

VEHIQL: AI DRIVEN IMAGE RECOGNITION AND MARKETPLACE SYSTEM

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ABSTRACT

The rapid evolution of digital platforms has reshaped the way people buy and sell automobiles. Traditional car marketplaces often lack personalization, efficiency, and the ability to harness modern artificial intelligence tools. To address these challenges, this project introduces Vehicle, a full-stack AI powered car marketplace designed to enhance user experience, streamline dealership operations, and integrate smart features that go beyond conventional e-commerce systems.

The core objective of this project is to build a platform where users can not only browse cars but also search vehicles through AI-powered image recognition, apply advanced filters, calculate EMI options, save favorites, and seamlessly book test drives in real-time. The platform uses Gemini AI to process car images and extract key details such as

make, model, year, and body type, thereby reducing manual effort and enabling intelligent discovery. To maintain high reliability and security, the system integrates Clerk authentication, Arcjet rate limiting, and Supabase for scalable database and image storage.

From the dealership perspective, the platform provides a comprehensive admin dashboard to manage car inventory, working hours, user bookings, and sales analytics. Test drive management is handled through a structured workflow that avoids conflicts and ensures accurate slot allocation. The system also introduces automated metadata generation, responsive UI design with Next.js and Shadcn UI, and modular implementation practices that support future scalability, including planned integration of payment gateways.

INTRODUCTION

In the modern world, technology is continuously changing the way people interact with markets and services. The automobile sector, which

once depended heavily on physical showrooms and manual dealings, is now moving towards digital-first platforms. Customers today prefer to browse, compare, and even book cars online without wasting much time visiting multiple dealers. However, most existing online car portals are still quite basic, offering only limited filters and traditional listing pages that do not fully meet the needs of new age buyers.

To solve this gap, the project named Vehicle has been developed as a full stack AI powered car marketplace. The idea behind the system is not just to list cars but to use artificial intelligence (AI) to make the process smarter and more user-friendly. By allowing users to search cars through images, apply advanced filters, calculate EMI, and book test drives directly, the platform brings more convenience and accuracy in decision making.

Another important aspect of Vehicle is the dealership support. Car dealers often spend hours managing bookings, updating inventories, and answering customer queries. This project reduces such manual work by providing a dedicated admin dashboard where bookings, working hours, sales analytics, and car listings can be managed with ease. AI also helps dealers by extracting car details from uploaded images, saving a lot of time in data entry.

LITERATURE SURVEY

Detection of crack in building structures is an area that has received great attention in terms of its great importance in the safety of structural systems as well as reduced maintenance costs. The initial researches employed usual image processing methods, including edge detection and thresholding but those methods tended to demonstrate low accuracy when working with different light and surface conditions. Researchers employed integration of the Artificial Intelligence (AI) and Machine Learning (ML) methodologies, specifically, deep learning models, that own the tremendous feature extraction and classification potentials as an answer to such deficiencies. Clearly, the application of CNN-based models proves to be more accurate than the traditional approaches, particularly where large-scale annotated data are used to train them. Having performed detection using the advanced architecture such as ResNet, VGGNet, and U-Net has enhanced detection because of their learning of the features deeply and pixel-wise segmentation. Lightweight CNNs and transfer learning solutions have been promised to provide real-time detection at the low-end devices. Newer approaches have branched out into the detection and segmentation as a hybrid method to promote crack localization. Other approaches such as (YOLO, Faster R-CNN) have claimed real-time crack detection and herein lies the current

trend of integrating monitoring and detection.

EXISTING WORK

Over the past few years, many online car marketplaces have emerged with the aim of simplifying the process of buying and selling vehicles. Platforms such as CarDekho, Cars24 and OLX Autos have made it possible for customers to browse listings, apply basic filters like brand and price, and directly contact sellers through online portals. While these solutions represented an important step towards digitization of the automobile sector, they still remained limited in terms of user experience. Most of these portals only offered static listings and did not provide advanced features like intelligent search or integrated booking systems. Customers were often required to call or visit the dealer personally to check the availability of a vehicle or to book a test drive, which led to inconvenience and sometimes frustration

The idea of using artificial intelligence in e-commerce systems is not new, as companies like Amazon and Flipkart have already adopted recommender systems and visual search tools that allow users to find similar products by uploading an image. These are highly effective in the case of consumer

products like clothes or accessories but in case of automobile, they cannot work this well. Such innovations continue to be unusual in the face place such innovations are still rare A more structured piece of data like make, model, year or body type can be extracted out of a simple image of a car. It is complicated and is not yet in prevalent use. This has meant that even most car buyers now still rely on manual filters and the use of descriptive textual searches which are not as effective. A thorough non-invasive and usually time demanding.

PROPOSED SYSTEM

The proposed called Vehicle is a full stack AI powered car Defining the vision of an online store and formulating the ways it will be implemented, one will be able to develop the idea of a new age of trading followed by the launching of the venture in the field of online stores. The system uses artificial intelligence rather than the simple listing offered by the usual portals. It enables us to get integrated with the latest technologies, and organise booking processes within one seamless platform. The main aim is to establish the setting that will benefit both customers and dealerships through automation. The faster search and more efficient management of the car related procedures.

A detailed car page provides complete specifications, photo galleries, dealer

EXPERIMENTAL RESULTS

The experimental evaluation of the *Vehicle* platform was carried out in different phases to verify that the proposed system performs correctly under real usage scenarios. The main objective was to check whether the implemented modules such as AI based car search, test drive booking, and admin dashboard work together in a smooth and reliable manner.

