SHARED TRANSPORT CONTRIBUTION APP

Vedansh Bhatia
(25FC551)
Dept. of CSE
STR, DPGU
Pimpri, Pune, India
vedanshbhatia14@gmail.com

Angel Srivastava
(25FC558)
Dept. of CSE
STR, DPGU
Pimpri, Pune, India
angelsrivastav24@gmail.com

Anshika Sawdekar
(25FC563)
Dept. of CSE
STR, DPGU
Pimpri, Pune, India
anshika.sawdekar@gmail.com

Disha Agrawal
(25FC570)
Dept. of CSE
STR, DPGU
Pimpri, Pune, India
dishaagrawal860@gmail.com

Guided by: Prof. Varda Gotmare

Abstract

Urban centers face two huge contradictions: while digital technology has advanced exponentially, and we can now digitally connect to anything, we are increasingly limited in how we can travel from one place to another due to outdated transportation systems. When we look at how many people are making up cities around the world, combined with the poor resource allocation that is currently being undertaken by government entities in those cities, it is clear that there is currently a crisis characterized by expensive logistics and traffic congestion. Much of that waste is caused by the conventional way in which people own cars, which leads to the accumulation of multiple vehicles on the same stretch of road, while the amount of available usage is significantly below expected means of transportation usage levels. This massive inefficiency in urban areas leads to billions of dollars' worth of productivity being lost each year and greatly contributes to the growing negative effects of urban sprawl and environmental degradation on our planet.

Splitride is working to change this way of thinking by promoting a dramatic shift in urban logistics away from cars as an individual transport solution, and towards using cars as a shared form of transportation.

1. Introduction

The development of ride-booking apps has drastically transformed the DNA of urban transport, taking the taxi business to a more advanced level of an on-demand digital utility. With the help of the rapid integration of fast mobile internet, GPS, and payment systems, Uber has rendered obsolete the process of hailing a cab in its traditional form. It is not only about booking a car through the app anymore; it is a significant technical innovation that has substituted the random process of using the means of public transport with a reliable, predictable, and efficient one. In 2026, when the global market for ride-booking apps reaches a value of over $200 billion, it is no longer just a transport application but a "super-app" that includes features such as safety prediction tools and multiple modes of transport integration. The foundation of this transformation lies in minimizing transactional friction. Traditionally, the interaction between a passenger and a taxi driver entailed uncertainty: passengers had to deal with unpredictable waiting times, unclear prices, and cumbersome cash transactions.

The modern application-based model solves these problems by letting you see the whole lifecycle of the journey. As soon as a user opens the app, they can see an upfront fare estimate, a verified driver profile, and a way to keep track of their car that makes waiting less stressful. The "end-of-ride" ritual is automatically settled in the cloud when you link your credit card or digital wallet directly to the platform. This makes the trip completely smooth. Algorithmic dispatching has improved city infrastructure in ways that traditional fleets never could, and it has also made things easier for people.

These platforms use real-time GPS data from millions of users to cut down on "dead mileage," which is the time drivers spend driving around without a passenger. This helps cut down on traffic and fuel use. This level of trust is not possible with street-hailing because of the efficiency and the ability to keep an eye on rides in real time for safety and share progress with emergency contacts. As cities get bigger and owning a car becomes less practical in crowded areas, these digital gateways are more than just a replacement for taxis; they are the basic building blocks for smart city transport in the future.

2. Motivation and Objectives

Motivation

- The existing application for splitting costs requires inputting of trip details manually without live tracking.
- Splitting cost applications fail to consider the possibility of different routes taken when several people are traveling together.
- The companies dealing with the ride-pooling business have had to retreat due to poor performance and logistical issues (Lyft halted their pooled rides service in May 2023).
- Lack of transparency of the process causes conflicts between passengers.

Objectives

1. Design an algorithm for fair cost distribution based on individual passenger distances.
2. Develop a mobile application with GPS integration for automatic journey tracking.
3. Implement real-time cost calculation during active trips.
4. Integrate secure payment gateway for immediate settlement.
5. Create an intuitive user interface for trip creation, tracking, and payment.

3. Related Work

Recent research on shared mobility and cost-sharing mechanisms provides important context:

1. Mitropoulos et al. (2021) conducted a systematic literature review of ride-sharing platforms, examining 127 publications. The European Transport Research Review study identified user factors, barriers, and platform characteristics globally. Key findings highlighted that safety concerns and fare transparency significantly impact user adoption.
2. Farinloye et al. (2024) examined consumer engagement with transportation payment apps in emerging economies, specifically studying the Cowry app in Lagos, Nigeria. Their Journal of Consumer Behaviour research revealed significant barriers including usage difficulties, network coverage issues, and socioeconomic challenges. The study emphasized the importance of user-friendly interfaces and reliable connectivity.
3. Shabur & Ali (2024) investigated ride-sharing services in Bangladesh through a survey of 1,300+ respondents. Published in Heliyon, their research found that fare-splitting was the most important positive aspect for users, with 38.1% citing cost savings as their primary motivation. However, safety concerns and lack of trust in fellow passengers remained significant barriers.
4. Creutzig et al. (2024) provided a transdisciplinary expert review of shared pooled mobility from nine disciplinary perspectives in Environmental Research Letters. The comprehensive analysis revealed that real-world economics limit viability without supportive incentives and regulation. The study identified a gap between theoretical efficiency gains and practical implementation challenges.

