iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** V **Month of publication:** May 2023

DOI: https://doi.org/10.22214/ijraset.2023.52152

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

Fake Product Identification Using Blockchain Technology

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Abstract: ***The most significant problem affecting today's retail industry is product counterfeiting. Products that are counterfeited are just poor imitations of a legitimate brand.***
Due to the lack of transparency, supply chain management frequently experienced problems with service redundancy, ineffective coordination among departments, and lack of standardisation. Nowadays, it is very common for products to be counterfeited, and it is nearly impossible to tell if a product is fake just by looking at it. Various strategies, including RFID tags, artificial intelligence, machine learning, QR code-based systems, and many more, have been used from time to time to prevent product counterfeiting.
However, there are drawbacks to these techniques. For example, a QR code can be used to pass off a bogus good as a legitimate one, and machine learning and artificial intelligence require a lot of computing power to operate. The goal of this project is to increase fake product detection through supply chain history tracking.
Blockchain technology, which guarantees the identification and traceability of actual products throughout the supply chain, enables this. Our approach involves using a QR code to store the product supply chain at each stage of the sale of a product to a new party.
As a result, blockchain enables us to store the supply chain of products. One of its main benefits is that the data is extremely secure and protected from all vulnerabilities because it cannot be changed without the consent of all parties involved.
Keywords: Counterfeit product, QR code, Blockchain., Supply chain, ethereum.

I. INTRODUCTION

Risk considerations like counterfeiting and duplication are always present when a technology or product is developed globally; these elements can have an impact on the reputation of the organisation, its revenue, and the wellbeing of its customers. When a product is sold pretending to be another, this is called product counterfeiting.
The supply chain contains a huge number of items and it's a challenge to verify if the product is genuine or not. Manufacturers are suffering the worst difficulties and the great losses as a result of counterfeit or fake goods. Companies are forced to choose between trying to keep their customers happy and avoiding wasting time and effort dealing with inferior copies of their products. Beyond customer relationships, counterfeiters also hurt businesses. Distributors, retailers, and other business partners frequently lose faith in legitimate businesses as a result of the actions of counterfeiters. This paper presents a system designed using blockchain technology for detection of counterfeit products

A. Blockchain

Blockchain is a system for storing data that makes it challenging or difficult to alter, hack, or defraud the system. A blockchain is simply a network of computer systems that copy and disseminate a digital record of transactions across the whole network .Multiple transactions are included in each block of the chain, and each time a new transaction takes place on the blockchain, a record of that transaction is added to the records of all participants.
Distributed Ledger Technology (DLT) refers to the decentralised database that is controlled by several users (DLT). Transactions on a blockchain are recorded with an unchangeable cryptographic signature known as a hash. Blockchain technology aids in addressing the issue of product counterfeiting. A chain will be constructed for that product's transactions once it is stored on the network, making it feasible to keep all transaction records for both the product and its present owner. In the blockchain, all transaction histories will be kept as blocks.

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II. SYSTEM MODEL

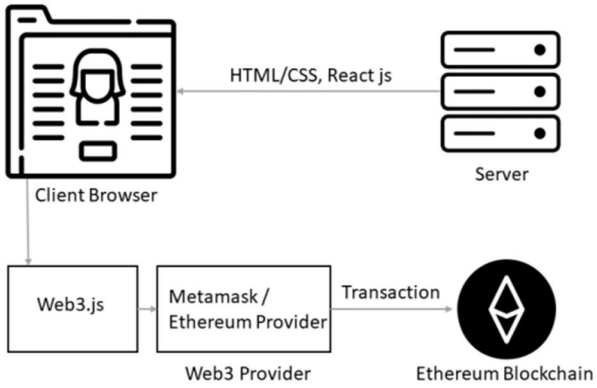


Figure 1. System Architecture

A. Ethereum

It is a decentralised blockchain with a consensus mechanism based on proof-of-work. Blocks are added to the blockchain through proof-of-work by resolving mathematical equations. The completion of the puzzle "proves" that nodes used computational resources to complete the "work".It verifies the block's addition to and recording in the blockchain. Mining is the term for this activity. Mining is usually done through brute force trial and error, but the task of adding a block is rewarded in ethereum (ETH).

