles. Vehicle Service Automation is a Web Application created to find the nearest service center that will provide services for vehicles owned by people. Any two-wheeler or four-wheeler user can make use of this website to locate and communicate with the service centers or garages in their vicinity. This system uses innovative technology that connects you with a mechanic at the tap of a button. Thus helping the user to find the service center quickly at the time of emergencies or car breakdowns in any location. The user and the service center owners have to register on the web application. Also, the user has to add details about his vehicle, his location, and other contact details, and the service center owner will have to enter the services provided and contact details. After registration, the user will be able to see recommendations based on his location and ratings/reviews given to the service centers. A payment portal will also be available in the system for the user to make online payments after the completion of the service. The website searches the service center for the owner thus saving the user's time and effort. This system aims to help the local service centers to become more recognizable and improve their financial status. The system is easy to use and free of cost for now so anyone who owns a vehicle can use it at their comfort.

II. LITERATURE REVIEW

Authors Hanamant B. Sale and Dharmendra Bari of Bharati Vidyapeeth College of Engineering, Navi Mumbai, proposed an objective study of all the factors required for the effective servicing of a car. They proposed a system that used Firebase for storage and hosting purposes and a frontend of Angular2 that uses HTML5, CSS, and Typescript for better designing of the website. The system proposed when the user logs in to the website which fetches the user's location from the device and finds nearby service centers and hospitals for the user, The user selects the service center and will wait till the service center accepts its request and after that the user is prompted to pay. The system even though is quite good enough has some limitations like how was the planning on verifying the user or the service center. Also, there was no mention of any SMS or email reminders for the service of the car.[1]

Authors ChunnuKhawas and Pritam Shah of Sikkim University Gangtok, India proposed a detailed study of Firebase connection with Android. This paper helps us get into the detailed services offered by Firebase such as user authentication, authorization, hosting, storage, etc. The paper provides end-to-end code for integration and how to check the usage. The only limitation of the paper is that it doesn't provide details on which of the services are paid. [2]

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Authors Mrs. Swetha Bachuwar and Mrs. V. Veena of Mahatma Gandhi Institute of Technology proposed a Web Application for Automobile Services. This paper discusses a mobile application that facilitates the user with immediate response in case their vehicle runs into an emergency by connecting them to nearby garages and service centers. Drift chatbots and Geo APIs were the technologies that they explored. However, there is no reminder system for the user for vehicle services in the form of SMS or emails.[3]

Authors Dr R Juliana, Naveen Kumar VG, Richard G, and Shivadarshini P have discussed their smart event management app called Evecurate. Which was made using Flutter and Firebase. The app helps students in creating sharing, and finding events that fuel their passion. It uses a recommendation system in Firebase and Flutter. The technologies they used were Flutter SDK, QR- Quick Response code, IM- Instant Messaging, and Firebase. The only limitation it holds is that it does not provide directions or have any live map locations for the venue. [4]

Authors Khalid AL Fararni, Fouad Nafis, BadraddineAghoutane, Ali Yahyaouy, Jamal Riffi, and Abdelouahed Sabri presented a new conceptual framework to implement tourism recommender systems. The system helps tourists by recommending tourist attractions as well as can be used to plan a multi-day visit. They have proposed a hybrid architecture by using three approaches: the content-based approach, the social approach, and the context-based approach. [5]

Authors Priscila Valdiviezo-Diaz, Fernando Ortega, Eduardo Cobo, and Raul Lara-Cabrera, have proposed a Bayesian model for recommendation. It is based on both user-based and item-based collaborative filtering approaches. By combining both user-based and item-based approaches they have achieved better predictions. They have tested the proposed model on four public CF datasets MovieLens, FilmTrust, Yahoo, and BookCrossing which are commonly used in the recommender systems field [6]

Authors Bheema Reddy, Boorla Sairam, R. M. Gomathi, and K. Nithya implemented an Android app that tracks down service centers for cars with the help of GPS and recommends shops based on geolocation. They used Firebase to store the service center data which proved to be very efficient.[7]

Authors Zhi Qiao, Peng Zhang, Yanan Cao, Chuan Zhou, and Li Guo provided a detailed study of collaborative filtering techniques in the paper and focused on adding attributes like Geographical information of Users like location and user activity that proved to be greatly efficient in improving the recommendation system. However, they could not address the cold start problem in the paper.[8].

III. PROPOSED SYSTEM

3.1 Project Scope

This project is concerned with the creation of an application for vehicle service automation. This will be a web application. The user interface designed will be for service centers and customers alike. The service centers will be able to create an account and publicize their services. Whereas the customers looking for service centers nearby will be able to search the same concerning their location and the type of service they are looking for for their vehicle. The project targets the local customers and service shop owners, for them to interact efficiently. Currently containing the information of service centers in Pune, the web app provides recommendations for the same.

3.2 System Architecture

For numerous applications to function together, web application architecture specifies the interactions between apps, middleware systems, and databases. A system's primary components, their connections, and their interactions are all described in the software architecture. In the proposed architecture, the website will be able to provide a platform for booking a service from the service center and will let the admin handle it throughout its life cycle. In later stages, by using AI technology the system will record the user's review/rating, user's location, and recommendation systems will be integrated. The user interface will allow you to register into the system. Here we have provided users with an interactive user interface. At the time of registration, a user can give details about his vehicle and other contact and location details. The same will be applied to the service center owner. And depending on the location given by the service center owner it will be grouped into groups. After verifying the account details a user can look at the services provided by the center and book it. We are proposing a system in which the user will efficiently select service and pay

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through the online portal. The Firebase Authentication Service will verify the user and the Admin will verify the Service Center Owner.