Existing platforms also inform our research:

5. BlaBlaCar operates in 21 countries with 27 million active users, facilitating long-distance carpooling. However, it charges 10-21% commission, requires 2-3 days advance planning, and faces challenges in rural areas with limited network effects.
6. Uber Pool/UberX Share and Lyft Shared attempted ride-pooling at scale. Uber suspended its service during COVID-19 and relaunched with limited availability in only 40 cities. Lyft completely discontinued its pooling service in May 2023, citing that detours were "taking people out of their way." Both platforms struggled with low adoption (17-18% pre-pandemic) and profitability issues.

4. Literature Survey

Sr.	Author(s)	Year	Paper Title	Method	Key Findings
1	Li & Krushinsky	2021	Cost-sharing mechanism for ride-sharing	Mathematical model	Distance-proportional fairness proven
2	Mitropoulos et al.	2021	Systematic review of ride-sharing platforms	Systematic literature review (127 papers)	Safety and fare transparency are top barriers
3	Farinloye et al.	2024	Consumer engagement with transport payment apps	Ethnography, interviews, ALARA model	Complex UI and poor network cause low adoption
4	Shabur & Ali	2024	Ride-sharing for sustainable transport: Bangladesh	Survey of 1,300+ users, binary logistic regression	Cost savings primary driver; trust and fare clarity still lacking
5	Creutzig et al.	2024	Shared pooled mobility: expert review	Nine-discipline literature review	Pooling only viable with fair incentives and simple UX

5. Research Gap

Currently, there is no available solution that provides both transportation-specific pricing as well as integrated payment processing. While Split wise and Tricount are both excellent tools for tracking expenses between multiple users, they require users to input trip-related information themselves and then pay each other for their transportation costs outside of the application, which creates an increased level of friction for frequent sharing users.

In addition, ride-sharing companies such as Uber focus primarily on providing passenger matching services and compensating drivers rather than fairly and transparently distributing costs among passengers using their service. Additionally, the fact that they are no longer able to maintain reasonable pooling levels for rides indicates that there are significant unmet needs for this market segment.

6. Proposed Approach

Trip Creation Module - Users create a trip by entering pickup location, destination, and estimated fare. The creator becomes the trip organizer who can invite other passengers via unique trip codes or links. Each passenger's joining location is automatically captured when they accept the invitation.

GPS Tracking and Distance Calculation - Once the trip begins, the application continuously tracks all active passengers using device GPS. The system records individual boarding points and timestamps, real-

time location during the journey, drop-off points and timestamps, and total distance traveled by each passenger.

Fair Cost Distribution Algorithm - The system calculates each passenger's contribution using a distance-proportional algorithm:

$$\text{Individual Share} = (\text{Passenger Distance} / \text{Total Trip Distance}) \times \text{Total Fare} + \text{Base Fee}$$

$$\text{Base Fee} = \text{Total Fare} \times 0.1 / \text{Number of Passengers}$$

This ensures that passengers pay proportionally for distance traveled while accounting for shared fixed costs (base fee covers initial pickup and vehicle availability). The algorithm prevents free-riding while maintaining fairness.

Payment Integration Module - After trip completion, the system displays a detailed breakdown showing each passenger's distance traveled, calculated fair share, visual representation of the journey, and itemized cost explanation. Users can immediately settle their shares through integrated payment gateways (UPI, card, wallet). The organizer receives payments directly, with the system maintaining transaction records for dispute resolution.

7. Advantages and Disadvantages `

Advantages

- Less manual work: GPS tracking makes it unnecessary for passengers to write down distances or calculate prices manually.
- Fair pricing: The algorithm guarantees that passengers will be charged according to their share of the trip
- .On-the-spot payments: Payment processing within the app removes the embarrassment of requesting money from friends.
- Tailored to transportation needs: The app is specifically designed for ride-sharing, unlike other expense trackers.
- Encourages ride-sharing: It encourages more people to opt for ride-sharing due to its efficiency and fairness.

Disadvantages

- GPS dependence: The precision of the service is dependent on the integrity of the GPS signal, which is affected in heavily constructed areas.
- Internet connectivity: Internet connectivity is necessary since real-time calculations and transaction processing are needed.
- Trust issues: Privacy becomes an issue when users need to provide location data.
- Transaction fees: Fees between 1% and 3% are levied for each transaction made.
- Spontaneity of service: Unplanned services are difficult because all riders have to have the application.

8. Applications

- Daily office commutes: Colleagues from the same area can share rides to work regularly.
- College student transportation: Students traveling between campus and dormitories can split cab costs fairly.
- Group outings and trips: Friends traveling to restaurants, movies, or weekend destinations can track contributions automatically.
- Airport and station drop-offs: When multiple people travel to the airport from different locations,

fair cost distribution becomes seamless.

- Corporate travel management: Companies can track employee shared transportation costs accurately for reimbursement purposes

9. Conclusion

This paper presented a mobile application designed to address the critical gap in fair cost distribution for shared transportation. By combining GPS-based distance tracking with algorithmic cost calculation and integrated payment processing, we remove significant barriers to ride-sharing adoption.

Our analysis of existing systems revealed that general expense-sharing apps lack transport-specific features, while ride-sharing platforms struggle with transparency and settlement friction. The proposed solution bridges this gap by automating the entire process - from trip creation through payment completion.

The system contributes to sustainable mobility goals by making shared transport more attractive and hassle-free. Fair, transparent cost distribution builds trust among passengers and encourages repeated use of ride-sharing options over private vehicles.

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