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Blockchain based Trust System for Counterfeit Product Detection

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Abstract: Counterfeit products have been a significant factor in the manufacturing of goods in recent years. This has an impact on a company's brand, sales, and bottom line. Blockchain technology is used to identify genuine goods and identify counterfeit goods. The distributed, decentralized, and digital ledger that houses transactional data is called blockchain technology. Many databases store information in the form of blocks that are linked together via chains. Blockchain innovation is secure technology, therefore no block can be altered or compromised. Blockchain technology allows for Customers or users do not have to rely on other users to vouch for the security of the product. Quick Response (QR) codes, a developing trend in wireless and mobile technologies, were used in this project a strong strategy to combat the problem of product counterfeiting. A QR code scanner is used to identify fake goods because each product's QR code is connected to a Blockchain. Therefore, this system may be utilized to store product information and its produced unique code as database blocks. It requests the user's unique code, then checks it against entries in the Blockchain database. If the code matches, the customer will receive notification; if not, the consumer will receive notification that the product is a fake.

General Terms: Blockchain, SHA-256, QR-code.

Keywords: Blockchain, Data Flow, Challenges, Future scope.

I. INTRODUCTION

The global growth of a technology or product is always fraught with risk in the rapidly evolving world of technology. Forgery and duplication, which can harm a company's reputation and financial performance, and client well-being. The main goal of the project is to confirm that the customer's purchased item is as described in the fake or genuine We have the conventional supply chain in comparison to blockchain. Typical supply chains offer centralized network where the firm providing the service or the products holds the data they control the market and the data, making them vulnerable because they can manipulate it anyway they like. Blockchain technology aids in addressing the issue of product counterfeiting. Technology based on blockchain is more secure.

A chain will be constructed for that product's transactions once it is stored on the network, making it possible to keep all transaction records for both the product and its present owner. In the blockchain, all transaction histories will be kept as blocks. In the suggested system, each product is given a generated QR code that the end user can scan. the product's full details by scanning the QR code. We can tell whether a product is genuine or phoney by scanning the QR code. [1]

1.2. Motivation

The dissemination of counterfeit goods has expanded globally in recent years. The existing supply chain contains a large number of counterfeit goods. The survey claims that occurrences of bogus products have increased recently. It is essential to have a system in place that allows buyers or users to verify all the product's specifications so they can determine whether the item is authentic or not.

There is currently no system in place in India to identify fake goods. Therefore, the solution entails a straightforward QR code-based identification that can assist the end-user or customers in scanning and verifying the product's authenticity using a smartphone.

1.2 Problem with current system:

Risk factors like forging and duplication frequently accompany the global enhancement of a product or innovation. The reputation of the company and the well-being of the customer can both be affected by forging. Nowadays, finding fake items is the biggest test. False goods have a serious negative effect on the organization and the client's welfare.

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As a result, product makers are facing severe hardship. India and other countries are fighting against such phoney and counterfeit goods. The suggested framework generates QR codes by employing [1]Blockchain technology. Blocks are used to hold exchange records in this innovation. Data stored in these squares cannot easily be accessed or changed. A QR code can be used to identify bogus goods.

1.3 How can it be solved?

Our suggested framework will generate a QR code by employing Blockchain technology. Block are used to hold and exchange records in this innovation. Data stored in these squares cannot be easily accessed or changed. A QR code can be used to identify bogus goods.

II. TECHNOLOGIES INVOLVED

Blockchain is an arrangement of recording information that makes it troublesome or hard to change, hack, or cheat the framework. [2] A blockchain is essentially a computerized record of transactions that is duplicated and distributed across the entire network of PC systems on the Blockchain. [1]Each block in the chain contains multiple transactions, and every time a new transaction occurs on the blockchain, a record of that transaction is added to every participant's record.

1. **Database:** The Personal details of sender and receiver as well as account details of sender and receiver are stored in database (SQL).
2. **User:** User do the registration on the system for QR code scan. (JSP, HTML, CSS).
3. **System:** In system, Blockchain Technology is used to identification of real products and detect fake products (JAVA).

III. IMPLEMENTATION THEORY

Here we see about our project implementation viz how we have used SHA-256 and other consensus algorithms along with their work flow as well as data flow.

3.1 Proposed Methodology

The system is Function. A QR code and information on the product's status, including its manufacturer, present owner, and previous owners, as well as a time stamp indicating when it was updated.

