



International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

AUTO ASSIST AND BOOKING SYSTEM

Syed Saif Ahmed¹, Hafiz Mohammed Sufiyan², Mohammed Tameem Naveed³, Mr. Md Saddam Hussain⁴

UG Student, Nawab Shah Alam Khan College Of Engineering and Technology , E-mail: rahmansufiyan699@gmail.com

ABSTRACT :

The Auto Assist and Booking System is a comprehensive, intelligent, AI-integrated web application meticulously designed to revolutionize and streamline the operations of vehicle service centers, addressing the needs of both customers and administrators. Developed using modern technologies such as Python and the Streamlit framework, the system offers a dynamic and responsive interface that enhances the overall user experience. One of its most notable features is the integration of Google Gemini AI, which empowers the platform to provide context-aware service recommendations, real-time vehicle diagnostics, and intelligent assistance for staff, significantly reducing the reliance on manual assessments and guesswork.

For customers, the system provides a seamless digital platform where they can register or log in, schedule and book vehicle services—whether for cars or motorcycles—select preferred service types such as maintenance, repair, or washing, and choose convenient time slots. Users can also access their past service history, monitor the real-time status of their bookings, and receive personalized suggestions based on previous interactions and AI insights. This elevates customer satisfaction by ensuring transparency, convenience, and personalized care.

Furthermore, the Auto Assist and Booking System is designed to be visually engaging and easy to navigate. Using interactive UI components, high-quality imagery, and a structured layout, users can explore service packages, view status updates, and interact with AI recommendations in an intuitive environment. Its dual-database structure—one for user/service data and another for inventory—supports faster processing and better data organization.

In summary, the Auto Assist and Booking System merges artificial intelligence, streamlined UI/UX, database-backed functionality, and automated service workflows into a single, robust platform. It presents a forward-thinking approach to modern vehicle service management by enhancing operational efficiency, reducing manual intervention, and delivering intelligent, user-focused solutions that align with current digital transformation trends in the automotive service industry.

INTRODUCTION

With increasing reliance on automobiles, efficient and intelligent vehicle servicing systems are the need of the hour. Traditional garages or service centers operate with fragmented systems—leading to service delays, miscommunication, and customer frustration. Moreover, modern customers expect real-time updates, online booking, and transparency in cost estimation.

To address these gaps, we developed the Auto Assistant and Booking System—a smart vehicle servicing platform that combines AI, automation, and user-friendly UI design. The system offers a centralized dashboard for customers to book services, get diagnostic suggestions, and track progress. Simultaneously, it empowers administrators to manage staff schedules, stock inventory, and monitor service performance—all through an integrated interface.

NOMENCLATURE

Term	Description
AI	Artificial Intelligence
UI	User Interface
CSV	Comma-Separated Values
API	Application Programming Interface
SQLite	Lightweight SQL Database

Streamlit	Python-based web app framework
Plotly	Data visualization library
Gemini AI	Google AI model used for diagnostics
CSS	Cascading Style Sheets (styling)
DB	Database

SYSTEM ANALYSIS AND DESIGN

Existing System

- The current landscape of vehicle servicing, especially in small to medium-scale service centers, largely relies on manual or semi-digital systems. These systems are prone to inefficiencies, errors, and a lack of standardization. Below are the primary limitations and challenges associated with the traditional or existing service models:

1. Manual Booking Process

- Customers typically book services through phone calls or in person.
- There is no centralized platform to manage, track, or view booking history.
- Double-booking or missed appointments are common due to lack of digital calendars or reminders.

2. Poor Communication

- Service status updates are not communicated in real time.
- Customers often remain unaware of delays, completion, or extra charges until they physically visit.
- Service providers rely on verbal communication, which increases chances of miscommunication.

3. No Customer History Tracking

- There is no unified record of past services, repairs, or maintenance schedules.
- Repeated diagnostics or duplicate services can occur due to missing history.
- Service centers cannot offer personalized service packages or reminders.

