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Safety Road



Revolutionizing Vehicle Sales, Rentals, and Mobile Assistance Across Saudi
Arabia

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Safety Road

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ABSTRACT

This project, **Safety Road**, is a comprehensive application designed to streamline vehicle sales, rentals, and mobile assistance services across Saudi Arabia. The application allows users to buy, sell, rent vehicles, and request maintenance or assistance through a mobile workshop. By providing an all-in-one platform, it eliminates the need for users to visit multiple physical locations, saving time and effort. The system is built to cater to the needs of a broad range of users, offering seamless access to various services from the comfort of their homes. This report presents the analysis, design, and implementation of the **Safety Road** application, focusing on its architecture, features, and performance validation.

Keywords: vehicle sales, mobile assistance, car rentals, Saudi Arabia

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Chapter 1: Introduction

The **Safety Road** app is a comprehensive car showroom designed to meet the needs of users across the **Kingdom of Saudi Arabia**. In this first version, the app offers a range of services, allowing users to buy, rent, sell, and even request maintenance or assistance, including mobile workshop support. By providing all these features in one place, the app aims to simplify the entire vehicle-related process, saving users time and effort. Instead of visiting multiple car showrooms or workshops, users can browse vehicles, compare brands, and manage maintenance needs conveniently from home. Safety Road is tailored to fit each user's preferences and requirements, making car ownership and care easier and more efficient.

1.1 Overview

The Safety Road application allows users to buy, rent, sell cars, and request maintenance or assistance from a mobile workshop throughout the Kingdom of Saudi Arabia. It aims to facilitate users' needs by providing a single platform for various automotive services.

1.1 Purpose of the Project

The **Safety Road** application is the first version of a comprehensive digital platform designed to function as an online car showroom. It enables users to buy, rent, and sell vehicles, as well as request maintenance services or roadside assistance through a mobile workshop. This service is available across all regions of the Kingdom of Saudi Arabia.

The primary goal of the application is to streamline vehicle-related transactions and services, providing users with a convenient, centralized solution that eliminates the need to visit multiple physical locations such as car showrooms or workshops. Through the app, users can browse various car models, compare options from different companies, and access maintenance or assistance services—all from the comfort of their homes.

By integrating these features, **Safety Road** aims to save time and effort for customers, offering a one-stop solution that caters to their automotive needs based on their preferences, requirements, and capabilities. The ultimate purpose of the project is to provide a user-friendly platform that simplifies the process of vehicle purchasing, renting, selling, and servicing, making it more accessible to a wide audience.

1.2 Purpose of this Document

The purpose of this document is to provide a comprehensive overview of the **Safety Road** application, outlining its objectives, functionalities, and features. It serves as a formal record of the project's design, development, and intended use, aimed at guiding stakeholders—including developers, testers, and end-users—through the key aspects of the application.

This document also details the project's background, system architecture, and technical specifications, ensuring that all parties involved have a clear understanding of the application's goals, scope, and future development plans. It is intended to act as a reference throughout the project lifecycle, facilitating communication and alignment among all team members and stakeholders.

In summary, this document provides a structured guide for the development and implementation of the **Safety Road** application, ensuring that the project meets its intended purpose and delivers value to users.

1.3 Overview of this Document

This document is organized into several sections to provide a clear and comprehensive understanding of the **Safety Road** application. The key sections include:

- **Chapter 1: Introduction**

This chapter introduces the project, including its purpose, objectives, and the reasons for creating this document.

- **Chapter 2: System Analysis**

Provides an analysis of the current system, including data flow diagrams and system requirements, covering both functional and non-functional aspects.

- **Chapter 3: Design Considerations**

Discusses design constraints, architectural strategies, and decisions made during the development process, including hardware and software environments.

- **Chapter 4: System Design**

Explains the overall system architecture, program flow, and detailed design of major components and submodules of the application.

- **Chapter 5: Implementation and Validation**

Covers the implementation details of the application, validation through testing, and an evaluation of the outcomes based on the original requirements.

1.4 Existing System

1.4.1 Existing System Description

In the current system, users rely on various disconnected service providers:

- **Car Showrooms:** Customers must visit physical showrooms to view and purchase vehicles, often traveling to multiple locations for comparison.
- **Rental Services:** Car rentals are managed separately, usually through dedicated companies with limited availability in certain regions.
- **Workshops and Maintenance:** Vehicle maintenance requires appointments at workshops, which may not provide immediate assistance or emergency roadside services.
- **Roadside Assistance:** In cases of breakdowns or emergencies, customers need to contact separate roadside assistance services, often leading to delays and additional costs.

1.4.2 Problems in the Existing System

The existing system presents several key challenges:

- **Time and Effort:** Users need to visit multiple locations for different services, which is both time-consuming and inconvenient.
- **Limited Integration:** There is no single platform that offers a unified solution for buying, renting, selling, and servicing vehicles.
- **Geographical Limitations:** Some services may not be available in all regions of the Kingdom, especially in remote areas, making it difficult for users to access assistance when needed.
- **Lack of Convenience:** Customers cannot view cars or schedule services from their homes, requiring physical visits and coordination.

1.5 Related and similar works

Related and similar works: Success of the Safety Road application, review of several similar applications in the areas of car sales and rental, in addition to mobile phone assistance indicators. For this reason, I reviewed the main response comparison through which the application can be improved and developed to provide solutions to meet the needs of users in the Kingdom of Saudi Arabia. Which are:

1. CarSwitch Application

CarSwitch is a digital platform that facilitates buying and selling cars, allowing users to list their vehicles for sale or search for new ones. While it efficiently provides a marketplace for car sales, it lacks rental services and mobile assistance features, limiting its ability to offer a fully integrated experience. Safety Road improves on CarSwitch by providing additional services such as car rentals and roadside assistance, creating a more comprehensive solution for users.

2. Careem Car Rentals

Careem Car Rentals offers a flexible and user-friendly car rental service, allowing users to select cars based on rental duration and location. However, Careem does not provide car buying or selling services, nor does it offer mobile maintenance assistance, restricting its functionality to rentals only. Safety Road stands out by integrating buying and selling options alongside rental services, addressing a broader range of user needs through a single platform.

3. Wasilny Mobile Assistance

Wasilny Mobile Assistance specializes in providing mobile maintenance services, allowing users to request roadside assistance through the app. While Wasilny offers an effective solution for on-road maintenance needs, it lacks car sales and rental options. Safety Road distinguishes itself by combining sales, rentals, and mobile assistance services into one app, offering a unified experience that covers all automotive needs.

Summary

Safety Road advances the user experience by providing a holistic platform that combines car sales, purchasing, rentals, and mobile assistance services in an easy-to-use application tailored for the Saudi market. In addition to the advantage of artificial intelligence, which is an advanced feature in technology.

Summary Chapter 1 :

The Safety Road application is a comprehensive digital platform designed to facilitate vehicle sales, rentals, and maintenance services across Saudi Arabia. Users can buy, rent, or sell vehicles, request maintenance, and get mobile assistance. This chapter explains the project's purpose, the need for an all-in-one vehicle platform, and provides a comparison with the existing fragmented systems. The app aims to simplify automotive transactions, offering a centralized solution that saves time and effort for users.

Chapter 2 – System Analysis

2.1 Data Analysis

Data analysis plays a crucial role in understanding the requirements and functionalities of the **Safety Road** application. This section provides an overview of the data flow within the system and outlines the key system requirements, including functional and non-functional aspects.

2.1.1 Data Flow Diagrams

Data flow diagrams (DFDs) represent the flow of information through the system, illustrating how data is processed by the system at various stages. The DFDs for the **Safety Road** application cover the following:

- **Level 0 DFD (Context Diagram):**

This diagram provides an overview of the entire system, showing interactions between the system and external entities such as users (customers), the car showroom, and service providers (maintenance and assistance teams).

