

Securing Product Based Integrity with Blockchain Based Verification Solutions

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Abstract—Recent years have seen a sharp rise in fake goods, posing a severe threat to consumers, manufacturers, and the economy. Blockchain technology is used to ensure product traceability and authenticity to avoid counterfeit goods. By using that, we create QR codes for each product and store them on the blockchain. We can then use those QR codes to check whether a product is fake or not having details validated against our records. If the verification process is unsuccessful, the product is fraudulent. Else Product is Authentic.

Keywords—Blockchain, IPFS, QR code, Flash.

I. INTRODUCTION

Blockchain is a technology that enables the safe, transparent, and immutable recording of transactions and information. It is built upon a network of nodes that employs cryptography to verify and log transactions. This creates a serious problem for authentic businesses, but too many people are unaware of the fake products available in the market. To ensure the identification and genuineness of products system is needed.

Impact of Counterfeit Products:

Authentic Companies themselves are caught between trying to avoid wasting resources on the imitations of their products which are available in the market. Distributors, Retailers, and other partners working with companies might lose their trust in authentic businesses due to the activities of the fake sellers.

II. RELATED WORKS

Based on several researched papers related to fake product identification. J A Konstan[1] explains one of the systems that have used the current tracking system for Product delivery. In this manner, the administrator has complete authority over the data, and we must enlist the help of a third party to provide trust and security. This approach provides a lot of flexibility when it comes to changing the real product before it reaches the user. S.T Li [2] explains about the system uses Artificial Intelligence technology to detect fake items by analyzing the products' color, packaging, material, and other key attributes. The major drawback of this system is that recently launched products not in the fake product identification software would be difficult to identify as the system is not exclusive to brands. There is another

disadvantage, they have many chances to hack the system and explore the product details to create better copies of the original product to upgrade their manufacturing process. This the system is used for both the recognition and creation of fake items. A D. Karlo explains this system based on data processing and intelligent risk mitigation models. It uses a behavioral approach to detect fake product reviews and tries to manipulate the ratings on target products. It tracks the user's IP address to observe fake reviews. This system will fail to track the fake reviews if the social media optimization team uses a different IP address to send their reviews.

Ruiguo Yu [4] explains about this system uses deep learning technology which is very complex than any other technology by collecting several images and comparing them with the original product image and then finding whether it is fake or real. This system makes the process long and difficult by doing image encoding and several methods. The author N. Salim explains about the conventional cloud storage model is centralized, and how a particular failure could cause the whole model to fail. The framework combines IPFS, the Ethereum Blockchain, and attribute- based encryption technologies with a shared storage system. The decentralized framework, which is based on the Ethereum Blockchain, has a keyword search feature on the cipher text, which solves the problem in conventional storage systems where cloud servers return incorrect results. The author of the paper M. Xu[6] proposes a framework for ensuring the uniqueness and integrity of documented and uploaded online content such as music, books, and other media. The framework makes use of cutting-edge technology such as Blockchain and IPFS. The solution is based on the originality, authenticity, and integrity of online books, but the architecture, design, logics, and smart contract code are general to be applied and used to provide authenticity, and integrity to all other types of digital

properties. The author S. Paul presents the idea of Blockchain technology in food supply chain security information and contrast the conventional system of supply. The proposed framework addresses the drawbacks by supporting Blockchain for tracking, monitoring, and auditing the food supply chain and assisting manufacturers in accurately recording transactions. The proposed method has not been applied in practice; rather, it is merely a theoretical concept. The author Christian Esposito [8] uses HACCP to explain how Blockchain functions in the food supply chain. The framework addressed the complexities of scaling blockchains in general and suggested a modern decentralized traceability system focused on IOT and blockchain technology. The particular system would produce real-time data on the protection of food products for all supply chain stakeholders. Furthermore, the framework has the power to greatly increase the quality and clear path of the food supply chain, paving way for the food safety and increasing consumer trust in the food industry. The author Si Chen uses Blockchain to explain how to build confidence in shared news on social media. The framework proposed a modern decentralized traceability system that integrates social media with blockchains. We can get the user ID from there. Whenever new information is produced, the transaction will broadcast it throughout the chain. The only news that has reached a certain level of “virality” will be reviewed by the framework. The information will be disseminated across the chain. This news will have no ranking at first. Validators will have their rating over time, and the news will appear with a ranking for the users. This score reflects the accuracy/authenticity of a piece of news. The main aim is to enhance customer satisfaction as well as to make online shopping reliable. B. Prabhu Shankar explains using sentiment analysis for finding fake reviews can be classified by using Natural Language Processing (NLP) techniques. E. Sasikala explains about the classification of fake reviews can be identified by applying deep learning techniques. Ananthi N [15] explains the security saving structure, which uses attribute-based encryption (ABE) for approval. Aarthi B explains for feature extraction, they employed the SFTA method in this system. Approximately 6 components are extracted: pigment, substance, scale, power, shape, and contrast.

