RECOGNITION OF FRAUDULENT PRODUCTS USING BLOCKCHAIN

Dr.Umesh Akare[1], Prof. Girish Umaratkar[2], Parag Wadhai[3], Aayush Kharwade[4], Pranav Bante[5], Ayush Dandekar[6]

Guide, Artificial Intelligence & Data Science, Priyadarshini College of Engineering, Nagpur, India[1]

Co.Guide, Artificial Intelligence & Data Science, Priyadarshini College of Engineering, Nagpur, India[2]

Student, Artificial Intelligence & Data Science, Priyadarshini College of Engineering, Nagpur, India[3-6]

Abstract: One of the major obstacles that the Internet retail industry faces is the widespread availability of counterfeit goods. These false goods imitate the look of real branded products, which poses a serious problem for both the industry and consumers. It's shocking to learn that about 30% of the things sold online are fake. Blockchain technology has attracted more attention as a response to this expanding problem, providing creative ways to reduce the ubiquity of counterfeit goods. Supply chain authenticity and transparency are guaranteed by blockchain's decentralized and impenetrable structure. By offering a traceable and secure framework that protects customers from purchasing fake items, this technology has the potential to completely transform the online retail industry. This paper proposes a decentralized blockchain solution to empower consumers in identifying the originality of the products independently of distributors. By establishing a blockchain network with anti-counterfeiting features, manufacturers can deliver goods without relying on traditional outlets, reducing quality assurance costs. The system utilizes blockchain technology to securely store product details, enabling verification against genuine information to identify counterfeit items. The verification procedure is streamlined by a smart contract-driven method, which enables producers to register items with distinct digital identities. Customers may use QR codes to confirm the genuineness of products.

Keywords: Fraudulent goods, Quick Response (QR) code, Blockchain, smart contracts, decentralized.

I. INTRODUCTION

Counterfeit items are a major worry in the current global economy since they put consumers' safety and brand faith at risk. To address this problem, our initiative, "Recognition of Fraudulent Products Using Blockchain," presents a revolutionary approach. With the strength of using blockchain technology, we can generate a transparent and irreversible ledger that tracks a product's complete lifecycle, from manufacturing to distribution. Every genuine good has a special identification that links to the blockchain, like an RFID chip or QR code. Customers and supply chain participants may instantly verify the originality of items using a specialized smartphone application, and smart contracts automate critical processes. The project " Recognition of Fraudulent Products Using Blockchain " transforms consumer safety and product authenticity. By using the technology of blockchain, guarantees that counterfeit goods are almost impossible to pass for genuine. Our technology helps businesses combat the worldwide issue of fake goods by improving supply chain transparency, traceability, and automation. This builds consumer trust and preserves brand integrity. As we continue to investigate the specifics and strategies of our blockchain-based system's implementation, we aspire to create a more reliable and safe marketplace for all stakeholders.

Blockchain is a safe data recording technique that strengthens a system's defences against hackers, manipulation, and changes. It connects every computer system on the distributed ledger network and functions as a collective and duplicated digital record of transactions. Every block in the chain contains many transactions, and each time a new transaction takes place, an instance of it is added to each participant's ledger. Distributed ledger technology is the term used to describe the decentralized database that is controlled by the number of participants (DLT). Hashes are unchangeable cryptographic signatures used to record transactions in the field of distributed ledger technology, or blockchain technology. By leveraging blockchain technology to verify commodities and maintain a public history of every transaction involving the commodity, this study provides a unique way to discover phony items. Manufacturers can ensure the quality and authenticity of their goods by assigning each one a unique digital identification and publishing it on the blockchain. Customers may use this to establish trust and ensure they are purchasing legitimate, high-quality goods by being able to verify a product's validity before making a purchase.

II. MOTIVATION

In today's world, the issue of counterfeit goods has become increasingly prevalent on a global scale, leading to an influx of fake products in our supply chain. Recent studies have shed light on the significant surge in the number of counterfeit goods available on the market. As a result, consumers must have access to a system that allows for detailed specifications and verification of the authenticity of products. Particularly in India, where a robust framework for identifying counterfeit goods is lacking, a simple QR code-based verification system is urgently needed. With the convenience of a smartphone, customers can quickly scan and verify the legitimacy of a product.

