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Fake Product Identification Using Blockchain Technology

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ABSTRACT-Product counterfeiting is currently the retail industry's most significant issue. Fake goods are nothing more than poor copies of genuine brands. Service redundancy, ineffective departmental coordination, and a lack of standardization were all frequent issues in supply chain management due to a lack of transparency. These days, it is exceptionally normal for items to be falsified, and it is almost difficult to discern whether an item is phony by simply checking it out. RFID tags, artificial intelligence, machine learning, QR code-based systems, and numerous other methods have occasionally been utilized to prevent product counterfeiting. However, these methods have some drawbacks. A fake product can be disguised using a QR code, for instance, and machine learning and artificial intelligence operate with a lot of computing power. The objective of this task is to increment counterfeit item discovery through inventory network history following. This is made possible by blockchain technology, which ensures the identification and traceability of actual goods throughout the supply chain. Our methodology includes utilizing a QR code to store the item inventory network at each phase of the offer of an item to another party. Consequently, we are able to store the product supply chain thanks to blockchain. Because it cannot be altered without the consent of all parties involved, the data is extremely secure and protected from all vulnerabilities.

KEYWORDS-Counterfeit product, QR code, Blockchain., Supply chain, ethereum.

I.INTRODUCTION

Counterfeiting in the supply chain is a widespread issue that affects nearly every industry. At the point when an item is offered claiming to be another, this is called item falsifying. There are fake electronic parts, vehicle parts, shopper products, drugs — even fake wines. While counterfeit goods cost distributors and manufacturers billions of dollars annually, the dangers they pose to consumers can be even greater. Flawed fake vehicle parts or shopper items can overheat or get .While producers, merchants, transporters and government offices are effectively attempting to eliminate fake products from the store network, distinguishing counterfeits is testing. Fake products cost worldwide brands more than \$232 billion out of 2018. In addition to the costs associated with safety concerns and legal liability, counterfeit automotive parts are estimated to cost \$2.2 billion annually[2]. It can be challenging, if not impossible, to identify counterfeit goods that enter the supply chain. The best way to beat forgers is to apply an idiot proof method for validating products from their starting place to definite conveyance. New cloud-based security innovation is presently accessible that can make exceptional, idiot proof advanced identifiers for items so they can be followed at each point in the production network.

Distinguishing proof of fake product in state of the art market is being an uncommon task for clients and it is extremely dangerous for the clients while this takes area in drug fields. Different fields like electronics, clothing, design frill moreover face a huge impact on their symbol due to fake items. This is due to the growing popularity of smartphones and the internet. Numerous market surveys have revealed that counterfeit goods are expanding rapidly, which can have a negative impact on economic growth and development. Additionally, as a result, numerous prominent businesses have received negative feedback and have been removed from the logo list.

Products that are counterfeit are identical to real products on the market. Frequently completely rumored organizations are working to thwart this framework that is hazardous to all individuals in the whole worldwide. The different marked or presumed bunches are running on contemporary innovation to recognize the falsified items from the first item inside the market and to upgrade this working, the IT region can give them fine signals and can help to forestall fake things. Among those various advancements accessible inside the it region blockchain is one of the promising Innovations which might be utilized for diminishing the duplicating of merchandise. A blockchain is a sort of administered record that is intended to forestall altering. primarily based on the consensus set of rules that have been allocated, clever

contracts, and encrypted algorithms. Blockchain age works with to get up the Issue free from forging of an item. What's more, on this reviews we proposed an item observation blockchain framework with the goal to share measurements about stock from the producer to the clients. We are making such an application that will giving each of the assigned information about the items to the client who arranges that item and assist them with recognizing assuming the item is verified or falsified. Furthermore, supply chain history tracking helps to increase the detection of counterfeit goods. At each stage of a product's sale to a new party, our method stores the product supply chain using a QR code. Consequently, we are able to store the product supply chain thanks to blockchain.

