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AutoAssist AI: An Integrated Intelligent Platform for Vehicle Assistance and Automotive Marketplace Management

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Abstract: AutoAssist AI is an integrated intelligent platform designed to simplify vehicle-related services through a single digital application. The system combines roadside assistance requests, AI-based vehicle price estimation, second-hand car listings, automotive spare-parts sales, and vehicle service bookings. It also provides emergency contact information to help users access essential services when required. The business dashboard allows automotive businesses to manage their vehicle listings, spare-parts products, and customer orders. The proposed platform aims to improve accessibility, convenience, and efficiency for vehicle owners, buyers, sellers, and automotive service providers. The research presents the system's major modules, proposed architecture, development methodology, and validation approach. Functional testing and usability evaluation can be used to assess the system's performance, while appropriate evaluation metrics can be applied to examine the accuracy of vehicle price estimation. AutoAssist AI provides a unified approach to vehicle assistance and automotive marketplace management.

Keywords: AutoAssist AI, Vehicle Assistance, Artificial Intelligence, Vehicle Price Estimation, Roadside Assistance, Automotive Marketplace, Second-Hand Cars, Spare Parts Management, Service Booking.

I. INTRODUCTION

The rapid growth of the automotive sector has increased the demand for accessible vehicle-related services, including roadside assistance, vehicle maintenance, second-hand vehicle purchasing, and spare-parts availability. However, these services may be accessed through different applications, websites, dealerships, and local service providers. For vehicle owners, this fragmented experience can make it difficult to identify suitable services, compare available options, and manage different vehicle-related requirements from a single place. The problem becomes particularly important when a vehicle breaks down unexpectedly or when a user needs reliable information before purchasing a used vehicle.

Digital platforms have created opportunities to simplify these activities by connecting users with relevant services through a common interface. Artificial intelligence can further support automotive applications by estimating vehicle prices from relevant attributes, such as the make, model, manufacturing year, and other available vehicle information. However, the usefulness of such estimates depends on the quality of the underlying data and the suitability of the prediction method. Similarly, online automotive marketplaces can improve the accessibility of vehicle listings and spare parts, while service-booking functionality can help users organize maintenance requirements.

To address these needs, this paper presents **AutoAssist AI**, an integrated vehicle assistance and automotive marketplace platform. The proposed system brings together roadside assistance, AI-based vehicle price estimation, second-hand car listings, spare-parts sales, and vehicle service bookings. It also incorporates emergency contact information and a business dashboard for managing relevant automotive listings, products, and customer orders. The central idea is to reduce the need to navigate multiple disconnected services by providing a common digital environment for vehicle owners and automotive businesses.

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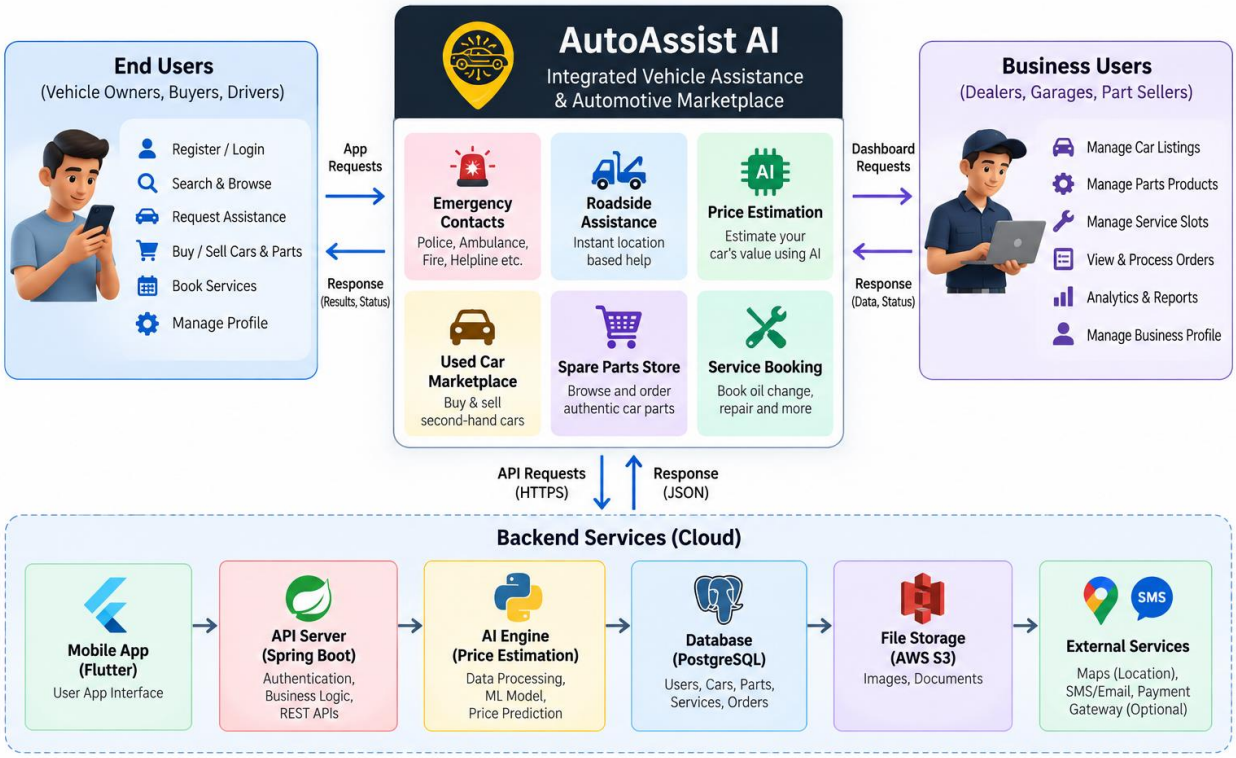


