Authentify - Blockchain Based Counterfeit Product Detection

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Abstract- In recent years, Fake products play an important role in product manufacturing industries. This affects the com- pany's name, sales, and profit of the companies. Blockchain technology is used to identification of real products and detects fake products. With the rapid rise of Blockchain technology,it has become known that data recorded within Blockchain is immutable and secure. Hence, the proposed project there uses this concept to handle the transfer of ownership of products. Hence, customers or users do not need to rely on third-party usersfor confirmation of product safety. In this project, with emerg- ing trends in mobile and wireless technology, Quick Response (QR) codes provide a robust technique to fight the practice of counterfeiting products. counterfeit products are detected usinga QR code scanner, where the QR code of the product is linkedto a Blockchain. So this system may be used to store product details and generated unique codes of that product as blocks in the database. It collects the unique code from the user and compares the code against entries in the Blockchain database. If the code matches, it will give inform the customer, otherwise it will give tell the customer that the product is fake.

Indexed Terms- Blockchain, Counterfeit Product Scams, QR Code

I. INTRODUCTION

Over the years, the identification of counterfeit goods inthe market has always posed a challenge for all supply chain stakeholders. It is consumer fraud and commonly defined as deceptive business practices that cause consumers to suer financial or other losses. Counterfeit goods include counterfeit handbags, clothing, cosmetics, and electronics. It not only has negative effects on the economy but on citizens too. For example, poor cosmetics can affect the skin and cause skin diseases and rashes, and counterfeit electronic components can cause a malfunction in gadgets and can lead to unfavourable situations and mishaps. Poor quality clothes, and shoes when worn can cause discomfort. Hence this issue necessitates finding some solution for the sale of counterfeit products.The most successful mitigation measures for overcoming misleading counterfeit risk in global supply chains include network transparency, cost control and pre-supply evaluation approaches, and supplier relationship management. Another consequence of counterfeiting is that a company's reputation suffers. Because many customers are clueless that the object they are holding is a knock-off, they will accuse the genuine company if the knock-off product fails to perform properly, comes apart rapidly, or fails to satisfy their expectations. Hencethe objective of this paper is to present the system designed foranti-counterfeit using Blockchain technology and to give end users and supplier power to track the supply chain of products in a secure environment. An overview of the proposed system is aimed to solve the problem of brand counterfeiting and provide the chance for the customer, vendors and suppliers to check the integrity of the product. Blockchain is an arrange- ment of recording information that makes it troublesome or hard to change, hack, or cheat the framework. A blockchain is essentially a computerized record of transactions that isduplicated and distributed across the entire network of PC systems on the blockchain. 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. There In recent years, the spreadof 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 checkthe all details of the product so that users can decide whether 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. The objectives of this project are: 1. To track the product at every stage of its development and shipment. 2. To increase transparency in a system bybuilding a reliable system. 3. To save the company's reputationby reducing the piracy of its products Identify applicable funding agency here. If none, delete this.

II. LITERATURE SURVEY

While reading through multiple different papers and web- sites we found that there were a few common loopholes that other projects have such as QR code can be copied from a genuine product and placed on a fake product, User needs a mobile device and the proposed application installed on his/her device for product authentication purposes. Some of them use RFID tags and AI which makes the system more complicated. Also in some projects, the cost of enrolling each product is very high which will increase the difficulty of adapting their system. The paper mentions various solutions such as verifying QR code transactions on Etherscan which ensures end-user verification. Some of them use SHA-256 algorithm to generate a QR code in the blockchain technology and then use can scan that code to verify the code. So that's why we developed a website which will solve the problem of installingapplications on every user's device. The Qrious library used inour project helps in generating QR codes at a very low cost. Different profiles for manufacturers, suppliers and consumer help in managing data efficiently. MySql database is used to store the login information of the users. As a next step, wecan help the people to evaluate the second-hand cost of the product by analysing its lifecycle and its previous users. We can also make separate logins for each customer, retailer and supplier which will help them to manage their data.

III. PROPOSED METHODOLOGY

For the flow of the working project, it all begins at the manufacturer, imprinting the QR code with the product. This QR is like an digital signature, that proves the integrity ofthe product. Once the user receives the product, which by now has passed through seller, logistics etc, the user willhave to scan the same QR code mentioned above to verifythe product's authenticity and integrity of the product. As the QR code, its generation and verification is all based on an decentralised blockchain environment, this highly increases reliability. Topics discussed below have been applied at in- tricate positions of the project, wherein ensuring the utmost accuracy and efficient working. In this project, with emerging trends in mobile and wireless technology, Quick Response (QR) codes provide a robust technique to fight the practice of counterfeiting the products. Fake products are detected usinga QR code scanner, where a QR code of the product is linked to a Blockchain. This system may be used to store product details and generate unique code of that product as blocks in the database. It collects the unique code from the user and compares the code against entries in the Blockchain database. If the code matches, it will give a notification of approvalto the customer, otherwise it will alert the customer that the product is fake.