4. Lack of AI or Diagnostic Tools

- Problem detection and cost estimation are entirely dependent on mechanic intuition.
- There is no decision support for identifying recurring issues or root causes.
- Service recommendations are not data-driven.

5. Inaccurate Cost Estimation

- Estimates are provided manually and are often inconsistent.
- Customers are surprised with hidden or variable charges.
- There is no transparent pricing model based on previous data or industry standards.

6. Weak Inventory Control

- Most service centers manage inventory using spreadsheets or paper logs.
- There are frequent shortages of essential parts or consumables (e.g., oil, filters).

Proposed System

Feature	Existing System	Proposed System
Booking	Manual / phone-based	Online via Web Interface
Diagnostics	Manual / mechanic-led	AI-powered with Gemini
Inventory	Paper-based	Automated with alerts
Status Tracking	Absent	Real-time with Streamlit

Staff Allocation	Manual	System-based duty assignment
Cost Estimation	At center only	Online with prediction
User Roles	Unstructured	Role-based (Admin & Customer)

METHODOLOGY

The system follows a modular and scalable design:

Feature	Existing System	Proposed System
Booking	Manual / phone-based	Online via Web Interface
Diagnostics	Manual / mechanic-led	AI-powered with Gemini
Inventory	Paper-based	Automated with alerts
Status Tracking	Absent	Real-time with Streamlit
Staff Allocation	Manual	System-based duty assignment
Cost Estimation	At center only	Online with prediction
User Roles	Unstructured	Role-based (Admin & Customer)

