Blockchain based Fake Product Identification

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Blockchain based Fake Product Identification

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Abstract

A counterfeit product results in huge loss to the company. As a result of counterfeit product, it not only makes customer dissatisfied but also a loss to retailer. Few solutions to these problems have been addressed using various techniques. And most of the solutions are based on centralized system where information about product is stored in central server. In such centralized system, there are problems such as single point of failure and prone to attacks. Using the Blockchain, data is distributed over the peer-to-peer network instead of central server handling all the data. In Blockchain, data is shared among the nodes in network. In this work, information about the product is stored in distributed ledger so that any one on the network can view the data. By scanning QR codes attached to the product, a customer can query about the product that he/she is buying and check whether the product is genuine or not.

Keywords: Blockchain, Ethereum, Smart contracts, Anti-counterfeiting, Decentralization.

1. Introduction

Many fake products have been generated in existing supply chain in the market. In order to resolve these problems, there must be a system for end user to check details about the product and determine whether to buy the product or not by checking whether the product is genuine or not. In past, the information about the products is stored in centralized manner. So, hacker can attack on just a single system and cause the whole system to fail i.e., cause single point of failure. Due to this single point of failure, we fail to track the information about the products. In some of case, QR code is being used but the information about the product is stored in centralized database which is not so good because attack may occurs in such system easily than the decentralized system. Vulnerabilities of centralized product anti-counterfeiting solutions could possibly lead to system failure or susceptibility of malicious modifications performed on product records or various potential attacks to the system components by dishonest participant nodes traversing along the supply chain [1]. So, our main aim is to build the decentralized blockchain system for sharing the information about the product for

product anti-counterfeiting. In such a system, it is much difficult for attacker to change information about the products and get their fake products in the market.

2. Literature Review

Satoshi Nakamoto [2] explained that a purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. A. Funde [3] described about how IPFS (Inter Planetary File System) which is Distributed Web can be used to manage the ownership of products. The algorithm that makes Blockchain system secure is hash algorithm [4]. N. Alzahrani [5] proposed the block-supply chain, a new decentralized supply chain that detects counterfeiting attacks using blockchain and Near Field Communication (NFC) technologies. Si Chen and his team [6] discussed how to improve the supply chain quality management by adopting the blockchain technology, and propose a framework for blockchain-based supply chain quality management.

QR i.e. "Quick Response" code is a 2D matrix code that is designed by keeping two points under consideration, i.e. it must store large amount of data as compared to 1D barcodes and it must be decoded at high speed using any handheld device like phones. QR code provides high data storage capacity, fast scanning, omnidirectional readability, and many other advantages including, error-correction (so that damaged code can also be read successfully) and different type of versions [7]. Smart contract are self-executing contracts with the terms of agreement between interested parties. The contracts are written in form of program codes that exist across a distributed, decentralized blockchain network. Smart contract allow transaction to be carried out between untrusted parties without the need of central authority. Early work on the smart contract has been done by Szabo and Miller [8].
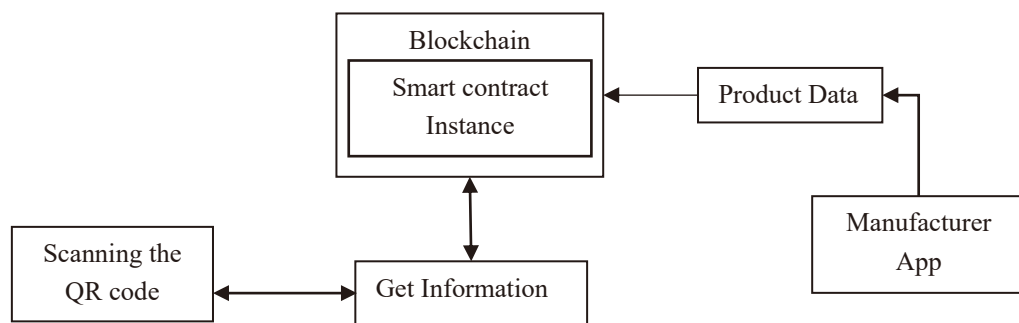
3. Methodology

Figure 1. Block Diagram of the System.

