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Review Paper On College Pool – Ridesharing App

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Abstract - This paper shows that Ridesharing is becoming the most chosen transportation option over private transportation in big cities. Ridesharing is also very quick, affordable and safe. Ridesharing also helps lot of students who travel to college from very long distances and sometimes public transportation is also very limited. This helps them save both time and money and also helps them earn some money by listing their rides. So the paper presents the blueprint and application of a peer to peer or a dynamic pooling app which lets the users list themselves as drivers or riders and which allows them to find each other a ride within a specific area in particular bandwidth of time. The applications have some special features like fare recommendation according to distance, time, mileage and ride recommendation based on type of ride and the history of the rider.

Keywords: Peer-to-Peer, Pooling, Ridesharing, Price Recommendation, Pool.

I. INTRODUCTION

There are many cab service providers such as Ola, Meru, Uber etc. who are aggregators connecting customers with drivers through technology such as mobile application. Technological advancements have impact on lifestyle. Convenience, safety, comfort, timely service are the factors which determine quality of services leading towards customer satisfaction. For this research data was collected from 50 Units (25 Male and 25 Female sample respondents) residing in Nashik city, India. From the study it is found that customers prefer Ola Cabs in Nashik city. Safety and convenience are the major factors which influence customers to select Ola Cabs services.[1] (Liu, K. et al, 2019). Increase in population in metropolitan areas have

increased the number of vehicles on the road resulting in an increase in environmental pollution. Nowadays ride sharing is becoming very popular almost everywhere. Ride sharing not only reduces the environmental pollution but also saves fossil fuels, time and money. It also benefits students in many ways. Students go to colleges from different remote locations and face difficulties in travelling due to lack of transportation facilities. So ride sharing helps them to travel to their desired location very easily. The ride sharing lets the users list their rides and also allows users to find a ride within a specific area. The features of the system are as follows: Pooling: (Hasan et al, 2016). It is the backbone of the application and allows the users to add a new and also search for the available rides. Select source and destination: The user can search through the list of locations around Pune

city easily from the drop down suggestion box. [1] carpooling, thus also the ride-sharing industry, has only recently started becoming globally interesting. However, carpooling formally appeared in the US in the mid-1970s, after the 1973 oil crisis [13]. Peer pooling is a way to share transportation services. This concept has been around for quite some time now and it is used by many multinational companies like Uber, lyft etc. It is widely adopted because it not only saves fuel costs but provides a cheap alternative to getting personal rides. Consider a scenario where one person has to go from a source to a destination. Many times another person has to travel to the same location or a second set of source and destination which is on the way to the source and destination of the first person. Likewise, many subsets of source and destination can be present. Pooling allows the driver to efficiently pick-up the riders and drop them according to the route set by the routing algorithm. There are many challenges and techniques to create the routing algorithms.[14]

Constant population and economic growth have resulted in a massive growth in using the private cars in cities around the world. This phenomenon has resulted in traffic jams, parking issues, excessive fuel consumption, and pollution. While the average passenger capacity of a car is four, cars are frequently seen with more than four passengers one occupant. The average capacity in a bike in India is 3 passengers. The buses have a average capacity of between 30 to 100 passengers in India. In earlier days where economy of the country is less people showed an interest to utilize public resources such as buses, trains. However as the economy of the country is growing rapidly every household began to buy their own vehicles for usage. Now a days youngsters disdain to use public resources as they are having their own vehicles. As a result the number of public buses have been reduced. Which in turned caused the students who are going to colleges in remote areas not to have public resources. As there are no public buses students tend to ask a ride from passerby's. So Our aim is to create a mobile application for students in which they want to share a ride with a stranger who goes in the same direction. The technologies used in this application are Flutter and Dart, MongoDB , node js.