II.LITERATURE SURVEY

1.Muhammad Nasir MumtazBhutta, Amir A. Khwaja, Adnan Nadeem, Hafiz Farooq Ahmad , Muhammad Khurram Khan, Moataz A. Hanif, Houbing Song, MajedAlshamari , and Yue Cao proposed a paper titled” **A Survey on Blockchain Technology: Evolution, Architecture and Security**” This survey paper has covered architecture of cryptocurrencies, smart contracts and general Blockchain based applications. The paper has provided a perspective to describe the Blockchain architectures in relation to cryptocurrencies, smart contracts and other applications. The research advances in consensus are also highlighted with some key development and application frameworks. A detailed discussion with respect to future and open research avenues is also performed, which could help to pave the way for researchers to explore the key challenging areas in the Blockchain field.

2.Rishabh Sushil Bhatnagar, Sneha Manoj Jha , ShreySurendra Singh, RajkumarShende proposed a paper titled” **Product Traceability using Blockchain** ”In this paper the conventional supply chain management (SCM) systems are widely used in the current market whereas blockchain is a relatively new system and is yet to be introduced in the industry on a large scale. The current SCM systems have prevailed so long in the market due to its easy and cheaper implementation on a large scale. Despite being used on a large-scale platform, these systems have their flaws which have prevailed since the existence of these systems. The current system is opaque in nature and is very vulnerable to various frauds and scams due to poor maintenance of the records of the transactions within the system. Even with all these flaws, these systems are being used by various market giants as the prices of the products can be easily exploited with any credibility.

3.Si Chen , Rui Shi , Zhuangyu Ren , Jiaqi Yan , Yanishi , Jinyu Zhang proposed a paper titled” **A Blockchain-based Supply Chain Quality Management Framework** ”In this paper, they proposed a framework for blockchain based SCQI. This framework will provide a theoretical basis to intelligent quality management of supply chain based on the blockchain technology. Furthermore, it provides a foundation to develop theories about information resource management in distributed, virtual organizations, especially distributed, cross-organizational and decentralized management theory.

4.Jinhua Ma , Shih-Ya Lin , Xin Chen , Hung-Min Sun proposed a paper titled” **A Blockchain-Based Application System for Product Anti-Counterfeiting** ”In this particular Paper, The system allows manufacturers to store relevant sales data in a Blockchain that is accessible to everyone. It is clear how many products the seller has left and the total amount of sales that the seller can make. The client can utilize the capabilities given by our framework to quickly perform seller side check. Digital signatures are used to verify identity by the system. Unless the key owner accidentally leaks his key, there is no other way to decrypt his private key.

IIIMETHODOLOGY

The proposed framework will store the inventory network of the item and keep the historical backdrop of responsibility for items. so that customers can determine whether the product's complete information is authentic when they purchase it. We will add product-specific information and verify the products using QR codes. Additionally, a system that prevents anyone from altering the product's data must be used for its storage; blockchain technology can accomplish this. So in this proposed framework, we are utilizing blockchain, and QR codes to recognize counterfeit items.

For the proposed framework, blockchain is carried out utilizing an individual programming called Ganache. The blockchain network used to keep track of and manage transactions was developed by Ganache. We need to use ganache software that helps us implement blockchain in order to use the Ethereumblockchain. Metamask is an

extension for the web browser that connects the blockchain to the page. To foster the page we are utilizing node.js and to create blockchain shrewd agreements we are utilizing a solidity programming language.

