

## DETECTION OF COUNTERFEIT PRODUCT USING BLOCKCHAIN

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**Abstract**—It has become very common for products to be counterfeited, and it is highly unlikely for the product that is counterfeited to be identified just by looking at the product. For major businesses, counterfeiters pose serious obstacles, but there are far too many of them. People are unaware of the full extent of counterfeit products' impact on brands. Various procedures have been developed before to identify the issue of counterfeiting of the product. The most procedures that are used in identifying the product counterfeiting involves technologies like RFID tags, AI, QR code-based systems, etc. But however, every one of the above mentioned methods of had a few drawbacks, such as the ability to copy a QR code from a real product and place it on a counterfeit one, and the use of artificial intelligence. CNN and machine learning, which need a lot of computer capacity, are used in intelligence. The objective of this project is to improve the identification of the counterfeited product. Blockchain technology, provides the necessary measures for the tracking and the identification of original products. Every process is made visible and accessible by different parties together via a blockchain-based system. One of the main benefits is that the data is secured and protected from any vulnerabilities as it cannot be changed without the authorization of the admin involved.

**Index Terms**—Blockchain, Counterfeit, QR Code, Decentralized Architecture.

### I.INTRODUCTION

Whenever a product is sold claiming to be another, this is called product counterfeiting. Consumer fraud is widely understood to be dishonest business tactics that result in losses to customers, whether monetary or otherwise. It costs the Indian economy INR 1 trillion annually, according to reports from the Authentication Solution Providers' Association. Incidences of counterfeit goods are rising 20% on average between 2018 and 2020.

The reputation of a business is damaged as a result of counterfeiting. Because many consumers are unaware that the item they are holding is a counterfeit, they will fault the original manufacturer if the fake item does not always work as intended, falls apart quickly, or doesn't meet their expectations. Businesses are caught between a difficult circumstances, trying to avoid wasting time and effort dealing with subpar copies of their products while still attempting to maintain consumer satisfaction. Beyond client connections, counterfeiters also hurt businesses. Distributors, retailers, and other business partners regularly lose trust in one another due to the actions of counterfeiters.

Network transparency, cost control, pre-supply evaluation strategies, and supplier relationship management are the most effective mitigating actions for reducing the danger of misleading counterfeit goods in global supply chains. Thus, the purpose of this paper is to describe a system created for anti- counterfeiting using Blockchain technology and to allow suppliers and end users the ability to follow the supply chain of a product in a secure setting. In an overview of the proposed system, it is intended to address the issue of trademark counterfeiting and give customers, vendors, and suppliers the ability to verify the authenticity of the product

### ***Block chain***

Blockchain technology was found back in the year 1991 for the purpose of time-stamping. Recently, blockchain was again brought to use in 2008 with the introduction of bitcoin. Blockchain is a distributed ledger amongst various nodes of different computers. It is defined as a digital ledger of information maintained by a number of computer networks in a method that causes a inability or trouble in hacking or accessing without proper access. This process allows a more secure way for users to process the data directly without any intermediary personnels such as a third party or a different organization or a governments involvement.

A blockchain acts as an electronic database for storing data in digital form. The most known application of blockchain technology is demonstrating a safeguarded and decentralised record of transactions in the process. The creation of a blockchain is that it ensures accuracy and security of the data without a dependable third party. During a new transaction, it is communicated with the network distributed across the globe. The process are necessarily processed by a network of computers to verify the accuracy of the process. This is grouped together into blocks once their authenticity has been established. The miner then receives a reward for the work they have put in for the completion of the process. The activity of all the transactions are then created by chaining together these blocks. The deal is concluded when all the necessary process is completed. Blockchain will add new entries of data to the database associated to the process to its own procedural process in a centralized authorization. It is a public database that is very reliable of its own in a process transaction.

### ***Problem Statement***

The global improvement of a product or innovation typically comes with risk considerations like forging and duplication. Forging might have an impact on both the client's well being and the company's reputation. These days, spotting phoney goods is the toughest challenge. Fake goods have a detrimental impact on the organization and the well being of the customers. As a result, manufacturers of goods are having a terrible time.

Such fake and counterfeit items are something that India and other nations are battling against. The suggested architecture uses Block chain technology to produce QR codes. In this innovation, trade records are stored in blocks. These squares' data storage is difficult to access or modify. A QR code allows us to identify the fake product.

