ISSN: 2582-7219

International Journal of Multidisciplinary Research in Science, Engineering and Technology

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Impact Factor: 8.206

Volume 8, Issue 8, August 2025

© 2025 IJMRSET | Volume 8, Issue 8, August 2025| DOI:10.15680/IJMRSET.2025.0808082

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

AI CAR MARKETPLACE

Gunasekaran K, Kowshik S

Assistant Professor, Department of MCA, AMC Engineering College, Bengaluru, India

Student, Department of MCA, AMC Engineering College, Bengaluru, India

ABSTRACT: Digital vehicle marketplaces have become a central hub for car buyers and sellers, yet most existing platforms still depend on repetitive manual entries and limited search features. The AI Car Marketplace addresses these gaps by merging advanced web technologies with an artificial intelligence system capable of interpreting both images and text. Users can discover vehicles by entering search terms or by uploading a photo, which is processed through Google's Gemini 1.5 Flash model to identify attributes such as brand, model, manufacturing year, and key specifications. The platform's interface, developed using Next.js, is paired with Supabase and Prisma for secure, real-time data handling, Clerk for streamlined user authentication, and Arcjet for system protection. In addition to buyer-focused tools like filtering, wishlisting, and EMI calculation, the system offers administrators full control over inventory, featured listings, and test drive scheduling. This work presents the complete design, implementation, and performance assessment of the system, demonstrating how AI-powered automation can improve efficiency, accuracy, and user experience in online automotive.

I. INTRODUCTION

Locating the appropriate vehicle online can resemble sifting through an infinite array of listings — some of which are accurate, others outdated, and many lacking essential details. Sellers provide the specifications, upload images, and hope that potential buyers take notice. Alternatively, buyers often lack confidence in the keywords they should use when searching. This back-and-forth is slow, and often frustrating, especially when all it takes is one wrong detail for a match to be missed.

The AI Car Marketplace flips that experience on its head. Instead of forcing people to rely only on typed searches, it lets them start with something simple — a photo. Snap a picture of a car on the street, upload it, and the system does the detective work. Using Google's Gemini 1.5 Flash, it identifies the make, model, year, fuel type, and transmission directly from the image. The result is a set of listings that match the car's actual look, not just someone's description.

This approach doesn't just help buyers. Sellers can skip the long forms entirely — they upload a photo, and the system fills in the technical details for them. Administrators also possess complete control: they have the ability to highlight specific cars, manage test drive requests, modify dealership hours, or designate vehicles as sold, all while maintaining their workflow.

II. LITERATURE SYRVEY

[1] S. Maheshwari and T. Bhargava, "Intelligent Vehicle Information Retrieval Utilizing Image Recognition," IEEE, 2020:
This paper introduces an intelligent framework for retrieving vehicle data through image inputs. It has commonalities with the suggested AI Car Marketplace; however, This platform shares similarities with the suggested AI Car Marketplace but is uniquely focused on academic applications, providing tailored features and functionalities that cater specifically to educational institutions and researchers rather than commercial automotive sales, enabling the use of AI-driven tools for research, learning, and academic projects within the automotive field. not incorporate real-time commercial functionalities or secure user authentication methods.
https://ieeexplore.ieee.org/document/9091119

[2] Kumar S et al., "Image-Based Vehicle Identification using Deep Learning," Springer, 2021: This work focuses on deep learning models to recognize vehicle models from street images. It lacks real-time frontend integration and user interactivity found in modern web applications. https://link.springer.com/chapter/10.1007/978-3-030-73605-8_26

[3] S. Sharma et al., "AI-Based Image Recognition for Retail," IEEE, 2020: This paper discusses how image-based AI can help recognize products and automate information extraction. It supports our methodology by showing how multimodal AI like Gemini can be effective in the automobile sector. https://ieeexplore.ieee.org/document/9076003

[4] M. Arif et al., "Next.js Based Real-Time Web Applications," IEEE, 2022: This study investigates the application of Next.js in the development of high-performance web applications. This aligns with our frontend development efforts aimed at optimizing server-side rendering and improving overall performance, as discussed in the IEEE paper (https://ieeexplore.ieee.org/document/9773123) , which emphasizes techniques for enhancing web application efficiency and user experience through advanced rendering strategies.