Figure 1. Conceptual system architecture of AutoAssist AI platform.

The proposed platform is organized around distinct functional modules that support different user requirements. Roadside assistance focuses on helping users initiate assistance requests, whereas the vehicle marketplace supports the discovery of available used cars. The price-estimation module is intended to provide an estimated vehicle value based on relevant input attributes. The spare-parts and service-booking modules address purchasing and maintenance requirements. The business dashboard provides a management interface for participating automotive businesses. These modules are conceptually connected through a shared platform, although their actual integration depends on the implemented application and backend services.

The main contribution of this work is the design of a unified automotive service platform that combines assistance, marketplace functionality, and AI-supported vehicle valuation within one application. The study also defines a systematic approach to evaluating the proposed system through functional validation, usability assessment, and appropriate performance measurements. Rather than assuming that integration automatically guarantees better outcomes, the research considers whether the proposed design can provide a practical, accessible, and maintainable solution to common vehicle-related requirements.

The scope of this paper covers the system's functional requirements, proposed architecture, operational methodology, and evaluation approach. The accuracy of vehicle price estimation and the overall effectiveness of the platform must be established through suitable testing and evidence. The paper therefore distinguishes the system's intended capabilities from outcomes that require experimental validation.

II. RELATED WORK

The development of digital automotive platforms has attracted attention in areas such as online vehicle marketplaces, vehicle valuation, and integrated customer services. Existing approaches address different parts of the automotive service process, including the discovery of used vehicles, estimation of resale prices, and the exchange of vehicle-related information. These studies provide a foundation for designing AutoAssist AI, which aims to bring several automotive functions together within a unified platform.

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A. Online Automotive Marketplaces

Online marketplaces have changed how buyers and sellers discover and evaluate used vehicles. However, transactions involving second-hand vehicles can be affected by information asymmetry, uncertainty about vehicle condition, and differences in the information provided by sellers. Fu et al. [1] investigated consumer preferences for used-vehicle e-commerce platforms using a discrete-choice experiment. Their findings indicate that buyers value additional services, particularly vehicle inspection, when choosing a platform. This suggests that an automotive marketplace should consider more than vehicle listings alone. AutoAssist AI follows a broader service-oriented approach by combining vehicle listings with roadside assistance, service booking, spare-parts sales, and other vehicle-related functions.

B. Machine Learning for Vehicle Price Estimation

Vehicle price estimation is another important area of automotive research. Traditional valuation practices may depend heavily on expert judgment, while machine learning approaches can use historical vehicle data to identify relationships between vehicle characteristics and resale prices. Arora et al. [2] examined machine learning methods for forecasting car resale values and compared several regression algorithms, including XGBoost. Their study highlights the relevance of attributes such as manufacturing year, distance driven, fuel type, and transmission. Similarly, the IEEE conference study *Prediction of Used Car Price Based on Supervised Learning Algorithm* [3] explored supervised learning techniques and reported promising results using tree-based regression models. These approaches provide useful guidance for designing the price-estimation module in AutoAssist AI. However, a suitable model must be selected and evaluated using relevant data before its accuracy can be established for the proposed platform.