### ***Working***

The technology will identify fake goods using QR (Quick response) codes, which are linked to smart contracts and chained to particular objects, allowing smart phones and other scanning devices to read the codes. This will indicate if the goods are authentic or false. A company will be allowed access to upload the product details with a system-generated QR code after having their mail ID and registration process verified. The product information includes the name of the brand of the product, the year it was manufactured, its price, its total quantity, its quality, and the manufacturer's information. This will be kept in a database (Firebase), and a decentralised block using Blockchain technology will hold the QR code.

A distinct QR code that can't be used by the manufacturer for multiple products will be included in each block transaction. Manufacturers can employ serialised QR codes to convey product information, engage customers, and boost sales, improving the security and dependability of the tracing and identification process. Before scanning the QR or barcode of the product, the customer must first log in or register with the system. The customer's unique scanned code will be compared to the manufacturer's code, which is kept in blocks of smart contracts, after user verification is complete.

The user will be informed that the product is original with all of its details and an authentic certificate from the database if the code matches. If the codes do not match, the user will be informed that the product is phoney, helping to avoid purchases of counterfeit goods that could cause serious harm to one's health or substantial financial losses.

If the product is false, the location of the user will be accessed with permission, and a notification will be issued to the manufacturer. The manufacturer can then take additional legal action against the distributor, retailer, and black-market manufacturer. This promotes user pleasure, guarantees that buyers have faith in merchants, and can help manufacturers avoid spending time and money battling false advertising and sales caused by counterfeit goods.

### *Need of project*

No one can afford to be duped when purchasing things like medicines and cosmetics, which are harmful to health if they are counterfeit. There is an evident cost to businesses due to duplicate products, but the consumer also feels tricked if the products he buys are forged or fake. The software employs a barcode or QR code specific to each packet to scan the merchandise in order to prevent this the suggested method is very helpful to the end user because it aids in the supply chain's detection of fraudulent goods. A QR code may be scanned to reveal all the details about a product which can help customers determine whether or not their purchase is authentic.

Products are counterfeited all over the place in the fashion apparel, sports equipment, toys, and automotive accessories industries. In addition to substantial income losses for legal businesses, counterfeit products can endanger lives by using subpar car parts, medicines without pertinent and necessary ingredients, and toys with undesirable components.

Since blockchain technology is the greatest way to solve these issues, it has gained popularity recently. It can provide a safe, transparent and reliable supply chain to prevent product fraud. Since the information is permanently stored in the blockchain network, it cannot be changed or altered in any way. A retailer may quickly verify and confirm the product's history because a blockchain is a public, decentralised ledger. As the E-commerce platform is transparent, the retailer may quickly verify the product's validity or originality.

This is a good solution for many supply-chain issues because the Blockchain technology ensures traceability and clarity and can improve the trading environment by making it more trustworthy for businesses or product-based companies in the supply chain. Blockchain may be trusted since it will likely improve in quality and efficiency over time and is constantly expanding.

## ***II. MOTIVATION***

There are various counterfeit goods in the supply chain technology now in use. The user must have a system in place where they can access all relevant information about the product in order to determine whether it is authentic or not. based upon

With the information, he may determine whether the goods is genuine or not. The existence of fraudulent items has an impact on businesses all over the world since it damages their reputation, revenue, and brand identity. Product anti- counterfeiting is crucial in supply chain management.

Businesses that want to succeed in the e-commerce sector must give customers access to product information as well as a platform to ask questions about the product. The customer must have faith in the system's overall architecture and comprehend how the product actually gets to the customer following the full cycle. A web platform must be used to facilitate all of this for the clients.

Small and medium-sized businesses may be pressured, whereas large businesses would likely have strong finances. As a result of consumers lack of trust in the system, traditional approaches to curb counterfeiting have failed and continue to fail. Paying little transaction fees and having faith in the system will entirely stop product counterfeiting. The concern of both customers and businesses is a man-in-the-middle attack.

Using RFID and other mobile technology did not stop counterfeiting, though. To stop prismatic attacks and counterfeiting of products, translated QR law ways will have to be enforced. This can be penetrated only by the authorized person which will be regulated by the authorities of force chain system. Secure running of system will lead to successful Blockchain system operation in any association.

