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Peer-to-Peer Car-Sharing System Using Blockchain Technology

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Abstract: ***Peer-to-peer car-sharing is a car-sharing service can be built that decentralizes the interaction between users of the app and ensures that no single entity has control over the transaction or the information involved. The project also ensures customer privacy and provides fair and accurate pricing by eliminating third-party services, and it is possible to do all of this by using smart contracts. Implementation of automation of most of the tasks and creating a crypto token that is specific to the application for use in payment for services. This leads to Exchange for carsharing service between the passenger and driver.***
Keywords: Blockchain, Smart Contract, Decentralization, MetaMask, Peer-to-Peer,

I. INTRODUCTION

As demand for car-sharing increases, various companies are stepping up to provide this service, with Uber and OLA also adopting auto-rickshaws in India. However, they share a commonality regarding the use of a centralized approach for their day-to-day operations, which imposes policies, rules, regulations, terms, and a variety of conditions imposed on both passengers and drivers.
Similarly, to ease the user experience the car-sharing service providers would involve intermediates or third-party companies to carry out the many operations such as payment, validations, data security, etc. involving more intermediaries and companies led to creating insufficient transparency, a low pricing model, and insufficient privacy since data is shared among the companies. These drawbacks contain led to a broad analysis of blockchain technology and showed our inducement to present a paper on solving the problems concerned with centralized methodology. We research and try to solve this by using a decentralized concept and removing third-party mediators by using Ethereum Smart Contract. Blockchain is a database that contains decentralized, immutable, reliable, and distributed throughout the world Ethereum is a blockchain technology that uses smart contracts, Smart Contract is a contract that includes predefined rules, which once depicts cannot be altered again, not even by admin.

II. PROPOSED SYSTEM

In order to implement a blockchain-based P2P car-sharing platform, the first step is to select a suitable blockchain platform. Ethereum is one of the most popular platforms for building decentralized applications due to its smart contract capabilities and large developer community. Smart contracts are self-executing programs that run on a blockchain network. They are encoded into the blockchain and can be automatically executed when certain conditions are met, without the need for intermediaries or central authorities. Smart contracts are used for a wide range of applications, including finance, supply chain management, voting, and more. The Ethereum System uses smart contracts to automate the process which allows secure and efficient transactions between driver and rider. The user interface of a Peer-to-Peer car-sharing platform should be easy to use for drivers and riders. In order for users to register themselves, they should be able to search for rides, register as drivers and riders, and make payments with ease. Besides the user interface, the credentials of the users should also be stored in a database for security purposes. Cryptographic algorithms to ensure that transactions are safe, transparent, and tamper-proof. The system utilizes a cryptocurrency, such as Ether (ETH), to facilitate payments between car driver and rider. The use of blockchain technology ensures secure and transparent transactions, with no need for intermediaries or third-party payment processors. This includes regular updates to the blockchain platform and smart contracts, as well as the implementation of new features and functionality based on user needs.

III. SYSTEM ARCHITECTURE

The process starts with the account opening. Each user (driver and rider) has to open an account to perform any task with Go-Cars. If the person opens the account as a rider, he is already available or visible to the connected network such as in MetaMask Network. A rider needs to deposit fixed security money to make himself available to the network every time the acquires in the subsequent procedures. Else, he must have chosen to be the driver while opening the account.

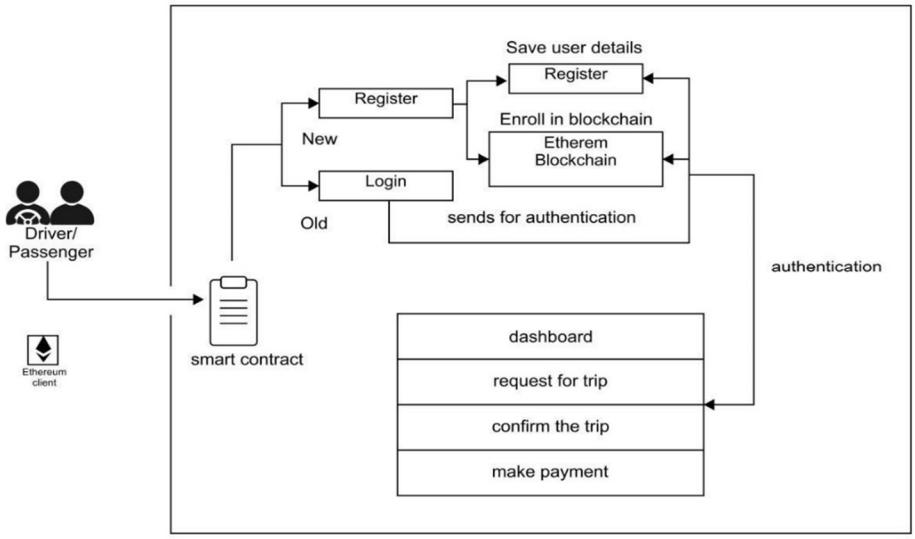

Fig 1: Architecture of D-app

When a rider creates an account for requesting a ride, he is required to provide all the requested details, including the source address, destination address, time, and date. a rider who joins a driver for a ride on the platform may require to pay a fixed deposit using a digital wallet such as MetaMask. The specified deposit aims to ensure that both the rider and the driver are committed to a lift. The amount of the deposit can vary depending on many factors. Now the driver would receive the ride request through the platform and review the details of the ride. If the driver is available and willing to provide the ride, they would accept the ride request through the platform. The driver would then need to enter the amount of Ethereum required to confirm the ride. Once the driver has entered the correct amount of cryptocurrency, he would accept the ride and start the transaction to the blockchain for processing. After the ride is confirmed, the driver and rider may need to use a digital wallet like MetaMask to complete the payment process. Here's how the payment process using MetaMask might work:

The rider opens their MetaMask wallet and confirms that they have enough Ethereum for the transaction.

