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CryptoDrive: A Decentralized Car Sharing System

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Abstract: Carsharing initiatives can aid in addressing various urban issues by providing access to shared vehicles while restricting the use of private cars. With the growth of the Internet of Things, individuals can use their mobile devices to carry out basic tasks and access shared cars. However, such programs have security concerns, as confidential information, including user identification, location data, and access codes, is transmitted through public channels. This makes it possible for attackers to obtain this information for malicious purposes, underscoring the importance of developing a reliable authentication protocol to enhance security.

Keywords: carsharing programs, urban challenges, shared automobile, mobile devices, security issues,

I. INTRODUCTION

To tackle transportation-related issues in urban areas, such as road congestion and fuel combustion pollution, car-sharing programs were developed. Carsharing is a cost-effective alternative to car ownership, providing people with increased mobility without the added expenses of maintenance and storage.

Peer-to-peer (p2p) carsharing, a novel shared-use vehicle concept, allows individuals in a neighborhood to access privately owned vehicles. P2p start-ups are part of a group of internet-based businesses that have popularized the notions of "collaborative consumption" and the "sharing economy." p2p vehicle sharing is one of many shared-use mobility services that focus on shared transportation resources, with the sharing economy becoming an increasingly influential force in society.

In the p2p service model, car owners transform their personal vehicles into shared cars and rent them out to other customers. In a traditional car-sharing system, a centralized service server stores and manages user and service data. However, this approach has a single point of failure and is vulnerable to malicious attackers.

For instance, if the service server is hacked, all sharing records can be erased, rendering users unable to access previous data on used cars, and making it difficult to identify any fraudulent activity during car-sharing or tampering with sharing records. Furthermore, compromised saved information poses a significant risk to user privacy.

II. METHODOLOGY

CryptoDrive is an ideal solution for several reasons. Firstly, it offers decentralized payments and ride fare-bidding, ensuring that customers from rural and semi-urban areas are charged fairly for their rides. Secondly, the use of blockchain technology reduces the risk of data theft and hacking by providing end-to-end encryption, ensuring that user data remains secure. Thirdly, crypto payments enhance transaction speed and security. Fourthly, drivers are not required to work full-time on the CryptoDrive platform, enabling them to increase their earnings strategically. Finally, the government can regulate the taxes paid by local taxi drivers and car drivers more efficiently.

CryptoDrive is a cutting-edge solution that addresses several pressing issues in the transportation industry. The platform leverages the power of blockchain technology to provide secure, decentralized payments and ride fare-bidding. By doing so, it ensures that customers from rural and semi-urban areas are not overcharged for their rides, while also providing drivers with a fair income.One of the key advantages of CryptoDrive is the use of blockchain technology, which offers unparalleled security and reliability. By leveraging a distributed ledger, the platform reduces the risk of data theft and hacking, while also providing end-to-end encryption to keep user data safe.

This feature is particularly important in today's digital age, where data breaches and cyber-attacks are becoming increasingly common.

Another advantage of CryptoDrive is the use of crypto payments, which offer several benefits over traditional payment methods. For example, crypto payments are faster, more secure, and less susceptible to fraud than credit card payments. Additionally, the use of crypto payments enables drivers to receive their earnings more quickly, reducing the financial burden of waiting for payments to clear.