## ***III.LITERATURE SURVEY***

The survey concentrated on identifying the sources of counterfeit goods and their effects on

society. There are numerous techniques for spotting phoney goods that make use of AI, QR codes, machine learning, and block-chain. One of the strategies mentioned by Shaik was the use of a product that included public and private keys as a QR code. The app that is used to scan the QR code must have cryptographic capabilities to decrypt the QR code. Also, the manufacturer must operate a server to accept requests and verify the buyer's name and item code. To decrypt the item code embedded in the QR code's ciphertext, the scanning app has to have cryptographic capabilities [9]. According to Benatia and Baudry et al., a traceability-CPS is made up of a number of interconnected layers that make up the supply chain management architecture. The suggested design additionally enables supply chain monitoring and data analysis for product improvement. Quality and security. The suggested approach consists of calculating the product transaction database's most popular item sets. Following that, these item sets are employed as actual product trajectories and can be used to identify abnormal product behaviour [10]. The solution proposed by Khalil and Doss et al. is to use an RFID-based system to reduce counterfeiting. Customers can use this technology to check an item's tag in-store to ensure it is authentic. Anti-counterfeiting and anti-theft RFID-based systems are appropriate for widespread adoption in retail settings. The suggested system is simple to implement and appropriate for use with inexpensive passive RFID tags. The anti-counterfeiting protocol developed by Tran and Hong is employed. Against DOS attacks, this system is resistant. [11] SCM trends are explained by Habib and Sardar et al. Executive challenges and transactional concerns are looked at in their work process as problems with the SCM. SCM was therefore suggested as a solution by taking into account the blockchain as a technological aspect for resolving problems. The transaction process should be located at the plan level as the primary technique for structuring new models [12]. The architecture of AI applications is the main emphasis of Daoud and Vu et al. The dataset, detection models, and trained model make up its three key components. Machine learning-based anti-counterfeiting method to identify counterfeit goods. The two phases needed are the training models step and the logodetection step. High accuracy and low training speed are achieved via faster R-CNN [13]. SCQI is explained by Chen and Shi et al. Building blocks for a blockchain A theoretical foundation for intelligent quality management of supply chains based on blockchain technology is provided by SCQI. Information about transactions and quality is recorded using RFID technology. Quality control is carried out through smart contracts, which also increase supply chain effectiveness [14]. Toyoda, Kentaroh, P Takis Mathiopoulos, et al. proposed system for using QR codes to identify bogus products. End customers can scan the QR code assigned to the product to access the product specifics and transaction history, as well as information about the stages involved in product enrollment, distribution, and retail sales [15]. Data is saved on each node of a Blockchain-based system before the nodes communicate with one another through the network. All Blockchain data is maintained by each node. Based on its own Blockchain data, the node checks the received transactions, includes them in the new block, and tries to claim the rights to the new block. The back-end Blockchain operating system is Ethereum. Put pertinent sales data in a public blockchain that is available to everybody. It is economical [7]. This blockchain technology makes a suggestion for information exchange. As the owner controls the information, it is difficult for third parties to intervene. Users are always informed of the information about them that is being gathered and how it is utilised. The sender, amount, recipient, transaction id, product id, and metadata

are all included in the blockchain block [16]. Ethereum is an open-source blockchain. Ethereum is the name of the technology that powers digital money, international payments, and applications.

Entering the gateway, choosing a wallet that connects to Ethereum and enables you to manage your money are simple processes. Get the ETH, start using Ethereum-powered applications, and begin building [17]. Abhijeet & Adrew et al.'s [18] discussion of various findings on counterfeiting in international supply chains is based on a number of studies and online professional questionnaires that were directed at a national purchasing body and connected UK purchasing groups. It was discovered that counterfeiting is significantly rising in markets for cheap replacement parts and industries like the pharmaceutical industry. Industries have employed avoidance, prevention based on prior experience, and destruction as solutions to this issue. Due to the availability of fake certifications, it was challenging for purchasers to distinguish between genuine and counterfeit goods.

