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Blockchain-Based Counterfeit Detection System

[1]Kanishk Purohit, [2]Mahek Joshi, [3]Manav Kaushal, [4]Krupi Saraf

[1]kanishkpurohit20801@acropolis.in, [2]mahekjoshi20408@acropolis.in, [3]manavkaushal20203@acropolis.in, [4]krupisaraf@acropolis.in

Computer Science and Engineering Department, Developer, Acropolis Institute of Technology and Research, Indore

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ABSTRACT: -

The increase in counterfeit products in the market is a growing concern for consumers, manufacturers, and regulators. Counterfeit products not only cause financial losses to companies but also pose serious health and safety risks to consumers. The traditional methods of detecting counterfeit products have proved to be insufficient. However, the emergence of blockchain technology has created new opportunities for the development of an effective counterfeit detection system. In this paper, we propose a fake product detection system using blockchain technology. Our proposed system combines the transparency and immutability of blockchain with the power of artificial intelligence and machine learning to detect counterfeit products. We demonstrate the effectiveness of our proposed system by conducting experiments on a dataset of 'product.

Key-Words: Counterfeit, Blockchain

I. Introduction

Counterfeit products have become a major problem in today's market. The increase in the number of counterfeit products is not only a threat to the financial well-being of companies but also poses serious health and safety risks to consumers. Counterfeit products range from luxury goods, electronics, pharmaceuticals, and even food items. Traditional methods of detecting counterfeit products such as security labels, holograms, and RFID tags have proven to be insufficient as counterfeiters have become more sophisticated.

Blockchain technology is an emerging technology that has the potential to revolutionize many industries. The transparency and immutability of blockchain make it a perfect fit for developing a counterfeit detection system. Blockchain technology has been used in many applications such as supply chain management, finance, and healthcare. However, its application in detecting counterfeit products is relatively new. In this paper, we propose a fake product detection system using blockchain technology. Our proposed system combines the transparency and immutability of blockchain with the power of artificial intelligence and machine learning to detect counterfeit products. We demonstrate the effectiveness of our proposed system by conducting experiments on a dataset of product images..

II. Problem Formulation

The aim of this project is to identify and eliminate counterfeit products from the market remain a challenge for businesses and regulatory authorities. Existing solutions often lack transparency, traceability, and authentication mechanisms, making it difficult to track the origin of products and verify their authenticity. This report aims to explore how blockchain technology can be utilized to develop a robust and reliable system for fake product identification.Thus, the system implemented has the following objectives :1. Counterfeit Detection : Implement mechanisms to identify counterfeit products by verifying their authenticity through blockchain records 2.Supply Chain Traceability: Enable end-to-end traceability of products, allowing stakeholders to track the movement of goods from manufacturer to consumer.

III. Literature review

The use of blockchain technology in product identification has been the focus of many research studies and publications in recent years. In particular, the use of blockchain in supply chain management has been extensively studied, as it can provide a secure and transparent way of tracking products from their origin to their destination. One study by Wang et al. (2020) proposed a blockchain-based system for product traceability that uses a combination of QR codes and RFID tags. The system is designed to track products through the entire supply chain, from the manufacturer to the retailer, and allows consumers to verify the authenticity of the product by scanning the QR code.

Another study by Gao et al. (2021) proposed a blockchain-based anti-counterfeiting system that uses a combination of digital signatures and smart contracts to ensure the authenticity of products. The system is designed to prevent the creation of fake products by verifying the authenticity of raw materials, ensuring that the product is produced by an authorized manufacturer, and tracking the product through the entire supply chain.

IV. Methodology

Our proposed fake product detection system consists of three main components: the blockchain network, the product authentication module, and the image recognition module. The product authentication module is responsible for verifying the authenticity of the product by comparing the product's unique identifier with the one stored on the blockchain. The image recognition module is responsible for detecting counterfeit products by analysing product images. tools and libraries, making it a versatile choice for building decentralized applications (Dapps) and interacting with the Ethereum blockchain. With its robust functionality and developer-friendly environment, Hardhat has become a valuable tool for those looking to streamline the Ethereum development process and ensure the reliability and security of their smart contracts.

The idea of this project came into existence because of the increase in the counterfeit products.