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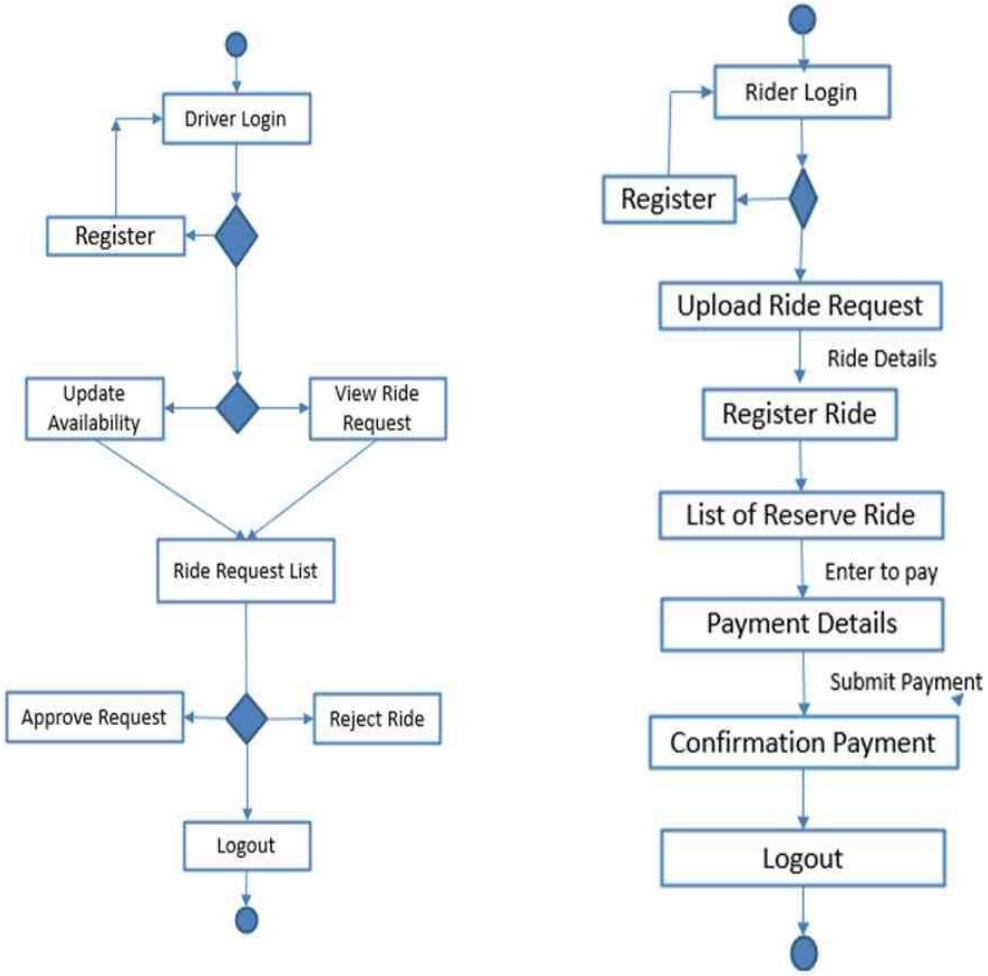


Fig.1 Flow diagram

III. PROPOSED SYSTEM

The platform requires drivers and Rider to register and verify their identity in order to participate. Once registered, drivers can update their availability and receive booking requests from interested riders.

The driver panel allows them to view and interact with all ride requests. Before taking a ride, the driver sets a fair charge for the ride and can either approve or decline the request based on availability and other factors.

If the driver accepts the ride, the rider panel receives the details. After completing the ride, the rider makes the payment through Metamax, which adds the appropriate amount in ETH to the driver's account. The ride-sharing platform ensures the safety of both drivers and riders by requiring users to register and undergo background verification.

After the verification process, users can request rides by providing their location details and trip information. The driver calculates the cost of the ride based on various parameters such as distance, car type, and a fixed price per kilometer and shares the fare details with the user. The rider can then choose the ride according to their convenience. Upon completing the ride, payment can be automatically transferred from the rider's wallet to the driver's wallet using crypto payments, ensuring secure and fast transactions.

The use of blockchain technology in the proposed framework offers several benefits, such as enhanced security and transparency. By utilizing blockchain, all the data and transactions are stored in an immutable and decentralized ledger, which makes it impossible for anyone to tamper with the data. This enhances the security of the platform and ensures that all the information shared between the riders and drivers is safe and secure. Additionally, the use of blockchain technology makes the platform more transparent as all the transactions and activities on the platform are visible to all the participants on the network. This enhances trust between the riders and drivers, as they can verify the information shared by each other. Overall, the use of blockchain technology in the proposed framework enhances the security and transparency of the platform, making it a more reliable option for both the riders and drivers.