The driver provides their Ethereum wallet address to the rider, either through the platform's messaging system or through a separate communication method. The rider sends the agreed-upon amount of Ethereum to the driver's wallet address using MetaMask.

The driver confirms receipt of the payment through their own MetaMask wallet.

The platform records the payment on the blockchain, creating a secure and transparent record of the transaction.

IV. SYSTEM WORKFLOW

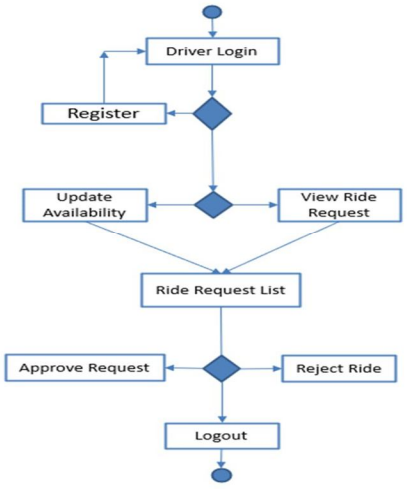

Fig 2. Workflow of Driver

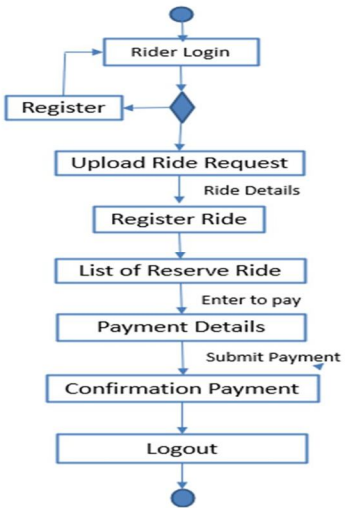

Fig3. Workflow of Rider Panel

A. Working Flow of Driver Board

1) *Registration:* Driver Register on the platform by providing their information and verifying their identity. They would also need to create an account in a digital wallet (MetaMask Wallet) to receive payment from the rider.
2) *Login:* After registering into Driver Account, he needs to log in to receive booking requests.
3) *View Ride Requests:* In the Driver Dashboard, Driver can interact with all Ride Request Lists.
4) *Approved Request:* Before taking a ride, the driver set a fair charge for the ride and approves them based on availability and other factors or he can decline the ride.
5) *Payment process:* Once the ride is complete, Payment is made by the rider through Metamax, which adds the **ETH** amount to the driver's account.

B. Working Flow of Rider Board

1) *Registration:* Rider Register on the platform by providing their information and verifying their identity.
2) They would also need to create an account in a digital wallet (MetaMask Wallet) to send the payment to the driver.
3) *Login:* After registering into Rider Account, he needs to log in to Request the ride.
4) *Register Ride:* The user Upload a ride request and fill in all ride Details such as the source, destination, etc
5) *List of Reserved Rides:* In the Rider Panel he can able to view all lists of reserved rides.
6) *Payment Process:* When the driver approved the request, the rider pays value for the particular conveyance.

V. LITRATURE SURVEY

Design analysis is a thorough appraisal of the many strategies, as well as their interactions both inside and outside the design. Why are there so many faults in the present approach is the important query here. What actions need to be performed to fix the issue? The study starts when a user or administrator launches a software survey on the live approach. The information is gathered through a variety of files, decision-making methodologies, and analysis-related actions taken out by the current scenario. Training, expertise, and common sense are needed to obtain the crucial data needed to create a system.

How the issue is discovered, simply read, and properly executed by choosing a solution, is essentially what specifies the effectiveness of the system. A good analytical prototype should provide a framework for solving the issues in addition to tactics for understanding it. As a consequence, additional information should be looked into by collecting system-related data. The needs of the proposed system should then be carefully assessed.

There are four sections in the system analysis.

1) Initial analysis and system design.
2) By using analytical tools, we can perform systematic analysis.
3) An analysis of the possibilities.
4) Advantages and expenditures can be examined

Author	Year	Title	Description
Robert Cornelius Hampshire, Craig Gaites	2011	Peer-to-Peer Car Sharing MarketAnalysis and Potential Growth	• This article explores the feasibility of ascalable structure of car sharing. • Car owners make allow their vehicles into share cars on a short-term basis.
Riddhi Gupta, Riya Gupta, Sonali ShripadShanbhag	2011	A Survey of Peer-to-Peer Ride-Sharing Services Using Blockchain	• An intellectual transport approach is comprised in this project, which uses applications to Monitor, Control, or Enhances Transportation Systems
Ballus-Armet, Ingrid Shaheen,Susan, Ph.D. Clonts, Kelly	2014	Exploring Public Perception andMarket Characteristics in the San Francisco Bay Area	• This paper contains a Remote Access technology that permits members to access their reserved cars.
Youngho Park	2021	Design of Secure DecentralizedCar-Sharing System Using Blockchain	• A secure authentication technique is provided in this paper for a distributed car-sharing system. • we used blockchain to design a system where it provides service for users.

VI. RESULT AND DISCUSSION

Car-sharing systems are vulnerable to a variety of threats due to their centralized structure and public communication channels' security issues. Using a safe decentralized model of car-sharing, this paper proposed a solution to these issues with blockchain technology, car sharing can be decentralized and information about services is guaranteed to be accurate. In addition, a pseudonym was used in the car-sharing system to ensure that the user's privacy was protected. The suggested protocol was shown to enable safe mutual authentication between the user, station, and owner. In addition to addressing mobility issues in metropolitan areas, this model will improve security and privacy for authorized users through the provision of a decentralized sharing service.

