Product Identification

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Abstract- *As the variety of products in the market increases, examples of fake products also increase. Producers suffer a huge loss in market value and cannot meet market standards. Customers feel cheated by the company, so the company has to report the loss to customers.*

The company's only way out is to provide a way for customers to know if they are purchasing real products, and have customers enter missing information that is voluntarily associated with a single creation. It can also be used to identify items rented from companies that have little to hide/steal, For example, gas cylinders, water tanks.

This can be a good way to prevent fraud and theft.

Keywords- Blockchain Technology, Counterfiet, Ethereum, Solidity

I. INTRODUCTION

Blockchain is a peer-to-peer transaction and ledger-based data management technology originally developed for the Bitcoin cryptocurrency. Since blockchain technology was announced in 2008 and is seen as a disruptive technology, interest and research on blockchain technology has increased. The reason for the interest and trust in Blockchain is that its main product provides security, does not fix the product without a third party to control the transaction, thus creating Research expansions especially in terms of difficulties and limitations, because it is necessary. large-scale computing and data storage.

II. OBJECTIVE

- To develop system to authenticate objects.
- To provide the owners of a tradable/rentable item with guarantee that, their goods won't be forged and they will not have a loss of brand name.
- Provide an easy interface for adding their goods to the blockchain.
- The distributed immutable ledger brings the factor of trust in the market.

III. STATUS OF RESEARCH AND DEVELOPMENT IN BLOCKCHAIN

When you think of blockchain, the first thing that comes to mind is Bitcoin. Bitcoin was introduced by Satoshi Nakamoto. There is a long journey of 8 years and it will continue through the Bitcoin system. In these 8 years, blockchain technology has done a lot for us, mostly in finance. It works like a traditional currency in the financial world, but it crosses borders and now works with many countries.

In blockchain development, there is a language called robustness with which we can build blockchain applications

3.1)**Stopping wastage of energy*****:*** Mining Bitcoin wastes huge amounts of energy. In order to do mining in faster than the peers the miners use sophisticated hardware technology such as CPU, GPU and ASIC. There is also wide useof proof of work in the industry. The probability of mining coins depends on the amount of work the miner does. While, in Proof of Stake, the resource that increases the probability is the amount of Bitcoin a miner holds. Since it's a game of solving a mathematical operation in order to obtain a correct "hash code" so the one with a faster processor solves the problem.

3.2)**Size and bandwidth:** At the moment, amount of data stored on the blockchain is around 50k bytes (February 2016). When the transaction would increase to the levels of VISA, Blockchain could grow 190PB in each year. It is assumed that the block size is close to 1mb, and one block is created every ten minutes. Therefore, there is a limitation in the number of transactions that can be done on the network. In order to increase the number of transactions the bandwidth and throughput issues should be solved.

3.3)**The rate of transactions:** The throughput in the bitcoin network is currently about 7 tps(transactions per second).other transaction processing networks are visa and twitter with capacity of 5000tps and 3200tps.so when the throughput of the blockchain network increases to the levels of visa and twitter then performance of the transaction has to increase. Internationally there are many online platforms for purchasing branded products like amazon, flipkart, myntraetc. but people have to rely on these websites for authenticity of goods.

Every branded or multinational, national companies have their own different systems through which they verify that the product is original or not but the system is for only their use not for the customers, they just give details of verification of the product and it does not give the full satisfaction to customers about the product.

So, there is a need of such gadgets and software applications which can verify easily if the products are counterfeit. So blockchain can help us regarding this type of issues like fake product, fake news and fake reviews.

IV. BLOCKCHAIN AND ITS IMPORTANCE

Blockchain technology has emerged as a revolutionary force across various industries, offering immense potential to transform traditional systems and processes. One area where blockchain has garnered significant attention is in the domain of land management. This introduction will provide an overview of blockchain technology and its application in the context of our project, focusing on its potential to revolutionize the land management system. Blockchain, at its core, is a decentralized and immutable digital ledger that records transactions in a transparent and secure manner. It operates on a distributed network of computers, known as nodes, where each node maintains a copy of the entire blockchain. This distributed nature eliminates the need for a central authority, ensuring transparency and removing single points of failure.

In the context of land management, blockchain technology presents a compelling solution to the challenges associated with traditional paper-based registries. Conventional land management systems often suffer from issues such as fraud, lack of transparency, and inefficient record-keeping. These shortcomings can result in financial losses for buyers, disputes over property ownership, and inefficiencies in land transactions.