- **Level 1 DFD:**

This diagram breaks down the system into its major processes, such as user registration, vehicle browsing, vehicle purchase/rental, and service requests. It shows the interactions between these processes and the data stores, such as the vehicle database and user profiles.

2.1.2 System Requirements

2.1.2.1 Clients, Customers, and Users

The application caters to different types of users, including:

- **Clients (Car Dealerships):** Car dealerships that want to list their vehicles for sale or rent.
- **Customers:** End-users looking to buy, rent, sell, or request vehicle services (maintenance or roadside assistance).
- **Service Providers:** Individuals or businesses providing mobile maintenance or roadside assistance services.

2.1.2.2 Functional and Data Requirements

The functional requirements outline what the system must do, while the data requirements specify the types of data the system will handle. These include:

- **User Registration:** Users must be able to register, log in, and manage their accounts.

Activity	Registration	Service
task	new user account log-in for user log-in for admin	purchase rental sale
task2	sign-in (personal details) Enter username and password Enter ID and password	sees the car or searches using the search box or using (AI) search sees the car or searches using the search box or using (AI) search Adds a picture of the car, personal information, price and defects
task3	set a password Recover password if forgotten Recover password if forgotten	Add to cart Choose the rental period and then add it to the cart
task4	Show a message that the account has been created successfully press login button press login button	choose the delivery method(Home delivery or pickup from the branch) choose the delivery method(Home delivery or pickup from the branch)
task5	modify Data	Go to the payment service Go to the payment service

- **Vehicle Listings:** The system must allow car dealerships and individual users to list vehicles for sale or rent, including details like make, model, year, price, and location.
- **Service Requests:** Users should be able to request maintenance or roadside assistance and track the status of these services.

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Activity	Service	Service
task1	Maintenance	Help
task2	periodic regular Road spare parts	Request a car workshop Request a tow truck
task3	It includes a group of services that you perform on a regular basis Maintenance required at any time In emergency cases, call the number provided Selects the type of car and its spare parts	Send current location Send current location
task4	I will receive notifications when maintenance is completed and I will be shown the cost of maintenance Go to the payment service choose the delivery method(Home delivery or pickup from the branch)	Go to the payment service Go to the payment service
task5	Go to the payment service Go to the payment service	the service owner will contact me the service owner will contact me

- **Payments:** The system must support secure payment gateways for purchases, rentals, and service fees.

Activity	Payment		
task1	Fill out the questionnaire with his information	Fill out the questionnaire with his information	Fill out the questionnaire with installment information
task2	Apple Pay	Credit Card	Contact him within 48 hours
task3	Check the bank	Add card information	
task4	Payment made	Payment made	

- **Data Storage:** All data related to vehicles, users, and transactions must be securely stored in a database.

2.1.2.3 Non-Functional Requirements

These requirements define the system's operational attributes, ensuring it performs effectively and meets user expectations.

2.1.2.3.1 Look and Feel Requirements

- The application should have a modern, user-friendly interface that is intuitive and visually appealing to users of all backgrounds.

2.1.2.3.2 Usability Requirements

- The application must be easy to navigate, allowing users to perform tasks such as browsing vehicles, scheduling services, and making payments with minimal effort.

2.1.2.3.3 Security Requirements

- The system should ensure secure user authentication, data protection, and secure payment transactions. User data must be encrypted and stored securely to prevent unauthorized access.

2.1.2.3.4 Performance Requirements

- The system must handle a large number of simultaneous users and transactions without significant slowdowns. It should be responsive, with loading times of less than 3 seconds for most tasks.

2.1.2.3.5 Portability Requirements

- The application should be compatible with various devices, including smartphones, tablets, and desktops. It must function consistently across different operating systems (iOS, Android, Windows).

2.1.3 Proposed Solutions

The proposed solution is a web and mobile application that integrates the functionalities of buying, renting, selling vehicles, and requesting services in one place. The system should be scalable to accommodate future expansions, such as adding new services or covering additional regions.

2.1.4 Alternative Solutions

Several alternative approaches were considered, including separate platforms for car sales, rentals, and services. However, the integrated solution was chosen due to its convenience, efficiency, and potential to provide a unified user experience.

Summary Chapter 2 :

This chapter delves into the data and functional requirements of the Safety Road application. It includes data flow diagrams that outline interactions between users, car dealerships, and service providers. Key system requirements are detailed, such as user registration, vehicle listings, and service requests. Non-functional requirements focus on security, performance, and compatibility with various devices and platforms, ensuring usability and data protection.

Chapter 3 – Design Considerations

The design considerations for the **Safety Road** application involve a range of factors that influence how the system is structured, developed, and implemented. This chapter covers the constraints, architectural strategies, and methodologies that shape the overall design of the application.

3.1 Design Constraints

Design constraints are the limitations and conditions that impact the development of the system. These constraints can arise from technical, operational, or user-related factors.

3.1.1 Hardware and Software Environment

- **Hardware:** The application needs to be optimized for a variety of devices, including smartphones, tablets, and desktop computers. It should perform efficiently on devices with varying processing power, storage, and network connectivity.
- **Software:** The application will be developed as a hybrid solution, supporting both web-based platforms and mobile applications (iOS and Android). This requires the use of frameworks and tools such as **Flutter** for cross-platform development, ensuring consistent user experience across all devices.
- **Databases:** A scalable cloud-based database (such as **Firebase** or **AWS DynamoDB**) will be used to store user data, vehicle listings, and service requests, ensuring real-time data access and security.

3.1.2 End-User Characteristics

The end-users of the application will vary significantly in terms of technical literacy and needs. Therefore, the application design must be:

- **User-Friendly:** Simple and intuitive for non-technical users who may not be familiar with digital car-related services.
- **Multilingual:** Support for both Arabic and English to cater to a wide demographic in Saudi Arabia.
- **Accessible:** Designed with accessibility features like adjustable font sizes, voice commands, and screen readers for users with disabilities.

3.2 Architectural Strategies

The architecture of the **Safety Road** application is driven by several key strategies to ensure scalability, performance, and ease of maintenance.

3.2.1 Algorithm to be Used

- **Recommendation Algorithms:** To enhance user experience, algorithms will be used to recommend vehicles and services based on user preferences, previous searches, and browsing behavior.
- **Search and Filter:** The search functionality will allow users to filter cars by make, model, year, price, and location, using efficient database queries to return results quickly.

3.2.2 Reuse of Existing Software Components

- The system will leverage existing frameworks and libraries, such as **Google Maps API** for location services, **Stripe** or **MadaPay** for payment gateways, and **Firebase** for authentication and real-time database integration.
- Reuse of these well-established components will reduce development time and ensure the use of proven technologies for critical features.

3.2.3 Project Management Strategies

- **Agile Methodology:** The project will follow an Agile approach with iterative development cycles, allowing for continuous feedback and refinement. The project will be divided into sprints, with each sprint delivering a functional part of the application, ensuring flexibility in responding to changing requirements.
- **Version Control:** A version control system like **Git** will be used to track code changes, manage contributions from multiple developers, and ensure smooth collaboration.

3.2.4 Development Method

- **Test-Driven Development (TDD):** The application will be developed using TDD, where test cases are written before the actual code. This ensures that the application meets its functional and non-functional requirements from the start.
- **Modular Design:** The application will be built using a modular design approach, breaking the system into distinct, reusable components that can be independently developed and tested.

3.2.5 Future Enhancements/Plans

The application is designed to be scalable, allowing for the addition of new features and services in the future. Planned enhancements include:

- **Expanding Service Coverage:** Extending the mobile workshop and roadside assistance services to more regions within Saudi Arabia.

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- **Vehicle Financing:** Adding a financing option where users can apply for car loans or leasing directly through the application.
- **User Reviews and Ratings:** Allowing users to rate vehicles, dealerships, and service providers to enhance trust and reliability.