[5] R. Agarwal and D. Dubey's 2022 IEEE publication, "AI-Driven Image Classification and Recognition Utilizing Deep Learning Techniques," explores advanced deep learning methodologies for enhancing image classification and recognition systems, emphasizing the application of neural networks and convolutional architectures to improve accuracy and efficiency in various AI-driven visual recognition tasks.

This study explores the potential of AI-based image recognition using CNN models. It demonstrates how deep learning models can effectively extract object features and classify images into various categories, which is fundamental to vehicle recognition in automotive marketplaces.
https://ieeexplore.ieee.org/document/9812378

EXISTING SYSTEM

The majority of current car marketplace platforms operate using a rather simple yet outdated procedure. Sellers generate listings by manually entering every detail — including the make, model, year, mileage, fuel type, and more — in addition to uploading several photographs. Subsequently, buyers explore these listings through search bars and fixed filters such as brand, price range, or body type.

Since the data entry is performed manually, it relies heavily on the seller's accuracy and diligence. If any details are omitted, incorrect, or formatted inconsistently, the search results can become unreliable. Buyers may miss out on pertinent listings simply because the seller described a vehicle as a "sedan" rather than a "saloon" or neglected to specify the fuel type.

Furthermore, there is a lack of genuine intelligence integrated into the search mechanism. Current platforms largely rely on textual inputs for vehicle searches, rendering them ineffective when a buyer uploads an image of the desired car, as most lack the capability to analyze visual data. This constraint emphasizes the necessity of incorporating sophisticated image recognition and deep learning technologies into vehicle search platforms. Consequently, this enhancement leads to improved accuracy, increased user satisfaction, and enhanced overall usability. integrating image recognition technologies to enhance search accuracy and user satisfaction. full-stack, robust, and scalable marketplace solution.

III. SYSTEM ARCHITECTURE

Secure Bridge architecture includes four main layers of architecture: Presentation Layer, Business Layer, Service Layer, and Data Access Layer. This structure keeps the applications modular, maintainable, and scalable for secure workspace activities, both individual and collaborative.

© 2025 IJMRSET | Volume 8, Issue 8, August 2025| DOI:10.15680/IJMRSET.2025.0808082

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

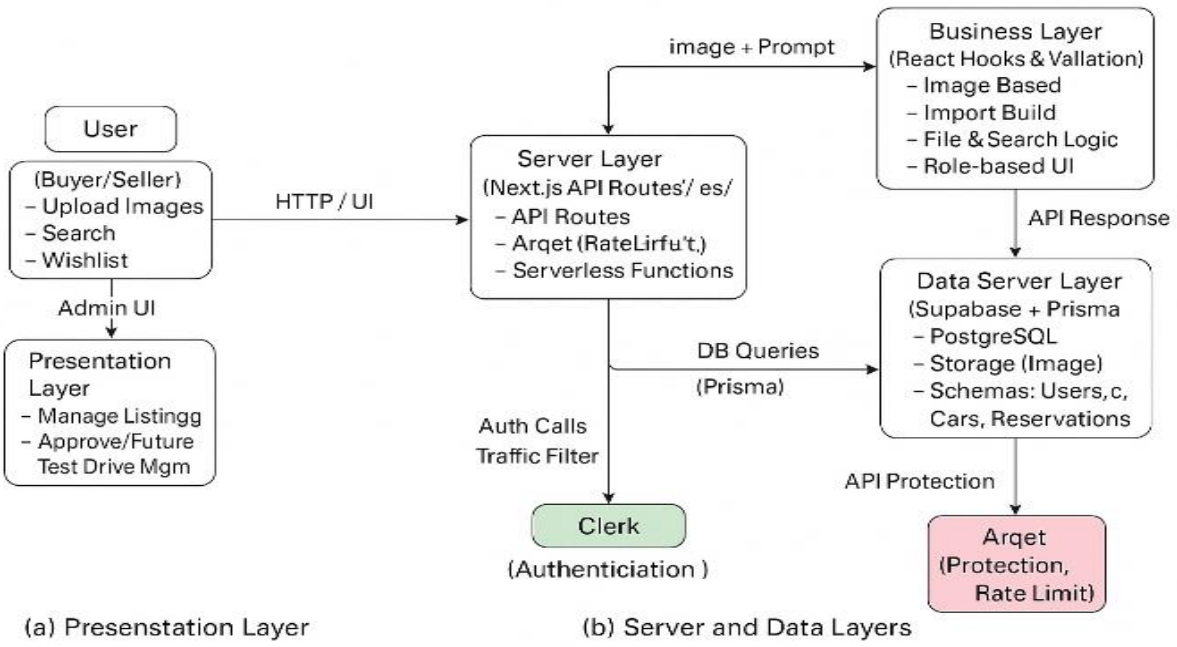


Fig 3.1 System Architecture

The system architecture of the AI Car Marketplace is divided into four major layers:
1. Presentation Layer: This is the frontend of the application built with Next.js. This component manages all user interactions such as car searches, image uploads, applying filters, and authentication via Clerk, ensuring a seamless and intuitive user interface by rendering pages, managing application states, and providing a user-friendly experience throughout the platform.