III. PROPOSED SYSTEM

Based on existing problems we propose the emerging technology IPFS. The Inter Planetary File System (IPFS), is simply a protocol and network for storing and sharing data in a peer-to-peer distributed file system. For connecting all computing devices, IPFS uses unique addressing for each file in a global namespace. It keeps a record of digital transactions which are permanent in a form of a database and does not need any central authority for this database to maintain and secure it. The recorded information can be accessed by anyone. The revenue that the seller will make

and the number of items that the seller has left are also visible to users. The consumer can utilize our system's functionalities to conduct vendor-side authentication right away. Once the product information is stored on a network, a hash code is generated for that product and it is possible to maintain all transaction history of the product, and its current owner as a chain will be generated for that product's transactions. In our system, we are assigning a QR code to a particular product, and the end customer can scan that QR code to get all information about that product.

Advantages of Blockchain in E-commerce platforms:

Blockchain provides the best outcome to E-commerce businesses to overcome the limitation of fake products E-commerce platforms also have a payment option in them. Managing this payment transaction ledger is the most important task in any E-commerce platform. Some of the Transactions like registering orders from customers, payment details, tracking the order through the logistic journey, delivering the item to the customer, returning or refunding of product, etc have to be securely recorded in ledgers to maintain a history of every small or big event throughout the process.

Advantages:

- Transparency of transactions increased
- Hacking threat reduced
- High level of security
- Different levels of accessibility
- Faster transactions

Algorithm:

The SHA-256 algorithm is one flavor of SHA-2 (Secure Hash Algorithm 2), which was created by the National Security Agency in 2001 as a successor to SHA-1. SHA-256 is a patented cryptographic hash function that outputs a value that is 256 bits long. □ SHA-256 algorithm is used in blockchain to get a constant hash of 256 bits every time. It is part of encryption technology. So, now let's see how this algorithm works Appending bits. The first step involves pre-processing the input message to make it compatible with the hash function

1. Pad the message such that the length of the message size is a multiple of 512.
2. Add length bits (Padding Length)
3. Initialize Chaining Variable.
4. Process each Block

Working on Proposed System

The product, current owner of the product, and time stamp this status will be maintained by the system at what time ownership changed. Our Blockchain-based product anti-counterfeiting system is made up of three parts: the manufacturer part, the seller part, and the buyer, which will be addressed in detail below.

➤ **Product Enrollment**

Initially, the first owner of the product will be the manufacturer. For adding the product to the network, the administrator is requested by the manufacturer and the QR code will be assigned to the product at the same time. If a requestor is a genuine manufacturer, Admin will enroll the product and manufacturer.

➤ **Product shipping to the distributor**

In this process, the product will be shipped to the distributor by the manufacturer, and the status is set as shipped which will not change the ownership of the product until the distributor's acknowledgment is received. Ownership of that product will be given to the distributor after receiving the acknowledgment.

➤ **Product shipping to the seller**

In this process, the product will be shipped by the distributor to the retailer, and the status is set as shipped and ownership of that product is given to the retailer, after receiving acknowledgment from a retailer that the product was received successfully.

➤ **Product details received by the buyer**

In this process, An android app will be provided to the customer, and the buyer can scan the product's QR code using that app and get the detail about the product that is the manufacturer, and current owner of the product and the user can decide whether to buy the product or not.

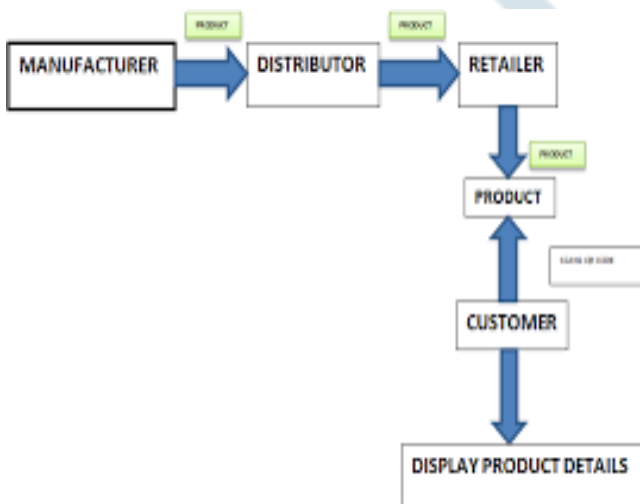


Figure 1. Workflow of the proposed system

Working Process of Blockchain:

Blockchain is the technology that supports the digital currency. This blockchain system only allows digital information to be distributed but not copied that means there will be no duplication of any data. This means each data can have only one owner. Blocks are groups of transactions. A series of transactions is called a block and each block is connected to its previous block. Each Transaction is secured

with a unique hash value. As the blocks are connected with previous hash values will be present in the connected blocks. Here the validation process takes place for the transactions to consider valid. When expanding their compute resources by a group of nodes, Mining is something to create a block of valid transactions. If any node on the network itself is a miner, it can attempt to produce and validate a block. To be included in the primary blockchain, a node must demonstrate that it is quicker than some other miners in the system. A proof of work is the process that asks for a mathematical proof that is provided by a miner for validating each block A miner will be rewarded with a certain amount of value who validates a new block for doing this work.

