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IMITATION DETECTION USING BLOCK CHAIN

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ABSTRACT
Counterfeiting poses significant challenges to businesses and consumers alike, with counterfeit goods infiltrating supply chains and undermining brand reputation. Traditional methods of detection have proven insufficient, prompting the exploration of innovative solutions. This project proposes a blockchain based system for the detection of counterfeit products, offering transparency and traceability throughout the supply chain. Leveraging Ethereum blockchain technology, manufacturers and suppliers securely store product details, while customers verify authenticity by accessing the product's supply chain history via QR code scanning. The system's decentralization ensures tamper resistance and data integrity, empowering consumers to make informed purchasing decisions. By bolstering trust and combating counterfeiting, the proposed system holds promise for enhancing consumer confidence, strengthening brand loyalty, and contributing to economic integrity. Moreover, its scalability suggests broader applications beyond supply chain management, addressing fraud across various sectors.

KEYWORDS: Blockchain, Supply Chain, Traceability, RFID/NFC Technology, Hash Function.

INTRODUCTION

The proliferation of counterfeit products poses significant challenges across various industries, ranging from consumer goods to electronics. Counterfeiting not only undermines consumer trust but also inflicts substantial financial losses on legitimate businesses, leading to revenue depletion, brand dilution, and compromised consumer safety. Reports from the Authentication Solution Providers' Association underscore the staggering economic impact of counterfeit goods, estimating losses of INR 1 trillion annually in the Indian economy
alone, with incidents of counterfeiting increasing by an average of 20% between 2018 and 2020. The repercussions extend beyond economic realms, affecting consumer wellbeing, as substandard counterfeit products such as cosmetics and electronic components pose health and safety risks, including skin diseases and malfunctioning gadgets.

LITERATURE SURVEY

Counterfeit Product Detection Using Artificial Intelligence, QR Codes, Machine Learning, and Blockchain

Counterfeiting is a growing concern in various industries, including pharmaceuticals, luxury goods, and food products. The impact of counterfeiting on society is significant, with estimated losses in the billions of dollars. In recent years, various systems have been proposed to detect counterfeit products, including those using Artificial Intelligence (AI), QR codes, Machine Learning, and Blockchain technology.

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Shaik et al. proposed a system that uses QR codes with public and private keys to detect counterfeit products . The system requires a manufacturer-run server to verify the buyer's name and item code, and a scanning app with cryptographic functionality to decrypt the QR code. Benatia and Baudry et al. proposed a traceability-CPS based architecture for supply chain management, which includes several layers that interact to form a traceability-CPS. The architecture allows for supply chain monitoring and data analytics to enhance product safety and quality.

Khalil and Doss et al. proposed an RFID-based system to reduce counterfeiting . The system allows consumers to query the tag attached to an item in-store to verify its legitimacy. RFID-based anti-counterfeiting and anti-theft schemes are suitable for large-scale implementation in retail environments. Tran and Hong's anti-counterfeiting protocol is immune to DOS attacks.

Habib and Sardar et al. examined the trends in Supply Chain Management (SCM) and proposed a solution using blockchain technology . The primary method for structuring new models should find the transaction process at a plan level. Daoud and Vu et al. focused on the architecture of AI applications for anti-counterfeiting, which includes a dataset, detection models, and trained models . The solution uses Faster R-CNN to achieve high accuracy and low training speed.

Chen and Shi et al. explained the SCQI framework for blockchain-based Supply Chain Quality Inspection (SCQI) . The framework provides a theoretical basis for intelligent quality management of supply chains based on blockchain technology. RFID technology is used to record quality information and transaction information, while smart contracts are used to execute quality control and improve the efficiency of the supply chain.

Toyoda et al. proposed a system to detect fake products using QR codes . End-users can scan the QR code assigned to the product to get the product details and transaction history. The system involves product enrollment, shipping the product to the distributor, and shipping the product to the retailer.

In addition, blockchain technology has been proposed for information sharing, which allows users to control their data and be aware of how it is used. Ethereum is an open-source blockchain operating system that allows for the creation of decentralized applications. Abhijeet and Andrew et al. discussed various findings on counterfeiting in global supply chain environments and strategies used by industries to tackle this problem .

However, the existing systems have limitations. For instance, QR codes can be copied and used to label counterfeit products . RFID-based systems are vulnerable to cloning attacks . AI and machine learning applications require training and testing phases and can fail to detect tag reapplication attacks . Moreover, there is no power for customers, suppliers, and retailers to check the integrity of products.