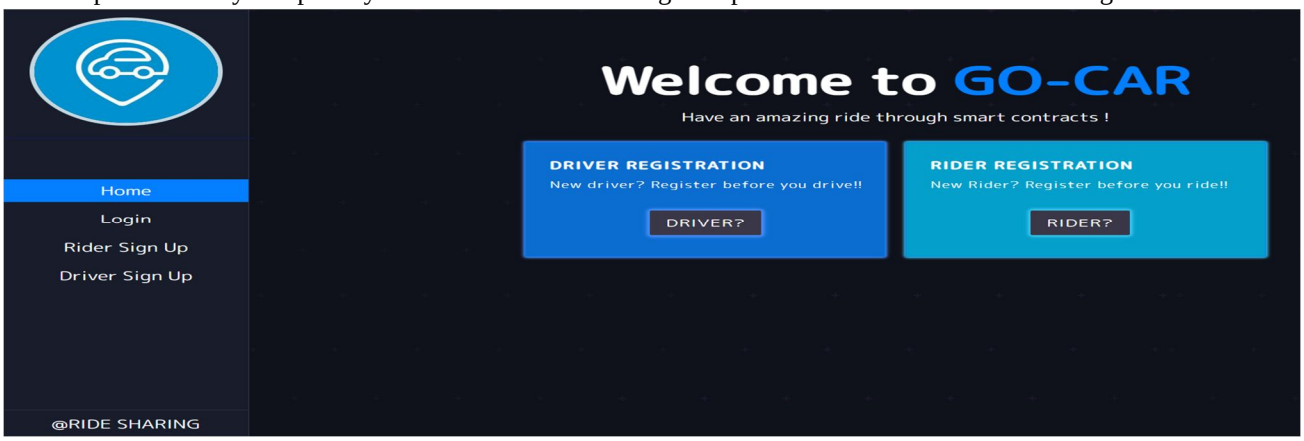

Fig4. Home Page

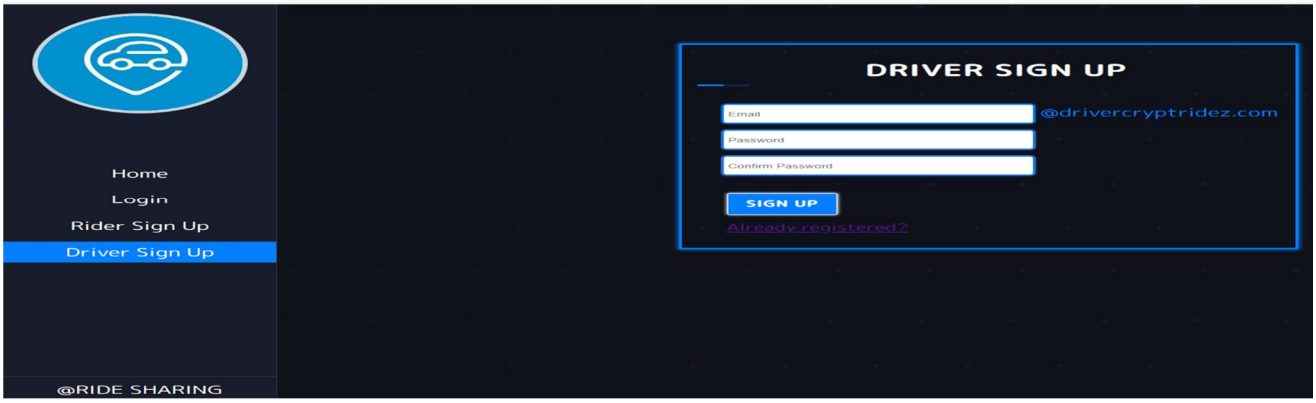

Fig5. Driver Sign-Up Page

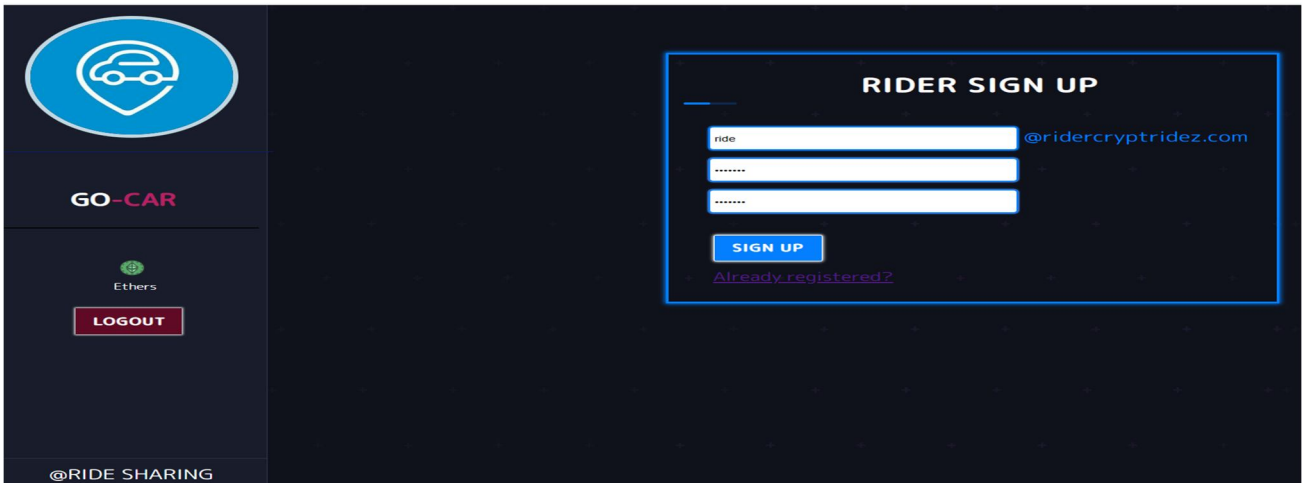

Fig6. Rider Sign-Up Page

Fig 7. Login Page

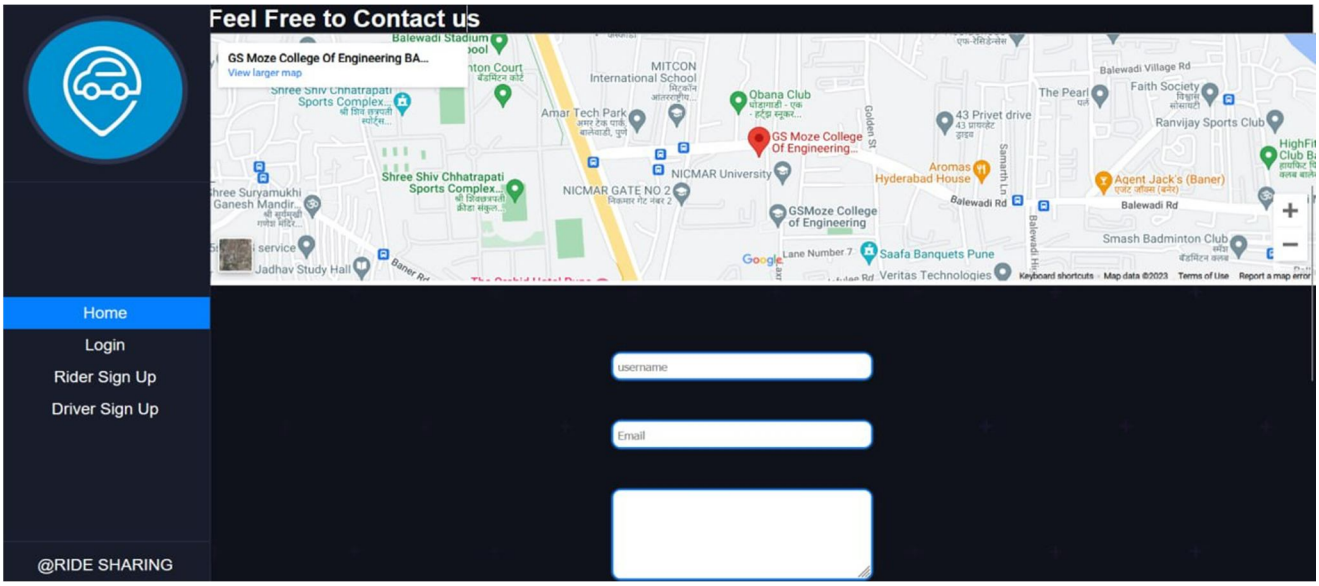