The maker will be the product's initial owner. Then, a QR code will be issued after the manufacturer asks the administrator to add the product to the network. The administrator will add manufacturer and product to the network and scan this QR code. [3] [4]

The producer will send the product to the distributor in the following phase. When a distributor receives a product, he will scan the QR code to update his information on the network, including the date, time, and owner of the product. At this stage, the retailer receives the product from the distributor, scans the QR code that was issued to it with a QR code reader, and updates the product's owner information on the network.

3.2 Algorithm (SHA-256)

The SHA-256 algorithm is one flavour 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.

1] Sha-256 algorithm is used in blockchain to get a constant hash of 256 bits every time. This algorithm, is also part of encryption technology. So, now let's see how this algorithm works:

2] In the figure you can see the prototype of algorithm. In this there is some data called IV which is of 256 bits. Now the input we get will be in the very large. So, be break it in size of 512 bits.

3] As the input will always be not a perfect multiple of 512 bits, So, some part of input will be left.

4] To this left input we do a padding concatenate the input with 10 bits before it. Now our input is perfect multiple, so we can proceed further.

5] Now 512-bit input is added with 256 bits IV to get total of 768 bit. These 768 bits is passed through compression function 'c' to get an output of 256 bit only.

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6] This output 256 bit is again merged with 512 bits input from block B2.

7] Again, the total is passed through the compression function to yield a 256-bit output. This loop goes on fill the last block (block n).

8]Again, a compressing function starts and gives final 256-bits output, what we call it as hash of input data.

3.3 Mathematical Model (Formula):

Objects:- Manufacturer(M), Distributor(D), Seller(S), Consumer(C).

Input:- Let B be the whole set of objects, such that B={M,D,S,C}

Four Consensus Algorithms will be created for each objects:
It goes as,

Step-1: Create Product(Name, Price)

Step-2: Distribute Product (Product ID)

Step-3: Seller Registration (Product, Name of Seller)

Step-4: Buy Product (QR Code – Product ID, Seller Name, Amount to Buy)

Output: In each case for invalid credentials in step-2 to step-4 if product fails then it is assumed as a counterfeit/fake product. [4]

IV. DATA & SYSTEM ARCHITECTURE

Here we will see about data flow from product manufacturing to product distributor to seller to buyer as well as system architecture work flow.

4.1 Data Flow

In Data Flow Diagram(4.1) & (4.2) , We show that base DFD in which rectangle present input as well as output and circle show our system, In DFD we show actual input and actual output of system input of our system is text or image and output is rumour detected like-wise in DFD we present operation of user as well as admin.

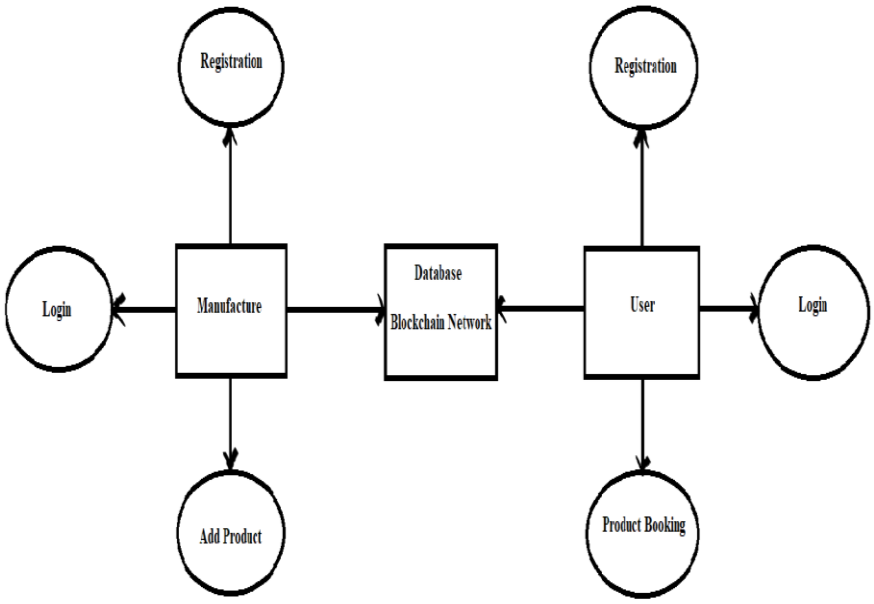

Fig 4.1 Data-flow diagram

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4.2 System Workflow:

As we know that there is no proper system to identify fake products from original products.
Blockchain can be very helpful in tackling such problems. Our project's main goal is to identify whether the product is an original product or fake product.

We have thereby proposed a fake product detection trust system using Blockchain technology and smart contracts. The proposed system ensures that the detection of fake products in day to day life. The proposed system consists of main components as manufacturer, blockchain network(database), seller, customer. Every customer of the application has to be authenticated before login in.

