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**DECENTRALIZED E COMMERCE USING BLOCKCHAIN****Mohammed Huzair\*1, Manoj G\*2, Zain M S\*3****Mrs. Kavitha K S\*4**

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**ABSTRACT**

In today's technology driven world information is continuously being circulated all over the internet and majority of the buying and selling takes place online. It is important to take into consideration user privacy and security while still keeping all the transactions transparent. From time to time in the traditional centralized system of e-commerce problems arise such as false rating, user information is compromised, loss of billions of dollars online to cyber thefts, high transactions fees and many other vulnerabilities. To solve this blockchain based decentralized e-commerce system is proposed which is built on the P2P model and the transactions are stored on a digitalized ledger. Blockchain based decentralized e-commerce can be used to hide user information while keeping all the transactions transparent. This system also eliminates the need for third party payment services which charge high transaction fees.

**Keywords:** Blockchain, Ethereum, Smart contracts, Ecommerce, Keccak256, Decentralization.**I. INTRODUCTION**

E commerce is the buying and selling of goods on the internet from corporations like Amazon, Flipkart, Alibaba, Myntra etc. e-commerce has made it easier for customers to buy products faster and sellers to reach a large number of customers globally and as a result it is estimated that around 2.2 billion people use ecommerce platforms across the globe. The Covid-19 pandemic has also contributed to the increase in E-Commerce from 15% in retail sales to an estimated 22 % currently and studies estimated that in 2022 global e-commerce retail sale has surpass \$5 trillion for the first time.

The above implies that ecommerce has made its importance in everyday life but there are drawbacks of the traditional e-commerce system like

1. No proper cost regulation and the seller can mark any price
2. User privacy s exposed to third party
3. Rating manipulation
4. High transaction fees

Even though reputed sites are used there is no means to guarantee that there won't be disputes and scams. To solve the issues faced by the traditional system, studies have been conducted and decentralized blockchain technology based e-commerce has been put forward as it is tamperproof and is distributed.

**II. LITERATURE SURVEY**

E- Yang Xia, Qi Li , Lei Wang in their paper titled "Research n decentralized e-commerce architecture in P2P environment" propose a decentralized based e-commerce architecture based on p2p and web service technology which can address issues with resource organization, cross platform, database maintenance and other issues that are difficult to address in the current centralized system. The three-layer network model combines pure P2P and hybrid P2P structures instead of strictly adhering to the conventional P2P architecture. High-level network topologies, which are made up of more potent Server Node groups, use pure P2P in order to handle more tasks. Each Topical Virtual Community (TVC) is constructed using hybrid P2P, with peer nodes arranged in a star topology around independent server nodes. Gulshan kumar in the paper titled "Decentralized accessibility of e-commerce products through blockchain" To ensure the sustainability of technology and e-commerce the authors took into consideration a distributed and transparent ledger system for a variety of e-commerce products, including health medications, electronics, security appliances, food products, and much more. This solution was given the name "PRODCHAIN." It is a general blockchain framework that uses lattice-

based cryptographic techniques to make tracking e-commerce products less complicated. Pankaj joshi and Anoj kumar in the paper titled “A novel framework for decentralized c2c e-commerce using smart contract” discuss about the easy and simplicity of ecommerce which attracts a large number of users. These ecommerce platforms have seen a large number of frauds in the past because they lack a model to stop fraudsters from joining the network. In light of this situation the author focuses on the problems with current e-commerce and how to solve the issues faced using Blockchain technology and a cost evaluation model.

### III. BLOCKCHAIN

Blockchain is a distributed ledger made up of a sequence of blocks consisting of digital records, each block consists of list of transactions. Data copies are created and shared across the network making it distributed and all the copies must match each other for the information to be valid. Each blockchain is made up of blocks which is like a data structure and can store information. The structure of a block is described below

| Size | Field               | Description                                       |
|------|---------------------|---|
| 4 B  | Version             | Version Number                                    |
| 32 B | Previous Block Hash | Previous block hash                               |
| 32 B | Merkle Root         | Hash of current block data                        |
| 4 B  | Timestamp           | Time of creation of current block                 |
| 4 B  | Difficulty          | difficulty target for block                       |
| 4 B  | Nonce               | A counter used by miners to generate correct hash |

Figure 1. components of a single Block

#### A. Keccak256

Keccak 256 belongs to the SHA-3 cryptographic hash function family. Keccak256 cryptographic hash function to return a 32 byte unique hash based on the input provided. Ethereum uses keccak256 as it is efficient against a wide range of attacks and can perform efficiently with simple implementation and low computational cost making it ideal for calculating hashes in the ethereum ecosystem.

