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Research Article

Ridesharing Today and Tomorrow: A Review of Current Practices and Future Directions

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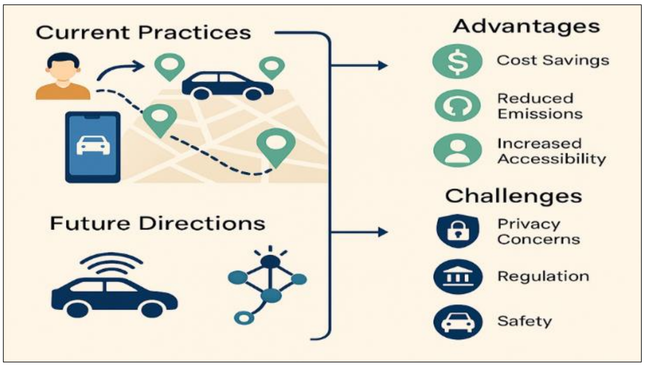
Abstract — Ridesharing services have become an essential part of modern urban transportation, offering flexible, affordable, and efficient travel options. This paper presents a structured review of current ridesharing practices, highlighting major developments in platform design, real-time ride matching, route planning, and pricing strategies. The study investigates how these systems operate, the technology they rely on, and the impact they have on urban mobility. By reviewing academic studies and real-world applications, the paper outlines the growth of ridesharing platforms and the changing behavior of commuters. The paper identifies various benefits such as reduced travel costs, lower emissions, and better use of transport infrastructure. At the same time, it also addresses pressing issues such as user privacy, inconsistent regulations, and system reliability. Theoretical models related to optimization, scheduling, and decision-making are introduced to explain the mechanisms behind ridesharing operations. The research also includes a discussion on the challenges platforms face in ensuring fairness, scalability, and user trust. This work contributes by connecting current trends with upcoming innovations, including the potential role of automation and smart city integration. The findings suggest that while ridesharing has transformed how people commute, there is still a need for stronger data policies, improved safety measures, and wider accessibility. The paper concludes by identifying areas for future research, such as developing context-aware algorithms and expanding ridesharing services in low-access regions. This review serves as a useful resource for transportation planners, developers, and researchers working to improve shared mobility systems.

Keywords—Ridesharing, Sustainable, Mobility, Platform, Carpooling, Mobility as a Service (MaaS)

Graphical Abstract



Highlights :

- Ridesharing platforms facilitate urban mobility by recommending a rideshare with optimal matches (e.g. cost sharing, reduced routes).
- Ridesharing platforms employ various technologies including GPS, mobile applications, and intelligent algorithms to scale with user feedback.
- Issues around data ownership, regulation, and safety are paramount for rideshare platforms to be accepted and trusted on a broad scale.

1. Introduction

Urban mobility is changing rapidly and in unprecedented ways, as cities across the world face issues driven by increasing population densities, excessive vehicular congestion, environmental challenges, and changing consumer needs from commuters adapted to the digital age. Ridesharing has emerged as a highly visible technology-based alternative to traditional transportation options. Ridesharing is defined as the sharing of a passenger vehicle trip with multiple passengers embarking on the same route. Ridesharing uses modern communication functions to connect drivers and passengers in real-time to decrease the number of vehicles on roads and improve the efficiency of transportation [4],[5],[10].

Although ridesharing is not a novel term, it has been practiced informally through carpooling and van-sharing for many decades. The progress and evolution evidenced by smartphones, GPS technology, cloud computing, and business analytics have reinvented ridesharing [2],[12],[13]. Increasingly sophisticated ridesharing platforms, including

Uber and Lyft, have taken the ridesharing model far beyond establishing routine coordination to provide flexible pricing, real-time ride matching, payment systems, rating systems, and marketing [10],[5]. These technologies and services help facilitate ridesharing in urban areas, helping demonstrate ridesharing has transitioned from a niche service to a popular option for mobility in urban areas [1],[12].

The growing importance of ridesharing is underscored by international efforts to reduce greenhouse gas emissions, and funneling resources toward sustainable development within urban settings. Transportation is a leading source of carbon emissions, particularly in urban areas that rely on single occupancy, private vehicles. Ridesharing, can offer emissions reductions to the proportion of mobility-dependent urban citizens, lessen parking demand, and help cities toward greener infrastructure [1],[11],[15]. Additionally, ridesharing models that use electric vehicles (EVs) or in combination with public transport provide even greater potential environmental benefit [3],[11],[15]. Despite experiences chronicling its rapid rise and projected transformative possibilities, there are still common socio-economic, regulatory, and technology barriers to service adoption and expansion [4],[6],[10].

Trust and safety concerns are still a major barrier, especially in areas where regulatory powers haven't been established [5],[9]. Issues related to user privacy, data protection, and digital accessibility have emerged as a significant concern for consumers and policy makers alike [6],[9]. Economically, the viability of ridesharing as a sustainable business model has also come into question, especially in light of price wars, discontented drivers and ongoing debates about platform sustainability [6],[4].