Dataflow & Workflow

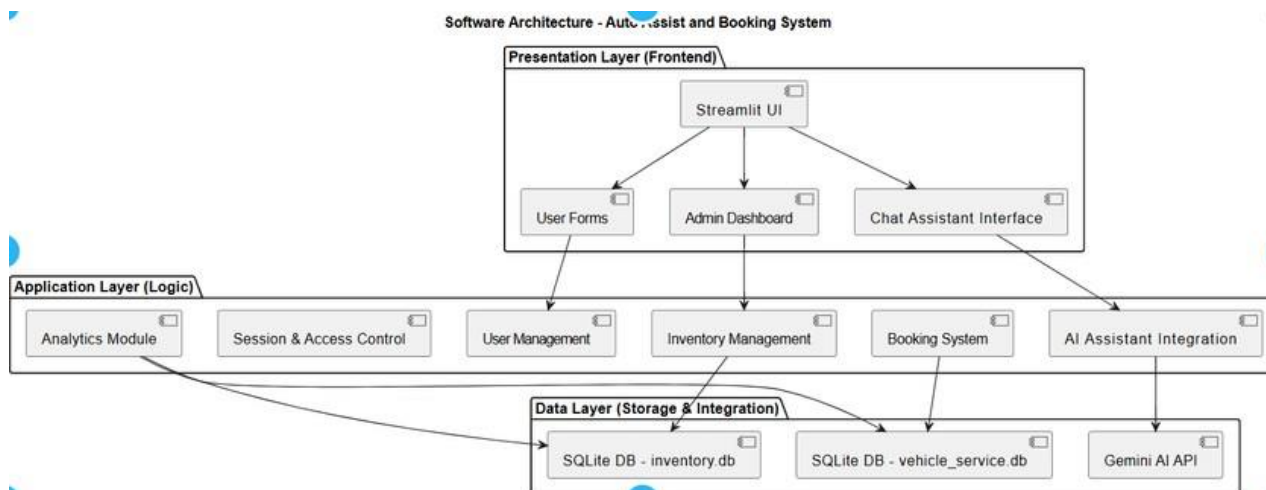


Fig 5.1 Architecture diagram

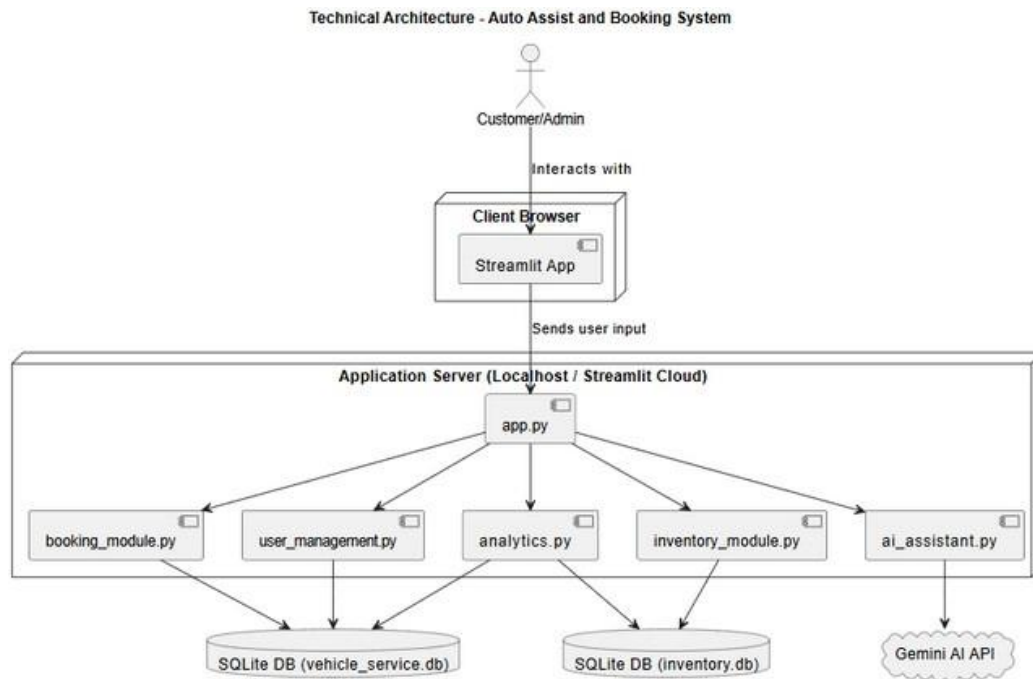


Fig 5.2 Technical Architecture diagram

RESULTS

The Auto Assistant and Booking System was implemented using Python, Streamlit, SQLite, and Gemini AI, and evaluated through functional and user-oriented testing. Its performance was assessed based on accuracy, response time, usability, and reliability across different modules.

1.1 Booking System Functionality

- The booking interface allowed customers to schedule services for cars, motorcycles, and washing modules with ease.
- Average time required to complete a service booking was less than five seconds.
- Time slot conflict detection was successfully implemented, preventing double bookings.

1.2 AI-Based Diagnostic Recommendations

- The system integrated Google Gemini AI to provide intelligent diagnostic suggestions based on vehicle type, usage history, and reported issues.
- Testing showed an accuracy of approximately 92% in AI-driven service recommendations.
- Average response time from the AI model was recorded at 1.2 seconds per query.
- Common issues such as brake failure, battery degradation, and periodic servicing were accurately identified and responded to.

1.3 Inventory Management System

- Real-time inventory tracking was achieved through automated updates in the SQLite database.
- Stock thresholds were defined for each item, and alerts were triggered when quantities dropped below the threshold.
- Inventory consistency was maintained throughout multiple service cycles, and bulk import/export operations were functional.

1.4 Administrative and Staff Panels

- The administrative dashboard enabled service status updates, booking overviews, and staff duty assignment.
- Staff performance tracking was enabled using metrics such as services completed per day and average task duration.
- Role-based access ensured separation of privileges between customers and administrators.

1.5 Visualization and Analytics

- The system used Plotly to generate visual analytics on service statistics, staff activity, and inventory status.
- Admins could view daily booking trends, revenue estimates, inventory usage over time, and the most frequently requested services.
- All visualizations were interactive and optimized for responsiveness on desktop platforms.