By implementing blockchain technology in the land management system, these challenges can be effectively addressed. The key characteristics of blockchain, such as immutability and transparency, ensure that once a transaction or record is added to the blockchain, it cannot be tampered with or altered. This immutability provides a high level of trust and eliminates the need for intermediaries to verify transactions, reducing costs and improving efficiency.

The transparency offered by blockchain technology enables all stakeholders to have access to a single version of the truth. This transparency ensures that land records are accurate, trustworthy, and easily verifiable. Additionally, blockchain's decentralized nature mitigates the risk of data loss or destruction, as information is stored across multiple nodes, making it highly resilient.

Smart contracts, which are self-executing contracts with predefined rules and conditions encoded within the blockchain, play a pivotal role in revolutionizing land management. Smart contracts enable automated execution of land transactions, eliminating the need for intermediaries and facilitating faster and more secure transfers of property rights. These contracts provide an auditable and transparent record of transactions, reducing the potential for fraud and disputes.
Furthermore, blockchain technology has the potential to streamline the overall land management process by integrating with existing land registries, government databases, and other relevant systems. This integration can enhance data interoperability, simplify information sharing, and facilitate seamless coordination among stakeholders.

4.1) Connection between Blocks

In blockchain, connectivity between blocks is an important factor in ensuring the integrity, security, and decisionmaking of the entire chain..

1. **Block structure**: First, briefly explain the structure of blocks in the blockchain. Explain that each block consists of several parts, such as the block header, the transaction layer or data, and a reference to the previous block.
2. **Block header**: Description Block header, a unique identifier called the hash, the time specified when the block was created, and other metadata specific to the blockchain used (e.g., platform).
3. **Hash Function**: Introduces the concept of a hash function, a cryptographic algorithm used to convert data into a fixed alphanumeric array. Make sure hash functions are deterministic, meaning the same input will always produce the same output. Also, emphasize that even a small change in strategy can make a big difference.
4. **Previous Block Reference**: Describes how each block in the blockchain contains a reference to the hash of the previous block. This practice creates links between blocks and extends the life of the chain. Any change to a previous block of data changes the hash value, invalidating subsequent blocks and breaking the chain.
5. **hash links**: Explain how a reference to the previous block’s hash creates a link between blocks. When a new block is added to the blockchain, the block header

contains the hash of the previous block. This link creates a chain in which each block points to the previous block.

6. **Merkle tree (optional)**: You can specify a Merkle tree if it is relevant to your blockchain application. Explain that the Merkle tree is a hierarchical structure that can be used to analyse large datasets. In blockchains, they are often used to represent transactions in blocks and form an information contract.
7. **Consensus Mechanisms**: Discuss the role of consensus mechanisms (such as PoW or PoS) in verifying connectivity between blocks. Explain how this process ensures that participants in the blockchain network agree on the order of the blocks, thereby preventing malicious attempts to tamper with the chain.
8. **Security and immutability**: Offers security and immutability through binding of blocks. Due to the cryptographic nature and decentralized negotiation of the hash function, it is very difficult for anyone to change the information stored in the previous block without being detected. This feature supports the overall security and reliability of the blockchain.
9. **Visual Representation**: Consider including a diagram or visual representation of the blockchain showing the link between blocks, hash links, and chronological order. This visual service can help readers better understand the concept of blocking links.
10. **Real World Examples**: Provide real world examples or use cases that use the link between blocks in the blockchain. This could include well-known blockchain platforms such as Bitcoin or Ethereum, showing how blockchain techniques can ensure the integrity and security of blockchain networks.