III. OBJECTIVE

This idea was inspired by the prevalence of counterfeit goods. The project aims to:
Our team is dedicated to developing a cutting-edge solution that combats the production of counterfeit products. Our state-of-the-art system harnesses the power of blockchain technology and includes QR codes that contain vital product information to verify its authenticity. In addition, we offer our clients secure access to data to further bolster product security. By utilizing the immutability of blockchain, we can establish a transparent and secure platform for all transactions. Our ultimate objective is to empower customers by equipping them with the knowledge necessary to prevent the manufacture of fraudulent goods. We are fully committed to optimizing performance and raising awareness to combat the proliferation of counterfeit products in the marketplace.

IV. LITERATURE SURVEY

I.   An article titled "Blockchain-Powered Counterfeit Product Detection," published in 2021 by Tejaswini Tambe, Sonali Chitalkar, Manali Khurud, Madhavi Varpe, S. Y. Raut, and others offers a technique that integrates IPFS, a decentralized system on the Ethereum blockchain enables users to search for encrypted information using keywords. This innovative technology addresses issues with conventional storage methods, such as inaccurate data from cloud servers.

II.   The suggested approach improves the efficiency of the testing stage for differentiating between authentic and counterfeit products, according to the 2020 paper "Artificial Intelligence-Based Monitoring System for Counterfeit Products," written by Reema Anne Roy and Sunita R Patil. A large percentage of defect prediction models incorporate well-known methods and algorithms, including machine learning and statistical approaches.

III.   Professor Prema Desai, Swaroop Jambhulkar, Harsh Bhoyar, Shantanu Dhore, and Arpita Bidkar's 2022 project, "Blockchain-Based Fake Product Identification System." The speaker of this article proposed a method and offered a remedy to stop the act of product counterfeiting. With the use of this system, consumers may check a product's legitimacy by looking through its whole supply chain. A final client may verify a product's legitimacy and have accessibility to all the data posted to the blockchain throughout the supply chain by scanning a quick response code linked to it.

IV.   "Fake Product Identification System Using Blockchain" (Anil Pawar, Meenaz Kolyal, Prof. S.A. Quadri, 2022). The study suggests a decentralized Blockchain-based anti-counterfeiting solution that enables manufacturers to authenticate goods at any of the points in the supply chain. This entails employing SHA256 QR Code technology to create unique QR codes that are then stored in a database, allowing for safe and traceable product verification without human intervention.

V.   Rashmi S., Varshita Artham, Vennapusa Anusree Reddy, Sujith, and Sanjana Patil published "A Reliable System for Identification of Fraudulent Commodities" in 2023. The author claims that by using blockchain technology, this approach enhances product traceability, mitigates the effects of counterfeiting, and fortifies overall security. The intention is to prevent the introduction of faulty products into the market by enabling businesses and consumers to recognise and halt the creation of faulty goods.

VI.   "Counterfeit Product Detection System Using Graphical QRcode in Blockchain," Mercy P., Madhubala R., and Dr. V. Brindha Devi, 2023. Manufacturers have proposed a method that combines blockchain technology with a graphical quick response code to address the problem of fake goods. A graphical QR code would be created instead of a traditional one, which is susceptible to copying because of ink spreading. Data integrity is guaranteed by the blockchain-linked graphical QR code. Each transaction generates a unique hash value that customers may use to confirm the legitimacy of the product by identifying the code. The method attempts to remove fake goods from the market by comparing the scanned hash with the manufacturer's registered value.

V.   PROBLEM STATEMENT

The use of blockchain technology is essential to implement a system that can identify fraudulent products. Counterfeit products are rampant, and intermediaries make it difficult for consumers to determine the authenticity of a product.

VI.   BACKGROUND

I.   Blockchain Technology:

Distributed ledger technology (DLT) securely records and preserves the history of digital assets through the use of cryptographic hashing and decentralized networks, just like blockchain. By sharing the document among users rather than copying it, it functions similarly to a shared Google Docs page and permits concurrent access to the essential content.

