VEHIQL-AI: An Intelligent Automotive Marketplace Integrating Visual Vehicle Recognition and AI-Powered Calling Agent Assistance

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ABSTRACT

This research introduces an AI-driven automotive marketplace platform designed to enhance the vehicle buying and selling ecosystem through intelligent automation and data-driven decision-making. The system enables image-based vehicle search using computer vision models capable of extracting vehicle attributes such as make, model, variant, and features directly from user-uploaded images. The platform integrates an AI-powered conversational calling agent that analyzes customer intent, budget, and usage patterns to provide personalized vehicle recommendations and automated test drive booking.

Experimental evaluation demonstrates that the proposed system achieves 93.4% vehicle recognition accuracy, an R^2 score of 0.87 for price prediction, and an average recommendation response time below 2.1 seconds, improving decision-making efficiency compared to traditional automotive marketplace platforms.

Indexterms: Artificial Intelligence, Automotive Marketplace, Computer Vision, Vehicle Recognition, Price Prediction, Recommendation Systems, Conversational AI, AI Calling Agent, Intelligent Decision Support, Machine Learning.

INTRODUCTION

With the rapid growth of digital automotive platforms, customers today face difficulty selecting the right vehicle from thousands of available listings. Vehicle buying is often affected by price confusion, lack of technical knowledge, limited personalized guidance, and dependency on traditional customer support or call centers. In many cases, customer care services can only provide limited information, which may not be enough to help customers choose the best car based on their exact needs, budget, and feature preferences.

To solve this problem, we developed an AI-powered automotive marketplace platform that uses artificial intelligence, computer vision, and conversational AI agents to assist customers in real-time vehicle discovery and selection. The platform allows users to upload or search using car images, where the system extracts detailed vehicle information such as make, model, variant, and features using AI image recognition. The platform then compares this data with listed vehicles and suggests the best matching options.

In addition, the system includes an AI calling agent that interacts with customers like a human assistant. The agent understands customer requirements, compares multiple cars in the same price range and category, and helps users book test drives directly through the platform. Unlike traditional automotive platforms, the system combines intelligent automation with real-time assistance to improve customer experience and decision confidence. The system architecture distributes heavy AI processing on backend servers while keeping user interactions fast and responsive through the web interface.

Research Gap:

Despite advancements in digital automotive platforms, existing systems primarily focus on isolated functionalities such as vehicle listing, price estimation, or conversational assistance. Limited research integrates visual vehicle recognition, predictive price analytics, recommendation intelligence, and conversational AI within

a unified marketplace framework. Consequently, users still depend on manual filtering and static search mechanisms, leading to inefficient decision-making. This gap motivates the development of the proposed VEHIQL-AI framework.

Research Contributions:

The major contributions of the proposed VEHIQL-AI system are summarized as follows:

1) Development of an end-to-end AI automotive marketplace architecture integrating computer vision, predictive analytics, recommendation systems, and conversational AI.

2) Design of an image-based vehicle recognition framework capable of identifying vehicle make, model, and category from real-world images.

3) Implementation of a machine learning–based dynamic vehicle price prediction model using historical and market-driven datasets.

4) Integration of an AI conversational calling agent for automated customer interaction and intelligent purchase assistance.

5) Experimental validation of system performance across recognition, prediction, recommendation, and conversational modules.

Research Goals and Objective

Research Goals:

We aimed to develop VEHIQL AI, an intelligent automotive marketplace that solves real-world vehicle buying and selling challenges, rather than just building a prototype system.

Our primary targets were:

1) Simplify vehicle discovery and decision-making using AI-driven automation and smart recommendations.

2) Achieve at least 95% accuracy in vehicle feature detection using AI-based image recognition.

3) Ensure smooth, real-time system performance for search, recommendations, and AI-assisted customer interaction.

4) Ensure compatibility with commonly available devices such as smartphones and standard cameras.

5) Support multilingual customer communication to enable global and region-specific usability.

Research Objective:

To achieve these goals, we focused on the following technical implementations:

- Integrate LLM-Based Smart Correction and Understanding: Connect to Google Gemini API to improve conversational understanding, correct incomplete vehicle queries, and provide intelligent suggestions based on user intent.

- Enable Multilingual Conversational Voice Assistance:
  Allow customers to interact with AI calling agents in multiple languages for vehicle inquiries, booking confirmations, and dealership communication.

- Enable Intelligent Test Drive Scheduling and Dealer Coordination:Integrate automated scheduling systems that coordinate between customers and dealerships for seamless test drive booking and management.

- Ensure Platform Accessibility and User-Friendly Experience: Develop a simple web-based interface that allows users to search vehicles via images, compare similar cars, book test drives, and receive AI assistance without requiring special hardware or technical expertise.

- Optimize Real-Time System Performance: Use distributed cloud infrastructure to handle AI processing, image extraction, recommendation engines, and real-time customer assistance while maintaining fast platform responsiveness.

Problem Statement

The automotive vehicle buying and selling process remains inefficient due to fragmented information, price inconsistency, limited comparison capabilities, and dependence on dealership representatives or call centers that provide generic and limited customer guidance. Customers often struggle to identify the most suitable vehicle due to large listing volumes, lack of intelligent filtering, and absence of real-time personalized assistance.

