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RESEARCH ARTICLE OPEN ACCESS

Share Cab: Revolutionizing Carpooling with React Native

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Abstract:

Share Cab is a practical application designed to connect drivers who commute solo to work with potential passengers through our dedicated platform. This service benefits daily public transportation users by helping them locate drivers headed in the same direction, thereby opting for a more efficient route. The platform serves as a convenient intermediary for both car owners and riders, allowing them to share rides seamlessly. This initiative empowers users to access available transportation resources from fellow commuters precisely when required. The system facilitates the identification of accessible vehicles, enabling users to arrange rides based on the car owner's availability, schedule, and seating capacity. The primary objective of this project is to establish an effective and user-friendly Car-pooling System with an integrated recommendation engine.

Keywords —Carpooling,Recommendation engine.

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I. INTRODUCTION

Nowadays, transportation is one of the major issues. One of the most used means of communication on roadways. One of the prime forms of road transport consists of private cars. These cars are generally used with only a single rider. An overabundance of cars creates various problems which include increased traffic, increased pollution, parking congestion, and many more also in recent years, the problems of global warming and the energy crisis have aroused widespread public concern. Our intended to make a system that aims to remove all of the above discrepancies [1]. We plan to create a carpooling application that gives users the same kind of flexibility that a private car gives which can reduce the number of vehicles being used at the same time. The recommended solution for reducing the harmful effects of the above problems is carpooling. Carpooling schemes are designed in such a way that they encourage commuters to share travel expenses and resources with colleagues. Carpooling is the sharing of cars by the driver and one or more passengers, usually for commuting. Carpooling arrangements and schemes involve varying degrees of formality and regularity. Car sharing aims to solve this problem by targeting all the vacant seats in private cars. Employees of the same area or the students going to the same school can carpool; this can be done because they know each other and can communicate. But when going on an intercity trip you are not aware if some other person also intends to make the same journey. Thus, the applications help you see people and journey schedules and make an informed decision about do you wish to travel alone or save money and travel with a safe company [2]. Furthermore, carpooling has documented social and environmental benefits that include: It helps in reducing traffic congestion as the number of vehicles on the road can be reduced significantly.

II. LITERATURE STUDY

The growth of urbanization is propagating rapidly and hence people prefer to travel in their vehicles rather than using a public transport system. Therefore, the problems of global warming, traffic congestion, and depletion of fuel arise. A social-

based community for carpooling has been proposed for both the rider and the passenger to reduce fuel costs by sharing among fellow passengers. The implications for environmental sustainability are sufficiently high [1]. The system elaborates on the usage of carpooling Android application and also discusses the major advantages of carpooling. The System architecture for carpooling is greatly identifying and the major implementation of Android applications relies on GPS-based navigation devices, smartphones, and social media for trust and accountability. A proposed system for carpooling has been efficiently discussed by prototype design and route matching algorithms and it also discusses the advantages and disadvantages of carpooling [2]. The paper which we have referred to has mainly discussed the current scenario of metropolitan cities. It also includes a brief calculation of the growth of motor vehicles and cars in the cities and also the distribution of population and vehicles in those cities. It mainly deals with doing a proper data analysis of the total number of cars. The impact of revenue has also been calculated. The paper mainly describes the innovations that have taken place in ridesharing services relying on advanced mobile technologies. This type of ridesharing attempts to provide added flexibility to ridesharing arrangements by allowing drivers and passengers to arrange occasionally shared rides. It also discusses about the advantages, disadvantages, economic challenges, social/behavioural challenges, Institutional challenges, technological challenges, opportunities, and challenges of ridesharing. The Rideshare challenges in a series of economic, behavioural, institutional, and technological obstacles. The system seemingly provides all the advantages of using a GPS-based navigation system and also has some additional SMS-based alerts to provide transparency to both the rider as well as passengers. This system is user-friendly [2]

III. ADVANTAGE

Reducing Overall Traffic Congestion on the Roads: The primary objective of reducing overall traffic congestion is to create a more efficient and fluid transportation network. By encouraging the use of shared transportation, such as carpooling, the system seeks to decrease the total number of vehicles on the road, thereby mitigating traffic jams and improving the overall flow of traffic[1].

