A Mini Project Report on

Roadside Assistance Application

T.E. - I.T Engineering

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Academic year: 2022-23

CERTIFICATE

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ACKNOWLEDGEMENT

This project would not have come to fruition without the invaluable help of our guide **Prof. Neha Deshmukh**. Expressing gratitude towards our HOD, **Dr. Kiran Deshpande**, and the Department of Information Technology for providing us with the opportunity as well as the support required to pursue this project. We would also like to thank our teacher **Ms. Charul Singh** who gave us her valuable suggestions and ideas when we were in need of them. We would also like to thank our peers for their helpful suggestions.

ABSTRACT

In this building world, the use of mobile applications has become increasingly prevalent for a wide range of purposes. One area where such applications have shown significant potential is in the field of roadside assistance. The development of a mobile application that can connect customers to mechanics near them in emergency situations from anywhere and at any time has the potential to greatly improve the efficiency and effectiveness of roadside assistance services. The app leverages a range of technologies including geolocation, and real-time communication to provide a seamless and stress-free experience for customers. Through the app, users can submit their location, vehicle details, and the nature of the problem they are experiencing, and are then connected with a network of qualified mechanics who are located in their area and available to provide assistance. The app also provides real-time updates on the status of the request, including estimated time of arrival and expected duration of the service. Overall, this roadside assistance mobile application provides a reliable and convenient solution for those in need of emergency vehicle assistance anytime, anywhere. The app has the potential to improve the safety and wellbeing of individuals and communities by reducing the time it takes to access professional assistance in emergency situations.

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Chapter 1

Introduction

Roadside assistance mobile applications have become increasingly popular in recent years as a quick and convenient solution to the problems that drivers face on the road. These apps offer a range of services, such as towing, battery replacement, fuel delivery, and tire changes. By simply downloading the app, users can access these services and receive help quickly in case of any vehicle breakdowns or accidents. Roadside assistance mobile applications are designed to provide prompt and reliable service to drivers in need, regardless of their location or time of day. This makes them an essential tool for any driver, providing peace of mind and a sense of security on the road. The roadside assistance mobile application that we have developed is designed to provide quick and easy access to professional assistance on the road. The application connects customers to nearby mechanics in emergency situations from anywhere and at any time, leveraging the latest technologies in geolocation, real-time communication, and data analytics.

1.1. Purpose

The purpose of the roadside assistance mobile application is to improve the efficiency and effectiveness of roadside assistance. The application is designed to provide a quick and easy way for customers to access professional assistance on the road in emergency situations from anywhere and at any time. The primary goal of the application is to reduce the time it takes for customers to receive help during a roadside emergency, providing a stress-free experience and ensuring the safety and wellbeing of individuals and communities. By connecting customers to nearby mechanics in a timely and efficient manner, the application has the potential to greatly enhance the overall roadside assistance experience, improving the reputation and credibility of the industry. The secondary goal of the application is to provide a user-friendly and efficient way for customers to request roadside assistance services. By allowing customers to submit their location, vehicle details, and the nature of the problem they are experiencing, the application can quickly connect them with qualified mechanics in their area who are available to provide assistance. This eliminates the need for customers to spend time searching for local mechanics, reducing stress and frustration during emergency situations.

1.2. Problem Statement

Roadside emergencies can be a stressful and time-consuming experience for drivers, particularly during emergency situations. The traditional approach of calling a tow truck company or a nearby garage for assistance can be frustrating and often leads to long wait times, leaving drivers stranded on the side of the road. This not only creates a negative experience for the driver, but also poses a risk to the safety and wellbeing of individuals and communities. Moreover, the current process of seeking assistance on the road is often inefficient and lacks transparency. Customers often have to spend time searching for local mechanics or tow truck companies, leading to a frustrating and time-consuming experience. In addition, customers are often left in the dark about the status of their request, including the expected arrival time of the service provider and the estimated duration of the service.

- Long wait times for roadside assistance services can be stressful and put the safety of individuals and communities at risk.
- The traditional approach of seeking assistance is often inefficient, lacks transparency, and can be frustrating for customers.
- Customers may have difficulty finding local mechanics or tow truck companies, particularly when traveling in unfamiliar or remote locations.
- There is a lack of standardization in the industry, which can lead to confusion and frustration for customers when comparing and choosing the best option for their needs.

1.3. Objectives

- Provide a user-friendly platform for customers to request roadside assistance services from their mobile devices, allowing them to quickly and easily access help during emergency situations.
- Ensure transparency and provide real-time updates on the status of the request, including the estimated time of arrival of the service provider and the expected duration of the service.
- Allow customers to choose from a range of service providers, with clear pricing structures and service offerings, providing greater choice and flexibility in selecting the best option for their needs.

- Ensure that the application is secure and reliable, protecting customer data and providing a high-quality experience that customers can trust and rely on.

1.4. Scope

The roadside assistance application is designed to provide a user-friendly and efficient platform for customers to request and receive professional assistance during emergency situations on the road. The application will provide a range of services, including towing, jump-starting, fuel delivery, lockout assistance, and more. Customers will be able to choose from a range of service providers, with clear pricing structures and service offerings, providing greater choice and flexibility in selecting the best option for their needs. The application will also provide a secure and reliable platform for storing customer data and ensuring the privacy and security of user information. The application will provide a range of options for payment, including credit/debit cards, and other popular payment methods. It will also provide users with the ability to rate and review the service they receive, helping to maintain a high standard of quality among service providers and providing valuable feedback for future users. It will be designed to work in all weather and environmental conditions, ensuring that customers can access assistance no matter where they are or what the conditions are like. Overall, the scope of a roadside assistance application is to provide a comprehensive and customizable platform for accessing professional assistance on the road, using the latest technologies and best practices to ensure efficiency, transparency, and reliability.

Chapter 2

Literature Review

Sr.no	Title	Author(s)	Year	Algorithms	Limitations	Result
1	Road Assist Mobile Application System	Nor Amanina Binti Zamri, Nik Sakinah Binti Nik Ab Aziz, Nurul Husna Binti Mohd Saad	2022	Natural Language Processing (NLP)	Limited insurance provider coverage and Privacy concerns as it is essential to ensure that user data is handled securely and transparently to prevent privacy breaches.	Road Assist is a mobile app that helps drivers report car breakdown issues to their insurance providers using a chatbot. It provides a transparent and efficient means of getting assistance from the provider.
2	Implementation of Motor Vehicle Tracking (SaaS) Application Based on Progressive Web App	Patrick Ryan Wijaya, Puji Valen Crisgar, Marcell D.F, Eniman Yunus, Muhammad Ogin Hasanuddin	2021	-	Compatibility, user acceptance, and efficiency are crucial when developing accessible applications.	The paper proposes a Progressive Web App for a vehicle-based support device. The app restricts access to certain data.
3	On Road Vehicle Breakdown Assistance	Prof. Shital S. Aher, Unhale Tribhuvan, Gade Pranjal, Patil Tulshidas	2022	A* Algorithm	Relying on user knowledge and privacy concerns due to sharing information.	It connects users with licensed mechanics during vehicle breakdowns.

Chapter 3

Proposed System

The aim of the project is to build a roadside assistance application which is a modern and efficient platform that uses the latest technologies to provide a seamless and stress-free experience for customers who need assistance on the road. The proposed system can overcome all the limitations and errors of manually finding a service mechanic.