In conclusion, the literature survey highlights the importance of detecting counterfeit products and the various approaches proposed to tackle this problem. While the existing systems have limitations, the use of blockchain technology, AI, and machine learning can improve the accuracy and efficiency of counterfeit product detection. Further research is needed to develop robust and scalable solutions that can be implemented in real-world scenarios.

EXISTING SYSTEM

The current landscape of counterfeit product detection systems is characterized by various technologies and methods aimed at mitigating the risks associated with counterfeit goods. Traditional approaches include the use of RFID tags, Artificial Intelligence (AI), QR codes, and barcode scanning

systems. However, these methods have notable limitations that hinder their effectiveness in combating counterfeit products.

RFID tags, while useful for product identification, are vulnerable to cloning and tampering, making them susceptible to exploitation by counterfeiters. Similarly, AIbased systems, such as Convolutional Neural Networks (CNN), require significant computational resources and training data, making them impractical for widespread adoption in certain applications. Additionally, QR codes and barcodes, while widely used for product labeling and tracking, lack comprehensive traceability features and can be easily replicated by counterfeiters.

Despite these limitations, existing systems have made some progress in detecting counterfeit products. For example, AI algorithms have been employed to analyze product images and identify potential signs of counterfeit goods based on visual cues. Similarly, QR code based systems have been implemented to provide consumers with product information and authentication features, albeit with limited security measures.

Overall, while existing systems have demonstrated some efficacy in detecting counterfeit products, they fall short of providing a comprehensive solution to the problem of counterfeiting. There is a pressing need for a more advanced and robust counterfeit detection system that leverages innovative technologies and provides transparency in product information storage and tracking, such as blockchain based solutions.

DISADVANTAGES

1. Technology Limitations: The system's design and implementation are constrained by the limitations of the underlying technologies, including blockchain platforms, smart contract languages, and cryptographic algorithms.

2. Resource Constraints: The system's operation may be constrained by factors such as limited computational resources, storage capacity, and bandwidth availability, particularly in decentralized environments with distributed nodes.

3. Budget Constraints: The development, deployment, and maintenance of the system are subject to budgetary constraints, requiring careful allocation of resources to ensure cost effectiveness and financial sustainability.

4. Scalability Constraints: The system's ability to scale may be constrained by factors such as network congestion, transaction throughput, and storage scalability, requiring careful planning and optimization for future growth.

PROPOSED SYSTEM

The proposed system aims to address the limitations of existing counterfeit product detection methods by leveraging blockchain technology for enhanced transparency, traceability, and security. In this system, each product is assigned a unique QR code or barcode generated by the manufacturer, containing detailed information about the product's origin, authenticity, and supply chain history.

Using blockchain technology, this information is securely stored in a decentralized database, ensuring immutability and transparency throughout the product's lifecycle. When a customer scans the QR code or barcode, they can instantly access the product's information stored on the blockchain, allowing them to verify its authenticity and trace its journey from the manufacturer to the point of sale.

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By harnessing the decentralized nature of blockchain, the proposed system empowers consumers, retailers, and manufacturers with a reliable and tamper proof mechanism for detecting counterfeit products. Additionally, the system offers real time tracking capabilities, enabling stakeholders to monitor the movement of goods and identify any discrepancies or unauthorized alterations in the supply chain.

Overall, the proposed system represents a significant advancement in counterfeit product detection, offering a robust and efficient solution that prioritizes transparency, security, and trust in the marketplace.

ADVANTAGES

1. Enhanced Traceability: Easily track where products come from and where they're going, ensuring transparency in the supply chain and allowing consumers to make informed choices.

2. Immutable Data Recording: Information recorded cannot be changed, ensuring the integrity and security of product data, which builds trust in the system.

3. Data Security: By storing data across multiple places instead of one central location, the system becomes more resistant to hacking or unauthorized access, ensuring better protection of sensitive information.

4. Privacy Preservation: Keep personal information secure by restricting access to authorized parties only, ensuring consumer privacy is maintained while still allowing for necessary transparency.

5. Decentralization: No single authority controls the system, reducing the risk of manipulation and ensuring fairness and transparency among all participants.