By sharing the costs of fuel, tolls, and parking, carpooling helps save money and reduces the burden of transportation expenses. It also allows passengers to relax, work, or socialize during the commute, making the journey more productive and enjoyable. From a broader perspective, carpooling contributes to the reduction of traffic congestion, especially during peak hours, by reducing the number of vehicles on the road. This leads to shorter travel times, improved traffic flow, and less frustration for commuters. Additionally, carpooling helps alleviate parking space shortages in crowded areas, as fewer parking spots are needed when multiple passengers share a vehicle. With the advent of technology, carpooling has been revolutionized by web and mobile applications that connect drivers and passengers in a convenient and efficient manner. These platforms facilitate the matchmaking process, allowing users to find suitable carpooling partners based on their travel preferences, schedules, and routes. Such applications provide a user friendly interface, secure payment systems, and features like real-time tracking, ratings, and reviews, enhancing the overall carpooling experience. Carpooling not only provides practical benefits but also fosters social connections and community building. Technological and data analytics advancements have led to the emergence of new options for transportation, such as app-based and ondemand services. These innovations have the potential to significantly influence travel demand and behavior. Implementing carefully designed rules and planning strategies, supported by a comprehensive understanding of how these services integrate into the larger transportation system, is essential to address transportation issues such as traffic congestion and air pollution using these emerging mobility options [5]. These new forms of transportation will only make travel and mobility worse in the absence of policies that encourage sustainability. Bikes and automobiles are in high demand because on-demand transportation services like Uber and Pathao make them available to those who would not have them otherwise. There would be more automobiles on the road if more people started using them, as more drivers would join ondemand services to fulfill this need.

The workflow illustrates the interaction between the The workflow represents the process of a smart bike-

API and the Driver in a ride-sharing system, outlining

sharing system, detailing the steps involved from user the processes for calculating fares and managing rides.

login to ride completion. It begins with the user logging

It is divided into two main sections: API and Drive, in to the system, where a check is performed to verify each handling specific aspects of the system. if the user account exists. If not, the user is prompted On the API side, the process begins with calculating to sign up. Once logged in, the user proceeds to book a the distance for a requested ride, followed by bike. If the booking is successful, the bike is confirmed determining the estimated ride duration. This as booked, and the process moves to the ride

management phase. information is sent to the client and driver via a real time communication channel (e.g., Socket IO). The At the start of the ride, the user is given the option to API continuously processes the driver's current

cancel. If the ride is not canceled, the user begins the destination and fare details, sending updated journey at the start station, with ride details being

information to the client. At the end of the ride, the API logged in the system's central database. As the ride finalizes the fare and distance details and sends them progresses, data from intermediate stations, if any, is to the client. also recorded in the database. Finally, the ride On the Drive side, the process starts with the driver concludes at the last station, where the system accepting a ride request. Once the ride begins, the calculates the total charges based on the journey's

duration and stops. driver's current location is periodically sent to the API (every 20 seconds) to recalculate the distance. When Throughout the process, the database plays a crucial the driver stops the ride, the API calculates the final role in logging user actions, ride details, and charge distance and fare, which is communicated back to the

calculations, ensuring smooth operation and tracking. client. After charge calculation, the ride is marked as

This workflow ensures seamless coordination between

completed, and the process ends. This workflow the driver and the client, using the API to manage real-provides a structured and efficient approach to managing a smart bike-sharing system. time updates and fare calculations, making the system efficient and user-friendly.

