Ethereum Blockchain Based E-Commerce Application (Use case Pre-Owned Cars Purchase)

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Abstract: An Ethereum blockchain-based pre-owned car application could offer several advantages over traditional methods of buying and selling used cars. By utilizing smart contracts, off-chain data storage, and a reputation system, the platform could provide increased transparency, security, and efficiency for buyers and sellers. However, it is important to note that this is a proposed methodology and further research and development would be necessary to fully implement such a system. Additionally, it is also important to consider any legal and regulatory challenges that may arise with using blockchain technology in this context. Overall, a blockchain-based platform for pre-owned car sales has the potential to revolutionize the way we buy and sell used cars, making the process more secure, transparent and efficient.

Keywords: Blockchain, Ethereum, Solidity, Pre-Owned Cars, Smart Contracts.

I. INTRODUCTION

Using a pre-owned car application created on the Ethereum blockchain, users can purchase and sell used cars with greater security and transparency. The application makes use of smart contracts to guarantee the integrity, security, and transparency of every transaction. In addition, the adoption of blockchain technology does away with the need for middlemen like dealerships, which lowers prices and accelerates the process. The blockchain can be used in this application to track vehicle ownership and history, giving potential buyers a transparent and accurate account of the car's past. A buyer can utilize this information to make an informed purchase decision. Examples of this information include past owners, maintenance history, accident reports, and more. private blockchain with the capabilities of Hyperledger Fabric is not a blockchain and that current non-blockchain technologies are much more affordable and provide the same level of security. When using Hyperledger Composer, a developer can easily create and customize the network's digital assets, transaction logic, participants, and access controls. Composer supports the sharing, reuse, and scaling of components among many companies. Additionally, the incorporation of cryptocurrencies into this programme permits secure and convenient payments. The smart contract will start to work after the buyer sends money directly to the seller's wallet, which triggers the execution of the transaction. To sum up, the usage of the Ethereum blockchain in apps for used cars has the potential to completely change how we acquire and sell used cars. The conventional method of buying and selling used cars can be changed with greater transparency, security, and efficiency. The pre-owned automobile business has seen a rise in the adoption of blockchain technology in recent years. This movement aims to speed up, improve transparency, and safeguard the process of buying and selling used cars.

The usage of blockchain technology is one of the key developments in the market for pre-owned automotive applications. These applications provide customers with a safer and more reliable platform for buying and selling used cars by utilizing the security and transparency of the blockchain. Furthermore, the adoption of blockchain technology does away with the necessity for middlemen, which lowers costs and speeds up the process. The employment of artificial intelligence and machine learning algorithms in apps for used cars is another trend. These algorithms can be used to evaluate car data and give buyers information on the history, maintenance history, and other aspects of the vehicle. This knowledge can aid purchasers in making more educated choices and ensuring that they are paying a fair price for the car. The prevalence of online pre-owned vehicle marketplaces is another trend. By eliminating the need for users to physically visit a dealership, these markets speed up and simplify the process of buying and selling used automobiles. These online markets also frequently leverage AI algorithms and blockchain technology to give users more security and transparency. Blockchain is a decentralized, immutable database that makes it easier to track assets and record transactions in a corporate network. An asset may be physical (such as a home, car, money, or land) or intangible (intellectual property, patents, copyrights, branding). On a blockchain network, practically anything of value may be recorded and traded, lowering risk and increasing efficiency for all parties. Information is essential to business.

It is best if it is received quickly and is accurate. Blockchain is the best technology for delivering that information because it offers real-time, shareable, and entirely transparent data that is kept on an immutable ledger and accessible exclusively to members of a permissioned network. Among other things, a blockchain network can track orders, payments, accounts, and production. Additionally, because everyone has access to the same version of the truth, you can see every aspect of a transaction from beginning to end, increasing your confidence and opening up new prospects. The main objective of the paper is to show the security for the transactions, transparency and the use of blockchain so that, this technology can be implemented to other applications where the risk for the security breaches, theft, cyber-attacks can be controlled and the organizations integrity will be well maintained and also to gain knowledge of the subject clean in depth. In this paper both sender and receiver will be able to see the transactions when they purchase the car. The details of the car will be given in detail so that the client will get a clear understanding about the car and it will be easy for them to decide and purchase the car. Once the car is sold, the car will be blocked and again the same car will not be there for sale. The overall Objective is to show that an application that is used to buy pre-owned cars can be developed using the Blockchain.