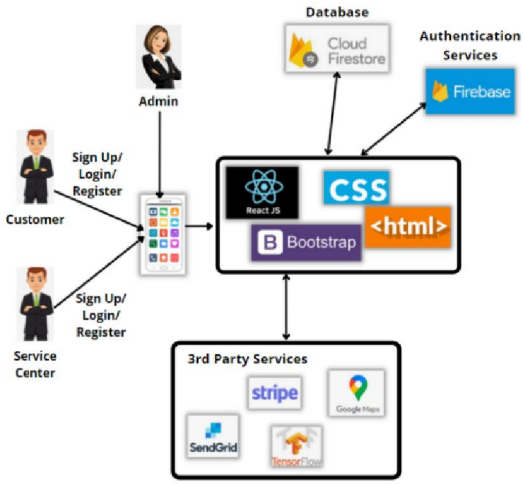

Fig. 2. System Architecture Web Application

3.3 User Classes and Characteristics

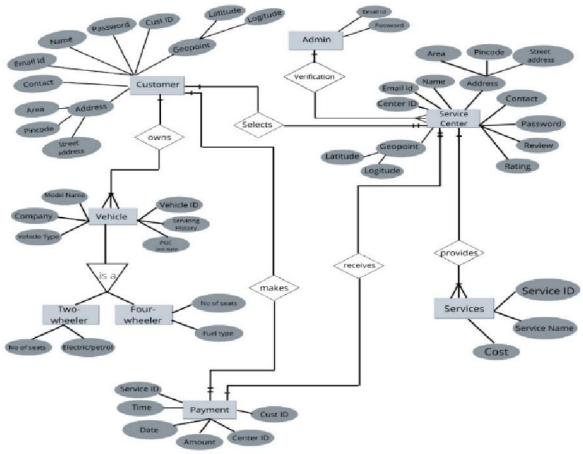

Fig. 1. Entity Relationship Diagram

Service Center Owner -

- Registration Page.
- Service Center Owner Login.
- Can add details such as Services provided, location, and contact.
- Will approve the user's request for a service appointment.
- Will receive online payment from the user.

User -

- Can register on the website.
- Will receive recommendations on the website.
- Will select a service and book a time slot.
- Can pay for the service through the online payment portal i.e. Stripe.
- Could give feedback once servicing is done.
- Will receive timely notifications regarding servicing.

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Admin -

- Will verify the service center details.
- Can monitor and control all the activities happening in the system.
- If required, it acts as a medium between users and service center owners

3.4 Functional Requirements

- The system must make sure that the user registers before using the website services.
- The system must allow customers to log in using a valid email ID and password.
- The system must allow the customer to log out once he is done with a task.
- The system must allow the user to submit feedback and rate the service center facility used by him.
- The system must provide various payment options and allow the user to choose the one he wants.
- The system must provide users with recommendations based on location and previous ratings.
- The system must send timely reminders regarding servicing and PUC schedules.
- The system should get permission from the user before recording his geolocation.
- The system must send timely notifications to the admin regarding new service center verification.
- The system must allow only verified service centers to accept bookings from users.
- The system must allow admins to accept or reject the service center and send respective mail to the service center.

3.5 Performance Requirements

- The application should be able to render its layout for different screen sizes. Along with automatic adjustment of font size and image rendering.
- When an application is made to start up, it shouldn't take more than 5 seconds to load the initial screen.
- When the user opens the web app, it should be able to load services in 5 seconds with all thumbnail images.
- The user must get a recommendation based on his current location and history.

3.6 Security Requirements

- Data security- User info like personal contact, payment methods, and payment details should be protected and should not be accessible to unauthorized personnel
- Service Center Data verification

3.7 Software Requirements

- Firebase platform along Firebase Firestore.
- Front End: Latest versions of React JS, HTML, CSS, NodeJS
- Programming Language: Python installed.
- API: SendGrid API ,GoogleMaps API and Stripe API .
- Code Editor: VSCode Installed
- Operating System: Windows 10 or above

IV. LIMITATIONS

Users must understand the English language, as the website will be developed in the same Internet environment. The users must be literate to use the system. The use of the web application is limited to Pune city currently, which can later be expanded. The proposed system recommends service centers for two-wheelers and cars only.

V. CONCLUSION AND FUTURE WORK

The proposed system can thus be used for connecting customers to local service centers thereby letting local shops have a platform and have a better outreach. The web app helps in recommending users to the nearest service stations with

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various services and booking an appointment with them. The system helps save time and effort by giving quick recommendations and reminders for their timely servicing schedule. The system database could be integrated to cover a larger area and more cities could be added based on a larger database the algorithm could be updated to give efficient recommendations.

This web app can further be converted into a mobile application. Additionally, it can be integrated with real-time tracking of the services done on the machine. In case of an emergency, the app could also provide locations of nearby hospitals or information on towing services.

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