Since all changes to the document are available right away, nobody needs to wait for updates from another party because all alterations are logged in real-time. It's crucial to keep in mind that information saved on the blockchain cannot be altered, improving security. To provide a single, reliable source of information that is accessible in both location and time, encrypted data blocks concerning digital assets are stored and linked together in a blockchain, a kind of digital ledger or database.

II.   Project Scope:

Purchasing fake goods nowadays has significant hazards to one's health and credibility, especially when it comes to goods like cosmetics and medications. Unknowingly purchasing phony items has a detrimental effect on individuals as well as businesses, since it can lead to emotions of betrayal and financial losses.

To address this issue, an innovative application has been created that utilizes barcode or QR code scanning, with each product packet receiving a unique identifier. This method works well for locating important details about the product and is useful for spotting fake items all the way up the supply chain. Due to this, the suggested fix is a priceless tool for final consumers that want to ensure the security and legitimacy of their transactions.

VII.   FUNCTIONAL REQUIREMENTS

- The software features functionality that is easy to use.
- It has an easy-to-use UI that is simple to use.
- Swift accessibility and rapid response times characterize the application.
- The system's performance is commendable, ensuring efficient operations.

I.   Interface

- Manufacturer
- Supplier
- QR Code Scanner
- Seller
- Products

VIII.   SYSTEM REQUIREMENTS

I.   Ganache

As a private Ethereum blockchain ecosystem, Ganache allows for the replication of smart contract interaction in a customized blockchain environment. It has functions like an integrated block explorer, sophisticated mining control, and a display of blockchain log output. Users may effectively create and test decentralized applications with these capabilities, all while keeping control over their blockchain environment.

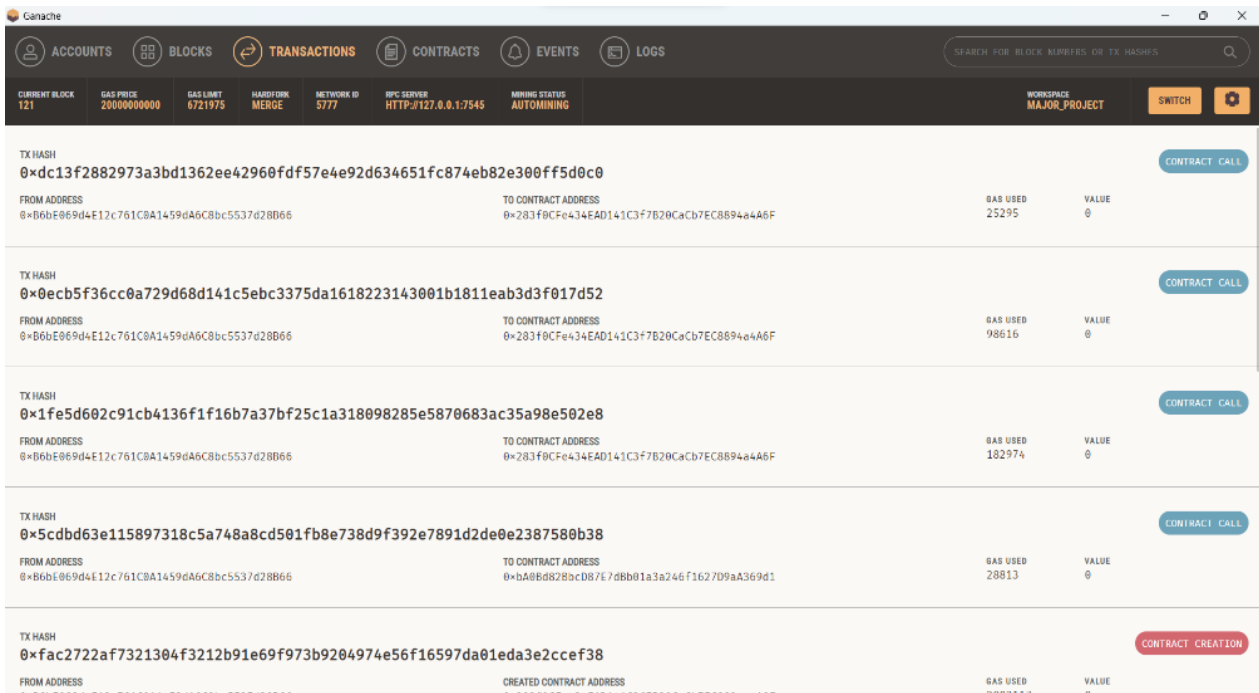An illustration of Ganache's desktop version can be found below:

