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# Leveraging Blockchain to Combat Counterfeit Goods

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***Abstract*— Rapid Response (QR) codes have emerged as a useful weapon in the battle against fake products, which are a significant issue for several businesses. By combining blockchain technology with QR codes, manufacturers and consumers can get a dependable way to verify products. Every genuine goods, in accordance with this system, is assigned a unique QR code that links to a blockchain-based database. The blockchain serves as a decentralised, immutable ledger, guaranteeing the accuracy and transparency of product information. The system reads the relevant data from the blockchain and compares it with the data included in the QR code when a customer scans it with the right scanner or smartphone app.Secure storage and retrieval of product details, such as manufacture data, serial numbers, and other pertinent information, are made possible by this system. As blockchain technology is unchangeable, any effort to alter or duplicate the product's information would result in immediately apparent flaws. The technology prompts users to enter the unique code or authentication key that corresponds with a scanned QR code. subsequently, there is a cross-reference between this code and the blockchain database records. The system verifies the legitimacy of the product if the code entered matches the data that is currently on file. The consumer is informed that the goods could be fake, though, if the code is not present in the database. Manufacturers and merchants may give customers a dependable way to confirm the validity of their transactions by putting this QR code-based system into place. This boosts customer trust while guarding against the negative impacts of counterfeiting and safeguarding income streams and brand reputation.**

***Index Terms*— Blockchain, QRcode, Supply Chain, Counterfeit product.**

## I. INTRODUCTION

Traceability is critically essential in today's globalised supply chain to guarantee product quality, authenticity, and customer trust. Product traceability tracking systems offer comprehensive data on an item's origins, parts, and locations, making it possible to monitor the product from point of manufacturing to point of distribution. Product suppliers and retailers have historically looked to independent traceability service providers with government certification when it comes to tracking and inspecting items along the supply chain.As long as the goods fulfil the prerequisites, these service providers provide traceability solutions that comprise comprehensive inspections and certificates attesting to the distinctiveness and quality of the products. Service providers use methods that allow certification issuance and data disclosure in order to enable traceability. In a system like this, forensic data security and accountability are crucial. Conventional traceability technologies often store data in centralised databases that are managed by service providers. This single point of failure and the manipulation risk associated with concentrated data storage might compromise the integrity of the entire system. In response to the needs of producers of goods using QR code labels, a new traceability technique has been developed. This technology makes

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it possible for hundreds of manufacturers and retailers to manage data related to product tracking by providing traceability information. Millions of product users also utilise this technology to verify and obtain traceability information .A blockchain-based solution has been suggested to improve this traceability system's security, dependability, and transparency. The system can accomplish several benefits by replacing the centralised database with a distributed, immutable blockchain ledger. Increased accessibility to information Traceability data is easily available and shielded from single-point failures by decentralised data storage across several nodes. Unbreakable and transparent traceability data: The visible audit trail that the immutability and transparency of blockchain technology creates forbids any unauthorised changes to the traceable data . Testing for automated regulatory compliance: The distributed architecture of the blockchain makes it possible to instantly and automatically verify regulatory compliance. This eliminates the need for manual inspections and expedites the certification process. The traceability system has the power to fundamentally alter how product information is managed, saved, and validated by utilising blockchain technology. More responsibility, openness, and confidence will result from this shift for all parties involved—manufacturers, suppliers, retailers, and consumers

## II. Literature Survey

### *A. Blockchain-Based Crypto-Anchor Platform for Inter operable Product Authentication.*

Many businesses face severe issues as a result of counterfeit goods, which can result in yearly losses of hundreds of billions of dollars. The importance of maintaining the connection between the real and virtual worlds has grown since the development of digital twins, which create virtual replicas of real objects. As digital twins become more common, it is crucial now more than ever to ensure the authenticity and integrity of this relationship. In addition to devaluing authentic goods, counterfeiting seriously jeopardises the reliability of digital counterparts, endangering both consumers and companies. Thus, robust solutions are desperately needed to ensure the seamless integration of digital and physical assets and prevent counterfeiting from having a negative impact on a range of organisations.

### *B. Blockchain Driven IoT for Food Traceability with an Integrated Consensus Mechansim*

One of the more recent applications of blockchain technology to improve quality control and fight counterfeiting is food traceability. Data quality, scalability, and strong system stability are lacking in the current meal monitoring techniques. In contemporary supply chain networks, tracking protocols can also occasionally be difficult and time-consuming. Blockchain technology offers a unique way to trace supply chains, which might allay these worries. Because of its intrinsic qualities—like decentralisation, immutability, and transparency—blockchain technology can offer a platform that makes it easier to create a food monitoring system from farm to table that is more trustworthy, efficient, and safe. Blockchain technology may improve the quality and dependability of traceability data by guaranteeing that stakeholders maintain a shared, immutable ledger.

