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Counterfeit Product Identification Using Blockchain

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Abstract: There are many fake products in the existing supply chain. It is necessary to have a system for end user to check all details about product that they are buying so that the customer can check if the product is genuine or not. In recent years, Counterfeit products play an important role in product manufacturing industries. This affects the company name, sales, and profit of the companies. Block technology is used to identification of real products and detects fake products. Blockchain technology is the distributed, decentralized and digital ledger that stores transactional information in the form of blocks in many database/node-computers which is connected with the chains. Blockchain technology is secure as the data stored once in the chain is immutable therefore any block cannot be changed or hacked. By using Blockchain technology, customers or users do not need to rely on third-party users for confirmation of product authenticity and safety.
Our System provides the emerging technology of web use cases, Quick Response (QR) codes provide a robust technique to fight the practice of counterfeiting the products. Counterfeited products can be detected using a QR code scanner, where a QR code of the product is linked to Blockchain. So, this system may be used to store product details and generated unique code of that product as blocks in database. It collects the unique code from the user and compares the code against entries in the Blockchain database. If the code matches, it will give all the information of the product otherwise no information will be outputted to the customer which shows that the product is fake or counterfeited.

Key words: Blockchain, Counterfeit, Supply Chain.

I. INTRODUCTION

Whenever a product is developed, it always has some risk factors such as counterfeiting and duplication which leads to affecting the company name, reputation, revenue, and customer satisfaction. The trading and marketing of counterfeit products are growing very fast. To ensure the identification and tracking of false goods or products and to combat this phenomenon, a fully functional blockchain system is proposed. Companies only need to pay very little effort and they no longer need to worry about counterfeit products. Due to the counterfeit products, manufacturers face a huge loss in the reputation of the company name and brand value because customers thought it is a genuine product by the company so they review the product on a counterfeit product basis. To overcome this problem a blockchain-based system can be adopted. Blockchain is a distributed decentralized-based technology that stores data in blocks in the database and is connected with chains. Whenever new data is going to add to databases it will add to existing data by connecting a chain of it to the existing block. Blockchain does not allow any user to update the existing data each time blockchain will add data as a new block to existing data. So it is impossible to delete or modify the data in the blockchain which leads to the security and protection of data. Blockchain helps to solve the problem of counterfeiting products.

In the current advancing world of technology, the global development of a product or technology always comes with risk factor such as counterfeiting and duplication, which can affect the company name, company revenue, and customer health. The basic idea of the project is to verify that the product purchased by the customer is fake or real. In comparison with blockchain we have traditional supply chain. Traditional supply chain provides centralized network where the data is in the hand of the company which provides the service or the products in the market, and they own the data so they can manipulate as per their wish so they are not secure. Counterfeiting of the product are produced to take advantage of the superior value of the imitated products. As mentioned, traditional supply chain provides centralized network whereas Blockchain provides decentralized data base, every transaction involving the data value for the product. This is done by creating a record whose authenticity can be verified by the entire community since blockchain runs by peer-to-peer network. In such a way manufacturer can use this system to provide genuine products to the

customer. This will help to maintain the customer trust and to increase the brand value of the product in the market. In blockchain every block consists of data, hash and previous block hash. Data contains the relevant information and hash consists of the unique code. It is impossible to change data of any block since person changing the data requires to own the majority of the network. If we try to change the data of any block the hash will get changed. So, this becomes the major advantage over the traditional centralized architecture where the data in blockchain is immutable so that the customer who buys the product gets the genuine information of the product.

A blockchain is a decentralized-based technology that is distributed among the computers in a computer network. As a database, a blockchain stores information in the form of blocks and chains. One of the biggest successful real-world applications of blockchain is cryptocurrency currency like bitcoin. Blockchain uses a more secure and protected mechanism to keep records of transactions. Blockchain provides a guarantee of security to our data.