#### ***IV. EXISTING SYSTEM***

A logo is a graphic symbol frequently employed by businesses and organization to support public recognition. Logos may be either entirely graphical (just symbols), purely textual (only name of the company), or textual-graphical (a combination of symbols and text). Since businesses' common values and brands are closely related to their logos, numerous Intellectual Property Rights (IPR) regulations safeguard logo designs. This renders a logo specific to a given organization and provides a visual cue for differentiating and identifying it. One of a product's most important components is frequently acknowledged to be its logo. Perhaps this is one of the main motives for which recognized companies' logos are imitated. Several popular products are falling victim to the counterfeit trade, which is turning into an increasing risk in the changing marketplaces. False logos not only cause financial loss to consumers trying to purchase the genuine item, but they can also negatively affect sales of the genuine. At the moment, corporations can be tracked or recognized using logo detection systems in a variety of security and recognition agencies. Building a reliable data model to represent random logo shapes, font style, logo colour, logo spelling, and discovering ways to link the models with precision in real-time are challenges faced when constructing a logo detection system. Managing rotation and scaled variants of the source image are additional difficulties.

#### ***Problems On The Existing System***

An AI can be trained to recognize logos, brand names, icons, cartoon or popular characters, and other distinctive design aspects in any visual medium through the use of a specific Visual-AI implementation known as logo detection (images and videos).:

- Without a substantial amount of training data, it is impossible to quickly add a new logo.
- A model trained would need to be updated with a significant amount of new data because the system is extremely sensitive to changes in the logo's appearance.
- A logo may appear radically different depending on the angle from which it is viewed, which could produce erroneous results

On the pixel level, illumination has a dramatic impact. Under various lighting situations, logos

display various hues.

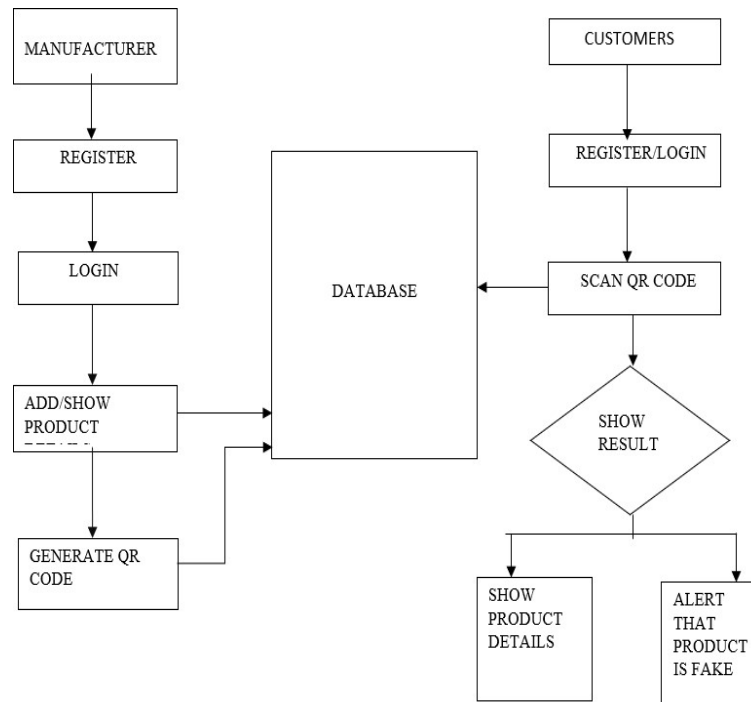
- The logo can be obscured. There are occasions when an object is just partially visible even just a few pixels
- The logo of interest can disappear into the background, making it difficult to recognize them.

**V. PROPOSED SYSTEM**

The system comprises of consumer and manufacturer parts.

**MANUFACTURE END:** The business following the verification of the mail ID for the purposes of registration and authentication. Users can log in to the system, add new products or items, and submit the product information using a system-generated QR code that contains all the product information. It's also suggested to serialise the QR code for further security and to maintain track of the product. The product information will be saved in a database, and a secure graphic technique was used to make the QR code copy sensitive, meaning that when copied, information is lost and printing is irreversible.

**CUSTOMER END:** Customers must register or log in using their email address and password. After user verification is complete, the product starts up with a scan button to scan the QR code of the product. In this scenario, the user is a customer trying to confirm the reliability of the products. The separate scanned code from the client will be compared to the block-produced code from the producer. The legitimacy of the product will then be disclosed to the user. The product's name, manufacturing year, price, overall quality, product quality, and manufacturer information are all available for customers to view.



In order to replace SHA-1, the National Security Agency created SHA-2 (Secure Hash Algorithm 2) in 2001. A subset of the SHA-2 algorithm is SHA-256. The patented cryptographic hash technique SHA-256 generates a 256-bit result.