Following are basic descriptions of technology used throughout the project.

A. Blockchain

Blockchain is a shared, immutable ledger that facilitatesthe process of recording transactions and tracking assets in a business network. An asset can be tangible (a house, car, cash, land) or intangible (intellectual property, patents, copyrights, branding). Virtually anything of value can be tracked andtraded on a blockchain network, reducing risk and cutting costsfor all involved. Key elements of a blockchain: Distributed ledger technology All network participants have access to the distributed ledger and its immutable record of transactions. With this shared ledger, transactions are recorded only once, eliminating the duplication of effort that's typical of traditionalbusiness networks. Immutable records No participant can change or tamper with a transaction after it's been recorded to the shared ledger. If a transaction record includes an error, a new transaction must be added to reverse the error, and both transactions are then visible. Smart contracts is to speed transactions, a set of rules — called a smart contract — is stored on the blockchain and executed automatically. A smart contract can define conditions for corporate bond transfers, include terms for travel insurance to be paid and much more.

B. Solidity

Solidity is an object-oriented, high-level language for imple- menting smart contracts. Smart contracts are programs which govern the behaviour of accounts within the Ethereum state.

C. Smart Contracts

Smart contracts are simply programs stored on a blockchainthat run when predetermined conditions are met. They typi- cally are used to automate the execution of an agreement so that all participants can be immediately certain of the outcome, without any intermediary's involvement or time loss. They canalso automate a workflow, triggering the next action when conditions are met. Transactions A blockchain is a globally shared, transactional database. This means that everyone can read entries in the database just by participating in the network. If you want to change something in the database, you must create a so-called transaction which has to be accepted byall others. The word transaction implies that the change you want to make (assume you want to change two values at the same time) is either not done at all or completely applied. Furthermore, while your transaction is being applied to the database, no other transaction can alter it.

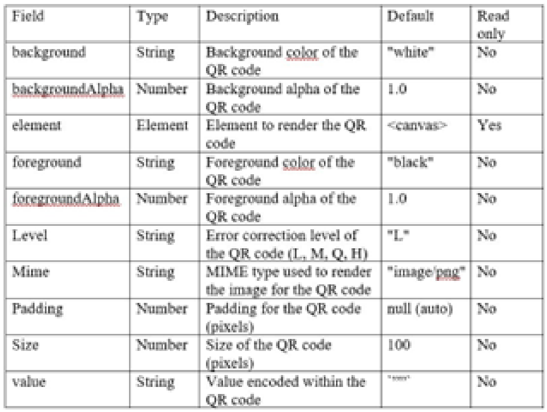
D. The Ethereum Virtual Machine

The Ethereum Virtual Machine or EVM is the runtime environment for smart contracts in Ethereum. It is not only sandboxed but completely isolated, which means that code running inside the EVM has no access to network, filesystem or other processes. Smart contracts even have limited access to other smart contracts.

E. Accounts

There are two kinds of accounts in Ethereum which share the same address space: External accounts that are controlled by public-private key pairs (i.e. humans) and contract accountswhich are controlled by the code stored together with the account. The address of an external account is determined from the public key while the address of a contract is determined at the time the contract is created (it is derived from the creator address and the number of transactions sent from that address,the so-called "nonce"). Regardless of whether the accountstores code, the two types are treated equally by the EVM. Every account has a persistent key-value store mapping 256- bit words to 256-bit words called storage. Furthermore, every account has a balance in Ether (in "Wei" to be exact, 1 ether is 10**18 Wei) which can be modified by sending transactions that include Ether. Transactions using EVM- A transaction isa message that is sent from one account to another account (which might be the same or empty, see below). It can includebinary data (which is called "payload") and Ether. If the target account contains code, that code is executed and the payloadis provided as input data. If the target account is not, the transaction creates a new contract. The address of that contractis not the zero address, but an address derived from the sender and its number of transactions sent (the "nonce"). The payloadof such a contract creation transaction is taken to be EVM bytecode and executed. The output data of this execution is permanently stored as the code of the contract. This means thatto create a contract, you do not send the actual code of the contract, but in fact code that returns that code when executed.

F. APIs Used



Field	Type	Description	Default	Read only
background	String	Background color of the QR code	"white"	No
backgroundAlpha	Number	Background alpha of the QR code	1.0	No
element	Element	Element to render the QR code	<canvas>	Yes
foreground	String	Foreground color of the QR code	"black"	No
foregroundAlpha	Number	Foreground alpha of the QR code	1.0	No
Level	String	Error correction level of the QR code (L, M, Q, H)	"L"	No
Mime	String	MIME type used to render the image for the QR code	"image/png"	No
Padding	Number	Padding for the QR code (pixels)	null (auto)	No
Size	Number	Size of the QR code (pixels)	100	No
value	String	Value encoded within the QR code	""	No

Creating and using an instance of QR ious is the key here. You can control many aspects of the QR code using the following fields on your instance: The QR code will automatically update when you change one of these fields, so be wary when you plan on changing lots of fields at the same time. You probably want to make a single call to set(options) insteadas it will only update the QR code once. Generates a base64 encoded data URI for the QR code. If you don't specify a MIME type, it will default to the one passed to the constructoras an option or the default value for the mime option.