Blockchain databases and typical databases are nearly the same. As both are used to store data, the only difference is how the data is structured in databases. Typical database stores data as it is provided by the user but in blockchain data is stored in blocks and blocks are linked to each other with the help of a chain. The technology behind block and chains is hashing. Each block has its own capacities and has information when it is completely filled a new block is linked to it and the new information is stored in a new block and the process continues as new data continue to come. One of the main advantages of blockchain is it provides us with a distributed, decentralized database but noneditable. So even if we want to change our existing data, the blockchain does not provide us that functionality.

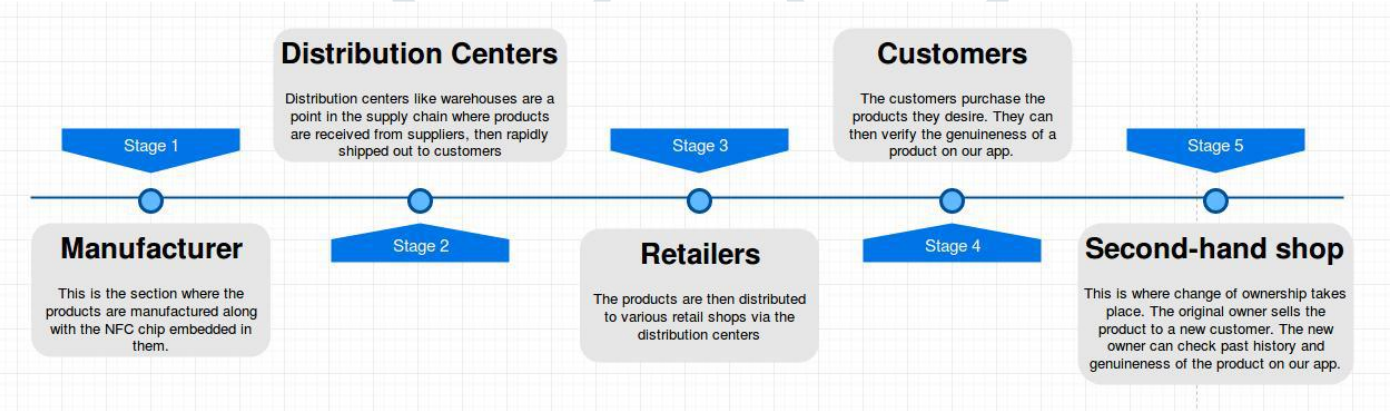

Figure 1: Supply chain of marketing

II. LITERATURE SURVEY

[1] Author of paper [1] paper discusses how the traditional cloud storage model runs in a centralized manner, so single point of failure might lead to the collapse of system. The system is a combination of the decentralized storage system, IPFS, the Ethereum blockchain, and attribute-based encryption technology. Based on the Ethereum blockchain, the decentralized system has keyword search function on the cipher text solving the problem in traditional storage systems where cloud server returns wrong results.

[2] Author of paper introduces the concept of Blockchain technology in information security of the food supply chain and comparing it with the traditional supply chain system. The proposed system focusses on the disadvantages, promoting the blockchain in tracking, monitoring and auditing the food supply chain and helping manufacturers to record the transactions in authenticity. The proposed system is not implemented in practical, they just gave the theoretical idea.

[3] Author of paper demonstrates how blockchain works in the food supply chain with HACCP. The system proposed a new decentralized traceability system based on the internet of things and blockchain technology and explored the challenges in scaling block-chains in general. This system will deliver real-time information to all supply chain members on the safety status of food products. Also, the system can significantly improve the efficiency and transparency of the food supply chain, which will obviously

enhance the food safety and rebuild the consumers' confidence in the food industry. The other Papers are reference Papers are helpful in different ways for implementation of proposed system.

[4] This paper shows proposed a system for the detection of fake products. The proposed system is that we make a QR code for a product that will contain all its information and store that QR in a blockchain database when the customer or distributor buys the same product and scan the QR code which is embedded in the product and if it is matched with the stored QR code then the system considers the product genuine and if it does not match with the stored QR code then system consider it as a fake product.

