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Product Anti-Counterfeiting Using Blockchain

Kiruthika C¹, Manaswini H², Sherin R³, Subalakshmi S⁴, Padmapriya M⁵

^{1, 2, 3, 4}Department of Information Technology, Saranathan College of Engineering

⁵Assistant Professor, Department of Information Technology, Saranathan College of Engineering

Abstract: Fake Products is a serious issue, as in today's world we can't really distinguish between real and fake product. And some people make these fake products just to make some profit without thinking about its impact on user and also affects company's name, profit and sales.

Blockchain technology can be used to detect whether the product is real or fake and assure user about the authenticity of the product. Blockchain technology is the technology where information is stored in the form of blocks in many databases which is connected with the chains and it doesn't require any third-party users for permission. We can use QR code or an encrypted unique codewhich is a very efficient technique to detect fake product.

When the QR code is scanned or the unique code is entered, it will redirect us to the blockchain containing the information of the product and provides us the details of the manufacturer and information of owner to make decision easy for buyer if they are looking to buy the product.

Keywords: Counterfeit product, QR code, Blockchain.

I. INTRODUCTION

Fake products create a huge negative impact in the market for both buyers and sellers. The sellers fail to deliver the product as per the consumers expectations and the consumers starts to doubt the quality and standards of the company which ultimately results in the negative marketing of the brand whose fake products are being circulated in the market. The most critical part about counterfeit products is that it can be really harmful for the consumers. Since, the fake or counterfeit products are not restricted to any particular sector in the market therefore it has become really important for us to detect these products and find a way to keep them out of the market. These products can be really dangerous if we consider very dominating sectors of market like pharmaceutical and food supplies. To tackle such problems, we need to maintain a data which is easily accessible to consumers where they can verify the details about the products and build a level of trust regarding the product authenticity. As we all know that no product is safe from counterfeiting due to the continuous growth in counterfeit products in the supply chain. It is degrading company's name and their profit, it also affects the customer. In this project, we will be using blockchain technology to find genuineness of the product. Blockchain technology is generally a ledger system which holds all the data of the transactions that take place on it. In this project, we propose a system where we store product's detail and its ownership status on architecture and we use smart contract to update the owner of the product when the product is sold. We will be using QR code which will be scanned by customer such that he/she will be able to find out the details of the product like manufacturing details, current owner etc. And will be able to determine whether the product is fake or real.

A. Motivation

There In recent years, the spread of counterfeit goods has become global. There are many fake products in the current supply chain. According to the report, fake product incidents have risen in the last few years. It is necessary to have a system for customers or users to check the all details of the product so that users can decide that the product is real or fake. In India currently, there is no such system to detect counterfeit products. So, the solution involves a simple QR code-based identification that can help the end-user or customers to scan and identify the genuineness of the product by using a smartphone.

B. Objective

The idea of this project came into existence because of the increase in the counterfeit products. The objectives of this project are:

- 1) To Design Anti Counterfeit System using Blockchain.
- 2) To secure product details using a QR code.
- 3) Provide security to the clients by offering data to client.

II. LITERATURE SURVEY

- 1) Anti-counterfeiting is a global problem. Brand owners suffer from huge losses due to counterfeits every year, and turn to advanced solutions to gain back control over their brands. An anti-counterfeiting system normally encodes a digital identifier in a physical identifier in essence. The physical identifier then is attached with the product. If the physical identifier is cloneable or reusable, the counterfeit products could easily cheat the anti-counterfeiting system. This paper continues our work on the anti-counterfeiting system applying phosphor physical uncloneable function (PUF). An offline anti-counterfeiting system is proposed in this paper prevailing over the previously proposed online system as it does not require any online database. Furthermore, a prototype software running on the commodity mobile phone of consumers for verification is designed.
- 2) This paper does not consider copyrights or digital piracy, counterfeiting, fraudulent documents but rather investigates the prevention of counterfeiting on a technological basis. The presence of counterfeit products on the European market is on the increase, therefore the intervention of inspection bodies and authorities alone is not sufficient, consumers can make their contribution and support this process.
- 3) Counterfeited products are costing the global economy hundreds of billions of dollars annually. Radio frequency identification (RFID) technology provides a promising solution for this problem, wherein each product is fitted with a secure tag, which is difficult to forge. However, RFID technology is faced with numerous security threats, for example, if the communication link between the reader and the tag is compromised, then it will be possible for a malicious adversary to obtain the private data stored on the device. Tag cloning attacks have also been demonstrated to be feasible, which severely undermines the capabilities of the RFID technology to protect against counterfeiting. One solution to this problem is the use of authentication protocol; however, existing schemes do not support mutual authentication and are still vulnerable to tag cloning attacks. Unclonable functions (PUF) technology.