Fig.1 Ganache

II.   Truffle

Blockchain applications can be developed with the Ethereum Virtual Machine by developers utilizing Truffle, a feature-rich and highly adaptable tool. It has been downloaded over 15 lakhs times, making it the go-to option for developers in need of a dependable testing framework, asset pipeline, and programming environment. Truffle offers compatibility for several platforms, such as Ethereum, Quorum, and Hyperledger, to help developers at every stage of the project lifecycle. It also seamlessly connects with other tools like Drizzle, a front-end development kit, and Ganache, a personal blockchain, to provide a comprehensive toolset for throughout its entirety dApp construction.

Fig.2 Truffle

III.   Metamask

Reputable cryptocurrency wallet MetaMask extends a warm welcome to novice and experienced traders alike. It offers non-fungible tokens (NFTs) and other Ethereum-based currency storage across supported blockchains. Users may interact with the Ethereum blockchain ecosystem, store and exchange currencies, and access decentralized apps (dApps) on web and mobile platforms with the wallet's capabilities. Even while its features are simple for seasoned traders to use, beginners may initially find it challenging. Ultimately, MetaMask remains one of the world's most widely used bitcoin applications.

Fig.3 Metamask

IX. HOW DOES BLOCKCHAIN OPERATE?

A blockchain is a type of digital record made up of encrypted data blocks connected by intricate cryptography problems. The complex math problems, which call for matching hashes and nonces, make it almost impossible to alter any transaction once it has been included, ensuring the blockchain's integrity and security. Because the blockchain is distributed across decentralized nodes, it remains equally dispersed, with no single entity having ownership or control.

I. Blockchain Decentralization

The underlying principle of blockchain technology is decentralization, which means that no solo entity or computer has control over the network. Instead, the network is composed of interconnected nodes, and the ledger is distributed across them. Any electrical device that can keep track of copies of the chain and keep the network running can function as a node in a blockchain network. The blockchain is replicated by these nodes, and it is updated by consensus mechanisms that use algorithms to verify and confirm newly mined blocks. Because blockchains are transparent, it is simple to verify and examine recorded transactions, which improves security. To track transactions, each member is given a distinct alphanumeric identification number, and the blockchain's integrity is maintained by a combination of public data and checks and balances. In blockchain, decentralization refers to the movement of power and decision-making from centralized organizations to a dispersed network architecture.
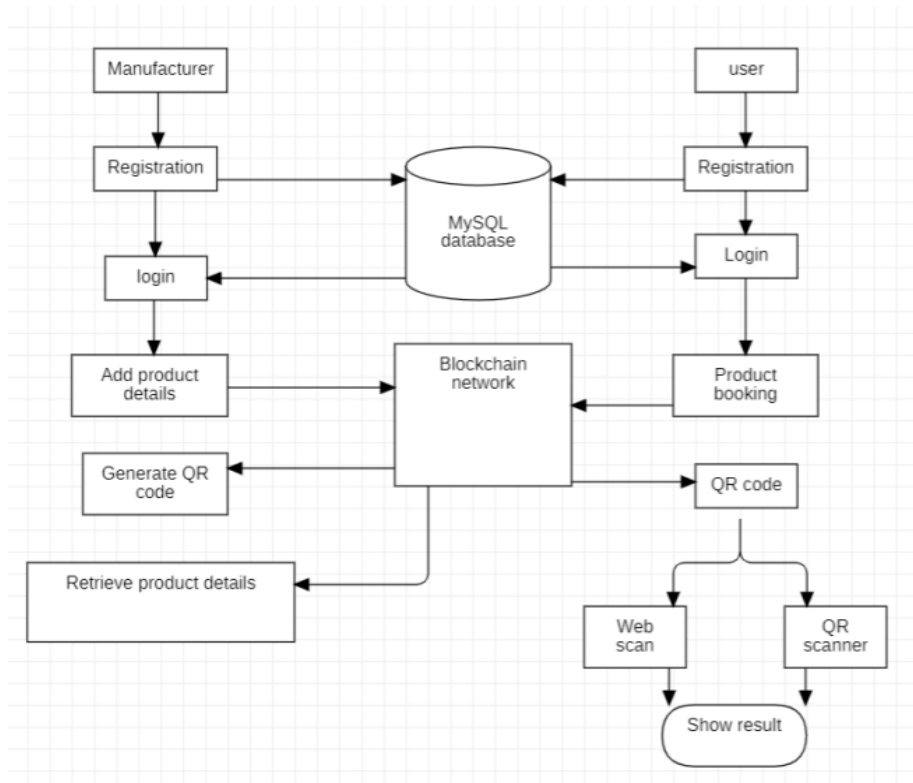
X. SYSTEM ARCHITECTURE

