Detection of Counterfeit Products Using Blockchain

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Abstract - Recently Blockchain Technology is getting really popular and is very much reliable. Blockchain is getting Popular due to its security and decentralized system. Blockchain can be simplified as a chain of blocks which contains data for each block to be considered as a new node.

In the past few year the number of counterfeit products has been increasing by many folds. Hence, it becomes really important to control the flow of these products as it directly affects the company's name, value and may also affect the consumer. So, there is a need for something that can provide the assurance to the consumer that the product they are paying for is a Real and Legit product, and this will also Protect companies from defamation.

This project is made by using emerging trends in technology, Quick Response (QR) codes provide a way to counter the fake products. Counterfeit products are received using a QR code scanner and the previously generated QR code of the same product is linked to the block of a Blockchain. The proposed system can store the data of products and will generate unique and product specific code of that product and will save it as a block. It will collect the unique code from the consumer which he can get by scanning the QR code given on the product then the system will check for the code in the blockchain database. If the code matches, it will give a receipt of the product to the customer, otherwise it will notify the customer that the product is not legit.

Index Terms - Blockchain, Hyperledger, Duplica, Ethereum, Counterfeit

I. INTRODUCTION

Detecting counterfeit products in the industry has been a challenge for anyone involved in the product industry for years. Today, thousands of manufacturers around the world produce counterfeit products. However, these products pose a serious danger to humans. They harm the interests of the owner and the trust relationship with the buyer and directly harm the health of the buyer. For this reason, methods of combating counterfeit products and techniques for identifying originals are being developed [1].

Relevant anti-trafficking technology has been proposed but is not yet perfect. For example, in "Makerchain: A Blockchain for Chemical Signatures in Self-Management in Job Markets", a blockchain with chemical names is proposed to represent private properties of private property. In this article, we want to use a blockchain architecture provided by Ethereum to register ownership of the blockchain. By leveraging the untraceability and transparency of the blockchain and the security that all information on the blockchain cannot be tampered with, customers do not need to rely on trusted third parties to know the history of the products they purchased.[2] certification and traceability of eligible products throughout the supply chain.

A unique QR code is generated for each product provided by the administrator and stored in the database. The system is built on the blockchain, and businesses using it only need to spend the necessary money to create and edit their contracts. Anyone can easily determine the legitimacy of business and consumer purchases using smart public contract information. By using this protection tool blockchain technology, companies can prove that the products they offer are genuine without having to compete with lower prices. In the process mentioned with, we provide a QR code created for a specific product that the end user can scan to get all the information about that product. After scanning the QR code, we can verify the authenticity of the product. Once, the customer scans the QR code and the product is identified. The name of the product to be sent to the customer who will receive approval.

II. LITERATURE SURVEY

For the reason that creation of Blockchain technological know-how in 2008, it's been executed in immoderate fields to assurance high facts reliability and safety, from the usage of Bitcoin to BaaS (Blockchain as a service), a latest blockchain trend that advantage as a structure of cloud-primarily based totally community for businesses who expand blockchain-primarily based totally apps.[1] The well regarded Blockchain - based completely foreign exchange no longer easily solves the double-spending hassle alternatively moreover independently confirms the accuracy of transactional facts.[1] For the cause that the Blockchain generation serves as the basis of all applications, as a result the integrity of their information is assured. This has an appeal at making use of a decentralized Blockchain technology and grant chain method to illustrate that forestall clients in a supply chain no longer clearly rely upon shoppers or different 1/3 parties to determine whether or no longer a product is counterfeit or not. This adjusts an industrial agency's income, manufacturer image. Actual and faux merchandise may additionally be decided by using a dispensed registry. An anti-counterfeiting decentralized Blockchain answer that producers can use to supply actual objects and no longer the use of a need to oversee proper now owned shops. This will be executed by way of the manner of authenticating the products at each degree of the grant chain. For each product delivered via the manner of the admin which creates a particular QR code the usage of SHA256 QR Code generates a set of guidelines and stores into the database.