Summary Chapter 3 :

The chapter covers the technical and user-oriented constraints influencing the application's development. Safety Road is designed for cross-platform support using tools like Flutter, with a focus on usability for diverse users across Saudi Arabia. The architectural strategies include modular design, AI-based recommendation algorithms, and reusable software components, ensuring scalability and efficiency.

Chapter 4 – System Design

The system design phase is critical in ensuring that the architecture, components, and flow of the **Safety Road application** are well-structured, efficient, and scalable. This chapter outlines the high-level system architecture, major modules, sub-modules, and the detailed design of core components.

4.1 System Architecture and Program Flow

The **Safety Road** application is designed to work only when connected to the Internet and is intended for iOS or Android. Therefore, users using other operating systems are excluded. There are also language and region restrictions, as the app is available in specific languages: Arabic and English. The program is limited to the Kingdom of Saudi Arabia and is not available globally. The language will be written in Java.

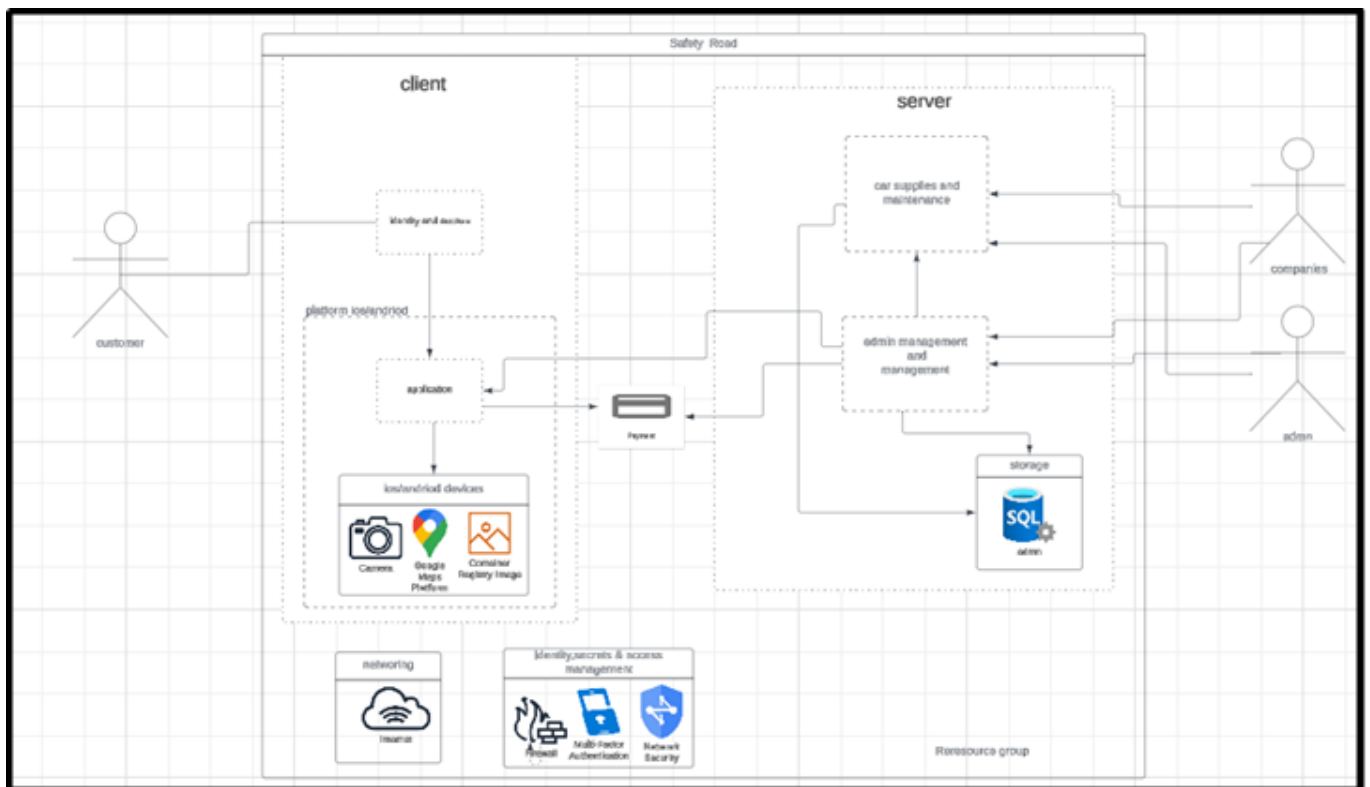


Figure 4.1: Software Architecture Document (SAD)

4.1.1 Major Modules

The system consists of several major modules that represent the core functionalities of the application. These modules interact to ensure smooth operation, from user registration to service requests.

1. **User Management Module:**
 - a. Handles user registration, login, and profile management.
 - b. Provides authentication using services like **Firebase Authentication** or **OAuth**.
 - c. Manages user roles (customer, service provider, dealership) and permissions.
2. **Vehicle Management Module:**

- a. Allows dealerships and individual users to list vehicles for sale or rent.
 - b. Supports the browsing, searching, and filtering of vehicle listings by potential buyers or renters.
 - c. Includes features like vehicle image uploads, descriptions, and pricing.
3. **Service Request Module:**
- a. Enables users to request maintenance, roadside assistance, or other vehicle services.
 - b. Integrates with third-party services for dispatching mobile workshops to users' locations.
 - c. Tracks the status of service requests and provides real-time updates to users.
4. **Payment Module:**
- a. Processes payments for car purchases, rentals, and service fees through secure payment gateways (e.g., **Stripe, MadaPay**).
 - b. Includes transaction tracking, receipts, and refund handling.
5. **Admin Management Module:**
- a. Allows system administrators to manage users, vehicle listings, service providers, and transactions.
 - b. Monitors system performance, user activity, and flags suspicious behavior for further review.

4.1.2 Sub-Modules

Each major module consists of smaller, more specific sub-modules that handle particular tasks:

1. **User Profile Sub-Module:**
 - a. Allows users to update personal information, contact details, and preferences.
 - b. Manages account settings, including notifications and language preferences.
2. **Vehicle Detail Sub-Module:**
 - a. Displays detailed information about each vehicle, including specifications, dealer information, and related vehicles.
 - b. Enables users to add vehicles to a wishlist or compare different models.
3. **Service Scheduling Sub-Module:**
 - a. Allows users to schedule service requests for a specific time and date.
 - b. Automatically suggests available service providers based on location and service type.
4. **Transaction History Sub-Module:**
 - a. Provides users with an overview of their past transactions, including vehicle purchases, rentals, and service requests.
 - b. Allows users to review or download receipts and transaction details.

4.2 Detailed System Design

The detailed system design focuses on the internal structure of each module and sub-module, including the specific components, classes, and interactions between them.

4.2.1 Detailed Component Description

1. User Management Module:

a. Components:

- i. **User Authentication:** Verifies user credentials during login using services like Firebase or OAuth.
- ii. **Profile Management:** Stores and manages user data, including preferences and history.
- iii. **Role Management:** Defines permissions and roles (e.g., customer, dealer, service provider) and ensures proper access control.

2. Vehicle Management Module:

a. Components:

- i. **Vehicle Listing:** Stores vehicle information, including images, descriptions, and pricing.
- ii. **Search & Filter:** Provides tools for users to search vehicles by make, model, price, location, etc.
- iii. **Vehicle Comparison:** Allows users to select multiple vehicles and compare their features side-by-side.

3. Service Request Module:

a. Components:

- i. **Service Provider Matching:** Matches user requests with available service providers based on location and service type.
- ii. **Real-time Updates:** Tracks the status of service requests and provides real-time updates (e.g., dispatched, en route, completed).