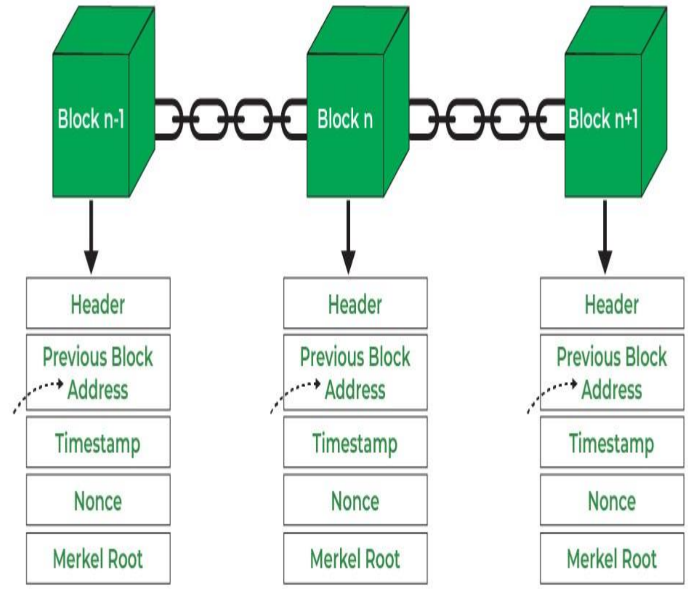

Figure 4.1: Connections between blocks in the blockchain

_4.2)_ IMPORTANCE OF BLOCKCHAIN IN OUR PROJECT: -

1. **Immutability:** Immutability is a one of special character of Blockchain. When we create a database, we need a trusted administrator upon whom we can trust that he/she doesn't tamper the database, but still, it creates trust issues. Blockchain provides kind of facility that ensures the immutability of the ledger and ensures data is saved permanently in the system using consensus protocols. The immutability of blockchain is referred to the inability to make adjustments to the data after it is recorded and stored. This aspect is the most important while dealing with any type of blockchain.
2. **Transparency:** Because Blockchain is a decentralized system it provides complete transparency. So, there is no need of central authority. In a blockchain. In a blockchain every miner have the detailed of all valid transactions if someone wants to chain in blocks then it will visible on the system of all miners and because it also break the hash system of every blocks everyone come to know about it ,that's why we called that it provide high transparency .changing in blocks make a change in any block then there's change in hash of the block which changes the hash of others blocks ahead, which is dealt with seriously by matching the changed block with other correct blocks.
3. **High Available**: Unlike centralized systems, Because Blockchain is a system where all the information stored in peer-to-peer network due to its decentralized nature. In

this system everyone has peer to peer connection, whole information therefore, if any peer loses its data server, other peers will remain on their works and if it wants the data, it can retrieve it from other peer nodes.

4. **High Security**: In a Blockchain we work on blocks where all the transaction are stored after their validation and produce a full chain. In a block, a hash has been generated with previous block. We follow this process in all nodes and it makes so difficult for hacker to produce millions of block hash that's why it become impossible to manipulate the transaction and valid information of blocks. For adding a block, it follows a valid process in which all miners are checked about the block and make sure about his transaction and hash then all process a vote for the block, if the votes will come in favor of new node, then it will add otherwise it will be votes ignored.

V. RELATED WORK

Here we have proposed a blockchain based system for identifying original product. As we know in older days sellers used to maintain a ledger file to record information about products as like that, we proposed a system in which a supply chain is available for recording data. Counterfeit products are important issues in today's world. That's why we want as system which provides all details about product like date of manufacturing, seller or buyer information. Basically, here we need security that's why we use blockchain technology. By applying blockchain in this proposed system we strictly monitor the flow of products.

5.1)How the system works

We claim that the information stored in blockchain will be unchanged, real and transparent. Below is the diagram which shows how data store in the blockchain.

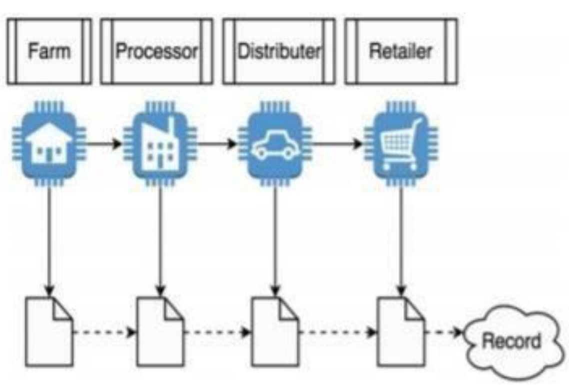

Figure 2: Product Supply data record on Block chain

Explanation: - At the beginning stage, products manufactured in the farm, so first block contains data about this information. And the owner of farm has to create a block and make himself owner of this product. Next stage products go for processing again a new block will create which is connected to previous block and contain info about processing owner. Next products go to distributor and new block contain info about distributor at the last retailer came and new block contain retailer info. As like that complete information of products will recorder in our blockchain which is visible for all the stage owner also for customer but only stage 1 owner have right to change data not for other.