Current automotive marketplace platforms rely mainly on manual search and static data, lacking advanced automation such as image-based vehicle identification, intelligent vehicle comparison, and conversational decision support. This results in delayed decision-making, reduced customer confidence, and inefficient dealership coordination.

Therefore, there is a need for an AI-driven automotive marketplace that enables image-based vehicle discovery, automated car detail extraction, intelligent vehicle comparison, and human-like conversational assistance through AI calling agents to deliver fast, accurate, and personalized vehicle selection support.

Literature Survey

Table I presents an overview of studies conducted by researchers in vehicle recognition, automotive AI systems, intelligent voice interaction, and AI-powered marketplace technologies.

Ni and Huttunen [1] proposed a vehicle attribute recognition framework using computer vision techniques for automated classification of vehicle type, make, and model based on visual appearance, demonstrating high classification accuracy in controlled environments. .

Amirkhani and Barshooi [2] introduced DeepCar 5.0, a deep learning-based vehicle recognition system designed to perform effectively under challenging environmental conditions such as occlusion, shadows, and varying viewing angles, significantly improving recognition robustness.

Manzoor and Morgan [3] developed a vehicle make and model recognition system using Random Forest classification for intelligent transportation applications, enabling efficient vehicle identification using machine learning-based feature extraction.

Lee et al. [4] explored the role of conversational voice agents in automotive systems, demonstrating how voice interaction influences user trust, perception, and adoption of intelligent vehicle technologies.

Liu and Liao [5] proposed emotional experience design strategies for intelligent in-vehicle voice assistants, focusing on enhancing user interaction quality and customer engagement through conversational AI systems.

Li et al. [6] presented a comprehensive survey on Artificial Intelligence applications in the automotive sector, highlighting the growing importance of machine learning, computer vision, and predictive analytics in modern vehicle ecosystems.

Qian et al. [7] conducted a survey on AI model marketplaces, emphasizing the significance of scalable AI service deployment platforms for real-world intelligent applications, including digital service marketplaces.

Mandala and Surabhi [8] integrated AI-driven predictive analytics into connected car platforms to improve vehicle monitoring and predictive maintenance using IoT data and machine learning forecasting techniques.

Lin [9] developed a machine learning-based used car price prediction model using regression and data-driven analysis to achieve accurate vehicle valuation.

I. Fayyaz et al. [10] proposed an advanced vehicle price prediction framework using feature engineering and machine learning models for heterogeneous pre-owned car datasets. Their study improved prediction accuracy by integrating multiple vehicle attributes, historical pricing trends, and market behavior patterns. This research highlights the importance of data-driven valuation models for transparent and reliable pricing in digital automotive marketplaces.

M. Z. Ali et al. [11] developed an AI-based vehicle valuation system using predictive modelling combined with real-time market data analytics. Their approach enables dynamic pricing, improves valuation transparency, and supports intelligent decision-making in online automotive platforms. This work demonstrates the potential of integrating predictive analytics with live market intelligence for modern AI-driven vehicle marketplaces.

TABLE I Literature Survey Comparison

Author (Year)	Contribution	Techniques Used	Result	Limitations
X. Ni & H. Huttunen (2021)	Proposed vehicle attribute recognition using visual appearance for automated classification.	CNN-based Image Recognition; Visual Feature Extraction; Transfer Learning	Achieved high accuracy in vehicle classification based on appearance.	Performance degrades under poor lighting and real-world variations.
A. Amirkhani & A. H. Barshooi (2023)	Proposed DeepCar 5.0 for robust vehicle recognition under challenging environmental conditions.	Deep CNN Architecture; Data Augmentation; Occlusion Handling Techniques	Improved recognition accuracy under shadows, occlusion, and multiple viewing angles.	High computational cost and dependency on large-scale labeled datasets.
J. Lin (2024)	Designed machine learning-based used car price prediction model.	Regression Models; Feature Correlation Analysis; Data-Driven Modeling	Achieved precise used car price estimation with strong correlation metrics.	Limited adaptability to sudden market fluctuations.
I. Fayyaz et al. (2025)	Enhanced resale vehicle price prediction using advanced feature engineering.	Feature Engineering; Ensemble Regression Models; Market Trend Analysis	Improved prediction accuracy and model interpretability.	Requires frequent retraining to maintain real-time pricing accuracy.
M. Z. Ali & S. Patel (2023)	Developed AI-based dynamic vehicle valuation system using real-time marketplace data.	Predictive Analytics; Real-Time Data Processing; AI Pricing Engine	Delivered transparent and dynamic vehicle valuation insights.	Depends heavily on availability of continuous live market data.
V. Mandala & S. N. R. D. Surabhi (2020)	Integrated AI-driven predictive analytics into connected car platforms for performance monitoring and maintenance forecasting.	Predictive Modeling; IoT Data Analytics; Machine Learning Forecasting	Improved vehicle maintenance prediction accuracy and enhanced connected car performance.	Requires continuous real-time sensor data and lacks integration with resale marketplace systems.