4. Payment Module:

a. Components:

- i. **Payment Gateway Integration:** Manages payment processing through third-party services (e.g., Paypal Mada Pay).
- ii. **Invoice Generation:** Automatically generates and emails receipts to users after each successful transaction.
- iii. **Refund Handling:** Processes refunds or cancellations as needed, updating the user's transaction history accordingly.

5. Admin Management Module:

a. Components:

- i. **User Management:** Allows administrators to review user activity, manage accounts, and resolve issues.
- ii. **System Monitoring:** Tracks system health, performance, and user activity to detect potential issues or anomalies.
- iii. **Content Moderation:** Enables admins to approve, flag, or remove vehicle listings or user-generated content.

4.2.2 System Flow and Interactions

The system operates on a multi-tier architecture, with a clear flow of data between the client-side (user interfaces), server-side (business logic and data processing), and database:

1. User Interaction Layer (Client-Side):

- a. Users interact with the mobile or web application to browse vehicles, request services, or make purchases.
- b. The interface is designed to be responsive, supporting various screen sizes and input methods (touch, keyboard).

2. Business Logic Layer (Server-Side):

- a. The server processes incoming requests from the client (e.g., login, search, service request) and returns the appropriate data or response.
- b. The server also handles the core business logic, such as user authentication, vehicle matching, and service request dispatch.

3. Data Management Layer (Database):

- a. The database stores all critical data, including user profiles, vehicle listings, service requests, and transaction records.
- b. Data is retrieved and updated through API calls that interact with the database securely, ensuring data integrity and consistency.

4.2.3 Use Cases

Use cases define how various users interact with the system to achieve specific goals. In the Safety Road application, these use cases represent the core functionalities that the system provides to its users, such as account management, vehicle sales, rentals, and requests for maintenance or mobile assistance. Each use case describes a scenario involving the user and the system, detailing the sequence of actions and system responses that enable users to complete a specific task.

The **Safety Road** application offers multiple services through a single platform, allowing users to perform tasks such as creating accounts, purchasing vehicles, renting cars, or requesting maintenance. Additionally, the system interacts with external actors such as payment services and administrators, ensuring that the functionalities are securely managed and available across various locations in Saudi Arabia.

The use case diagram below (Figure 4.2.3.1) visually represents these interactions. It shows the key use cases of the system and the relationships between the users (actors) and the functionalities provided by the system, including external services like service authentication, payment providers, and administrators.