- 1] The blockchain uses the Sha-256 method to produce a consistent hash size of 256 bits each time. Another component of encryption technology is this algorithm.
- 2] Inside this, there is some 256-bit data known as IV. Now, the input we receive will be enormous. Thus, divide it into 512 bits.
- 3] Because the input will never be a perfect multiple of 512 bits, some input will always be missing.
- 4] We add 10 bits of padding to the left input before concatenating it. Now that our input is a perfect multiple, we may go on.
- 5] 256 bits of IV are now added to the 512 bits of input to create a total of 768 bits. These 768 bits are compressed using function "c" to produce an output of only 256 bits.
- 6] Its 256-bit output is once more combined with 512-bit input from block B2.
- 7] A 256-bit output is produced by running the sum through the compression function once more. Fill the final block as this cycle continues (block n)
- 8] Once more, a function that compresses data begins and produces a final output of 256 bits is called a hash of the input data.

Message Length: The clear text's length shouldn't exceed 264 bits. To keep the digest as random as possible, the size must be in the comparison area.

Digest Length: The length of the hash digest for the SHA-256 algorithm should be 256 bits, for the SHA-512 algorithm 512 bits, and so forth. Larger digests typically imply a lot more calculations at the expense of performance and storage.

All hash functions, including the SHA 256, are irreversible by design. You should neither get a plain text when you have the digest previously nor should the digest offer its original value when you send it through the hash function again.

## ***VII. MODULE DESCRIPTION***

### **1. Manufacturer Login**

In the login module, first the administrator or an authorized personnel logs in to the app with the required credentials. The customer can also create a login module when required.

### **2. Fingerprint Authentication**

After the login, the next module is the verification module. Here the user can verify their fingerprint for further access.

### **3. Product List**

In the products list page, the admin can add any product to the list of products to the present list. They can also update the list according to the requirement of a product. The product that are in sales are determined here for the checking. Here the QR code is also added for the



products that are added.

#### 4.Roles

In the next module, the administrator can add roles for each personnel in the app. Here the administrator determines what each user can access and change what in the product list. The administrator has full access, the other user sometimes can only add a product or update a product according to the role given to them.

#### 5.Audit Trails

The audit trail displays the time in which the product was added and if any changes are made to the product. This can be necessary when checking the time and date in which the product was added for any use needed.

#### 6.QR code Scanning

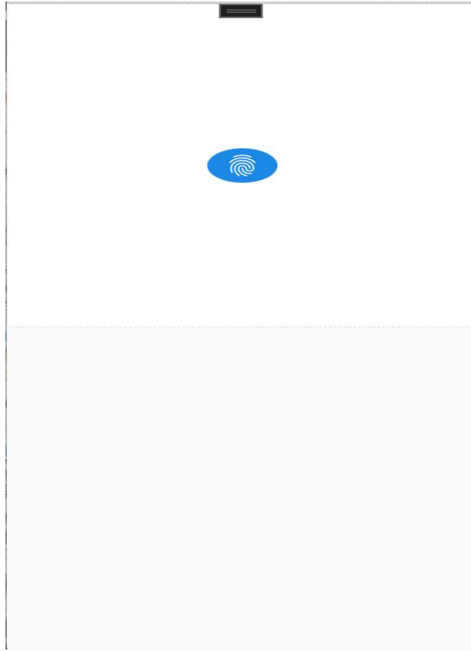
The next phase is where we can check the QR code of the product is checked. When a product is scanned it checks whether a product is authentic or not here. This is the main purpose of the app as it checks whether the product is fake or any inconvenience has occurred in the product sales.

### VIII.IMPLEMENTATION

#### 1.Manufacturer login

The screenshot shows the login interface for the 'COUNTERFEIT PRODUCT DETECTION' application. The interface includes a blue header bar with a globe icon and a gear icon. The main title 'COUNTERFEIT PRODUCT DETECTION' is displayed in large, bold, black letters. Below the title, there are two input fields: 'User Name' containing the text 'admin' and 'Password' containing the text '123Pa\$\$word!'. To the right of the password field is an eye icon for toggling visibility. Below the input fields, there is a checkbox labeled 'Remember me?' and a link 'Forgot password?'. At the bottom of the form is a blue button labeled 'SIGN IN'.