From the Block diagram we can see that, at first the manufacturer registers the product using front end of our system by entering the product information. Then our system takes the product information entered by the manufacturer and hashes the information and stores into the blockchain. The business logic is implemented

using smart contracts. The QR code is generated according to the information provided by the manufacturer. The user uses the client app to scan the QR code of the product then our system takes the information from the QR code and hashes the information and gets the information about the product from the blockchain according to the information scanned. Before registering or buying the product, he/she needs to select the accounts from the Metamask to perform operation in blockchain.

4. Results and Discussion

With the help of frontend part of manufacturer, manufacturer can register the product with the product information. After product was added to blockchain, manufacturer would be able to generate and download the QR code given the product information. Manufacture also can attach the QR code.

Figure 2. Generation of QR code for a product using Web based decentralized application (Dapps).

Consumer got information whether the product is real or fake by scanning QR code. After the product is added to blockchain, consumer could get information about the product whether the product is fake or not.
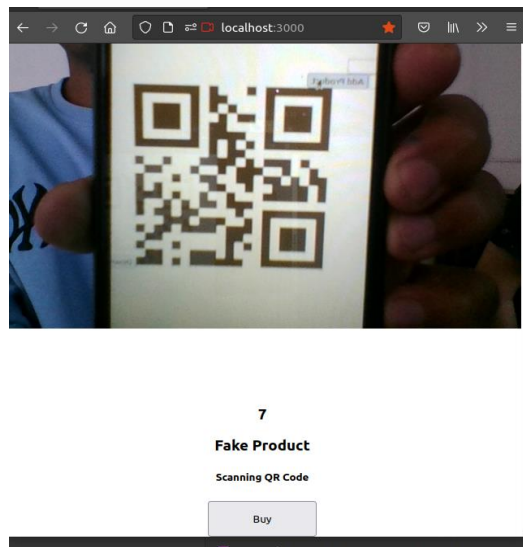

Figure 3. Scanning QR code of Product.

From consumer side, we have the separate frontend for consumer. There is scan button, consumer can scan QR code and get the information.
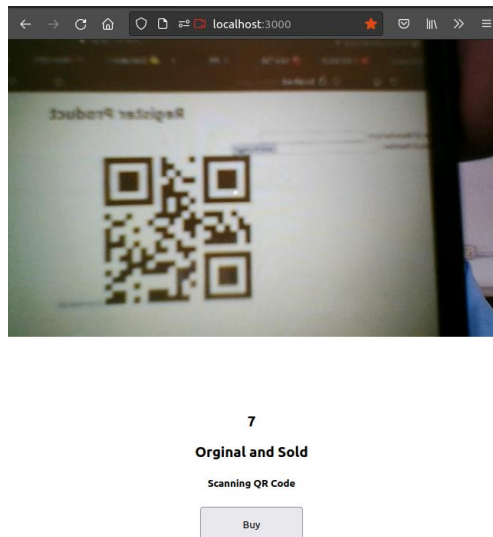
Figure 4. Original and sold product status.

The whole business logic is implemented using smart contracts written in the solidity programming language. While implementing business logic using smart contracts, openzeppelin libraries help to write secure smart contracts so that it helps to reduce the loophole in the smart contracts. This work seems similar to the findings of N. C. Yiu who studied the supply chain management and store information about the product according to state of product wheather it is in production state or shiping state or retailer state or any other state depending upon type of bussiness model. But this work doesn't implement concept of supply chain. It only takes the information about product such as product number and stores hash of product number to the blockchain. Jiewn Leng implemented the chemical signature to represent unique features of product. Here we implemented the QRcode to contains the hash of information of the product data and stored in the blockchain.

5. Conclusion

Thus, using the blockchain system, business logic for storing the information about the product is done successfully with the feature such as determining the fakeness of the product by scanning QR code.

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