#### B. Ethereum blockchain

Ethereum was first proposed by Vitalik Buterin in January 2014 at the North American Bitcoin conference as distributed computing platforms which can be used to build decentralize applications. The cryptocurrency used in accordance with the ethereum blockchain is the Ether. Code can be written to interact with the ethereum blockchain and the code runs with the help of ethereum virtual machine.

#### C. Smart Contracts

Smart contracts are simple code written and stored on the blockchain and are executed with the help of ethereum virtual machine. Smart contracts are digitalize contracts that facilitate in exchange of information or money. Smart contracts on the ethereum blockchain are usually written using solidity. Smart contracts help automate execution of agreements.

### IV. DESIGN AND IMPLEMENTATION

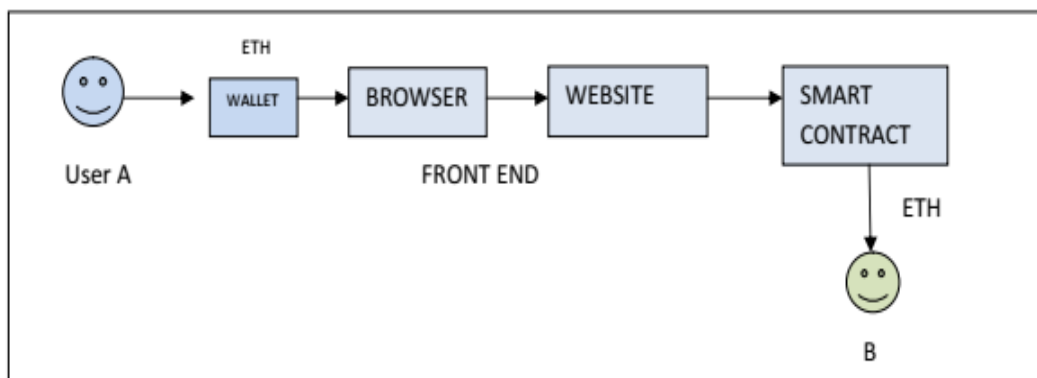


Figure 2: Design of the website

```
function buy(uint256 _id) public payable{
    //fetch item
    Item memory item=items[_id];

    //require enough ether to buy item
    require(msg.value>=item.cost);

    //require item is in stock
    require(item.stock>0);
    //create an order
    Order memory order=Order(block.timestamp,item);

    //save order to chain
    orderCount[msg.sender]=orderCount[msg.sender]+1;//<--orderID
    orders[msg.sender][orderCount[msg.sender]]=order;

    //subtract stock
    items[_id].stock=item.stock-1;

    //emit an event
    emit Buy(msg.sender,orderCount[msg.sender],item.id);
}
```

**Figure 3.** Function to buy item.

User A is the buyer who can see the products being listed on the page and can buy products with the help of metamask. User B is the seller who gets the amount sent by user A on successful transaction.

**A. IMPLEMENTATION**

```
function withdraw() public onlyOwner{
    (bool success,)=owner.call{value:address(this).balance}("");
    require(success);
}
```

**Figure 4.** Function to withdraw funds.

Function buy() written in smart contract using solidity is used to purchase the item. During the transaction, the value of ethereum being sent is compared to check if it is greater than or equal to the price of the product, if the value is less, then the transaction fails. The stock value is also checked to see if the item is available to continue with the transaction. If the transaction succeeds the stock of item is subtracted by one indicating 1 unit of that item has been purchased.

In the above function withdraw(), after the smart contract is executed and the transaction is successful the order is successfully placed, the amount for the item paid by the buyer is sent to the seller.

**B. TESTING**

Testing is important to make sure the smart contract is error free before being deployed to the blockchain as smart contracts handle large amounts of money/information and the transactions are irreversible.

A JavaScript assertion library called “Chai” and test framework “Mocha” can be used to write test files to check if the smart contract is executing the way it is supposed to be.

Test can be run with the command

**Npx hardhat test**

**V. RESULTS**

All the tests run on the smart contract PASS and the contract is deployed to the address “:0x5FbDB2315678afecb367f032d93F642f64180aa3”. The products are listed on the webpage and the user can view and buy the products. The user needs to connect to a metamask wallet to buy items. The wallet address acts as the user identity upholding user privacy.

| properties       | Our model                                   | Traditional model                            |
|------------------|---|--|
| Transaction fees | No transaction fees for seller              | Transaction fees charged for every item sold |
| Data stored      | Uses blockchain to store data               | Centralized server used to store data        |
| Trustworthiness  | Trustworthy because of immutable blockchain | Not trustworthy                              |
| Payment          | No third party payment service needed       | Presence of third party payment service      |

**VI. CONCLUSION**

Intrigued by the concept of blockchain and its use cases, we applied it to the counter the limitations faced by the traditional e-commerce model. We applied the blockchain technology to e-commerce making it more secure and transparent.

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