2. Business Layer: This Layer encompasses the core application logic, including AI interactions facilitated by custom React hooks that process images with Gemini AI, parse the returned data, and perform The Business Layer is responsible for validation, managing user session flows, and implementing role-based conditional rendering for users and administrators, thereby ensuring secure, personalized, and context-aware application functionality.

3. Server Layer: This layer in Next.js acts as the intermediary between the frontend and backend, managing API routes to handle various requests, performing authorization checks using Clerk tokens to The Server Layer in Next.js ensures secure user authentication by performing authorization checks with Clerk tokens and facilitates secure, efficient data exchange with backend services like Supabase through Prisma, thereby maintaining robust security protocols and ensuring smooth, reliable data flow between the client and server components. The system effectively manages user authentication and enables seamless, secure data exchange with Supabase through Prisma, ensuring efficient data retrieval and storage while upholding stringent security standards to safeguard user information and maintain data integrity across all operations.

4. Data Server Layer: This is the storage and database management layer. Supabase acts as the PostgreSQL-based database and storage provider, while Prisma handles the Object Relational Mapping (ORM). The Next.js server layer securely manages car details, user data, and AI-processed metadata by utilizing Prisma for secure database connections, ensuring data integrity, confidentiality, and efficient querying, which supports reliable data storage and seamless access for application functionalities. while providing efficient access for frontend components and backend processes.

© 2025 IJMRSET | Volume 8, Issue 8, August 2025| DOI:10.15680/IJMRSET.2025.0808082

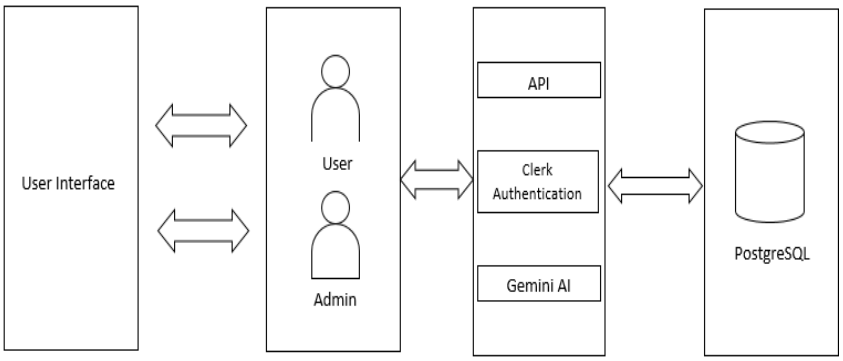
ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

IV. METHODOLOGY

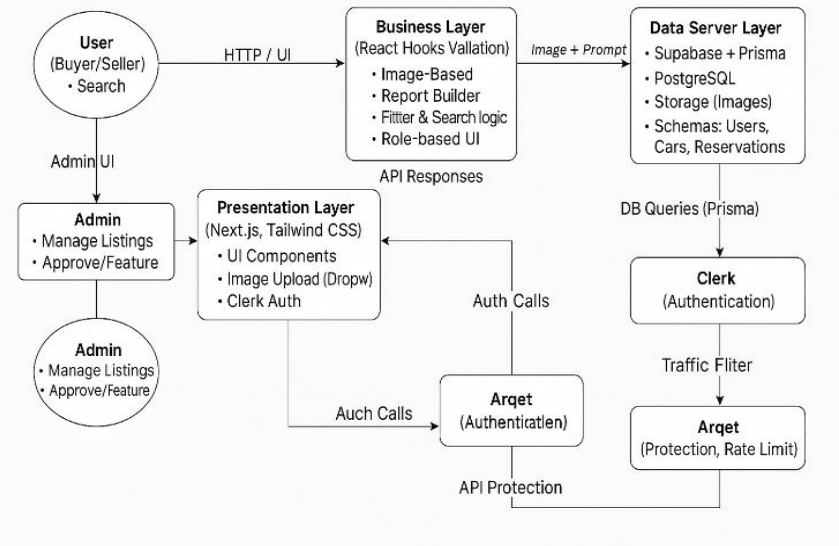
The development employed an agile methodology with iterative testing and development, focusing on Gemini AI integration as the core feature. The frontend utilizes React components and Tailwind CSS for a responsive, modern interface.