Fig 8. Map Fetching

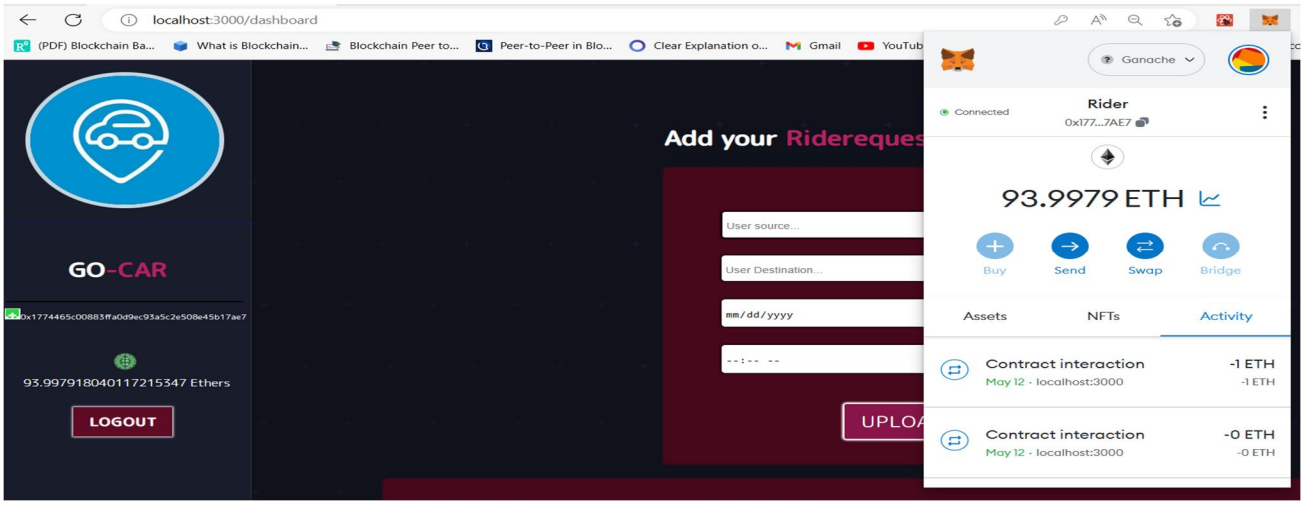

Fig 9. Rider Connection to MetaMask

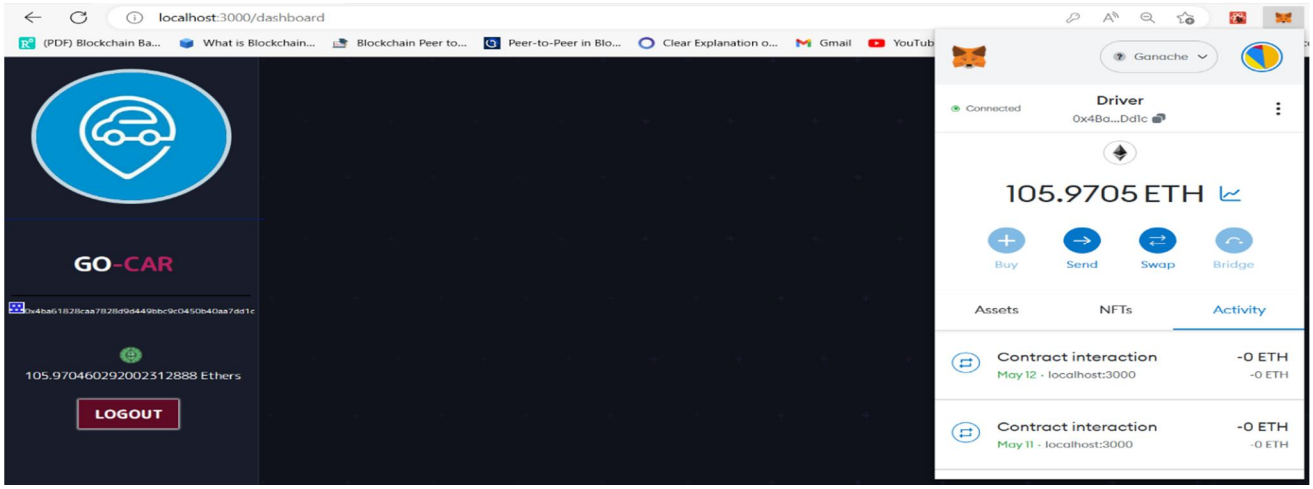

Fig 10. Driver Connection to MetaMask

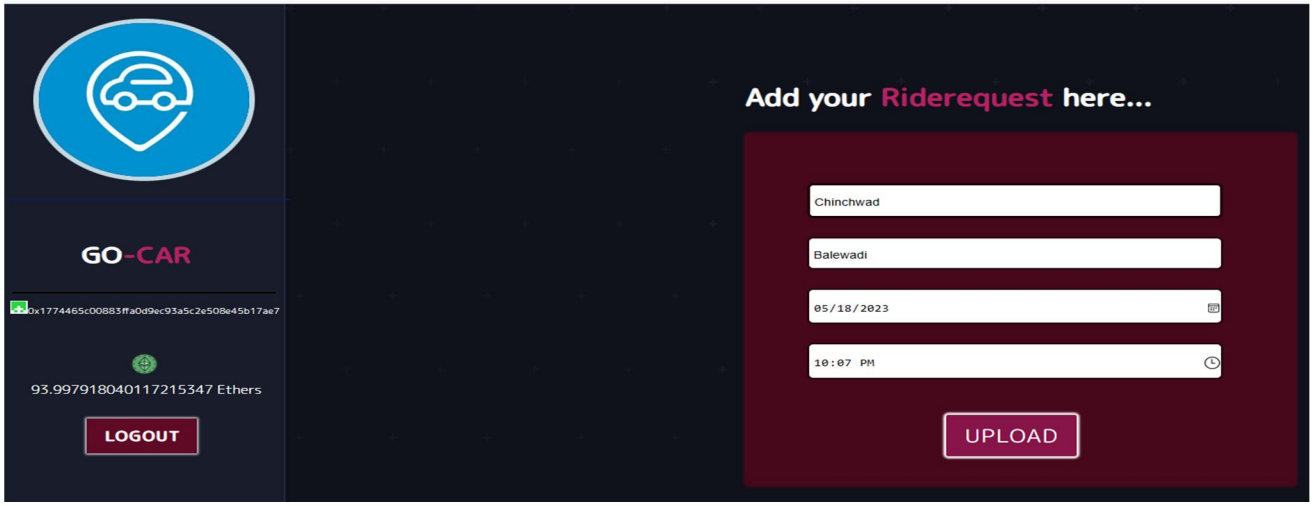

Fig 11. Rider Adds the Ride Request