### *C. A Block Chain-Based Application System For Product Anti-Counterfeiting*

Counterfeit items may cause annual losses of hundreds of billions of dollars, posing serious challenges to many firms. Since the creation of digital twins—virtual copies of actual objects—the significance of preserving the link between the real and virtual worlds has increased. As digital twins proliferate, it is more important than ever to guarantee the integrity and validity of this connection. Counterfeiting not only lowers the value of genuine products but also puts digital counterparts' dependability in grave danger, putting customers and businesses at risk. Therefore, strong solutions are imperatively required to guarantee the smooth integration of digital and physical assets and stop counterfeiting from negatively affecting various companies.

Research and Application of Anti-Counterfeiting Technology of Inspection and Test Report Based on Block chain Technology

The product quality inspection report, a vital final product that testing and inspection organisations provide to their clients, is the subject of this research. These research may be important, but the number of phoney goods on the market is continually rising. This alarming trend—which has serious consequences—is the result of insufficient anti-counterfeiting measures.

## III. Methodology

Today's customers, distributors, retailers, and manufacturers have all suffered greatly from the inability to distinguish between authentic and imitation goods due to the development of technology and markets. Therefore, as a precautionary measure, the blockchain-based programme fake goods detector is advised. This chapter provides a quick overview of the system's architecture along with a detailed description of its functioning and user interface.

The objective is to use the benefits of blockchain technology to offer a practical, precise, and reasonably priced anti-counterfeiting solution for goods. Every day, the system—an android application built on blockchain—is used to identify phoney goods.

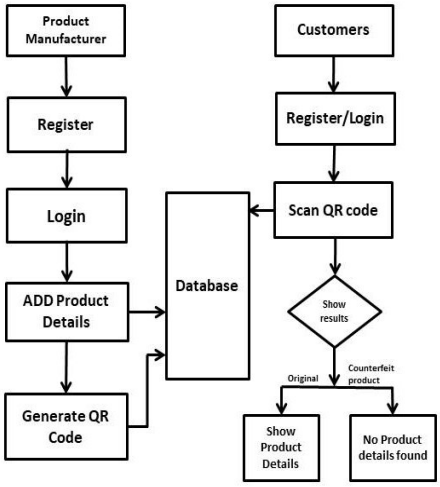


Figure .1.System Architecture

*A. Manufacturer End*

The business may enter the system and add new products or items after validating the email address for registration and login needs. In addition to a QR code that the system generates that contains all of the product information, they may enter details about the items. It is also recommended to serialise the QR code in order to improve security and monitor the merchandise. Because a secure graphic approach was used in its creation, the QR code is tamper-proof and copy-sensitive. This implies that information is lost and reverse printing is not possible if it is copied. The details of the product will be stored in a database.

*B. Customer End*

Using their email address and password, customers must register or log in. Following successful user verification, the product displays a QR code scan button. Here, the user is a client looking to verify the things' validity. Block by block, the manufacturer's code and the customer's unique scanned code will be compared. The purchaser will then get information on the validity of the items. Customers have access to information about the product, including its name, manufacturer, price, manufacturing year, overall quality, and product quality.

## IV. WORKING

The system will identify counterfeit items using the Quick Response (QR) code, which is linked to a specific product and coupled to smart contracts that enable consumers to scan the code with smartphones or other scanning devices. This will show if the products are real or fake.

After completing the registration process and having their email address validated, a company can use a QR code produced by the system to upload product data.

The product data include details on the product's name, brand, year of manufacture, cost overall, price, quality, and manufacturer. This will be stored in a Firebase database, and the QR code will be stored in a decentralised block using Blockchain technology. The manufacturer will not be able to utilise the unique QR code created for each block transaction for any other product.

Using serialised QR codes, manufacturers may increase sales, engage customers, and show product information while also strengthening the security and reliability of the tracing and identifying process. The consumer has to register or log in to the system before they may scan the barcode or QR code on the merchandise. After user verification, a comparison will be made between the unique scanned code of the customer and the manufacturer's code, which is created and stored in blocks of smart contracts. If the code matches, the customer will be notified about the authenticity of the goods and all of its details. The buyer may be discouraged from buying a phoney item that might cause serious health problems or financial losses if they are informed that the code does not match.

If the product is equally phoney, the maker will profit. Once the manufacturer has the right to be notified of the user's location, they may file a lawsuit against the distributor, retailer, and maker for the illicit market. This can save manufacturers time and money in the battle against sales and defamation caused by dishonest manufacturers, while also maintaining customer confidence and improving user pleasure.