Fake Product Detection Using Blockchain Technology [2]
With rising developments in wi-fi technologies, Quick Response (QR) codes furnish a sturdy technique to combat the exercise of counterfeiting the products. The counterfeit products are detected by the usage of a QR code scanner, where the QR code of a product is linked to the Blockchain network. So this gadget can be used to shop the product details and generate a special code of that product

as blocks in the database. It collects all the unique code from the consumer and compares the code from the entries in the Blockchain database. If the code matches, it gives a notification to customer, in any other case it will provide the notification to the purchaser that the product is pretend

Previous studies on fake product detection using blockchain

Various studies have been conducted on fake product detection using blockchain technology. A study by Li et al. (2021) proposed a blockchain-based anti-counterfeiting system for the healthcare industry. The system uses blockchain technology to track and verify the authenticity of pharmaceutical products. The study found that the proposed system can effectively prevent the circulation of counterfeit drugs in the supply chain.

Another study by Jiang et al. (2020) proposed a blockchain-based traceability system for the food industry. The system uses blockchain technology to track the origin, production, and distribution of food products. The study found that the proposed system can effectively detect and prevent the circulation of fake food products.

Challenges and limitations of fake product detection using blockchain

Despite the potential benefits of using blockchain technology for fake product detection, there are also several challenges and limitations. One of the major challenges is the cost and complexity of implementing a blockchain-based system. Another challenge is the need for a standardized and interoperable system that can be adopted by various stakeholders in the supply chain. Additionally, there are also issues related to data privacy, security, and scalability that need to be addressed.[1]

Conclusion and future research directions

In conclusion, fake product detection using blockchain is a promising area of research that has the potential to revolutionize various industries. While there are challenges and limitations that need to be addressed, the benefits of using blockchain technology for supply chain traceability and anti-counterfeiting are significant. Future research should focus on developing standardized and interoperable blockchain-based systems that can be adopted by various stakeholders in the supply chain. Additionally, research should also focus on addressing the issues related to data privacy, security, and scalability in blockchain-based systems

III.BLOCKCHAIN

In its broadest form, blockchain is a collection of computers that copy and publish digital records of transactions. Each time a new interest is added to the list, mileage is added to each person's list. Every blockchain has many transactions. A distributed ledger managed by many participants is called a Paid Ledger (DLT). The blockchain [7] is a set of data or "blocks" combined with cryptography.

The timestamp, the secret code of the chain before it, and information about the transaction are included in each block (usually represented as a Merkle tree). Its design is blockchain and prevents data modification. This is because the data is saved once; cannot be changed back without affecting subsequent blocks. If you want to use shared data, you usually manage the blockchain using a peer-to-peer network followed by a control structure for communication and authentication between nodes. genesis block. Blockchain is an example of electronic technology with Byzantine influence, although the information on the network can still be changed.

Defined as "an open record that shows transactions between two parties in a fast, verifiable and stable manner", blockchain is a distributed database.

IV.ETHEREUM

Bitcoin Magazine programmer and co-founder Vitalik Buterin first presented Ethereum in a whitepaper aimed at creating decentralized software packages in late 2013. Buterin said that not only can bitcoin and blockchain technology be used for financial transactions, but the written word is also important for applications to emerge. This could lead to global assets such as stocks and real estate being added to the blockchain.[3] While briefly working in the capital market with eToro CEO Yoni Assia in 2013, Buterin wrote a white paper on the Cash Color Contest explaining the use cases of the Blockchain generation. He proposed the introduction of a new platform with a generic written language that could eventually become ethereum, but disagreed on how the job should be done.

V.SHA-256 ALGORITHM

The SHA-256 algorithm is a widely used cryptographic hash function that is used to create a unique digital fingerprint of data. This algorithm is commonly used in blockchain technology to secure and validate transactions. One potential use case for SHA-256 algorithm in blockchain technology is in fake product detection. With the rise of e-commerce and online marketplaces, the problem of counterfeit products has become increasingly prevalent. To combat this problem, companies are exploring the use of blockchain technology to create a decentralized ledger of product information that can be used to verify the authenticity of products.

