Peer to Peer Carpooling Using Blockchain

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Abstract: Peer-to-peer carpooling using blockchain is a decentralized approach that enables individuals to share their cars with others who are traveling in the same direction. Blockchain technology provides a secure and transparent way to handle transactions and eliminates the need for intermediaries. This paper proposes a peer-to-peer carpooling system that utilizes blockchain technology to facilitate transactions and provide a trustless environment. The proposed system would enable individuals to connect with each other and share rides without the need for a centralized platform. It also ensures that all transactions are recorded on the blockchain, providing transparency and security. The system would utilize smart contracts to automate the process of matching drivers with riders and handling payments. This approach could potentially reduce traffic congestion, lower transportation costs, and contribute to a more sustainable environment.

Keywords: Blockchain; peer-to-peer carpooling; ride sharing; decentralization

I. INTRODUCTION

Lift-sharing services have gained fissionability as a feasible means of transportation in recent times. Services that enable consumers to make better use of their particular vehicles. A lift- participating motorist shares his lift with other passengers. individualities can profit from lift-sharing in a variety of ways as well as the community, including increased residency rates, blistering trip charges, extending social circles, and lowering both energy operation and pollution. numerous companies, similar to Flinc, Uber Pool, Ola, and others, give online ridesharing services all over the world.

Hack service aggregators carry out their day-to-day conditioning using centralized technology. likewise, the payment process for hack bookings is handled by intercessors or third-party businesses. With further parties engaged, this becomes a problem since a lack of translucency emerges.

Blockchain is a public, inflexible tally for tracking coffers, recording deals, and erecting trust. Anything asset (palpable or impalpable) can be tracked and traded on a blockchain network, with the main advantage being the reduced threat as well as a significant cut in costs for all parties. Every sector in every field is erected on data. utmost businesses operate solely because of the transfer of information, the briskly this happens, the better. Blockchain is perfect for the movement of data because it can give prompt, participated, and fully transparent information that will be kept on a certain tally that can be recaptured only by those who are authorized to do so.

A blockchain network can be employed in the shadowing of orders, expenditures, fiscal records, manufacture, and so on. The most important point of blockchain is that all druggies partake in a single view of the variety, so each member can see all the particulars of a sale from the veritably morning, giving members lesser confidence while also adding effectiveness and giving rise to a plethora of operations blockchain can be used for. To further reduce sale time, a set of rules known as the smart contract is stored on the blockchain and executed automatically. It's used to define conditions for the transfer, including terms for different bonds and so on. In a blockchain-grounded carpooling system, druggies can produce smart contracts that define the terms and conditions of their lift-sharing agreement. These smart contracts are tone-executing and enforceable, which eliminates the need for a third-party conciliator. The smart contracts can also include payment terms, which ensure that the payment is made automatically once the lift is completed.

Blockchain technology also enables the use of character systems, which help make trust between druggies. Character systems allow druggies to rate and review their lift- participating mates, which helps other druggies make informed opinions about who to partake in lifts with.

Overall, blockchain- grounded peer- to- peer carpooling has the implicit to make lift- participating more effective, secure, and transparent. still, there are still challenges to overcome, similar to scalability, usability, and nonsupervisory compliance.

II.   PROBLEM STATEMENT

Looking for a motorist a hack on the road regularly is not considered the helpful portability on-demand benefit. One further issue with the being frame is that it doesn't give plumpness roughly the traveling course of the lift. This gives rise to enterprises about security within the ancient frame. In addition, the proposed demonstration includes mortal lacks as the hack motorists are employed in this show. When there is a conventional auto with the motorist, there are security troubles for the customer since he doesn't know the subtle rudiments of the motorist accessible for his lift. For the lift, he should believe in the case of motorist recognizable evidence, since he has no other volition. Concurring to the circumstances of these days, this is frequently truly a security hazard for guests. That's why we're exercising blockchain invention to sound the security-related issue.

III.   LITERATURE SURVEY

[1]" Decentralized Carpooling operation Using Blockchain Technology" byT. Ravi andM.N. Giriprasad(2019)- This paper proposes a decentralized carpooling operation that uses blockchain technology to manage deals securely and transparently between motorists and passengers.

[2]" A Blockchain- grounded Carpooling System for a Sustainable Civic Mobility" byA.I. Awan,S. Hussain, andS. Raza (2020)- This paper presents a blockchain- grounded carpooling system that aims to promote sustainable civic mobility and reduce business traffic.

[3]" Blockchain and Distributed Ledger Technologies in Supply Chain Logistics" byR. Khoshkbar Sadigh,S. Gohari, andA. Asgari (2020)- 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.

[4]" Blockchain- grounded Carpooling System A Feasibility Study" byM. Akbar andR. Mahmod(2021)- 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.

[5]" A Blockchain- grounded Framework for Secure and Effective Carpooling" byS. Li,Y. Li, andY. Cheng(2021)- This paper proposes a blockchain- grounded frame for secure and effective carpooling, which includes features similar as smart contract- grounded payment and character operation.