C. Information Transparency in Used-Car Transactions

Reliable vehicle information is essential for building confidence in digital automotive transactions. Engelmann and Schwabe [4] examined how certified vehicle data could support future used-car markets by extending digital platforms beyond basic information provision. Their work emphasizes the role of vehicle condition and history information in reducing uncertainty during online transactions. This is relevant to AutoAssist AI because vehicle listings and estimated prices are more useful when users can access accurate and sufficiently detailed information. The current platform concept provides vehicle listing and valuation functionality; verification of vehicle history, inspection records, and seller claims would require additional mechanisms if these capabilities are introduced.

D. Integrated Automotive Service Platforms

The reviewed approaches demonstrate the value of individual automotive capabilities, including marketplace services, data-supported vehicle valuation, and improved information transparency. However, the studies discussed above primarily investigate specific aspects of the automotive ecosystem rather than validating the complete AutoAssist AI application. The proposed platform addresses this design opportunity by combining roadside assistance requests, emergency contacts, used-car listings, spare-parts management, vehicle price estimation, and service booking in one application. It also includes a business dashboard to support the management of vehicle listings and products.

The main distinction of AutoAssist AI is therefore its **integrated functional design**, rather than a claim that its individual technologies are entirely new. The platform's practical value will depend on the reliability of its modules, the consistency of information exchanged between them, and the usability of the application for both individual users and automotive businesses. These aspects require further evaluation through the methodology and validation procedures presented in the subsequent sections.

III. LITERATURE SURVEY

The literature survey examines existing research related to online automotive marketplaces, machine learning-based vehicle price estimation, and information transparency in used-car transactions. The selected studies provide insights into the design of digital automotive platforms and the factors that influence their reliability and usefulness. A comparative analysis is presented in Table I.

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Table I. Comparative Analysis of Existing Research

Ref.	Research Focus	Method / Approach	Key Contribution	Limitation / Relevance to AutoAssist AI
[1]	Used-vehicle e-commerce platforms (2025)	Online survey and discrete-choice experiment	Examines consumer preferences for marketplace features and additional services, particularly vehicle inspection.	Focuses on consumer preferences rather than developing an integrated automotive application.
[2]	Vehicle resale price prediction (2022)	Comparison of machine learning regression models	Investigates the use of vehicle attributes to estimate resale prices.	Model performance depends on the quality and relevance of the training data.
[3]	Supervised learning for used-car price prediction (2021)	Supervised machine learning algorithms	Explores data-driven methods for predicting used-car prices.	Price prediction alone does not address roadside assistance, service booking, or marketplace management.
[4]	Information transparency in used-car markets (2024)	Design and evaluation of a certified-data chat prototype	Investigates how certified vehicle information can support communication and reduce uncertainty in transactions.	Concentrates on certified data exchange and negotiation rather than a broad set of automotive services.
[5]	Explainable used-car pricing (2025)	Comparative prediction models and explainable machine learning	Studies prediction accuracy and the influence of vehicle characteristics on estimated prices.	Concentrates on pricing methodology; its findings do not establish the performance of AutoAssist AI.

The reviewed literature indicates that automotive technology research covers several important areas. Studies of online marketplaces emphasize customer preferences and the value of additional services. Research on vehicle price estimation explores how vehicle characteristics and historical data can support price prediction. Work on information transparency highlights the importance of reliable vehicle information when buyers and sellers interact through digital platforms. These findings provide a foundation for designing the corresponding modules in AutoAssist AI.

Research Gap

The studies reviewed above primarily focus on individual challenges, such as marketplace design, vehicle price prediction, or information exchange. AutoAssist AI addresses a broader application-level requirement by bringing roadside assistance requests, emergency contact information, second-hand car listings, spare-parts sales, service bookings, and vehicle price estimation into a unified platform. Its business dashboard also supports the management of vehicle listings, products, and customer orders.



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The research opportunity is therefore to examine how these functions can be organized within one application and how effectively the resulting platform supports its intended users. The proposed study will consider functional correctness, usability, and the evaluation of vehicle price estimation as separate assessment areas. The integration itself should not be treated as proof of improved performance; that conclusion would require appropriate testing and evidence.