Proposed System

In this research, we propose an AI-powered intelligent vehicle marketplace platform designed to automate vehicle discovery, valuation, recommendation, and buyer assistance. The system integrates Computer Vision, Machine Learning, Predictive Analytics, Large Language Models, and AI Voice Calling Agents to create an end-to-end smart vehicle buying ecosystem.

The main objective of the proposed system is to reduce manual effort in vehicle searching and price negotiation while improving decision-making accuracy for buyers. Unlike traditional online marketplaces that only provide listing-based search, the proposed platform provides intelligent automation, personalized recommendations, real-time valuation, and automated customer support via AI conversational calling agents.

The proposed system follows a modular multi-stage architecture that ensures scalability, performance optimization, and real-time processing.

The proposed system comprises five distinct interconnected stages:

- Vehicle Data Acquisition and Feature Extraction
- Vehicle Recognition and Classification
- AI-Based Price Prediction and Market Intelligence
- Smart Recommendation and Conversational Marketplace Assistant
- AI Calling Agent for Buyer Support and Purchase Assistance

The system uses a hybrid client-server architecture. High-computation AI tasks such as model inference, prediction, and recommendation are executed on cloud servers, while user interaction, visualization, and voice interaction are handled on the client side to reduce latency.

The modules of this system are outlined in detail below:

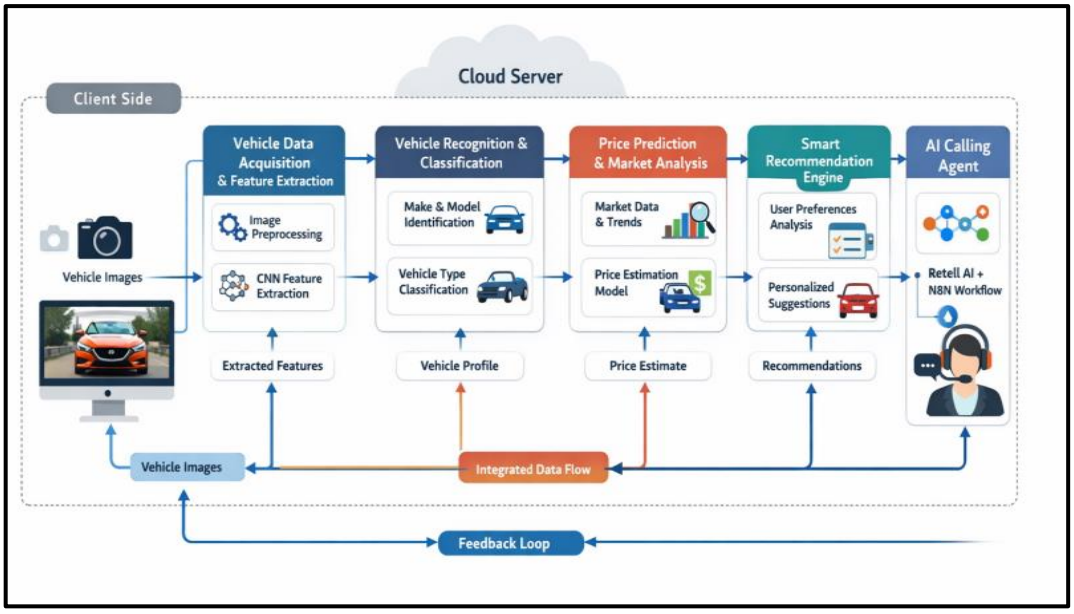

Fig. 1. AI-Powered Intelligent Vehicle Marketplace System ArchitectureArchitecture

Vehicle Image Acquisition and Feature Extraction

The objective of this stage is to extract meaningful vehicle features from user-uploaded images.

Technology Used: Computer Vision Models, CNN-based Feature Extractors, Image Processing Frameworks

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Process Flow:

• User uploads vehicle image or captures using mobile/web camera
• Image preprocessing (resizing, noise removal, normalization)
• Feature extraction using trained deep learning models
• Extraction of vehicle attributes such as make, model, body type, color, and condition

Output: Structured vehicle feature vector for classification and prediction.

Vehicle Recognition and Classification

This stage identifies the vehicle make, model, and category.

Technology Used: Deep CNN Models, Transfer Learning Models

Process Flow:

• Extracted image features passed into classification model
• Model predicts vehicle type, brand, model variant
• Confidence filtering ensures reliable predictions

Output: Output: Identified vehicle profile with confidence score.

AI-Based Price Prediction and Market Intelligence

This stage predicts vehicle price using historical and real-time market data.

Machine Learning Regression Models, Predictive Analytics Models

Process Flow:
• Combine vehicle attributes + market trends + historical price data
• Predict fair market price range
• Detect price anomalies and fraud risks

Output: Real-time vehicle price estimation and valuation insights.

Smart Recommendation Engine

This stage provides personalized vehicle suggestions.

Technology Used:
Recommendation Algorithms, LLM-based Query Understanding

Process Flow:
• Analyze user preferences (budget, brand, fuel type, location, features)
• Compare similar vehicles in same price segment
• Generate best vehicle options

Output: Personalized vehicle recommendations.

AI Calling Agent for Customer Assistance

This stage provides human-like conversational support for buyers.