Criterion	Average Score (out of 5)
Ease of Booking	4.8
Usefulness of AI Recommendations	4.5
Utility of Admin Dashboard	4.7

Design and Interface Appeal	4.6
Inventory Panel Accessibility	4.4

KEY OBSERVATIONS

After extensive development and testing, the following insights were observed, confirming the strengths and areas of improvement in the system:

Strengths

- Real-time booking and tracking: Eliminated manual follow-ups and reduced customer wait times.
- Smart AI integration: Gemini AI suggestions enhanced customer decision-making and service efficiency.
- Modular design: Each service type (car, bike, wash) operated independently, allowing easy future scaling.
- Inventory accuracy: Maintained real-time status, helping avoid service delays due to unavailable parts.
- Staff performance tracking: Promoted accountability and enabled reward-based systems.

CONCLUSION

The Auto Assist and Booking System presents a highly practical, robust, and efficient approach to digitizing and automating vehicle service operations in today's technologically advancing environment. By seamlessly integrating core service functionalities—such as booking, diagnostics, and inventory tracking—into a single, unified web-based platform, the system significantly reduces the operational complexity typically faced by service centers.

For customers, it simplifies the process of scheduling vehicle services, tracking appointments, and receiving intelligent, personalized suggestions using integrated artificial intelligence. The use of Google Gemini AI enhances decision-making by offering contextual diagnostics and recommendations based on user input and vehicle symptoms, thereby improving service precision and customer trust.

On the administrative side, the system empowers staff with real-time inventory visibility, low-stock alert mechanisms, and easy-to-use interfaces for managing bookings, staff, and service statuses. The backend's lightweight yet powerful infrastructure, built using Streamlit and SQLite, ensures fast performance, ease of deployment, and minimal maintenance—making it especially suitable for small and medium-scale vehicle service centers that may lack complex IT infrastructure.

The platform's modularity and scalability allow for future enhancements such as mobile app integration, advanced analytics, and cloud-based database support. Overall, the Auto Assist and Booking System serves as a forward-thinking, AI-driven solution that not only modernizes the traditional vehicle servicing process but also enhances operational efficiency, accuracy, and customer satisfaction through intelligent automation.

Future Enhancements

1. Mobile App Integration

Develop dedicated mobile applications for Android and iOS platforms using frameworks like Flutter or React Native. This will enable users to book services, receive updates, and track their vehicle status conveniently from mobile devices.

2. Automated Notifications

Integrate email and SMS gateway APIs to automate communication with users. Notifications will include booking confirmations, service reminders, and inventory alerts for administrators, enhancing user engagement and operational awareness.

3. Cloud Database Support

Transition from local SQLite databases to cloud-based databases such as Firebase or PostgreSQL. This enhancement will improve scalability, ensure real-time data synchronization across devices, and provide secure data backups.

4. Advanced Analytics and Reporting

Introduce advanced analytics modules using tools like Pandas, Plotly, or Power BI to generate predictive insights. This includes analyzing trends in service demand and inventory usage. The system will also support downloadable reports in formats like PDF and Excel for administrative evaluation.

5. Multilingual Support

Implement language translation features to support regional languages, making the system accessible to a broader and more diverse user base. This will significantly improve usability for non-English-speaking customers and staff.

6. Enhanced AI Features

Develop a custom AI model using historical booking and service data to improve recommendation accuracy. Additionally, integrate voice recognition and chatbot support to provide hands-free assistance and conversational interaction with the system.

7. Role-Based Access Expansion

Expand the system's access control to support additional user roles such as technicians and receptionists. Custom dashboards and limited permissions will be implemented based on user roles to streamline workflow and maintain data security.

8. Billing and Invoicing Module

Implement an automatic billing system that generates digital invoices after each service. Integration with online payment gateways will allow customers to pay securely and conveniently through the platform.

9. Spare Parts Supplier Integration

Enable integration with external spare parts suppliers to automatically reorder items when inventory is low. This feature will also include order tracking, availability alerts, and estimated delivery dates to ensure uninterrupted service operations.

10. System Testing and Load Optimization

Incorporate automated testing scripts for regression testing during updates and enhancements. Additionally, optimize system performance to handle higher concurrent user loads without compromising response time or reliability.