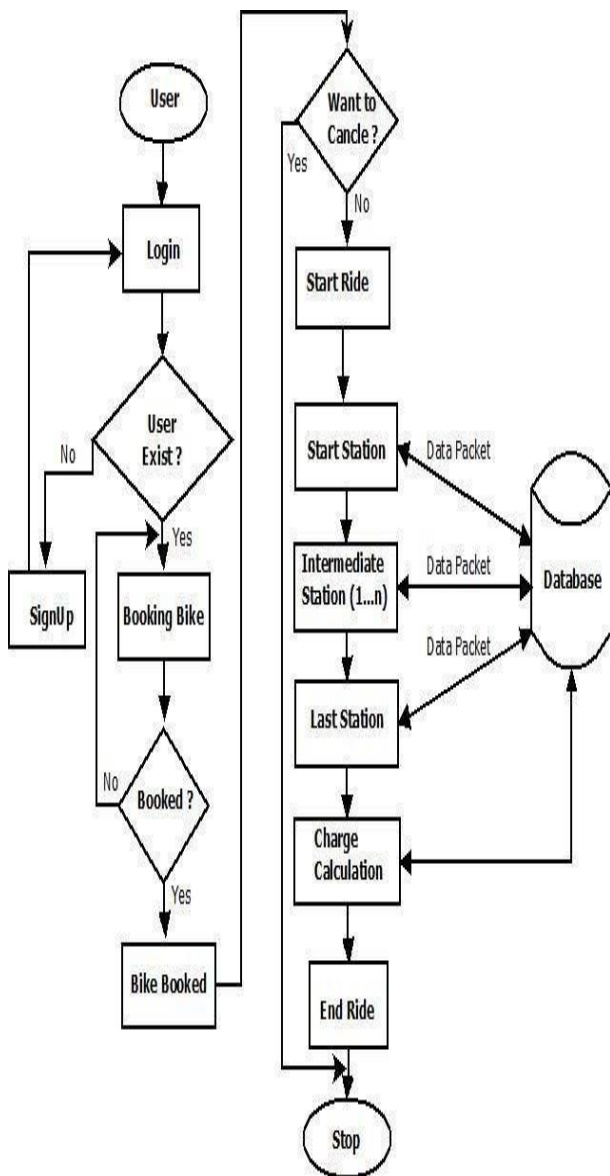


Fig 1: Use Case Diagram for College Pool

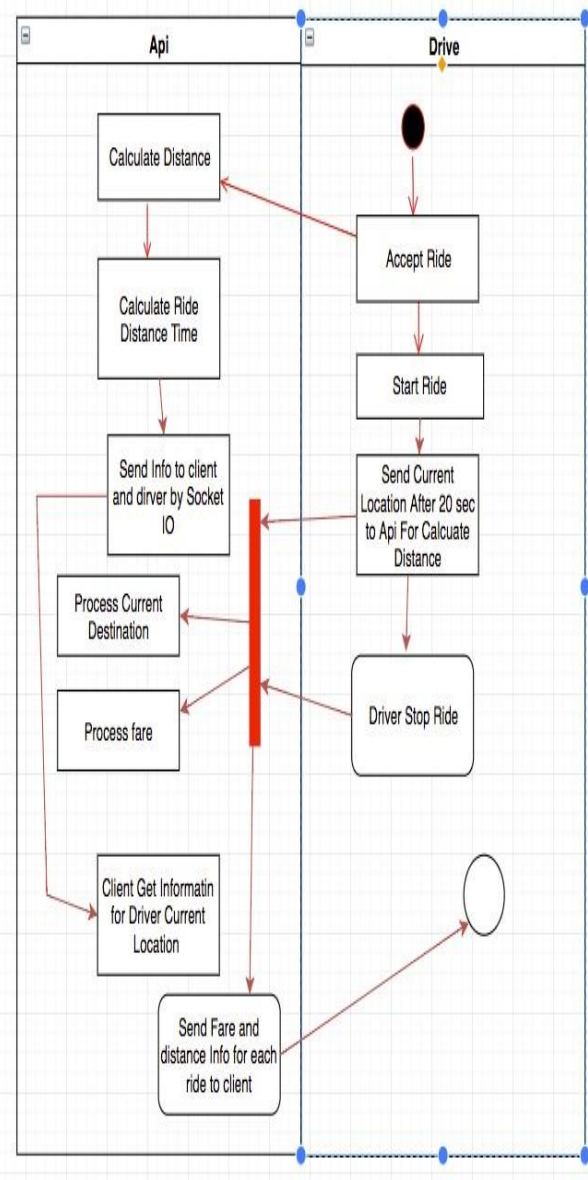


Fig 2: Deployment Diagram

II . OBJECTIVE

The primary objective of "College Pool" is to establish a smart, secure, and sustainable ride-sharing platform that enhances transportation efficiency for college students, faculty, and staff. The platform is designed to foster a community-driven approach to commuting by facilitating shared rides, reducing individual transportation costs, lowering carbon emissions, and improving accessibility. By leveraging advanced technology such as AI-driven ride matching, real-time route optimization, and integrated safety features, "College Pool" aims to revolutionize the way college members travel to and from campus. This initiative promotes a culture of eco-friendly

transportation, convenience, and cost-effectiveness, ensuring a seamless and hassle-free commuting experience. The key objectives include:

1. Alleviating Transportation Challenges

By facilitating shared rides among campus members, "College Pool" aims to reduce transportation issues such as parking shortages and traffic congestion, which are common in suburban university settings. This approach is supported by studies like "Ridesharing as a Potential Sustainable Transportation Alternative in Suburban Universities: The Case of Najran University, Saudi Arabia," which highlights the

benefits of ride-sharing in reducing campus traffic and parking demand.