IV. PROPOSED SYSTEM

AutoAssist AI is proposed as an integrated mobile application that brings multiple vehicle-related services together within a single platform. The system is designed to support vehicle owners, second-hand car buyers and sellers, and automotive businesses. Instead of requiring users to access separate platforms for different needs, the application provides a common interface for vehicle assistance, marketplace activities, price estimation, and maintenance-related services.

A. System Overview

The proposed system consists of a mobile application and a business dashboard. The mobile application enables users to access available automotive services, while the business dashboard supports the management of vehicle listings, spare-parts products, and customer orders. The system is organized into functional modules so that each service addresses a specific user requirement while contributing to the overall platform.

B. Major Modules

1. Roadside Assistance Module: This module allows users to submit requests for roadside assistance when they experience vehicle-related problems. It provides a digital interface for recording and managing assistance requests.
2. Emergency Contacts Module: This module provides access to emergency contact information relevant to users in India. It is intended to make essential contact details easier to access when assistance is required.
3. AI-Based Vehicle Price Estimation Module: This module is designed to estimate a vehicle's price using relevant vehicle information. The usefulness of its estimates depends on the data, estimation method, and validation process. Its predictive accuracy must be established through appropriate testing.
4. Second-Hand Car Marketplace: This module allows users to explore second-hand car listings. It supports the digital presentation of available vehicles and helps users access vehicle information before making purchasing decisions.
5. Spare-Parts Marketplace: This module supports the listing and sale of automotive spare parts. It also enables automotive businesses to manage their product information through the business dashboard.
6. Vehicle Service Booking Module: This module allows users to access vehicle service-booking functionality. It supports the recording and management of service bookings within the application.
7. Business Dashboard: The dashboard provides business users with an interface for managing vehicle listings, spare-parts products, and customer orders. It complements the mobile application by supporting business-side operations.

C. System Architecture

The system architecture is organized around the interaction between end users, business users, application modules, and the supporting backend services. Users access the platform through the mobile application or business dashboard. Their actions are processed by the corresponding application modules, while supporting backend components handle the required data and service operations.

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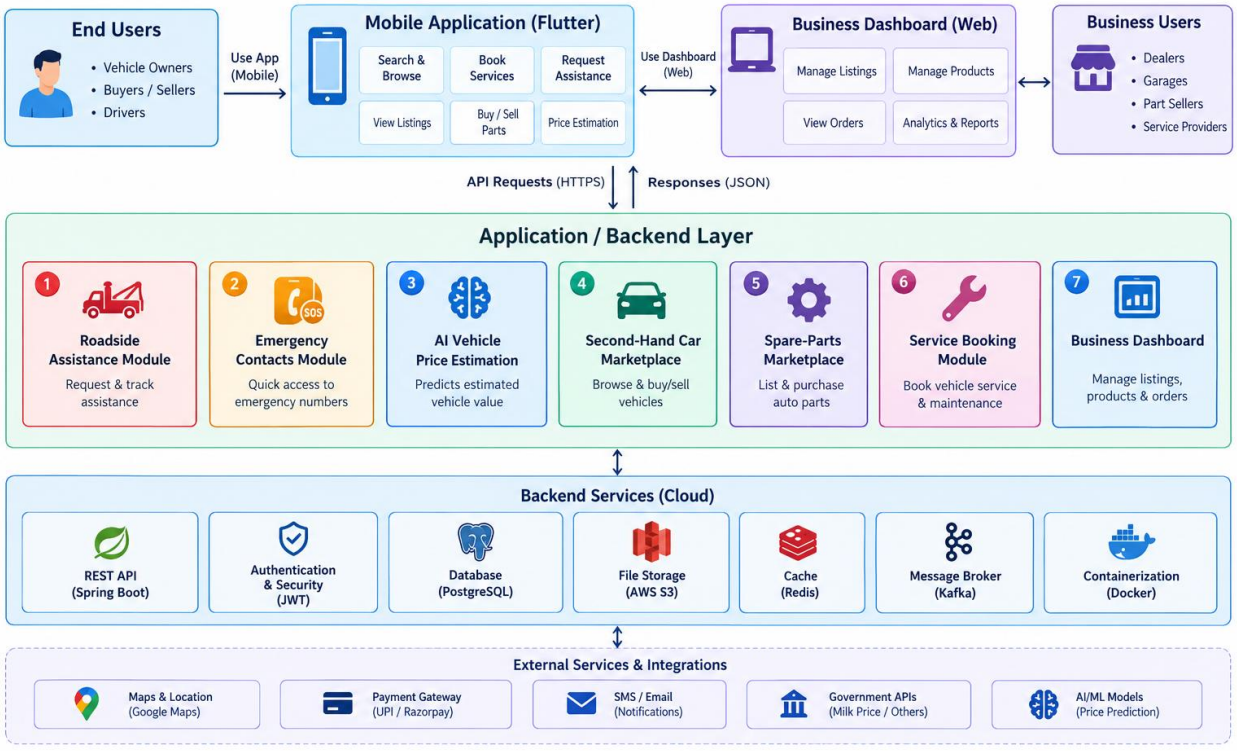