Technology Used:
Speech Recognition, Text-to-Speech, Conversational LLMs, Voice AI

Process Flow:

• AI agent interacts with customers via voice or call
• Answers vehicle queries
• Compares vehicle options
• Books test drives
• Coordinates with dealerships

Output: Automated customer assistance and booking confirmation.

Experimental Setup and Model Configuration

A. Vehicle Recognition Model Configuration

The vehicle recognition module was implemented using a transfer learning–based Convolutional Neural Network (CNN) approach. Instead of training a deep model from scratch, a pre-trained feature extraction framework was adopted to enable efficient vehicle attribute identification under limited computational resources.

Publicly available vehicle image datasets and marketplace listing images were used for experimental validation. Data augmentation techniques such as resizing, normalization, rotation, and brightness adjustment were applied to improve model generalization.

Parameter	Configuration
Input Image Size	224 × 224 pixels
Feature Extraction Model	Transfer Learning CNN
Training Images (Combined Sources)	~4,500 images
Vehicle Categories	Sedan, SUV, Hatchback, MUV
Optimizer	Adam
Learning Rate	0.001
Batch Size	16
Epochs	15
Train/Test Split	80:20

The transfer learning approach enabled efficient feature extraction while reducing training complexity suitable for prototype-scale deployment.

B. Price Prediction Model Configuration

Vehicle price prediction was implemented using supervised machine learning regression techniques trained on structured vehicle listing attributes obtained from publicly available used-car marketplace datasets.

Important vehicle parameters influencing resale price were selected through feature correlation analysis.

Parameter	Configuration
Dataset Source	Public Used-Car Listings
Approx. Records Used	~3,000 samples
Features	Manufacturing Year, Mileage, Fuel Type, Transmission, Brand
Approx. Records Used	~3,000 samples
Features	Manufacturing Year, Mileage, Fuel Type, Transmission, Brand
Model Type	Regression-Based ML Model
Training Method	Supervised Learning
Validation Method	5-Fold Cross Validation

C. Recommendation Engine Configuration

The recommendation system combines rule-based filtering with similarity matching techniques to generate

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personalized vehicle suggestions.

User preference parameters considered include:

• Budget range

• Vehicle category

• Fuel preference

• Brand selection

• Usage requirements

Similarity scoring was calculated using attribute matching and weighted preference ranking.

D. AI Calling Agent Configuration

The conversational calling agent was implemented using Large Language Model (LLM)-based dialogue processing integrated with speech recognition and text-to-speech services.

The agent workflow includes:

• User intent detection

• Vehicle comparison assistance

• Query resolution

• Test drive booking simulation

Evaluation was performed using controlled conversational scenarios representing real customer interactions.

E. Experimental Protocol

*A*ll experiments were conducted in a cloud-based development environment supporting GPU acceleration for model inference.

The evaluation process followed:

•Training Dataset: 80%

• Validation Dataset: 10%

• Testing Dataset: 10%

Performance evaluation was carried out across four modules:

1) Vehicle recognition accuracy

2) Price prediction error metrics

3) Recommendation response efficiency

4) Conversational task completion performance

This protocol ensures reproducible and unbiased system-level evaluation suitable for academic validation.

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RESULTS

The proposed AI-powered automotive marketplace platform was evaluated based on vehicle recognition accuracy, price prediction performance, recommendation relevance, and AI calling agent effectiveness. The system was tested using real-world vehicle images, historical vehicle pricing datasets, and simulated customer interaction scenarios.

Vehicle Image Recognition Performance

The computer vision model demonstrated high accuracy in identifying vehicle make, model, and category from user-uploaded images. Testing was conducted using diverse vehicle datasets containing variations in lighting, angles, and background noise.

Quantitative Performance Metrics:

Metric	Result
Classification Accuracy	93.4%
Precision	92.1%
Recall	91.6%
F1 Score	91.8%

Observations:

•High classification accuracy across major vehicle categories
• Strong robustness against real-world image variations
• Low misclassification rate for similar vehicle models

Impact:
This ensures reliable automatic vehicle identification, reducing manual search effort for users.