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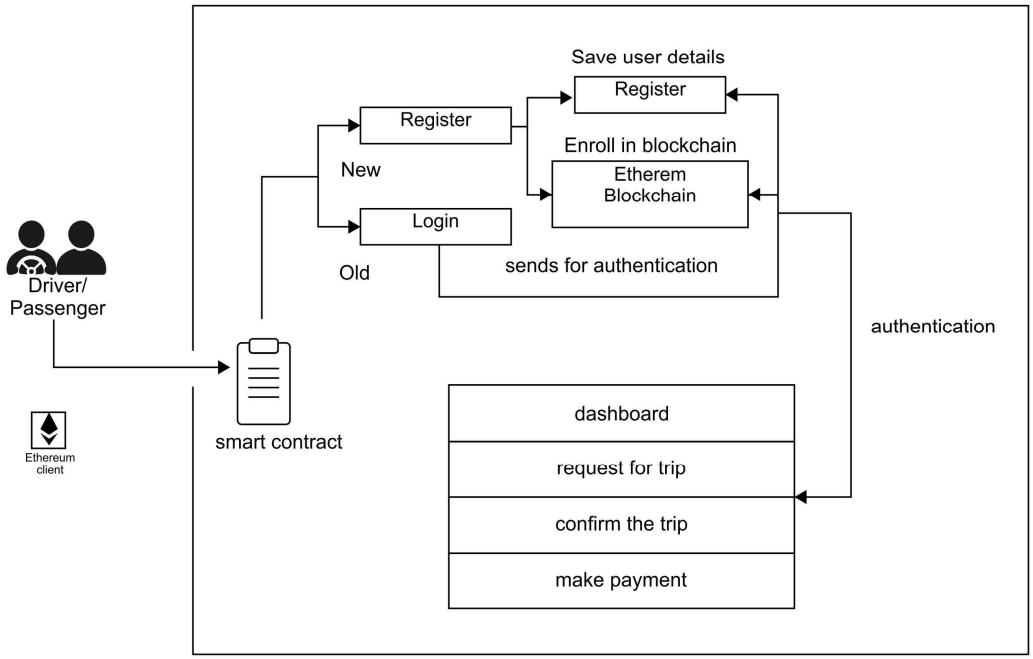
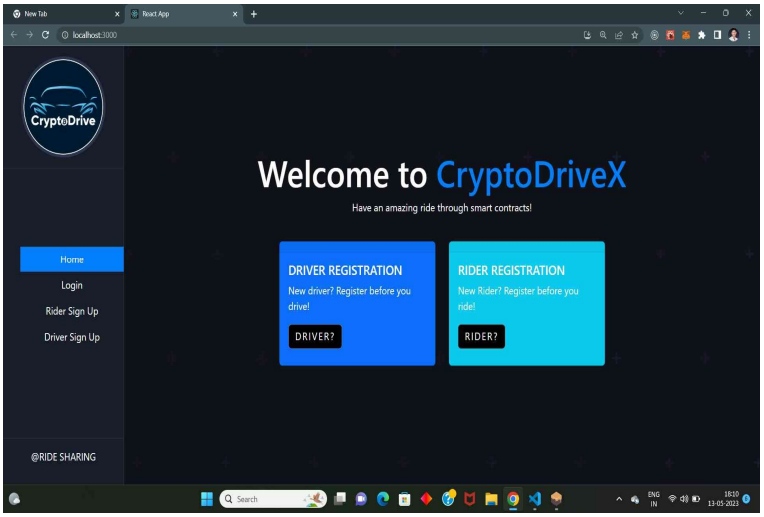


