VROOM – Seamless and Eco-Friendly carpooling for Modern Commuters

Gunasekar S
Assistant Professor
gunasekar.s@rajalakshmi.edu.in
Department of Computer Science and Design
Rajalakshmi Engineering College

Naren M B
211701036@rajalakshmi.edu.in
Department of Computer Science and Design
Rajalakshmi Engineering College

Sharon Steve J
211701050@rajalakshmi.edu.in
Department of Computer Science and Design
Rajalakshmi Engineering College

***Abstract*—: With traffic congestion and environmental concerns on the rise, carpooling systems have become increasingly popular. This paper proposes a carpooling system that matches drivers and riders based on their travel preferences and routes using an advanced algorithm. The system considers factors such as pickup and drop-off locations, preferred departure time, and route to find the most compatible matches. Additionally, real-time updates are provided on the driver's location and the rider's estimated time of arrival. This carpooling system not only reduces traffic congestion but also lowers carbon emissions, promoting environmental sustainability. It also offers a safe and reliable alternative for individuals without access to private transportation or public transit. The proposed carpooling system has the potential to transform commuting, providing a practical solution for a more sustainable future.**

Keywords*— *Carpool, Traffic, Route, Travel, Private, Public, Location.

I. INTRODUCTION

Urban areas face significant challenges due to elevated carbon dioxide (CO2) emissions, largely resulting from the prevalence of single-occupancy vehicles. This not only contributes to air pollution and global climate change but also exacerbates traffic congestion, leading to longer commute times, heightened stress, and decreased productivity. Moreover, the increasing need for road infrastructure and parking facilities places additional financial burdens on urban resources, diverting funds from essential public services. In response to these issues, our project, presents a solution that emphasizes sustainability, cost-efficiency, and user experience. Designed as a mobile application, Vroom aims to tackle urban transportation challenges by reducing the number of vehicles on the road, thereby lowering carbon emissions and easing traffic congestion. The project harnesses the power of artificial intelligence to optimize routes, ensuring commuters can travel efficiently and affordably. Vroom also focuses on providing a user-friendly interface for a smooth commuting experience, with features that allow users to book, review, and manage rides effortlessly. By offering a reliable alternative to single-occupancy travel, Vroom aligns with modern needs for sustainable urban mobility, enhancing both environmental and economic well-being for commuters and cities alike. With its focus on reducing traffic congestion, lowering carbon emissions, and offering an affordable alternative to single-occupancy travel, *Vroom* not only enhances commuter convenience but also promotes a greener, more economically sound approach to transportation, positioning it as a vital tool in the push towards sustainable urban living.

Fig.1. The disadvantages of increased traffic congestion

Fig 1 shows the disadvantages of increased traffic congestion. This effect of traffic congestion has an increased effects in the urban and metropolitan areas.

II. LITERATURE SURVEY

RazaHasan, Abdul hadi Bhatti, Syed imranali and Abeerjavedsyed [1] proposed a Smart peer carpooling system. In which they proposed a smart model for SPCPS based on sustainable mobility, which includes architecture and business model approaches. The government and institutions are encouraged to promote carpooling to increase high-occupancy vehicle lanes rather than individual commuters. Nikhil Bacchav and PriyaMalode [2] proposed an application for carpooling. They used route matching in their paper, which can assist users in finding the most suitable rides for their journey. The application will compare the shortest path with already taken trips after taking into account the source and destination to construct the path. Additionally, the results will be ranked based on how closely the paths matched. They also used GPS and Google Maps to track where people were. Alejandro Lugo, Nathalie Aquino, Magali González, Luca Cernuzzi [3] proposed a UCarpooling: decongesting traffic through carpooling using automatic in which they focused on pairings which Both the back end and the front end are included in the design and modelling of such systems; however, in this study, we are primarily concentrating on the back end while leaving the front end for future work.make it easier for those who frequent the same institution or are coworkers to carpool. RutujaPharande, Prof. Neha Sharma, ShubhangiGunjal and Abhishek Mahale [4] proposed a Peer-to-Peer car sharing system in their paper they proposed a decentralized Peer-to-peer automobile sharing which is implemented to aid with transportation issues in urban areas by reducing traffic congestion. Two kinds of stakeholders are identified for this D- App i.e., the driver and the rider. Each user has different functions and responsibilities that are

offered using various dashboards of the D-App. YueshenXu, Yuqiao Liao, Jianbin Huang and Ying L [5] proposed a real-time demand-aware ridesharing service which is developed with the aim to give the quality-of-service. When users submit a request in devices, it will find a car on the user's way only. It is also made to find the most appropriate route. Methodology Users can use a web application or have our built Car sharing application loaded on their Android smartphones. The users' registration will start the carpooling procedure. After that, users can create and share rides. The processes for creating rides and finding rides involve the following actions.