The procedure of transforming image files into Base64 format and transmitting them alongside prompts to Gemini AI facilitates effective communication, with the AI providing a JSON representation of the car's characteristics. that are carefully parsed, validated, and either rendered for display or stored for further use, ensuring accurate data extraction, consistency, and integrity throughout the workflow. and either rendered or stored. Role-based dashboards provide customized features and data access for users and admins, enhancing usability and security. Extensive testing at both functional and UI levels ensured the system's robustness, performance, and user experience quality.

V. DESIGN AND IMPLEMENTATION

The AI Car Marketplace is built on a comprehensive modular stack that includes Next.js, Tailwind CSS, Prisma, Supabase, Gemini AI, Clerk, and Arcjet. The system is organized into four fundamental layers: user interaction, business logic, AI integration, and database management. The User Module facilitates authentication for both buyers and sellers, while the Admin Module offers management capabilities to oversee listing moderation, address system misuse, and ensure the platform's maintenance. The AI Module is the core of the application where users can upload car images which are later processed by Gemini 1.5 Flash to extract relevant information like the cars make, model, and year.



© 2025 IJMRSET | Volume 8, Issue 8, August 2025| DOI:10.15680/IJMRSET.2025.0808082

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

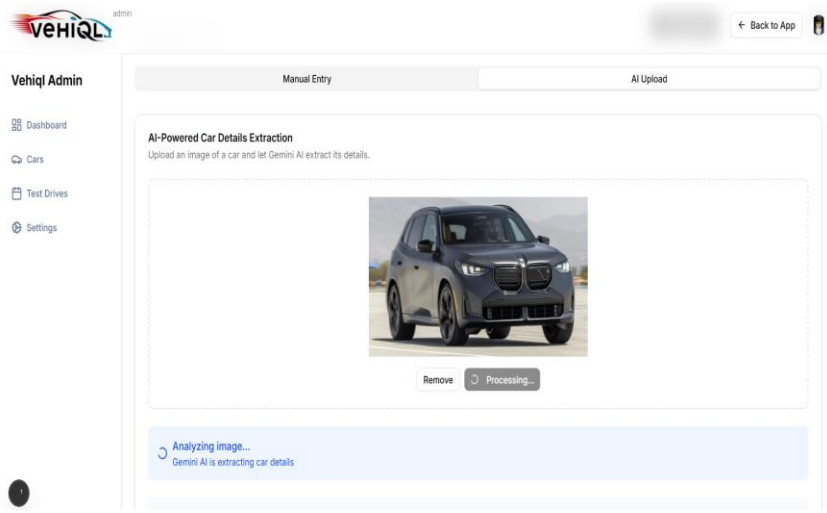
International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

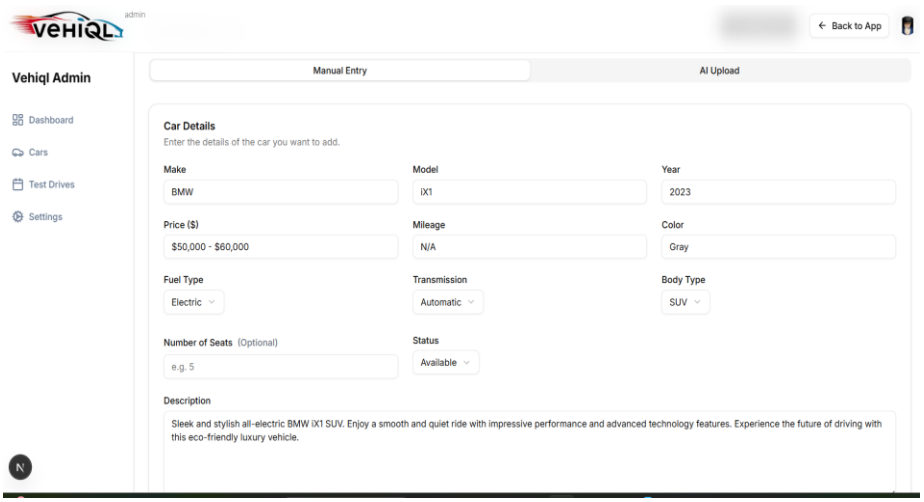
Responsive user interfaces and experiences (UI/UX) were achieved with Tailwind CSS and Next.js, which also powered the frontend. Supabase with Prisma ORM served as the backend and handled user information, car listings, and admin functions. In the car marketplace, users are provided with AI-powered functions. Business processes are separated which allow for user and data privacy, while in the backend this implementation permits functionality, security and scalability to be achieved effortlessly.