II.   PROBLEM STATEMENT

Purchasing used automobiles may be a difficult and dangerous procedure that sometimes involves several middlemen and lengthy documentation. Conventional e-commerce systems lack transparency, leaving customers and sellers exposed to fraud and misunderstandings. Moreover, centralised systems are frequently vulnerable to hacking and data breaches, endangering the security of users' personal and financial data. We suggest creating an e-commerce application built on the Ethereum blockchain that enables safe and open pre-owned automobile transactions in order to address these issues. Our platform will guarantee confidence and security for all parties engaged in the transaction by utilising the advantages of blockchain technology, including immutability, transparency, and decentralization. Our website will allow vendors to display their pre-owned automobiles for sale and consumers to explore and purchase them straight from the platform. The transaction will be facilitated by the use of smart contracts, which will make sure that both parties fulfil their responsibilities before the transaction is finished. To further reduce the danger of fraud, our platform will use blockchain-based identity verification to confirm that all parties are who they say they are. Ultimately, our e-commerce application built on the Ethereum blockchain will offer a safe, dependable, and effective platform for used vehicle purchases, enhancing the purchasing and selling experience for all parties.

III.   LITERATURE SURVEY

[1] Subramanian, G. et al., (2021) offer a blockchain-based solution for the used electric vehicle market that might foster confidence, transparency, immutable data, and a productive way to monitor a futuristic electric vehicle supply chain's whole life cycle. The majority of used electric vehicle purchases currently take place through third-party services, websites, and mobile applications. This does not give accurate information on the history of electric vehicles, the battery's charging capacity, the records of previous charges, or the driver's performance (wear and tear affect battery life). Hybrid blockchain technology was used to implement our solution. Each stakeholder has been given an Ethereum blockchain address to use as a distributed ledger to track vehicle records. This concept considered road conveyance, battery manufacturer, charging station, and electric vehicle manufacturer as main stakeholders cleverly crafted contracts created using Solidity programming. The Truffle technology is used to deploy highly intelligent contracts on private blockchains that ensure the privacy of stakeholders and owners of electric vehicles. A mobile application called Meta Mask used the Kovan network to track vehicles on a public blockchain. For each transaction, this program tested using 0.1 ether. IoT-Blockchain application integration in a cloud environment is proposed by the Blockchain Electric Vehicle Cloud of Things (BEVCoT) idea.

[2] New approaches in changing the current model of car ownership transfer systems are being developed as a result of the increase in vehicle sales transactions worldwide. To prevent various forms of fraud, the integrity of the data in this type of activity must be given top importance. These can include everything from the falsification of the buyer's and seller's identities to the modification of vehicle data. To solve this issue, we suggest implementing a blockchain-based system, which boasts decentralization, security, and information transparency to alert customers to potential fraud in the course of a purchase transaction. In order to achieve this and much more, the systematic evaluation of the literature is conducted, and via it, the best components for the infrastructure of the proposed system will be identified. (Barreto, J. L. S. et al., 2022)

[3] The preliminary objective of Abishu, H. N. et al., (2021) is to cut the carbon emissions in smart cities by the usage of electric vehicles (EVs). However, EV drivers are reluctant to make long trips because of the short battery life of EVs and the lack of charging outlets. So, in recent times, wireless power transfer (WPT) technology has been employed to safely distribute energy among EVs through blockchain-enabled energy trading (BET). Blockchain is utilized in the WPT

process to guarantee the confidentiality and secrecy of transactions between dubious EVs. However, earlier BET research depended on consensus mechanisms already in place that were created to meet the needs of bitcoin systems. We suggest PBFT-based PoR, a new consensus mechanism that makes use of the advantages of Practical Byzantine Fault Tolerance (PBFT) and Proof of Reputation (PoR) (PPoR). The validator selection, block generation, and consensus processes are carried out in each cluster during the operation of the energy trading process in a clustered vehicular network. In order to maximize the utility of sellers, buyers, and validator nodes—which incentivizes trustworthy and helpful nodes. We use an incentive system based on a Stackelberg game model. According to the simulation results, the suggested plan lowers buyer costs by 21.1% while raising seller utility by 18%. Additionally, the suggested technique improves throughput and decreases transaction processing delay by about 47.1% and 15.7%, respectively, as compared to benchmarks.

[4] A distributed and decentralized digital ledger using blockchain technology keeps track of transactions across numerous computers. It uses encryption to confirm the validity of transactions and prevent manipulation, making it a secure and transparent method of storing and transferring data. Transactions are logged in blocks that are connected by a chain in a blockchain system. A "hash" code found in each block ties it to the one before it, forming an unalterable and secure record of all the transactions in the chain. In smart contracts, the details of the agreement between the buyer and seller are directly encoded into lines of code. These contracts self-execute. On the blockchain network, the code and the agreements it contains are copied and saved. Smart contracts make it possible to automate procedures and do away with the need for middlemen, which can speed up, streamline, and increase the security of transactions. Masum B et al., (2020) says that Smart contracts are executed on Ethereum, a decentralized, open-source blockchain platform. Since its creation in 2015, it has grown to become one of the most well-liked blockchain development environments for creating decentralized applications (dApps). Decentralized apps, or dApps, can be created and deployed by developers on the Ethereum blockchain. The creation of a secure loan mechanism is just one of the many uses for these dApps.In conclusion, integrating blockchain technology and smart contracts into a lending system can have a lot of advantages, including improved efficiency, security, and transparency. A lending system based on blockchain technology and smart contracts has the potential to lower the risk of corruption and increase the overall reliability of the system by automating operations and eliminating middlemen.