Fig. 1. System architecture of the AutoAssist AI platform.

The conceptual architecture is presented in Fig. 1. It illustrates the relationship between the platform's user interfaces, functional modules, and supporting services. The specific technologies shown in the diagram should correspond to the actual implementation; any component that has not yet been implemented should be identified as proposed rather than existing.

D. Expected Benefits

The proposed system aims to improve accessibility by providing multiple vehicle-related functions through one application. It may reduce the effort required to switch between separate services and provide automotive businesses with a common interface for managing listings, products, and orders. The modular structure also provides a basis for evaluating each function independently. These benefits are intended outcomes and should be confirmed through functional testing and user evaluation.

V. METHODOLOGY AND VALIDATION

The methodology for AutoAssist AI focuses on organizing the application's functional modules, processing user requests, managing automotive information, and evaluating the system's operation. The validation approach is intended to determine whether the platform's features function as expected and whether the vehicle price estimation module produces reasonable predictions. The methodology separates functional verification from the evaluation of predictive performance.

A. System Development Approach

The system is organized into modules based on the requirements of vehicle owners, buyers, sellers, and automotive businesses. Each module addresses a specific function, such as roadside assistance, vehicle listing, spare-parts management, service booking, or price estimation. The mobile application and business dashboard provide interfaces through which users interact with these functions.

B. Data Input and Processing

The platform accepts user inputs according to the selected service. For vehicle price estimation, relevant attributes may include the vehicle's make, model, manufacturing year, distance driven, fuel type, and transmission. These attributes can be processed by a suitable estimation model to generate an estimated vehicle value. For marketplace and booking functions, the system processes the information submitted by users and maintains the corresponding records.

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The quality of the output depends on the completeness, consistency, and reliability of the input data. If a machine learning model is used, its training data should be checked for missing values, inconsistent entries, and unsuitable records before model training and evaluation.

C. Functional Testing

Functional testing can be performed by executing representative user actions and checking whether the system produces the expected responses. The following cases are proposed for evaluation:

1. **Roadside assistance:** Verify that users can submit assistance requests and that the submitted information is recorded correctly.
2. **Emergency contacts:** Check that the displayed contact information is accurate and accessible.
3. **Vehicle price estimation:** Verify that valid vehicle details are accepted and that an estimated value is returned when the estimation service is available.
4. **Second-hand car marketplace:** Check that vehicle listings display the expected information.
5. **Spare-parts marketplace:** Verify that products can be displayed and that relevant product information is handled correctly.
6. **Service booking:** Check that booking details are submitted and recorded correctly.
7. **Business dashboard:** Verify that authorized business users can manage vehicle listings, products, and customer orders according to the application's supported functions.

Each test should record the input, expected output, observed output, and final status. Actual pass or fail results should be added only after the tests have been executed.

D. Validation of Vehicle Price Estimation

The vehicle price estimation module requires a separate evaluation because the presence of an estimated price does not establish its accuracy. If a trained regression model is used, its predictions should be compared with actual vehicle prices from a suitable test dataset that was not used for training.

Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE) can be used to quantify prediction errors. MAE represents the average absolute difference between actual and predicted prices, while RMSE gives greater weight to larger errors. The coefficient of determination ((R^2)) may also be reported to examine how well the model explains variation in the target values. Lower MAE and RMSE values generally indicate smaller prediction errors, while (R^2) must be interpreted in the context of the dataset and evaluation method. [5]

The evaluation should document the dataset source, sample size, input attributes, data preprocessing steps, model type, train-test split, and measured results. If these experiments have not yet been performed, the model's predictive accuracy should be reported as unevaluated rather than assigned an assumed value.