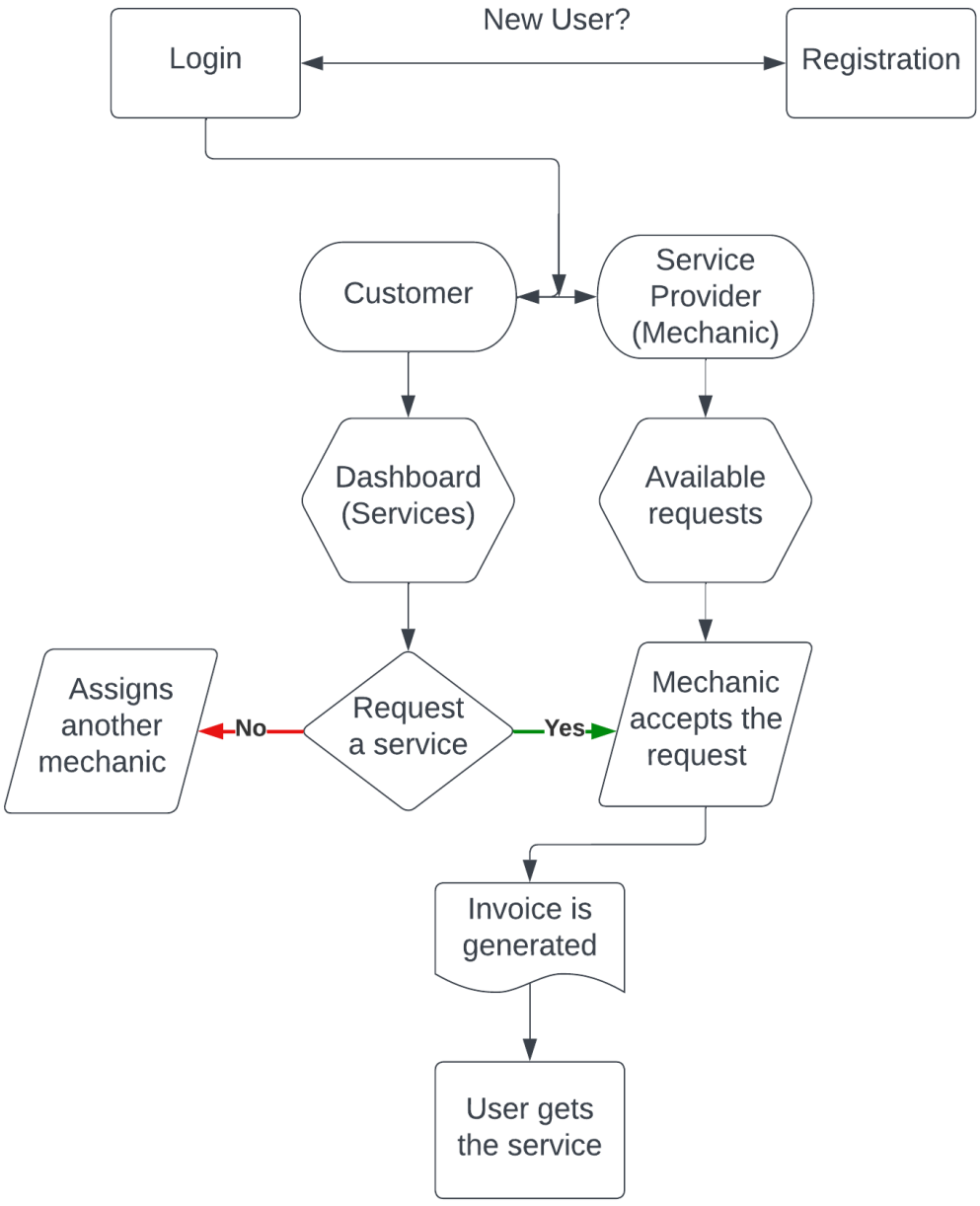

Fig 3.1. Block Diagram

3.1. Features and Functionality

1. Sign In/Sign Up:

User can be able to login the system and if the user is new, he/she should signup first with credentials first. If the user forgets password his/her password they can reset it with their username and password. This provides the information of the user and acts as a security to the data.

2. Profile Management:

Users can manage their personal information, such as their name, address, phone number, and payment details, from within the app. They can also edit their profile, update their preferences, and view their service history.

3. Service Request Tracking:

Users can track the status of their service requests in real-time, from the time they make the request to the time the roadside assistance provider arrives. They can also see the estimated arrival time of the provider and track the provider's location on a map.

4. Service History:

The app can maintain a record of the user's service history, including details such as the type of service requested, the date and time of the request, and the service provider's name.

5. Price Estimation:

The app can provide users with an estimated price for the requested service before they confirm the request. The estimated price can be based on the user's location, the type of service requested, and other factors.

6. Payment Portal:

The app can allow users to pay for services using their preferred payment method, such as credit/debit cards, UPI, or mobile wallets.

3.2. Algorithm

K-Nearest Neighbors (KNN)

The KNN algorithm is a popular and simple classification and regression algorithm used in machine learning. It is a type of instance-based learning where new data is classified based on its proximity to existing labeled data points. The K in KNN represents the number of neighboring data points considered when making a prediction.

The basic idea behind KNN is that similar things are close to each other. The algorithm works by calculating the distance between the new data point and all other data points in the dataset. It then identifies the K nearest data points (neighbors) based on the calculated distance and assigns the new data point the class that is most common among its K neighbors.

The KNN algorithm can be thought of as a graph where each data point in the dataset is represented by a node. The goal of the algorithm is to classify a new data point based on its proximity to the nodes in the graph.

The first step in the KNN algorithm is to define the value of K. This determines how many neighboring nodes will be considered when making a prediction. For example, if K=3, the three closest nodes to the new data point will be used to make a prediction. The second step is to calculate the distance between the new data point and all other nodes in the graph. This distance can be calculated using a distance metric such as Euclidean distance. Once the distance between the new data point and all other nodes has been calculated, the next step is to identify the K nearest nodes based on the calculated distance. These K nearest nodes is known as the K-nearest neighbors. The final step in the KNN algorithm is to assign the new data point the class that is most common among its K-nearest neighbors. For example, if the majority of the K-nearest neighbors are classified as belonging to the red class, the new data point will be assigned to the red class as well.

By identifying the K-nearest neighbors to a given data point in a feature space, the KNN algorithm can quickly and accurately predict the class or value of the data point, making it a valuable tool for many machine learning applications.

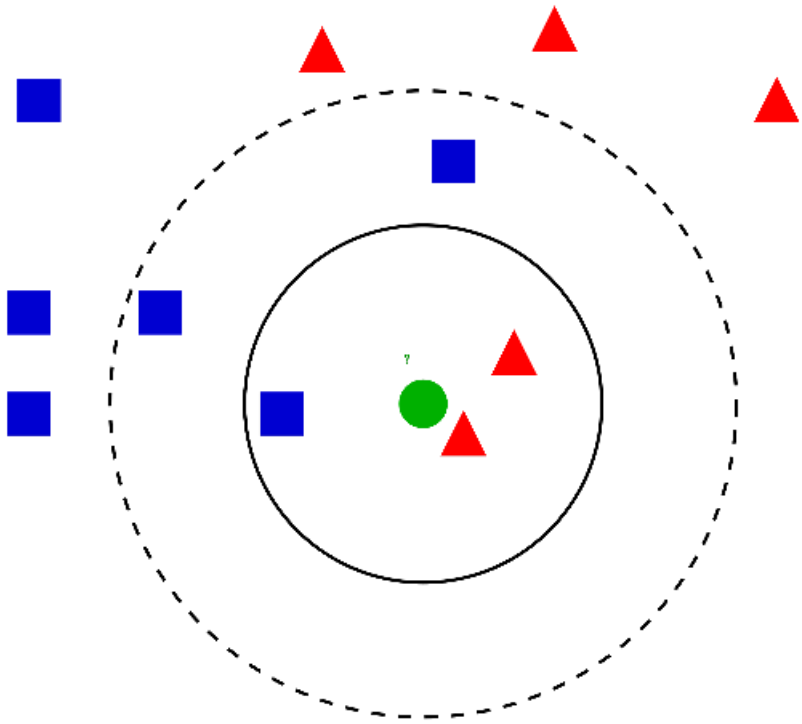

Fig 3.2. KNN Algorithm

The KNN algorithm can be used to classify the type of assistance required based on the location of the user's vehicle and other relevant features. Specifically, the KNN algorithm can be used to identify nearby service providers who have previously provided assistance for similar problems and recommend them to the user.