From a societal focus, ridesharing implications are broader than environmental impacts. It offers important access to an underrepresented segment of the community by allowing people without access to private vehicles to have reliable, affordable, & flexible transportation [5],[9],[14]. It also facilitates job creation in the gig economy, allowing individuals to earn supplemental income through driving [6],[10]. Nevertheless, the rise of ridesharing has also introduced new tensions, including disputes over labor rights, insurance liabilities, and urban congestion caused by platform-driven vehicle surges in high-demand areas [4],[9].

In recent years, academic and industry research has begun to explore these multifaceted dimensions of ridesharing more comprehensively. Studies have focused on ride-matching algorithms, pricing mechanisms, behavioral patterns of users, and the integration of ridesharing with other transportation modes [3],[4],[10],[5]. There is growing interest in understanding how urban design, policy frameworks, and technological innovation can collectively shape the future of shared mobility [4],[10],[15]. Researchers are also examining the scalability of ridesharing platforms in diverse settings, including low-density suburbs and rural areas, where the economics of shared transport differ significantly from metropolitan environments [9],[11].

This study provides an exploration of the growth and application of TravelMate, while also allowing for unfiltered observations on user engagement, considerations regarding competing designs and usability, and the infrastructure that helps build ridesharing on the ground level [7],[8].

The research also highlights the urgency to assess how ridesharing platforms can utilize sustainability goals, resilient urban mobility frameworks. Cities around the world revisit transport policies for a climate resilience agenda, limiting vehicles, and an access agenda for more urban mobility [1],[11],[14]. In these situations, ridesharing is increasingly seen as a key ingredient within smart transportation systems, while also contributing data to urban planners and allowing for personalized mobility solutions for different populations [4],[10].

The contribution of this paper in the academic space also includes review & understanding of the latest technologies that have attempted to shape the ridesharing field. This includes Artificial Intelligence (AI) for route optimization, blockchain for accountable payment systems, and Internet of Things (IoT) devices for safer monitoring [12],[13]. The study reviewed operational improvements from these technologies, user friction reduction, and trust within shared transportation systems [12],[13]. The study also pointed out the ineffective regulatory environment governing the ridesharing landscape and provided frameworks on how public authorities and private mobility providers may co-operate [4],[10].Ultimately, this study seeks to bridge the gap between the conceptual promise of ridesharing and its practical implementation. It advocates for a balanced perspective that recognizes both the advantages and limitations of ridesharing as a mobility solution. While the benefits are substantial—ranging from environmental sustainability to social inclusivity—the road to widespread adoption demands concerted efforts from developers, policymakers, urban planners, and end-users alike [5],[10],[15].

The rest of this paper is organized as follows: Section 2 presents a survey of related work in the field of ridesharing and mobility systems. Section 3 examines the operational and strategic challenges affecting the success of ridesharing platforms, highlights key advantages such as cost-efficiency and environmental benefits, and outlines the theoretical models and algorithms that underpin their functionality. Section 4 outlines the implementation details and system architecture and discusses the proposed methodology and design principles adopted in the development of the TravelMate application. Section 5 provides a detailed analysis of the results and a discussion of key findings. Finally, Section 6 concludes the paper with a summary of insights and suggests directions for future research and development.

2. Related Work

Grand View Research states that this technology significantly impacts urban Mobility, sustainability, and cost-effective reduction of traffic congestion and emissions by vehicles. Currently, the key research focus is optimizing ride-matching algorithms, dynamic pricing & increasing trust among users via robust security. Significant studies are ongoing to find solutions to improve the range and reliability of ridesharing, and affordability, regulatory compliance, and user acceptance are the challenges ahead [1].

From The Lean Startup, Eric Ries promotes validated learning, rapid iterations and product development. Startups ship a Minimum Viable Product (MVP) to test assumptions and get feedback through the Build–Measure–Learn loop. Reduces waste and makes you focused on good things. It is the perfect way to test ridesharing app algorithms, pricing, and Safety features to get values faster [2].

In a 2016 study, Chen and Kockelman see that shared autonomous electric vehicle (SAEV) fleets improve the urban Mobility of cities. They develop fleet performance models focusing on routing, charging infrastructure and rebalancing. The study shows that SAEV can decrease vehicle ownership, congestion, and emissions[3].

Wang and Yang investigate the ridesharing growth, problems, and future in their research published in 2019. Technologies boosted by extraordinary advancements (mobile apps, real-time data, etc.) are gaining immense popularity. Traffic trends such as autonomous vehicles and electric fleets are coming, but sustainable business with regulatory support remains crucial for success [4].

The European Transport Research Review conference will examine ridesharing as a service, both profit and non-profit. In total, we identified 12 characteristics/attributes of platforms and 16 user elements grouped into sociodemographic, location and system. They are needed for ridesharing. Economic, Technological and Regulatory Barriers[5].

Based on ridesharing, the genesis of passenger satisfaction, passenger satisfaction, more importantly, service quality, service perception quality, perceived value for money passenger loyalty. In addition, in app-based ridesharing service, quality and value for money indirectly impact loyalty through satisfaction as a mediator[6].

Ridesharing (what we commonly know as carpooling) is another trending approach to popularise the sharing of car rides to reduce vehicular traffic, carbon emission and parking load. In cities, mass transportation has lengthy journey periods due to traffic complications caused by additional automobiles. Carpooling is a sustainable, greener answer to these challenges and an engine of urban Mobility [7].