B. Smart Contract

Smart contracts are programmes that are stored within Blocks. Third-party participants are replaced by smart contracts. These essentially operate as protocols when the prerequisites are met. They remain constant, so nobody can alter the contract .

III. FLOW OF PROSED SYSTEM

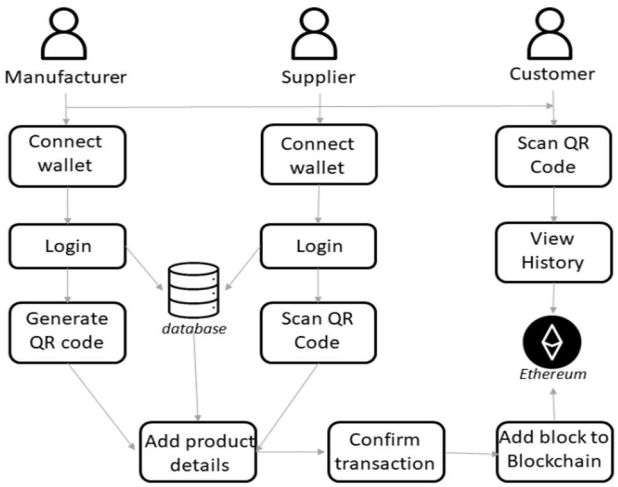


Figure 2. System Flow

The main goal of this proposed system is to maintain the originality of the product by assisting the customer to track the product's supply chain history. Customers have the ability to track a product's entire history from manufacturer to customer using the system. Three roles make up this Blockchain-based system for preventing product counterfeiting: the Manufacturer role, the Seller role, and the Consumer role.

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The system comprises of manufacturer, supplier and customer components.

1) *Manufacturer:* Manufacturer logs into the manufacturer account, creates a QR code for the product, adds any additional information that is needed, and then uses his Ethereum wallet to add a block to the Ethereum blockchain. When a manufacturer logs in using his or her own account and uses their own wallet, only that block will be added to the digital ledger. If both the userid of our local database and the wallet address of the entity are present, then both will be mapped together.
2) *Supplier:* Supplier scans the QR code on the product after logging into the supplier account. The seller can access the information that the manufacturer has entered about his products. It pushes the product's additional details, such as the shop's location, into the Blockchain. The buyer can see these details.
3) *Customer:* Customers can verify the product's integrity by scanning a QR code that displays the history of transactions and thereby confirming the product's authenticity. If the last location is not the same as the purchase location at the time of customer purchase after the QR scan in supply chain history, the customer will be aware that the product is not authentic. The customer learns about counterfeiting and the conclusion is that the QR code was copied.

IV. FUTURE SCOPE

Future scope will involve putting this model into practise and attempting to overcome the limitation, such as by incorporating some material into the products so that when someone tries to scan a QR code, a chip or other device will send a signal.

