

Blockchain Platform For Product Anticounterfeiting In Supply Chain

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Abstract— *In current years, blockchain has obtained increasing interest and numerous packages have emerged from this technology. A renowned blockchain software is the cryptocurrency bitcoin, that has Not simplest been effectively fixing the double-spending problem however also it could verify the legitimacy of transactional facts without counting on a centralized system to achieve this. Therefore, any application the use of blockchain technology because the base structure guarantees that the contents of its statistics are tamper-evidence. This Paper uses the decentralized blockchain technology technique to make sure that customers do no longer completely rely upon the traders to determine if products are genuine. We describe a decentralized blockchain machine with products anti-counterfeiting, in that way producers can use this device to provide real merchandise without having to control direct-operated stores, that may substantially reduce the value of product high-quality guarantee.*

Keywords— *Blockchain, Hashing, QR codes, Anticounterfeiting, Transparency.*

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I. INTRODUCTION

Identification of counterfeit merchandise in cutting-edge market is being an exceptional assignment for customers and it is very life threatening for the customers while this takes vicinity in pharmaceutical fields. Other fields like electronics, clothing, fashion-accessories additionally face a large effect on their emblem because of counterfeit products. E-commerce has visible exceptional boom through the years from \$39 billion in 2017 and it is projected to upward push to \$200 billion via 2026. This comes within the wake of extending penetration of the net and cell phones. After numerous market surveys it is observed that the counterfeit merchandise are growing rapidly and the rise of counterfeit products can badly affect the improvement and economic boom. Additionally because of this the many top companies have become bad comments and dropping their positions from the logo list. Counterfeit merchandise are twins of the real merchandise in the marketplace. Often all reputed businesses are operating to forestall this system that is dangerous to all people in the entire international. The various branded or reputed groups are running on contemporary technology to

identify the counterfeited products from the original product inside the market and to enhance this operating, the it area can give them fine signals and can assist to prevent counterfeit items. Among those numerous technologies available inside the it area blockchain is one of the promising Technologies which may be used for decreasing the counterfeiting of goods. A blockchain is a kind of dispensed ledger that is designed to prevent tampering. Primarily based on the allotted consensus Set of rules, clever contracts and encrypted algorithms. Blockchain generation facilitates to clear up the Problem of counterfeiting of a product. And on this studies paper we proposed a product surveillance blockchain device with the intention to share statistics about merchandise from the manufacturer to the clients. We are growing such an application that will work on smart phones so one can Be giving all of the designated data about the products to the client who orders that product and help them to identify if the product is authenticated or counterfeited.

Background:

A.BLOCKCHAIN OVERVIEW:

Blockchain is a decentralized gadget. It refers back to the collective renovation of a technical solution that maintains a Continuous document document as a dependable database thru decentralization. It become to start with used drastically on bitcoin the block era method of blockchain is to gather and verify the records and then generate a brand new block via. We first describe the blockchain consensus mechanism the use of bitcoin as an example, its blockchain consensus mechanism is a proof of work algorithm (poor or worse). Every node competes based on their respective computing energy to remedy a SHA256 math problem this is complex to solve but easy to verify. The first node that solves this hassle will get the new block accounting right. Blockchain facts is stored on every node, then the nodes exchange data with each different over the community. Every node maintains a whole blockchain records. The node will verify the received transactions and encompass them in the new block based on its own blockchain information, and try to achieve the accounting rights of the brand new block within the above manner.

