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FAKE PRODUCT IDENTIFICATION USING BLOCKCHAIN

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Abstract: *The project aims to use block chain to create a secure and tamper-proof system for detecting counterfeit products and documenting product information. This program addresses the growing problem of counterfeit products in the market. We are running this campaign to remove fraudulent products that are harmful to consumers and brands. Block chain ensures a clear and immutable recordof product details, strengthening trust in the supply chain. We are building a block chain system thatconnects manufacturers, distributors and retailers. Each product is assigned a unique ID on the block chain so that everyone can verify its authenticity. The project provides a secure and transparentsystem for people to verify whether a product is authentic using a decentralized block chain. This willreduce counterfeit products and increase consumer confidence in the products they buy. The manufacture and marketing of counterfeit or counterfeit products and goods pose a financial, health and safety threat to end users. It also negatively affects the economic growth of original manufacturers and companies due to lost sales, damage to product reputation, downtime, replacementcosts, forcing many brands to invest in fighting counterfeit products, disruption of trust between business partners and theft of goods. It's crazy. To defeat and avoid the high impact of this type of fraud, we use a block chain-based system to identify the original product and detect duplicate productsto identify the original product.*

Keywords: Block chain based system, detecting counterfeit products, tamper-proof system

I. INTRODUCTION

The spread of counterfeit products is a major challenge in several industries, including pharmaceuticals, luxury goods and electronics, posing a serious threat to consumer safety, brand reputation and market integrity. Counterfeit products not only destroy consumer confidence and cause financial loss to businesses, but also cause loss of revenue to legitimate businesses and pose a serious threat to the health and safety of consumers. Traditional anti-counterfeiting methods such as holograms and serial numbers are

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ineffective and can be easily copied by fraudsters. Therefore, there is a great need for innovative solutions to authenticate products and secure market position. It uses block chain technology to identify fraudulent/duplicate products. Product identification systems can have long lead times, because intermediate and critical points of failure, because more than one counterfeit product can make it difficult for consumers to make a mistake or for a product to be genuine.

DESCRIPTION:

Fake product identification involves the detection and prevention of counterfeit goods by leveraging block chain technology. Block chain offers a decentralized and immutable ledger that records transactions across multiple nodes. By utilizing block chain for product identification, each product can be assigned a unique identifier that is securely stored on the block chain. This identifier can include information about the product's origin, manufacturing process, and distribution chain, making it difficult for counterfeiters to replicate**.**

II. LITERATURE SURVEY

The regulatory landscape and standards surrounding block chain technology in counterfeit detection within the supply chain are evolving rapidly. Various jurisdictions are exploring frameworks to address the legal and compliance aspects of block chain implementation, including data privacy, intellectual property rights, and consumer protection laws. Additionally, industry-specific standards and guidelines are emerging to ensure interoperability and best practices in block chain-based authentication solutions. Collaborative efforts between regulators, industry stakeholders, and technology providers are essential to establish clear regulatory frameworks that promote innovation while safeguarding against potential risks. Adhering to these regulations and standards is crucial for organizations seeking to deploy block chain solutions for counterfeit detection, as compliance ensures trust, reliability, and legal certainty in the evolving landscape of supplychain security and integrity.

Future directions and research gaps in block chain-based counterfeit detection within the supply chain present both opportunities and challenges. As the technology continues to evolve, research efforts should focus on addressing scalability issues, improving interoperability between block chain networks, and developing standardized protocols for data exchange and integration. Additionally, there is a need for further exploration into the potential socio-economic impacts of block chain

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adoption on supply chain dynamics and consumer behaviour. Research gaps also exist in understanding the long- term sustainability and environmental implications of block chain technology in supply chain management. Moreover, advancing research in areas such as zero-knowledge proofs, homomorphism encryption, and privacy-preserving techniques could enhance the security and confidentiality of block chain-based authentication systems. Collaboration between academia, industry, and regulatory bodies is essential to address these research gaps effectively and drive innovation in combating counterfeit products while ensuring the integrity and transparency of global supply chains.

III. SYSTEM ANALYSIS

EXISTING SYSTEM:

In the past, the procedure followed in fake product identification relied heavily on manual inspection and traditional security measures like holograms, serial numbers, and visual inspection. Consumers would typically rely on these features to determine if a product was genuine or counterfeit. While these methods provided some level of protection, they had certain drawbacks.

Drawbacks:

Time consuming,

High costs,

Manual errors,

Slow process.

This system based on centralised system.

It has a less security

Data base handler can change the data

Existing system have use the current tracking system for Product delivery. In this method the admin can take all the control, so they can modify the data and also we need go for the third party for trust and making a security. This system has a lot possibility to change the real product when it's going to customer.

IV. PROPOSED SYSTEM:

To address the drawbacks of traditional product identification methods we are utilizing block chain's decentralized and immutable nature to prevent unauthorized alterations or falsifications of product information

We are trying to implement block chain's immutability to create a tamper-proof ledger of product details. We are trying to implement smart contracts to automate product verification processes, ensuring authenticity throughout the supply chain.