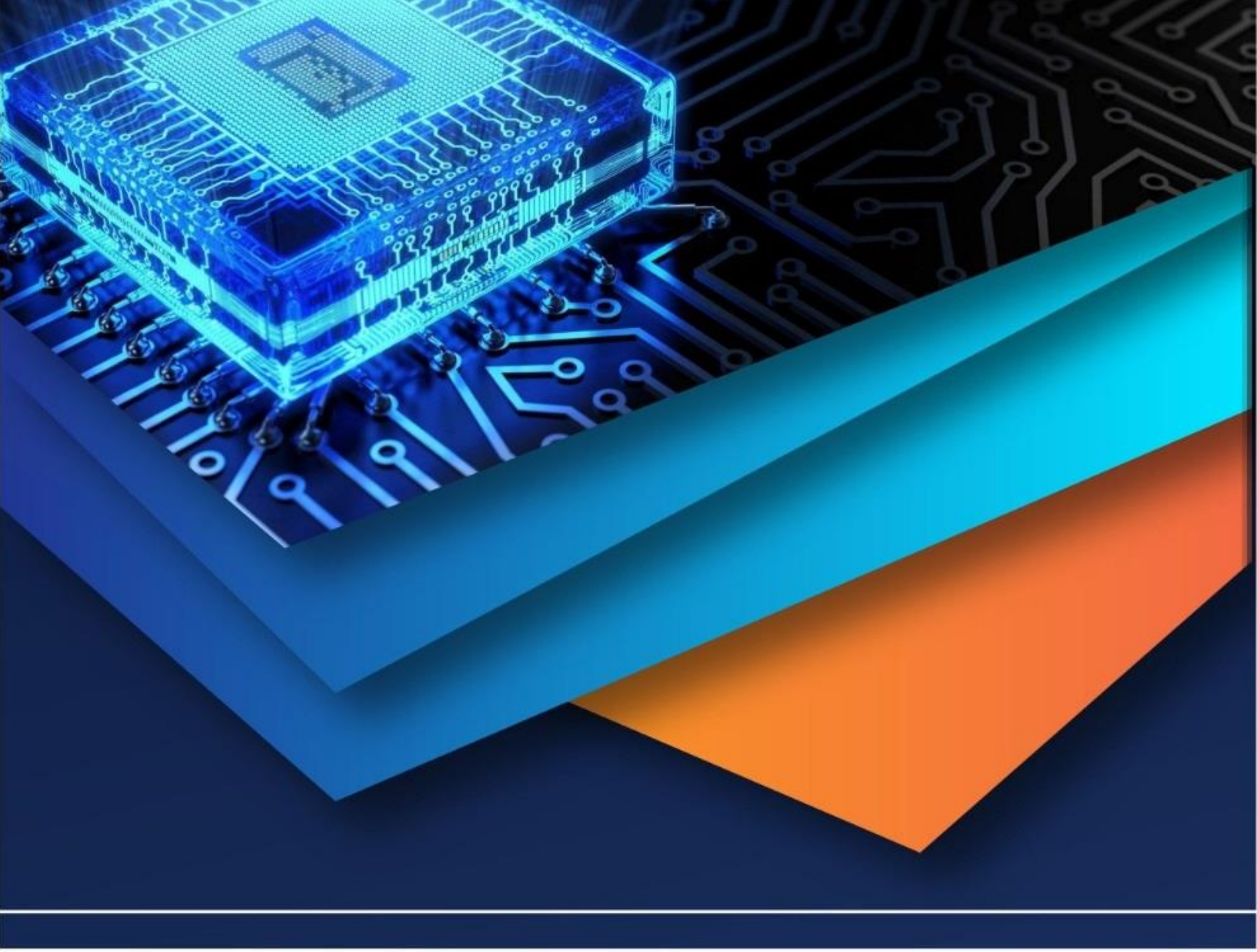
V. CONCLUSION

Thus we can say that building a fully functional application that can tell whether a product is real or fake really aids in the growth of the retail industry, gives the customer assurance that the product he is purchasing is real and branded, and also aids manufacturers in maintaining their brand value and reputation. Blockchain is the only newly developed technology in the world of modern technology that offers additional security and functionality for data that is stored. Therefore, blockchain-based applications are a blessing for all consumers and producers.

In order to assist users in determining whether a product is genuine or not, we have proposed a fully functional application. The manufacturer created a QR code that was embedded in the product and for the first time stored product details in the blockchain. Other parties will add their ownership information at the time they receive the product. In the end, the consumer can scan the QR code, look up the product's history, and determine whether or not the product is authentic.

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