That how blockchain provide security and transparency.

5.2)OPERATION FLOW

Every Product Identify by their product ID. Manufacturer have to record all product ID in block. When Whole seller buy a product, they have to add the ID information of all the purchased products in the block. Same thing the retailer has to do. When a customer buys a product, he can see product information by product ID whether the Product is sold or not.

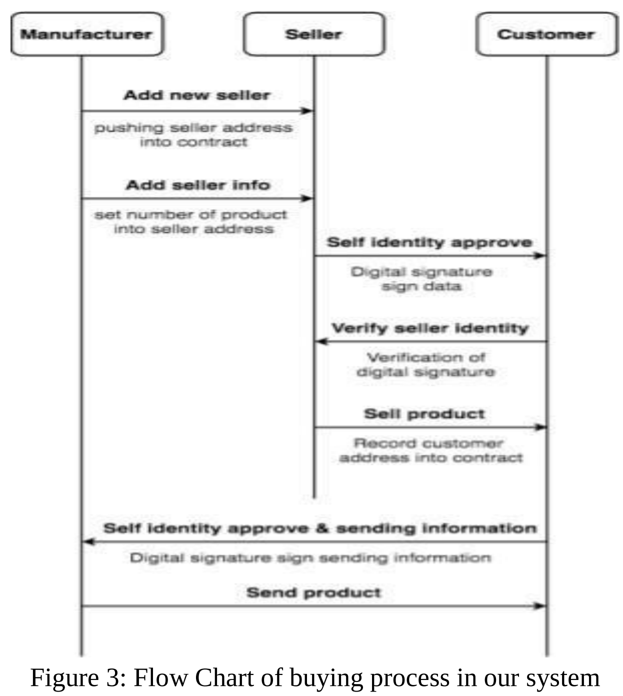

Figure 3: Flow Chart of buying process in our system

5.3)HASHING ALGORITHM

A hashing algorithm, also known as a hash function, is a mathematical function that takes an input (or "message") and produces a fixed-size alphanumeric string as output, known as the hash or hash value. Hashing algorithms are designed to efficiently transform data of any size into a unique and representative fixed-size output.

Key characteristics and properties of hashing algorithms include:

1. **Deterministic**: For a given input, a hashing algorithm will always produce the same hash value. This property ensures consistency and predictability.
2. **Fixed Output Size**: Hashing algorithms generate hash values of a fixed length, regardless of the size of the input. Common hash lengths include 128-bit, 256-bit, or 512-bit.
3. **Irreversibility**: Hash functions are designed to be one-way functions, meaning that it is computationally infeasible to obtain the original input data from the hash value. This property ensures data security and privacy.
4. **Collision Resistance**: Hash functions aim to minimize the likelihood of two different inputs producing the same hash value (collision). While collisions are theoretically possible, a well-designed hashing algorithm will make them extremely unlikely.
5. **Uniform Distribution**: A good hashing algorithm strives to distribute hash values uniformly across the entire output space, ensuring that small changes in the input result in significantly different hash values.

6. **Efficiency**: Hashing algorithms are designed to be computationally efficient, allowing for quick calculation of hash values, even for large data sets.

Hashing algorithms have various applications, including data integrity verification, password storage, digital signatures, and indexing in data structures. In the context of blockchain, hashing algorithms play a crucial role in ensuring the integrity and security of data stored in blocks and linking blocks together to form an immutable and tamper-resistant chain.

Commonly used hashing algorithms include SHA-256 (Secure Hash Algorithm 256-bit), SHA-3, MD5 (Message Digest 5), and HMAC (Hash-based Message Authentication Code), among others. The choice of hashing algorithm depends on the specific requirements of the application, including security considerations, performance, and compatibility with existing systems.

5.4) HOW HASH CODE GENERATE

Hash codes are generated by applying a hashing algorithm to an input or message. Here's a general overview of how hash codes are generated:

1. **Input Data**: The hashing algorithm takes an input, which can be any data, such as a string, file, or object.
2. **Preprocessing (Optional)**: In some cases, preprocessing steps may be applied to the input data before hashing. This can include data normalization, padding, or conversion to a specific format required by the hashing algorithm.
3. **Hashing Algorithm**: The input data is processed through the chosen hashing algorithm. The algorithm performs a series of mathematical operations on the input to transform it into a fixed-size output.
4. **Output (Hash Code)**: The result of the hashing algorithm is a fixed-size alphanumeric string called the hash code or hash value. This hash code is unique to the input data, meaning that even a small change in the input will produce a significantly different hash code.

