IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.102 ⁜ Peer-reviewed journal / Refereed journal ⁜ Vol. 12, Issue 10, October 2023

DOI: 10.17148/IJARCCE.2023.121012

Carpool Crew: Uniting Commuters for a Greener and a cheaper ride

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Abstract: Decentralized blockchain-powered peer-to-peer carpooling presents an innovative, middleman-free solution for secure and transparent ride-sharing. By leveraging blockchain, this proposal establishes a trust-less environment for direct user connections and ride-sharing, with all transactions securely recorded, promoting transparency and heightened security. Smart contracts automate driver-passenger matching and payments, offering the potential to alleviate traffic congestion, reduce transportation costs, and enhance environmental sustainability. Furthermore, the proposed model introduces an essential emergency contact and live location sharing feature, enhancing trust and security within carpooling services by enabling users to share real-time locations with trusted contacts and promptly access emergency services in the event of safety concerns.

Keywords: Peer-to-peer Carpooling, Decentralization, Authentication, Blockchain

I. INTRODUCTION

In recent years, ride-sharing services have transformed the way people commute, offering a convenient and cost-effective means of transportation while also promoting community and environmental benefits. Companies like Uber, Ola, and others have become household names, providing ride-sharing services through centralized platforms. However, the centralization of data in these systems can result in issues of transparency, reliability, and security. This project introduces a groundbreaking feature to traditional ride-sharing platforms by embracing decentralization, blockchain technology, and peer-to-peer interactions to enhance the entire ride-sharing experience.

In a decentralized ride-sharing app, blockchain technology takes center stage to revolutionize the way users connect and share rides. By employing smart contracts, essential requirements are pre-defined, ensuring consistent pricing and fostering trust among users. These advancements in technology address the shortcomings of centralized systems, where a single point of failure can disrupt the entire network.

Decentralized ride-sharing, with its reliance on blockchain and peer-to-peer technology, aims to enhance security, transparency, and trust within the system. These innovations not only offer benefits to individual passengers but also contribute to the well-being of the community. Furthermore, the adoption of this technology ensures resilience against the growing threat of cyber-attacks, making the ride-sharing experience safer and more reliable for all.

In addition to the transformative shift towards decentralized ride-sharing, this project introduces a pioneering feature that further enhances the safety and trustworthiness of the entire experience. The new emergency contact feature empowers users to share their real-time location with trusted contacts, ensuring that their loved ones can monitor their journey and take swift action in the event of safety concerns. This innovative addition prioritizes user safety, offering peace of mind and addressing a crucial need in the ride-sharing ecosystem. By bridging the gap between technology and personal safety, this feature underscores our commitment to delivering a ride-sharing platform that not only optimizes transportation but also places the well-being of our users at the forefront.

II. MOTIVATION

Carpooling platforms have become increasingly popular due to their numerous advantages for urban transportation. They offer convenient ways for people to find compatible travel partners through smartphone apps, reducing the number of cars on the road and easing the hassle of parking in crowded areas. Carpooling optimizes energy use and lessens the

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environmental footprint. Financial incentives, like shared costs, make it appealing for both drivers and passengers, saving money on fuel, tolls, and parking. Besides practical benefits, carpooling promotes community and social connections among participants, enhancing the commuting experience and fostering a sense of belonging. User-friendly apps make it even easier to coordinate rides, while government measures, like car pool lanes and reduced tolls, encourage more people to carpool.

The motivation behind the introduction of the emergency contact feature is to prioritize and elevate user safety within the decentralized ride-sharing system. Our aim is to provide users with the means to enhance their security and peace of mind throughout their ride-sharing journeys. By allowing users to share their real-time location with trusted contacts and enabling direct communication with emergency services, we address a critical need for safety and trust in ride-sharing services. This feature stems from a commitment to not only revolutionize transportation through blockchain and peer-to-peer technology but also to ensure that users feel secure and protected during their ride-sharing experiences. It reflects our dedication to empowering users to take control of their safety, enhancing the overall ride-sharing experience.