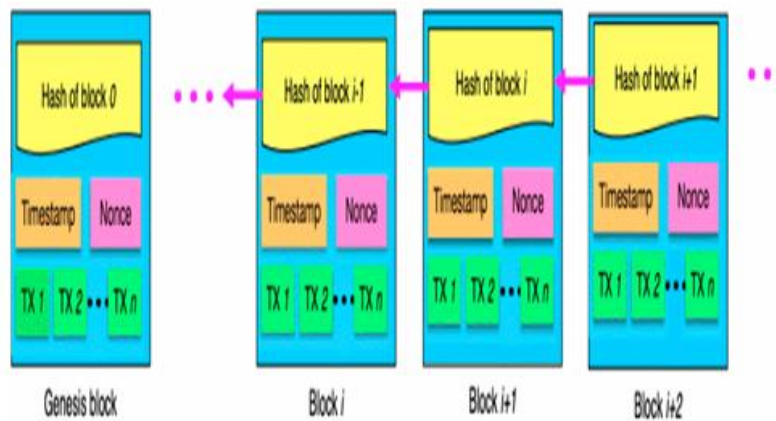


Figure 1. Connections Between Blocks In Blockchain

B. BLOCKCHAIN FEATURES:

In these day's social machine, a large a part of the economic conduct of individuals relies upon on believe wherein frequently facets interact with a third birthday celebration, as a consequence forming a trust relationship. Generally, there is a mutual non-consider between those two parties which have lengthy been primarily based on believe ensures supplied with the aid of 1/3 events, consequently it is critical to take observe of the characteristics of blockchain technology that assist subvert the inspiration of human transactions that have been performed for thousands of years.

The use of blockchain you'll create a information report device that does not rely on a trusted third party as a transaction middleman, and that is overtly shared and reliable at the identical time. The traits of blockchain technology are defined in detail beneath.

There are few basic properties of blockchain

1. **Decentralization:** Inside the conventional centralized machine, a trusted authority is required to validate each taking place transaction within the network. But, the decentralized surroundings do not support any governing authority or single entity to manipulate the entire network. All of the nodes in the network collectively control the community, i.e., decentralized governance. The transaction in blockchain can consequently be finished among 2 friends (p2p) without the approval of a valuable enterprise.
2. **Security and Privacy:** SHA- 256 cryptography set of rules is used for hashing. Further fixed-duration has output

value is generated regardless of the input facts length. This makes it hard to hack. Additionally, the components that go into block generation increase the difficulty degree for hacking. Immutability is every other factor including securing information. Thus the systemic thing of BCT inherently affords security.

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 shape of peer to peer community allows equality among the nodes. Even supposing the shape will become slightly altered, the members can inspect the kingdom of any transaction, while it's far in the system. Therefore a consensus is given by using anode with full focus. Similarly, the peers have replicated shared ledgers. Consequently, any interest or transaction in a blockchain is facilitated with full transparency.

5. Flexibility: The technology of blockchain is open supply and all of us can use it to regulate it into our very own version. There are already several flexible blockchain platforms available, and users can also redevelop a new blockchain platform if they desire to. Blockchain is a limitless generation which means that customers can create more than one application based totally on a blockchain.

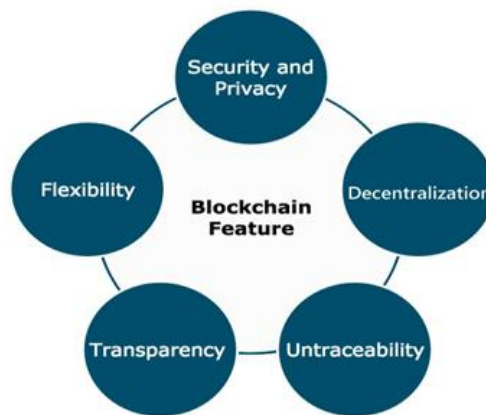


Figure2. Characteristics of Blockchain.

SHA-256 Algorithm

Secure Hashing Algorithm (SHA) - 256 is the hash capacity and mining calculation of the Bitcoin convention, alluding to the cryptographic hash work that yields a 256 pieces in length esteem. It directs the creation and the executives of addresses, and is likewise utilized for exchange check. Bitcoin utilizes twofold SHA-256, implying that it applies the hash capacities two times.

