Detection of Counterfeited Products Using Blockchain

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Abstract -Blockchain technology has gained significant popularity over the past few years, especially in the banking sector, due to its ability to facilitate quicker transactions and enhance transparency. Its tamper-proof nature has made it a reliable tool for financial transactional records. However, the prevalence of unsafe and fraudulent goods in the market has created a need for product transparency. To address this, a system has been designed that utilizes blockchain technology to monitor the market's supply chain and prevent the production of counterfeit goods. The system assigns a unique digital code to each product, which can be scanned to determine its authenticity. This not only prevents the production of fake goods but also raises awareness among consumers. The suggested method is explained in detail in a research article, and it has the potential to revolutionize the way we approach product authenticity

Index Terms - Blockchain Technology, Authentication, Supply-chain,counterfeiting, smart contract

I. INTRODUCTION

In recent years, the global market has been expanding rapidly, bringing with it a number of challenges, one of which is the issue of determining the authenticity of products. Counterfeit products not only harm the reputation of businesses but also lead to significant financial losses. This issue is further complicated by the presence of identical replicas of genuine products on the market. However, blockchain technology offers a promising solution to this problem. Blockchain is a distributed ledger technology that is designed to prevent the alteration, hacking, or manipulation of data. The blockchain is a digital ledger that is replicated across a network of computers. Each record is kept as a block in a blockchain, and every block in a series contains a number of activities every time a new transaction occurs on a blockchain. Market studies have shown that the prevalence of fake goods is increasing, which can have a negative impact on economic growth and force many high-profile corporations to suffer significant losses. To combat this dangerous trend, many businesses are turning to technology to distinguish counterfeit products from genuine ones. The IT sector has many tools that can be used to reduce the production of counterfeit goods. Blockchain technology, with its distributed ledger and smart contracts, has the potential to address the issue of fake products. In this work, we propose a system that allows manufacturers and consumers to exchange information about products. Our system is designed to run on smartphones, and it enables consumers to access information about a product they are interested in purchasing. This information includes details about the product's origin, manufacturing process, and distribution. With this information, consumers can make an informed decision about whether or not to purchase the product. The system also allows manufacturers to track their products through the supply chain, ensuring that only genuine products reach the market. In conclusion, the problem of counterfeit products is a significant challenge for businesses and consumers alike. However, blockchain technology offers a promising solution to this issue. By using a distributed ledger and smart contracts, manufacturers and consumers can exchange information about products, enabling consumers to make informed decisions about their purchases. This system has the potential to reduce the production and distribution of counterfeit goods, which will benefit businesses and consumers alike.

II. LITERATURE SURVEY

Previous research has shown that blockchain technology can be an effective solution for detecting and preventing fake products in supply chains. One of the primary benefits of blockchain technology is that it provides a secure and transparent system for tracking and verifying the authenticity of products. This can be achieved through the use of smart contracts, which enable the automatic verification of product information and the tracking of product movement throughout the supply chain. According to a study conducted by IBM, the use of blockchain technology in supply chains can reduce the risk of counterfeit products by up to 50%. The study found that blockchain technology can improve supply chain visibility, increase transparency, and reduce the time and cost of product verification. This can help to prevent the sale of counterfeit products and protect consumer safety. Another study conducted by the World Economic Forum (WEF) examined the use of blockchain technology for the traceability of food products. The study found that blockchain technology can increase the traceability of food products throughout the supply chain, reducing the risk of contamination and ensuring food safety. The study also noted that the use of blockchain technology can increase consumer trust in food products and improve supply chain efficiency .A study published in the Journal of Business Research explored the use of blockchain technology for the detection and prevention of counterfeit luxury goods. The study found that the use of blockchain technology can increase supply chain transparency, reduce the risk of counterfeit products, and improve brand reputation. The study also noted that blockchain technology can provide a secure and transparent system for verifying the authenticity of luxury goods throughout the supply chain.In a study published in the International Journal of Production Research, researchers examined the use of blockchain technology for the verification of pharmaceutical products in the supply chain. The study found that blockchain technology can improve supply chain security, reduce the risk of counterfeit pharmaceuticals, and improve patient safety. The study also noted that blockchain technology can increase the traceability of pharmaceutical products throughout the supply chain, enabling faster recalls in case of product quality issues.Overall, the literature suggests that blockchain technology can be an effective solution for detecting and preventing fake products in supply chains. The use of blockchain technology can increase supply chain transparency, enhance traceability, and improve accountability, thus reducing the risk of counterfeit products. However, the adoption of blockchain technology in supply chains is still in its early stages, and further research is needed to identify best practices for implementation and to address the cost barrier of implementation.