To implement the KNN algorithm in a roadside assistance application, a dataset of past service requests can be collected, which includes information such as the location of the user's vehicle, the type of problem they experienced, and the time of day. Each service request in the dataset can be represented as a data point in a high-dimensional feature space. The KNN algorithm works by calculating the distance between the user's location and all other service requests in the dataset. The distance metric used can vary depending on the specific problem being solved, but commonly used metrics include Euclidean distance and cosine similarity.

Once the distances have been calculated, the K-nearest neighbors to the user's location can be identified. The majority class of these neighbors is then used to predict the class of the user's service request. For example, if the majority of the K-nearest neighbors have previously provided assistance for flat tires, the

KNN algorithm could predict that the user is experiencing a flat tire and recommend a nearby service provider who specializes in tire repairs.

One advantage of the KNN algorithm in the context of a roadside assistance application is that it can quickly and accurately identify nearby service providers who can provide the necessary assistance. This can help to reduce the response time and increase the satisfaction of the user. However, the performance of the KNN algorithm can be sensitive to the choice of K and the distance metric used, which should be carefully selected based on the specific problem being solved.

Overall, the KNN algorithm can be a valuable tool for predicting the type of assistance required in a roadside assistance application, by leveraging the location of the user's vehicle and other relevant features to identify nearby service providers who can provide the necessary assistance.

Chapter 4

Requirement Analysis

1. Functional Requirements

a. **User Registration:** The application must allow users to create an account and store their personal information, including contact information and vehicle details.
b. **Request Assistance:** The application must allow users to request roadside assistance by selecting the type of issue they are experiencing, the location of their vehicle, and the type of vehicle they have.
c. **Real-time location tracking:** The application must allow users to track the real-time location of the roadside assistance provider while they are en route to the user's location.
d. **Service provider management:** The application must allow the service provider to accept or reject the request, update the estimated arrival time, and mark the job as completed.
e. **Payment integration:** The application must allow users to pay for the service using a secure payment gateway.

2. Non-Functional Requirements

a. **Performance:** The application must be able to handle a large number of simultaneous requests without crashing or slowing down.
b. **Security:** The application must be designed with robust security measures to ensure that all user information and payment details are kept safe.
c. **Availability:** The application must be available 24/7 to ensure that users can request assistance at any time.
d. **Usability:** The application must be user-friendly and easy to navigate, with clear instructions and prompts.
e. **Reliability:** The application must be reliable and consistent, with minimal downtime or service disruptions.