[6]" A Blockchain- grounded Carpooling System with sequestration Preservation" byY. Wang,J. Zhou, andY. Cao(2021)- This paper presents a blockchain- grounded carpooling system that incorporates sequestration preservation ways, similar as discriminational sequestration and homomorphic encryption, to cover stoner data.

[7]" A Blockchain- grounded Carpooling System with stoner impulses" byL. Huang,J. Sun, andX. Zhang(2022)- This paper proposes a blockchain- grounded carpooling system that includes stoner impulses, similar as token prices and abatements, to encourage further people to share in carpooling.

[8]" Blockchain- grounded carpooling system using smart contracts for secure and effective ridesharing" by Yongtae Park, Eung Kwon Kim, and Yongsu Park, published in Future Generation Computer Systems in 2020. The paper proposes a blockchain- grounded carpooling system that uses smart contracts to insure secure and effective ridesharing.

[9]" A blockchain- grounded result for ridesharing" by Eric Rausch, published in the Journal of Business Research in 2019. The paper proposes a blockchain- grounded result for lift- sharing that includes a decentralized system for matching motorists with riders, a secure payment system, and a character system for actors.

[10]10)" Peer- to- peer carpooling with blockchain and smart contracts" by João Almeida, Fernando Alves, and Bruno Nunes, published in the Proceedings of the 2nd International Conference on Computer Science and Technologies in Education in 2019. The paper proposes a peer- to- peer carpooling system that uses blockchain and smart contracts to insure secure and effective ridesharing.

[11]" Blockchain- grounded carpooling A methodical literature review and exploration docket" by Mohamed Abdel- Basset, Ali El- Gammal, and Rami Mohafar, published in the Journal of Enterprise Information Management in 2021. The paper provides a methodical literature review of blockchain- grounded carpooling and proposes a exploration docket for unborn work in this area.

[12]" Blockchain- enabled carpooling A decentralized and secure result" by Muhammed Asim and Awais Ahmad, published in the Journal of Ambient Intelligence and Humanized Computing in 2020. The paper proposes a blockchain-enabled carpooling system that uses smart contracts and a decentralized armature to insure secure and effective ridesharing. Overall, the literature suggests that blockchain has the implicit to enhance the security and effectiveness of peer- to- peer carpooling systems by enabling secure and transparent deals, decentralized matching algorithms, and character systems. still, farther exploration is demanded to probe the scalability and usability of blockchain- grounded carpooling systems in real- world settings.

IV. METHODOLOGY

The methodology of peer-to-peer carpooling using blockchain involves the use of blockchain technology to create a decentralized and secure platform for ridesharing. Here are the key steps in the methodology:

The application should allow users to create a decentralized profile on the blockchain, where they can store their personal information securely and transparently and users should be able to create and book trips directly on the blockchain, without the need for intermediaries.

1. Smart contract-based payment system: The application should use smart contracts to automatically enforce the terms of the carpooling agreement, including payment.
2. Trip tracking and management: The application should provide real-time tracking of trips, as well as a system for managing trip details and schedules.
3. Reputation system: To encourage trust between users, the application should have a reputation system that allows users to rate and review each other based on their experiences.
4. Data privacy and security: The application should use the decentralized nature of the blockchain to provide enhanced privacy and security for user data and transactions.
5. User interface: The application should have a user-friendly interface that allows users to easily create and book trips, as well as manage their profiles and transactions.
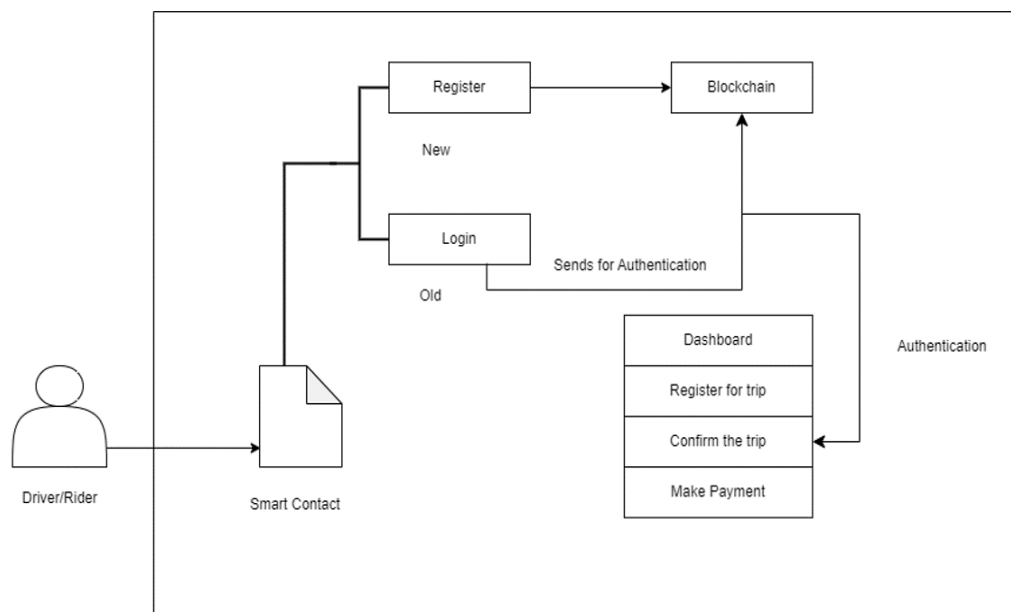
4.1 System Architecture

Fig1 System Architecture

1. User Interface: This is the interface that users interact with to access the carpooling platform. It can be a mobile application, a web-based application, or a combination of both.