Car Pooling Web Application Matches drivers with empty seats available for people headed in the same direction. Meant to encourage shared rides, solve congestion problems, reduce environmental concerns and reduce the cost of rides. Users come to the platform, register, and provide their details. Drivers would input every trip they will take in the future - starting point, destination, date, time and how many seats can be filled. Passengers can browse these listings later to pick a suitable ride and request boarding[8].

Binod Mishra covers the recent impact of online-based industries as seen via public internet access. With the internet, opportunities for economic relationships aiding economic expansion also saw a rapid rise of online-driven economies, even in Nepal. Ridesharing started with Uber in general globally (2009), and Uber remains one of the leading industries worldwide [9].

Fernando Ordóñez, Masabumi Furuhata, Maged Dessouky, Marc-Étienne Brunet, Xiaoqing Wang, and Sven Koenig offers a full-fledged ridesharing. Though ridesharing has many benefits, namely lower travel prices, fewer traffic jams, and less pollution, issues have thwarted its broader viability. The percentage of work-related trips in which someone uses ride-sourcing via real-time information to help support declined by nearly 10 % over the last 3 decades, even though communication technologies have allowed the increased use of ridesharing is heavily attributed to the introduction of modern technologies and has contributed significantly to the market consolidation transportation sustainability [10].

Modern technologies, to some extent ridesharing becoming more popular, are playing one of the driving forces behind the change towards sustainable transportation solutions. A 2023 study in Bangladesh relying on an online survey of more than 1,300 respondents takes a deep dive into ride-hailing apps (i.e. Pathao and Uber) usage patterns [11].

The ridesharing revolution is examined in greater detail in this deep dive from the Uber Engineering Blog. It explains the complex machinery that runs ride-matching, routing optimization, optimization, and real-time data processing to increase daily operational efficiency from the ground up. With these innovations, Uber strives to solve urban mobility issues and provides a more efficient and sustainable solution for users worldwide [12].

Google Developers Blog goes into integrating APIs and tools like Google Maps that can further optimize ridesharing solutions. It highlights these technologies, which allow hyper-local notice and precise geolocation, route optimization, and live tracking, which drive efficiencies and a better user experience for ridesharing platforms [13].

Shivani and Soni looked at the disruptive nature of ridesharing for travel in cities as a potential solution to tackle issues of urban traffic congestion, for commuters to save on travel expenses, and for providing a sustainable travel alternative. They looked to the literature regarding feeder ridesharing services and eventually came to the conclusion that ridesharing could improve accessibility and urban mobility, but this would require ridesharing providers to build better partnerships with existing public transport systems[14].

Kumar and Sharma similarly evaluated risesharing as a means of enhancing sustainability in public transportation.

Their analysis connected urban sustainability with carbon emissions abatement and suggested directions for the future such as including ridesharing with electric vehicles (EVs)[15].

3. Theory

Ridesharing systems are developed and operated using many theories from transportation science, operations research, and economics. Although this paper is not empirical in its modeling or calculation, it discusses the theoretical ideas that underpin how contemporary ridesharing services create systems that operate.

A key principle is route optimization, directing attention to how to determine the most optimal route between multiple origins and multiple destinations. Algorithms of the type of Dijkstra's and A* will provide the shortest path. Real-Time Global positioning systems (GPS) incorporated with traffic data can allow ridesharing platforms to update routes based on real information, thereby optimizing time, cost, and environmental footprint.

Driver-passenger matching is another key area, which is usually modeled as a bipartite vertex matching problem type in graph theory. The goal of this driver-passenger matching is to assign riders to drivers in close proximity to their listed origins, rather than just riders who happen to be near to their end destination. Assumptions around distance, estimated time from origin to destination, and pricing also factor into this matching. The commonly used approaches are Greedy methods, heuristic methods, and auctions; each method can be improved by using historical information.

Statistical models allow for demand forecasting and dynamic pricing, modeling request patterns according to temporal and spatial features. The temporal features that influence pricing models include fairly complicated time-of-day, daytime, local weather, and local events influences. Ridesharing platforms can effectively manage large fluctuations in demand through things such as surge pricing, appropriate continuum surges are based on microeconomic theory to ensure that riders have availability to companions and drivers have availability to rides.

Successful marketing and usability strategies are guided by theories of engagement and user designs, and feature theories of behavioral engagement and incentive engagement. Engagement can be increased by using discounts to help drive frequency and when it is inconvenient for local users, offering reward structures for ride pooling, or unplanned travel through off-peak incentives.

Whereas ridesharing platforms gain efficiencies in the similar concept as where game theory can be applied to deal design and operational costs, they create systems that operate efficiently according to individual goals with full market efficiency. As discussed above, by employing these theories ridesharing, services potentially become intelligent, adaptable, and scalable systems for responding to urban mobility needs.

These efficiencies allow ridesharing platforms to maintain successful sustainable, efficient scaling in urban areas, and provide users with affordable and timely service. These advantages enable ridesharing platforms to operate more sustainably, scale efficiently in urban environments, and deliver timely, cost-effective services to users.

