Journal of **N**onlinear **A**nalysis and **O**ptimization
Vol. 16, Issue. 1: 2025
ISSN : **1906-9685**

BLOCK CHAIN-BASED RIDE SHARING PLATFORM

N. RUPA DEVI, Mr. K. UDAY KIRAN

#1 Pursuing M.C.A #2 Assistant Professor Department of Master of Computer Applications

QIS COLLEGE OF ENGINEERING & TECHNOLOGY

Vengamukkapalem(V), Ongole, Prakasam dist., Andhra Pradesh- 523272

Abstract

The rising demand for efficient, sustainable, and secure transportation solutions has led to the exploration of innovative technologies. Peer-to-peer (P2P) carpooling, which allows individuals to share rides, presents a promising solution to reduce traffic congestion, lower carbon emissions, and decrease transportation costs. However, traditional carpooling platforms face challenges related to trust, security, and transparency. This paper proposes a novel P2P carpooling system leveraging block chain technology to address these issues. Block chain, a decentralized and immutable ledger, ensures transparent and secure transactions without the need for intermediaries. By integrating block chain with P2P carpooling, we can enhance trust among users, ensure data integrity, and provide a secure platform for ride-sharing transactions. The proposed system uses smart contracts to automate and enforce agreements between carpool participants, thereby reducing the risk of fraud and ensuring fair payment distribution.

Keywords: Blockchain Technology, Decentralized Ride Sharing, Smart Contracts, Peer-to-Peer Transportation, Data Privacy, Cryptocurrency Payments

Introduction:

The transportation sector is undergoing significant changes driven by increasing urbanization, environmental concerns, and the need for more efficient mobility solutions. One innovative approach to addressing these challenges is peer-to-peer (P2P) carpooling, where individuals share rides with others travel in the same direction. P2P carpooling offers numerous benefits, including reduced traffic congestion, lower greenhouse gas emissions, and decreased transportation costs for participants. However, traditional carpooling platforms often struggle with issues related to trust, security, and transparency, which can hinder their widespread adoption and effectiveness. Block chain technology, with its decentralized and immutable nature,

presents a promising solution to these challenges. Block chain is a distributed ledger technology that records transactions across multiple computers in a way that ensures the security, transparency, and integrity of data. By leveraging block chain, we can create a P2P carpooling system that addresses the limitations of traditional platforms, providing a more secure and trustworthy environment for users. This paper proposes a block chain-based P2P carpooling system designed to enhance the reliability and efficiency of ride-sharing services.

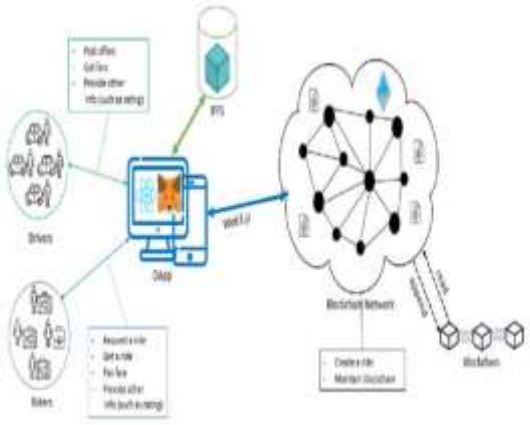
Literature Survey:

Ride-sharing is a service that enables drivers to share trips with riders, which leads to several benefits such as sharing the travel cost and reducing traffic congestion. However, most of the existing ride-sharing systems rely on a central trusted unit to organize the service, which makes them subject to a single point of failure and attack, and lack of transparency. A few works have investigated decentralized ride-sharing systems, but they either do not consider privacy preservation or suffer from a tradeoff between privacy protection and accuracy due to using location cloaking technique. This paper proposes a Blockchain-based ride sharing organization system with accurate matching and privacy preservation. To achieve the accurate matching, instead of representing the ride-sharing area by a single grid, it is represented by several overlapping grids so that only near drivers/riders share rides. To preserve privacy, drivers/riders encrypt their offers/requests using a lightweight cryptosystem, and the Blockchain matches the encrypted offers and requests without being able to decrypt them. Our security and privacy analysis demonstrate that our system can organize the ride-sharing service in a secure and transparent way, and also preserve the privacy of drivers and riders. To evaluate the performance of our system, we have implemented it, and our measurements indicate that our system requires low communication and computation overheads.