[5] This paper tries to understand provides us the information about the supply chain management system using blockchain. Blockchain can provide a permanent, shareable, auditable record of products through their supply chain, which improves product traceability, authenticity, and legality in a more cost-effective way.provides us the information about the QR codes, their texture, and authentication. The popular use of high-quality printing and scanning QR codes makes it easier to counterfeit important printed matter, such as important documents, the anti-counterfeit label on merchandise, packaging, etc.proposed a simple QR code-based system which is embedded in the product at the time of manufacturing and the user verifies it by matching the product QR codes with the stored QR code.

III. PROPOSED METHODOLOGY

As counterfeiting products are increasing widely in the world, we need to develop a full-fledged application system that will help us to identify these counterfeiting products. In this paper, the proposed system is that it will store the supply chain of the product and keep the history of ownership of the products. So that when the customers buy this product they will see the complete information about the product and decide whether the product is authenticated or not. We will use QR codes to verify the products and add information about the product. And for storing the data of the product we need to use a system that does not allow anyone to change the existing data, this can be achieved by blockchain technology. So in this proposed system, we are using blockchain, and QR codes to detect fake products.

For the proposed system, blockchain is implemented using a personal software called Ganache. Ganache developed a blockchain network that is used for keeping and managing transactions. To use the Ethereum blockchain we need to use a ganache software that helps us to implement blockchain. Metamask is a web browser extension that acts as an interface between the web page and the blockchain. To develop the web page we are using node.js and to develop blockchain smart contracts we are using a solidity programming language.

The proposed system really helps the retail market, manufacturers, and consumers from counterfeiting products but the system failed when a QR code is taken from a genuine product and given to a fake product then the product which is sold first become genuine it does not matter it is a genuine product or fake product but another product is treated as a fake product. Also storing the supply chain of every product require a huge amount of memory which is going to make this system expensive.

The future work is to implement this model and try to resolve the limitation such as embedding some material in the product so that when a person tries to take the QR code, the chip or something will send the signal.

