Online Garage Management System: A Mobile Application Using Flutter

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Abstract: The paper focuses on developing an Online Garage Management System, designed to enhance the efficiency of garage operations and improve customer experiences. With a user-friendly mobile platform, it allows customers to locate nearby garages, book services, and track their vehicle's status in real-time. Garage operators can manage appointments, inventory, and service records while receiving alerts for vehicle maintenance. Built using Flutter for a seamless cross-platform interface, the system ensures real-time data synchronization, communication, and secure payment integration through Firebase. This solution addresses the challenges of rising vehicle numbers and manual record-keeping, offering a modern, automated approach to streamline garage operations and reduce customer wait times. Future developments aim to include predictive vehicle health diagnostics and advanced payment methods. The system's overall goal is to increase transparency and operational efficiency, benefiting both garage operators and vehicle users.

Keywords: *Garage, Flutter, Dart, Fire-Base, UI/UX, Service Management, Inventory, Map Api, etc.*

I. INTRODUCTION

In today's developing era, the number of vehicles is increasing almost all over the world. So providing efficient service to each vehicle user is a challenging task for garages in the future. Vehicle users have to stand in queue to get service. Using this application the user can locate the nearby active garages / mechanics and communicate with them to get service in need. It is a mobile platform with administrators, principals, receptionists, and supervisors as users. The admin will provide other users access to particular modules. The users must log in and control the system's activity. The supervisor should be able to examine the garage's inventory of vehicle spares. Users can see which cars are presently being maintained and which ones need to be alerted for servicing. The user will also be able to record the hours spent at the mechanic shop. The device can also look for car spare components that the garage has to provide. The user interface was created using Flutter.

It has a user-friendly online interface. Mobile applications are having a progressively more significant role in our day-to-day lives. Ever since November 2016, there has been more network traffic made by mobile devices (48.19%) compared to desktops or laptops (47%). To dispense it to most of the users, a mobile application needs to familiarize itself with two independent platforms which are Android and iOS.Flutter is a cross-platform framework that targets developing high-performance mobile applications. Flutter was publicly released in 2016 by Google. Firebase provides tools for tracking analytics, reporting and fixing app crashes, and creating marketing and product experiments.
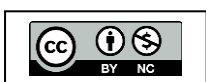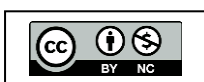
Aim:

The Online Garage Management System aims to develop a comprehensive, user-friendly platform that automates and streamlines the operations of garages and service centers. The system seeks to enhance the efficiency of daily tasks such as appointment scheduling, inventory management, vehicle tracking, and customer communication. It also aims to provide an improved customer experience by enabling online booking, real-time updates on service progress, and seamless payment options. Ultimately, the system strives to reduce operational overheads, minimize errors, and improve service delivery, while offering a convenient and transparent interface for both garage operators and customers.

II. LITERATURE REVIEW

Table 1: Literature Survey Table

| Sr. No.	Authors	Title	Journal/ Conference	Volume/ Issue	Year
1	Er. Swati Ganar, Gulhasan Siddiquee, Attaullah Khan, Soyab Anwar	E-Garage Management System	IOSR Journal of Engineering (IOSRJEN)	PP 38-41	April 2019
2	Ambika Patidar, Sharayu Dosalwar, Tanishq Varshney	An Effective Garage Management System Web Application for Customer Service	International Journal of Computer Application	Vol. 183, No. 31	2021
3	Mr. Harshavardhan P, Mr. Yashas S Gowda, Mr Balaram M	Garage Management System	International Research Journal of Modernization in Engineering Technology and Science	Vol. 5, Issue 7	July 2023
4	Manoj Kumar, Dayanand Kumar	Manoj Kumar, Dayanand Kumar	IJSRD - International Journal for Scientific Research & Development	Vol. 10, Issue 1	2022
5	Shrivatsa Hebbar, Vinodraj, Pawankumar Shetty, Ashwin Bhat, Sangeetha Harikantra	An Efficient Web Application For Customer Service For Garage Control Systems	International Journal of Creative Research Thoughts (IJCRT)	Vol. 10, Issue 7	July 2022
6	Sonali Pawar, Maruf Shaikh, Sneha Shejwal, Ayush Kumar Kamble, Laxman Gore	GARAGE MANAGEMENT APPLICATION	International Research Journal of Modernization in Engineering Technology and Science	Vol. 4, Issue 5	May 2022
7	Aakanksha Tashildar, Nisha Shah, Rushabh Gala, Trishul Giri, Pranali Chavhan	Application Development Using Flutter	International Research Journal of Modernization in Engineering Technology and Science	Vol. 2, Issue 8	August 2020