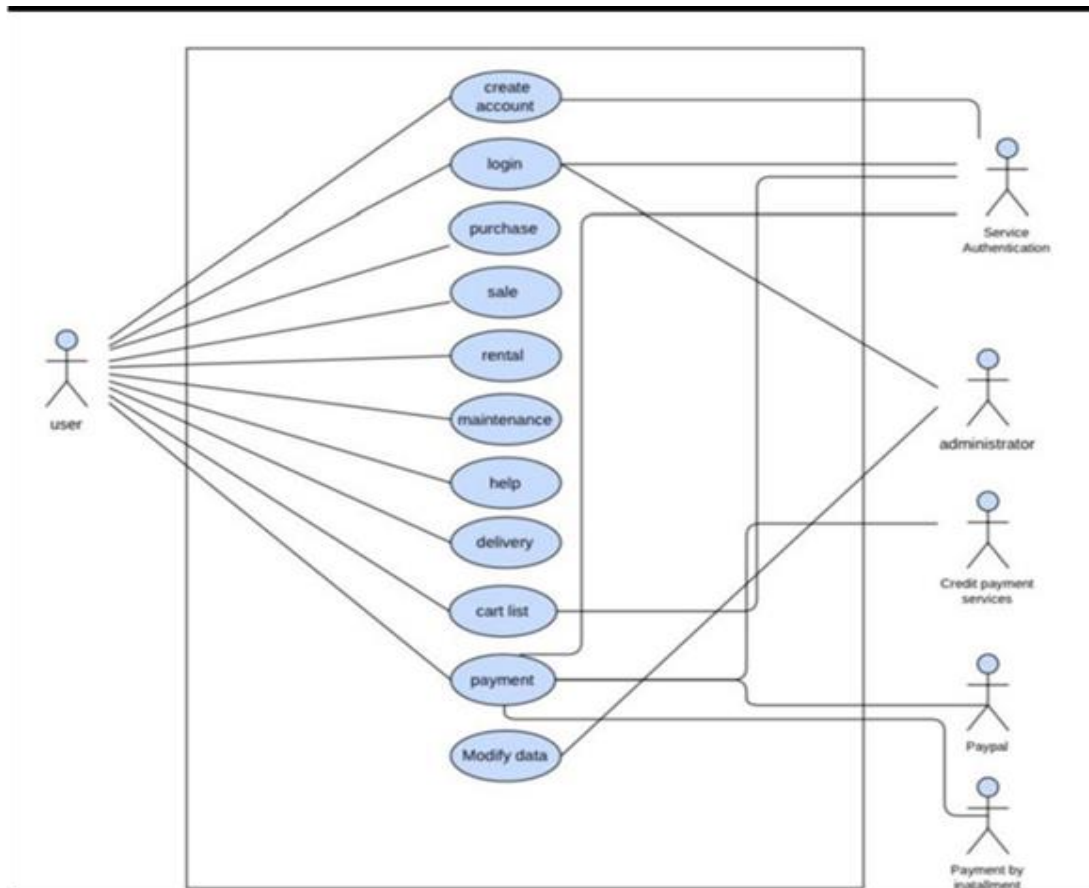


Figure 4.2.3.1 – Use Case Diagram for Safety Road Application

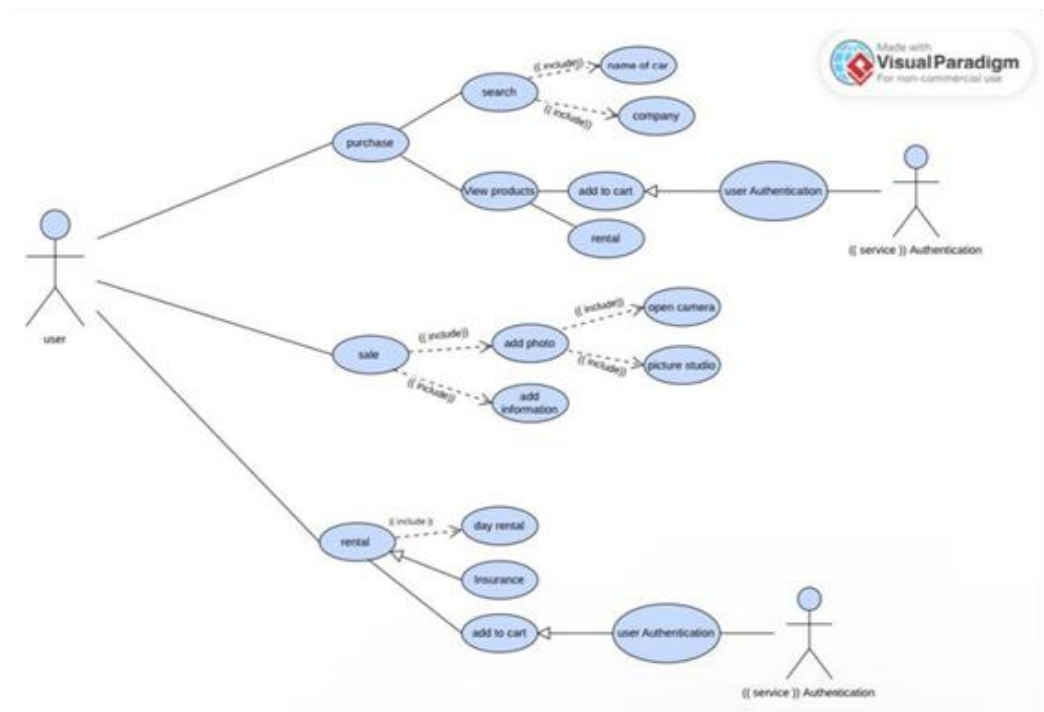


Figure 4.2.3.2: Detailed Use Case Diagram for Vehicle Purchase, Sale, and Rental

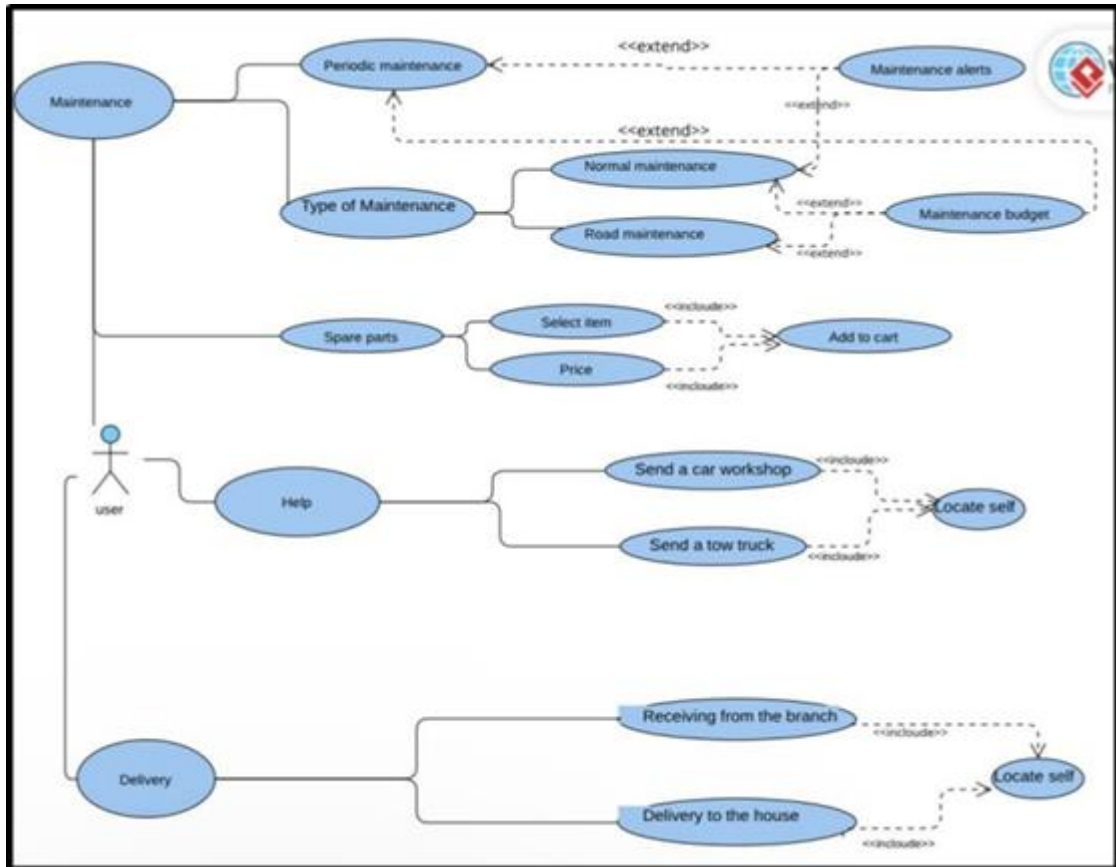


Figure 4.2.3.3: Details Use Case Diagram for Mantance Services

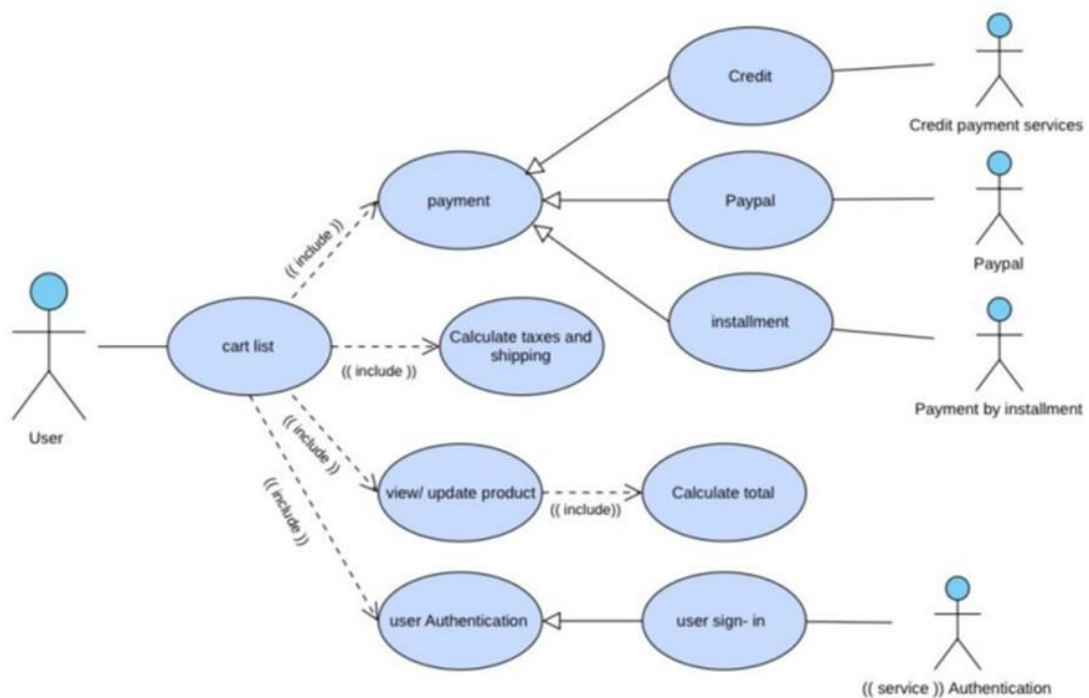


Figure 4.2.3.4: Details Use Case Diagram for User Interactions

Summary Chapter 4 :

System architecture and program flow are discussed, detailing the major modules such as user management, vehicle management, service requests, and payment. Each module's sub-components are outlined, focusing on secure, user-friendly interactions. Diagrams show how the application handles user interactions, processes data, and communicates with databases.

Chapter 5 – Implementation and Validation

Getting Started

To run the Safety Road application with full functionality, it must operate on either iOS or Android and requires an internet connection. The app supports both Arabic and English languages. You can install the app by downloading it from the App Store or Google Play. Once installed, you can create an account by opening the app and clicking "Create Account." Enter your personal information (name, email, password, phone number etc.) and click "Next." The application offers several features (Menu list), including car purchasing, where you can log in, navigate to the "Buy" section, browse available cars, can you search by AI for specific car, filter based on your preferences, and select a car to view its details. To start the purchase process, simply click "Add to Cart." If you're looking to sell a car, you can log in and go to the "Sell" section, upload photos of your car, and provide details like specifications, defects, and price. For renting cars, navigate to the "Rent" section, browse available vehicles, select your desired car, choose the rental period, and confirm your booking. The app also allows you to request maintenance services via the "Maintenance" section, where you can select the type of service (regular or emergency) and schedule your appointment. If you require assistance, head to the "Help" section, choose between a workshop or tow truck service, and provide your location for quick assistance. The main menu offers easy access to all these features, allowing for seamless navigation between buying, selling, renting, maintenance, and help requests.

Cautions & Warnings

If you apply for one of the maintenance services, you must pay attention to the maintenance notifications to know about all updates and changes.

Set-up Considerations

The application has access to the camera and Google Map

Accessing the System

- **Creating a User Account:**
 - **Download the Application:** Users can download the application from the appropriate app store (iOS or Android). Open the Application: After installation, launch the application.
- **Registration:**
 - **Click on the "Create Account" option.**
 - **Fill in the required personal information, such as:** (Username, Password, Email Address, Phone Number)

Safety Road

- **Logging into the System:**

- **Open the Application:** Launch the application on your device.
- **Login Screen:** Click on the "Login" option.
- **Enter Credentials:** input your username and password.
- **Submit:** Click the "Login" button to access the system.