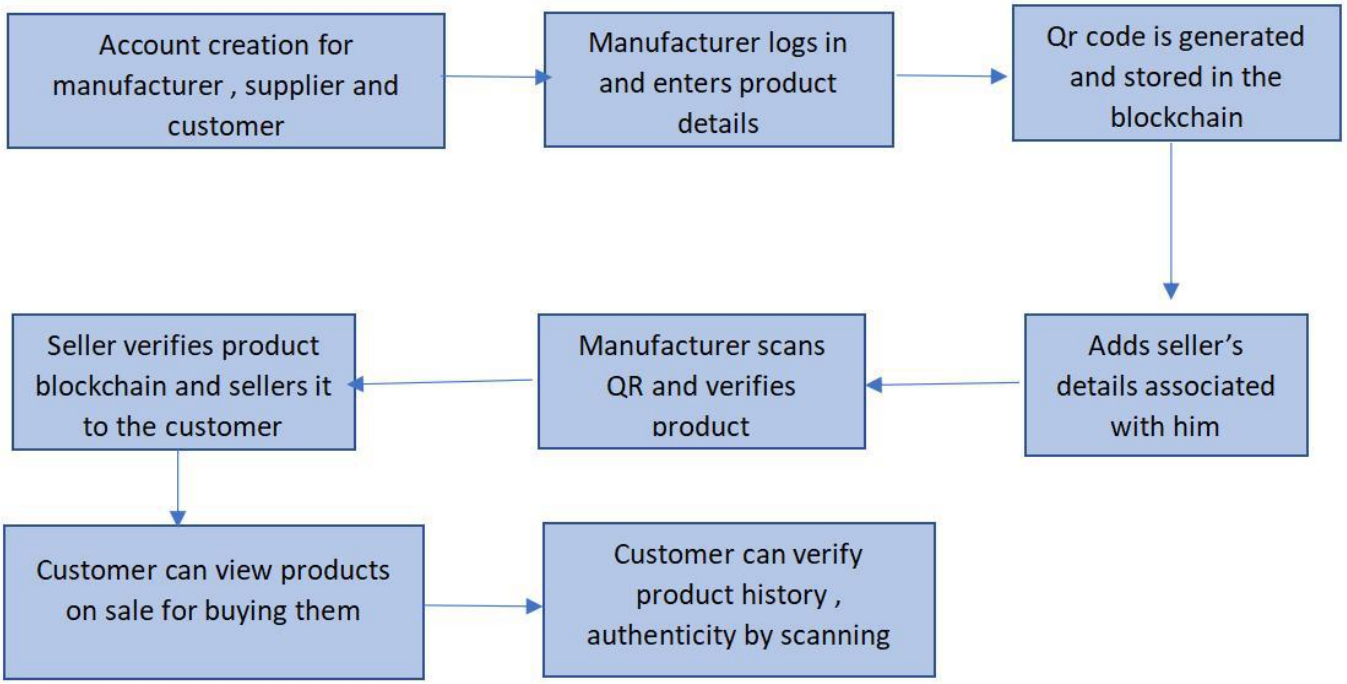

Figure 2 : System Workflow

System is maintaining Status of product i.e., Manufacturer of product, current owner of product, and history of owners, time stamp i.e., at what time product was updated and a QR code.

IV. RESULTS

The results of the project show that how the system work. It uses QR code for authenticating the product originality, if the scan QR code shows the details of the for the product which includes the description, product name, manufacturer name, company name, unique product id, and others then we can say that product is authentic.

If by scanning the product QR code if it does not show any details the we can say that the data for the product does not present in the blockchain system and it has been counterfeited. So, we can say that the product is fake.