2. Promoting Sustainable Travel Behavior

The platform encourages environmentally friendly commuting habits by decreasing the number of single-occupancy vehicles. Research such as "Exploring Shared Travel Behavior of University Students" indicates that shared transportation options can significantly lower carbon emissions and promote sustainability on campuses. [1]

3. Enhancing Safety and Reducing Impaired Driving

"College Pool" provides a reliable transportation alternative, contributing to the reduction of substance-impaired driving incidents among college students. The study "College Student Use of Transportation Networking Companies: An Opportunity to Decrease Substance-Impaired Driving" suggests that accessible ride-sharing services can play a crucial role in improving student safety.

4. Improving Accessibility and Convenience

By offering a user-friendly platform for coordinating shared rides, "College Pool" enhances mobility options for students without personal vehicles. The research paper "A Ride Sharing System for University Community" discusses how tailored ride-sharing systems can effectively address the unique transportation needs of university populations.

5. Building a Connected Campus Community

Beyond transportation, "College Pool" fosters social interactions and strengthens community bonds among users. The study "VISHWA-CONNECT: A Ride Sharing Mobile Application for Campus Students" illustrates how ride-sharing platforms can enhance social connectivity within the university environment. [3]

III. LITERATURE REVIEW

Transportation has always been a crucial factor in university campuses, influencing students' punctuality, mobility, and overall academic experience. With the increasing number of students and faculty members relying on personal vehicles or inefficient public transport, university campuses are experiencing congestion, parking shortages, and environmental concerns. Ride-sharing, a cost-effective and sustainable mobility solution, has gained attention in recent years as an alternative to traditional campus transport.

Several studies have explored the impact of ride-sharing services in higher education settings, highlighting its benefits in reducing traffic congestion, enhancing convenience, and promoting sustainability. This literature review examines existing studies related to:

1. The need for university ride-sharing platforms

AI-driven ride-matching and optimization

Security, trust, and user adoption factors

Economic and environmental benefits of ride-sharing

Future smart mobility trends in higher education

By synthesizing research from journals, conference papers, and real-world ride-sharing implementations, this review aims to establish a strong foundation for the "College Pool" ride-sharing platform, ensuring its effectiveness as a campus-based transportation solution.

2. The Need for Ride-Sharing in University Campuses

University campuses typically struggle with overcrowded parking lots, increasing transportation costs, and inefficient commuting options. Public transport availability is often limited, and individual car usage contributes to excessive fuel consumption and emissions. Studies have suggested that carpooling and ride-

sharing services can significantly improve campus mobility.[32]

3. AI-Based Ride Matching and Optimization

A successful ride-sharing platform depends on efficient ride-matching algorithms. Research has shown that AI-driven ride allocation can improve travel time, passenger satisfaction, and fuel efficiency by considering real-time traffic conditions, ride history, and route optimization techniques.[33]

4. Security and Trust in Ride-Sharing Platforms

One of the major barriers to ride-sharing adoption is concern for personal safety and trust between drivers and passengers. Research has consistently emphasized the need for user authentication, real-time tracking, and emergency response mechanisms in ride-sharing platforms.[40]

5. Economic and Environmental Benefits of Ride-Sharing

Ride-sharing is not only a cost-saving solution for students but also a green transportation alternative that helps reduce carbon emissions and fuel consumption. Studies suggest that structured campus ride-sharing can lead to significant financial and environmental benefits.[37]

6. Future Smart Mobility Trends in Universities

As technology evolves, ride-sharing platforms are integrating electric vehicles, public transport synchronization, and AI-driven route planning to improve campus mobility further.[22]

The existing literature on campus ride-sharing solutions highlights the need for structured, AI-driven platforms that prioritize safety, efficiency, and sustainability. Research findings suggest that integrating intelligent ride-matching algorithms, user security features, and cost-saving mechanisms can significantly improve the adoption of campus ride-sharing services.