8	Pankaj Chougale, Vaibhav Yadav, Dr. Anil Gaikwad	Firebase - Overview and Usage	International Research Journal of Modernization in Engineering Technology and Science	Vol. 3, Issue 12	Dec 2021
9	Shivam Jadaun, Rajeev Kumar Singh, Rohit Kumar, Krishna Kant Agarwal	Analysis of Cross Platform Application Development Over Multiple Devices using Flutter & Dart	International Journal of Recent Technology and Engineering (IJRTE)	Vol. 12, Issue 1	May 2023
10	Thomas C. G., A. Jayanthila Devi	A Study and Overview of the Mobile App Development Industry	International Journal of Applied Engineering and Management Letters	Vol. 5, No. 1	June 2021

In the paper named "E-Garage Management System" An application is built to locate nearby active garages and mechanics and communicate with them. Three separate panels are created for i.e. for User, Garage, Admin. All operations in the garage are tracked and stored in database. Inventory management is also possible in this web application-based project. User is can also track hours spent in garage and which vehicle is currently repairing. A website for tacking activities in garage, manage garage's stock, billing system, etc for reducing manual work of keeping records which results in high accuracy and easy maintenance. It's a web-based service that lets you keep track of your garage's inventory, get repair estimates, and arrange deliveries, among other things. It records the vehicle's service history as well as the amount of time it spends in the mechanic's shop. It also maintains track of the inventory of car parts. Reminders send to client as per as per service dates. MySql is used for storing the data. A website which records both the maintenance history of the car and the spent some time in the repair shop along with inventory management. application to provide the service with online paper work which ease outs the manual work of the customers. The system will be able to record the service details of vehicles which was earlier done manually.

In the paper "Application Development Using Flutter" advantages of flutter are shown as below: Flutter is cross platform mobile application development framework. Flutter is an open-source SDK for developing high-performance and more reliable mobile applications. Flutter uses Dart language which modern programming language and have java like syntax. videos, photos, audio, text, files and other inappropriate content, Icon It is difficult for the Relational Database Management. Firebase is a new technology for managing large amounts random data. Very fast compared to RDBMS. Firebase provides following services: Analytics, Authentication, Cloud Messaging, Realtime Database, Crashlytics, etc. This paper aims to present the benefits of using Cross Platform Application Development using Flutter as while Java or Kotlin is basically used in Application Development but the only drawback of it was that for individual Operating System we have to code individually and for another Operating System we have to code individually. The evolution of software development has revolutionized technology accessibility. With the rise of mobile phones, app usage has surged across all age groups, enabling widespread engagement. This shift has significantly boosted the App Development Industry, making technology available to a broader audience.
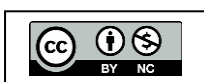
III. MOTIVATION

The automotive industry has witnessed significant growth, leading to a rise in the number of vehicles on the road and an increasing demand for efficient garage services. However, many garages still rely on outdated, manual systems to manage their day-to-day operations, which results in inefficiencies such as double bookings, poor inventory management, slow communication with customers, and difficulty tracking vehicle service histories. These challenges often lead to customer frustration and lost business opportunities.

The motivation behind developing an Online Garage Management System stems from the need to modernize and streamline garage operations, improving both customer experience and business efficiency. With advancements in digital technology, there is an opportunity to create a centralized platform that automates essential processes like appointment scheduling, service tracking, inventory control, and payment management. Such a system can greatly reduce the time spent on administrative tasks, minimize human error, and provide real-time updates to customers. 5 By creating an online system that integrates all aspects of garage management, the goal is to increase operational efficiency, improve customer satisfaction, and give garages a competitive edge in an increasingly digital world. This project is driven by the desire to create a more organized, accessible, and user-friendly environment for both garage operators and their customers.