Reduce Peak Hour Congestion: Focusing on peak hours specifically targets one of the most congested periods during the day. By promoting carpooling during these high-traffic times, the objective is to alleviate the strain on road infrastructure and reduce the frustration associated with peak-hour congestion, contributing to a smoother and more predictable traffic flow.

Promoting Alternative Modes of Transport: Beyond carpooling, this objective emphasizes the broader goal of diversifying transportation options. Encouraging the use of alternative modes such as public transit, cycling, or walking aims to reduce dependence on individual car travel, promoting a more sustainable and varied transportation ecosystem.

Save Money by Sharing the Cost of Driving One Car: The financial incentive of cost-sharing is a key objective. By encouraging individuals to share rides, the system aims to reduce the financial burden of transportation for participants, fostering economic savings through shared fuel, tolls, and parking expenses[2].

Reduce the Number of Cars on the Road: Aiming to decrease the overall number of cars is crucial for addressing both congestion and environmental concerns. By optimizing vehicle occupancy through carpooling, the objective is to contribute to a reduction in the total number of vehicles in circulation.

Reduce Pollution and Carbon Dioxide Emissions: Environmental sustainability is a central objective. By promoting shared transportation and reducing the number of individual vehicles, the system seeks to lower emissions and decrease the environmental impact, contributing to cleaner air and a reduction in carbon dioxide emissions[3].

Reduce Driving-Related Stress for Participants: Beyond the physical congestion, this objective focuses on the well-being of participants. By providing an alternative to individual driving, the system aims to reduce the stress associated with navigating congested roads, promoting a more relaxed and enjoyable commute experience[3].

IV. MODULE DESCRIPTION

Driver Functionality

Drivers are essential contributors to the transportation ecosystem within the application. They register their vehicles and list upcoming trips, detailing start and endpoints. This enables collaboration, with multiple passengers joining a single journey. Drivers can monitor trip status, including passenger count, and adjust details accordingly, ensuring control over their journeys. Accumulating points for each trip incentivizes driver participation and fosters community engagement. This functionality empowers drivers to offer rides efficiently while providing passengers with accessible transportation options.

Rider Functionality

For traveller's and commuters, the application offers user-friendly ride searching. Riders filter available rides based on location, destination, and preferences such as departure time and vehicle type. This ensures they find suitable options that align with their needs. Upon identifying a ride, requesting to join is simple, facilitating smooth coordination with the driver. Throughout the journey, riders stay informed about trip status updates, enhancing transparency and trust. By prioritizing user experience and convenience, the rider functionality revolutionizes commuting and travel experiences.

Admin Oversight

Admins hold overarching responsibility for platform operations, managing user interactions, and enforcing policies. They monitor user activities to prevent misuse and maintain platform integrity. Admins also provide support, handle inquiries, and complaints, and mediate communication between users. Upholding fairness, transparency, and accountability, admins ensure the platform remains trusted and dependable. Their proactive oversight and diligent management shape positive user experiences and promote platform sustainability.

V. TECHNOLOGIES USED

React Native

A well-liked open-source framework for creating mobile applications with JavaScript and React is called React Native. Cross-platform development can be done more affordably and quickly with this method, as developers can create code only once and have it run on both the iOS and Android platforms. Similar to React for web development, React Native uses a declarative syntax and component-based design to make it simple for developers to construct responsive and interactive mobile apps. Because of the framework's utilization of native components, high-performance apps that nearly mimic native ones are produced. Hot-reloading is a useful feature for React Native developers as it lets them view the changes made to the code right away without having to recompile the entire application. The framework also offers a vast ecosystem of community-contributed modules and libraries, which accelerates development. All things considered, React Native streamlines the process of developing mobile apps, allowing programmers to produce feature-rich, cross-platform apps with less time and effort.