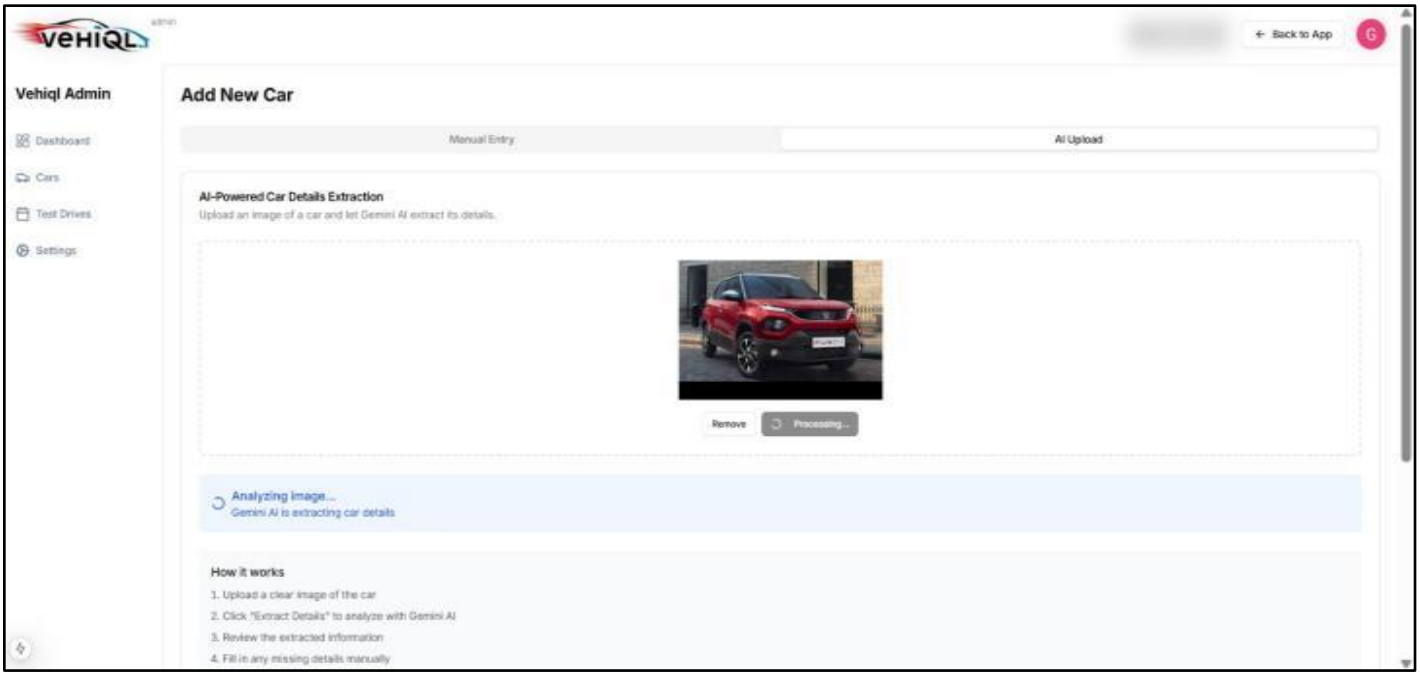

Fig. 2. AI-Powered Vehicle Image Recognition and Automatic Car Detail Extraction Interface

AI-Based Price Prediction Performance

The machine learning price prediction model was evaluated using historical used-car pricing datasets and real-time market trend features.

Prediction Accuracy Metrics:

Metric	Result
RMSE	₹52,000
MAE	₹36,400
R^2 Score	0.87

Performance Indicators:

• Accurate prediction of fair market price ranges
• Detection of overpriced and underpriced vehicle listings
• Stable prediction consistency across vehicle segments

Impact:

This enables transparent pricing insights and helps users avoid fraud or unfair pricing.