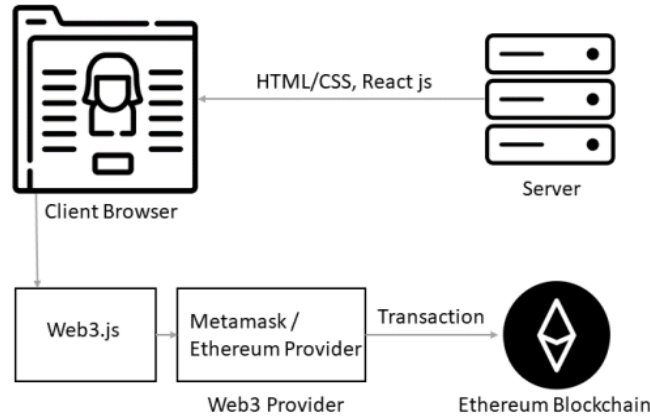


Figure 1. System Model

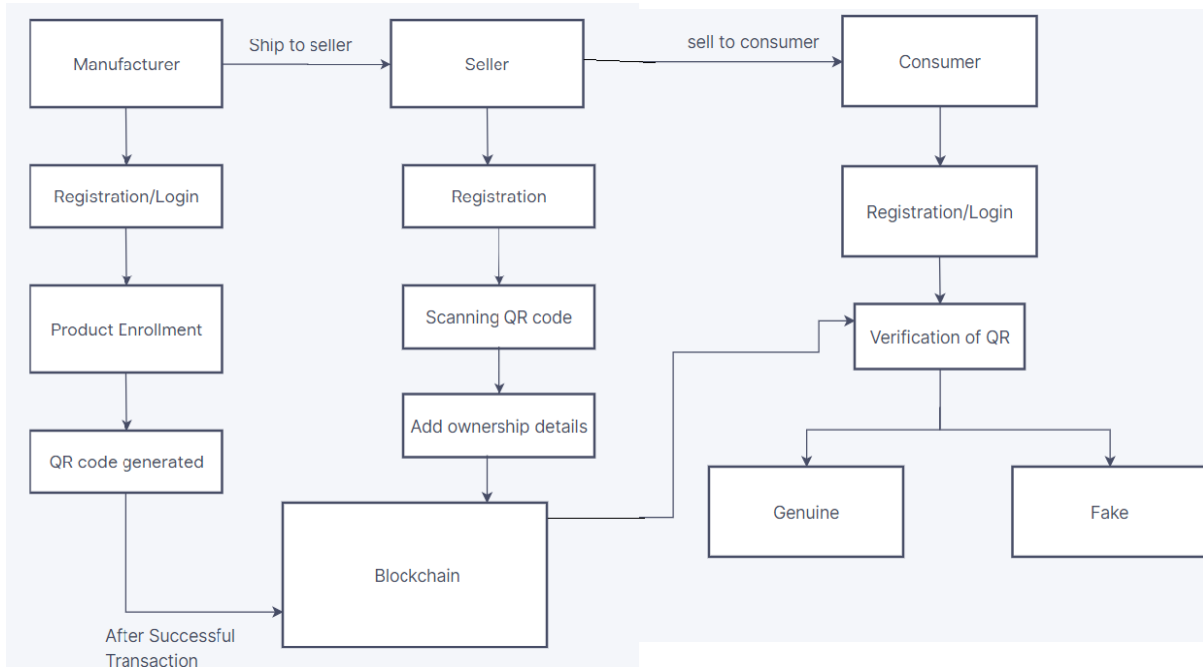


Figure 2. System Architecture

ALGORITHM

Step 1: Signup to blockchain as manufacturer or seller or consumer .

Step 2: login to blockchain

if user is manufacturer
then register product and generate QR code
scan the QR along with location
deduct ETH for each product registration
record the transaction

Step 3: if user is seller

scan the QR along with location
deduct ETH from wallet for each scanning
update the details in blockchain

Step 4: if user is consumer

Verify the received product
By scanning the QR code
if image is QR code and generated by blockchain
 than product details are shown
else
 product details are not available

Step 5: Logout of the transactions

WORKFLOW OF SYSTEM:

Manufacturer: The manufacturer uses his ethereum wallet to add a block to the Ethereum blockchain after logging into the manufacturer account, creating a QR code for the product and providing additional product-related information. If both the entity's wallet address and the userid of our local database are present, only the block will be added to the digital ledger when a manufacturer logs in from his own account and uses his own wallet.