It's important to note that hash codes are typically represented in hexadecimal or binary format to make them more compact and suitable for storage and transmission.

The specific steps and calculations performed by the hashing algorithm depend on the chosen algorithm itself. Different algorithms have different internal structures and mathematical operations. However, they all aim to produce a hash code that exhibits properties such as determinism, irreversibility, and uniform distribution, as mentioned in the previous response.

It's worth mentioning that different hashing algorithms have different levels of security, computational efficiency, and collision resistance. The choice of a hashing algorithm depends on the specific requirements of the application, taking into account factors such as desired security level, performance considerations, and compatibility with existing systems or protocols.

5.5)REQUIREMENT OF HASHING ALGORITHM

There are 5 requirements of hashing algorithm

a) **One way: -** It is a one way. Data in converted to encrypted data but encrypted data cannot be converted back to the original format.
b) **Deterministic: -** It generates different hash value for different data. Ex: - suppose data is "abc" and after converted using sha-256 it generates hash value 845, so if we again perform this action for same data "abc" So value will not change.
c) **Fast Computation: -**This algorithm has to be very fast because we have Create so many blocks in blockchain.
d) **Withstand Collision: -** This algorithm has to prevent from hackers.

e) **Avalanche Effect: -** change in a single character of data will change the hash completely.

5.6)HOW SHA-256 ALGORITHM WORKS

The sha-256 (secure hashing algorithm) is cryptographic technique which output is 256-bits long.

1) It contains 256 bits of data ‘x’. If the input is very large, then break it into 512 bits or its multiple.
2) Because the input is not always 512 bits or a multiple of it, then some part of the data remains.
3) Next to this remaining input 10 bits will be padding. Now if our input is of perfect square, then we will process further.
4) Now with 512 bits input we will add 256 bits data ‘x’ which will give 768 bits. These 768 bits have to be passed through the compression function, which will give a result of 256 bits.
5) Now we will merge the output of these 256 bits with the 512 bits input of the next block.
6) Now again these total bits will have to be passed through the compression function so that the output will be 256 bits.
7) This process will run like a loop until the last block is reached.
8) Again, the compression function will be called which will give the final output of 256 bits and this output will be called the hash code for the input data.

VI. CONCLUSION

In a blockchain-based system, the verification of transactions comes at a minimal fee, ensuring cost effectiveness for all participants. This means that consumers can engage in transactions with confidence, knowing that the authenticity of the product can be easily verified. By simply scanning the product's QR code, customers gain access to a wealth of information pertaining to that particular item.

The blockchain system acts as an immutable and transparent ledger, recording every transaction and piece of information associated with the product. When a customer scans the QR code, they are granted access to a wide range of details, including the origin of the product, its manufacturing and distribution history, quality certifications, and any relevant warranty or maintenance information. This transparency empowers consumers to make informed decisions based on accurate and trustworthy data.

The decentralized nature of blockchain ensures that no single entity has control over the data, mitigating the risk of tampering or manipulation. All participants in the network, including manufacturers, distributors, and retailers, contribute to the integrity of the information stored in the blockchain. This collaborative effort ensures a robust and reliable system, reducing the chances of counterfeit products or fraudulent activities.

By providing transparency to all end users, the blockchain-based system instils a sense of trust and confidence in the marketplace. Customers can verify the authenticity and legitimacy of the products they are purchasing, reducing the risk of falling victim to counterfeit or substandard goods. This fosters a more secure and efficient marketplace, benefiting both consumers and businesses alike.

Furthermore, the transparency provided by the blockchain system extends beyond individual transactions. It enables broader insights into market trends, supply chain efficiency, and consumer preferences. This aggregated data can be used to enhance decision-making processes, optimize inventory management, and drive product improvements.

In summary, a blockchain-based system offers a cost-effective and trustworthy solution for verifying transactions and ensuring the authenticity of products. Through the use of QR codes and easy access to detailed information, consumers are empowered to make informed choices. The transparency provided by the system creates a more secure and efficient marketplace, fostering trust and benefiting all stakeholders involved.

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