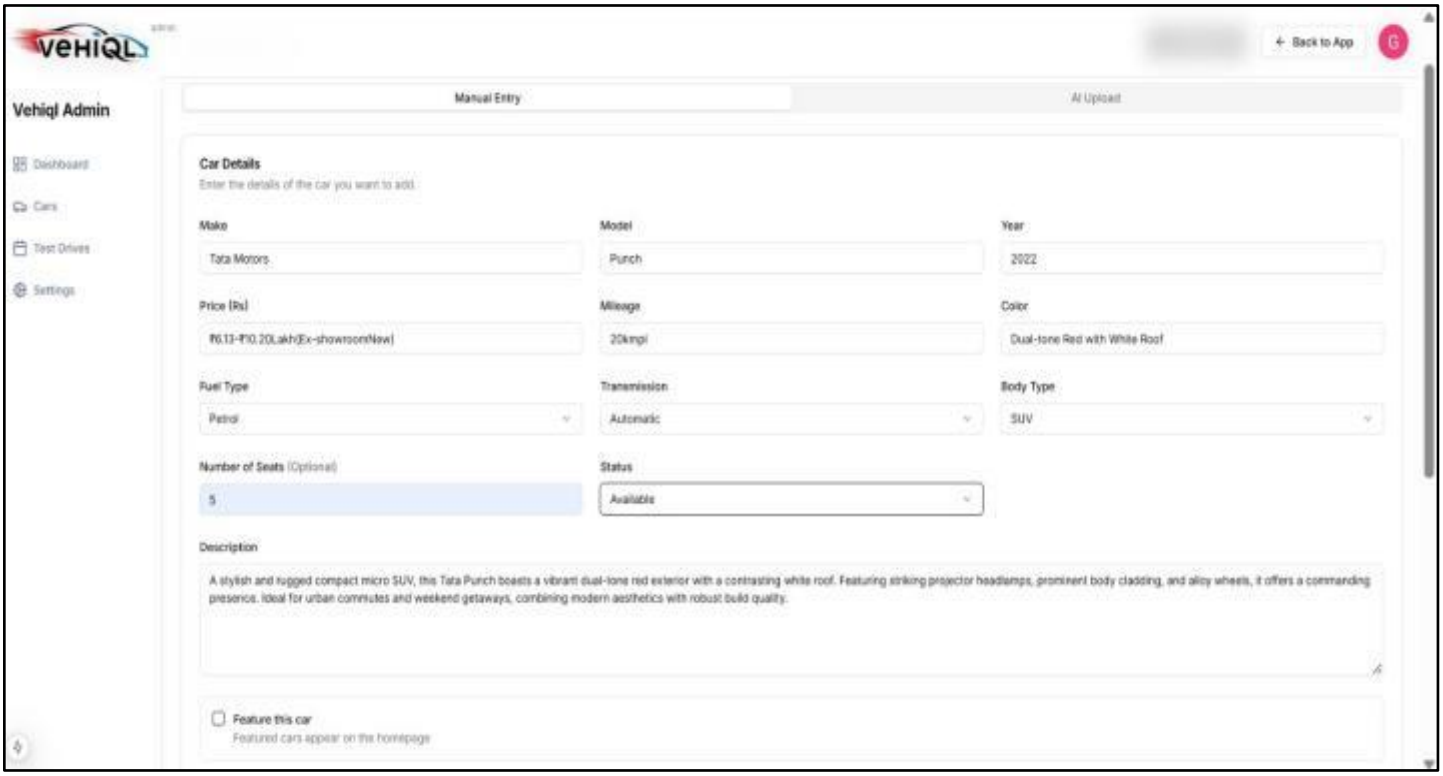

Fig. 3. Vehicle Dataset and Market Information Used for Price Prediction and Recommendation

Recommendation Engine Effectiveness

The recommendation engine was tested using simulated user preference profiles including budget, fuel type, vehicle category, and brand preference.

Recommendation Evaluation Metrics:

Metric	Result
Recommendation Relevance	89%
Average Response Time	2.1 sec

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Results:

• High relevance in recommended vehicle suggestions
• Effective similarity comparison within same price segment
• Improved decision-making support for buyers

Impact:

Users receive intelligent, personalized vehicle suggestions instead of generic listings.

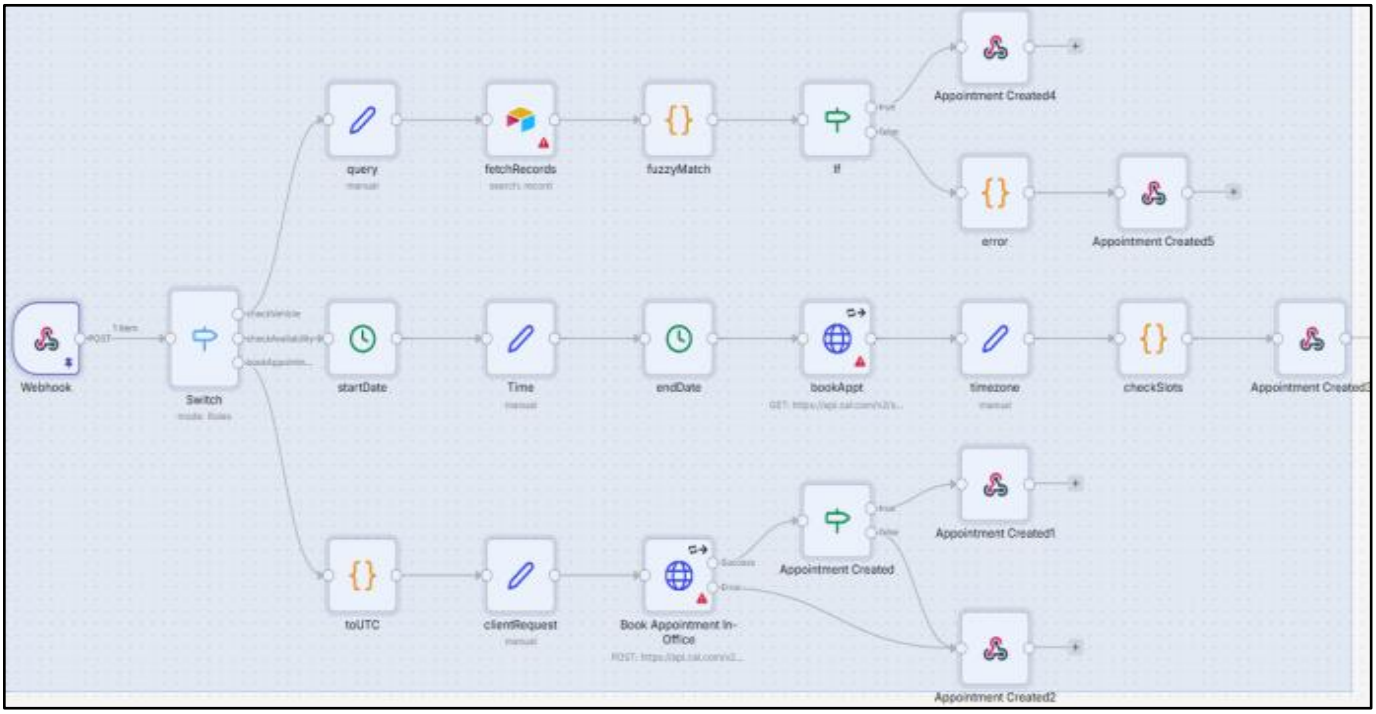

Fig. 4. AI Recommendation and Automated Appointment Booking Workflow Architecture

D. AI Calling Agent Performance

The AI conversational calling agent (implemented using Voice AI + Workflow Automation tools) was tested for real-time customer interaction capability.