The "College Pool" ride-sharing system aligns with these research insights, aiming to create a seamless, secure, and eco-friendly commuting solution for university students and faculty. Future advancements, such as electric vehicle

integration, multimodal transport connectivity, and AI-based ride personalization, will further enhance the efficiency and effectiveness of the platform.

By adopting best practices from existing research and leveraging emerging mobility trends, "College Pool" has the potential to revolutionize university transportation, making it smarter, safer, and more sustainable.

IV. PROBLEM STATEMENT

Students and staff of **Priyadarshini College of Engineering** often face difficulties in commuting due to high transportation costs, lack of reliable public transport, and the inconvenience of traveling alone. Many individuals drive to college daily with empty seats in their vehicles, leading to unnecessary fuel expenses and increased traffic congestion. At the same time, those without a ride partner struggle to find affordable and efficient commuting options.

To address these challenges, **College Pool** aims to provide a dedicated ride-sharing platform exclusively for the students and staff of Priyadarshini College of Engineering. The platform will allow users to connect with others traveling on the same route, enabling them to share rides, split fuel costs, and reduce individual transportation expenses. With a verified user system, in-app messaging, ride scheduling, real-time tracking, and secure payment options, College Pool ensures a safe and seamless commuting experience.

By facilitating carpooling among students and staff, this initiative will not only help users save on petrol costs but also contribute to reducing traffic congestion and carbon emissions. Additionally, it fosters a sense of community within the college by encouraging collaboration and social interaction among peers. The **College Pool** project aims to create a sustainable, cost-effective, and eco-friendly transportation solution that benefits both individuals and the environment.

V . METHODOLOGY

The "College Pool" platform is a ride-sharing system designed to improve campus commuting by offering safe, cost-effective, and eco-friendly transportation solutions for students, faculty, and staff.

1. User Registration and Profile Setup

Users register using their college email ID to ensure only verified members can access the platform. Registration includes: Home and college location, Preferred commute timings, Role: Driver (offering rides) or Passenger (seeking rides), Ride preferences (e.g., gender preference, smoking policy, etc.), AI-powered profile verification enhances security, reducing unauthorized access.[15]

2. Ride Creation and Search

For Drivers: Drivers list available seats, departure time, and route. Options include pickup/drop points, ride fees (if applicable), and passenger preferences. The ride is then made visible to potential passengers.[17]

For Passengers: Passengers input their pickup location, destination, and preferred travel time. The system suggests the best-matching rides using AI-powered algorithms. Passengers can book an instant or scheduled ride for better planning.

3. AI-Based Ride Matching and Optimization

The platform's AI-driven matching algorithm pairs users based on: Route similarity and minimum detour allowance, Time availability and commute history, User ratings and reliability. The system minimizes waiting times and optimizes ride-sharing [23]

4. Secure Ride Confirmation and Communication

Once a ride is matched, both driver and passenger receive ride details. In-app chat and notifications allow real-time coordination. Alerts for delays, ride cancellations, and

pickup changes ensure better user experience.[9]