The SHA-256 algorithm can be used to create a unique digital fingerprint of product information, such as the product name, manufacturer, and serial number. This digital fingerprint can be stored on the blockchain, creating a secure and immutable record of the product's authenticity. When a product is sold or transferred, the digital fingerprint can be verified against the blockchain record to ensure that the product is genuine. By using the SHA-256 algorithm in this way, companies can create a secure and tamper-proof record of product information that can be used to prevent the distribution of fake products. This can help to protect consumers and maintain the integrity of the supply chain.

VI.SYSTEM DESIGN

We propose a non-reproducible, complete blockchain-based product to avoid transactions. In our opinion, developers can use this system to store information about products on the blockchain that is accessible to everyone. All the sales that the seller can sell and the current remaining stock of the seller are transparent to the user. Users can use the functions provided by our system to immediately complete the manufacturer-side verification, which is not possible.[4]
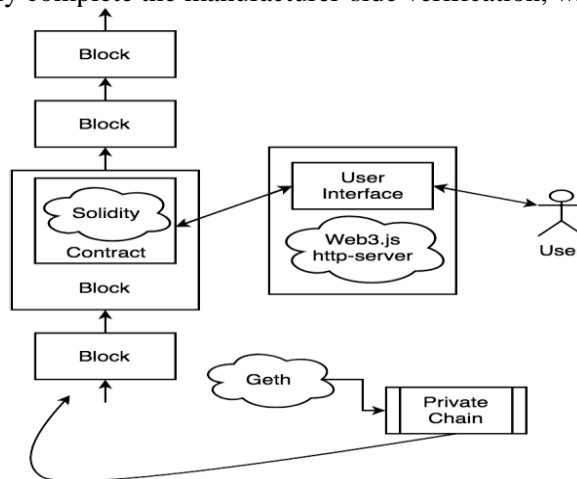

Fig1 system design

VII.METHODOLOGY

The methodology of this blockchain project titled "Fake Product Detection Using Blockchain" involves the following steps:

1. Identification of the problem: The problem is the prevalence of fake products in the market and the need for a reliable and secure method to detect them.

2. Data structure: In this step we define the data structure for the blockchain. This includes identifying the types of data that will be stored on the blockchain, we have stored the product information, manufacturer information, current and previous owner details, authentication details, and transaction history.

3. Develop smart contracts: Smart contracts are self-executing contracts that are stored on the blockchain. They automate the process of verifying the authenticity of products and can be used to trigger actions such as sending alerts or initiating a recall. The smart contract is developed using solidity language on Open source Remix IDE.

4. Test the smart contracts: After developing the smart contracts we have been developed, we have tested to ensure they function as expected. We have tested the contract for security vulnerabilities, scalability, and interoperability.

5. Deploy the blockchain: After the smart contracts have been tested, the blockchain was deployed.

6. Integrate with web app: The blockchain was then integrated with the front end React app which was created prior and integrated with the help of node JS.

7. Monitoring and maintaining the blockchain: After integrating we have monitored the system for performance and security issues.

8. Evaluate the outcomes: Finally we have evaluated the outcomes of the project. by measuring the effectiveness of the blockchain in detecting fake products.

VIII.OPERATION FLOW

In our design, it is the Admin's responsibility to Approve a manufacturer, manufacturer's responsibility is to push product information into the contract, including the quantity of items the seller can sell and the seller's location. The seller may obtain certain filing rights for goods that can be sold under the contract, after obtaining permission from the manufacturer. When a customer makes a purchase, the seller stores the customer's address in the contract through the system to complete the transaction. Customers can directly check through the system whether the seller is in the contract, directly check whether there are unsold items for business. After the customer purchases, the data is sent to the manufacturer and encrypted with Ī

1.Connecting wallet: The very first thing that needs to be done is connecting a wallet by using the connection feature provided by the website.
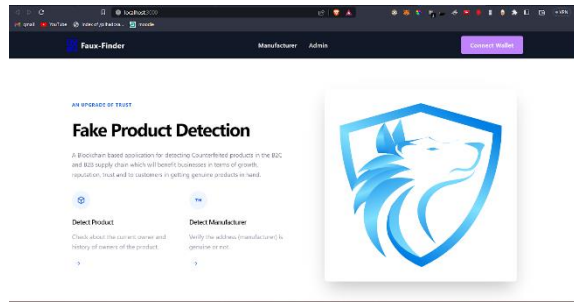
Fig 2 Homepage

2.Admin verification : Due to use of solidity contracts the admin rights can be given to only one specific address. Address is the main identity of anyone using the website. By using smart contracts we can decide whom to give admin rights.