Chapter 5

Project Design

5.1. Use Case Diagram

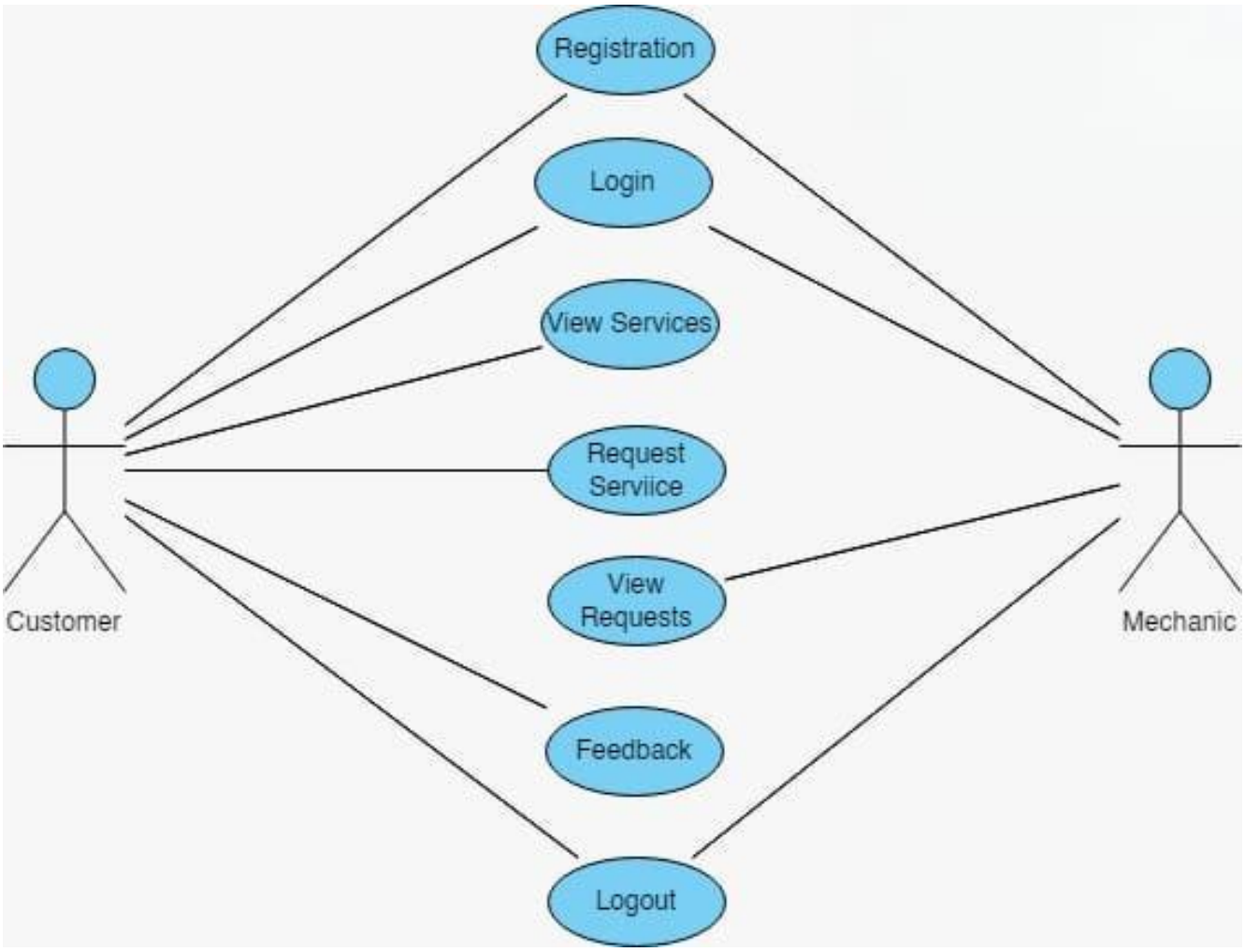

Fig 5.1. Use Case Diagram

5.2. DFD (Data Flow Diagram)

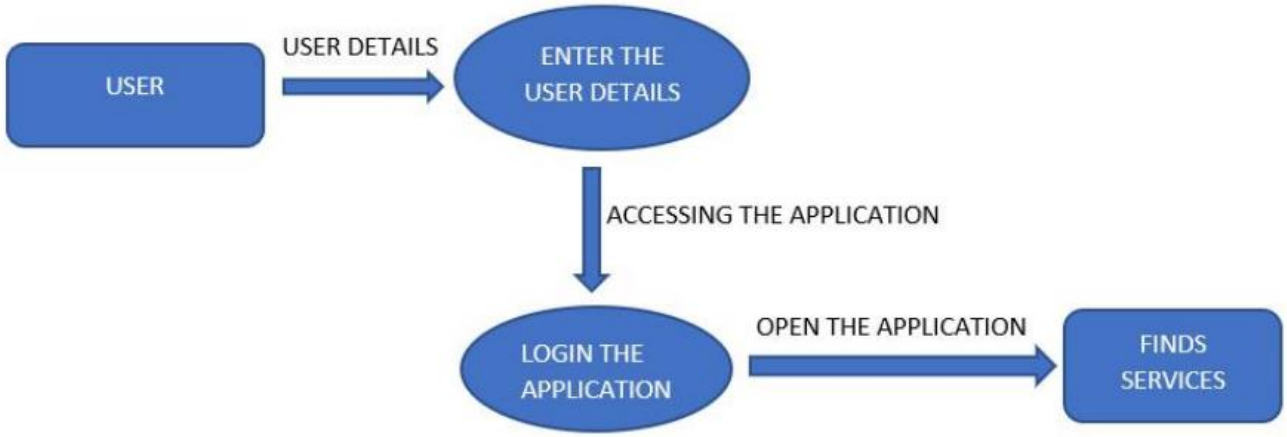

Fig 5.2. DFD Level 1

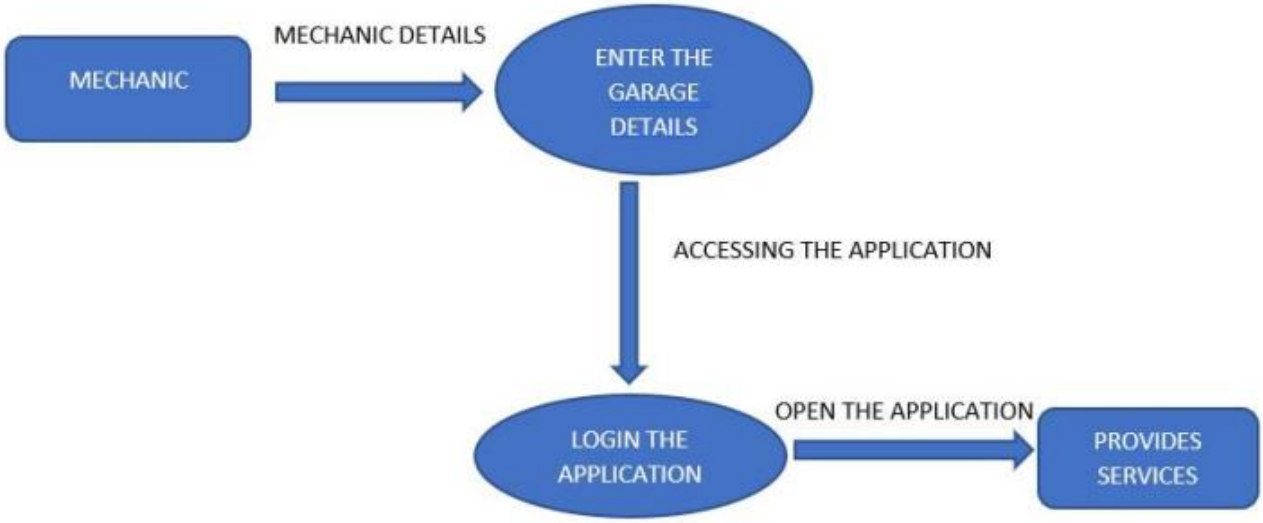

Fig 5.3. DFD Level 2

Chapter 6

Technical Specifications

- **Frontend:**
  - **Dart**

Dart is a high-level object-oriented language that supports both AOT (Ahead of Time) and JIT (Just in Time) compilation. It has a simple syntax that is easy to learn and understand. Dart technology stack provides developers with a comprehensive set of tools for building high-quality web, mobile, and desktop applications.

  - **Flutter**

Flutter is a framework for building cross-platform mobile applications with Dart. It allows for fast development and provides a set of pre-built UI components, making it easier to build high-quality, interactive user interfaces.

  - **Kotlin**

Kotlin's syntax is more concise and expressive than Java, which allows developers to write less code that is more readable and easier to maintain. Kotlin supports functional programming concepts such as higher-order functions, lambda expressions, and extension functions.

- **Backend:**
  - **Firebase**

Firebase provides a real-time database that allows developers to store and synchronize data in real-time across multiple clients. This feature is particularly useful for building collaborative applications that require real-time updates.

  - **Maps API**

Maps API provides geocoding services that allow developers to convert addresses into geographic coordinates (latitude and longitude) and vice versa. This feature makes it easy to display locations on maps and perform other location-based tasks.

Chapter 7

Project Scheduling

Sr no.	Group Member	Time Duration	Work Done
1	Kevin Thakkar, Vinayak Somvanshi, Yogesh Kumbhar	3rd and 4th week of January	• Gather requirements and specifications for the application. • Sketch wireframes and designs for both apps.
2	Kevin Thakkar, Vinayak Somvanshi, Yogesh Kumbhar	1st and 2nd week of February	• Implement the maps integration and location services. • Implement the mechanic app features, such as mechanics registration, login, and profile management. • Build the mechanic app UI and integrate with backend services.
3	Kevin Thakkar, Vinayak Somvanshi, Yogesh Kumbhar	4th week of February and 1st week of March	• Implement the machine learning models for predicting common car problems and required repairs. • Build a system to integrate the machine learning models with user and mechanic app.

Chapter 8

Implementation

Mechanic Application:

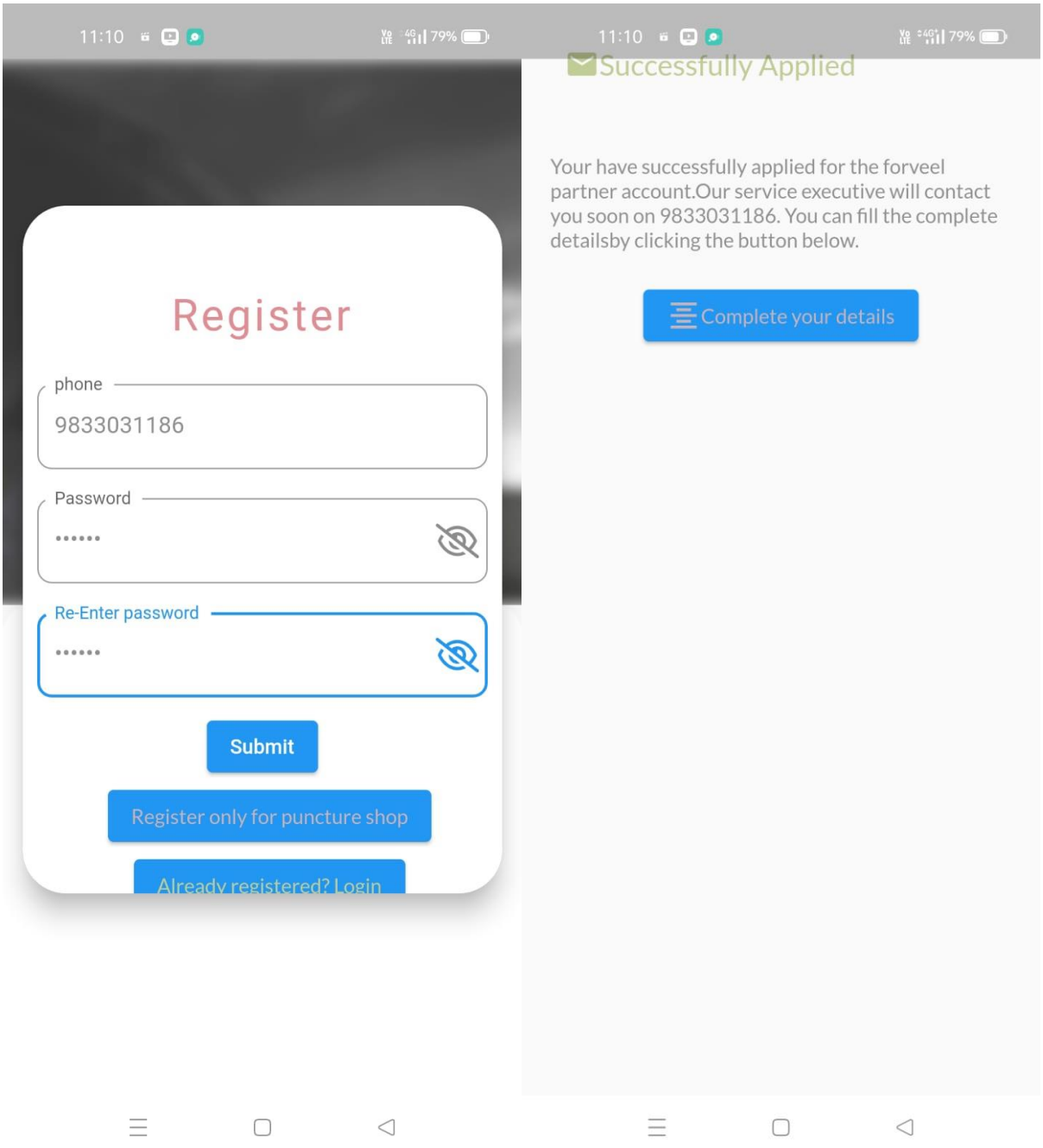

Fig 8.1. Mechanic Registration

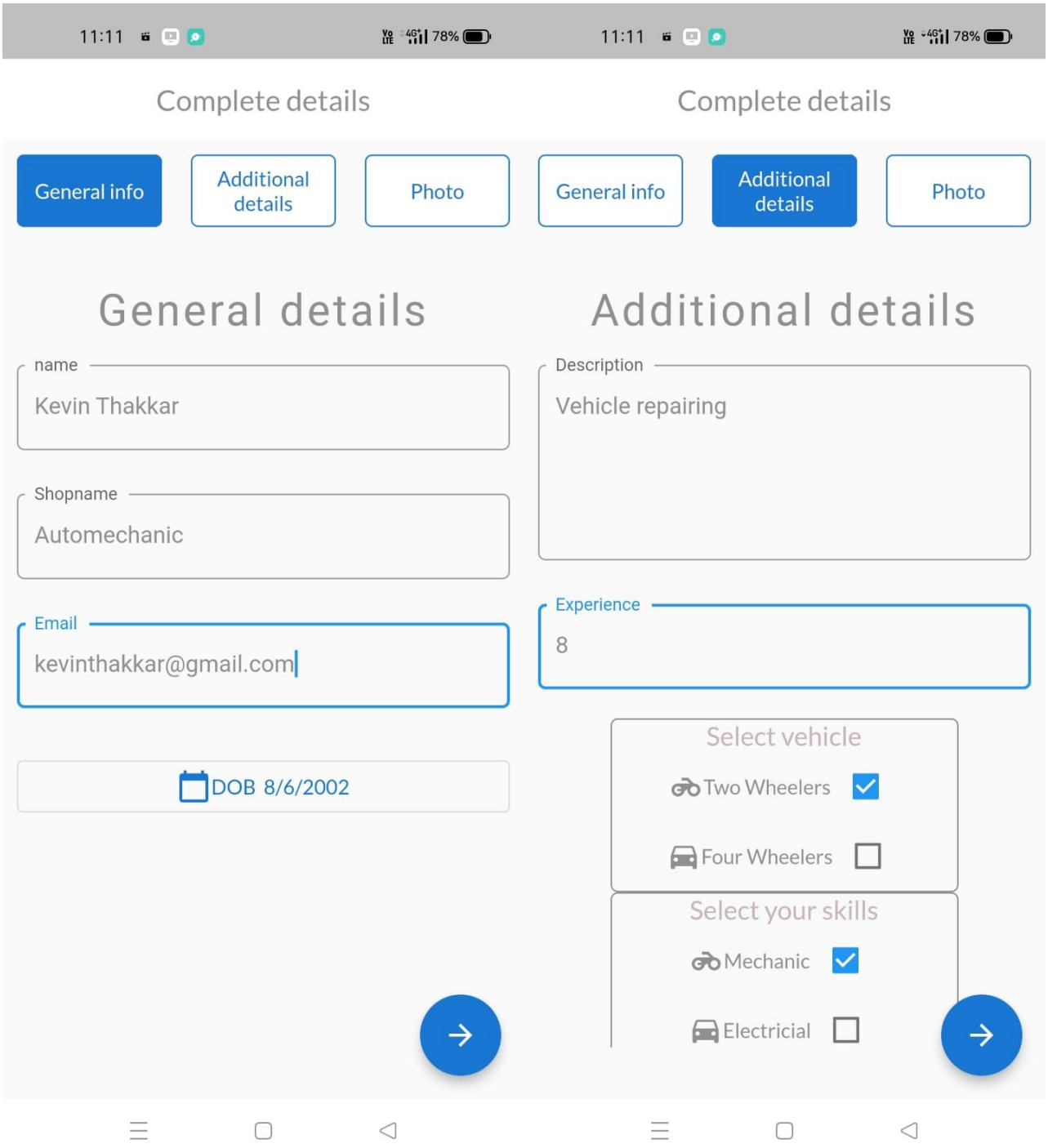

Fig 8.2. Mechanic Registration