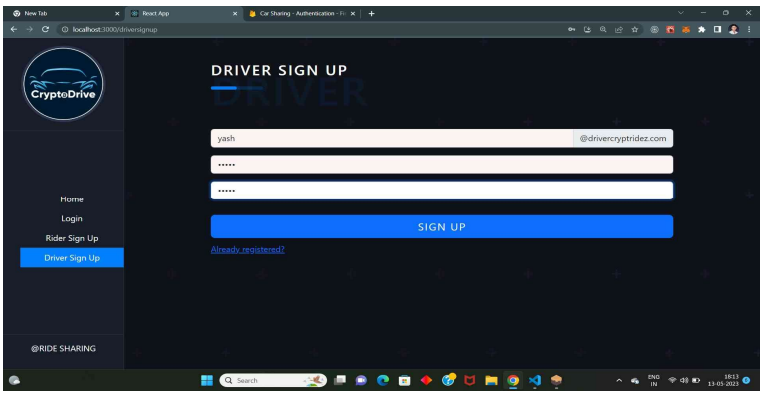
Fig.2 System architecture

IV. RESULTS AND ANALYSIS

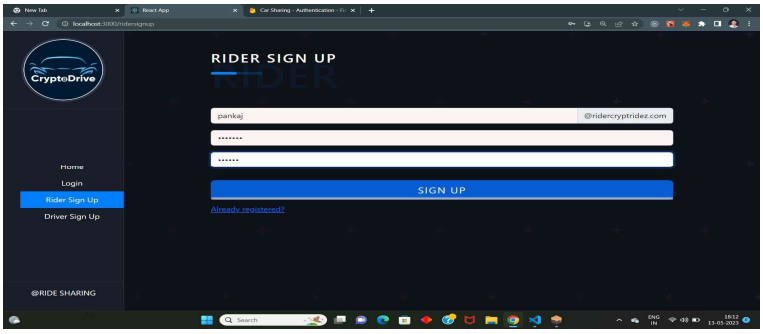
The conventional car-sharing system's centralised structure and public communication channel have made it vulnerable to various security issues. To address these issues, this paper proposed a safe decentralised model of a car-sharing system, which utilised blockchain to offer a decentralised car-sharing service and guarantee the accuracy of service information. In addition, a secure authentication technique was employed to ensure the user's privacy by using a pseudonym in the car-sharing system. The suggested protocol was shown to enable safe mutual authentication between the user, station, and owner, according to BAN logic analysis. Furthermore, the AVISPA simulation demonstrated the suggested protocol's security against replay and man-in-the-middle attacks. By providing a decentralised sharing service for authorised users, this model could potentially address mobility issues in metropolitan areas while improving security and privacy.



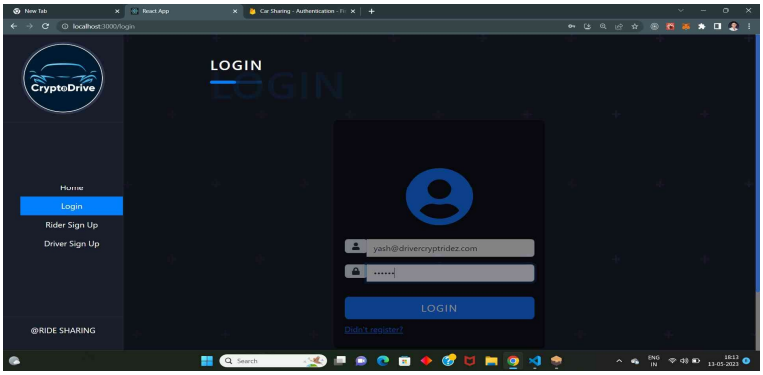
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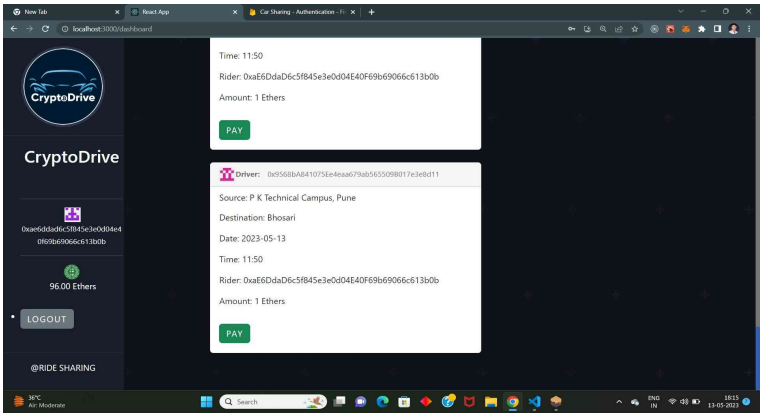
SIGNUP AS DRIVER