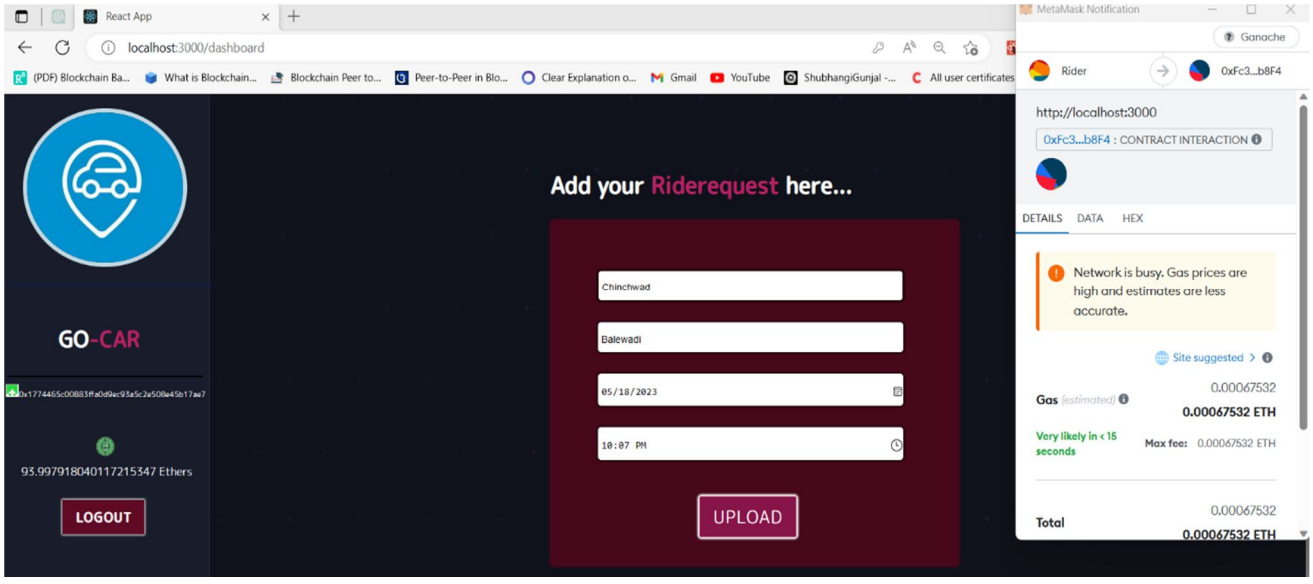

Fig 12. Request Upload Successfully

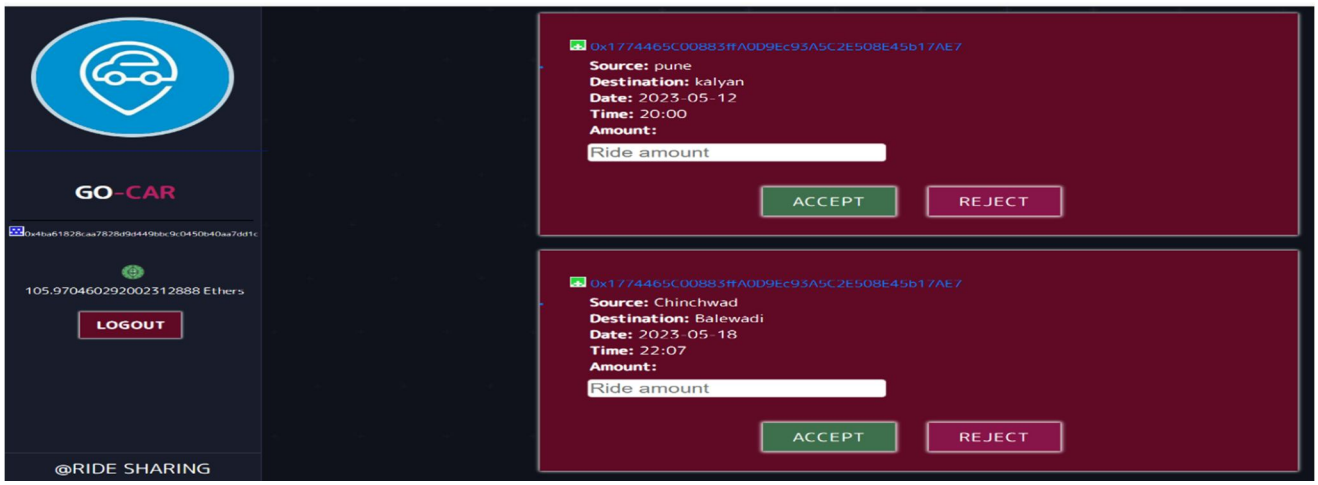

Fig 13. Request Received to Driver Successfully

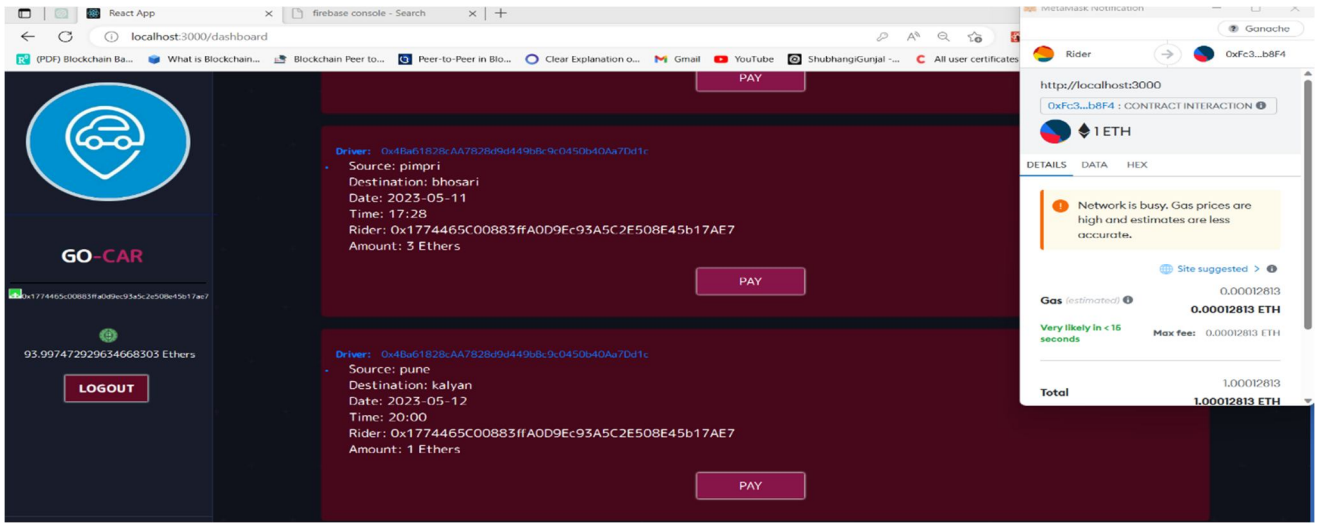

Fig 14. Rider Now Ready to Pay