[5] Blockchain is a decentralized technology that was initially created for the Bitcoin cryptocurrency. Since the concept was first proposed in 2008, interest in Blockchain technology has risen. The primary characteristics of Blockchain that provide security, anonymity, and data integrity without a third-party organization in control of the transactions are the reason for the interest in it. As a result, it generates interesting research areas, particularly from the perspective of technical challenges and limitations. Our goal is to comprehend the present areas of study, difficulties, and potential future developments in relation to blockchain technology. A third-party organization frequently centralizes and regulates currency transactions between people or businesses. A bank or credit card company must act as the middleman to complete a digital payment or currency transfer. A bank or credit card firm may charge a fee for a transaction as well. The same procedure is used in a variety of other fields, including software, gaming, and music. Yli-Huumo, J et.al., (2016) has suggested that instead of the two main parties participating in the transaction, the transaction system is often centralized, and all data and information are handled and maintained by a third-party entity. To address this problem, blockchain technology has been developed. Blockchain technology aims to establish a decentralized ecosystem in which data and transactions are controlled by no outside entity.

[6] One of the main issues with document version control is managing accurate digital information and keeping track of changes to the digital asset when several parties are engaged in the preparation of the document. Nizamuddin N et.al., (2019) has surveyed that, In today's fast-paced world, document version control is frequently utilized to enable quicker product development and release cycles. The development of digitization has brought about challenges with document collaboration, inaccurate content, and version control that take 83% of productivity. The majority of current document version control systems are centralized and have a single point of failure, which results in longer update times and errors that allow changes to be made to a document without the awareness of other network users. More crucially, with centralized systems, it is possible to tamper with the document's changes and update history, endangering the veracity of those changes and their update history. Consequently, a totally secure and decentralized platform is required for the version control of digital documents.

[7] (Khoury, D et.al., 2018) States that the outcomes of voting events in centralized settings have always been debatable and subject to differing voter perceptions. The majority of current electronic voting methods are based on centralized servers, where voters must have faith in the organizing body to ensure the accuracy of the results. a fresh method for a decentralized trust less voting system that uses Blockchain technology to address trust problems. The primary components of this system are the assurance of data transparency and integrity, as well as the imposition of one vote per cell phone number for each poll with privacy assurance. For each voting event, organizers will deploy transparent,

reliable, and deterministic smart contracts on top of the Ethereum Virtual Machine (EVM), which serves as the Blockchain runtime environment, to implement the voting rules. Without a third-party server, users can be verified using their mobile phone numbers. Results indicated that the system is workable and might provide a first step towards environments that are suited for such experiences.

[8] Consumers have another choice to sell and buy things with relative ease because to modern centralized internet marketplaces like eBay. However, disadvantages of these marketplaces include the platform's power to arbitrarily block merchants, the fees associated with listing and selling products on the site, and the lack of user data privacy. The application claims that by utilizing the Ethereum blockchain platform, it overcomes each of these three disadvantages. The Truffle development framework was employed in the creation of the application. An Ethereum smart contract that was later moved to the Ethereum network housed the application's capabilities. The web3.js API was used to send the user's input to the Ethereum network after being read through a web interface. On the Rinkeby test network, statistics on the application were gathered. The gas cost of the application was then contrasted with the cost of using an online auction marketplace. The gas consumption of the transactions required to both buy and sell a goods was converted into US dollars. (Ranganthan, V. P et.al., 2018)