5. Safety and Security Measures

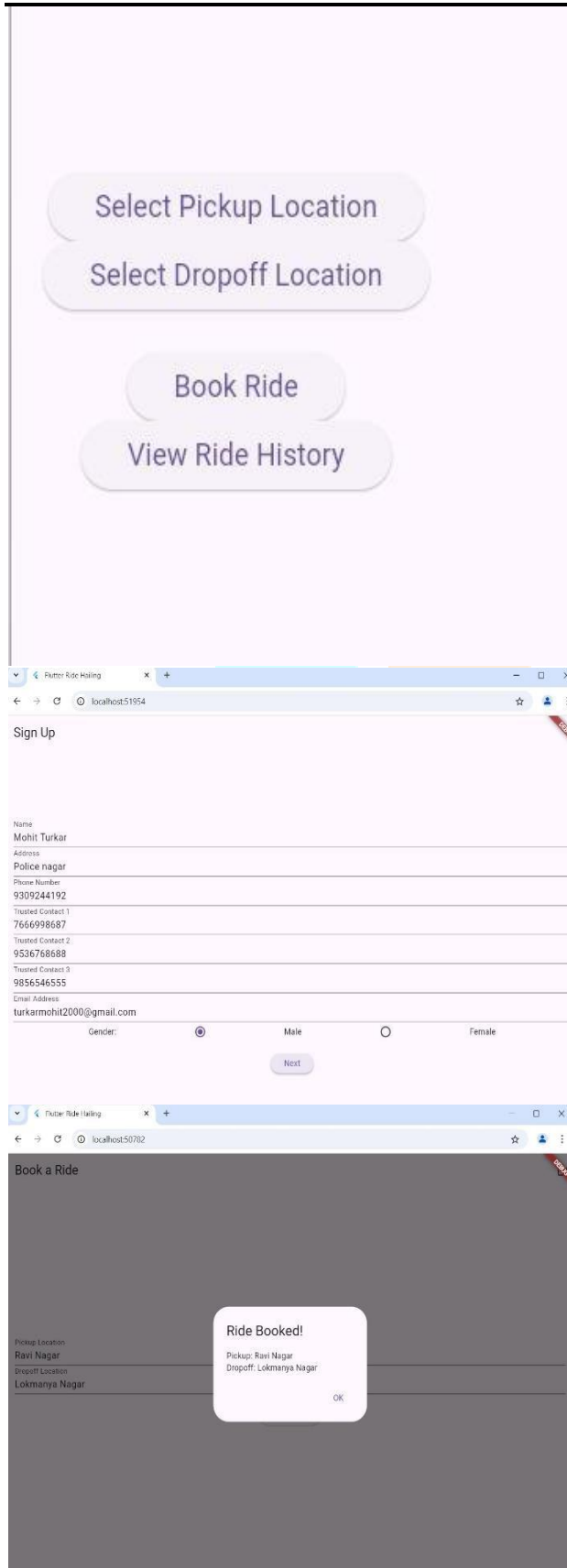
To enhance security, "College Pool" integrates: Verified User Authentication – Only authorized college members can access rides. Live GPS Tracking – Rides can be monitored in real-time for safety. SOS Emergency Button – Instant alerts for emergencies. Ratings and Reviews – Drivers and passengers are rated to maintain a quality service.[3]

6. Cost-Sharing and Payment Integration (Optional Feature)

The system calculates fair ride-sharing fares based on: Distance covered, Fuel cost estimation, Campus policies on cost-sharing. Payments can be made via UPI, Google Pay, PayPal, or in-app wallets. Users can choose to split costs automatically through the app[21].

7. Post-Ride Feedback and Community Building

After each ride, users can: Rate their experience (driver/passenger ratings). Provide feedback on punctuality, safety, and behavior. Earn ride-sharing reward points to promote eco-friendly commuting. The system encourages a community-driven ride-sharing culture, making commutes more interactive and enjoyable.



VI. FEASIBILITY

The College Pool app is highly feasible both technically and economically. From a technical perspective, the app leverages widely available technologies such as Node.js, React Native, and

Google Maps API, which ensures smooth performance, cross-platform compatibility, and effective route optimization. The app's backend can easily scale to accommodate growing numbers of users and integrate additional features like real-time traffic updates or machine learning algorithms to improve route matching accuracy. Economically, the app has a strong potential for adoption. With many students seeking cost-effective transportation options, College Pool can significantly reduce commuting expenses by allowing students to share rides, while also offering drivers a way to offset fuel and maintenance costs. The low operational costs of the app, due to the reliance on mobile technology and minimal infrastructure requirements, make it a cost-effective solution. Furthermore, the environmental impact of reducing single-occupancy vehicles supports the app's alignment with growing trends toward sustainability and green solutions, enhancing its appeal among students and educational institutions. Overall, the College Pool app is both technically feasible with current resources and economically sustainable in a college setting. Market feasibility is driven by assessing the target market's demand for ride-sharing services, identifying competitive advantages, and deploying effective marketing strategies. The app must differentiate itself from competitors like Uber or Lyft by offering unique features and value propositions to attract and retain users. Additionally, social and environmental sustainability play a role in the app's long-term success, as ride-sharing contributes to reducing congestion and emissions. However, challenges such as intense competition, driver retention, regulatory hurdles, and high customer acquisition costs must be managed carefully.