IV. SYSTEM ARCHITECTURE

The below diagrams tells us about the overview of the architecture of our project, the blockchain network prevents the tampering of the information which makes the systemsafer from external attacks of intruders. Change in any oneof the blocks will get informed to all the nodes of the blockchain which makes it very difficult to tamper with the data. Blockchain being a decentralised system i.e it doesn't have any central body which is managing the system enforces more trust among the users and hence it becomes very toughto manipulate the system.

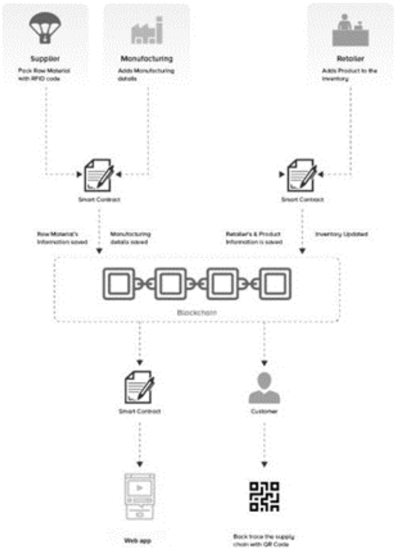

Supplier
Pack Raw Material with RFID code
Manufacturing
Adds Manufacturing details
Retailer
Adds Product to the Inventory
Smart Contract
Smart Contract
Raw Material's Information saved
Manufacturing details saved
Retailer's & Product Information is saved
Inventory Updated
Blockchain
Smart Contract
Customer
Web app
Back trace the supply chain with QR Code

Fig. 1. Flow Diagram

In fig 1, Manufacturer will initiate the data filling process and then supplier will confirm the data entry and hence it will be stored in Blockchain network. Hence, All the manufacturing details will be saved. This data will be entered bundled in the form of smart contract in the blochain. So, this program will run only when some predetermined conditions are met.

Reatailers will also enter the information once they recievedthe product such as time and date at which it has recieved he product. All this information will be saved in the QR code which will be printed on the product.

User will scan the QR code and then it will get all the lifecycle of the product with the manufacturer's and retailer's details.

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Retailers will also enter the information once they received the product such as the time and date at which it has received he product. All this information will be saved in the QR code which will be printed on the product.

The user will scan the QR code and then it will get all the lifecycle of the product with the manufacturer's and retailer's details.

V. CONCLUSION AND FUTURE SCOPE

Counterfeit products are growing exponentially with the enormous amount online. So, there is a strong need to detecting counterfeit products and blockchain technology is used to detect fake products. Furthermore, the information is encoded into a QR code. Customers or users scan the QR code andthen they can detect the fake product. Digital information of products can be stored in the form of blocks in blockchain technology. Customers can be sure about the integrity of goods they purchase. The proposed system can effectivelylower the rate of counterfeiting of branded goods and provide the companies with an easier approach to provide consumers with the confidence that they will not

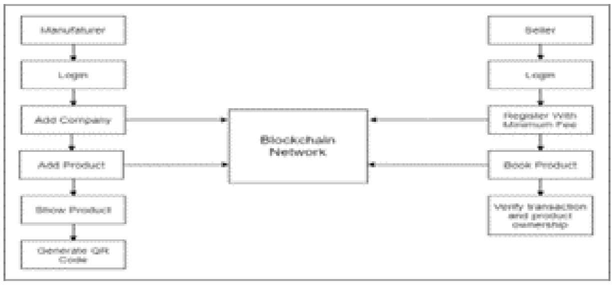

Fig. 2. System Architecture

purchase counterfeit goods. This system will help to build trust and good bonding between manufacturer and customer and in deed it will help inimproving economy and reducing corruption. Further system can be extended to avoid frauds done in banking, healthcare, voting system, online shopping and so on.

As for future work, various additional features can be added,such as:

A. History

For products like sneakers, collectable watches etc, the re- sale market and the value of products is huge, hence providinga blockchain backed certified history of the product, such as previous owners, amount of period each owner had the productin their possession etc, is highly sought-after data.

B. Smoother integration with E-commerce

As this project heavily relies on e-commerce and such seller-buyer related scenarios, building features that will ensure a smoother integration into their platforms will grant a mass implementation of this project in the real world. Other such scopes and applications in the future are to be looked after.

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