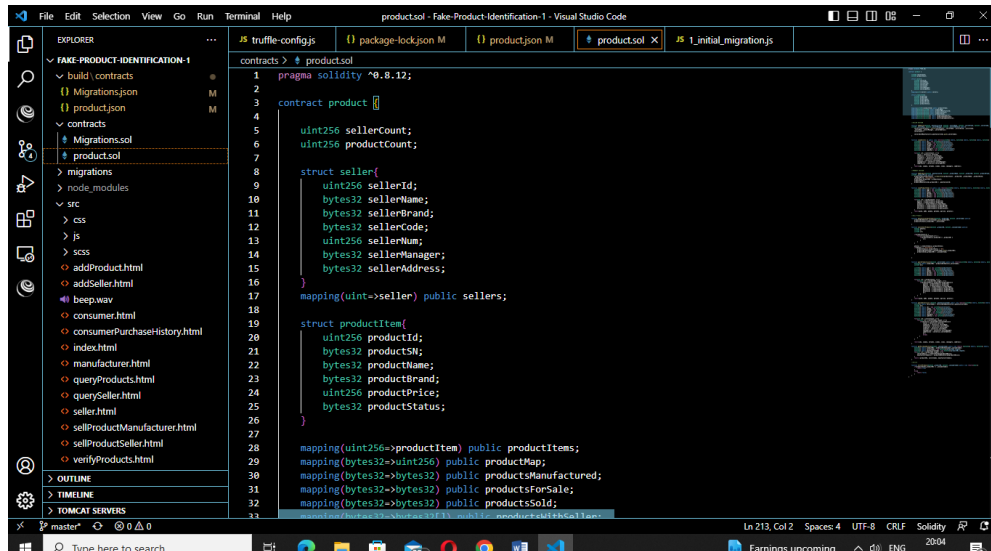
Supplier: The supplier accesses their supplier account and scans the product's QR code. The merchant can get to data about his items that the producer has entered. It adds its own subtleties of the item like shop objective and drives it into the Blockchain. The buyer has access to those particulars.

Customer: Clients can check the trustworthiness of the item by filtering QR code which will list the historical backdrop of exchanges and accordingly confirming the genuinity of the item. If the last location in the supply chain history does not match the purchase location when the customer makes their purchase of the product following the QR scan, the customer will be aware that the product is not genuine. It concludes that the QR code was copied, bringing the customer's awareness of counterfeit results.

IV.RESULTS

The proposed system makes it possible for both suppliers and manufacturers to interact with the system in order to add their respective blocks to the blockchain containing the transaction details without altering the blocks of other parties. Solidity is used to write the contracts for the manufacturer and supplier block. Ganache has been used for local testing because the code is running on a local network. The truffle-config.js file contains settings for the host and port. The agreements are then arranged and sent utilizing truffle. Relocations documents are made for arrangement. Relocations are documents that assist us with sending contracts on an ethereum blockchain network. React is used to create the interface. To permit associating with ethereum blockchain Web3.js library is utilized which is utilized to perform activities like sending ether, affirming exchanges perusing and composing information from savvy contracts. Metamask

is introduced on a program which is a wallet to communicate with ethereumblockchain, to permit getting to ethereum wallet through a program. The metamask is used to import accounts from ganache. They must use their metamask wallet account, which is connected via Web3.js, to confirm the transactions in order to add blocks for suppliers and manufacturers. The end user can then verify the product's integrity by scanning the QR code to check the supply chain.

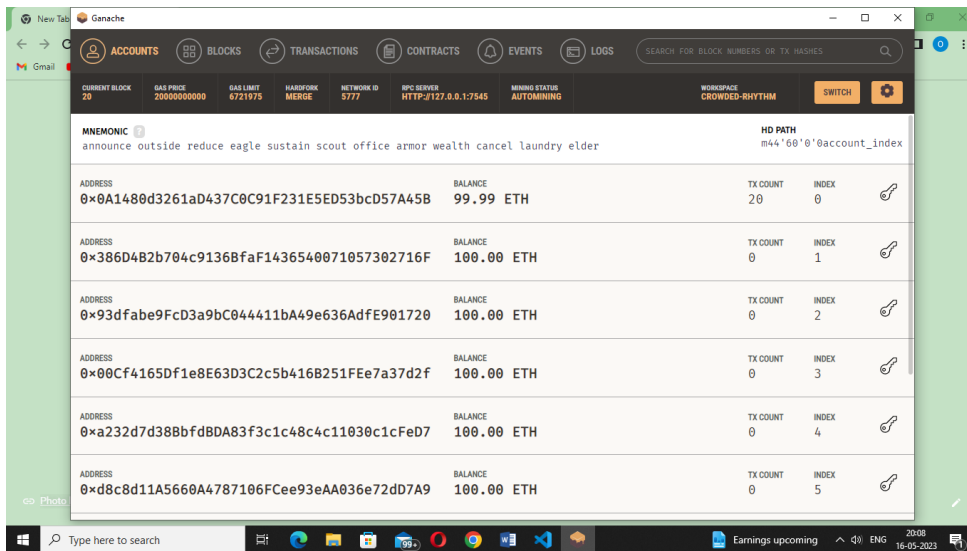


```

1 pragma solidity ^0.8.12;
2
3 contract product {
4
5     uint256 sellerCount;
6     uint256 productCount;
7
8     struct seller{
9         uint256 sellerId;
10        bytes32 sellerName;
11        bytes32 sellerBrand;
12        bytes32 sellerCode;
13        uint256 sellerNum;
14        bytes32 sellerManager;
15        bytes32 sellerAddress;
16    }
17    mapping(uint->seller) public sellers;
18
19
20    struct productItem{
21        uint256 productId;
22        bytes32 productName;
23        bytes32 productBrand;
24        uint256 productPrice;
25        bytes32 productStatus;
26    }
27
28    mapping(uint256->productItem) public productItems;
29    mapping(bytes32->uint256) public productMap;
30    mapping(bytes32->bytes32) public productsManufactured;
31    mapping(bytes32->bytes32) public productsForSale;
32    mapping(bytes32->bytes32) public productsSold;
33