III. PROBLEM STATEMENT

The worldwide improvement of an item or innovation consistently accompanies hazard factors, for example, forging and duplication. Forging items can influence the organization's name and the client's wellbeing. Presently days discovery of phony item is the greatest test. Fake items are causing a significant impact on the organization and the client's wellbeing. Hence, item creators are confronting enormous misfortune. India and different nations are battling such fake and fake items. In the proposed framework, the framework produces QR codes utilizing Blockchain innovation. This innovation stores exchange records in blocks. These squares are secure and difficult to access and change the data from it. By utilizing a QR code we can recognize the fake item.

IV. RELATED STUDIES

There is no good solution before to differentiate fake products from original products. Blockchain technology can be helpful to tackle such problems. The project's main goal is to help people to identify the product is an original product or a fake product. Initially admin will login into the website and check the unique code. After checking the unique code, the admin can add the product details. User will log in through their account, view the product details, and scan the QR code. After scanning the QR code by the user, a notification will be sent to the user by the admin. User sign-up details, QR code details, QR code id, product details and hash id generated for each product will be stored in a database to verify the product details which are finally sent to the customer in form of an email.

A. Blockchain Technology

Blockchain data is stored on each node, then the nodes exchange information with each other over the network. Each node maintains an entire Blockchain data. The node will verify the received transactions and include them in the new block based on its own Blockchain data, and try to obtain the accounting rights of the new block in the above manner.

B. Blockchain Features

In today's social system a large part of the economic behavior of individuals depends on trust where regularly two sides interact with a third party, thus forming a trust relationship. Usually, there is a mutual non-trust between these two parties that have long been based on trust guarantees provided by third parties, therefore it is important to take notice of the characteristics of Blockchain technology that help subvert the foundation of human transactions that have been conducted for thousands of years.

Using Blockchain one can create a data record system that does not depend on a trusted third party as a transaction intermediary, and that is openly shared and reliable at the same time. The characteristics of Blockchain technology are described in detail below. (Fig. 2)

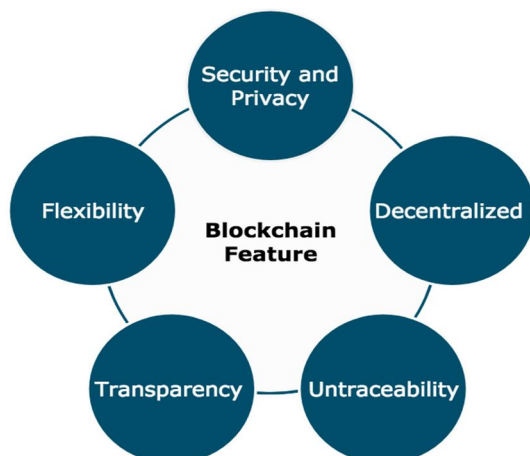
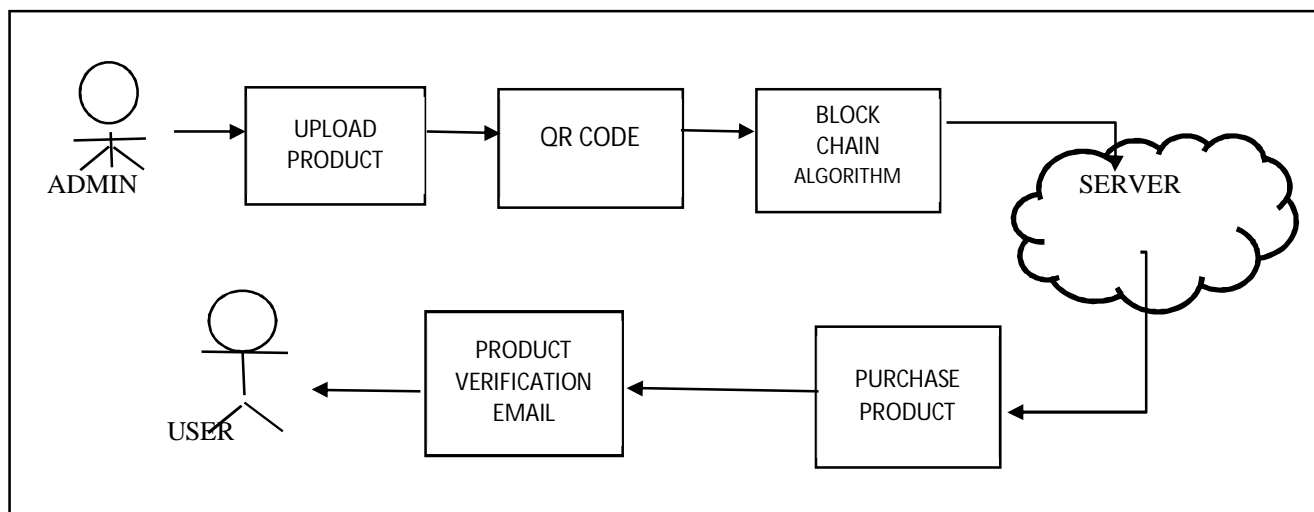


