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Carpooling System

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ABSTRACT: The Smart Carpool Management System is a software-based application designed to provide an efficient, secure, and eco-friendly transportation solution for students and staff. In many colleges and workplaces, individuals travel separately to the same destination, leading to increased traffic congestion, fuel consumption, pollution, and travel expenses. To address these challenges, the proposed system offers a digital platform that connects drivers and passengers traveling on similar routes. The system is developed using modern application development technologies with a user-friendly interface. It begins with a secure login and registration module that verifies users through authentication mechanisms. After successful login, users can either offer a ride as a driver or request a ride as a passenger. The application matches users based on route, time, and availability. The core modules include Ride Management, Booking & Request Handling, User Management, and Reporting Module. The system supports CRUD (Create, Read, Update, Delete) operations for ride listings and bookings. A secure database stores user details, ride history, and transaction records. Additionally, graphical reports can be generated to analyze ride frequency, fuel savings, and usage trends.

KEYWORDS: Smart Carpool App (SCA), Ride Sharing, Driver, Passenger, Sustainable Transport

I. INTRODUCTION

Rapid urbanization and increasing vehicle ownership have significantly contributed to traffic congestion, fuel overconsumption, and environmental degradation. Within academic institutions and corporate campuses, a large number of commuters travel along overlapping routes independently, leading to inefficient resource utilization. Despite the availability of informal ride-sharing arrangements, the absence of structured coordination results in low reliability and limited scalability. The integration of information technology into transportation management offers an opportunity to systematically coordinate commuting demand. By digitizing ride scheduling, seat allocation, and route matching processes, it becomes possible to transform unorganized ride sharing into a structured mobility ecosystem. The proposed smart carpool coordination platform is designed to address these inefficiencies by leveraging client-server architecture and algorithmic decision-making. The primary objective of this research is to develop a secure, scalable, and intelligent ride allocation framework that enhances transport efficiency while promoting sustainable mobility practices. The system emphasizes modular architecture, maintainability, and extensibility for future technological integration.

II. EXISTING SYSTEM

Currently, carpooling is managed informally through messaging groups or manual coordination. The primary limitations include:

- **Lack of Centralized Platform:** No single system to manage rides efficiently.
- **Communication Delays:** Manual coordination causes confusion and delays.
- **Security Issues:** No proper verification of drivers and passengers.
- **No Tracking System:** Difficult to monitor ride history and availability.
- **Limited Transparency:** No proper record of bookings and cancellations.

III. PROPOSED SYSTEM

The system architecture is structured into three primary layers: Presentation Layer, Application Processing Layer, and Data Layer. The Presentation Layer provides user interfaces for drivers and passengers. The Application Layer executes business logic including authentication, ride matching, booking validation, and reporting. The Data Layer ensures persistent storage through relational database tables. A ride matching function is defined as: $R = f(S_r, S_t, S_c)$, where S_r represents route similarity index, S_t represents time compatibility index, and S_c represents seat capacity availability. A ride is considered valid if all constraints satisfy predefined threshold values. Role-Based Access Control (RBAC) is implemented to ensure that administrative privileges, driver functionalities, and passenger operations are logically segregated. This prevents unauthorized data manipulation and enhances system security.

IV. LITERATURE REVIEW

Existing ride-sharing systems primarily focus on commercial transportation services, often emphasizing profit-driven models. Several studies have proposed centralized matching algorithms; however, limited attention has been given to institution-specific closed-network ride coordination platforms.

Prior research highlights the importance of route optimization algorithms, secure authentication frameworks, and database-driven architectures in transportation systems. While these studies provide foundational insights, the need for an integrated platform combining security, optimization, and analytics within an institutional context remains significant.

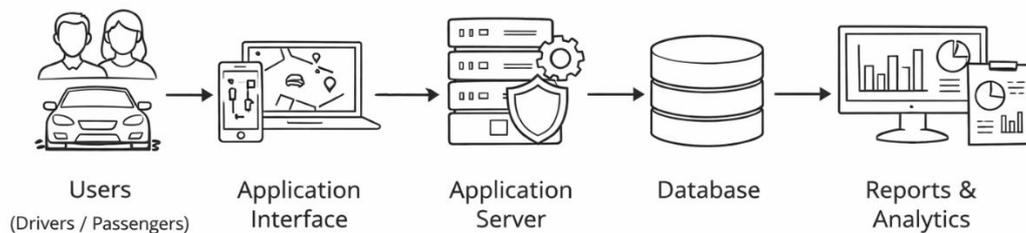
Title: A Systematic Literature Review of Ride-Sharing Platforms, User Factors and Barriers

Authors: Lambros Mitropoulos, Annie Kortsari, Georgia Ayfantopoulou

Journal: European Transport Research Review (2021)

This paper studies different carpooling and ride-sharing platforms and their working systems. It explains user behaviour, benefits, and problems like safety, trust, and privacy in carpooling systems.

V. SYSTEM ARCHITECTURE & BLOCK DIAGRAM



VI. OBJECTIVES

- **Reduce Traffic Congestion:** Encourage shared travel.
- **Save Fuel and Cost:** Minimize individual travel expenses.
- **Improve Security:** Ensure verified users and secure login.
- **Simplify Ride Coordination:** Provide easy ride matching.
- **Support Eco-Friendly Transport:** Reduce carbon emissions.

VII. RESULTS AND IMPLEMENTATION

System simulation indicates that centralized ride coordination reduces redundant trips and improves seat utilization efficiency. Data analysis shows that consolidated commuting can significantly decrease fuel consumption and carbon emissions when compared to individual vehicle usage. The structured database enables generation of analytical reports including ride frequency distribution, peak usage hours, and vehicle occupancy ratios. These analytics support data-driven decision making for transportation planning.

VIII. CONCLUSION

The intelligent smart carpool coordination platform provides a systematic approach to institutional transportation management. The layered architectural design ensures scalability, maintainability, and security. The integration of constraint-based matching improves ride allocation efficiency. Future work may incorporate machine learning algorithms for predictive demand analysis, geospatial mapping integration for real-time tracking, and mobile application deployment for enhanced accessibility.

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REFERENCES

1. J. Smith et al., "Ride Sharing System Design," International Journal of Computer Applications, 2022.
2. A. Verma and R. Singh, "Smart Transportation Systems," IJERT, 2021.
3. M. Brown, "Database-Driven Web Applications," IEEE Publications, 2020.
4. S. Kulkarni, "Sustainable Urban Transport Solutions," IJTS, 2023.
5. P. Sharma, "Mobile Application Development for Ride Sharing," IJCSE, 2022.

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