1.Manufacturer: The manufacturer functions include adding the company to the blockchain by providing company name and setting registration fee to become a seller or retailer for the company. The manufacturer can also control the distribution status of the products and transfer ownership after the seller has bought the product stock. The manufacturer performs two main function mainly adding and distributing the products to the system.

2.Seller: A seller can pay the minimum fee set by the manufacturer and register for the company after registering once the seller can buy any product as well as track its distribution. A production status is set from "Ready to go" to "Shipped" after the manufacturer ship it out to the seller.

3.Consumer/Customer: A consumer can scan the QR code provided with each product and verify the transfer of ownership of product from manufacturer to seller. The consumer can also the verify the name of the current owner of the product and check its distribution station. Thus in this way the system works for counterfeit product detection.

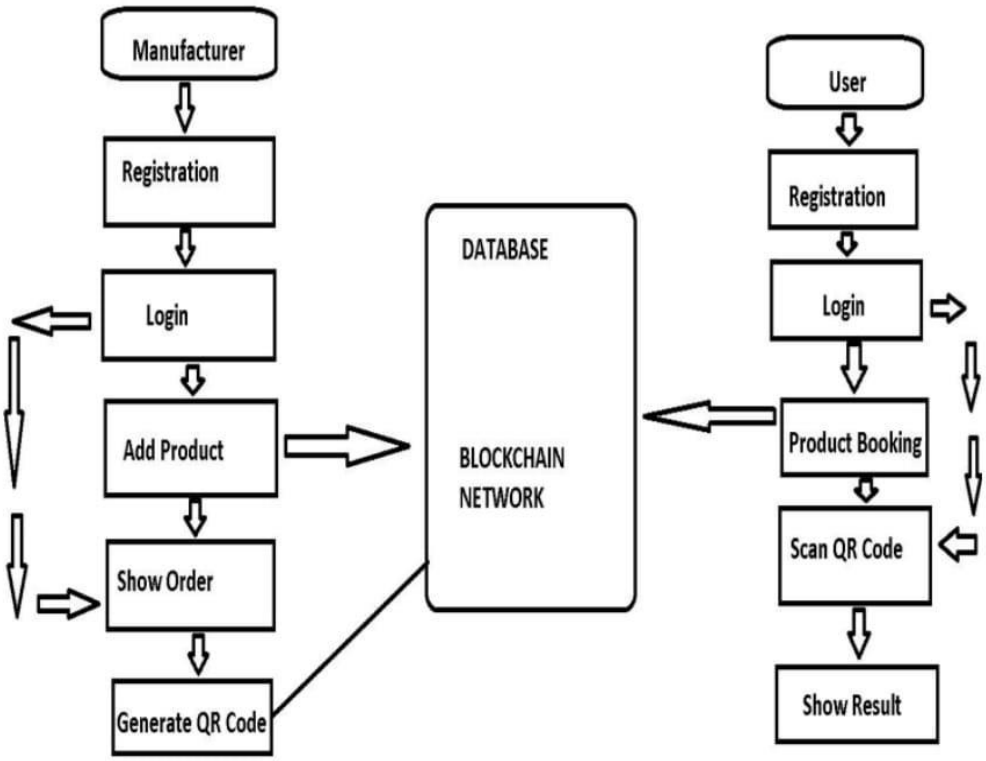

Fig 4.2 System Architecture

V. CHALLENGES

- **Centralization of Current Anti-Counterfeiting Supply Chains:-** In today's supply chain products follows centralized approach with great harmony but lacks security So there is need to make them follow decentralization approach.

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- **High Cost(Expensive) to implement:-** The cost to implement and create Blockchain network is very expensive as we need to maintain the speed of transaction at which they exchange their records.
- **Lack of recognition/awareness:-** There is lack of talent and learning awareness which make Blockchain technology which we have use unknown to many since it is still new to our era.
- **Scalability problems:-** One of the main problem regarding out proposed model is scalability issue as it is still not scalable more at global level.

VI. CONCLUSION

With the vast range of products available online, fake items are expanding tremendously. Therefore, there is a critical need to identify fake goods, and blockchain technology is employed to do so. Additionally, a QR code with the information has been created. Customers or consumers can identify a fake product after scanning the QR code. So, in this article, we talked about a system that helps consumers determine whether a product is real or not by looking at its entire supply chain history. End users can scan QR codes assigned to products to access all the data that has been posted across the supply chain in the blockchain, allowing them to determine whether or not a product is genuine or not.

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