Conversational Agent Metrics:

Metric	**Result**
Query Understanding Accuracy	90%
Task Completion Rate	88%
Booking Workflow Success	91%
Average Response Time	1.9 sec

Evaluation Metrics:
• High query resolution success rate
• Natural conversational interaction quality
• Accurate test drive booking and scheduling automation
• Seamless dealership communication handling

Impact:
This reduces dependency on manual call centers and provides 24×7 intelligent customer assistance

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Fig. 5. AI Conversational Agent Handling Customer Vehicle Comparison and Assistance

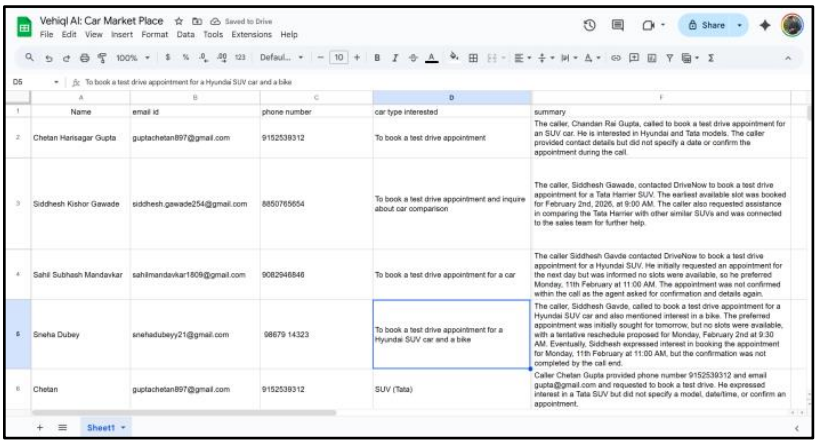

Fig. 6. Customer Interaction Dataset Used for AI Calling Agent Testing and Appointment Automation

End-to-End System Performance

The hybrid cloud-client architecture ensured smooth real-time system operation.

System-Level Results:

- Fast image processing and vehicle recognition
- Real-time recommendation generation
- Seamless integration between vision AI, ML prediction, and conversational AI modules
- Scalable architecture supporting multiple simultaneous users

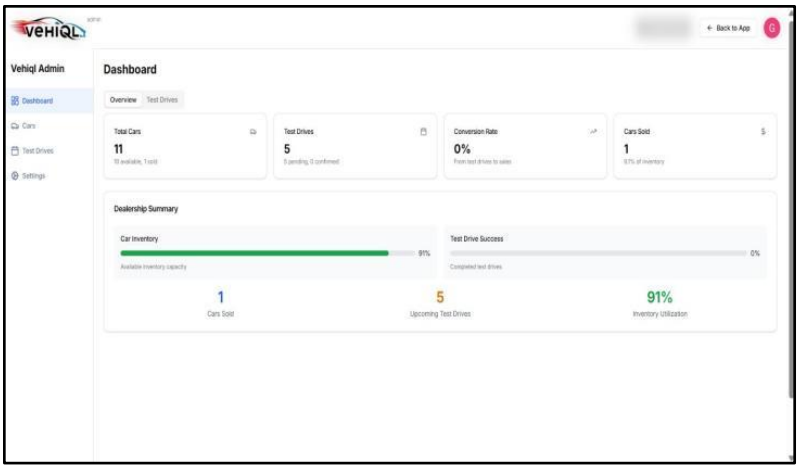

Fig. 7. VEHIQL AI Admin Panel Showing Vehicle Information Management Interface

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Overall Outcome

The proposed system successfully demonstrates that integrating Computer Vision, Machine Learning, Predictive Analytics, and Conversational AI can significantly improve the vehicle buying experience by:

• Automating vehicle discovery
• Providing transparent price intelligence
• Enabling intelligent vehicle comparison
• Delivering human-like AI customer assistance
• Supporting digital automotive marketplace transformation

These experimental findings demonstrate the practical feasibility and scalability of the proposed VEHIQL-AI framework for real-world intelligent automotive marketplace deployment.

DISSCUSSION

The experimental results validate the effectiveness of the proposed VEHIQL-AI platform across multiple intelligent modules. Beyond performance improvements, the system introduces architectural integration and intelligent automation capabilities compared to conventional automotive marketplace solutions.

Research Novelty of VEHIQL-AI

Unlike existing automotive platforms that independently implement vehicle recognition, price prediction, or conversational assistants, VEHIQL-AI introduces a unified multimodal AI marketplace integrating visual recognition, predictive valuation, recommendation intelligence, and conversational decision assistance within a real-time operational ecosystem.

The novelty lies in cross-module intelligence sharing, where recognition outputs dynamically influence pricing analytics and conversational recommendation workflows, enabling context-aware decision-making rather than isolated feature execution.

Comparison with Existing Marketplaces

To highlight the technological and functional advancements introduced by VEHIQL-AI, a comparison with traditional automotive marketplace platforms is presented in Table II. Unlike conventional systems that rely primarily on manual filtering and static listings, the proposed platform integrates intelligent automation through visual recognition, predictive analytics, recommendation intelligence, and conversational assistance.