```

Figure 3. Solidity Compilation



ADDRESS	BALANCE	TX COUNT	INDEX
0xA1480d3261aD437C0C91F231E5ED53bcD57A45B	99.99 ETH	20	0
0x386D4B2b704c9136BfaF1436540071057302716F	100.00 ETH	0	1
0x93dfabe9FcD3a9bC044411bA49e636AdfE901720	100.00 ETH	0	2
0x00Cf4165Df1e8E63D3C2c5b416B251FEe7a37d2f	100.00 ETH	0	3
0xa232d7d38BbfdBDA83f3c1c48c4c11030c1cFeD7	100.00 ETH	0	4
0xd8c8d11A5660A4787106Fce93eAA036e72dD7A9	100.00 ETH	0	5

Figure 4. Ganache

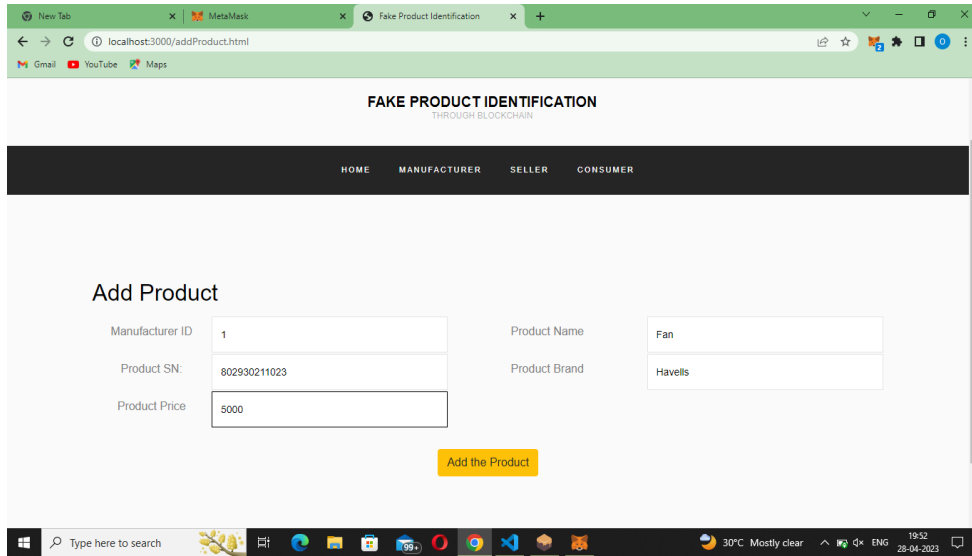


Figure 5. Add product

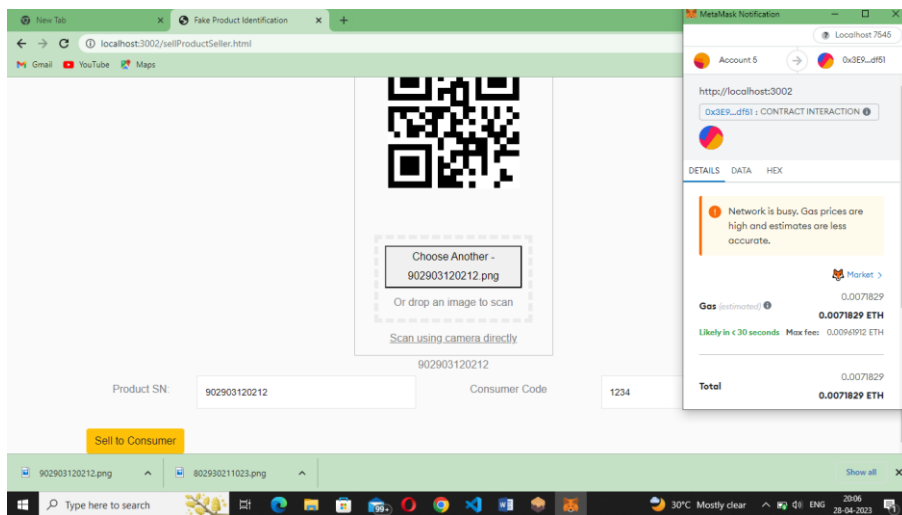


Figure 6. Product QR uploaded

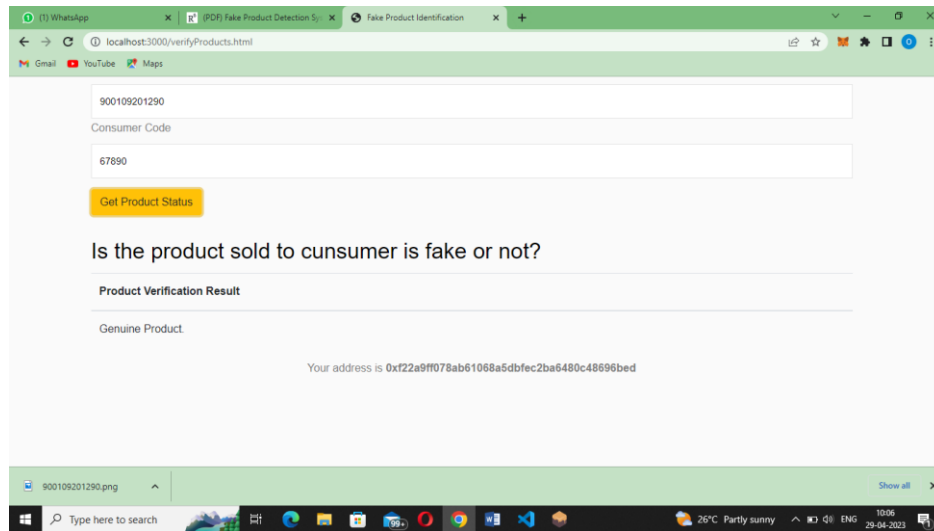


Figure 7. Verification

V.FUTURE SCOPE

Blockchain innovation is still in its general beginning phases as far as utilization, in this way more examination is required. The simplicity of the code may be demonstrated in subsequent framework development. The client can trust that the appropriate applications and because of the effortlessness of the code, without unreasonable code, will have extra use. Based on this project's experience, it is clear that a move toward genuine product warranties is necessary for platform improvement when assigning a chain of blocks that is traceable and resistant to counterfeiting. This would further develop the client experience by making the whole inventory network system more open and straightforward. In addition, it is hoped that cross-line product tracing can be used to build a buyers' intellectual framework, giving administrative authorities around the world more precise and extensive information about product and seller tracing. With estimates of coordinated efforts, such as administrative support, framework creation, and data sharing, it will be possible to obtain data of this quality.

VI.CONCLUSION

The primary Blockchain framework that makes the case for a fully operational fake item forgery framework is presented in this paper. Customers of our framework should not be concerned about the possibility of receiving a counterfeit product at this time because they will not be required to pay any transaction fees. Consequently, the proposed framework is useful for end customers to identify counterfeit inventory items. The item's QR code can be checked by the customer to obtain all relevant information, including the current owner's name and exchange history, allowing the customer to determine whether or not the item is counterfeit.

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