The calculation is a variation of the SHA-2 (Secure Hash Algorithm 2), created by the National Security Agency (NSA). SHA-256 is likewise utilized in well known encryption conventions, for example, SSL/TLS, SSH and open source working frameworks like Unix/Linux.

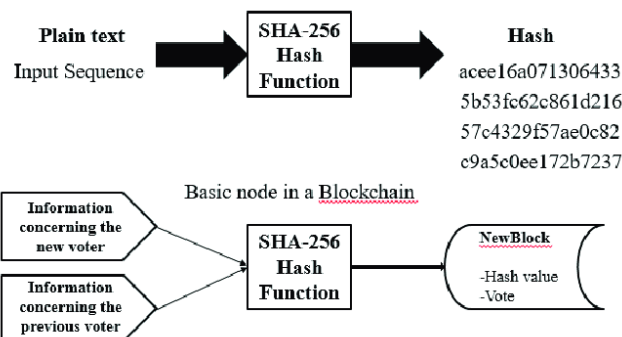


Figure 3 Usage of SHA-256 Algorithm in Blockchain

The hash calculation is very secure and its functions aren't known in the public area. It's utilized by the United States government to safeguard touchy data, because of its capacity to confirm a substance of information without uncovering it because of the utilization of computerized marks. Moreover, it is likewise

used for secret phrase check, since it helpfully doesn't need the capacity of precise passwords, as the hash values can be put away and coordinated with the client section to confirm on the off chance that it's right or not.

As a matter of fact, it is almost difficult to uncover the underlying information from a hash esteem itself. In addition, a savage power assault is incredibly improbable to succeed on account of the galactic number of possible blends. Furthermore, it's additionally seriously impossible that two information values (known as impact) have a similar hash.

II. LITERATURE SURVEY

A faux business middle can affect the improvement of a country. Fake items are fake or unapproved copies of the real object. Fake objects are frequently created with the expectancy to make the most frequent estimation of the imitated item. Quite plenty every agency faces a fake chance when you consider that it is influencing a corporation's earnings in addition to harming the logo's status. Whilst the era gives numerous answers to authenticate the original product, a few technological types of equipment, particularly artificial intelligence help create clones, and blockchain generation creates chaining and tracing. What is required is regular up-gradation and improvement to remain in the front of the forgers. Therefore, we must have guidelines for the market.

Existing system:

1. RFID Based Anti-Counterfeiting System:

The paper entitled 'a contrast survey to observe on RFID primarily based anti-counterfeiting structures' describes radio frequency identification tag anti-forging as an implemented association that has gotten consideration within the last few years. This system represents an overview concentrating on the exploration subject as opposed to duplicating gadgets using radio frequency identification tags on the product. Radio frequency identification (RFID) and remote sensor networks (WSN) are substantial far-off advances that have a wide assortment of utilization and provide infinite future possibilities, even as RFID tags are like an actuator that requires a control sign and a wellspring of electricity. RFID perceives regions and recognizable evidence of classified matters — yet in place of perusing laser mild reflections from published standardized tag names, it makes use of low-electricity radio frequencies to collect and store statistics. In a stockroom or distribution center, this gadget is utilized to automate facts assortment. The transceiver scans radio frequencies and sends them to an RFID tag. The distinguishing statistics are then communicated from a little microchip inserted in the tag and communicated to the RFID reader. [1]

2. Fake Product Detection Using AI-Based Technology:

This system proposes an answer that is predicated on device learning-based totally technology which allows stop-consumers to discover and verify products with no special device. Through the usage of the picture and textual content popularity. For identification, the give up-clients take pictures of an object packaging, which incorporates product text facts, emblems, and possibly accreditation marks/emblems. These pics might be sent in a solicitation to the worker for processing and confirmation. In a while, the detection result can be lowered back to the cease-consumer to make a further decision. Inside the case of faux product detection, the quit-purchaser can record this counterfeit product to the authorities machine, along with the protection gate - European's fast alert gadget [2].