Fig. 4 System Architecture

I. Modules

- Sorts of Login: There are three sorts of logins. Manufacturer, User, and Administrator.
- Registration: Prior to interacting with the product, users must register.
- Login: Each user must log in separately in order to access a project.
- Add Product: Using JavaScript and smart contracts, manufacturers can add products to the blockchain database after logging in.
- Generate QR Code: From the admin side, administrators can assess product details, generate a QR code for a related product, and then add it to the blockchain database.
- Scan QR Code: By using an Android application to scan the QR code, users can read all pertinent product details on their mobile device.

XI. WORKING

- Application of smart contract-linked QR codes for product authentication. Companies must first verify their email addresses and register before uploading product details.
- Brand name, manufacturing year, cost, quantity, quality, and manufacturer information are all included in the product information.
- The blockchain's decentralized QR code storage is controlled by the Firebase database.
- Manufacturers cannot reuse QR codes; each product transaction requires a unique code.
- Serialized QR codes are used to improve client interaction and provide product details.
- Prior to scanning a barcode or QR code, customers must log in or register. Smart contract blocks that use cross-referencing of scanned code with manufacturer's code to provide authentication.
- Users receive confirmation for authentic products and alerts for fake goods.
- Permission-based access to the user's location for the purpose of alerting manufacturers about fake goods.
- When counterfeit goods are discovered, legal action against distributors, retailers, and illegal makers is facilitated.
- Improvements in consumer happiness, confidence in retailers, and the amount of money saved on fighting fake goods.

XII. RESULT

When it comes to procedures used for product identification, blockchain technology has greater potential. Supply chain supervisors, authorization, tracking, and anti-counterfeiting strategies may all benefit greatly from it. An environment that is more transparent, safe, and reliable becomes evident as we examine the anticipated outcomes of using blockchain for these objectives.

I. Improved Transparency in the Supply Chain:
Supply chain transparency might rise significantly thanks to blockchain technology's decentralized, fixed ledger. Real-time access to an extensive record of transactions throughout the entire supply chain will be available to stakeholders. In addition to increasing stakeholder trust, this increased transparency guarantees that the legitimacy of the items can be confirmed at every stage, boosting faith in the supply chain's integrity.

II. Strong Anti-Counterfeiting Measures:
It is predicted that blockchain technology's capacity to provide things distinct digital identities will produce a strong barrier against counterfeiters. The use of cryptography and smart contracts will significantly increase the difficulty of replicating or tampering with goods by counterfeiters. Consequently, this protects customers and companies from the negative effects of fake goods.

III. Efficient Traceability:
The end-to-end traceability features of blockchain are expected to deliver significant advantages to sectors like food and pharmaceuticals, where identifying a product's origin is critical. It will be simple for the stakeholders and customers to follow a product from the point of origin to the location of destination. This improves the supply chain's overall dependability by streamlining quality control procedures and guaranteeing compliance with laws.