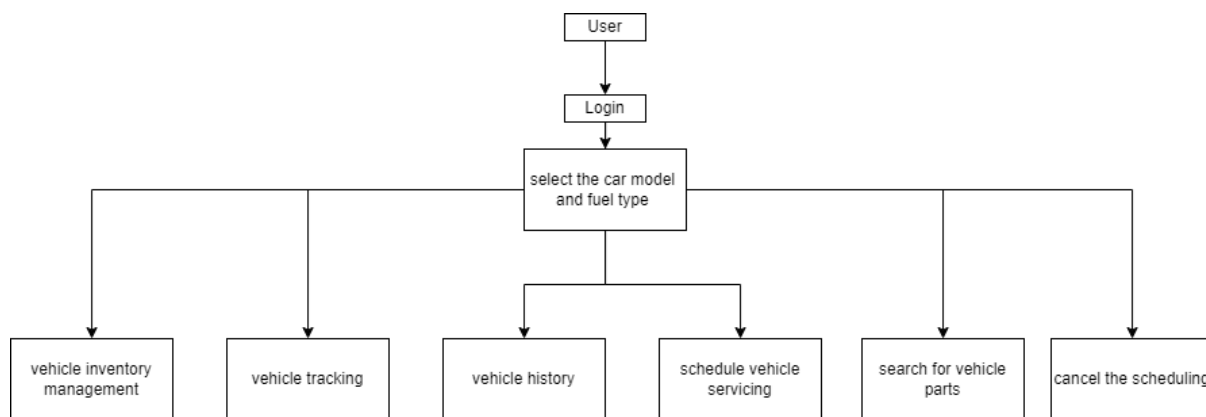## IV. PROPOSED SYSTEM DESIGN

Figure 1: User Architecture

The flowchart represents a car service management system where:

1. User logs into the system.
2. After logging in, the user selects the car model and fuel type to specify their vehicle.
3. Based on this selection, the user can:
   - Manage vehicle inventory.
   - Track the vehicle's location.
   - View vehicle history.
   - Schedule vehicle servicing.
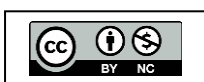
- Search for vehicle parts.
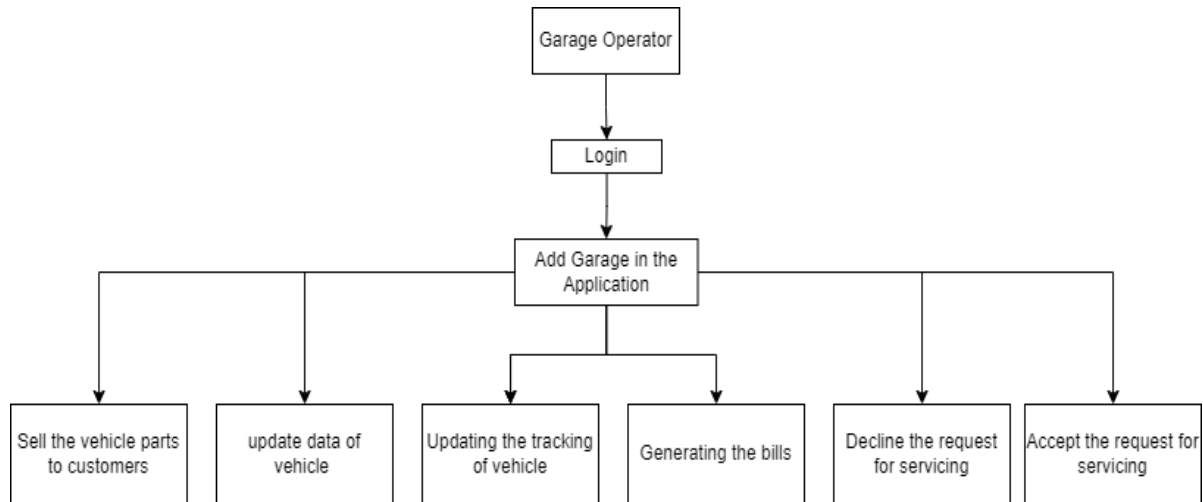- Cancel scheduled services if needed.