Figure 2. characteristics of Blockchain

- 1) *Security and Privacy*: Public key encryption in cryptography is used in Blockchain to protect data security. Users can generate their own key pairs, including a private key and a public key. Private key is used to sign data, and public key is used to verify the authenticity of the signed data. As long as the user prevents the private key from leaking, the data will remain secure. In Blockchain, each user is anonymous, and each user can have multiple addresses. When the system is operating, only one address is used as the identification, and the anonymous address can hardly be mapped to the real person, thereby protecting the user's privacy.
- 2) *Decentralization*: Through decentralized operations and storage, each node of the Blockchain implements the verification, delivery, and management of information at the local side. Blockchain technology does not rely on an additional third-party control, has no centralized control, and is self-contained.
- 3) *Untraceability*: After a block has been determined in the Blockchain, it cannot be tampered with. Due to the following circumstances, once a block in the Blockchain is altered, it will be immediately detected and rejected by other nodes.
- 4) *Transparency*: The data in Blockchain is completely public and anyone can inquire. Within the Information flow one can clearly see who is passing data to whom as Blockchain maintains a continuous transaction log file.
- 5) *Flexibility*: The technology of Blockchain is open source and anyone can use it to modify it into their own version. There are already numerous flexible Blockchain platforms available, and users can also develop a new Blockchain platform if they desire so. Blockchain is an unlimited technology meaning that users can create multiple applications based on Blockchain.

V. SYSTEM ARCHITECTURE



We have designed our website with single login for both the admin and the customers. Admin will be uploading the products to the website and these details like product name, product ID, product type will be stored in the database. Based on product ID, QR code will be generated. For Encryption, Block chain algorithm is used. The encrypted QR code will be stored in the server. The user will fetch the product from the server. After the product selection, admin will send the verification email to the user.

VI. MODULES

In general, there are four modules used in our proposed system namely,

A. Login/Logout

In this module, the user will be creating their login username and password by submitting their information like name, mail id, phone number etc and these details will be stored in the server. Once they have registered, the user can login into the website by using their username and password which was already registered in the server. It compares whether the given username and password matches with the stored username and password in the server. If the username and password is matched then the user can login to the website else if it doesn't match then the access is denied.

B. Upload the Products

In this module, the admin have to login to upload the product details so that the buyer can buy the products from the website. Uploading is the process of adding images onto a web server and these details will be stored in the server. Admin will be uploading the unique product id for each product. He will be uploading the product name, product Id, product image and he will also be specifying the product type while uploading the product to the server. Unique hash id will be generated for each product Id. Once the admin have uploaded the product in the server it will check whether the similar product with the same product id is uploaded before or not. If the similar product with the same product id is already present and it will also check for the product type whether it is fake or original. If the uploading product is fake and exciting product is original in the case server will not allow admin to upload the particular product. To secure the product id, SHA256 encryption algorithm has been used to implement blockchain technology. In particular encode method from hashlib package has been used to encode the product id. And the encrypted product id will be stored in the hexadecimal product.

C. Adding Product to the Cart

A cart module shows the items that have been added to the cart before the customer proceeds to checkout. The shopping cart allows customers to select and hold the products they wish to purchase. It tracks the user's session, allowing them to leave the site and come back later with items still in their cart.

The shopping cart has a database to store and retrieve the data necessary for the checkout process and email verification will be sent to the customer while clicking add to the cart button in the product details page and shopping cart allows us to modify the quantity of the product.

D. Email Verification

Once we click the purchase button, an alert message will be popping up and it displays whether the product is original or fake. After clicking ok button in the popup an email will also be sent for our verification purpose. To send the email from server to user, SMTP email package has been used. In particular, for sending mail send email method has been used.

E. Search the Product

In the this module, User will enter the product id in the search box. After entering the product id, the page is directed to another page and that page render the details of product like product name, description, price and whether the product is original or fake.

VII. CONCLUSION

Counterfeit products are developing dramatically with the huge amount of resources on the web. In this way, there is a solid need to distinguish fake products and blockchain innovation is utilized to recognize counterfeit products. Moreover, the data is encoded into a block of code. Admin will upload the product details. Customers examine the product details using the product id and then distinguish whether the product is original or fake. Thus, the proposed framework is valuable for the customers to identify counterfeit products in the production network. Customers can verify the product purchased using the product id and can get all the product details.

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