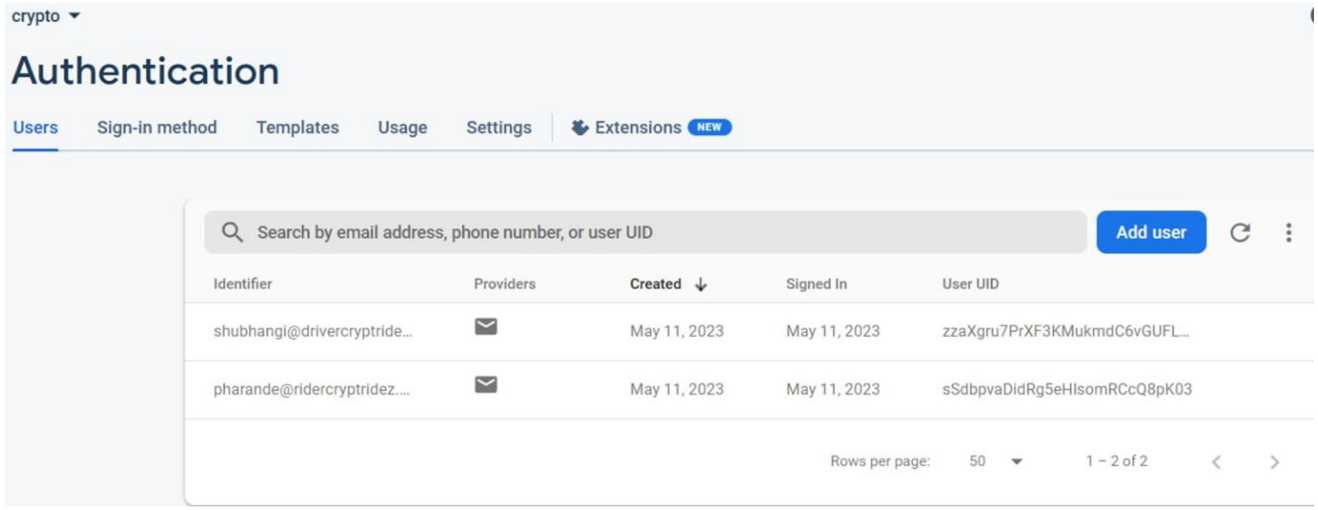

Fig 15. User Data Storage

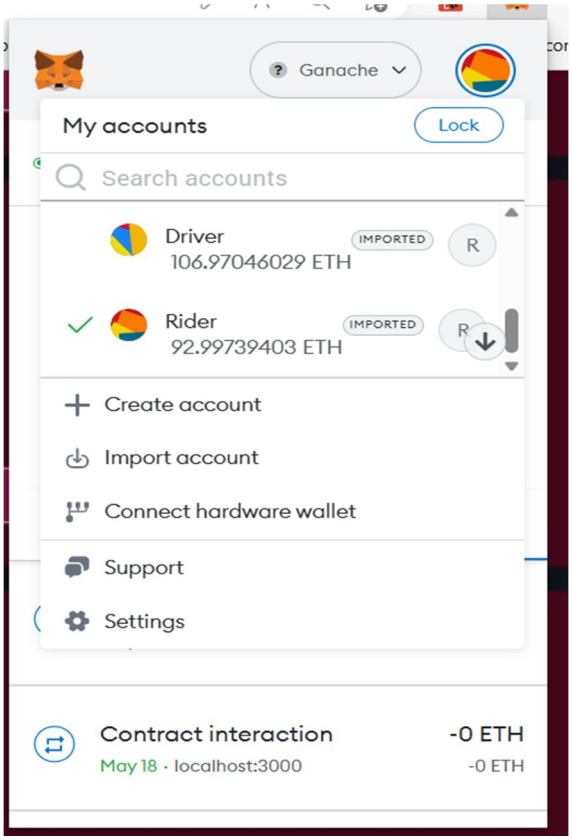

Fig 16. Payment Done in MetaMask

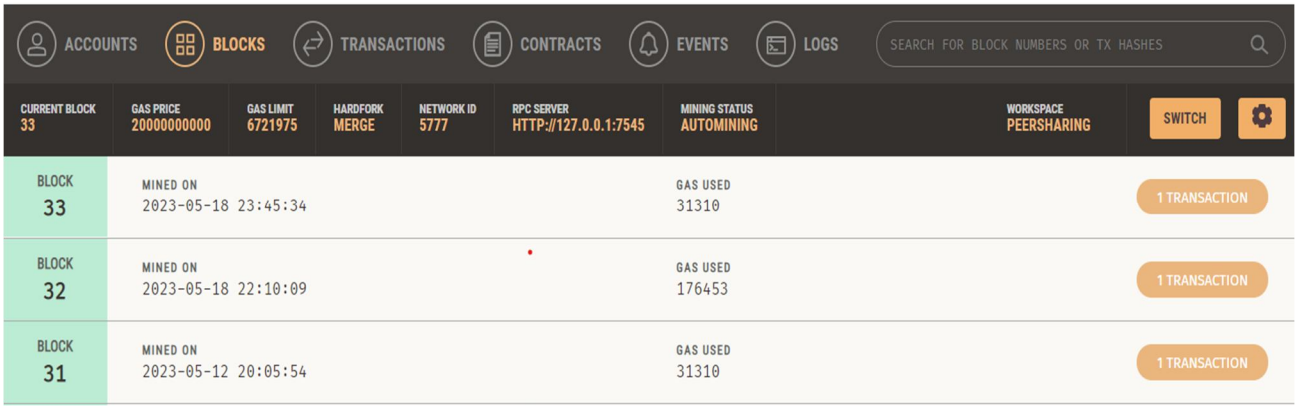

Fig 17. Transaction Value in Block

VII. FUTURE SCOPE

In spite of its ability to operate independently, blockchain is expected to perform better when paired with other technologies such as the Internet of Things, artificial intelligence, and big data. By doing so, we might be able to provide better location-based automobile services.