SYSTEM BLOCK DIAGRAM

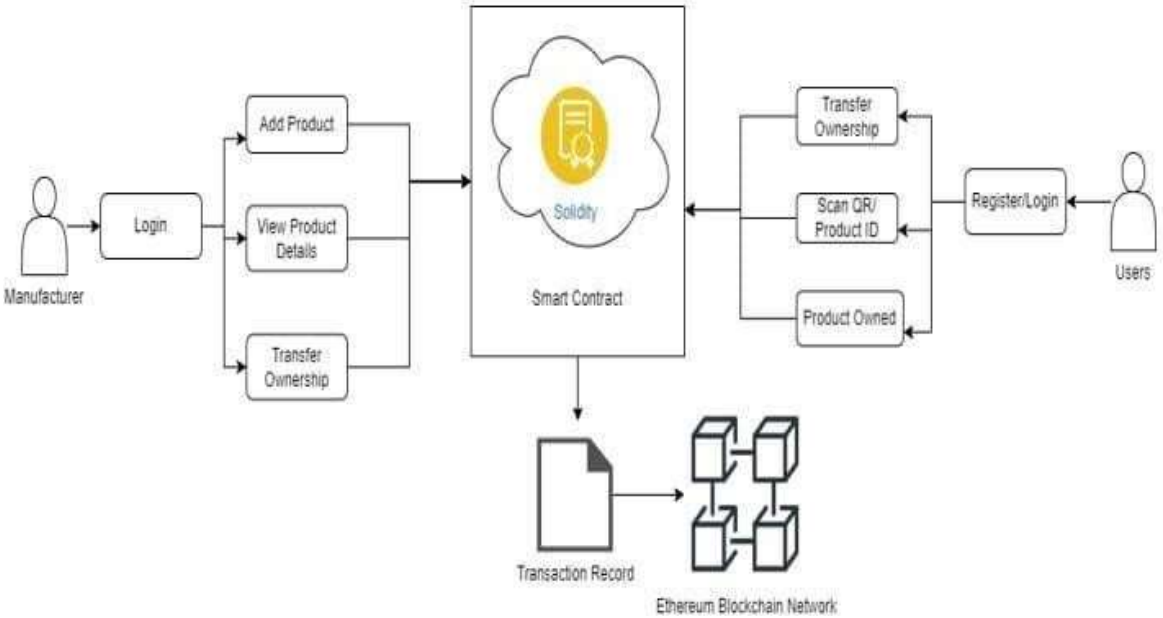

Fig: SYSTEM ARCHITECTURE

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OUTPUT SCREENS

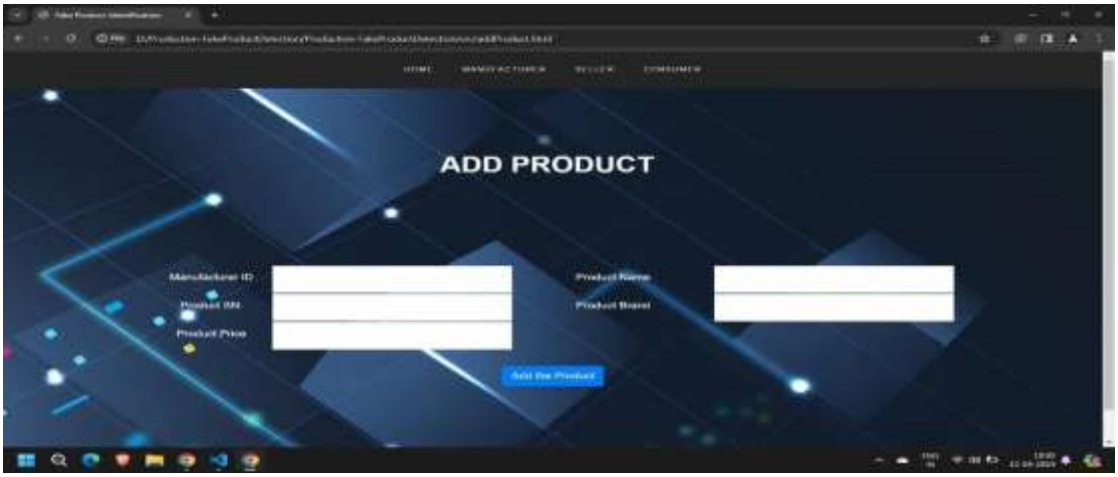

Fig: Add New product

Fig: Customer Page

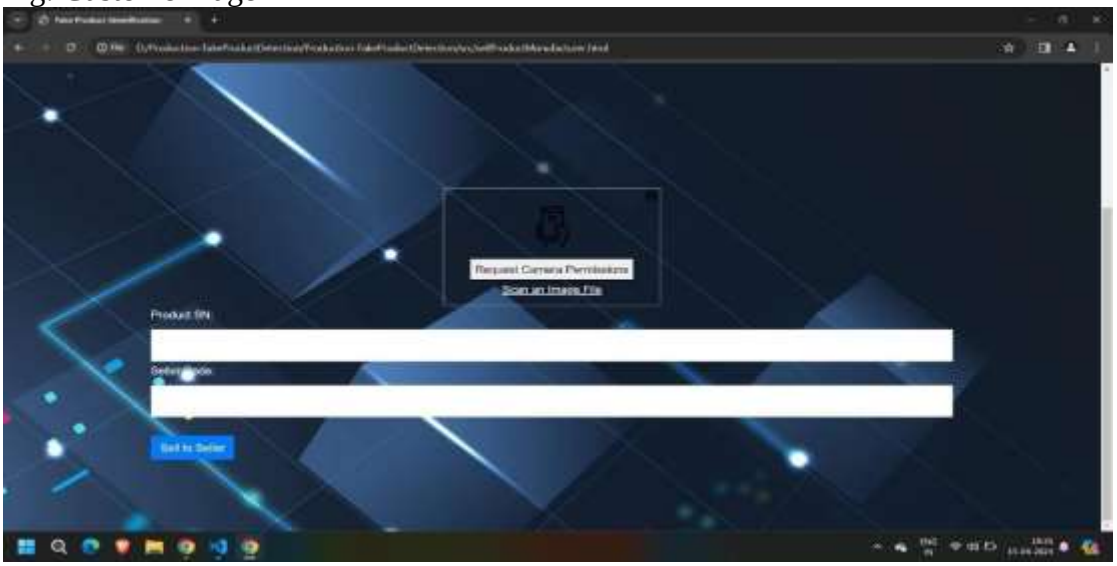

Fig: Product Id and seller code

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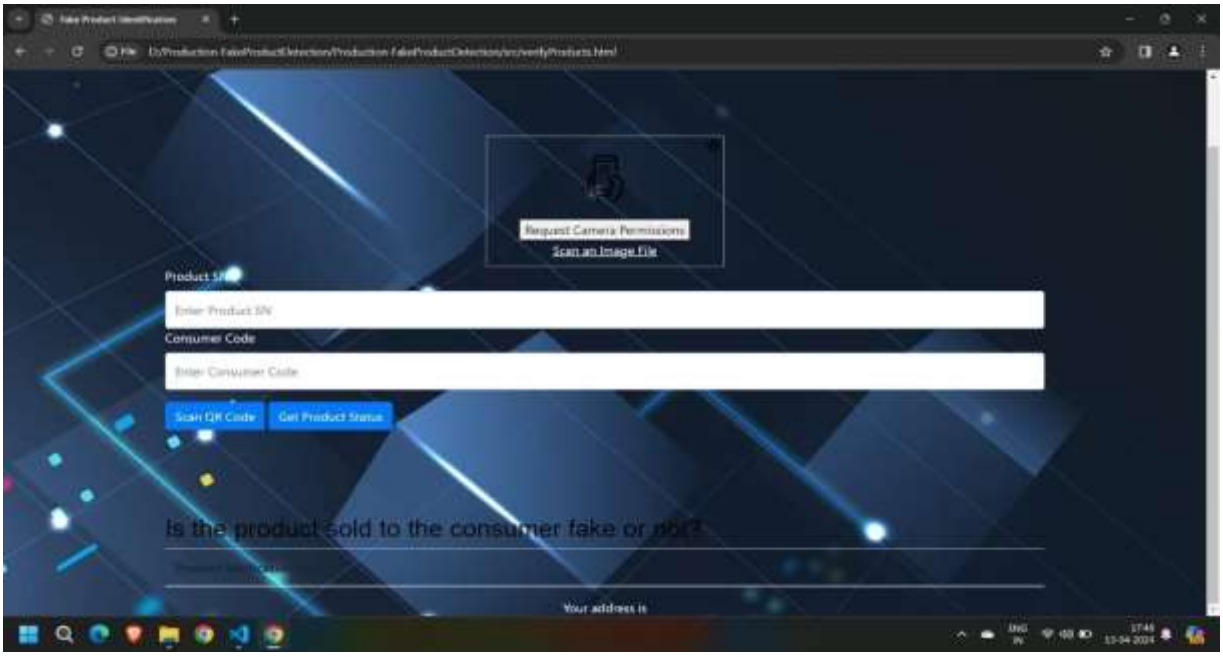

Fig: Fake Product Detection

CONCLUSION

In conclusion, the utilization of block chain technology for detecting counterfeit products holds immense promise in enhancing product authenticity verification. Leveraging blockchain's immutable and decentralized nature ensures accurate recording of product data, mitigating the risk of tampering and increasing transparency in the supply chain. This advancement not only safeguards consumers and businesses from the detrimental effects of fake products but also fosters a more secure and trustworthy global trade ecosystem. By embracing blockchain-based product verification systems, we can fortify the integrity of supply chains, bolster consumer confidence, and ultimately protect the integrity of the economy against the proliferation of counterfeit goods.

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