VI. OUTCOME OF RESEARCH

The AI Car Marketplace successfully showcased the integration of artificial intelligence within a practical e-commerce framework. By leveraging Gemini AI to extract vehicle information from uploaded images, the initiative reduced manual data entry errors and enhanced user convenience. Users could simply upload a photo of their car, and the system would promptly retrieve essential details such as make, model, year, and category. Performance evaluations indicated that the image-to-data conversion process generally required under two seconds, significantly improving the overall user experience.



Additionally, the use of Next.js and Tailwind CSS improved the platform's responsiveness, while Clerk authentication provided secure access for both buyers and sellers. The administrative tools effectively managed fraudulent content and approved listings. This research underscores the practicality and effectiveness of employing AI in marketplace environments, particularly in streamlining data entry, boosting accuracy, and fostering user engagement.



© 2025 IJMRSET | Volume 8, Issue 8, August 2025| DOI:10.15680/IJMRSET.2025.0808082

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

VII. RESULT AND DISCUSSION

The developed AI Car Marketplace yielded promising results both functionally and in terms of user interaction. The AI feature driven by Gemini showcased an impressive capability to accurately identify key car specifications such as brand, model, year, and category from images.

User feedback collected during testing showed that more than 85% of users preferred the image-based car listing method over manual form entry. This demonstrates the system's practical impact and ease of use. The Admin dashboard allowed quick approval and monitoring of listings, and the Clerk authentication system ensured secure logins across all user types.

The combination of Next.js, Supabase, Prisma, and Clerk established a highly efficient pipeline from backend to frontend, demonstrating robust performance even with moderate traffic levels. Performance tests indicated minimal latency, rapid data retrieval, and an overall compelling user interface and experience. The project successfully demonstrates how AI can be used to build intelligent, interactive, and scalable web platforms for specialized marketplaces.

VIII. CONCLUSION

The AI Car Marketplace offers an innovative and efficient approach to streamline the car listing and discovery experience. By leveraging Gemini AI, the platform converts car images into actionable data, thereby removing the necessity for manual data entry. Enhanced features benefit both system users and administrators as they are provided with a seamless operating system at all levels. The modular design is intentionally crafted to facilitate future expansion and adaptability. This project exemplifies the possibilities available with AI-driven marketplace solutions.

REFERENCES

[1] H. Wang, W. Wang, and Q. Zhang, "Car recognition in surveillance images using deep convolutional neural networks," IEEE Access, vol. 8, pp. 125020–125030, 2020. This research demonstrates the use of AI models in vehicle identification through image inputs, which supports our project's image-based listing system.
Available: https://ieeexplore.ieee.org/document/9109346
[2] Vercel, "Next.js Documentation," 2024.Our frontend framework is built on a foundation that emphasizes rapid rendering capabilities through static site generation, complemented by the API routes provided by Next.js.
Available: https://nextjs.org/docs
[3] Supabase Inc., "Supabase: The Open Source Firebase Alternative," 2023. Supabase provides scalable real-time backend services, enabling smooth database communication and user data handling in our marketplace project.
Available: https://supabase.com/docs
[4] Prisma Data, Inc.Launched in 2024, Prisma is an advanced ORM (Object-Relational Mapping) tool specifically for Node.js and TypeScript.This innovative solution streamlines and secures database access and operations, enhancing the development experience for programmers.
Available: https://www.prisma.io/docs
[5] Google DeepMind, "Gemini 1.5 Technical Report," 2024. This official document explains how Gemini models work in image-text understanding, which was applied for extracting car details from uploaded images. Available: https://deepmind.google/discover/blog/google-gemini-15

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING AND TECHNOLOGY

| Mobile No: +91-6381907438 | Whatsapp: +91-6381907438 | ijmrset@gmail.com |

www.ijmrset.com