3. Security with holographic bar code using computer-generated holograms:

Holograms had been utilized to fight against fakes and to diminish forgery. Incorporating the possibility of standardized identifications into holograms supplies two-degree safety from forging. This framework acquaints a method with multiplied safety and genuineness in object distinguishing evidence employing using holographic standardized identifications. The particular and patron characterized object distinguishing evidence code accommodated every object is modified over into a brief reaction (QR) code. The QR code created is then modified over right into a 3D photo, as a result giving outstanding security to the item. In this framework, holographic standardized tags using laptop-created visualizations are actualized by making use of MatLab. The deciphering of The barcode recreated from the holograms gives the corresponding product recognizable evidence number assigned for the product.[3]

III. PROPOSED METHODS FOR PRODUCT ANTI-COUNTERFEITING USING BLOCKCHAIN

There is no proper solution before tackling this issue. As barcodes can be easily copied it is also not a guarantee system, nor a good solution to differentiate counterfeit products from originals some products. Blockchain technology is one of the promising technologies emerging in recent years that can help solve such a problem. Blockchain technology can be used to monitor and regulate the supply chain of products in the market so that users can only obtain original products. The main goal of the project was to provide people's original product and help people identify whether the product they buy is original or fake easily. The prototype of the system will be a distributed application (DApp) with a supporting blockchain network. The network will be developed on hyper-ledger fabric which is an open-source Blockchain development tool and uses the default DPoS/PBFT consensus algorithm.

The basic module of our system;

1. **Manufacturer role:** For the seller, the available functions include adding a new seller's address in contracts, adding the number of products the seller can sell, and retrieving information on sellers so that the status of recent sales can be retrieved. On the consumer side, it is possible to query the product that the seller has provided to the consumer, check whether the product has been replaced, or confirm whether the current state of the product has been verified through the consumer's public key certificate.

2. **The role of the seller:** On the consumer side, the seller can use the system functions to encrypt verification information with a private key, and the consumer can use the seller's public key to check whether the seller is what it claims to be. After the sale and purchase, the seller specifies the buyer's address in the contract for the manufacturer to obtain the information. The seller can access information about his products, such as sales lists and the amount of his remaining inventory.

3. **The role of the consumer:** On the part of the seller, the consumer can check whether the seller has a sales relationship with the manufacturer, and also check whether the seller's inventory has not been sold. On the manufacturer's side, consumers can prove that their identity matches their address and in the case of a well-preserved contract address, consumers can get individual purchase records and product status in their product.

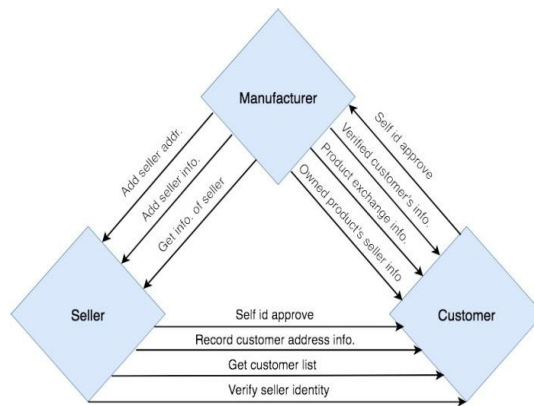


Figure 3 Modules and dataflow in Blockchain.