3. Adding manufacturer: The manufacturer has to register himself by giving wallet address & few details.
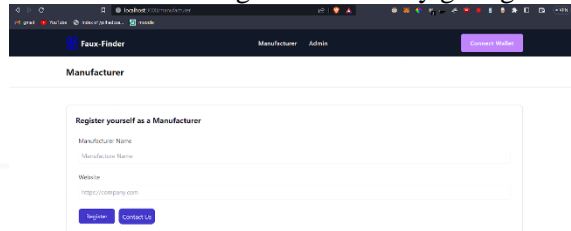

Fig 3 Adding manufacturer page

4. Manufacturer verification: When any manufacturer wants to use the application. They have to put in a request to acquire the usage rights. Admin will verify the manufacturer request by checking against the company's authenticity. If authenticity is confirmed then the admin will approve the request. Otherwise, the request can be rejected too.
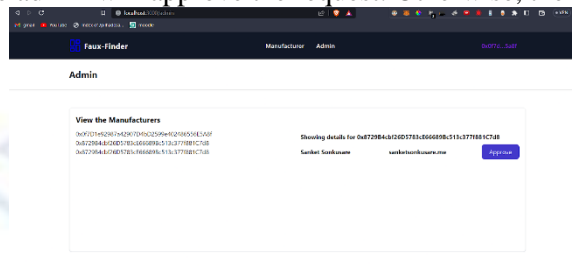

Fig 4 Admin page

5.Adding Product: The authorized manufacturer can now add the products manually.after successfully adding a product the system will generate a verification QR code.this code is to be given to that specific product which can confirm the products authenticity.
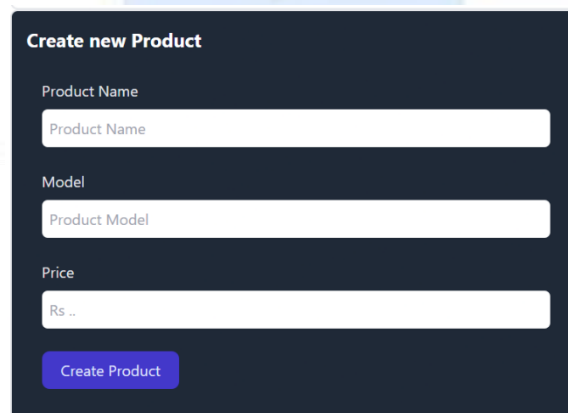

Fig 5 Product creation

6.Product verification: When the customer buys an legit product which is listed on the website . then it can be verified by scanning the qr code present on the product.
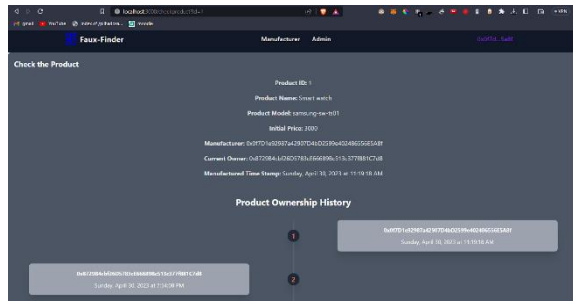
Fig 6 Details of a product

7.Ownership Transfer: After successfully scanning the qr code .if the product is verified then the system will transfer the ownership of that specific product to the customer who has scanned the QR code.