The objectives of this project are:

1.To Design Anti Counterfeit System using Blockchain.

2.To secure product details using a QR code.

3. Provide security to the clients by offering data to client

V. Tools and Technology

Blockchain technology has emerged as a transformative innovation with the potential to revolutionize various industries. Initially introduced as the underlying technology behind Bitcoin, blockchain has evolved into a versatile solution that extends far beyond cryptocurrencies. Its decentralized and transparent nature, combined with cryptographic security mechanisms, offers numerous advantages in terms of data integrity, trust, and efficiency. In this report, we will explore the fundamental concepts, components, and mechanisms of blockchain technology.

Several libraries will be used in the project such as: **Hash and block structure:** The hash algorithm is a function that maps a sequence of messages of any length to a shorter fixed-length value, and is characterized by susceptibility, unidirectionality, collision resistance, and high sensitivity. Hash is usually used to ensure data integrity, that is, to verify the data has been illegally tampered with. When the data tested changes, its hash value also changes correspondingly. Therefore, even if the data is in an unsafe environment, the integrity of the data can be detected based on the hash value of the data.

Smart Contract: A smart contract is a computer program or protocol that directly controls the transfer of digital assets between parties under certain conditions. It is a self- executing contract with the terms of the agreement between buyers and sellers being directly written into lines of code. Smart contracts are stored on a blockchain, which is a distributed ledger that is secure, transparent, and tamper-proof.

Ganache: Ganache is a personal blockchain simulator for Ethereum and Filecoin. It allows developers to test their smart contracts and dApps in a safe and isolated environment. Ganache also provides a number of features that can help developers debug and troubleshoot their code.Ganache can be used to create a local blockchain network that Truffle can connect to. This allows developers to test their smart contracts and dApps in a safe and isolated environment.

Truffle: Truffle is a popular development framework for Ethereum and other EVM-compatible blockchains. It provides a suite of tools to help developers build, test, and deploy smart contracts and dApps.

Solidity: Solidity is a high-level programming language specifically designed for writing smart contracts on the Ethereum blockchain. Smart contracts are self-executing contracts with the terms of the agreement directly written into code. Solidity is the primary language for developing smart contracts on the Ethereum platform.

VI. Design/Flow diagrams

Fig 1: Representation of Model's Work-flow
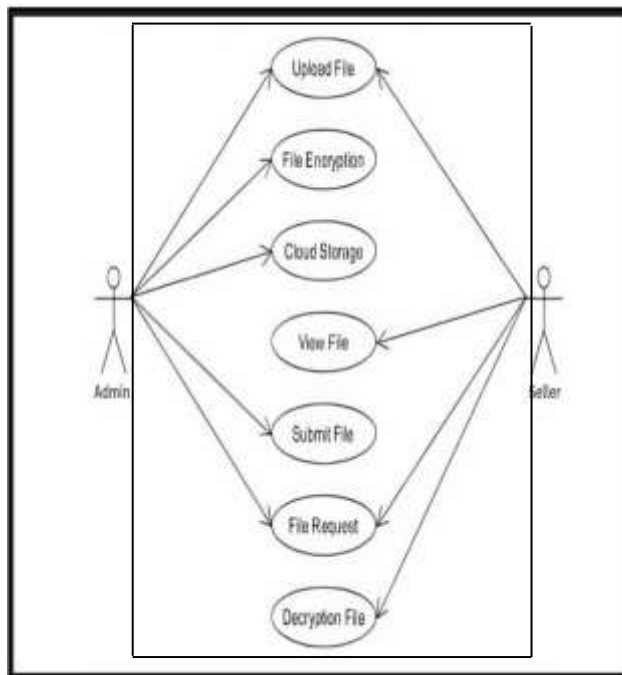
VII. Conclusion

In conclusion, Counterfeit products are a persistent problem in the market, and it is essential to have an efficient and secure system to detect and prevent them. The proposed blockchain-based fake product detection system provides a tamperproof and automated solution to detect and prevent the sale of fake products. The system utilizes the immutability and security of blockchain technology and the automation capabilities of smart contracts to provide security to the customers. However, more research is needed to explore the

scalability and practicality of these approaches in real world settings.

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