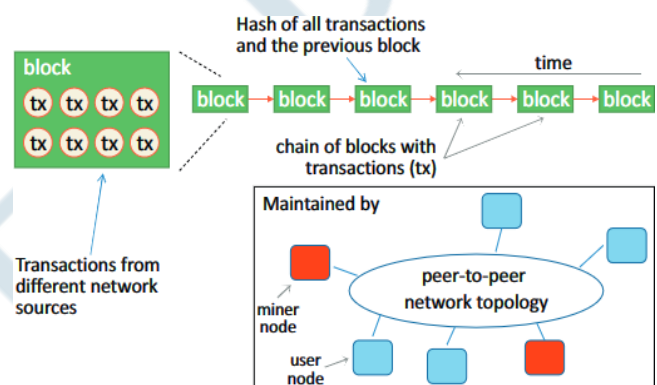


Figure 2. Overview of Blockchain

Blockchain provides a secure tracking system from the beginning of the supply chain (procurement of raw material) to the very end (where the end user gets the finished product) and hence blockchain helps in tackling counterfeiting by identifying products' proof of origin.

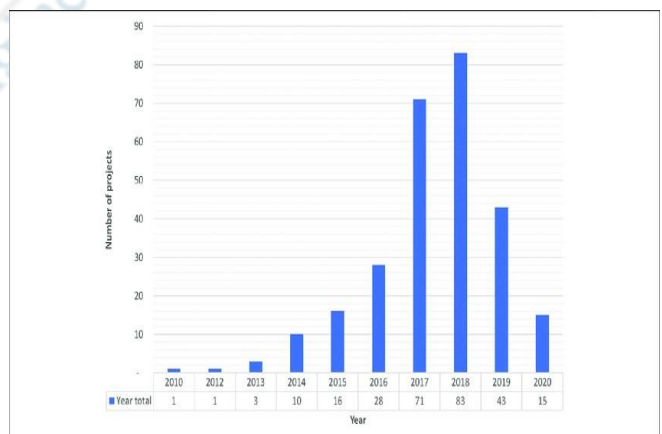


Figure 3. improving the growth of blockchain Technology bar graph

System Architecture Design:

It represents the overall methodology of the proposed system. The user can scan a QR code encoded with unique cryptographic identifiers for the product. Postgres stores all the related data of the product which in turn can be fetched at any time. If a new product is to be added, then a unique

cryptographic identifier is assigned to it in the Authentication module which is then stored in Postgres which is nothing but a SQL database. After adding the particular history and relevant data of a product into Postgres, it is then used to trigger the Blockchain module in which the relevant data gets stored in the Blockchain. If the customer needs to verify the authenticity of his/her product after scanning the Blockchain controller triggers the Blockchain module in which the Blockchains are mined to verify whether the particular product is present in the server or not.

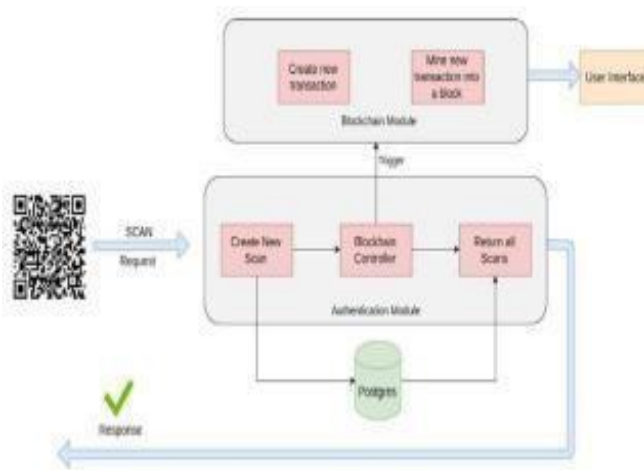


Figure 4. System architecture design

The output of the Proposed System:



Figure 5. Product Authenticated

IV. CONCLUSION

In this project, we have focused on classifying fake and authentic products. The use of blockchain has helped us in achieving 99% accuracy. Effective results have been produced by this project. This project can be taken into real-world applications for detecting and differentiating fake and authentic products. In the Future, we can develop this system by including smart contracts that contain a set of rules under which the parties i.e., manufacturer and customer interact with each other through the smart contract for payment details and a tracking system can be developed to know about the journey of the product to the customer.

V. FEATURE ENHANCEMENT

This system's future work may be evidence of code simplicity. Since the code is simple and lacks redundant nature, the customer can be certain that the distributed application will not consume more resources. Thus in future works, the upgraded system will solve these problems for further security.

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