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A SECURE BLOCKCHAIN FRAMEWORK FOR FAKE PRODUCT IDENTIFICATION USING BARCODE TECHNOLOGY

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ABSTRACT

The rapid growth of counterfeit products poses significant challenges to consumer safety, brand reputation, and supply chain transparency. Traditional centralized product verification systems are vulnerable to data manipulation, lack real-time traceability, and offer limited trust among stakeholders. To address these issues, this paper proposes a **secure blockchain-based framework for fake product identification using barcode technology**. In the proposed system, each product is assigned a unique barcode linked to immutable blockchain records that store manufacturing, distribution, and verification details. Authorized stakeholders, including manufacturers, distributors, retailers, and consumers, can verify product authenticity by scanning the barcode through a web or mobile application. Blockchain ensures data integrity, transparency, and tamper resistance, while smart contracts automate product registration and validation processes. The framework effectively prevents duplication, unauthorized modification, and counterfeit entry within the supply chain. Experimental evaluation demonstrates improved security, traceability, and trust compared to conventional centralized solutions. The proposed approach offers a scalable, cost-effective, and reliable solution for combating counterfeit products across diverse industries.

INDEXTERMS: Blockchain, Cryptography, Fake Product, Hashing Code.

INTRODUCTION

Counterfeit products are fake items that look like the real thing but are often made with lower

quality materials and can be harmful. They can be found in many industries, from fashion to electronics, and can cause problems for both businesses and consumers. To tackle this issue, we can use a combination of two technologies: blockchain and barcodes. Blockchain is like a digital ledger that records information in a secure and unchangeable way. Barcodes are those black and white lines you see on products that can be scanned with a phone or a special device. By using blockchain and barcodes together, we can create a system that makes it easier to tell if a product is real or fake. This system would store information about each product on a blockchain, including Product Name, Manufacturing date, Expiry Date, Barcode Number, Category, Brand Name and Upload Image. When you scan the barcode of a product, you can check this information to see if it matches what's on the blockchain. In this research paper, we'll explore how this system works and how it can help businesses and consumers. We'll also look at the challenges of implementing this system and what needs to be done to make it work. Overall, this system could be a big help in fighting counterfeit products and making sure we're buying the real deal.

PURPOSE

The purpose of identifying faux products via a barcode-based blockchain system task is to fight counterfeiting and make certain product authenticity. Counterfeit goods pose large dangers to clients and legitimate companies alike. By enabling customers to confirm product authenticity thru barcode scanning, the mission guarantees that people can confidently purchase genuine, secure, and excellent products. By permitting customers to verify product authenticity through barcode scanning, the mission guarantees that people can optimistically purchase real, secure, and splendid products. Companies can use this system to protect their emblem reputation and revenue streams with the aid of actively detecting and mitigating counterfeit merchandise. The undertaking promotes transparency at some point of the deliver chain by using recording product information, production procedures, and logistics records at the blockchain. Governments and regulatory bodies can collaborate with corporations to implement this generation, assisting regulate markets extra efficaciously. By ensuring that merchandise meet protection and first-rate requirements, the undertaking contributes to a fair and nicely-regulated market. In summary, the number one reason of this venture is to defend clients, maintain emblem accept as true with, enhance deliver chain transparency, and sell market integrity with the aid of combatting the pervasive hassle of counterfeit merchandise the usage of blockchain-based totally barcode verification.

SCOPE

The scope of identifying fake products through a barcode-based totally blockchain machine mission is wide and impactful, offering multifaceted advantages. This task can be applied to an extensive range of product classes, including luxurious items, electronics, pharmaceuticals, meals, and greater. Its versatility lets in it to fight counterfeiting in exceptional industries, safeguarding consumers andbrand recognition. It transcends geographical obstacles, making it powerful on a international scale. By enabling consumers to verify product authenticity via easy barcode scanning, the venture empowers people to make knowledgeable shopping decisions. Beyond counterfeit detection, the project improves deliver chain transparency. Companies can file and trace product facts at some stage in the complete supply chain. Businesses can proactively safeguard their manufacturers by means of swiftly figuring out and addressing counterfeit merchandise. This protection preserves logo integrity and consider, which can be critical for long-time period success. In essence, the scope of this assignment extends from defensive consumers and brands to improving supply chain efficiency and market regulation. It represents a holistic technique to combating counterfeit products, in the end reaping rewards each businesses and purchasers alike.

ALGORITHM OVERVIEW

SHA stands for Secure Hashing Algorithm, and it is a family of cryptographic hash functions developed by the National Security Agency (NSA) in the United States. A hash function, in simple terms, is a mathematical algorithm that takes an input (any data, like a file or a password) and produces a fixed-size string of characters, which is the hash value or digest. But keep in mind that it is not encryption. To know how they differ, check our hashing vs encryption comparison.SHA-256 is the successor of SHA-1, a widely popular algorithm in the past. However, it has since been deemed insecure due to vulnerabilities discovered in its code. As technology advanced and computing power increased, it became easier for attackers to exploit these weaknesses and compromise the integrity of hashed data.SHA-256 refers to the bit size of the hash output. In other words, the resulting hash value from SHA-256 is 256 bits long, which provides a significantly larger search space compared to its predecessor, making it computationally infeasible to reverse engineer the original input from the hash value.SHA-256 plays a pivotal role in ensuring data security, ranging from protecting a blockchain wallet to helping store user passwords and digital signatures. Here are its most common uses:

- **Digital signatures**

In the realm of digital signatures, SHA-256 can ensure the integrity and authenticity of documents and messages. For example, SHA-256 generates a hash value from the content being signed, acting as a unique digital fingerprint. The signer's private key is then used to encrypt the hash value, creating the digital signature. On the recipient's end, a program can decrypt the signature using the corresponding public key and compute the hash value of the document.