IMPLEMENTATION

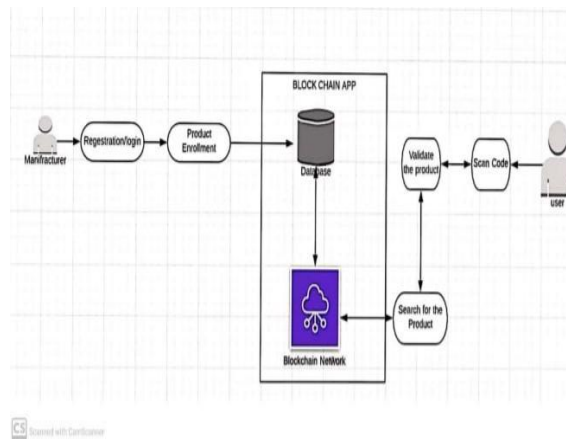


Figure 4 System Architecture of Dapp

1)Login process: Before establishing a connection to the system, the user must choose which account to log into. The user's accounts are linked to the accounts in Geth, as long as Geth is started, the user can choose the account which is also linked to the serial number of the list of accounts in Geth. Next, the user has to type the Keystore file, which is an encrypted file that contains the private key. Finally, the user can type the contract address and click the save button to set the basic information.

2) Public information about the contract: With the aim of disclosure of information, information about the sellers is completely public. Our system provides smart contract data search functions, which can return the list of sellers, the list of consumers, all information about the seller, and the remaining number of products of each seller. The data storage format in the smart contract.

3) Adding new sellers and number of products: In our system, manufacturers can check seller information, including adding new seller addresses and also the number of products that can be sold by a specific seller. The program in the smart contract will first check if the function setter is the producer. If correct, the program will build a seller structure and set the maximum number of products that can be sold for sellers, this amount can also be changed later.

4) Exchange provision for specific user products: as customers provide proof of identity and the address to send the product to. The manufacturer will initially check if the identity is correct and then determine if the consumer's product information is in the smart contract, then proceed to change the product status to exchange status. As an observation, this function will check if the setter is the producer. Otherwise, the function will return without setting the value.

5) Smart Contract: When the transaction between seller and consumer is established, the seller will add the consumer's address in the smart contract. Each seller has a product structure in the seller structure, the seller enters the consumer's addresses in the product owner field. Also, the access rights of the seller's product owner field can only be set by the seller.

6) Identity Verification: Identity Verification is one of the most important components of our system. Users of our system can use their addresses as their representation. The address is defined within the last 20 bits of the user's public key. Whenever a user wants to make a change to the current status of the Ethereum contract, the user must sign the transaction with his or her private key to perform a digital signature. As long as the user's private key is secure, there will be no other means to change the user's identity

Result and discussion:

The system enhanced security, the system provides decentralization, it provides transparency and it protects the data which we are given to the system it gives privacy and it increased efficiency.

IV. CONCLUSION

This paper is the first blockchain system to propose a fully functional anti-counterfeiting system. By paying a very low transaction fee, users of our system no longer have to worry about the possibility of purchasing a counterfeit product.

Manufacturers can use the system to store relevant information about product sales in blockchain for everyone to see. The total amount of sales that can be sold by the seller and the number of products that the seller currently has left are transparent. The user can use the functions provided by our system to carry out manufacturer verification immediately. The system provides identity verification using digital signatures. There are no other means of decrypting the key owner's private key unless the key owner accidentally loses their key.

In our system analysis result, the cost of the initial product record contract is only \$1.2893394289 US, and the cost of each product sales process is \$0.17415436749 US. Both costs are much lower than working with reliable large chain stores and well-established direct selling stores. Our system can effectively lower the anti-counterfeiting threshold of branded goods and provide companies with limited financial resources with an easier approach to reassure consumers that they will not buy counterfeit goods.

Future work:

Blockchain technology is still in its general early stages in terms of usage, therefore more research is required. Future work on this framework may be proof of the simplicity of the code. The customer can believe that the proper applications and due to the simplicity of the code, without excessive code, will have additional use. With the experience gained in this project, it is clear that when assigning a chain of blocks that is counterfeit-resistant and traceable, then platform improvement is warranted by a move toward genuine product warranties. This would improve the customer experience by making the entire supply chain framework more open and transparent. In addition, it is hoped that a buyers' intellectual framework can be built on cross-line product tracing, providing more accurate and far-reaching product and seller tracing information to administrative authorities around the world. Obtaining data of such quality will be

conceivable with estimates of coordinated efforts, for example, administrative support, framework creation, and data sharing.

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