III. LITERATURE SURVEY

Myeonghyun Kim, Joonyoung Lee, Kisung Park, Yohan Park,Kil Houm Park, And Youngho Park proposed "Design of Secure Decentralized Car-Sharing System Using Blockchain".This paper introduces a secure decentralized car-sharing system using blockchain technology, addressing security concerns in traditional centralized systems[4][2]. The system involves trust authorities, stations, owners, vehicles, and users, offering pseudonym-based anonymity. It employs elliptic curve cryptography and hash functions to ensure message confidentiality and integrity, with robust security analysis and efficient computation[4]. The proposed scheme is suitable for peer-to-peer car sharing, providing a secure and decentralized solution while preserving user anonymity.

G.Kavitha**,** P.Logavarshini , N.Aarthi proposed “Peer to Peer Carpooling Using Blockchain”. This paper suggests that the integration of blockchain technology in peer-to-peer ride sharing, contrasting it with centralized services like Uber and Ola, highlighting issues such as cost, security, and transparency[1]. The authors propose a decentralized carpooling system using blockchain, smart contracts, and reputation ratings to foster trust. Blockchain offers cost reduction, transparency, and secure payments. The system employs the Ethereum blockchain, profiles registered on a public ledger, and roles for verification[1][2]. Ride matching optimizes distance. The authors see blockchain's potential for transforming governance and business through transparency, but anticipate a gradual adoption process.

Sarvesh Wadi, Mrunal Shidore, Vedant Savalajkar proposed “P2P Ride-Sharing Using Blockchain Technology” .This paper proposes a decentralized carpooling operation that uses blockchain technology to manage deals securely and transparently between motorists and passengers[3].

Ms. Feon Jaison , Suhas Chandra R proposed “Peer to Peer Carpooling Using Blockchain” . This paper presents a blockchain- grounded carpooling system that aims to promote sustainable civic mobility and reduce business traffic[2].

R. Khoshkbar Sadigh, S. Gohari, and A. Asgari proposed “Blockchain and Distributed Ledger Technologies in Supply Chain Logistics”. While not specifically concentrated on carpooling, this paper explores the implicit benefits of blockchain and distributed tally technologies in force chain logistics, which could also be applicable to the carpooling assiduity[6].

M. Akbar and R. Mahmod proposed “Blockchain- grounded Carpooling System A Feasibility Study”- This paper investigates the feasibility of a blockchain- grounded carpooling system and evaluates its implicit benefits, similar as reduced sale costs and increased security and translucency[2].

IV. PROPOSED MODEL

Our proposed model for a peer-to-peer carpooling system places paramount importance on enhancing user safety and security while optimizing the overall carpooling experience. At its core, our system offers a user-friendly mobile application as the primary interface for accessing and utilizing the platform. Registration and profile management are fundamental steps, ensuring that both users and drivers complete the necessary identification and vehicle information. Users also have the option to personalize their profiles with details like photos, names, and preferences.

What truly sets our model apart is the introduction of a groundbreaking feature - Emergency Contact and Live Location Sharing. This innovative addition empowers users to share their real-time location with trusted contacts, creating a powerful safety net during carpooling journeys. In cases of emergencies or safety concerns, users can directly contact