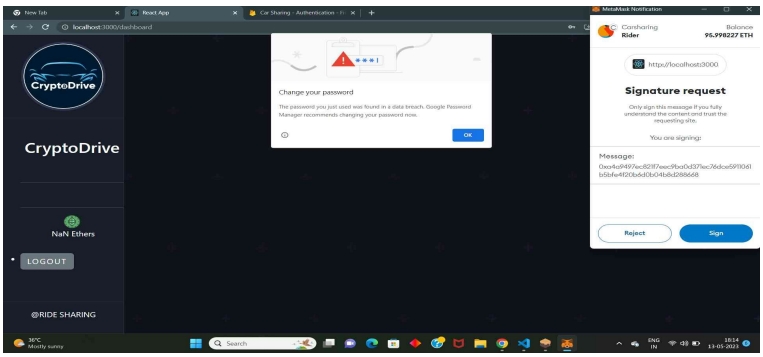
SIGNUP AS RIDER



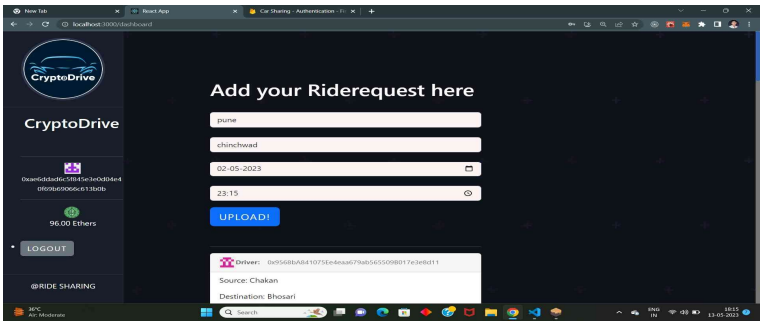
Login



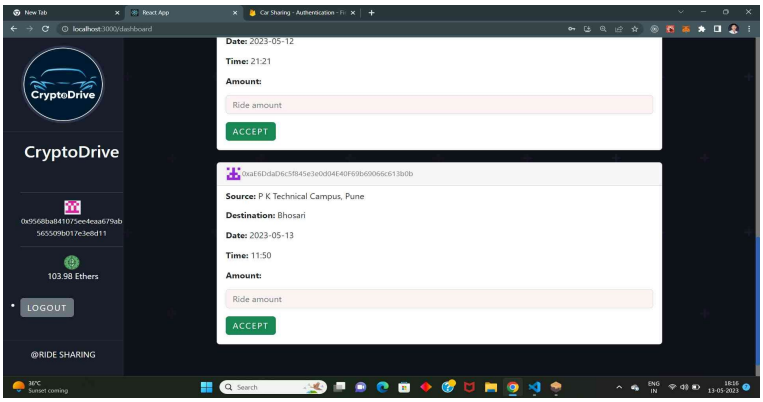
DRIVER DASHBOARD



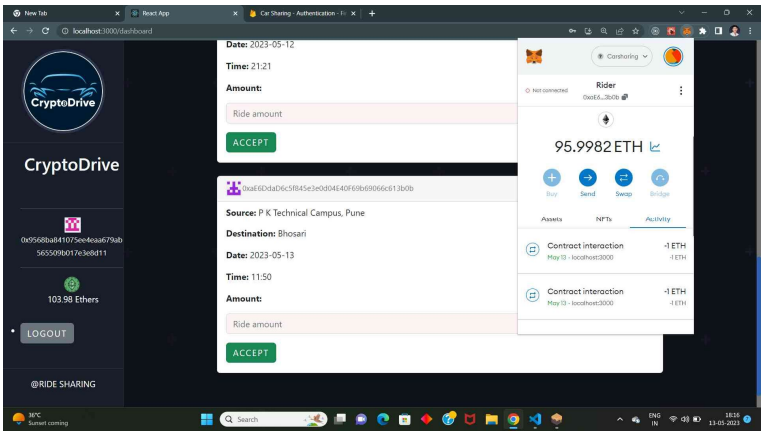
LOGIN AS RIDER



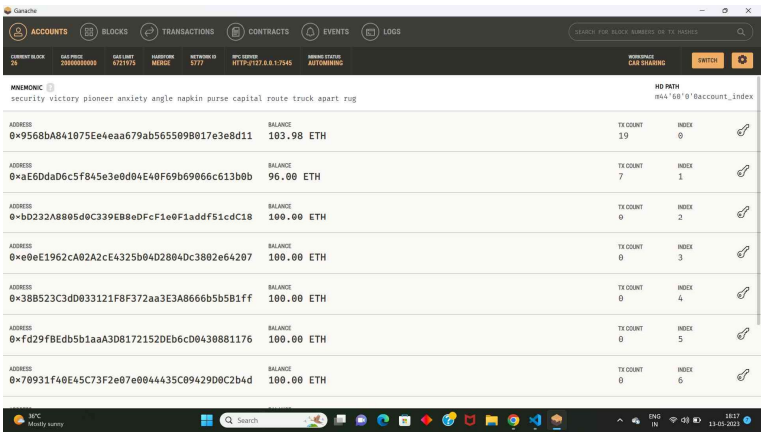
RIDER DASHBOARD



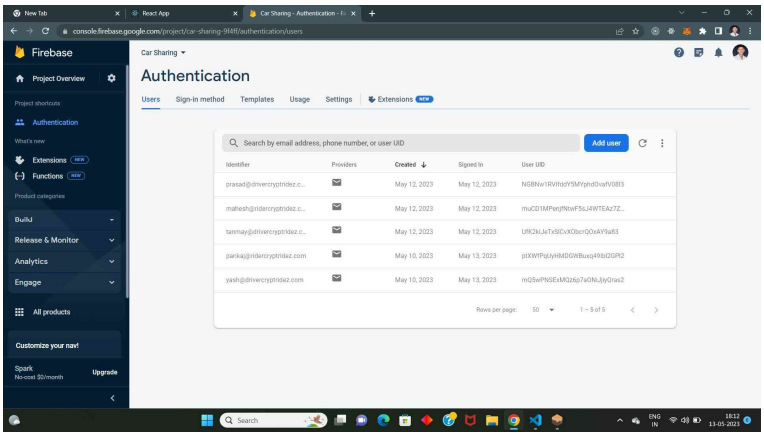
RIDE REQUESTS



PAYMENT CONFIRMATION



DEPLOYED SMART CONTRACT



USER DATA STORAGE

V. CONCLUSIONS

The aim of this paper is to explore the potential of Blockchain technology in the shared economy and its applicability in smart city ideas. The article presents an existing framework for decentralized, P2P, blockchain-based ridesharing services, and proposes an improved version of the same. To support this framework, a decentralized application (DApp) is developed, which acts as a front-end user interface assisted by blockchain. Ethereum, a permissionless public blockchain, is used in this DApp, and transactions and information exchange over the network are automated using smart contracts.

The use of blockchain can create a system where smart contracts incorporated in digital code are maintained in decentralized and transparent databases. This can lead to an ecosystem where intermediaries are not needed, and every process and task has a digital record that can be identified and validated using a digital signature. However, the practical implementation of blockchain technology is still years away, and it cannot be seen as a disruptive technology that can eradicate traditional business models by providing low-cost solutions. Rather, it can lay new frameworks for economic and social issues.