2. Smart Contracts: Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller being directly written into lines of code. In the case of peer-to-peer carpooling, smart contracts are used to execute the terms of the ride-sharing agreement, including payment, pickup and drop-off locations, and other details.

3. User Registration: Users register on the carpooling platform and provide their personal information such as name, address, and payment information. The platform verifies the user's identity and creates a unique digital identity for each user on the blockchain.

4. Blockchain: The platform uses a blockchain network to record all transactions and smart contracts. The blockchain network can be public or private depending on the requirements of the platform.

5. Authentication: The process of verification of the legitimate user to access the portal

6. Decentralized Storage: Decentralized storage is used to store user data and other platform information. This is typically implemented using a distributed file system or IPFS (Interplanetary File System).

7. Ride Matching Algorithm: The ride-matching algorithm matches riders with suitable drivers based on factors such as pickup location, destination, and the driver's reputation score.

8. Payment System: The payment system is used to facilitate payment between riders and drivers. Payment can be made using traditional methods such as credit cards or through a cryptocurrency payment system.

9. Analytics and Reporting: The platform may also include analytics and reporting tools to track the usage of the platform, monitor user behavior, and generate reports for platform operators.
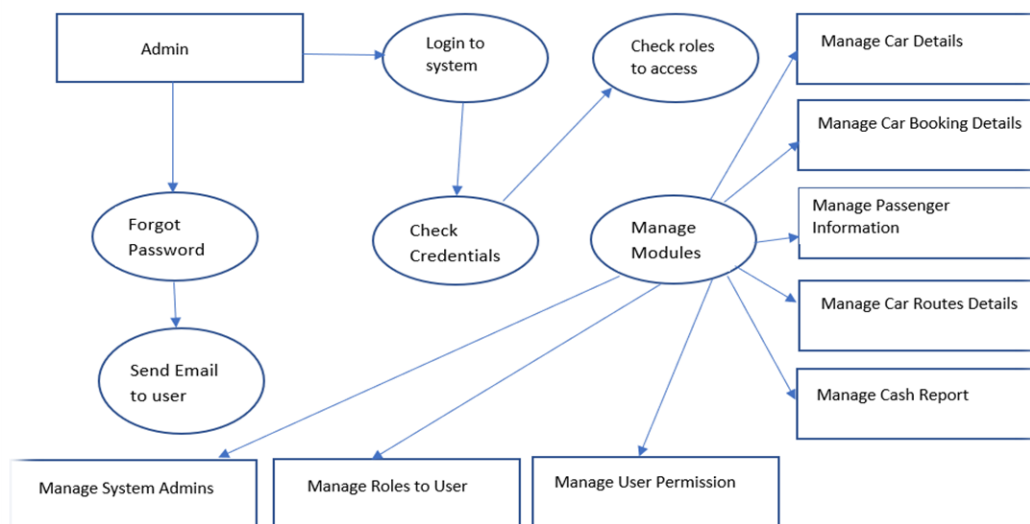

Fig 2 Admin portal workflow

Fig 2 represents the admin portal workflow where we can see various features present in his/her interface. The admin portal should be secured as it holds the overall control of the application.

Overall, the methodology of peer-to-peer carpooling using blockchain provides a secure, efficient, and decentralized solution for ridesharing. Using blockchain technology eliminates the need for intermediaries and provides a transparent and trustless system for users.

V.   CONCLUSION

Peer-to-peer carpooling using blockchain is a promising solution for the transportation industry. By leveraging the decentralized and secure nature of blockchain technology, it provides a transparent and efficient platform for ride-sharing. The use of smart contracts ensures that the terms of the agreement are automatically executed, reducing the need for intermediaries, and increasing the speed and efficiency of transactions.

The reputation system in peer-to-peer carpooling using blockchain builds trust among users and promotes responsible behavior, leading to a safer and more reliable platform. The decentralized architecture of the platform ensures that there is no single point of failure and provides a tamper-proof system for storing user data.

The use of blockchain technology in peer-to-peer carpooling has the potential to revolutionize the transportation industry by providing a more sustainable and cost-effective solution for users. It can also help reduce traffic congestion and carbon emissions by encouraging the sharing of rides. In summary, peer-to-peer carpooling using blockchain is a promising solution for the future of transportation, and its adoption can lead to a more sustainable and efficient transportation system.

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