Ultimately, despite the challenges, developing a ridesharing app is feasible with a solid plan, strategic investment, and the right operational and market approaches, offering significant growth potential in the evolving transportation landscape. Moreover, the success of a ride-sharing app is closely tied to its ability to foster trust among users and drivers. Features like driver verification, ride tracking, real-time support, and safety measures such as emergency buttons and insurance coverage help build credibility. The app also needs to continuously

innovate by adopting new technologies like machine learning for route optimization and

VII. CONCLUSION

In conclusion, a ride-sharing app is an innovative and impactful solution that addresses key challenges in modern transportation, offering a more efficient, affordable, and convenient way for people to commute. By connecting riders and drivers seamlessly through a user-friendly platform, the app eliminates the need for private vehicle ownership, reduces traffic congestion, and offers an eco-friendly alternative to traditional modes of transport. The app's success is grounded in the use of advanced technologies like real-time GPS tracking, dynamic pricing, and secure payment gateways, which ensure smooth and reliable operations.

The methodology followed in the development of the app ensures that every aspect—from user interface design to back-end infrastructure—is meticulously planned and executed. Agile development practices allow for iterative progress, enabling the team to adapt to user feedback and market demands, ensuring that the app remains relevant and competitive. Furthermore, a strong focus on safety, with features such as driver verification, ride tracking, and emergency response capabilities, builds trust among users, encouraging widespread adoption. Financially, the app offers various revenue models, such as commission-based earnings, surge pricing, and in-app advertisements, which can drive sustainable growth. Additionally, the app provides drivers with flexible earning opportunities, empowering them to work according to their schedules and enhancing overall satisfaction. This mutual benefit between drivers and riders is fundamental to the app's success, creating a balanced ecosystem that encourages repeat usage. From an environmental perspective, ride-sharing contributes significantly to reducing individual car ownership, leading to fewer cars on the road, lower fuel consumption, and a decrease in harmful emissions. This aligns with global sustainability goals and appeals to a growing segment of environmentally-conscious consumers. However, challenges such as competition from established players, regulatory compliance, and maintaining user trust must be carefully managed.

predictive pricing, ensuring that users have the best experience possible.

The app needs to continuously evolve to meet the changing needs of users and adapt to new technological advancements in the transportation sector. Effective marketing strategies and partnerships, along with user engagement initiatives like referral programs and incentives, are critical for building a loyal user base. In the long run, the ride-sharing app has the potential to revolutionize urban mobility by offering a flexible, cost-effective, and sustainable transportation option that meets the needs of modern consumers.

VIII . FUTURE DIRECTIONS

The future directions for a ride-sharing app are focused on enhancing its functionality, expanding its user base, and embracing emerging technologies to stay ahead of the curve. One key area of development is the integration of electric vehicles (EVs) into the fleet, which would reduce the app's carbon footprint and appeal to eco-conscious users. As governments around the world push for sustainability, ride-sharing apps can play a significant role in supporting the transition to cleaner energy. Autonomous vehicles also represent a major opportunity, with self-driving cars potentially revolutionizing the ride-sharing industry by reducing operational costs and providing a more efficient, 24/7 transportation service.

Additionally, machine learning and AI can be leveraged to improve route optimization, dynamic pricing, and customer service. By analyzing user data, these technologies can predict demand more accurately, offer personalized recommendations, and enhance overall user experience. Multi-modal transportation is another exciting direction, where the app could integrate different types of transport, such as bikes, scooters, and public transit, to offer users a more comprehensive and flexible mobility solution. Furthermore, expanding into new markets—especially in emerging economies with rapidly growing urban populations—presents significant growth potential. These regions often face challenges like traffic congestion and limited public transport, making ridesharing a highly attractive solution. The app can also develop new revenue models, such as subscription-based services

for frequent riders or corporate partnerships for employee transportation solutions. In terms of user experience, focusing on safety, privacy, and trust will be crucial. The app should continue to innovate with new safety features, such as in-app emergency buttons, enhanced driver verification, and real-time ride tracking, to ensure users feel secure. Additionally, fostering a stronger relationship between the app, drivers, and riders will improve retention and satisfaction.

Overall, the future of ride-sharing apps is bound to evolve with advances in technology, sustainability,

and user-centered innovation. As the landscape shifts, these apps will need to remain adaptable, continuously refining their offerings to meet the changing needs of users, enhance their operational efficiency, and contribute to the development of smarter, more sustainable cities.

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