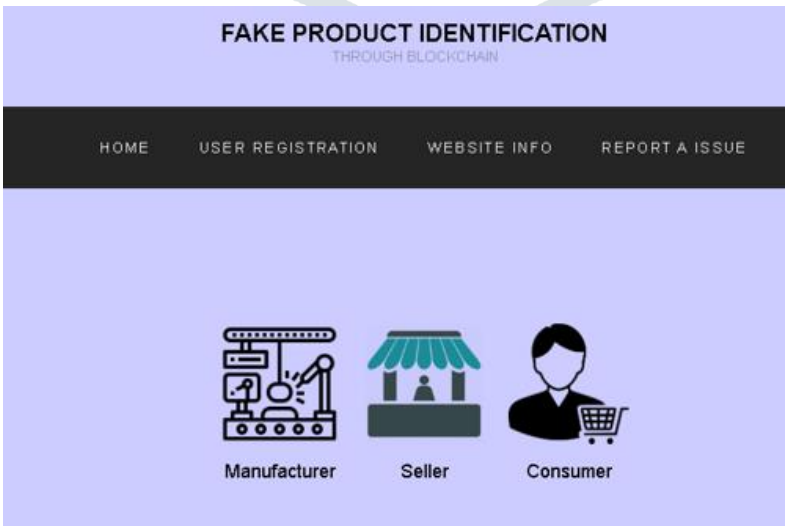

Figure 3: Results of Fake Production Identification

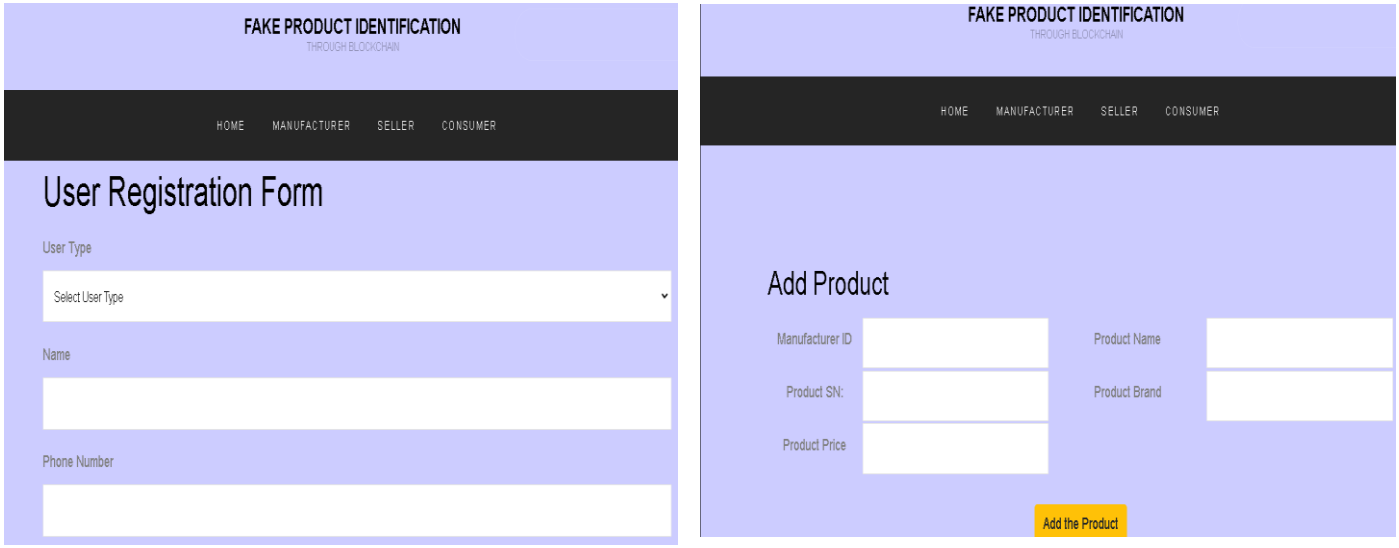

Figure 4: Results of Fake Production Identification

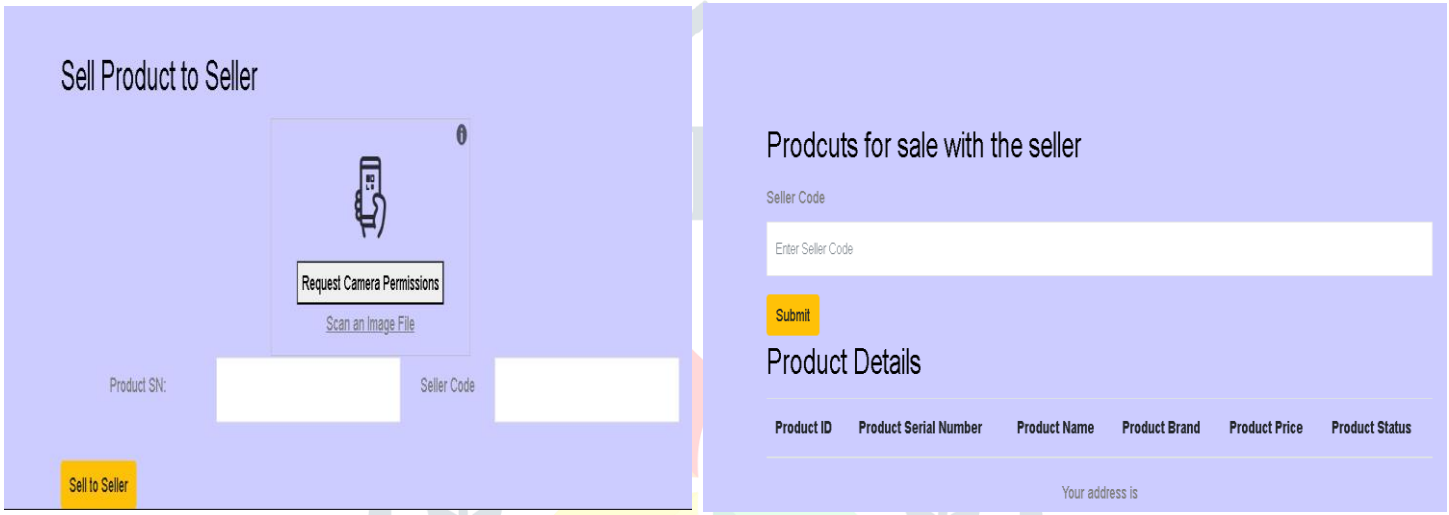

Figure 5: Results of Fake Production Identification

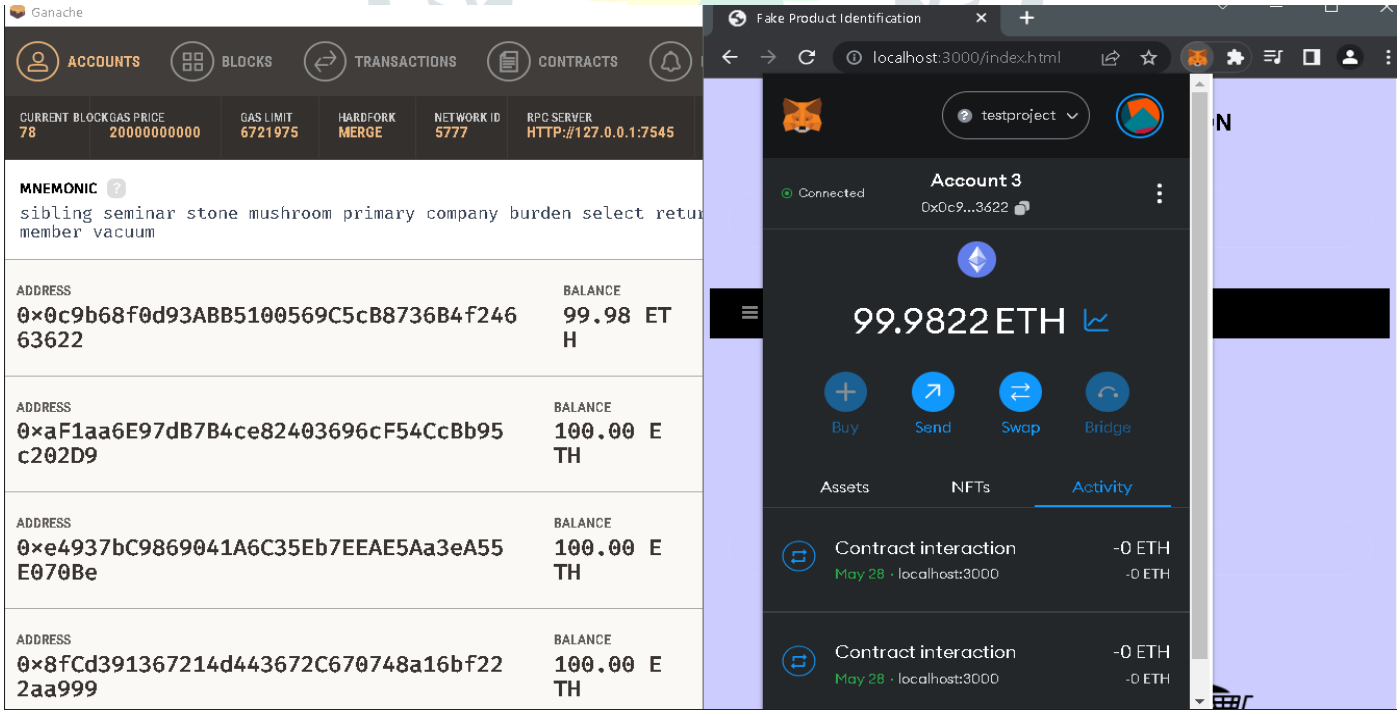

Figure 6: Results of Fake Production Identification

V. CONCLUSION

Thus from the above discussion, we can say that developing a completely functional application that can detect whether the product is fake or genuine really helps the retail market to grow and provides security to the end user that the product he is buying is really genuine and is branded and also it helps manufacturers to maintain its company reputation and company value. In today's modern technology world, the only emerging technology that provides more security and functionality for stored data is blockchain. Thus blockchain-based application is a life savers for all customers and manufacturers. In this paper, we have proposed a fully functional application that helps users to detect whether the product is fake or real. The manufacturer for the first time stored the detail of the product in the blockchain and generated an embedded QR code to add other details by other parties. At the time of receiving the product, other parties will add their details of ownership of the product. In the end, the customer can scan the QR code and can check the history of the product, and decide whether the product is genuine or not.

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