E. Usability and Overall Validation

Usability can be assessed by asking representative users to complete common tasks, such as finding a vehicle listing, submitting an assistance request, or accessing service-booking functionality. Evaluation may consider task completion, errors encountered, time required, and user feedback. The findings can help identify difficulties in navigation, information presentation, and interaction.

The overall validation process should combine functional test results, usability observations, and price estimation metrics where applicable. This provides a structured basis for assessing the platform without assuming that all modules perform effectively merely because they are available in the application.

VI. RESULTS

The AutoAssist AI application brings together multiple vehicle-related functions through a common interface. The available application screenshots demonstrate the presentation of key modules, including roadside assistance, vehicle price estimation, second-hand car listings, spare-parts services, vehicle service booking, and business management. These observations provide an initial view of the system's functional organization. However, complete functional performance and prediction accuracy require separate testing.

A. Application Interface and Functional Modules

The application interface is organized to provide access to different automotive services. The mobile application supports user-oriented functions, while the business dashboard provides interfaces for managing vehicle listings, spare-parts

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products, and customer orders. This separation helps distinguish individual service activities from business management operations.

B. Observations from the Application

Table II. Observed Application Features

Feature	Observation	Evaluation Status
Roadside assistance	An interface is provided for vehicle assistance requests.	Interface observed; request processing requires testing.
Emergency contacts	Emergency contact functionality is included in the application.	Verify contact accuracy and accessibility.
Vehicle price estimation	A vehicle price estimation interface is available.	Prediction accuracy requires dataset-based evaluation.
Second-hand car listings	A marketplace interface supports vehicle discovery.	Listing retrieval and data correctness require testing.
Spare-parts marketplace	Spare-parts functionality is included in the platform.	Product and order operations require testing.
Service booking	A vehicle service-booking interface is available.	Booking creation and status updates require testing.
Business dashboard	Interfaces are provided for business-related management.	Management operations and access permissions require testing.

C. Analysis of Results

The observed interfaces indicate that AutoAssist AI is designed to address several automotive requirements within one platform. Combining vehicle assistance, marketplace functions, service booking, and business management provides a unified application structure. This integration may reduce the need for users to navigate multiple independent applications to access different vehicle-related services.

The screenshots also demonstrate the presentation of the vehicle price estimation feature. Nevertheless, the accuracy of its estimates cannot be determined from the interface alone. A quantitative evaluation using independent test data and suitable regression metrics is necessary before making claims about predictive performance.

Similarly, the availability of booking and marketplace interfaces does not independently establish the reliability of request processing, data storage, or order management. These functions should be evaluated using the test procedures described in Section V.

D. Summary of Findings

The preliminary observations support the description of AutoAssist AI as an integrated automotive service platform with user-facing and business-facing interfaces. The application's modular organization provides a foundation for further functional testing and usability assessment. Additional experimental evidence is required to establish successful end-to-end operation, user satisfaction, and vehicle price estimation performance.

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E. Output:

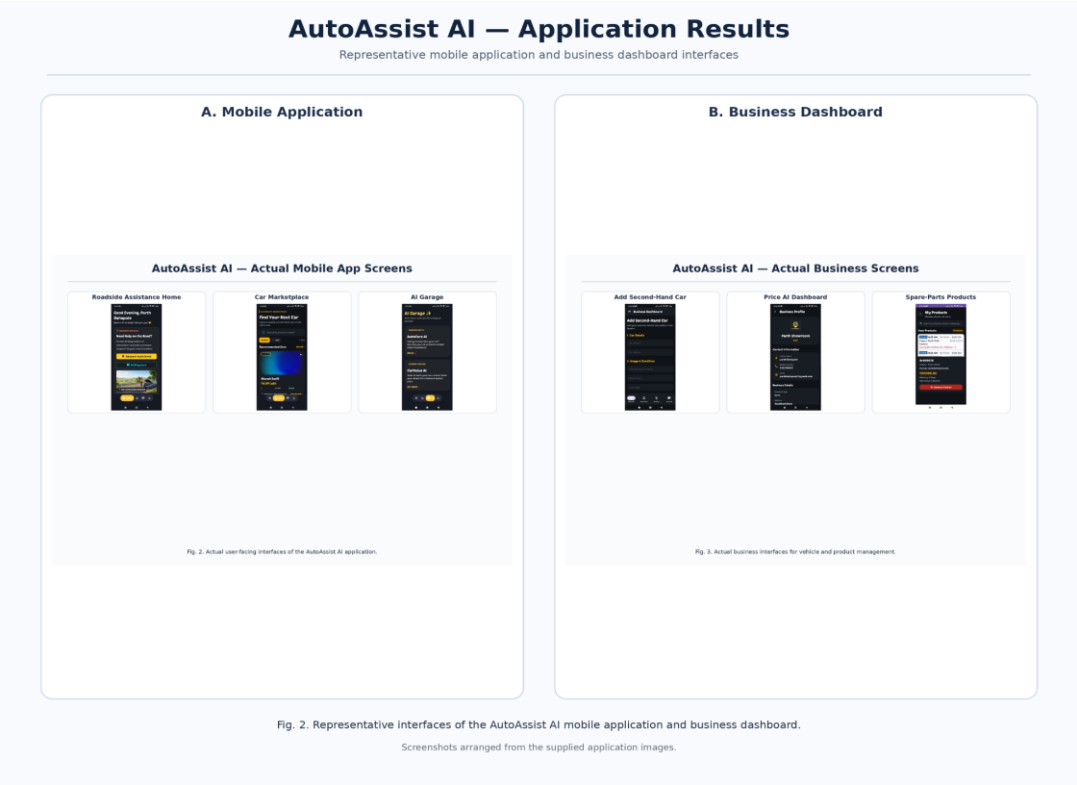


Fig. 2. Representative interfaces of the AutoAssist AI mobile application and business dashboard.

Screenshots arranged from the supplied application images.

VII. CONCLUSION AND FUTURE SCOPE

A. Conclusion

AutoAssist AI presents an integrated platform designed to bring multiple vehicle-related services together within a single application. The system combines roadside assistance, emergency contact information, AI-based vehicle price estimation, second-hand car listings, spare-parts management, and vehicle service booking. It also provides a business dashboard through which automotive businesses can manage vehicle listings, products, and customer orders.

The application demonstrates how different automotive functions can be organized within a common digital environment for vehicle owners, buyers, sellers, and service providers. Its modular design provides a foundation for extending individual services and evaluating their functionality independently. The application interfaces presented in this research illustrate the organization of the major user-facing and business-facing modules.

However, the practical effectiveness of the platform depends on the reliability of its individual functions, the consistency of its data, and the usability of its interfaces. In particular, the accuracy of vehicle price estimation must be established through appropriate dataset-based testing. Further functional and usability evaluation is also required to determine how effectively the platform meets users' needs. Overall, AutoAssist AI provides a foundation for an integrated automotive service platform, with opportunities for further validation and development.

B. Future Scope

Future development of AutoAssist AI can focus on improving the intelligence, reliability, and usability of the platform. The following enhancements are potential directions for further work:

1. **Improved Vehicle Price Estimation:** The price estimation module can be evaluated and improved using a larger, representative dataset of vehicle prices and attributes. Different machine learning models can be compared using suitable evaluation metrics to identify an appropriate estimation approach.
2. **Real-Time Roadside Assistance:** Future versions could support real-time request tracking, location-based service-provider discovery, and assistance-status notifications, subject to the availability of reliable location and service-provider data.
3. **Enhanced Vehicle Listings:** The marketplace could incorporate advanced filtering, vehicle comparison, verified listing information, and vehicle-history details to help buyers make more informed decisions.



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4. **Advanced Spare-Parts Management:** Additional features could include inventory tracking, stock availability updates, order-status notifications, and improved product categorization for automotive businesses.
5. **Service Provider Integration:** The platform could be extended to connect users with verified garages, mechanics, and roadside assistance providers, allowing users to compare available services and manage service requests more conveniently.
6. **Security and Privacy Improvements:** Future work could strengthen authentication, role-based access control, secure data handling, and protection of sensitive user and location information.
7. **Comprehensive System Evaluation:** Further research could conduct structured functional testing, usability studies with representative users, and quantitative evaluation of vehicle price estimation. The resulting evidence could be used to identify limitations and guide subsequent improvements.

These future enhancements could help develop AutoAssist AI into a more reliable and comprehensive automotive service ecosystem. Their implementation and effectiveness would need to be assessed through subsequent development and experimental evaluation.

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