III. METHODOLOGY

Using blockchain technology, we must identify phoney or counterfeit goods in this project. Giving each manufacturer a valid ID and registration password will first add them to the blockchain network. The product's original owner is the manufacturer. The Manufacturer QR code will be assigned to the product at the time it is added to the blockchain network. When a product is successfully added to the blockchain network, a special QR code for the product is generated, which contains the product's information in encrypted text. The manufacturer then dispatched the item to the distributor and changed the status to "shipped."stays the same until both parties agree to a change. After the payment is completed and both parties have approved, the product's status in the blockchain network will transition to ownership. The customer must then use an Android application to scan the QR code on the product. Following scanning, the client receives the information as decrypted text and makes a decision regarding whether to buy the product or not.

1)Blockchain :

Blockchain is the most recent method of storing data on a distributed ledger that enables multiple users to safely share access to the same material. Blockchain is defined as a public book for all visual activity that allows recorded transactions to be added to the block collection and records digital currency transactions independently from a central repository. The authenticity of the record is equated with the general public using blockchain rather than a single authority at this time similar technologies are used directly to make certain transactions within digital currencies; therefore, it can be computer-generated coded and embedded in almost any text content in blockchain. Private key cryptography, distributed networks with shared ledgers, and the promotion of network transactions, record keeping, and security are incorporated in the three fundamental technologies that make up blockchain technology. In the paragraphs that follow, we explain how technology protects digital relationships as a whole. Combining private and public keys to start an online transaction between two parties who each have their own private and public keys results in a digital signature with strong ownership control. Due to the need to protect digital relationships, allow transactions to take place and be made mandatory, and begin with a dispersed network using statistical
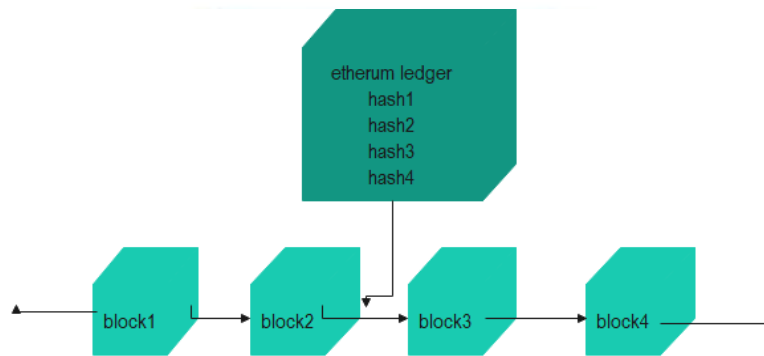

Fig.1 Ethereum ledger
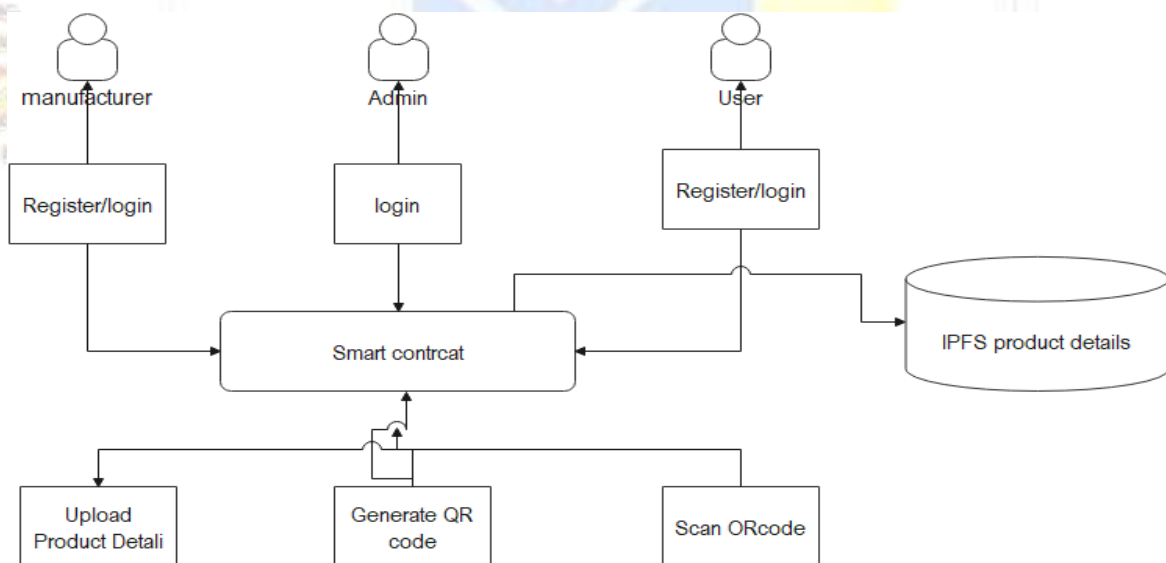
IV. SYSTEM ARCHITECTURE

Fig.2Proposed Solution

(1) Manufacture:

The manufacturer is in charge of registering the product on the blockchain by giving product information such as the product id, name, category, quantity, and price. The manufacturer can utilise blockchain to confirm the authenticity of the product and to follow its travel through the supply chain.