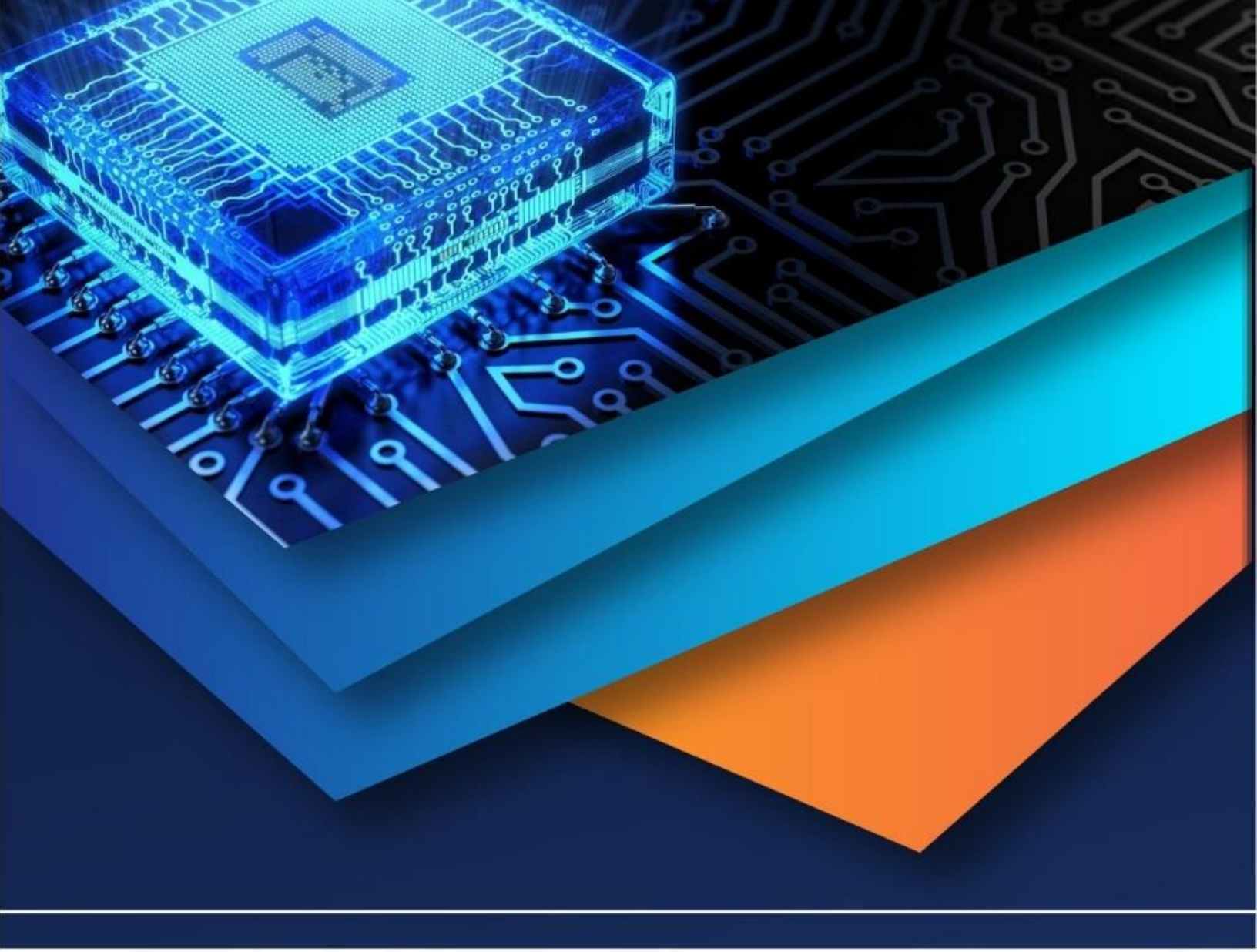
While blockchain has the potential to transform business models and governance, it will take decades to pervade our socioeconomic infrastructure. Integration with other technologies like the Internet of Things, Artificial Intelligence, and Big data could lead to better solutions for location-based automotive services. Future work should analyze the cost and performance of the developed application, explore the technology from a data processing perspective, and analyze the data processing workloads on different types of blockchain.

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