Notes:

- Ensure that your password is strong (a mix of letters, numbers, and special characters) for enhanced security.
- It is advised to log out of the application after use, especially on shared devices, to protect your account information.

Exiting the System

When you finish using the application, close the application.

Using the System

- **Creating a New Account**

When you click on "Create New Account," you will see an interface designed just for you as a new user! Once you register your account, this welcome screen will appear, showing you everything you need to get started.

Now you allow to complete your details. Please fill in the necessary information to help us get to know you better! When creating your account, you'll also enter your password. After that, you can complete the rest of your information here!

- **Registration Success**

Congratulations! You will see a success message confirming that your registration for the program was successful.

- **Main Interface**

Welcome to the main interface of the application! Here, you can find information on how to contact us and learn about the services we offer. You will see all the available services we provide.

- **Menu list**

It contains all the services provided by the application.

- **Car Purchase**

When you select the purchase list, you'll see an interface where you can search for the name of the car you want or choose from the suggested companies. AI will assist you in specifying the type of car you're looking for—whether it's family, personal, or sports. You can also set your budget range, select a car company (like Toyota, Mercedes, Kia, or Hyundai), and choose the number of seats you need (2, 4, or 6). Viewing Available Cars. If you choose the company you want to view, you'll see a list of available cars with their full specifications, prices, and pictures. If you'd like to buy one, just click 'Add to Cart. If you want to rent it instead, click 'Rent' to go to the rental interface. You can also click 'Return' or use one of the buttons at the end of the interface for any other options.

- **Renting a Car**

When you choose to rent a car, this interface will appear first. You'll see a picture along with the specifications of the car you selected. Then, you'll be asked to choose the rental period you'd like. The price will be displayed automatically, along with a note regarding the insurance policy.

- **Selling Your Car**

If you want to sell your car, you'll start by adding a photo of the vehicle. You can take a new picture or select one from your gallery. Next, fill in the details and specifications of your car, including any defects and your desired price. After that, enter your personal information for communication. Once everything looks good, simply press the confirmation button to complete the transaction.

- **Maintenance Section**

In the maintenance section, you'll find the periodic maintenance window with a list of services to keep your car running smoothly and safely. You'll see two options:

1. Normal Maintenance: Choose the type of car you want to maintain.
2. Road Maintenance: If you encounter any issues while on the road, just let us know, and we'll assist you right away!

- **Spare Parts Section**

In the spare parts section, first select the type of car and its brand. Then, you can choose the specific parts you need and the delivery method that works best for you.

- **Help Section**

In the Help section, you have two options:

1. Send a Car Workshop: If you need professional help with your vehicle, select this option, and we'll arrange for a workshop to assist you.
2. Send a Tow Truck: If your car is having trouble, choose this option, and we'll determine your location to send a tow truck.

- **Delivery Service**

When you choose the delivery service, you can opt to have your car or spare parts delivered right to your home or select to pick them up from the branch.

- Shopping Cart

In your shopping cart, you'll see the car or items you've added. There's also a box to enter a discount coupon. You can choose to make either a full payment or pay in installments—just select the option that works best for you!

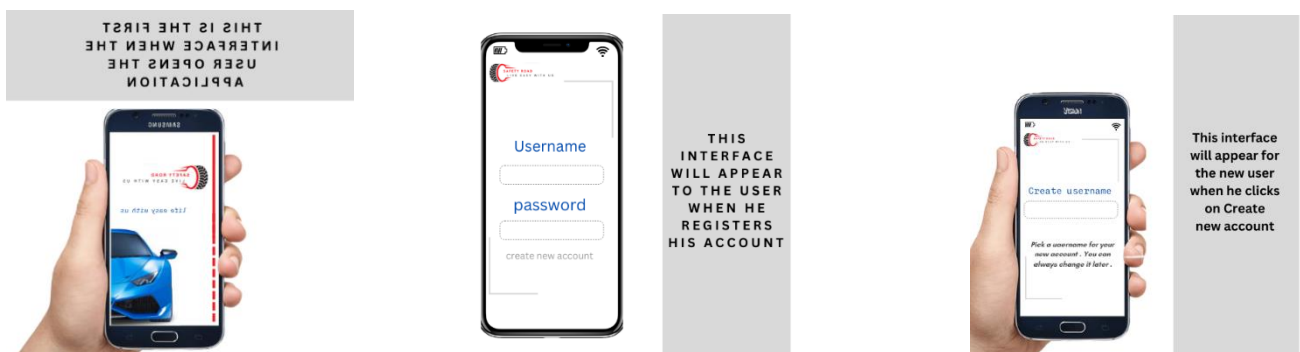
- Payment Process

When you choose to make a payment, you'll fill out a questionnaire with your information and any specific requests. You can pay using either Apple Pay or your credit card. If you choose your credit card, you'll be directed to the bank's page. A code will be sent to you via SMS to help you complete the payment process successfully. If you choose the installment option, you'll also fill out a questionnaire to tailor the payment plan to suit your needs.

- Order Completion

Congratulations! A message will pop up to let you know that your order has been completed successfully. You'll see your order number along with a heartfelt thank you message. We appreciate your business!

5.1 Overview of User Interface (Screen Images)





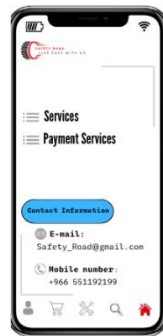
THIS INTERFACE WILL APPEAR FOR NEW USER TO PUT THE PASSWORD MUST TAKE INTO ACCOUNT THE FOLLOWING CONDITIONS



Here the user will complete the rest of his data

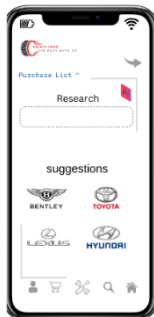
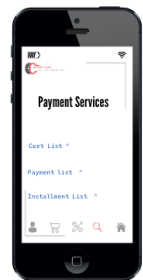
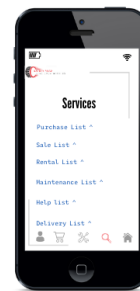


In this interface, the user will see a successful message about his registration for the program



This interface is the main interface of the application, where information about contacting the company and the services provided by the application appears

In this interface will show the user the available services



When the user chooses the purchase list, the interface appears to him to searches for the name of the car he wants or chooses one of the companies suggested to him



When the user chooses the purchase list, the interface appears to him to set the type of car (family, personal, sports) and set the appropriate range amount for him. Also choose the car company (Toyota, Mercedes, Kia, Hyundai). And also the number of seats (2,4,6)



If he chooses the company he wants to view, the available cars will appear for him with their full specifications, price, and a picture. If he wants to buy one of them, he clicks on Add to Cart. If he wants to rent it, he clicks on Rent and goes to the interface he chose. If anyone wants anything from the interface, he can choose either Return. Or one of the buttons at the end of the interface



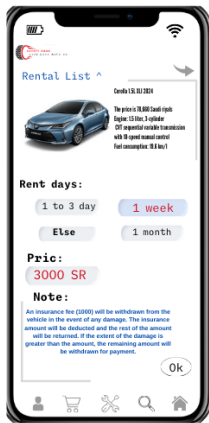
If he chooses the company he wants to view, the available cars will appear for him with their full specifications, price, and a picture. If he wants to buy one of them, he clicks on Add to Cart. If he wants to rent it, he clicks on Rent and goes to the interface he chose. If anyone wants anything from the interface, he can choose either Return. Or one of the buttons at the end of the interface



If he chooses the company he wants to view, the available cars will appear for him with their full specifications, price, and a picture. If he wants to buy one of them, he clicks on Add to Cart. If he wants to rent it, he clicks on Rent and goes to the interface he chose. If anyone wants anything from the interface, he can choose either Return. Or one of the buttons at the end of the interface



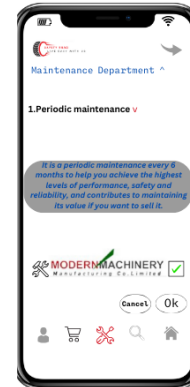
If he chooses the company he wants to view, the available cars will appear for him with their full specifications, price, and a picture. If he wants to buy one of them, he clicks on Add to Cart. If he wants to rent it, he clicks on Rent and goes to the interface he chose. If anyone wants anything from the interface, he can choose either Return. Or one of the buttons at the end of the interface



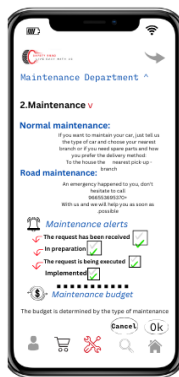
If the user chooses to rent, this interface will first appear with a picture of the specifications of the car he chose and he will be asked to choose the period he wants to rent, then the price will be shown to him automatically and there will be a note about the insurance policy.