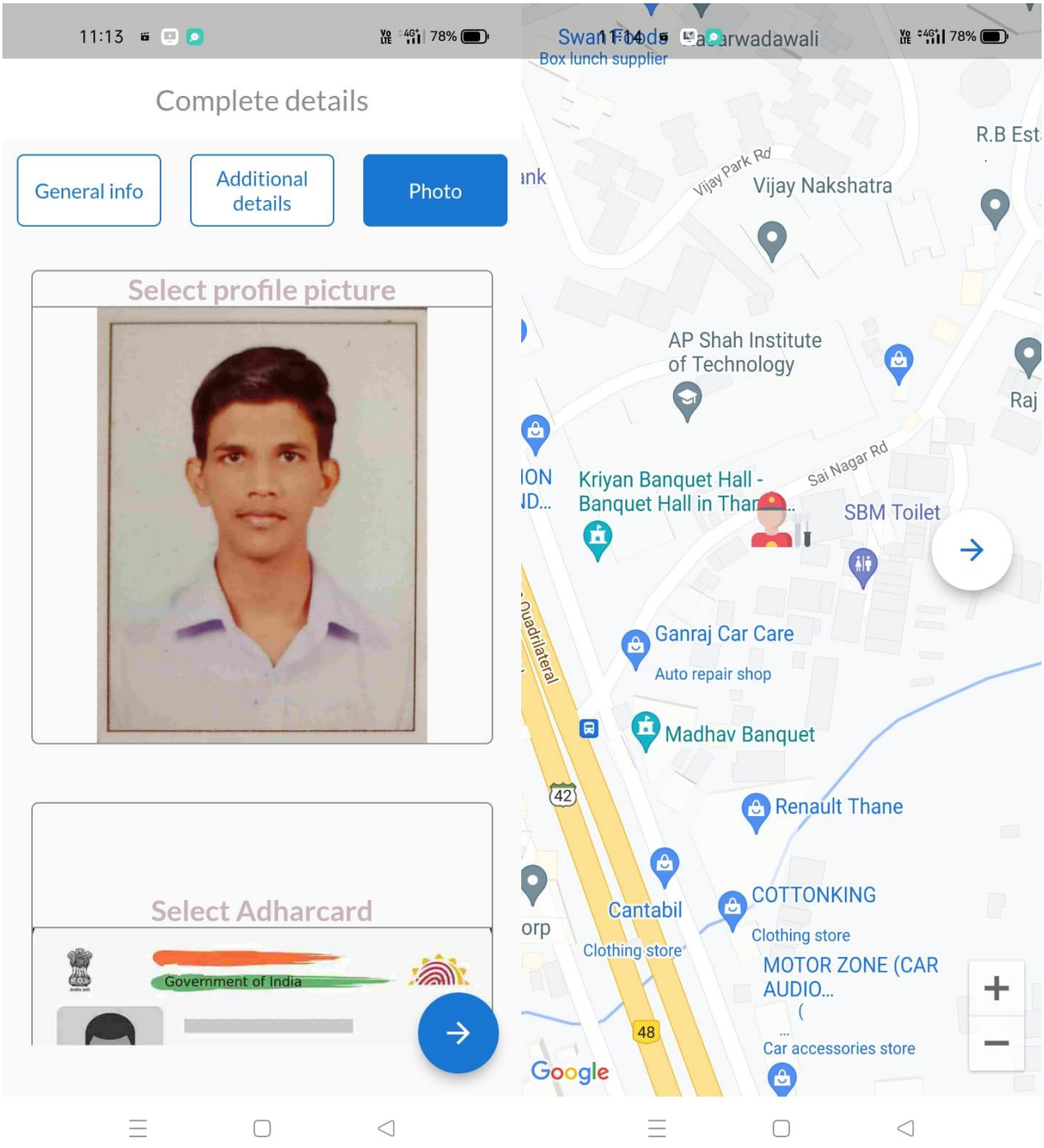

Fig 8.3. Mechanic Registration

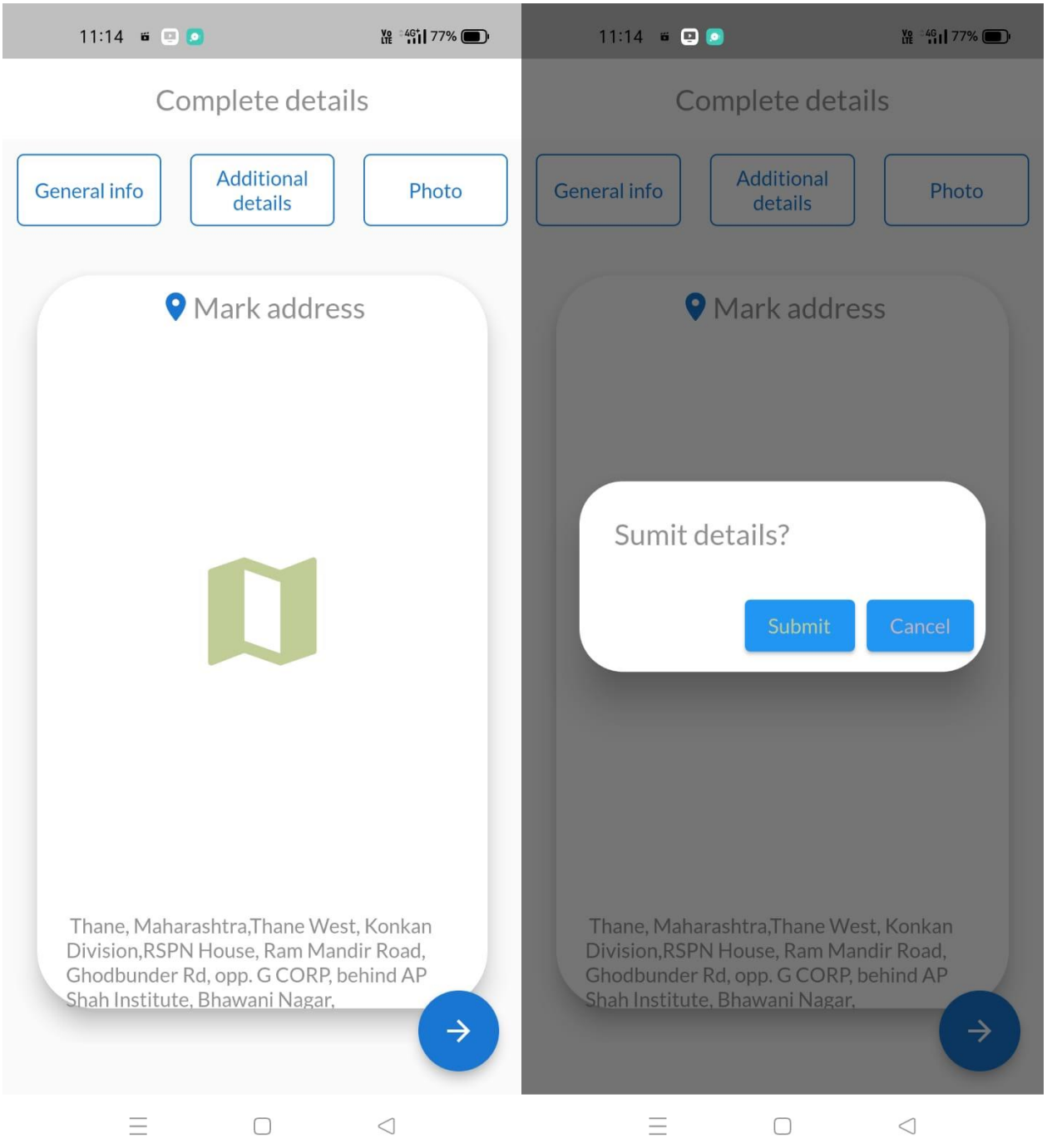

Fig 8.4. Mechanic Registration