Ridesharing entails the sharing of journeys in order to make optimal use of fuel by allowing people to go along the same route to share rides. It allows regular passengers to share trips with others, having the additive benefit of lowering travel costs and reducing traffic congestion. Most current ride choices rely on a centralized authority to enable the system, leaving it vulnerable to faults at a specific point in the system and raising concerns about privacy disclosure to attackers acting both within and outside. Furthermore, they are vulnerable to external threats and fraud, and the payment made by the current ride-sharing service provider is rather costly. As a result, we have proposed the system named EtherRider, based on the Ethereum blockchain technology. EtherRider enables drivers to provide transportation services without the need for a central system. Both the passenger and the driver will know about sharing ride details, secure their travel details, such as pick-up and drop-off locations, arrival/departure times, and secure payment through the

ethereum blockchain. With a distributed ledger, drivers and riders could create a more user-driven,value-oriented marketplace.In the context of car-sharing systems, our work also indicates that the design of such an integrated platform is dependent on striking the correct balance between important design concepts (such as security and privacy, authenticity, traceability and reliability, scalability, and interoperability). With the rapid advancement of vehicular technologies, today's crowded world necessitates ultra-fast moving cars. Transportation should be enhanced to be convenient and safe for every entity with a well-planned traffic system. All of these things depend on the vehicle's speed, which is proportional to the amount of traffic on the road. According to statistics, in recent years the amount of automobiles per person has increased around the world, resulting in delayed vehicle traffic because of the limited capacity of the roads. To steer clear of them, the key purpose should be to encourage efficient usage of car capacity, i.e., people who own vehicles should be advised to make use of them as part of mass transit [8][9]. One of the most extensively used and effective modes of public transportation is the mass transit system. Although mass transit can mitigate some of the negative effects of private vehicles, it lacks flexibility and reliability. The majority of ridership is centered on a few routes. It also has the disadvantage of having a lower occupancy per vehicle, with most buses moving empty seated during off-peak hours and regularly becoming overloaded during peak hours. As a result, consumers who seek a comfortable ride rarely use regular public transportation. The Ride-Sharing System, which matches drivers with other riders who want to travel the same or a similar route, is a more effective and efficient technique. It can be a manually matched ride-sharing where drivers who want to create a carpool pick up passengers waiting by the roadside. [10] The Ridesharing technology automatically compares the information to those of other users in the database and suggests possible Rideshare partners. The goal is to plan requests in real-time and reduce user trip time while ensuring service quality. Blockchain is different from the conventional client-server approach. Blockchain is a provable, immutable, and distributed ledger that allows mistrusting entities to deal with one another without depending on a central third party [1]. Smart contracts are self-contained computer programs that operate on a Blockchain network. These computer programs function as smart contracts, having the capacity to execute and enforce without the necessity for a centralized authority [6].

System Architecture:



Modules:

This module develops a block chain-based ride sharing platform that connects drivers and riders securely and efficiently. The platform utilizes block chain technology to ensure transparency, security, and decentralization. Key Features

1. Decentralized Matching: Smart contracts match drivers and riders based on location, availability, and preferences.

2. Secure Payments: Block chain-based payment system ensures secure and transparent transactions.

3. Reputation System: Decentralized reputation system allows users to rate and review each other.

4. Real-Time Tracking: Integration with GPS and mapping technologies for real-time ride tracking.

Benefits

1. Security: Block chain technology ensures secure and transparent transactions.

2. Trust: Decentralized reputation system fosters trust among users.

3. Efficiency: Smart contracts automate matching and payment processes.

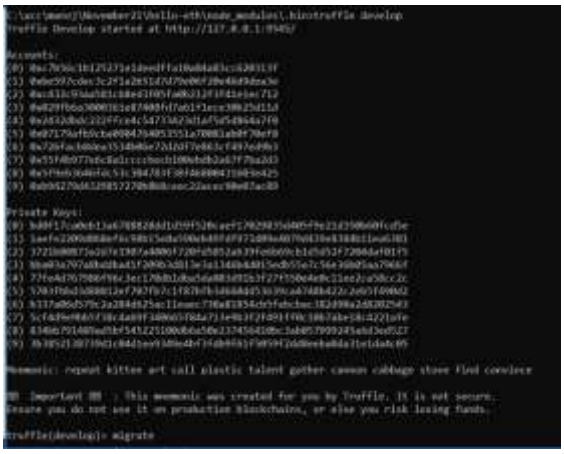
4. Transparency: Block chain technology provides a transparent and auditable record of all transactions.

Technical Requirements 1. Block chain Platform: Selection of a suitable block chain platform (e.g., Ethereum, Hyperledger).

2. Smart Contract Development: Development of smart contracts for matching, payment, and reputation management.

3. Front-end Development: User-friendly interface for drivers and riders. 4. Integration: Integration with GPS, mapping, and payment gateways.