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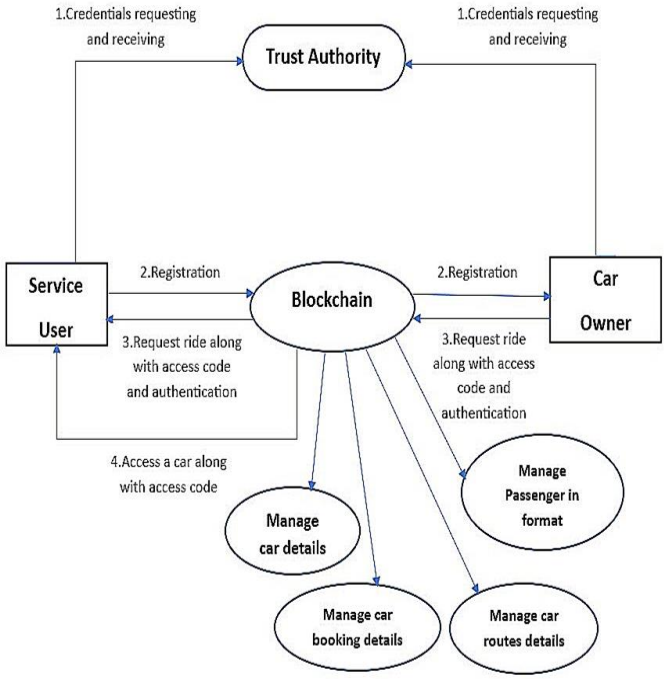
emergency services through the app, further enhancing their sense of security. We've also implemented in-app emergency buttons for immediate assistance, allowing users to swiftly report any safety concerns and triggering a rapid response from our dedicated support team.

In addition to these safety-centric features, we conduct thorough background checks on drivers, implement a user rating and review system to build trust and hold drivers accountable, and provide around-the-clock customer support. The integration of GPS technology enables real-time tracking of the vehicle's location, contributing to transparency and safety throughout the journey. Our vision is to revolutionize the peer-to-peer carpooling experience by prioritizing user safety while ensuring that every ride is not only secure but also enjoyable for all participants.

V.SYSTEM ARCHITECTURE

Our system architecture revolves around service users, who are the primary participants in the carpooling process, along with car owners who offer their vehicles. The trust authority acts as a central governing entity, ensuring the security and trustworthiness of the platform. All of the following components operate on the blockchain, which serves as the foundation for secure and transparent carpooling transactions.



1.Service Users: Service users are individuals who intend to use the peer-to-peer carpooling platform for transportation. They can be both riders and drivers, depending on their preferences and requirements. As riders, they seek shared rides, while as drivers, they offer rides to other users in exchange for cost-sharing.

2.Car Owners: Car owners are users who possess personal vehicles that they are willing to share with others on the platform. They register their vehicles and provide access codes for users to book and access their cars. Car owners may also specify the conditions and availability of their vehicles.

3. Trust Authority: The trust authority is a central entity responsible for setting up and governing the decentralized carpooling system. It plays a pivotal role in ensuring the security and trustworthiness of the platform. The trust authority issues credentials to both users and car owners, facilitating secure transactions and interactions on the platform. This entity acts as a trusted intermediary that enhances user confidence and safety.

4. Blockchain: Blockchain is the underlying technology that powers the decentralized carpooling system. It serves as a distributed ledger where all carpooling transactions are securely recorded. The blockchain ensures the transparency, immutability, and security of these transactions, making it resistant to manipulation and providing a high level of trust. Smart contracts, programmed on the blockchain, automate various processes, such as matching drivers with passengers and handling payments, further enhancing the efficiency and security of the system.

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VI.ALGORITHM

Step 1: User Registration and Profile Creation

Users and drivers register on the platform, providing necessary identification and vehicle information.

Step 2:Location and Availability Tracking

The system continuously tracks the real-time location and availability of registered drivers.

Step 3: Passenger Request

A user initiates a ride request by specifying the pickup and drop-off locations, desired time, and any special preferences.

Step 4:Driver Search

The system identifies available drivers in proximity to the pickup location.

Step 5:Matching Algorithms

The ride-matching algorithm considers various factors, including location, destination, user preferences, and driver availability. The algorithm also evaluates the user's emergency contact settings.

Step 6:Request Confirmation

The algorithm confirms the ride request and provides details of the selected driver.

Step 7:Ride Confirmation

Upon driver confirmation, the system provides details to both the user and the driver, including real-time location, estimated time of arrival, and the route.

Step 8: Emergency Contact and Location Sharing

Users can enable the emergency contact and location sharing feature before the ride starts.Trusted contacts are selected, and the real-time location is shared with them.