Recommendation System

In a carpooling system primarily reliant on passenger reviews, machine learning (ML) assumes a central role in extracting valuable insights from these reviews to enhance various facets of the service. Natural language processing (NLP) techniques can be employed to analyse sentiments and key features mentioned in reviews, offering a comprehensive understanding of passengers' experiences. ML algorithms can then be applied to predict user preferences, contributing to optimized

driver-passenger matches. The system can use sentiment analysis to continually assess and improve service quality based on passenger feedback. Recommendations for routes, drivers, and other personalized features can be generated using ML models that learn from the patterns within reviews. Safety measures can also be enhanced through the analysis of sentiment-related cues in reviews, ensuring the security and satisfaction of passengers. Continuous learning from these reviews allows the carpooling system to dynamically adapt to evolving user expectations and preferences, ultimately providing a more tailored and reliable service based on real-time passenger experiences.

Firebase

Google provides Firebase, a feature-rich platform for developing mobile and online applications. With its collection of tools and services, developers can build, deploy, and scale apps more effectively, all while streamlining the development process. Firebase simplifies the development cycle and makes it possible to create dynamic, responsive apps. Its capabilities include real-time databases, authentication, cloud services, hosting, and analytics. Firebase allows developers to concentrate on creating excellent user experiences rather than worrying about the backend infrastructure, thanks to its smooth integration with other Google Cloud services. Below is a succinct overview of some of Firebase's main features:

•Realtime Database: Firebase's Realtime Database is a NoSQL cloud database that allows developers to store and sync data in real-time. It's particularly well-suited for applications that require collaborative features and instant updates across devices.

•Authentication: Firebase Authentication provides secure and easy-to-implement user authentication for your app. It supports a variety of authentication methods, including email/password, social media logins, and anonymous sign-ins.

•Cloud Fire store: Firebase Cloud Fire store is a scalable NoSQL database that stores data in documents and collections. It offers more advanced querying capabilities compared to the real-time database and is designed to scale with your application.

•Cloud Storage: Firebase Cloud Storage allows you to securely upload and download files directly from your app. It is particularly useful for handling user-generated content like images, videos, and other media.

•Authentication: Firebase Authentication provides secure and easy-to-implement user authentication for your app. It supports a variety of authentication methods, including email/password, social media logins, and anonymous sign-ins.

•Machine Learning: Firebase integrates with GoogleCloud's machine learning services, allowing you to build and deploy machine learning models in your app. This can be used for features like image recognition, natural language processing, and more.

•Analytics: Firebase Analytics provides insights into user behaviour and app performance. It helps you understand how users interact with your app, allowing you to make informed decisions to improve user experience.

VI. DIAGRAM

use case diagram

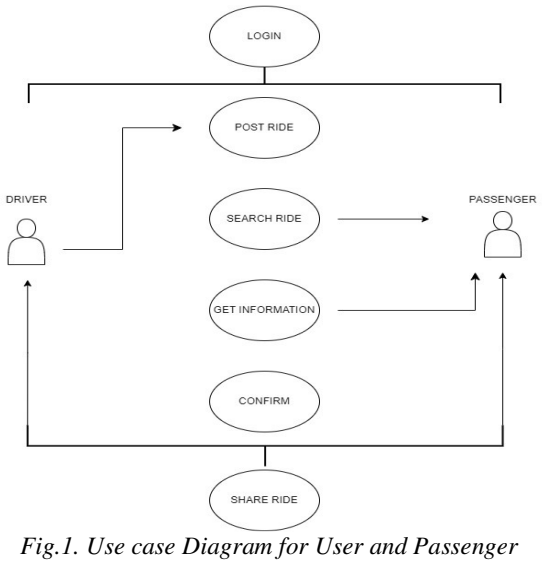

Fig.1. Use case Diagram for User and Passenger

Passengers can log in, search for rides based on location, and get fare estimates. Once a suitable ride is found, they can book it and even share it with others. Drivers can log in to offer rides. The diagram clearly illustrates the core interactions between passengers and drivers using the Share Cab online platform.