Sales service: For anyone who wants to sell his car, he is first asked to add a photo of the vehicle. Either he opens the camera and takes the photo, or he chooses photos from the studio and writes their information and specifications. He must write down the defects, if any, and set the price he desires. Then he enters his personal information for communication, and finally presses the confirmation button to complete the transaction.



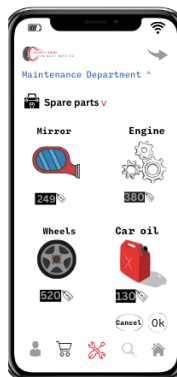
In the maintenance section, the periodic maintenance window appears, which includes a set of services that you perform regularly to maintain the performance and safety of the car.



In the maintenance section, the customer has two boxes:

1. Normal maintenance
2. road maintenance

Regular maintenance chooses the type of car he wants to maintain, as for road maintenance, we will help you immediately when you tell us about your problem

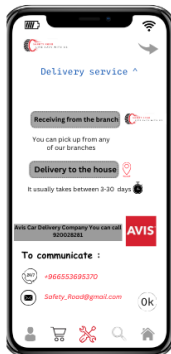


In spare parts, the customer determines the type of car and its company and then the parts he wants and the delivery method he wants



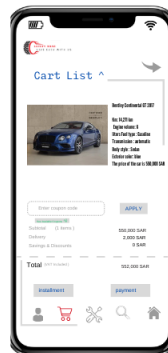
In the Help section, a window appears in which two options are:

1. Send a car workshop
2. Send a tow truck and the customer's location is determined to send the required to him

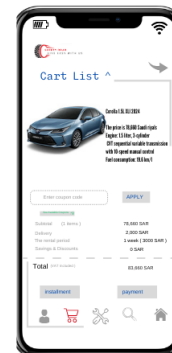


In the delivery service so that this service is chosen when he wants Delivery of the car or spare parts to his home Avis with a company

Or receive it from the branch according to the user's choice



IN THE SHOPPING CART, THE CHOSEN CAR OR ANYTHING ADDED TO THE CART IS DISPLAYED, AND THERE IS A BOX TO PUT A DISCOUNT COUPON, AND YOU CAN CHOOSE EITHER FULL PAYMENT OR IN INSTALLMENTS.



IN THE SHOPPING CART, THE CHOSEN CAR OR ANYTHING ADDED TO THE CART IS DISPLAYED, AND THERE IS A BOX TO PUT A DISCOUNT COUPON, AND YOU CAN CHOOSE EITHER FULL PAYMENT OR IN INSTALLMENTS.



WHEN THE USER
CHOSES
PAYMENT, THE
QUESTIONNAIRE
WILL BE FILLED
OUT WITH HIS
INFORMATION AND
REQUESTS



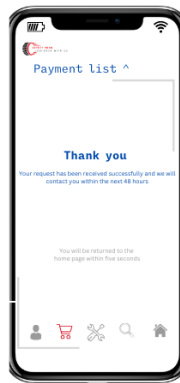
THE USER
CHOSES EITHER
APPLE PAY OR
CREDIT CARD AND
ADDS HIS CARD
WITH ITS
INFORMATION TO
COMPLETE THE
PAYMENT



THE USER WILL BE
TAKEN TO THE
BANK PAGE IF HE
CHOSES HIS
CARD, AND THE
CODE WILL BE
SENT VIA SMS TO
COMPLETE THE
PAYMENT PROCESS
SUCCESSFULLY



WHEN THE USER
CHOSES
INSTALLMENT, THE
QUESTIONNAIRE
WILL BE FILLED
OUT WITH HIS
INFORMATION AND
REQUESTS



A MESSAGE
APPEARS TO THE
USER STATING
THAT THE ORDER
WAS COMPLETED
SUCCESSFULLY,
THE ORDER
NUMBER, AND A
THANK YOU
MESSAGE

5.2 Source Code Documentation (SCD)

START

FUNCTION `main()`

 DISPLAY "Welcome to Safety Road"

 // Check if the user already exists

 IF `userExists()` THEN

 CALL `login()` // Log in existing user

 ELSE

 CALL `register()` // Register a new user

 ENDIF

 // Main application loop

 WHILE true DO

 DISPLAY `mainMenu()` // Show the main menu

 choice = GET `userChoice()` // Get user choice

Safety Road

```
// Navigate based on user choice
SWITCH choice DO
    CASE "Service":
        CALL serviceMenu() // Show service options
    CASE "Payment Service":
        CALL paymentServiceMenu() // Show payment options
    CASE "Exit":
        DISPLAY "Goodbye" // Exit the application
        BREAK
END SWITCH
END WHILE
END FUNCTION

FUNCTION register()
    DISPLAY "Enter your email"
    email = GET userInput() // Get user email
    DISPLAY "Enter your name"
    name = GET userInput() // Get user name
    DISPLAY "Enter your password"
    password = GET userInput() // Get user password

    // Save user information and check if successful
    IF saveUser(email, name, password) THEN
        DISPLAY "Registration Successful" // Registration success message
    ELSE
        DISPLAY "Registration Failed" // Registration failure message
    ENDIF
END FUNCTION

FUNCTION login()
    DISPLAY "Enter your email"
    email = GET userInput() // Get user email
    DISPLAY "Enter your password"
    password = GET userInput() // Get user password

    // Validate user credentials
    IF validateUser(email, password) THEN
        DISPLAY "Login Successful" // Login success message
    ELSE
```


Safety Road

```
        DISPLAY "Invalid Credentials" // Invalid login message
    ENDIF
END FUNCTION

FUNCTION serviceMenu()
    // Display service options
    DISPLAY "1. Purchase List"
    DISPLAY "2. Rental List"
    DISPLAY "3. Sale List"
    DISPLAY "4. Maintenance List"
    DISPLAY "5. Help List"
    DISPLAY "6. Delivery List"

    choice = GET userChoice() // Get user choice

    // Navigate to the selected service
    SWITCH choice DO
        CASE "1":
            CALL purchaseList() // Show purchase options
        CASE "2":
            CALL rentalList() // Show rental options
        CASE "3":
            CALL saleList() // Show sale options
        CASE "4":
            CALL maintenanceList() // Show maintenance options
        CASE "5":
            CALL helpList() // Show help options
        CASE "6":
            CALL deliveryList() // Show delivery options
    END SWITCH
END FUNCTION

FUNCTION purchaseList()
    DISPLAY "Available Cars"
    cars = getAvailableCars() // Get available cars
    DISPLAY cars // Display available cars

    // AI search for specific car
    DISPLAY "Search for a car using AI"
```