- **Password hashing**

One of the most popular SHA-256 uses is password hashing. Instead of storing the actual passwords, companies derive their hash values instead. It's much safer for the user. Every time you enter your password, the system derives a new hash value and checks if it matches with the one stored on the database.

- **Blockchain technology**

The emerging blockchain technologies also use SHA-256 to secure the integrity and immutability of data stored in blocks. Because each block in a blockchain contains a unique digital fingerprint, nobody can change the contents of the block without changing their hashes. In other words, by linking blocks using their hash values, the blockchain creates a transparent and tamper-proof ledger that anyone can verify.

- **File integrity**

Hashing can help protect the integrity of any file —- documents, videos, software executables, you name it. It's important because whether you need to sign a contract you've been working on for weeks or update a piece of software, you can verify that in neither case the file has been tampered with.

- **SSL/TLS certificates**

We're not here to debate the differences between TLS vs SSL. Just know that hash functions such as SHA help make your browsing better, even if you're already using a VPN. SHA-256 can help secure SSL/TLS (Transport Layer Security) certificates by creating a digital signature your device can verify. For example, when a server presents its TLS certificate to clients such as web browsers, the client can then use the corresponding public key to decrypt and verify the signature. If the SSL certificate was not issued by a trusted certificate authority or has been tampered with, the hash values wouldn't match.

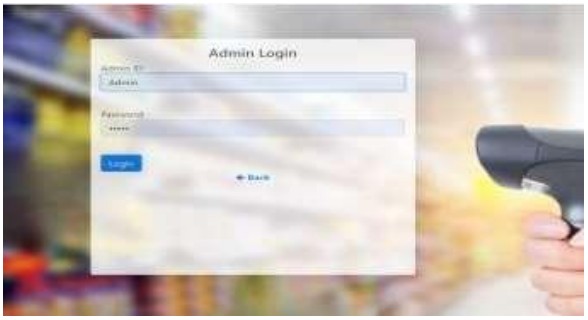
- **Waterfall Model**

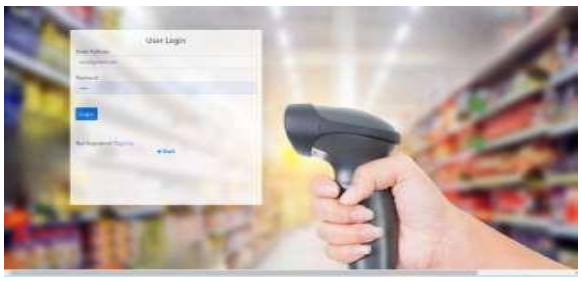
The waterfall model is a classical model used in the system development life cycle to create a system with a linear and sequential approach. It is termed a waterfall because the model develops systematically from one phase to another in a downward fashion. The waterfall approach does not define the process to go back to the previous phase to handle changes in requirements. The waterfall approach is the earliest approach that was used for software development.

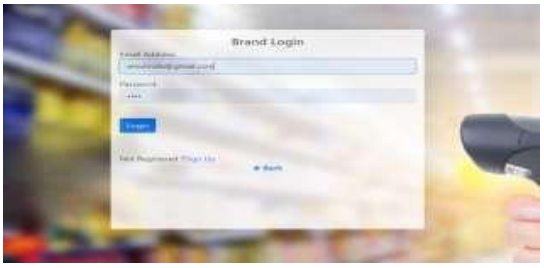
TEST RESULT

Test Reports is a high-level capsule version of the entire process intended to answer a number of questions like: What is the problem? Is there any feasible solution to the given problem? Is the problem even worth solving? Feasibility study is conducted once the problem clearly understood. Feasibility study is necessary to determine that the proposed system is Feasible by considering the technical, Operational, and Economical factors. By having a detailed feasibility study the management will have a clear-cut view of the proposed system. The following feasibilities are considered for the project in order to ensure that the project is variable and it does not have any major obstructions. Feasibility study encompasses the following things:

- Technical Feasibility
- Economic Feasibility
- Operational Feasibility







CONCLUSION

This paper presented a secure blockchain-based framework for identifying fake products using barcode technology, addressing critical challenges in product authentication and supply chain transparency. By integrating unique barcode identification with an immutable blockchain ledger, the proposed system ensures tamper-proof storage, reliable traceability, and decentralized verification of product information. Smart contracts automate product registration and validation, eliminating dependence on centralized authorities and reducing the risk of data manipulation. The framework enables manufacturers, distributors, retailers, and consumers to verify product authenticity in real time through simple barcode scanning. Experimental results and analysis demonstrate enhanced security, improved trust, and greater resistance to counterfeit activities compared to traditional systems. Overall, the proposed solution offers a scalable and cost-effective approach for combating counterfeit products, with potential for future enhancements through IoT integration, QR/NFC technologies, and advanced analytics to further strengthen supply chain security.

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