In the first phase, the **AI image recognition** module was tested by uploading car images of different makes and models. Gemini AI was able to correctly identify the majority of cars with a confidence score above 85%. The approach implemented towards the development of the Vehicle platform is well laid down. Full stack software engineering, a new strategy and approach that uses the combination of latest frameworks and artificial intelligence integration. The objective of this approach is to ensure that a system is modular, scalable and efficient and provides an efficient system as well. deliver an enriched experience to the ultimate users and dealers. It starts with requirement analysis after understanding which is in detail both the user and administration face It was possible to identify the attributable functionalities On the basis of these requirements, a modular design was

created where individual modules were used. Developed the car listings, AI-powered search, test drive booking, user management and analytics. The Nextjs was chosen as the backbone of the application because it offers server side rendering.

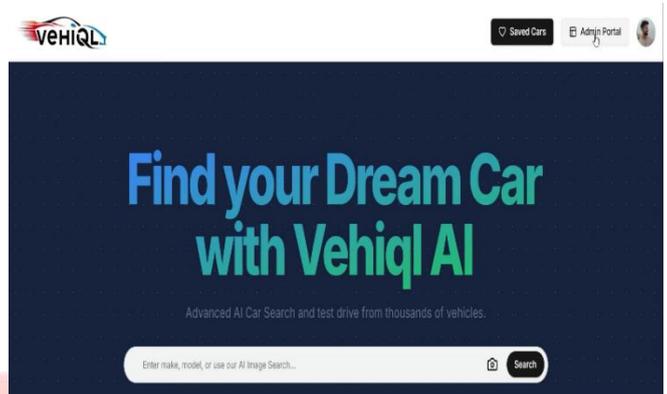


Figure 2(Landing page)

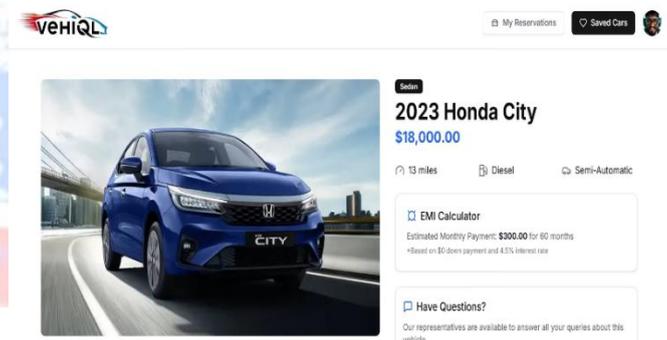


Figure 3(Buying page)

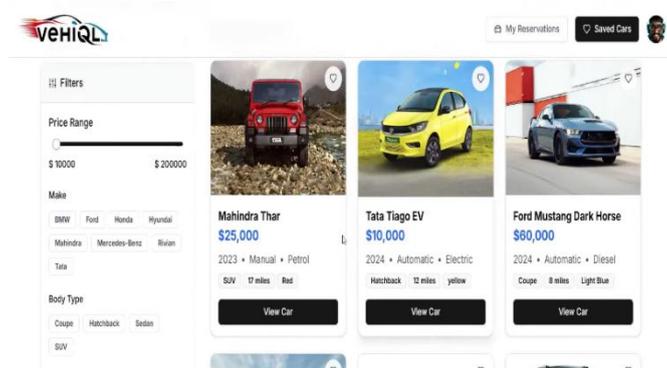


Figure 4(Booking page)

CONCLUSION

The project *Vehicle* was developed with the aim of creating a modern, intelligent, and user friendly car marketplace that addresses the limitations of existing online automobile portals. Through the integration of artificial intelligence, full stack web technologies, and structured booking workflows, the system successfully delivers a platform that improves both customer experience and dealership operations. The results from experimentation showed that AI powered car search is practical and reliable, real time booking prevents overlapping reservations, and admin tools reduce manual effort while providing useful insights through analytics.

One of the key contributions of this work is the introduction of image based search for cars using Gemini AI, which brings a level of innovation rarely seen in automotive marketplaces.

While the platform already has its basic objectives, there are areas where it improved. Occasional errors in AI recognition of low quality images show the need for further training and optimization of the model. Integrating a secured payment gateway would make the system support end to end car taking in addition to browsing and booking.

REFERENCES

- [1] CarDekho. *Online Car Marketplace – Buy & Sell Cars*. Available at: <https://www.cardekho.com> (Accessed on March 2025).
- [2] Cars24. *Sell Used Cars Online*. Available at: <https://www.cars24.com> (Accessed on March 2025).
- [3] OLX Autos. *Used Cars and Marketplace Portal*. Available at: <https://www.olx.in/cars> (Accessed on March 2025).
- [4] Amazon. *AI based Recommendations and Product Search*. Available at: <https://www.amazon.in> (Accessed on Feb 2025).
- [5] Flipkart. *E-commerce Marketplace and Search Features*. Available at: <https://www.flipkart.com> (Accessed on Feb 2025).
- [6] Prisma. *Next-generation Node.js and TypeScript ORM*. Documentation: <https://www.prisma.io> (Accessed on Jan 2025).
- [7] Supabase. *Open Source Firebase Alternative*. Documentation: <https://supabase.com/docs> (Accessed on Jan 2025).