Safety Road

```
type = GET carType() // Get car type (Family, Personal, Sports)
budget = GET budgetRange() // Get budget range
brand = GET carBrand() // Get car brand (Toyota, Mercedes, etc.)
seats = GET seatCount() // Get number of seats (2, 4, 6)

// Search for cars using AI
searchedCars = searchCarsAI(type, budget, brand, seats)
DISPLAY searchedCars // Display searched cars
carSelection = GET userInput() // Get selected car

IF selectCar(carSelection) THEN
    CALL addToCart(carSelection) // Add car to cart
    CALL checkout() // Proceed to checkout
ENDIF
END FUNCTION

FUNCTION rentalList()
    DISPLAY "Available Rental Cars"
    rentalCars = getAvailableRentalCars() // Get available rental cars
    DISPLAY rentalCars // Display rental cars
    carSelection = GET userInput() // Get selected car

    IF selectCar(carSelection) THEN
        CALL addToCart(carSelection) // Add car to cart
        CALL checkout() // Proceed to checkout
    ENDIF
END FUNCTION

FUNCTION checkout()
    DISPLAY "Choose payment method: 1. Payment List 2. Installment List"
    paymentChoice = GET userChoice() // Get payment choice

    // Proceed based on payment choice
    IF paymentChoice == "1" THEN
        CALL paymentList() // Proceed to payment list
    ELSE
        CALL installmentList() // Proceed to installment list
    ENDIF
END FUNCTION
```

Safety Road

```
FUNCTION paymentList()
    personalInfo = GET personalDetails() // Get personal details
    paymentMethod = GET paymentMethod() // Get payment method (Apple Pay, Credit Card)

    // Process payment and check if successful
    IF processPayment(paymentMethod) THEN
        DISPLAY "Payment Accepted. You will be contacted within 48 hours." // Payment success message
    ELSE
        DISPLAY "Payment Failed." // Payment failure message
    ENDIF
END FUNCTION
```

```
FUNCTION installmentList()
    personalInfo = GET personalDetails() // Get personal details
    installmentDetails = GET installmentDetails() // Get installment details

    // Process payment and check if successful
    IF processPayment(installmentDetails) THEN
        DISPLAY "Payment Accepted. You will be contacted within 48 hours." // Payment success message
    ELSE
        DISPLAY "Payment Failed." // Payment failure message
    ENDIF
END FUNCTION
```

```
FUNCTION maintenanceList()
    DISPLAY "Choose Maintenance Type: 1. Regular 2. Roadside"
    maintenanceType = GET userChoice() // Get maintenance type

    // Schedule maintenance and check if successful
    IF scheduleMaintenance(maintenanceType) THEN
        DISPLAY "Maintenance Scheduled." // Maintenance success message
    ELSE
        DISPLAY "Failed to Schedule." // Maintenance failure message
    ENDIF
END FUNCTION
```

Safety Road

```
FUNCTION helpList()
    DISPLAY "Request assistance: 1. Car Workshop 2. Towing Service"
    requestType = GET userChoice() // Get request type

    // Request help and check if successful
    IF requestHelp(requestType) THEN
        DISPLAY "Help Requested." // Help request success message
    ELSE
        DISPLAY "Failed to Request Help." // Help request failure message
    ENDIF
END FUNCTION

FUNCTION deliveryList()
    DISPLAY "Choose Delivery Method: 1. Home Delivery 2. Pickup"
    deliveryMethod = GET userChoice() // Get delivery method

    // Schedule delivery and check if successful
    IF scheduleDelivery(deliveryMethod) THEN
        DISPLAY "Delivery Scheduled." // Delivery success message
    ELSE
        DISPLAY "Failed to Schedule Delivery." // Delivery failure message
    ENDIF
END FUNCTION

END
```

5.3 Quality Assurance Documentation (QAD)

5.3.1 Quality Management Plan

classs name :

main

register

login

serviceMenu

purchaseList

rentalList

checkout

paymentList

installmentList

Safety Road

maintenanceList

helpList

deliveryList

functionality

Goal	Outcome	Target/objective	Performance Measures/Data Source(s)/ Frequency/Responsible Person
WelcomeMessage	welcome message to the user.	displays a welcome message to the user.	software
Registration	create new accounts by entering their email, name, and password.	Allows users to create new accounts by entering their email, name, and password.	user
login	log in by entering their email and password	Enables existing users to log in by entering their email and password.	user
serviceMenu	main menu with options like "Service, " "Payment Service,	Presents the main menu with options like "Service, " "Payment Service,	user
purchaseList	services like "Purchase List, " "Rental List, " "Sale List," "Maintenance List," "Help List," and "Delivery List."	Offers various services like "Purchase List, " "Rental List, " "Sale List," "Maintenance List," "Help List, " and "Delivery List."	user
rentalList	available cars, allows AI search for specific cars, and adds selected cars to the cart.	Displays available cars, allows AI search for specific cars, and adds selected cars to the cart.	User

checkout	available rental cars and allows users to add selected cars to the cart.	Displays available rental cars and allows users to add selected cars to the cart.	software & company
paymentList	options for payment methods and proceeds to checkout.	Provides options for payment methods and proceeds to checkout.	user

5.3.2 Test Specifications:

Test Name:		Test Case 3: Display list of all TICSRS documents.		
Description:		Case Details screen tab will provide access to users to view or display list of all TICSRS documents.		
Requirement(s):		TICSRS		
Prerequisites:		The user is logged on as an LIE/SLIE/BA.		
Setup:		Tester must point to Mock P drive in test environment. Verify that the most recent file is currently in Trademarks\FAST 2.1\BIN\Fast Application.exe of the current CM Build. Create a desktop shortcut of the FAST executable file from Mock P and launch the FAST exe. Map to the TICSRS drive(s):		
Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Welcome Message	displays a welcome message to the user.	welcome message to the user.	pass
2	Registration	Allows users to create new accounts by entering their email, name, and password.	create new accounts by entering their email, name, and password.	pass
3	Login	Enables existing users to log in by entering their email and password.	log in by entering their email and password.	pass
4	Main Menu	Presents the main menu with options like "Service," "Payment Service,	main menu with options like "Service," "Payment Service,	pass
5	Service Menu	Offers various services like "Purchase List," "Rental List," "Sale List," "Maintenance List," "Help List," And "Delivery List."	services like "Purchase List," "Rental List," "Sale List," "Maintenance List," "Help List," and "Delivery List."	pass
6	Purchase List	Displays available cars, allows AI	available cars, allows AI search for	pass

Safety Road

		search for specific cars, and adds selected cars to the cart.	specific cars, and adds selected cars to the cart.	
7	Rental List	Displays available rental cars and allows users to add selected cars to the cart.	available rental cars and allows users to add selected cars to the cart.	pass
8	Checkout	Provides options for payment methods and proceeds to checkout.	Provides options for payment methods and proceeds to checkout.	pass

Summary Chapter5 :

This chapter outlines the practical aspects of using the application, from account creation to payment and service requests. Detailed setup and usage instructions are provided, along with a description of the main interface and available services like car purchase, rental, maintenance, and assistance. A quality assurance plan and test specifications ensure each feature works as intended, highlighting the system's commitment to providing a seamless user experience.

Conclusion:

In conclusion, the **Safety Road** app provides an all-in-one solution for managing vehicle needs, from purchasing and selling to renting and maintenance. With its intuitive interface, multilingual support, and a range of helpful features, users can easily navigate the automotive process, ensuring convenience and efficiency right at their fingertips. Whether you're buying, selling, renting, or seeking assistance, Safety Road has you covered.

Appendix A: Referenced Documents

visual paradigm for use case

canva for interface

lucid for (SAD)

Document Name	Document Location and/or URL	Issuance Date
<i>CarSwitch Application</i>	https://ksa.carswitch.com/	<2016>
<i>Careem Application</i>	https://www.careem.com/ar-AE/rental/	<2020>
<i>Wassilni Application</i>	https://wassilni.com/	<2018>

Table 1 - Referenced Documents