III. PROPOSED METHODOLOGY

A. PROJECT SCOPE

In this modern world, convenience and safety are two important things are that are being sort and the two most important things that are not compromised. Car-pooling systems are an alternative to the conventional public transport or the expensive private transport. Moreover, Mobility as a Service (MaaS) is gaining traction, where various transportation modes, including carpooling, are seamlessly integrated into a single, user-friendly platform. This could lead to more holistic and interconnected urban transportation ecosystems.

IV. ARCHITECTURE

This architectural diagram provides an overview of the project. The modules and the overall workflow are described here. In Fig.2 gives the basic block diagram of the project. The workflow starts from the client side where the user searches for the particular URL and enters it then enters the website where they perform activities ranging from booking and scheduling rides and through which the request is sent and the other activities such as cost optimization to bill generation are done.

Fig.2 Block diagram of the software

Fig.2 represents the different activities involved in the construction of the software application such as the frontend part along with the backend services. The different functionalities including the Google maps API

V. MODULES AND THEIR DESCRIPTION

A. *LOGIN AND USER AUTHENTICATION:*

The login page that consists of the username/email address and the information is then verified and authenticated using the database. If not a registered user, then he is prompted to the registration page where he is asked his information and the information are stored in the database.

B. *BOOKING AND RESERVATION MODULE:*

Once the passenger enters his/her destination, then the passenger can select among the particular drivers available and select the one who feels comfortable to him/her. So, this is done, the seat gets reserved and this seat will no longer be available to the other users.

C. *PAYMENT AND INVOICING MODULE*:

The payment is being done using a payment gateway where the payment is securely done and invoice is sent to the email id of the passenger so that he/she can utilize this invoice in the future for various purposes such as claiming his travel allowances and record keeping, etc. Razopay integrated with an Escrow service to manage holding and releasing funds.

E. *OPTIMIZED FARE PREDICTION MODULE:*

The payment for the ride is calculated in a secured and transparent way that uses to predict the fare. It uses parameters such as distance, time of day, traffic conditions and predicting the time and the it uses parameters such as car types and duration for predicting the fare.

F. *SECURITY MEASURES:*

Security is integrated throughout the app, including secure logins, encrypted data storage, and secure transactions. The system ensures user data is protected and transactions are safe. Additionally, the app uses advanced encryption protocols to secure personal and payment information, ensuring that user data remains confidential and safe from cyber threats. This comprehensive approach to security reinforces *Vroom*'s commitment to user protection, making it a reliable and secure carpooling solution for modern commuters.

G. *VIEW FEEDBACK:*

It allows users to view feedback given by other passengers about a driver or ride. This helps users make informed decisions when selecting a carpool option. After completing a ride, users can provide feedback on their experience, rate the driver, and leave comments. This helps in improving the service and building trust within the community.

VI. CONCLUSION AND FUTURE ENCHANCEMENT

Vroom, a carpooling app, is a promising solution to transportation challenges. It is user-friendly, optimizes routes in real-time, and matches efficiently. It provides a convenient and sustainable way for people to share rides and reduce their environmental impact. Vroom has the potential to revolutionize commuting, create a sense of community, save costs, and contribute to a greener future. Furthermore, incorporating smart vehicle-sharing options, where users can opt for shared mobility services like electric scooters or bikes for the last mile, would make Vroom a comprehensive, multimodal platform.

AUTHORS

1. Dr, S. Gunasekar, Assistant Professor, Department of Computer Science and Design, Rajalakshmi Engineering College, gunasekar.s@rajalakshmi.edu.in
2. Naren M B, Department of Computer Science and Design, Rajalakshmi Engineering College, 211701036@rajalakshmi.edu.in
3. Sharon Steve J, Department of Computer Science and Design, Rajalakshmi Engineering College, 211701050@rajalakshmi.edu.in

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