3.1 Instant Scheduling : With ridesharing, passengers use their mobile phones to book rides of complete that they can use within a few minutes of booking it, which makes transportation quick and easy. Ridesharing starkly contrasts these traditional taxi services that often require scheduling ahead of time or waiting indefinitely for a car to become available through real-time ride-matching, resulting in substantially lower wait times. This is especially helpful in regions without (or minimal) public transportation solutions.

3.2 Cost Sharing : The most enticing feature of ridesharing is the low cost. Passengers pay with other people travelling in the same direction. Thus, the costs are decreased. For drivers, this model gives a chance to earn hassle-free additional income. Ride sharing allows to share the expenses related to fuel and car maintenance, resulting in lower travel prices per citizen than those offered by the private cars or the traditional taxi transportation system.

3.3 Driver Flexibility : With ridesharing apps, drivers can choose what hours they want to work and drive either all day long, part-time, or even at peak and high-demand hours. This flexibility makes it appealing for those who want extra cash but do not want to be tied down to a specific schedule. Work-life balance and improved satisfaction with the job itself, thanks to the flexibility of choosing when and where a driver wants to work.

3.4 Environmental Impact: Ridesharing allows less fuel and less carbon to be shot into the atmosphere, as rideshare vehicles will always ensure that units of a high capacity are filled timely rather than taking multiple solo rides in a spare car. Transitioning to eco-friendly urban transportation thus contributing to the fight against climate change and creating greener, more liveable cities worldwide.

3.5 Public Transport Integration : Rideshare is complementary to public transportation by filling the last-mile gap transporting commuters to their final destinations from transport hubs, such as locations where buses or trains stop. Scoot & other ridesharing companies partner with local transit authorities to increase accessibility, minimize reliance on private vehicles & optimize public transport networks.

3.6 Real-Time Tracking: Ridesharing apps often use real-time GPS tracking so that passenger can track their ride status, expected arrival times, and route information. This adds to the ease factor and enriches safety, as the passengers and their families can monitor their trips live through real-time navigation for optimized routes, less waiting time and more efficiency for drivers.

3.7 Community and Social Interaction: Ridesharing is more than taking a person from point A to B—it also assists with social interaction, allowing the riders to engage with one another during their commute. A comfortable discussion between the passengers and drivers makes it easier for them to enjoy the daily commute.

3.8 Urban Mobility : Ridesharing helps to increase flexibility in urban transportation infrastructure as an alternative to traditional commuting. With the urban population growing, traffic jams and transport inefficiencies are the real, upcoming problems. Because of this, ridesharing effectively solves all of these problems, by optimizing usage of the vehicle, reducing reliance on private cars, and making transport easier for the general population.

Figure 1. Application of Ride Sharing

There are many difficulties in operating ridesharing platforms that must be managed to maintain long-term success. One of the most essential Challenges is those Derived from regulatory frameworks. Companies are generally left in the dark when cities and regions create policies that will govern ridesharing companies, promoting or punishing change. Another big issue for drivers and passengers is safety concerns. Safety both ways is crucial since taxi-sharing involves a stranger riding in your car. Take pilots to driver background checks and ensure vehicles are street legal and compliant with any emergency in the company's app. These measures encourage users to trust & secure these as they are vital for the further platform boom.

Demand management and supply management are the significant hurdles. Most ridesharing platforms struggle to scale with demand during peak hours or high-demand events, which means longer ride times and unhappy customers. When demand tails off, drivers get lower fares, which means hardship. Data privacy is another issue that needs to be watched. Much of the data gathered by ridesharing services is personal (like the exact routes you are taking and payment). Keeping this data breach-free and following the privacy policy keeps the user's trust alive. Paranoia can be removed only if we emphasise the context of data protection and use.

Lastly, Competition in ridesharing can also make scale pricing behaviour impossible. This almost always is at the cost of service level & driver pay because there is no better way for a company to reach user volumes than by lowering its costs and prices. If these pricing approaches are not catalogued carefully, the service's economics and the customer experience's value can bleed out. One lucrative aspect that ridesharing companies have to stick with is ensuring fair pricing and offering adequate measures for users & drivers. Ride-hailing companies are to adapt, innovate, and be flexible to these obstacles and increased hurdles in part.

Table 1. Comparative Analysis of Traditional Transport vs. Ridesharing Solutions

ASPECT	TRADITIONAL TRANSPORT	RIDESHARING SOLUTIONS
Cost per User	High (individual fuel and maintenance costs)	Shared costs, significantly reduced fares
Environmental Impact	High emissions per vehicle	Lower emissions through shared rides
Accessibility	Limited to personal vehicle owners or public transport availability	Available via mobile apps, flexible for all users
Ride Scheduling Flexibility	Fixed schedules (public transport) or personal availability	On-demand real-time ride matching
Vehicle Utilization	Low (single passenger in private car)	High (multiple passengers per vehicle)
Integration with Technology	Limited	Extensive (GPS tracking, mobile payment, ride optimization)
Contribution to Urban Mobility	Congestion, high parking demand	Reduces congestion and parking space needs
User Safety Measures	Dependent on individual drivers	App-based safety features: driver vetting, live tracking

4. Experimental Method/ Procedure/ Design

Ridesharing applications that involve connecting riders, passengers and administrators in one smooth flow by way of its own optimized platform, making the process more convenient, secure and efficient features. In the case of real rideshare, it is about enabling some users on similar paths or headed to nearby locations to share the exact vehicle and thus decrease individual travel costs while improving vehicle occupancy.