(2) Admin:

The admin is in charge of managing the product registration process, ensuring the authenticity standards are followed, and monitoring the blockchain transactions. Admin creates a QR code in the system using a smart contract and sends it to the user. The administrator can also ensure that the smart contract is up to date with the most recent norms and regulations regarding product authenticity

(3) User:

The end-user can validate the product's validity by scanning the QR code created by the system and verifying the information presented. The user can have faith that the goods is genuine, which increases their likelihood of purchasing products from that particular company. When a scanned QR code fails to provide information, the user will know the goods is counterfeit.

(4) Smart Contract:

An agreement between a manufacturer and a user that self-executes according to its conditions is known as a smart contract. It can carry out a predetermined set of actions in response to particular occurrences and enforce the authenticity criteria. This system's smart contract executes the steps necessary to create QR codes and upload product details.

(5) IPFS (interplanetary file system)*:*

An agreement between a manufacturer and a user that self-executes according to its conditions is known as a smart contract. It can carry out a predetermined set of actions in response to particular occurrences and enforce the authenticity criteria. This system's smart contract executes the steps necessary to create QR codes and upload product details

V. REQUIREMENT ANALYSIS

(1) Android Studio

With the help of Android's robust application architecture and Java programming environment, you can create cutting-edge mobile apps and games. The documents on the left navigation include information on how to create apps using the various Android APIs. Android apps are created as a collection of unique elements that can be used separately. For instance, a service operates independently in the background while a particular activity provides a single screen for a user interface.

(2) Ganache Blockchain

The development of decentralized digital identification systems is one-way Ethereum may be used to counteract deep fake videos. It is For Ethereum and Corda, Ganache is a private blockchain that promotes app development. utilise of Ganache during the development cycle enables you to create, utilise, and test your dApp in a safe and superior setting. UI and CLI are the flavours of the ganache. A computer programme called Ganache UI supports the Ethereum and Corda technologies. For the purpose of developing Ethereum, ganache-ehl (formerly known as TestRPC) is to be utilised. Do you like to use command line? These sentences will solely take Ganache's UI preferences into account. The Ganache CLI Readme should be consulted for command line documentation.

(3) *Anaconda*

Anaconda is an open-source distribution of the Python programming language, which includes a collection of popular data science packages and tools for scientific computing and data analysis. It was developed by Continuum Analytics and is now maintained by Anaconda Inc. One of the main features of Anaconda is its package management system, which allows users to easily install, update, and manage packages and dependencies. It comes with a range of popular data science packages pre-installed, such as NumPy, Pandas, Scikit-learn, and Jupiter Notebook. Anaconda also includes an environment management system, which enables users to create and manage isolated environments with different versions of Python and packages. This feature is particularly useful for managing conflicting dependencies and for testing code in different environments.

VI. IMPLEMENTATION DETAILS

The project involves the development of a multi-platform anti-counterfeiting system that utilizes Flask as the backend web framework, and HTML, CSS, and JavaScript for the frontend user interface. The system also includes an Android application, developed using Java and XML, for scanning purposes. The blockchain component of the system is implemented using Solidity programming language and Remix IDE, which enables the creation of smart contracts to facilitate secure and transparent tracking of product authenticity throughout the supply chain. One of the key advantages of using Flask as the backend web framework is its flexibility and ease of use, which allowed for rapid development and deployment of the system. The use of HTML, CSS, and JavaScript for the frontend also provided a user-friendly interface for easy navigation and interaction with the system.

The Android application provides a convenient way for users to scan products and check their authenticity, using the camera on their mobile devices. The application is integrated with the Flask backend, which allows for real-time updates and tracking of scanned products. The use of Solidity programming language and Remix IDE for the development of smart contracts provides a secure and transparent method for tracking product authenticity on the blockchain. This allows for easy verification of the authenticity of a product at any point in the supply chain, providing consumers with greater confidence and trust in the products they purchase.

Overall, the development of a multi-platform anti-counterfeiting system using Flask, HTML, CSS, JavaScript, Java, XML, Solidity, and Remix IDE demonstrates the potential for integrating various technologies to create a secure and transparent supply chain system.