Step 9:Navigation and Communication

The app includes built-in navigation for the driver and passenger to follow the designated route.

Step 10:Ride Execution

The ride takes place with real-time tracking of the vehicle's location. Users and trusted contacts can monitor the ride's progress through the app.

Step 11:Payment and Fare Calculation

Upon ride completion, the app calculates the fare based on predetermined rates and any additional charges. Payment is processed through the app, ensuring a cashless transaction.

Step 12:Rating and Review

Passengers and drivers have the opportunity to provide ratings and reviews after the ride.Feedback contributes to user accountability and trust-building within the community.

Step 13:Emergency Procedures

In the case of a safety concern or emergency, the user can tap the in-app emergency button. This action triggers immediate contact with the support team or emergency services.

Step 14:Driver Compensation

Drivers are compensated based on the distance travelled, time, and other relevant factors. Payment is processed securely through the app.

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VII. RESULTS AND DISCUSSION

The introduction of the emergency contact and live location sharing feature in our peer-to-peer carpooling platform offers numerous significant benefits. It significantly enhances user safety, allowing them to share their real-time location with trusted contacts and directly contact emergency services, fostering peace of mind and reducing safety concerns. This feature, coupled with increased user trust and improved user experiences, makes our platform more appealing to new users and strengthens our existing user base. Real-time monitoring, swift emergency responses, and preventative deterrence mechanisms further contribute to a secure and supportive carpooling community, providing us with a competitive advantage and valuable data for continuous enhancements, ensuring a safer and more satisfying carpooling experience.

The proposed addition of an emergency contact feature to a peer-to-peer carpooling platform offers significant advantages to both users and app managers. Users benefit from heightened safety, the ability to share real-time locations with trusted contacts, and quick access to authorities in emergencies, building trust and accountability.App managers gain a competitive edge, enhanced brand trust, reduced liability, improved user retention, data for safety enhancement, and possible monetization options. This feature can make the platform more appealing, secure, and user-friendly while responding to critical safety concerns and providing valuable insights for continuous improvement.

VII. CONCLUSION

The incorporation of the emergency contact feature represents a pivotal milestone in the evolution of our peer-to-peer carpooling platform, reaffirming our unwavering commitment to user safety and security. By allowing users to share their real-time location with trusted contacts and providing direct access to emergency services, we have significantly elevated the safety net of our platform, fostering peace of mind and reducing safety concerns. As a result, our platform has become a more attractive and trustworthy choice for both existing and potential users, expanding our user base and strengthening our position in the competitive carpooling market. Furthermore, real-time monitoring, swift emergency response capabilities, and preventative deterrence mechanisms have contributed to a more secure and supportive carpooling community. This marks not only a competitive advantage but also a continuous source of invaluable data for ongoing improvements and optimizations. In conclusion, the introduction of the emergency contact feature has reshaped our platform into a safer and more satisfying carpooling experience, reinforcing our dedication to user safety and satisfaction.

REFERENCES

[1]“Peer to Peer Carpooling Using Blockchain” by G. Kavitha**,** P. Logavarshini , N. Aarthi (2023).
[2]“Peer to Peer Carpooling Using Blockchain” by Ms. Feon Jaison , Suhas Chandra R (2023).
[3]“P2P Ride-Sharing Using Blockchain Technology” by Sarvesh Wadi, Mrunal Shidore, Vedant Savalajkar (2022)
[4]Design of Secure Decentralized Car-Sharing System Using Blockchain" by Myeonghyun Kim, Joonyoung Lee, Kisung Park, Yohan Park, Kil Houm Park, And Youngho Park(2021).
[5]“Blockchain- grounded Carpooling System A Feasibility Study” by M. Akbar and R. Mahmod (2021)
[6]“Blockchain and Distributed Ledger Technologies in Supply Chain Logistics” by R. Khoshkbar Sadigh,S. Gohari, and A. Asgari (2020)