4.1 User Access, User Roles and Authentication

Log in with unique credentials that allow any user-rider, passenger, or Admin to have access to their personalized login. This is the way that this system helps figure out how to route users to each other's domain functionality, effectively, if nothing else, to prevent them from screwing around with each other's identity.

- **Riders**: Vehicle owners (drivers) ready to share his trip with others.
- **Passengers**: People who want to join for the same trip or have a similar itinerary.

- **Admin**: Manage operations, payment reports and user activity.

The app has users (riders and passengers) logging into the app and filling up profiles that demand features such as preferred travel routes, timings, and even the vehicle capacity in case of riders. Then this information is key to the success of ride-matching.

4.2 Rider Features, Ride Scheduling, and Ride Matching Process

Riders are given options to create two types of trips**: Regular** and **Frequent.**

- **Regular Rides:** One-time trip-rider fills in trip details, i.e., pick-up location, drop-off location and preferred time. After creating the ride, it will be shown to passengers so they can browse and book.

- **Frequent Rides:** In case the trips and rides taken by the riders are not simply regular (daily or once a week), riders specify a schedule ahead of time according to which rides will be published according to a customized posting schedule. Suitable for predictable riders while being convenient for passengers who need a ride.
  Using GPS-based check-ins, which use device location data to verify the check-ins, Passengers check into the pre- scheduled meeting point.

- **Rider Trip Posting**
  Whenever a rider creates a trip in the app, he defines the origin and destination along with a time to leave & one that will fill all empty seats in the vehicle. More usage of the app, which gets BIOS, is proposed akin to whether or not the Rider will blue-blooded some micro-optimizations of their path top to light up riders. It then gets plugged into the app search, which can be mated to some passengers on a similar path.

- **Passenger Ride Request**
  Entering the trip's origin, destination, and time range to leave. They use versatility in timings, which suggests to the system, offering them a trip earlier or later than what the user has insisted . Rider checks different rides with the driver, vehicle type, route, fare, and seats available.

- **Ride Matching and Confirmation**
  The app's algorithm matches passengers with tourists according to route similarity, timing, and seat availability. Multiple passengers travelling in the same direction are matched to a single rider up to this pedicab until it reaches the Rider's max capacity. For example, a driver offers up three seats, and three passengers with similar travel routes are grouped for a ride. When a match is found, both passengers are told their ride particulars, and they can also confirm the booking.

4.3 Real-Time Ride-Sharing and Coordination

- **Check-In and Meeting Point**
  GPS check-in ensures riders and passengers arrive at the pre-agreed pick-up points. The app can take a few minor turns for passenger pick-ups within a predefined range along the route. Passengers are notified with an estimated drop time at the halfway point where the Rider will drop in.

- **Route Optimization**
  While Passenger Onboard, the app allocates an optimal route based on each passenger's destination to reduce detours and associated travel length. The app keeps reoptimizing it in real-time to drop off each passenger at the shortest path distance-wise and one after another in proximity.

4.4 Payment and Cost Sharing

- **Dynamic Fare Calculation**
  For the taxi ride, the cost is distributed amongst passengers according to the distance travelled and how long they are in the vehicle. Pro-rata fare share is based on more extended route segments shared by passengers. One is passenger share; travelling a more significant part of the route costs a higher share of the overall fare.

- **Automated Payments**
  Payments for each trip get deducted from the passenger account after the trip and are implemented with secure payment integrations. The cost each passenger must contribute is listed in the fare under that passenger, which is then deducted from the Rider's account minus platform fees.

4.5 Admin Panel and System Oversight

- **Trip Monitoring**
  Admins have their view of pending trips, track real-time GPS locations and administer a user's interaction. With this, the Admin can monitor trip completion and delays as well.

- **Payment Records and Report**
  Admin access to payment transaction records ensures transparency and seamless financial operations.

Instead of individual passengers in separate vehicles, ridesharing merges the transport of people with overlapping routes - all in one vehicle, all at once; this model is the rideshare. By leveraging the similarity of the route, optimum cost share, and GPS tracking in real-time, the system is introduced as an economical and eco-friendly alternative to conventional modes of transport. That results in the lowest travel costs per user and saturation of vehicles per mile, creating the orchestration of urban transport as a service. It achieves the least travel costs per individual, has a higher saturation of cars in traffic, and promotes urban transport orchestration as a service.

