

Peer to Peer Car Polling using Blockchain

Abstract:

The car-sharing market is constantly growing and recently it has become even more popular than car ownership. However, classic car-sharing system is based on a centralised database server which can often lead to hacker attacks or pass-word leaks. Moreover, in a classic car-sharing system, the owners of the cars can misuse customers' data. As seen nowadays from a lot of use cases, the best solution to these problematic issues is to use blockchain technology. Blockchain as decentralised, immutable, public ledger provides the customers with security that is impossible to tamper.

The aim of the proposed solution is to create and implement peer-to-peer short term car-sharing application based on blockchain technology and smart contracts. For the implementation of smart contracts, Solidity programming language is used. Solidity works with Ethereum blockchain. The key novelty of the project is introducing a peer-to-peer car sharing service without a central authority, what reflects a decrease of costs and increase of data transparency in that system. Also token based solution gives us ability to cover business-to-business (B2B) and business-to-customer (B2C) use cases.

Existing System:

First application is HireGo. It is built on Ethereum using smart contracts as a distributor of virtual fungible tokens called HGO. When we want to rent a car using HireGo, we need to exchange ETH to HGO tokens. Hire Go's market place consists of three contracts. First contract provides HGO tokens, second one provides ERC-721 car tokens and the last one provides a rental contract. This rental contract acts as an escrow and it is responsible for Vehicle token between two parties. In other words, when we rent a car, we send HGO tokens to rental smart contract which locks car token and HGO tokens for selected period. Then the contract manages the transfer of the vehicle token from owner to us. The rental solution also brings big security issues.

If we rent a car for a day trip and then we lose the phone with Ethereum address, the car will be stuck for the rest of time and the owner is unable to help us because he/she does not own that vehicle at the time of renting. Unfortunately, the developers allowed us only the ability to create a car for rent in this version.

Next application we will introduce is Helbiz. Helbiz's philosophy is to create and integrate transport ecosystem, where we are rewarded for using this system. This project is using well-known implementation of blockchain car-sharing platform by providing ERC-20 tokens called HBZ. In contrast to HireGo, we can also earn tokens by providing our data about driving to

insurance companies. Helbiz is the only project which has created a mobile application for renting electric scooters. When we want to rent a scooter, we simply find a free one in the application and then we scan QR code, and pay for the service with HBZ tokens.

Next project we will look at is DAV. As opposed to other projects the main goal is to connect autonomous vehicles (cars, trucks and drones) with users. For communication purposes we use DAV token, which also serves as an access token. Services in DAV network can be bought with virtual tokens based on Ethereum. It shall not be mistaken with a DAV token. If we are owning vehicle or charging station which we provide to other users in the network are rewarded with DAV tokens.

Autonomous vehicles in network automatically interact with and also can fulfil the user's commands.

Proposed System:

We will attempt to compare our project with those solutions' specifications. In contrast to related work and what we have learnt, we try to build our solution with two different tokens based on non-fungible token type ERC-721 and one fungible token type ERC-20. A smart contract which holds a list of unique assets.

These Assets are represented as non-fungible tokens. First token type represents a car asset and the second one represents Unlock token for a car token. This solution will allow us to scale the app more efficiently. The car owner, by the very nature of blockchain, would have full control over who gets access to his or her information, and the same goes for the person borrowing the vehicle. Without a key to piece together the distributed data and then decrypt it, it is far harder for a third party to hack either side's personal information. We applied ERC-20 token to reward users for using our car-sharing application. After a user collects a particular number of tokens, he can apply for a discount for renting a vehicle. Users are more motivated to use our service if they can get it cheaper.

Software Tools:

1. Ganache
2. Truffle Suite
3. NodeJS
4. NPM
5. Metamask
6. VS Code
7. Solidity
8. Web3.js

Hardware Tools:

1. Laptop
2. Operating System: Windows 11
3. RAM: 16GB
4. ROM: 4GB
5. Fast Internet Connectivity

Applications:

1. The same technology can be applied for hotel and restaurants.
2. More decentralised, more secured, and tamper freeness in al most of all the applications we can bring this tech there.