## V. ALGORITHM

### *SHA256*

The Secured Hash Method (SHA-256) family of algorithms includes the 256-bit SHA-1 algorithm. It was released in 2001 to replace the SHA 1 family, which was gradually becoming less resistant to brute force assaults as a result of NSA and NIST cooperation. No matter how much plain or clear text is included, the hash value will always be 256 bits. This is so because the ultimate hash digest value is represented by the number 256 in the name. The other algorithms in the SHA family are comparable to SHA 256. Try to learn a little bit more about their rules at this time.

The following are a few of the SHA algorithm's special features:

*1. Length of Message:* A message's readable text can only be 264 bits long. The space needs to be contained to the topic area in order to preserve the unexpected character of the digest.

*2. Digest Length*: For the SHA-256 technique, the hash digest should be 256 bytes; for the SHA-512 approach, it should be 512 bits, and so on. Larger digests usually mean a lot more calculations at the expense of performance and storage.

*3. Irreversible:* All hash algorithms, including SHA 256, are made to be irreversible. If a digest is supplied, the hash function should return the digester's initial value or plain text when it is executed again.

## VI. RESULT

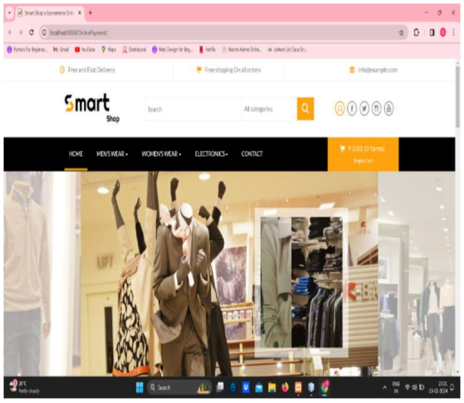


Figure.2. website

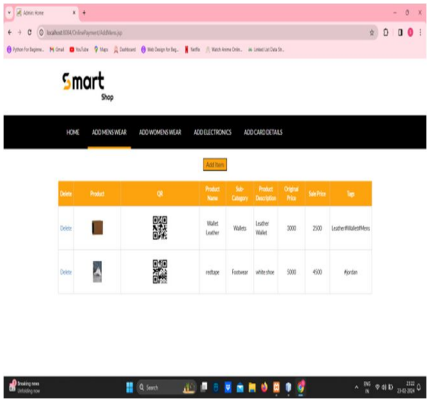


Figure.3.Product Details

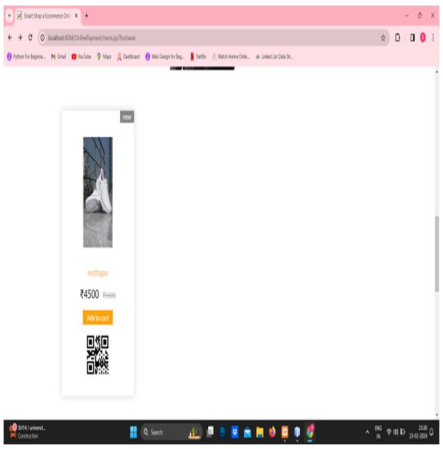


Figure.4.Product with QR Code

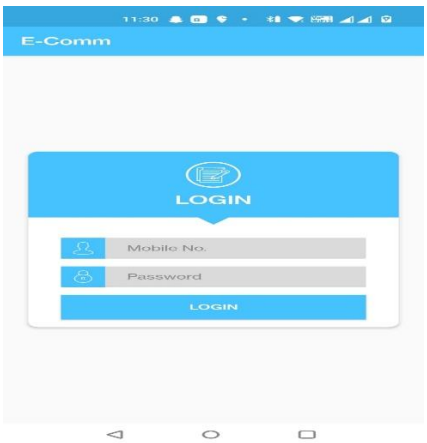


Figure.5.Login Page


Figure.6.Product Description


Figure.7.Counterfeit Details

## FUTURE SCOPE

Our objective is to give consumers the ability to discern between authentic and fake products by use of a legitimate QR code that the supplier will affix to every item. Customers may use the same app to identify the compromised goods and contact assistance if they discover that a product has been tampered with by a third party.

## CONCLUSION

The system aims to quickly examine how block chain technology functions and how it should be applied to manage product anti-counterfeiting in order to preserve product traceability and consumer confidence.
There are several ways in which the supply chain sector applies blockchain technology. We've successfully opened an online store where customers can purchase brand-new merchandise every day, validate transactions using QR codes, and have updates sent to their phones.
The computer just received it successfully, giving the administrator access to the whole database and the ability to respond to inquiries from clients. He is able to add, remove, or alter anything. In our work, we used blockchain technology for transactions.

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