Results:



In above screen I gave command as ‘migrate’ and press enter key to get below page

In above screen python server started and now open browser and enter URL as http://127.0.0.1:8000/index.html and press enter key to get below page

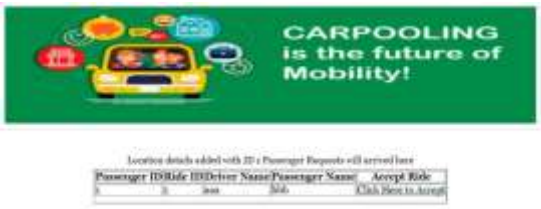
In above screen click on 'New User Signup Here' link to signup either driver or passenger

In above screen I am entering driver details and now click on 'Register' button to get below page

In above screen driver can click on 'Enter Your Location' link to add his current location details

In above screen driver entering current location name, latitude and longitude as we don't have GPS so we entering latitude and longitude manually and now pres 'Submit' button to get below page

In above screen passenger can click on 'Click Here to Share Location' link to send request top driver and if distance between passenger and driver under 3 miles then driver will get below request under driver tab



In above screen driver can view request details from passenger 'bb' and now click on 'Click Here to Accept' link to accept request and then click on 'Start Ride' link once passenger arrived to start ride and get below page

In above screen driver will select ride id and passenger id and then entre number of miles travelled to calculate below fair amount

CONCLUSION

Car pooling is an effective way to reduce air pollution, parking problems, fuel consumption and commuting costs based on shared use of private cars or vehicles. In this paper, we study the car pooling problem and develop a prototype car pooling system to realize ridesharing based on smart phone platform and Google Map API. To study the car pooling problem, we formulate the problem to match passengers with drivers in this paper. As the car pooling problem formulated in this paper above is not a standard matching problem in computer science, existing algorithms for matching problems cannot be applied directly. Instead of applying existing algorithms for matching problems, we have proposed a heuristic method to solve the above mentioned problem. In our approach, we collect the requests of passengers and the trajectory data of drivers first. With the widespread deployment of applications and value-added services, smart phones become an important mobile computing platform today. Smart phones provide a cost effective way to acquire the trajectories of drivers. In this paper, we acquire the trajectory data of passengers with drivers based on smart phones. The problem is to match passengers' requests with drivers' trajectories. We propose a matching algorithm to assign passengers to drivers' cars based on their trajectories

References:

[1] Roberto Baldacci, Vittorio Maniezzo, and Aristide Mingozzi, An Exact Method for the Car Pooling Problem Based on Lagrangean Column Generation, Operations Research, vol. 52 no. 3, pp.422-439, May/June 2004. [2] Maniezzo V, Carbonaro A, Hildmann H. An ants heuristic for the long-term car pooling problem. In: Onwubolu G,Babu BV (Eds.), New Optimization Techniques in Engineering, 2004, p. 412-429. [3] Davis, F. D. and V. Venkatesh, Measuring user acceptance of emerging information tech nologies: An assessment of possible method biases, in Proc. 28th Hawaii Int. Conf. System Sciences, pp. 729–736, 1995. [4] Cheverst, K., N. Davies, K. Mitchell, A. Friday, Experiences of developing and deploying a context-aware tourist guide: The GUIDE project, in: 6th International Conference on Mobile Computing and Networking, Boston, August, pp. 20–31, 2000. [5] Shi, Y., W. Xie, G. Xu, R. Shi, E. Chen, Y. Mao, F. Liu, The smart classroom: Merging technologies for seamless tele-education, IEEE Pervasive Computing 2 (2) 47–55, 2003. [6] Chen, H., F. Perich, D. Chakraborty, T. Fin in, A. Joshi, Intelligent agents meet semantic web in a smart meeting room, in: 3rd International Joint Conference on Autonomous Agents and Multiagent Systems, July, pp. 854–861, 2004. [7] Helal, S. Winkler, B. Lee, C., Kaddoura, Y., Ran, L., Giraldo, C., Kuchibhotla, S., Mann, W., Enabling location-aware pervasive computing applications for the elderly, in: 1st IEEE Confer ence on Pervasive Computing and Communications, Fort Worth, March, 2003. [8] A.K. Dey, G.D. Abowd, Towards a better understanding of context and context-awareness, in: Conference on Human Factors in Computing Systems, 2000.

Authors:

Mr. K. Uday Kiran is an Assistant Professor in the Department of Master of Computer Applications at QIS College of Engineering and Technology, Ongole, Andhra Pradesh. He earned his Master of Computer Applications (MCA) from Bapatla Engineering College, Bapatla. His research interests include Machine Learning,Programming Languages. He is committed to advancing research and fostering innovation while mentoring students to excel in both academic and professional pursuits.