The ownership can also be transferred to the third person if the first buyer wishes to do so.
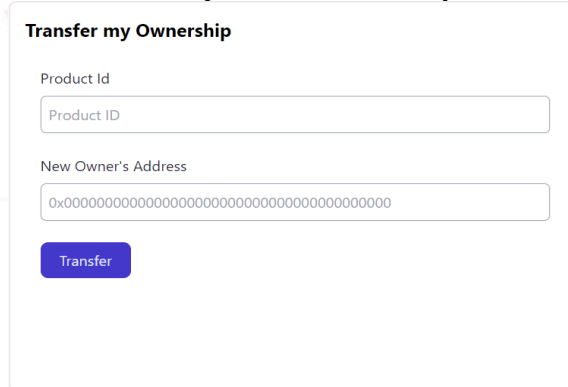

Fig 7 Owner transfer page

IX.CONCLUSION

Through this research, we found different acceptance levels of blockchain technology. Finally, create a powerful, inexpensive, simple, decentralized and highly secure application against counterfeiting and counterfeiting. It can be found by scanning the QR code attached to the product and many products can be processed at the same time. By scanning the QR code provided for the product, customers can obtain transaction history, current owner, etc. can get all the information according to the end user, check whether the product is real. The overall theme of

is the design and creation of a secure transaction using the blockchain and the SHA-256 algorithm.

X.REFERENCES

1. A.Bansal and P. Rani, "A blockchain-based approach for counterfeit product detection and prevention," in 2021 International Conference on Intelligent Sustainable Systems (ICISS), pp. 1291-1296, 2021.

2. R. K. Singh and A. S. Chauhan, "An overview of counterfeit product detection and prevention using blockchain technology," in 2021 11th International Conference on Cloud Computing, Data Science & Engineering (Confluence), pp. 299-304, 2021.

3. M. V. Gajawada and N. Prasad, "A blockchain-based approach to counterfeit product detection in the supply chain," in 2021 IEEE 12th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON), pp. 1-6, 2021.

4. S. V. Karanam and S. S. Lala, "Blockchain-based counterfeit product detection and prevention system," in 2020 3rd International Conference on Information Science and Systems (ICISS), pp. 135-140, 2020.

5. R. Jain, M. Pathak, and V. Sharma, "Blockchain-based counterfeit product detection: An overview," in 2020 11th International Conference on Computing, Communication and Networking Technologies (ICCCNT), pp. 1-6, 2020.

6. S. U. Khan, A. Al-Muhtadi, and M. Hussain, "Blockchain-based counterfeit product detection: Challenges, opportunities, and solutions," in 2019 2nd International Conference on Computing, Mathematics and Engineering Technologies (iCoMET), pp. 1-6, 2019.

   a. Kumar and M. K. Patel, "Blockchain-based counterfeit product detection using machine learning," in 2019 IEEE 2nd International Conference on Inventive Systems and Control (ICISC), pp. 1038-1043, 2019.

7. S. K. Asif, S. R. Bhuiyan, and M. A. Hossain, "A blockchain-based approach for counterfeit product detection," in 2019 IEEE International Conference on Informatics, Electronics and Vision (ICIEV), pp. 1-6, 2019.

8. M. N. Mahfuz, M. S. Islam, and M. M. Hassan, "A blockchain-based solution for counterfeit product detection," in 2018 21st International Conference on Computer and Information Technology (ICCIT), pp. 1-6, 2018.

9. T. H. Ng, J. C. S. Lui, and S. Lu, "A blockchain-based approach to counterfeit prevention in supply chain management," IEEE Transactions on Cloud Computing, vol. 6, no. 1, pp. 1-12, 2018.

10. N. R. Kesavan and B. Prabhakaran, "Blockchain-based product counterfeit detection system," in 2018 IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS), pp. 1-6, 2018.

11. Y. Li, F. Zhao, and H. Liu, "Blockchain-based counterfeit product detection system," in 2017 IEEE International Conference on Service Operations and Logistics, and Informatics (SOLI), pp. 358-363, 2017.

12. HTTPS://WWW.INVESTOPEDIA.COM/TERMS/B/BLOCKCHAIN.ASP

13. HTTPS://WWW.BLOCKCHAIN.COM/