General flow chart

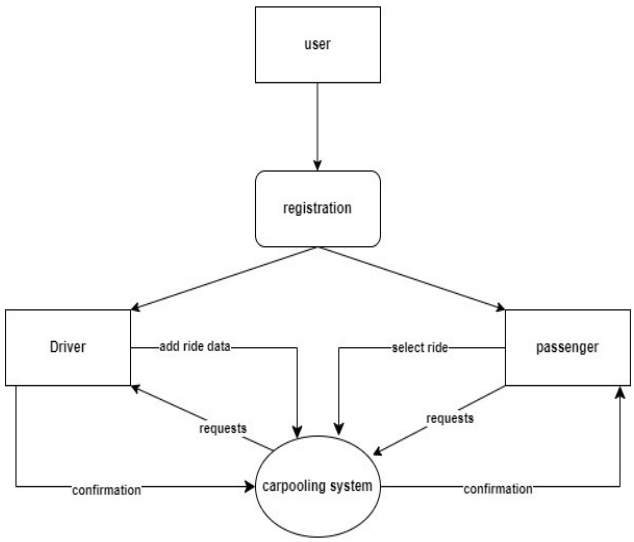

Fig. 2. General flow chart.

The flowchart outlines the user journey within a carpooling system, facilitating connections between drivers with available seats and passengers seeking rides. The process starts with user registration, where individuals choose to identify as either a driver or a passenger. Drivers entering the system proceed to add trip details, specifying their origin, destination, departure time, and the number of seats they can offer. Passengers, on the other hand, can search for rides based on their own travel needs, likely filtering options by origin, destination, and desired travel time.

Following these initial steps, both parties encounter a confirmation stage. Drivers presumably confirm the details of their offered ride, ensuring accuracy and adherence to their availability. Passengers likely confirm their selection of a particular carpool option, solidifying their interest in sharing the ride.

Once these confirmations are made, the carpooling system takes centre stage. The flowchart illustrates the system's role in matching riders and drivers based on their compatible routes and timings. This matching process is likely facilitated by an algorithm that considers factors like geographical proximity, travel times, and the number of available seats in each driver's car.

VII. FUTURE SCOPE

The potential benefits of carpooling for employees' commutes could be enormous for a particular firm in the future. Creating a specific platform or adding functionality to already-existing systems is the first step in customizing a carpooling program for a company in order to enable employee ridesharing [1]. This could be especially helpful for big businesses or organizations when a sizable portion of the workforce commutes from nearby areas. Organization-centric carpooling can result in better workplace connections, less demand for parking, and more efficient travel [2]. Furthermore, by reducing the environmental effect of individual journeys, it supports company sustainability goals. Incentives like preferential parking, financial aid, or acknowledgement for frequent users should be included to increase uptake and promote a shared transportation culture inside the company. Carpooling is made more convenient and safe in real time when the driver has live tracking and passengers may communicate their whereabouts in real time. With live monitoring, passengers can keep an eye on the whereabouts of their designated driver in real time, which improves trip transparency and provides precise arrival times. Concurrently, passengers can share their current location, which expedites the meeting process by giving drivers accurate information about pick-up locations. The ability for travelers to communicate their whereabouts to friends and family while traveling greatly enhances safety [2]. These features

improve the trust and security aspects of the carpooling system in addition to increasing its efficiency, making the whole experience more user-friendly and appealing to a wider audience.The incorporation of geolocation technology also makes it possible to organize trips more efficiently and dynamically, which enhances the adaptability and responsiveness of the carpooling system.

VIII. CONCLUSION

To sum up, the carpooling initiative offers a viable way to address the urgent problems of traffic jams, environmental sustainability, and affordable transportation. We have outlined the many advantages of carpooling, such as less traffic congestion, lower emissions, and possible cost savings for participants, through a thorough literature review and analysis. The use of technology and regulatory assistance has improved carpooling's viability and accessibility as a transportation option. However, it is critical to recognize that overcoming obstacles pertaining to infrastructure, privacy, and trust is necessary for carpooling programs to succeed. As we proceed, further study and deliberate action to address these issues, coupled with encouraging a culture of carpooling, can result in a more efficient and sustainable transportation system that is advantageous to both parties.

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