This system has the potential to significantly reduce the prevalence of counterfeit products in the market, ensuring consumer safety and trust in the products they purchase. Here product details uploaded in system android app show the product detail if product is real. If product is counterfeited it will not show any detail on android app.
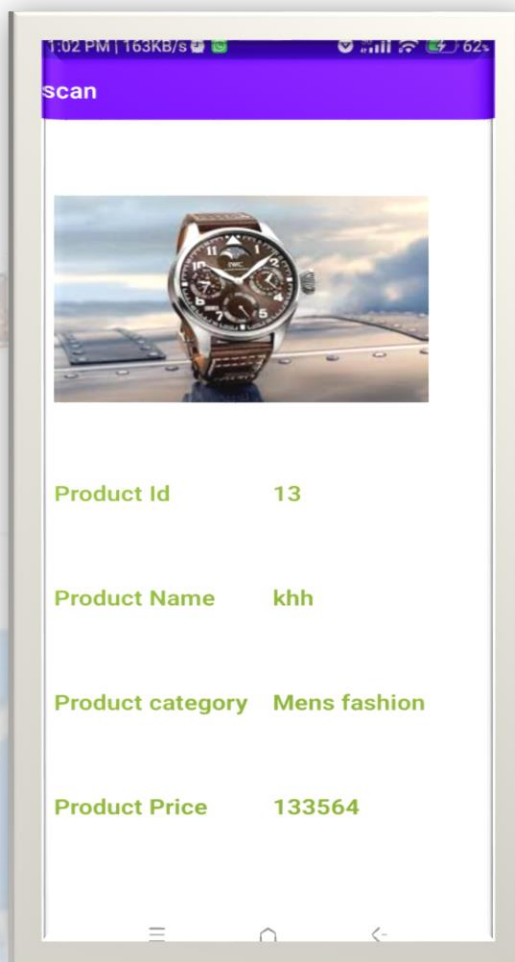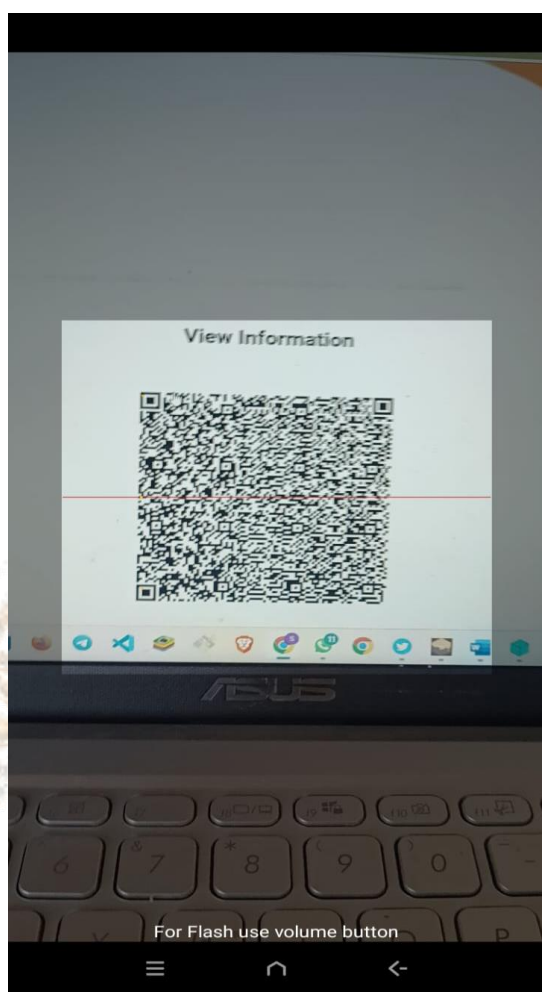
VII. CONCLUSION

This research paper proposes a blockchain-based framework for detecting counterfeit products in the supply chain. The framework offers an end-to-end customer-focused approach, enabling customers to easily identify counterfeit items by scanning the product's QR code. The proposed framework uses blockchain technology to ensure the security and transparency of the supply chain, making it virtually impossible for counterfeit products to enter undetected. Additionally, the framework can integrate with existing inventory management systems, making it easy for businesses to adopt without significant changes to their existing processes. Overall, the proposed framework offers an efficient, cost-effective, and accessible solution to the problem of counterfeit products in the market. By ensuring customer safety and trust in the products they purchase, the framework has the potential to significantly reduce the prevalence of counterfeit products in the market.

VIII. FUTURE SCOPE

While blockchain-based frameworks offer a promising solution for detecting counterfeit products in the supply chain, there are still some challenges that need to be addressed. One of these challenges is the need to ensure the simplicity and validity of the code used in blockchain-based applications, as clients may be hesitant to trust a system with complex or questionable code. Additionally, it is crucial to develop a blockchain that is resistant to fraud and tampering by implementing robust security measures that ensure the integrity of the system. Finally, the development of a transparent and open resource framework can further enhance the authenticity of real products and increase customer trust in the supply chain. Addressing these challenges will help to ensure the proper development of blockchain-based anti-counterfeiting systems and their effectiveness in ensuring customer safety and trust in the products they purchase.

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