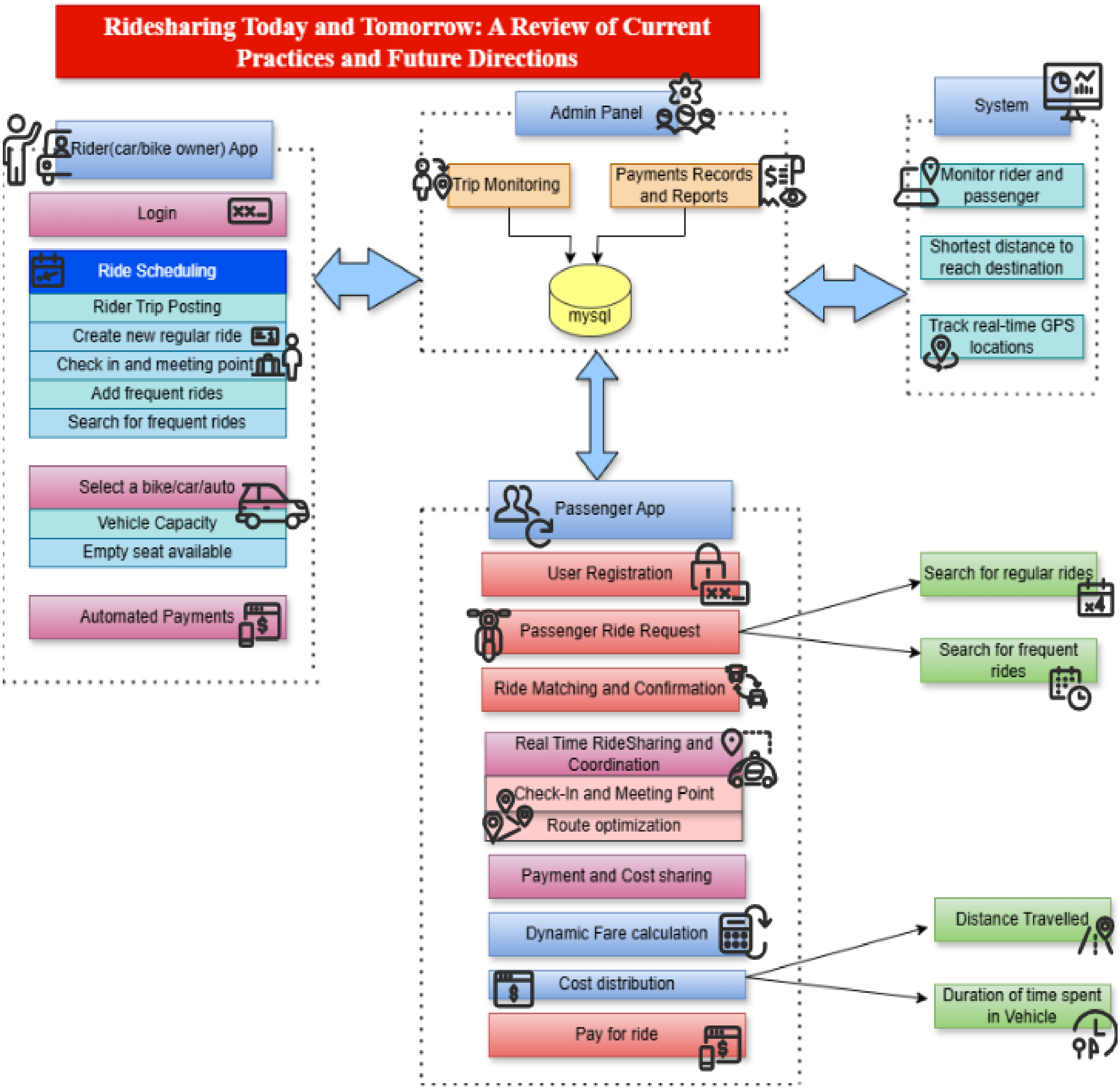


Figure 2. Implementation of Ride Sharing

The TravelMate ride-sharing application is built with current technology to maximize efficiency, scalability and accessibility to all users. For the front-end, TypeScript and React Native are used to create a seamless experience across both iOS and Android devices. The app is developed using the WebStorm IDE and uses Expo to conveniently deploy to the App Store and Google Play ensuring full cross-platform capabilities whilst allowing simple testing as well.

The backend is developed using Express.js and handles the core functionality of the application which performs actions like user authentication, rideshare matching, driver-passenger communications, handling real-time requests, etc. Users, rides and tracking data are managed in a serverless Neon DB PostgreSQL database. With Neon DB, you get a database that is both powerful and scalable enough to grow when the app does.

When it comes to integration of external services, like GPS-tracking and ride locations, the application uses Google Cloud Console to manage secure API access. By this design, the application is capable of managing integration of external services, whilst handling scale with user growth, performing secure communication of data, and managing efficient performance during data exchange. This will allow the application to deliver real time ride matching, secure data, and cross-platform functionality.

5. Results And Discussion

The review around ride-sharing services is evaluating how the role of technology has altered low-cost travel and decreased congestion and bettered sustainability. As companies like Uber and Lyft globalize they are providing new option that is cheaper and more flexible than past options, especially in urban settings.

User engagement behavior suggests that younger people, especially those who are technologically adept and socially oriented, are more likely to use a ride-sharing service than an older population. Younger generations tend to use these services more for the convenience of app-based bookings, while technology adoption, improved and quicker routing, and other travels shared therein generally leads to lowering trip costs to the user. Additionally, integration of artificial intelligence in ride-sharing platforms with route planning reduced wait time and fuel consumption for rides completing.

For ridesharing in particular, it improves active urban mobility through issues like congestion, transportation costs, and over-reliance on private vehicles - in this case it eliminates the need for car ownership - ultimately reducing parking capacity, vehicle footprint, and traveled roadways in the traditional car sense, which engender urban mobility and pollution. In addition, with ride-share fleets veering towards increasing number of electric vehicles (EV), less carbon footprint aligns with our sustainability efforts. However, this is largely true only with larger metropolitan areas, where it is clearer to provide alternative mobility options and galvanize participation from the public.