#### 2.Fingerprint Authentication



### 3.Product List

Product Manager

Products

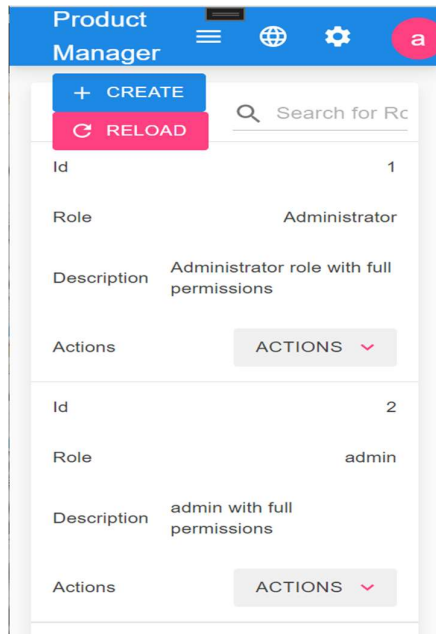
Manage Products

+ CREATE RELOAD

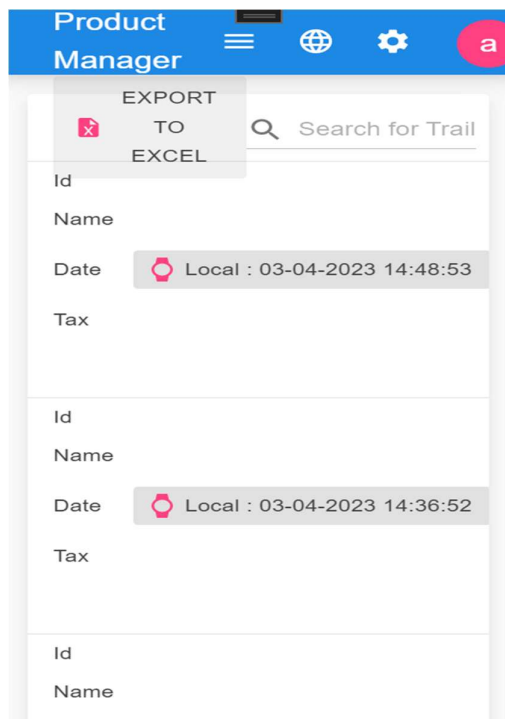
Search

Id	2
Code	27
Name	shoe
Description	zxzxz
Brand	puma
Actions	ACTIONS

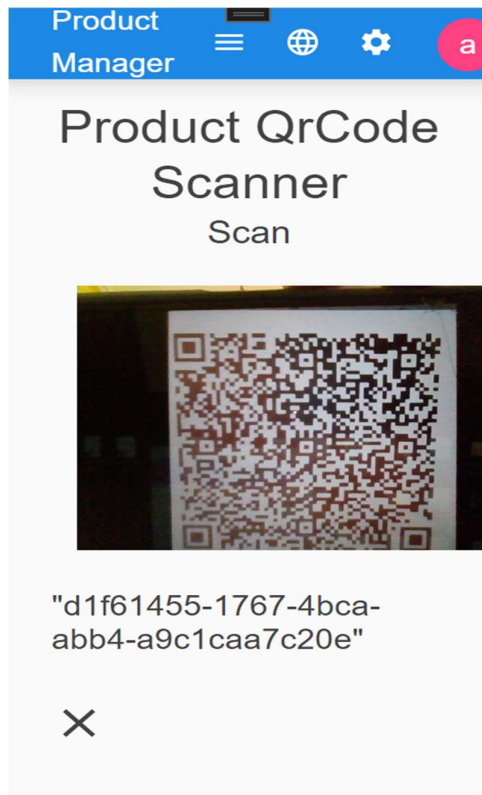
#### 4.Roles Page



#### 5.Audit Trails



## 6. QR code Scanning

***VIII. CONCLUSION***

Since block chain is a decentralised system, local suppliers cannot affect how the product is checked or if it is being counterfeited in the proposed system. Manufacturers and Suppliers can make use of the system to store product information in Block chain, which has several features like tamper-resistance, data consistency, and confidentiality that guarantee the security and privacy of the data on the network. The customer examines the product's history along the supply chain to confirm its authenticity. Consumers may be confident in the quality of the products they buy. The proposed technique can significantly reduce the amount of branded items that are counterfeited while giving businesses an easier way to reassure customers that they won't buy fake goods. This technique will help to strengthen the relationship between the company and the client and will actually improve the economy and lower corruption. To prevent fraud in banking, healthcare, the voting process, online shopping, and other areas, the system can be expanded.

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