Ride Sharing Mobile Application Optimised with Courier Service

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***Abstract*— The *Cab Sharing Mobile Application with Integrated Courier Service* merges passenger ride-sharing with parcel delivery to enhance urban transportation and streamline logistics. This dual-function platform maximizes vehicle utilization by enabling both commuter ride-sharing and parcel delivery within a single system. The application pairs passengers traveling in similar directions, facilitating shared rides that lower travel expenses and reduce emissions, which is beneficial for the environment. Additionally, it leverages available space in shared cabs to transport parcels, offering cost-effective, same-day delivery solutions. Through an advanced algorithm, the app efficiently plans routes to balance the needs of passengers and parcel drop-offs, minimizing delays. Key features like real-time tracking, secure payment options, and a feedback mechanism ensure a smooth, reliable experience for users.**

***Index Terms*— Cab sharing, Parcel delivery, Eco-friendly transport, Ride-sharing**

I. INTRODUCTION

In today's fast-paced environment, the demand for efficient and affordable transportation and delivery solutions is increasing. Our *Cab Sharing Mobile Application* with integrated *Courier Service* addresses this need by combining shared rides with convenient parcel delivery. The platform enables passengers heading in the same direction to share rides, cutting down on travel expenses, while drivers can also transport small packages along their route. This dual-purpose system enhances resource use, saves time, and reduces environmental impact.

The application ensures a smooth user experience with real-time ride matching and optimized route planning, catering to both ride-sharing and parcel delivery. For individuals using the courier service, same-day delivery is available, complete with real-time tracking and notifications. Packages are picked up and delivered along drivers' existing routes, allowing for fast deliveries without adding significant travel.

With a secure payment system supporting multiple methods, users can easily book rides or courier services through a single interface. By promoting shared mobility and maximizing vehicle utilization, the platform not only lowers costs but also helps reduce carbon emissions, supporting sustainable urban transportation. This innovative solution meets the evolving needs of both commuters and businesses by making travel affordable and deliveries efficient. Whether users need to travel or send a package across the city, this app delivers convenience, cost-effectiveness, and environmental sustainability.

II. LITERATURE SURVEY

[1] A systemic literature review of ride sharing: This paper provides a comprehensive review of literature on ride-sharing platforms, analyzing factors that affect user adoption, platform functionalities, and the challenges to effective implementation. By examining studies from various regions, it identifies key elements such as user demographics, operational hurdles, and system characteristics that can help guide sustainable ride-sharing solutions. The review follows a structured approach, screening research to extract insights on ride-sharing definitions, user-related factors, platform features, and barriers to adoption. It highlights multiple user characteristics influencing participation, including sociodemographic attributes (like age, gender, and income), geographic considerations (urban vs. interurban), and system incentives (such as HOV lane privileges and parking benefits). Key challenges include financial constraints, the need for advanced matching algorithms, revenue model complexities, and behavioral issues related to trust and security. Advanced algorithms, such as dynamic ride-matching, collaborative activity-based ride-sharing, and integration of real-time traffic data, are essential for improving platform efficiency and user satisfaction.

[2] An interactive android application to share rides with NSUsers- To summarise this report adoption of a ride-sharing app is usually a secure and dependable method of transportation. Still, there are many economic and security risks to acknowledge. The world has observed a precipitous rise and infiltration of the sharing automation aided by the increasing digital platform and enthusiasm of customers to try mobile apps that promote peer-to-peer marketing models, shared entrepreneurial companies, etc. More moderate prices and lower waiting periods may improve the readiness to pick a taxi service in favor of public transport. Public transportation was represented unfairly valuable to door-to-door alternatives, due

to public transport not being economically viable for regions with low or scattered demand.

[3] Locality filtering for efficient ride sharing platform- Overall we can conclude that, let SC H and SMCM denote the space complexity for the one-to-many CH path computations over GA, and for the maximum matching execution over GS N, the asymptotic space occupancy of both the legacy and our new approach can be bounded by SC H + SMCM + - (|GA| +|T |). So our solution is not worse than the legacy one by [7]. Digging further into the algorithmic details of the two algorithms, it can be shown that the described worst-case scenario is very pessimistic in practice as, indeed, our solution is more succinct in space than the legacy solution. In fact, we have hidden in the notation SC H the dependency on the number of selected destinations in the 1-to-many shortest path computations. As this number increases, CH visits more nodes in the city graph and, possibly, these nodes are spread over a large geographical area. Conversely, our approach selects just C |T | candidate trips (hence destinations or sources), which are very short because they are selected only among the ones clustered within a (narrow) locality area wrapping T.