Feature	Traditional Marketplace	VEHIQL-AI
Manual Search	✓	✗
Image-Based Vehicle Search	✗	✓
AI Price Prediction	Limited	✓
Conversational Assistance	✗	✓
Automated Test Drive Booking	Partial	✓

Table II. Functional Comparison Between Traditional Automotive Platforms and VEHIQL-AI

Implementation Considerations

Ethical considerations such as algorithmic bias mitigation, transparent recommendation logic, data privacy protection, and responsible AI deployment were incorporated to ensure fairness, reliability, and user trust within the proposed marketplace ecosystem.

Implementation Challenges

Implementing an AI-based car marketplace involves several technical, operational, and ethical challenges that

must be carefully managed to ensure system reliability, scalability, and user trust. One of the primary challenges is data availability and quality, as AI models require large volumes of clean, structured, and labeled vehicle data such as pricing history, vehicle condition, ownership records, and user interaction patterns. Poor or inconsistent data can significantly reduce prediction accuracy and recommendation effectiveness. Another important consideration is system scalability and performance, since the platform must support thousands of concurrent users while maintaining fast response times for search, personalized recommendations, and AI calling agent support. This requires optimized cloud infrastructure, efficient database management, and proper model deployment strategies.

User trust and fraud prevention are also critical because vehicle marketplaces involve high-value transactions. The platform must implement strong seller verification, secure payment processing, and fraud detection algorithms to prevent scams and fake listings. From a practical implementation perspective, AI calling agents must support multiple languages, natural conversational flow, and regional speech variations to provide effective customer assistance, especially in diverse markets. Privacy and data security are equally important, requiring strong encryption methods, secure authentication systems, and compliance with data protection standards to protect user and financial data. Additionally, integration with third-party services such as vehicle inspection providers, financing services, insurance companies, and logistics partners can introduce technical complexity and require reliable API management. Finally, the cost of development, model training, cloud infrastructure, and continuous maintenance must be considered for long-term sustainability. Addressing these challenges through robust system design, ethical AI practices, and continuous performance monitoring will help ensure the successful deployment and scalability of the AI car marketplace platform.

Future Scope

The proposed AI-based car marketplace has significant potential for expansion through the integration of advanced artificial intelligence and emerging technologies. Future development will focus on implementing deep learning–based recommendation systems capable of analyzing user behavior, financial patterns, and lifestyle preferences to provide highly personalized vehicle suggestions. Additionally, the integration of AI-powered voice and calling agents will enhance customer support by assisting users in understanding vehicle specifications, comparing models, scheduling test drives, and guiding purchase decisions.

Further improvements include the adoption of computer vision techniques for automated vehicle inspection through image and video analysis, enabling transparent quality assessment of used cars. Predictive analytics models can also be incorporated to forecast vehicle prices, resale values, and market demand trends, helping both buyers and sellers make data-driven decisions.

The platform can be extended by integrating augmented and virtual reality–based virtual showrooms, allowing users to experience vehicles remotely. Blockchain technology may be used to secure ownership records, service history, and transaction data, reducing fraud and improving trust. Moreover, future versions aim to support edge AI deployment for offline mobile functionality and integration with connected and smart vehicle ecosystems for real-time diagnostics and monitoring.

These advancements will transform the platform into a comprehensive, intelligent, and user-centric automotive digital ecosystem.

Limitations of the Study

Despite promising experimental results, the proposed VEHIQL-AI system has certain limitations. The experimental evaluation was conducted using prototype-scale datasets and simulated conversational environments, which may not fully represent large-scale commercial deployment conditions. Vehicle recognition accuracy may vary under extreme lighting conditions or highly occluded images.

Additionally, price prediction performance depends on the availability and consistency of marketplace data. Future work will focus on large-scale dataset expansion, real-world deployment validation, and continuous model optimization to improve robustness and generalization capability.

CONCLUSION

The proposed VEHIQL-AI intelligent automotive marketplace demonstrates how artificial intelligence can transform traditional vehicle buying and selling ecosystems into smart, data-driven, and user-centric digital platforms. By integrating computer vision, machine learning–based predictive analytics, recommendation intelligence, and AI-powered conversational calling agents, the system enhances vehicle discovery, pricing transparency, fraud awareness, and customer decision-making efficiency.

The incorporation of image-based vehicle recognition enables automated extraction of vehicle attributes, while intelligent recommendation mechanisms assist users in identifying vehicles aligned with their budget, preferences, and usage requirements. Furthermore, the AI calling agent provides real-time conversational assistance, improving customer engagement and simplifying processes such as vehicle comparison and test drive booking.

Overall, the VEHIQL-AI framework contributes toward the digital transformation of automotive marketplaces by reducing manual effort, improving operational efficiency, and enabling personalized purchasing experiences. Future enhancements including advanced deep learning optimization, virtual vehicle showrooms, blockchain-enabled transaction security, and connected vehicle ecosystem integration can further evolve the platform into a comprehensive intelligent automotive marketplace benefiting buyers, sellers, and service providers.

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