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Blockchain-Based Peer-To-Peer Vehicle Sharing Platform

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Abstract—A peer-to-peer (P2P) car-sharing service can be built using a decentralized approach, allowing users to interact directly and eliminating the need for a central authority. By leveraging smart contracts, the platform can automate transactions and agreements, ensuring both user privacy and fair pricing without relying on intermediaries. This system would also use a dedicated crypto token to facilitate direct payments between drivers and passengers, making the entire process more efficient.

Keywords— P2P car-sharing, Decentralized interaction, Smart contracts, Crypto token, Customer privacy, Fair pricing.

intermediaries to handle tasks like payments and data security. The use of these intermediaries can lead to a lack of transparency, unfair pricing, and compromised privacy due to extensive data sharing.

To solve these issues, we explored blockchain technology and its potential for creating a decentralized system. Our research focused on using Ethereum Smart Contracts to remove the need for intermediaries. A smart contract is a self-executing agreement on the blockchain with predefined, permanent rules that cannot be changed, not even by the administrator. This creates a transparent, secure, and private system. The Ethereum blockchain, as a decentralized, immutable, and globally distributed database, serves as the ideal foundation for this solution.

I. INTRODUCTION

While car-sharing is growing in popularity, with major companies like Uber and OLA expanding their services, these traditional platforms operate on a centralized model. This means a single entity controls all operations and enforces a wide range of rules on both drivers and passengers. This centralized structure often requires multiple third-party

II. LITERATURE REVIEW

System analysis is a detailed evaluation of a system's components and their internal and external interactions. The main goal is to identify current problems and determine the necessary steps to fix them. This process starts when a user or administrator performs a survey of the existing

system. Information is gathered from various sources, including files, decision-making processes, and system activities.

This often involves the use of data streams and visual aids like diagrams. Effective analysis requires a combination of training, experience, and logic to collect the critical data needed to design a new system. The success of any system depends on how well the problem is identified, understood, and solved. A strong analytical model should provide both an understanding of the problem and a framework for its solution. This requires gathering specific system data and thoroughly assessing the requirements for the proposed system.

The system analysis process consists of four main stages:

1. Initial analysis and system layout.
2. Systematic analysis using analytical tools.
3. Feasibility study.
4. Cost-benefit analysis.

III.METHODOLOGY

Our new protocol is designed to protect users from various cyber threats, including man-in-the-middle, replay, and offline password guessing attacks, as well as impersonation and stolen device threats. A preliminary security analysis confirms that this protocol offers mutual authentication, anonymity, and confidentiality. When compared to similar systems, our protocol shows strong performance and is well-suited for a blockchain-based car-sharing service.

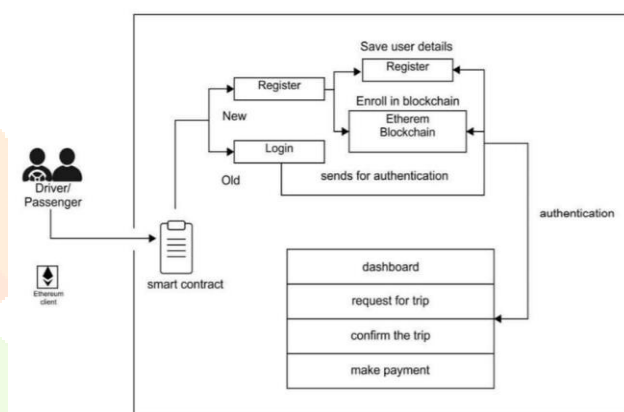
The protocol will eventually be tested through a simulation before being implemented in a real car-sharing system. This blockchain-based authentication method involves five key entities: a trust authority, stations, owners, vehicles, and users.

Key Benefits:

- **High Security:** Blockchain's distributed verification process provides a high level of security by validating all transactions across the network before adding them to the chain.
- **Efficient Transactions:** The system ensures transactions are fast, secure, and efficient.

- **Transparent Pricing:** It offers a transparent and accurate pricing model.
- **Reduced Effort:** Online reservation tools simplify the process, requiring less user effort.
- **Travel Simplification:** The overall travel experience is made easier.
- **Enhanced Security and Privacy:** The system significantly improves security and privacy for all participants.

IV. SYSTEM ARCHITECTURE



V. CONCLUSION AND FUTURE WORK

5.1 CONCLUSION

Car-sharing has become a popular urban mobility solution, but traditional centralized systems are vulnerable to security risks due to their reliance on public communication channels. This paper presents a secure, decentralized car-sharing model that uses blockchain technology to authenticate users and ensure service accuracy. To protect user privacy, the system uses a pseudonym for each user, making it impossible for an attacker to discover their true identity, even if they access the stored data.

5.2 FUTURE WORK

While blockchain can be used on its own, its true potential is unlocked when combined with technologies like the Internet of Things (IoT), artificial intelligence (AI), and big data. This

integration could lead to improved solutions for location-based vehicle services.

Future research will include a detailed analysis of the application's performance and cost. It is also important to examine the technology from a data processing perspective, as blockchain is a trust-free system where data integrity is paramount. While blockchain generally improves data quality, understanding its processing capabilities is crucial when integrating it into a larger software system. Additionally, the research should investigate data processing workloads across different blockchain architectures.

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