[4] Toward a Shared Urban Transport System Ensuring Passengers & Goods Cohabitation - Almost surprisingly, 94.5% (and more) of trips in Manhattan can be shared between two people using a taxi if the distance is short (e.g. one minute). Recently, proposed a real-time travel time sharing algorithm based on the request-trip-transit graph (RTV graph). The algorithm starts with a satisfactory trip-car route and improves it by optimizing the constraints, converging to the best traffic solution over time.

[5] A real-time algorithm to solve the peer-to-peer ride-matching problem in a flexible ridesharing system- The study titled *"On-Demand High-Capacity Ride Sharing via Dynamic Trip Vehicle Assignment"* investigates ways to enhance ride-sharing services for larger vehicles, like shuttles and minibuses, by dynamically assigning trips in response to real-time demand and vehicle availability. The research tackles the challenge of efficiently grouping passengers with similar routes to increase vehicle occupancy and reduce both travel time and operational costs. Using advanced algorithms for real-time trip matching and route optimization, the system seeks to decrease traffic congestion and emissions, providing a cost-effective and eco-friendly transportation option. By incorporating high-capacity ride-sharing within existing transit systems, this approach aims to improve urban mobility, offer greater flexibility, and cater to the diverse needs of commuters.

III. OBJECTIVES

This paper aims to Optimize Vehicle Utilization: Maximize the use of vehicles by combining passenger rides with courier deliveries to reduce idle time and increase efficiency and Minimize Costs for Users: Provide affordable transportation and courier services through ride-sharing and delivery pooling, ensuring savings for both passengers and senders.

IV. PROBLEM STATEMENT

An integrated cab-sharing and courier delivery platform is needed to optimize vehicle utilization, reduce costs and emissions, while ensuring passenger convenience and timely package delivery.

V. METHODOLOGY

1) Real-time Dynamic Matching and Route Optimization: The app matches passengers with similar routes, adjusting routes dynamically based on incoming requests. This helps optimize both vehicle usage and travel times.

2) Dynamic Ride-Matching Algorithms: These algorithms help manage real-time or last-minute ride requests by matching users with similar routes on short notice, enhancing flexibility in ride-sharing.

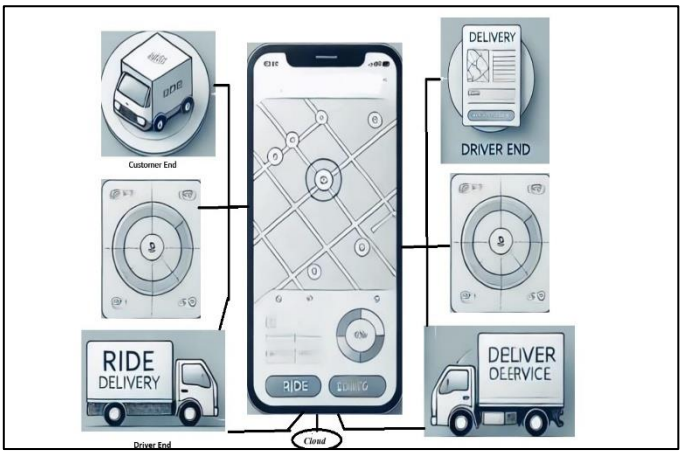
3) Collaborative Activity-Based Ride-Sharing Algorithm: This algorithm addresses trust and flexibility barriers by structuring ride-sharing around participants' activities rather than fixed trips, increasing user convenience without excessive detours.

4) Real-Time Traffic Data Integration: Some platforms use intelligent algorithms that incorporate real-time traffic information to optimize routes and estimated arrival times, improving reliability and user satisfaction.

5) Greedy Matching Algorithm: Pairs passengers based on their requested pickup and drop-off times, distance compatibility, and ride preferences (such as gender or vehicle type).

6) Dijkstra's Algorithm: Finds the shortest path between points, which helps determine the optimal route for the driver, considering multiple passengers' pickup and drop-off points.
A (A-star) Search Algorithm*: Enhances Dijkstra's by using heuristics to reach the destination faster, helping with real-time routing adjustments.

VI. SYSTEM ARCHITECTURE



VII. CONCLUSION

To conclude this paper the integration of ride-sharing services with courier functionality represents a promising innovation in transportation and logistics. This hybrid model leverages underutilized capacities within ride-sharing vehicles, providing an efficient solution for parcel delivery that benefits both users and admin service providers. By allowing drivers to earn additional income through parcel deliveries and enabling customers to access an affordable, on-demand service, the model fosters economic and operational efficiency. Furthermore, this approach supports environmental sustainability by reducing the number of vehicles on the road, thus lowering carbon emissions and traffic congestion. This integrated model offers a transformative path forward for urban logistics, providing a cost-effective and eco-friendly alternative to traditional courier services. Future research can focus on optimizing algorithms for routing and scheduling to maximize efficiency and enhance the user experience.

VIII. REFERENCES

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