This research revealed many positive aspects of ride-sharing, but there are also serious challenges. One challenge is in the context of public transportation as ride-sharing has the potential to remove users from more traditional transportation methods, and in cities, the public transportation systems are already overburdened. Another challenge is in the difference in use around income segments, and in towns and rural areas where infrastructure or service coverage already exist, limits on ride-sharing options. Residents from lower-income strata and users in towns and rural areas are less likely than their wealthier counterparts to use ride-sharing services.

A second issue can be that issues of governance are developed related to ride-sharing platforms. Student capstone services in transportation are not able to keep pace with private solutions some cities and governments are trying to integrate into existing or any emerging transportation plans and policies. Because there is already a patchwork of state and local rules that have not begun to catch with ride-sharing, it is often unclear and creates conflicts in service or legality. In all instances, safety is paramount for the user, either as a driver or rider. The frequency of reports on user instances of an improper driver, as well as user acts as a passenger has made its way to a considerable amount of media coverage, which understandably creates questions of platform trust.

In total, ride-sharing has in general been a very good thing for ride-share users. In many regions, ride-sharing now becomes debt-addictive at the same time as a controlled-use-mode attached to public transit that are using ride-sharing to assist travel seekers make last mile connections, and also lead journeyers to another mixed-mode smart transportation the flexible-on-demand segment. Although there is no way to say it is more sustainable or efficient in the totality from public to ride-share, the hybrid methods employed surrounding public transit, and ride-sharing have the potential to lead to more sustainable and bespoke solutions to urban mobility, in particular to previously underserved communities and groups.

TravelMate is designed to meet similar concerns and challenges, but on a much smaller scale. TravelMate was created as a part of our college project. TravelMate is about matching users with a nearby, rideshare that includes a friend or travel seeker also traveling in the same direction, that will also allow for a sharing fee that will decrease traffic congestion, and the impact on the environment. TravelMate includes user friendly components with respecting the activity of scheduling a ride, real-time ride tracking, and user feedback, and could seamlessly collect experiences from users at the point when the driver drops them off. Additionally, by being able to include environmentally sustainable ride-sharing options, the owner-user relationship and service was better-developed to create one unit response for the ride-sharing community.

While TravelMate was a pilot in a small urban area, it was indicative that people are searching for viable alternatives now that there are new transportation options. TravelMate's mission of local ride-sharing is finding community and trust through its users while it prides itself on a safe and comfortable ride through accuracy such as real-time tracking. Technologies in the app such as GPS tracking and route optimization exemplify how smaller platforms are ready to lead the future of urban mobility. The TravelMate app provides users with the ability to check real-time availability of seats, giving users an easy reference point to gauge availability for rides. Their price calculation tool sets fair, transparent, economical prices based on distance and traffic conditions. The addition of map integration and real-time tracking provide users a sense of security, while also providing some comfort to drivers. Route optimization minimizes travel time and fuel resources therefore being more beneficial for the environment. when fully established, if TravelMate improves its security and protocol systems, it would generate more trust from its users and by extension produce a platform that is a viable contributor to credible ride-sharing.

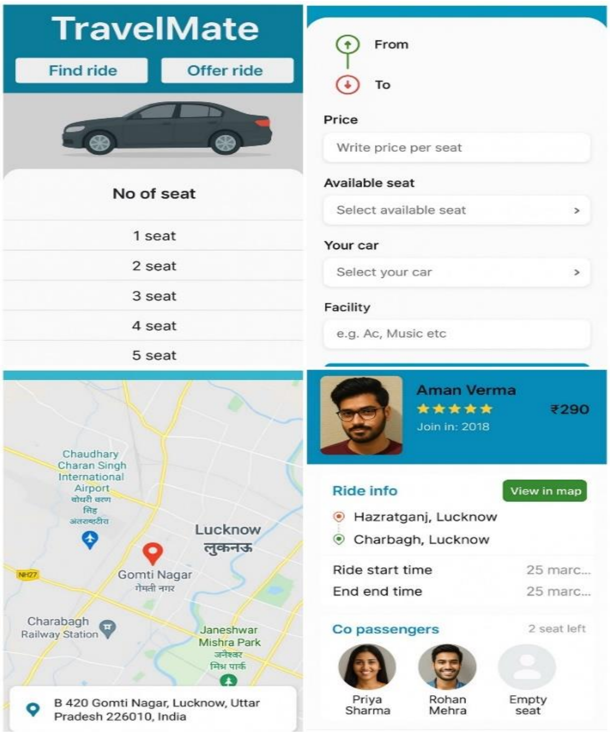


Figure 3. TravelMate app interface showing ride search, ride offer, seat selection, and location features.

6. Conclusion And Future Scope

Ride-sharing is rapidly changing transportation in urban areas by providing an efficient and sustainable replacement for owning a car. This review highlights the overarching possibilities of ride-sharing systems with data from cities around the world to show the wide-ranging impact that these systems are making and the potential to reduce traffic congestion, lower transportation costs, and promote environmental sustainability. The data included from cities like: San Francisco demonstrated how ride-sharing systems are providing commuters with significate alternatives from private automobiles thereby decreasing vehicle density through ride-sharing systems which is directly impacting traffic congestion and greenhouse gas emissions. In San Francisco, the influence ride-sharing platforms had on behaviour made a 20% decrease in the use of a private car, creating a 15% decrease in traffic congestion (U.S. Department of Transportation. 2023).