This study will be expanded to include an assessment of the application's performance and cost in the future. It is also important to examine blockchain technology from the standpoint of data processing since it is a trust-free system that ensuresconsumers can trust their data.

Data quality is generally improved by blockchain technology, but when blockchains are integrated with larger software systems, it is important to understand the capabilities of data processing.

VIII. CONCLUSION

Blockchain is used to provide the integrity of information and provide a distributed car-sharing service. If the reserved information is exposed to an adversary, they cannot know the user's authentic identity.

The availability of a cost-efficient option for car privilege might result in induced car usage. The implementation of a Peer-to-Peer car-sharing standard improves the efficiency of used cars, expands mobility for individuals with no means of buying a car, and can even create additional income for the vehicle proprietors.

The conventional car-sharing system is exposed to some security problems owing to the centralized approach and communication via a shared medium. This paper proposed a secure decentralized model of a car-sharing system and a secureauthentication strategy to provide a decentralized sharing service for legitimate users.

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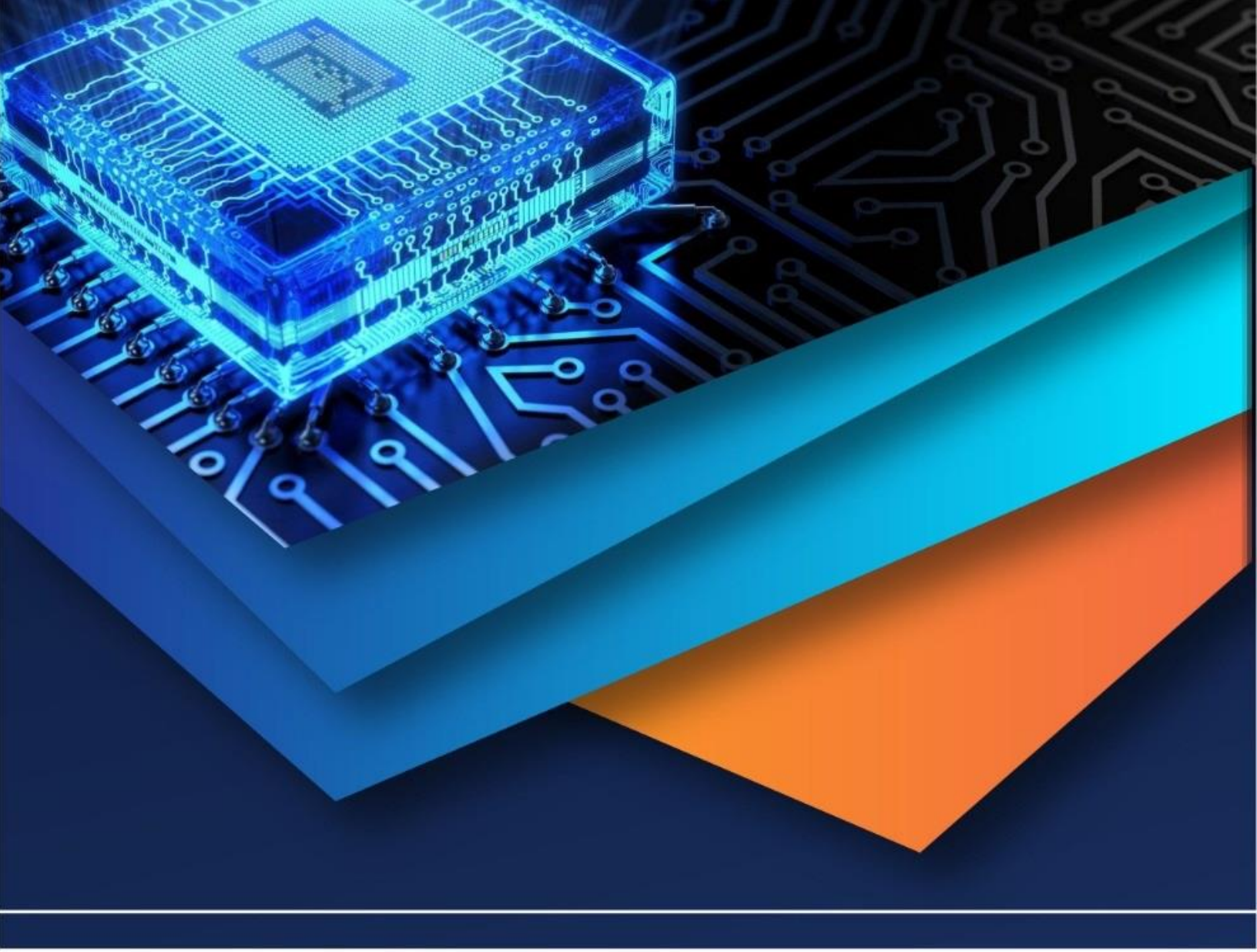

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