Figure 2: Garage Operator Architecture

The flowchart outlines the process flow for a Garage Operator within a car service management system:

1. Garage Operator logs into the system.
2. After logging in, the operator can add the garage to the application to manage services.
3. The operator then has several options:
   - Sell vehicle parts to customers.
   - Update vehicle data to keep information current.
   - Update vehicle tracking to monitor the vehicle's location or status.
   - Generate bills for services rendered.
   - Decline or accept requests for servicing based on availability or other criteria.
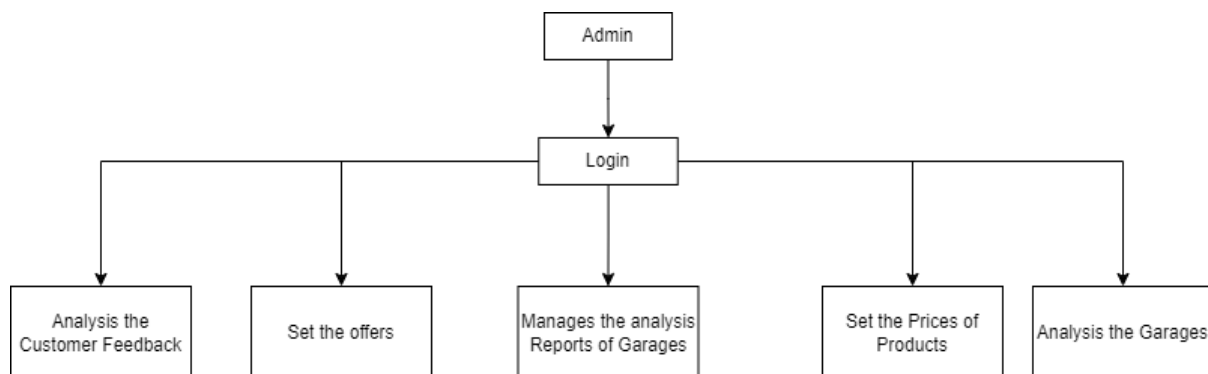

Figure 3: Admin Architecture

The flowchart represents the process flow for an Admin in a car service management system:

1. Admin logs into the system.
2. After logging in, the admin has the following options:
   - Analyze customer feedback to assess service quality and satisfaction.
   - Set offers for customers, potentially to attract more business.
   - Manage analysis reports of garages to monitor performance and efficiency.
   - Set the prices of products to control pricing strategy.
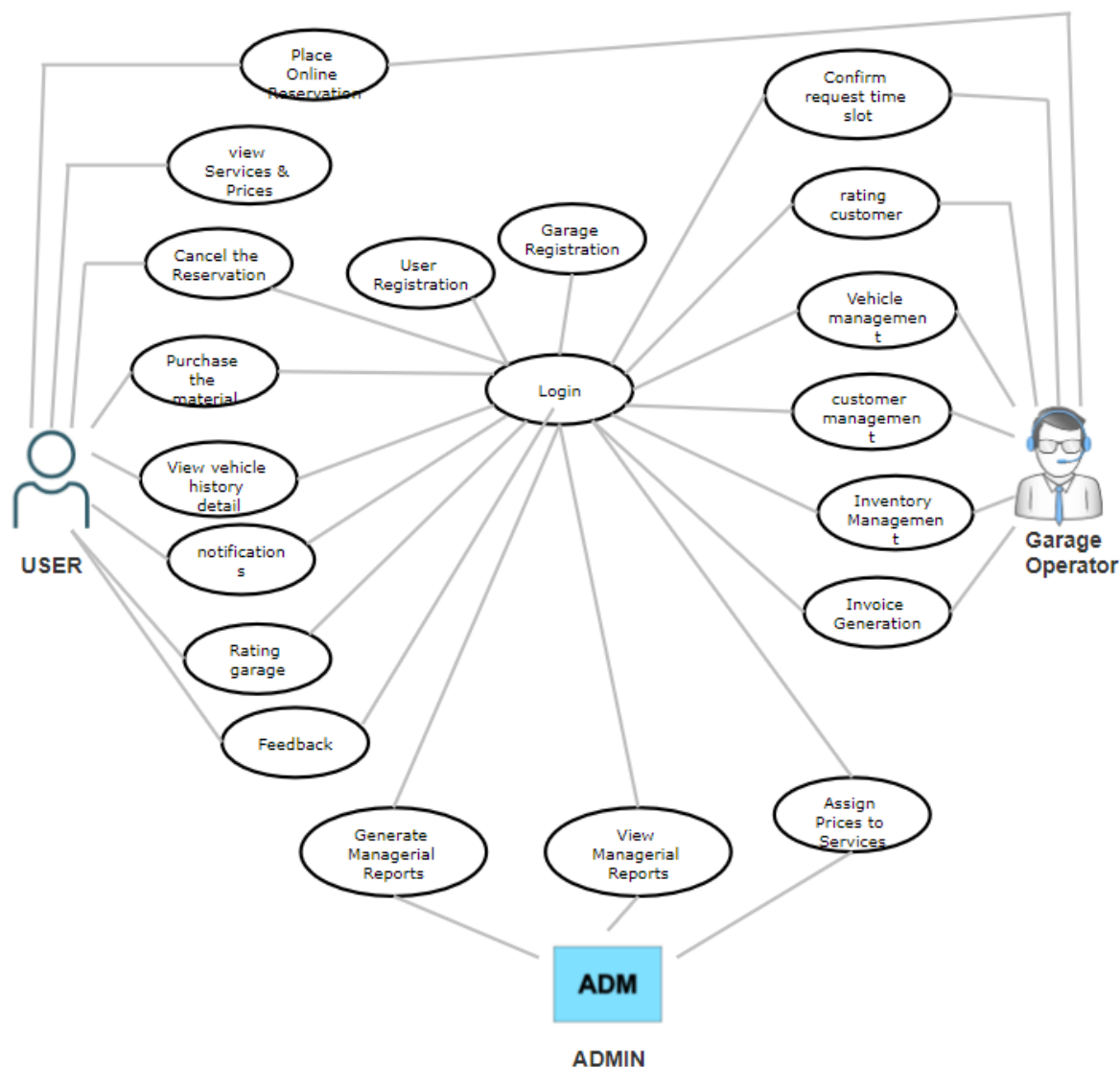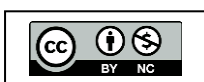   - Analyze garages to evaluate their operations and standards.

Figure 4: Database Design (ER Diagram)

This flowchart represents a system for managing a garage, showing interactions among three main roles: User, Garage Operator, and Admin.

1. **Login:** All roles start by logging into the system.
2. **User Role:** The User can:
   - Place Online Reservation: Make a reservation for services.
   - View Services & Prices: Check available services and their prices.
   - Cancel the Reservation: Cancel an existing reservation.
   - Purchase Material: Buy materials needed.
   - View Vehicle History Details: Review details about their vehicle's service history.
   - Receive Notifications: Get updates and reminders.
   - Rate Garage and Provide Feedback: Rate the garage services and provide feedback.
3. **Garage Operator Role:** The Garage Operator can
   - Confirm Request Time Slot: Confirm a time slot for a customer's reservation.
   - Rate Customer: Give a rating to customers.
   - Vehicle Management: Manage details about vehicles.
   - Customer Management: Handle customer information.
   - Inventory Management: Oversee inventory of materials and tools.
   - Invoice Generation: Generate invoices for services provided.
4. **Admin Role:** The Admin can:
   - Assign Prices to Services: Set prices for different services.
   - Generate and View Managerial Reports: Access reports on garage operations.

V. EXPECTED RESULT AND CONCLUSION

In this paper, "Garage Management System" benefits the automobile industry as it makes Garage Bookings more convenient for users, provides a better interface, and saves time by booking an appointment in advance.This technology allows owners of automobiles to receive regular updates on their vehicles' services. This website makes automobile maintenance simple.In the event of a car breakdown in an unfamiliar place, automobile owners can use this technology to discover all neighboring garages. In the future, from the data entered by mechanic about our vehicle we can predict the heath of vehicle. Also we can integrate payment method in the application..

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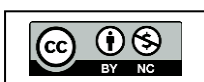
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