IV. METHODOLOGY

4.1 Pre-Owned Cars Application System Architecture

Create and set the Ethereum Blockchain environment in the Widows system and create the Project folders and files using "Truffle" in the Windows System then write the Solidity program "Pre-owned Cars purchase.sol" capturing the main logic of the solution. Write the required frontend, middleware and other required files for the solution and provide the Solution data using .JSON file then place the required Pre-owned Cars' image files in the appropriate Folder.
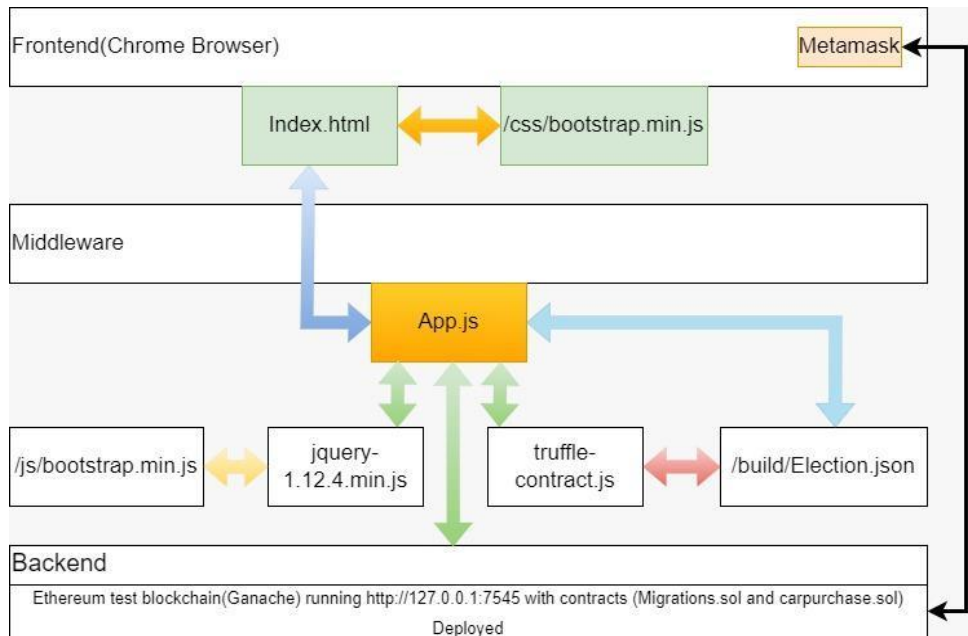

Fig. 1 Architecture of the Application

4.2 Pre-Owned Cars Application Network Architecture

Nodes are components of the network that maintain a copy of the Ethereum blockchain. In Ethereum, full nodes and light nodes are the two different types of nodes. Light nodes only save a portion of the data, while full nodes store the entire blockchain. Additionally, the blockchain for Ethereum is a shared public ledger that keeps track of all network activity, including the execution of smart contracts. Ethereum's smart contracts are self-executing programs that operate on the network and automate the process of managing and executing agreements between parties. It is maintained by a decentralized network of nodes that validate transactions and add them to the blockchain. They are visible, unchangeable, and safe since they are stored on the blockchain.
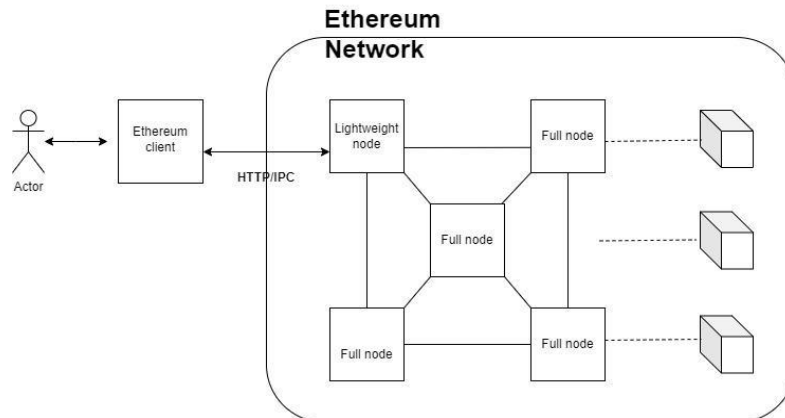
Fig. 2 Network Architecture of Application

V. CONCLUSION

As a result of the growing adoption of technology and blockchain, the market for applications relating to used cars is undergoing a substantial transition. These tendencies, which work to increase the efficiency, transparency, and security of the purchasing and selling of used cars, are expected to gain momentum in the upcoming years. To sum up, the usage of the Ethereum blockchain in apps for used cars has the potential to completely change how we acquire and sell used cars. Pre-owned automobile applications give users a more secure, reliable, and effective platform for purchasing and selling vehicles by using the security, transparency, and efficiency of the Ethereum blockchain. The implementation of smart contracts in apps for used cars eliminates the need for middlemen and guarantees that all transactions are safe, open, and impervious to fraud. Additionally, the usage of cryptocurrencies in these applications allows for quick and safe payments, speeding up the process. The market for pre-owned automotive applications is now experiencing growth, and this trend is mostly due to the growing usage of technology and blockchain. The usage of Ethereum blockchain in pre-owned car apps is poised to become an increasingly significant component of the automotive sector as the demand for secure, transparent, and efficient platforms for buying and selling used cars rises.

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