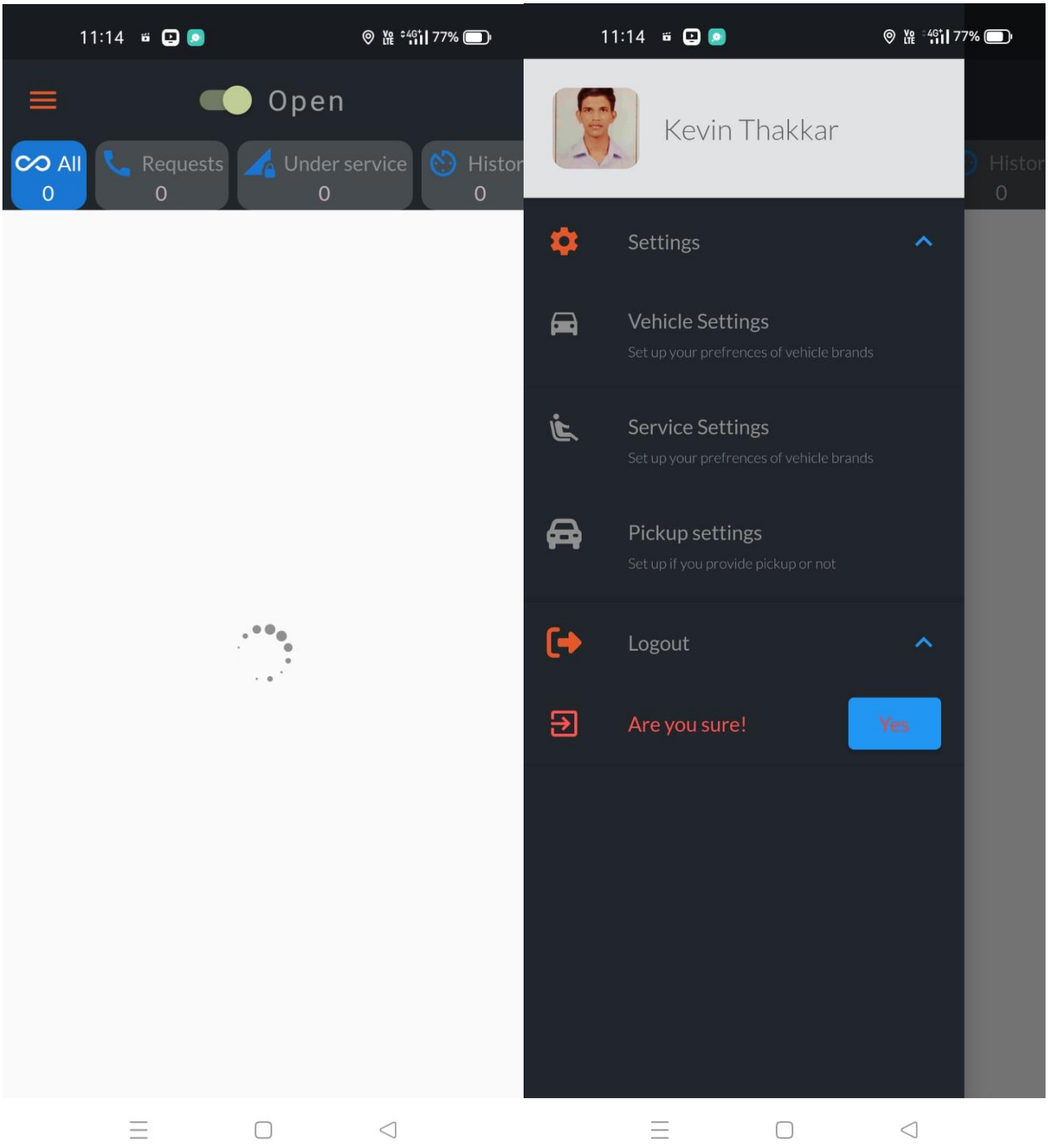

Fig 8.5. Mechanic Home Page

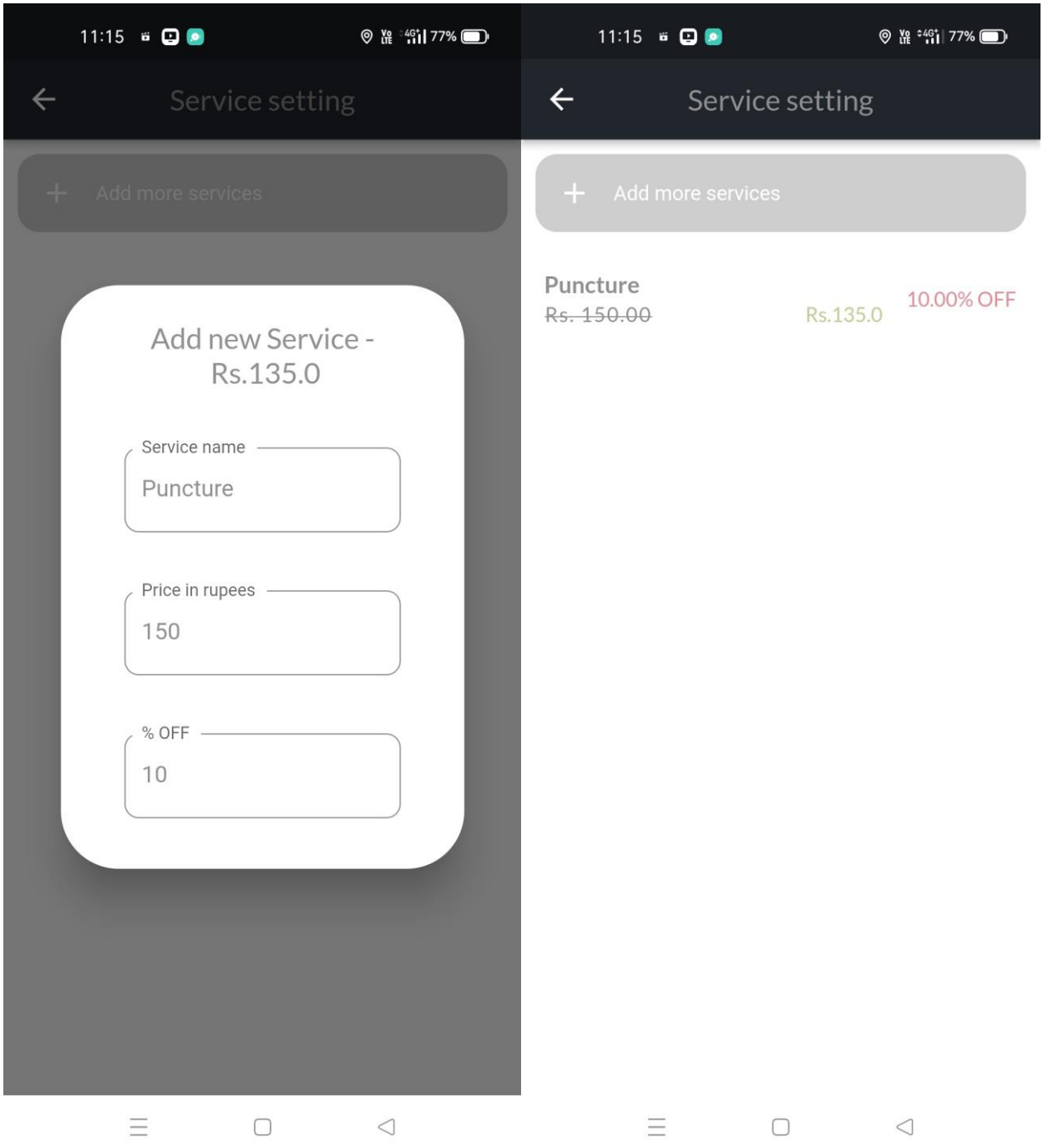

Fig 8.6. Mechanic Services

Customer Application:

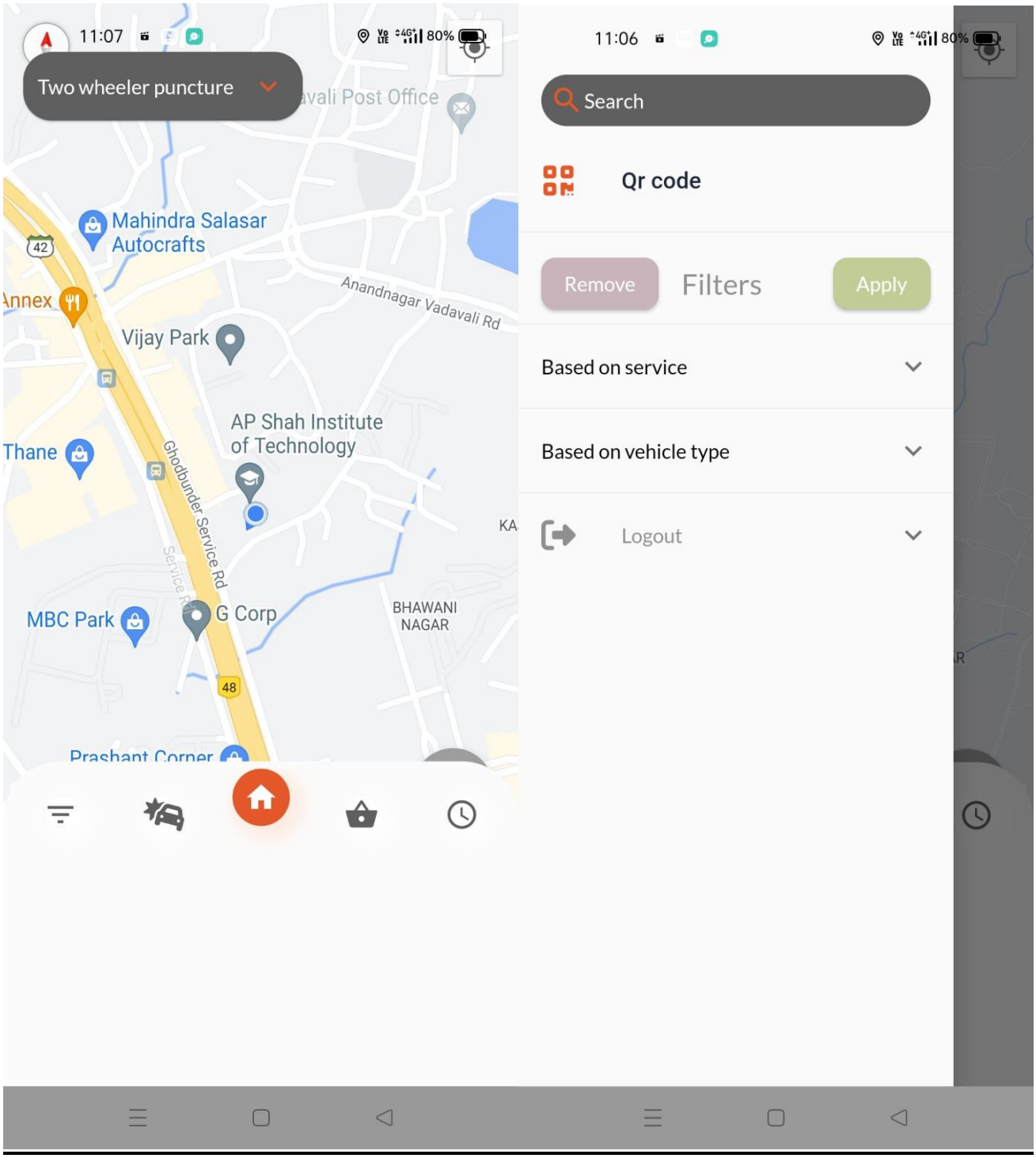

Fig 8.7. Customer Home Page

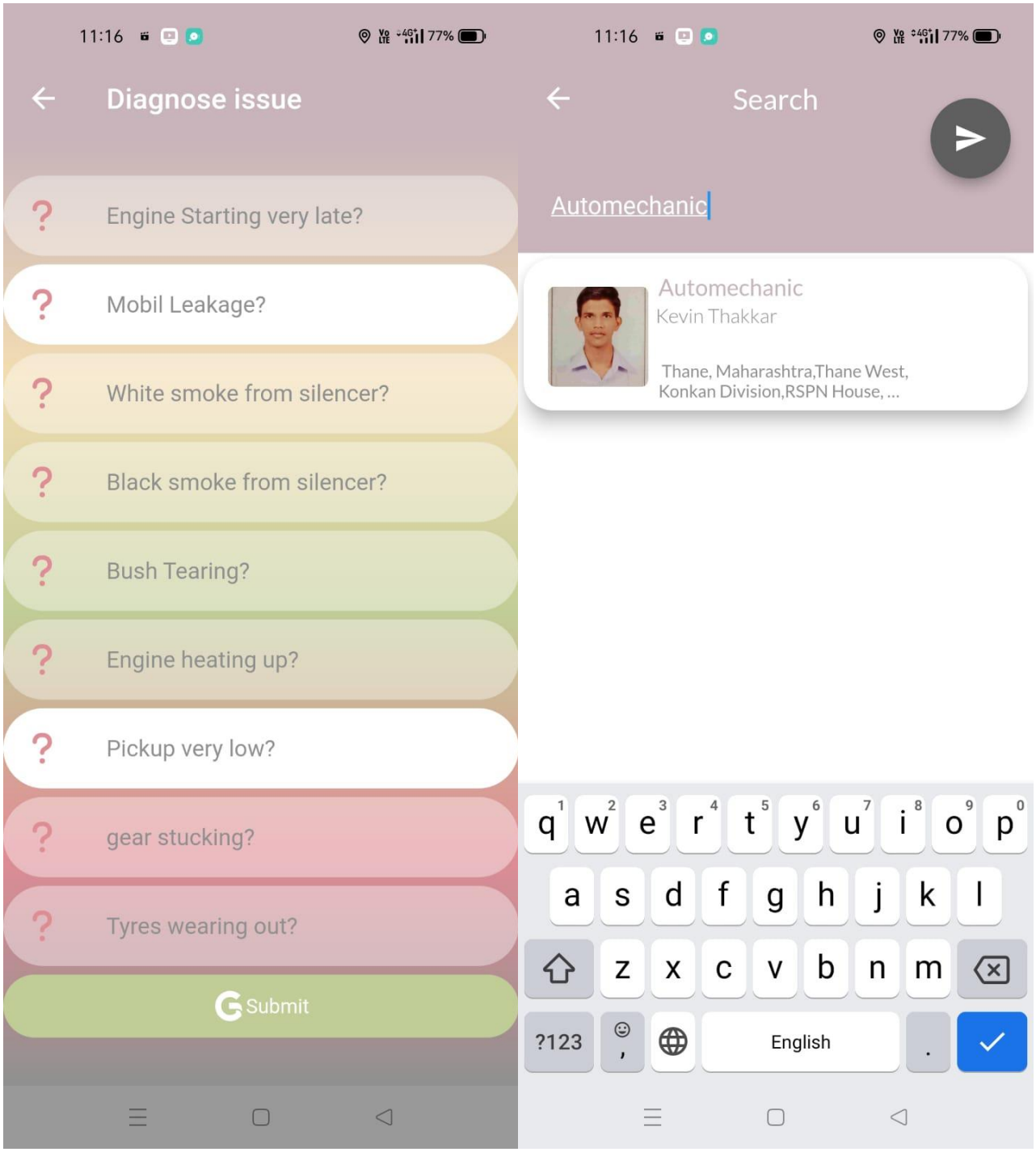

Fig 8.8. Customer service request

Chapter 9

Result and Discussion

The Roadside Assistance Android Application has the potential to revolutionize the way roadside assistance is provided to customers. The application is designed to provide quick and efficient service to customers in need, while also providing mechanics with a platform to grow their business.

One of the key features of the application is the real-time availability of mechanics. This feature helps customers to know the availability of mechanics in their area and choose the best available option. The rating system also helps to build trust between mechanics and customers, ensuring that customers receive quality service every time they use the application.

Another important aspect of the application is the payment system. The application provides various payment options, including online payment, which makes the payment process easy and hassle-free for customers. This helps to build trust between mechanics and customers, ensuring that customers receive quality service every time they use the application.

The application's rating system and customer feedback feature help to improve the quality of service provided by mechanics. By providing customers with the opportunity to rate their service, mechanics are incentivized to provide high-quality service, leading to better customer satisfaction.

Finally, the application's secure platform provides customers with the confidence to share their personal and payment information. This is important in building trust between customers and the application, leading to increased usage and better customer satisfaction.

Chapter 10

Conclusion and Future Scope

In conclusion, the Roadside Assistance Android Application is a well-designed and efficient platform that connects mechanics and customers in need of roadside assistance. The application offers a range of features, including real-time tracking, a rating system, customer feedback, service history, and security, making it a reliable and convenient option for customers.

The application's user-friendly interface and notification system make it easy for customers to request assistance and stay informed about the status of their service request. Additionally, the rating system and customer feedback feature provide a means for mechanics to improve the quality of service they provide and build trust with customers. The secure platform of the application provides customers with the confidence to share their personal and payment information, leading to increased usage and better customer satisfaction.

Furthermore, the application can be integrated with smart vehicles, allowing for real-time diagnostics and information to be provided to mechanics, improving the speed and accuracy of the service provided. Digital payment systems can also be integrated, making it more convenient and secure for customers to pay for the services provided.

In addition, the application can be integrated with artificial intelligence (AI), allowing for certain tasks to be automated, such as service request routing, which can improve the speed and efficiency of the service provided. Moreover, social media integration can allow customers to share their experiences with the service and provide referrals to potential customers.

With blockchain technology, roadside assistance providers can store data in a decentralized and secure way, reducing the risk of data breaches and unauthorized access. This can help to protect sensitive customer information, such as payment details, personal information, and location data. Blockchain technology can facilitate real-time tracking and monitoring of service requests and response times, allowing providers to improve their response times and provide more efficient and effective services to customers.

Chapter 11

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