IV. Authentication and Verification:
Customers are expected to gain from a rigorous process for product authentication and verification, as well as simple access to a decentralised and impenetrable record via blockchain. This would enable both businesses and consumers to confidently confirm the legitimacy of the merchandise, hence reducing the amount of fake or inferior goods that are purchased.

XIII. CONCLUSION

Upon completion of this study, it is evident that blockchain technology is revolutionizing product authentication in a way that is very different from traditional methods. Tailor-proof data, decentralized verification processes, and the incorporation of automated warnings enabled by smart contracts are ensured by the utilization of blockchain technology. This complete strategy not only revolutionizes methods of product security and authentication but also paves the way for increased consumer confidence by offering transparent supply chain traceability.

The fundamental elements of blockchain technology's efficiency are its transparency and immutability. The decentralized character of blockchain, in contrast with conventional methods, guarantees that records are impervious to tampering or illegal adjustments. This not only fosters trust in the veracity of product information but also offers stakeholders and customers a dependable setting in which to easily validate products. By establishing automated alerts and promptly notifying relevant parties in the event of any discrepancies or unauthorized access, using of smart contracts further improves the system.

This project represents a forward-thinking perspective for a more secure and decentralized future, even beyond its technological features. Blockchain technology is a driving force behind enhanced transparency, the elimination of middlemen, and data and transaction integrity. The intended result is a market that is trusted and legitimate by reducing the dangers related to counterfeiting and fraudulent activity.

XIV. FUTURE WORK

- User trust is known to be increased by distributed applications, and the system's ability to efficiently execute basic code will be demonstrated by its future performance.
- Manufacturers may find it difficult to manually enter all product details. Alternatively, the procedure can be made more efficient and streamlined by extracting data via the company's API.
- Although QR codes cannot be hacked, the data they contain can be duplicated or utilized to create identical codes. Secure graphic QR codes, which smear ink when photocopied, can be used as a solution to this problem.
- When copied, these secure visual patterns are meant to permanently lose information.
- To improve usability, efficiency, and efficacy in the event of counterfeit goods, the system should be able to show authentic products at varied prices from different websites.
- The unpredictable nature of the code affects the total cost of running the distributed system on the Ethereum blockchain. Future usage of the code will demonstrate how simple it is, giving users confidence that no needless complexity will result in additional consumption from the software.

REFERENCES

[1]. Tejaswini Tambe, Sonali Chitalkar, Manali Khurud, Madhavi Varpe, S. Y. Raut "Fake Product Detection Using Blockchain Technology", Vol-7 Issue-4 2021, IJARIIE-ISSN(O)-2395-4396.
[2]. Prof. Dr. Sunita R Patil, Reema Anne Roy, "Fake Product Monitoring System using Artificial Intelligence", Vol 3, Issue 11, November 2022, IJRPR.
[3]. Prof. Prema Desai, Swaroop Jambhulkar, Harsh Bhoyar, Shantanu Dhore, Arpita Bidkar, "Blockchain Based Fake Product Identification System", e-ISSN: 2582-5208 2022 (IRJMETS).
[4]. Anil Pawar, Prof. S.A.Quadri, Meenaz Kolyal, "Fake Product Identification System using Blockchain", Volume 9, Issue 7, 2022 (JETIR).
[5]. Rashmi S, Varshita Artham, Vennapusa Anusree Reddy, Sujith, Sanjana Patil, "A Reliable System for Identification of Fraudulent Commodities", ISSN 2063-5346, 2023 (ECB).
[6]. Dr. V. Brindha Devi, Mercy P. and Madhubala R, "Counterfeit Product Detection System Using Graphical QRcode in Blockchain", ISSN: 2320-5407, 2023 (IJAR).
[7]. Ms. Vaishnavi Hedaoo, Ms. Sakshi Sawarkar, Ms. Mayuri Kosare, Ms. Pragati Gawande, Mr. Swapnil Wahokar, "Blockchain-Fake Product Identification", Vol-8 Issue-3 ISSN(O)-2395-4396 2022 (IJARIIE).