A similar story unfolded in Los Angeles. Inclusion of electric vehicles (EVs) within ride-sharing platforms contributed a overall 30% decrease in greenhouse gas emissions from the transport sector (California Air Resources board, 2022). These examples show how impactful ride-sharing platforms can be in improving the richness of urban life through enhanced urban mobility. Notably our discussion of the nature of ride-sharing systems included the potential of linking ride-sharing systems with public transit systems. In London, an agreed coordinated effort between ride-sharing platforms and public transit systems the merged constructed a 25% improvement on commuter wait time and a 10% increase in public transport commuters (Transport for London, 2022).This synergy facilitates urban travel and last mile connectivity to the shareable segment.

However, the study notes that there are barriers to implementation. In cities that are not quite regulated, there was 18% lower utilization of ride-sharing therefore, arguably the greatest risk to fear was physical harm. Issues with safety and providing safe transportation for passengers and drivers, Renders barriers to implementation. The simple fact that not all jurisdictions have regulated to consumption adds to these barriers.

TravelMate, an app developed at the college level, represents these global issues on a small scale. The app shows seat availability, has a price estimating system and GPS functionality so that local users can connect with rides in the immediate vicinity, even in a university city. The evident success of TravelMate in a test format, is an indication of participant's preparedness to engage in education related to the workings of local ride-share systems; it also adds weight to growing notions of mobility based in community.

Evidence that real-time maps, pricing fairness, and real-time route mapping have increased usability for users and trust in the process has changed transportation overall. These characteristics in common model and communicate the global ride-share ecosystem, and speaks to even small local applications can allow for larger sustainable transportation pipelines.

In conclusion, new rideshare technology needs to proceed by way of defined systematic research in particular, noting the elements of partnerships through public and private engagement. One key area is, "what happens when ride-share platforms work in conjunction with public transport in low confined region with low mobility options," to support last mile mobility and greater availability of transportation. Cities may be able to aggregate ride-share technologies information, to use their infrastructure where low peak demand, be changed over to provide service during peak demand, and/or more effectively use the infrastructure of both roadway (and its use) or parking. There will also be an ongoing curiosity around the impact of EVs and even the possibilities for autonomous vehicles to be integrated into their ride-share service fleets, and further inquiry related to cost/benefits , safety/risk and productivity or efficiency of planned use. At present a great deal of work has to be done to fully understand the socio-economics of ride-sharing services, particularly related to low-income (or rural) communities, with the aim to provide equity of access through public-private partnership arrangement; government sponsored ride voucher system; or even less sophisticated platform technology design for those that are less technologically engaged or inaccess; or less experienced with technology (families with children or differently abled families). It can be argued that the greatest impediment to adopting ride-sharing will always be building trust.

By getting close to full identity verification technologies, safety functions such as emergency buttons, and transparency of user ratings, we can create a sense of trust/viewing a user experience that is akin to what we see in Airbnb or Amazon-type websites. Understanding user psychology and behaviours will help practitioners and developers create systems for mobility but also confidence and safety. Sustainability also needs to remain centre-stage in the future of ride-sharing, and undertaking research which measures the carbon savings due to shared rides, as well as moves to electric vehicle, are critical to understanding user willingness to adopt environmentally friendly mobility options. By having an understanding of the impact of our shared rides on the environment, such as fuel use reductions and lower noise pollution, we can also better understand the development of a long-term environmental dashboard to aid decision making. Furthermore, with long terms changes to cities, a range of impacts must be considered by urban planners due to ride-sharing when creating physical planning in varied local contexts - e.g. pick-up/drop-off areas, electric vehicle charging infrastructure, and a revaluation of existing parking spaces. To conclude, ride-sharing has great potential to change urban mobility to be more efficient, sustainable, and equitable. However, if that potential is to be realized, a combined commitment by all the relevant stakeholders and in particular policy makers, researchers, and developers - is essential. Innovative research approaches, stronger stipulations and official requirements, and inclusion in urban planning practice can enable ride-sharing to move beyond the current barriers and change to become something that stops being an appealing alternative option, and becomes a key component of an integrated modern and sustainable transport system.

Data Availability

The authors can share the data supporting this study's findings on request if needed.

Conflict Of Interest

Authors declare that they do not have any conflict of interest.

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Author's Contribution

Parul conducted the preliminary literature review, structured the Introduction, Literature Review, and Implementation sections, contributed to app development, and prepared the initial draft of the manuscript. Parinit Sinha analyzed the Methodology, offered detailed insights into current implementation trends, and contributed to app development. Sadhana Rana reviewed the sections on Advantages, Challenges, and Considerations, developed the discussion on Future Scope, and handled editing and manuscript finalization. Ratan Rajan Srivastava compiled the Results and Conclusion, managed the reference organization, and finalized the manuscript. All authors reviewed the complete manuscript, made necessary revisions, and approved the final version for submission.

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