IV SYSTEM DESIGN

SYSTEM ARCHITECTURE

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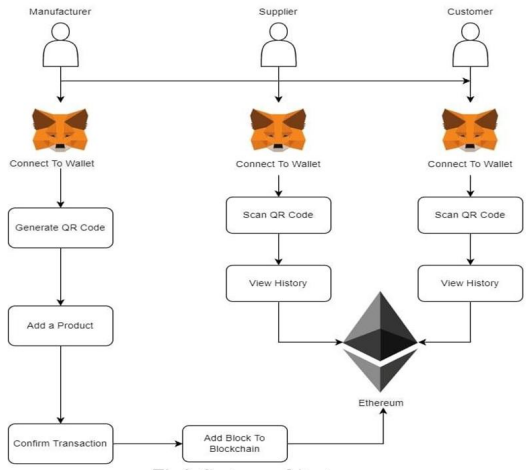

Fig 2: System architecture

The "Manufacturer" refers to the entity responsible for producing goods or products. They are the initial point in the supply chain, creating the items that will eventually reach the endcustomer.

The "Supplier" is the intermediary between the manufacturer and the customer. They facilitate the distribution of goods from the manufacturer to the customer, often handling logistics and inventory management. The "Customer" is the final recipient of the product or service. They interact with the system to make purchases or receive goods, completing the transaction cycle.

"Connect to Wallet" indicates a step where users link their digital wallets to the system. This allows for secure transactions and the transfer of funds or assets within the system.

"Generate QR Code" creates a quick response (QR) code, which can be scanned by users to initiate or complete transactions. QR codes provide a convenient and efficient way to transfer information, such as payment details or product information.

"Scan QR Code" enables users to capture QR codes using their devices, initiating actions or retrieving information embedded within the code.

"View History" allows users to access a record of past transactions or interactions within the system. This feature enhances transparency and enables users to track their activity overtime.

"Add a Product" permits users to include new items or services within the system, expanding the range of offerings available to customers.

"Confirm Transaction" prompts users to verify and authorize a transaction before it is finalized. This step ensures accuracy and security in the exchange of goods or services. "Add Block to Block chain" involves incorporating transactional data into a block chain, a decentralized and immutable ledger. This process ensures transparency, security, and integrity within the system.

"Ethereal" refers to a block chain platform that supports smart contracts and decentralized applications. It may be utilized within the system architecture to

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execute transactions and record data securely overall.

V. ETHEREUM:

Often hailed as a pioneer of smart contract technology, Ethereal emerged in 2015 as the brainchild of visionary developer Vitally Buttering. What sets Ethereal apart is that it uses Turing-complete programming languages to enable developers to build distributed applications (DApps) that can automatically manage contracts and transactions without intermediaries.

Unlike Bitcoin, Ethereum works on a Proof-of-Stake (PoS) consensus scheme, which aimsto move away from the energy-intensive Proof-of-Work (PoW) model. These changes promise better scalability and efficiency, positioning Ethereum as a leader in sustainable block chain solutions. Ethereum 2.0, an upcoming update to Ethereum, is expected to significantly improve scalability and security, paving the way for mainstream adoption.

The Ethereum ecosystem is characterized by a vibrant community of developers and enthusiasts who continue to push the boundaries of block chain innovation. Projects such as decentralized finance (DeFi), non-fungible tokens (NFTs), and decentralized organizations (DAOs) are growing on the Ethereum network, demonstrating its capacity and adaptability to many use cases beyond peer-to-peer transactions.

The Ethereum Virtual Machine (EVM) is a working environment for smart contracts on the Ethereum block chain. This allows developers to deploy their code in a secure environment, ensuring that the contract is stable without outside interference.

i. USE CASE DIAGRAM:

A use case diagram is a type of Unified Modelling Language diagram used to visualize interactions between systems and actors. A graphical representation of how the system works and the actors that interact with it. Case diagrams are used to model system behaviour from the user's perspective. This helps identify different ways users interact with the system and provides information about how the system behaves in different situations.

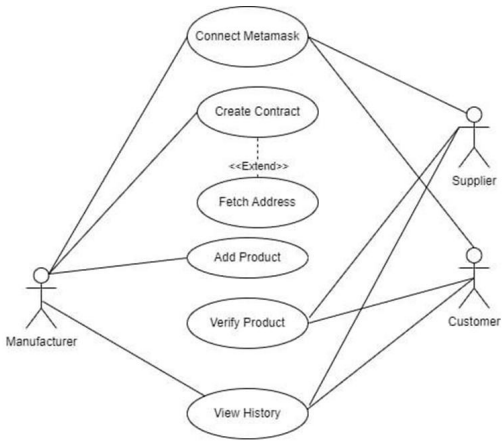

Fig 3: Use case diagram

i. CLASS DIAGRAM:

A class diagram is a type of diagram that

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describes and provides an overview and structure of a system based on classes, properties, methods, and characteristics, and is part of the Unified Modelling Language (UML). Relations between the different classes.

Typically, a class diagram contains two or more classes or all classes created for a system. This is a type of structural diagram, similar to a flowchart with three main components shown in square boxes. The first, or top section, names the class, the second, or middle section, identifies the characteristics of that class, and the third, or bottom section, lists the terms and functions any class can perform.

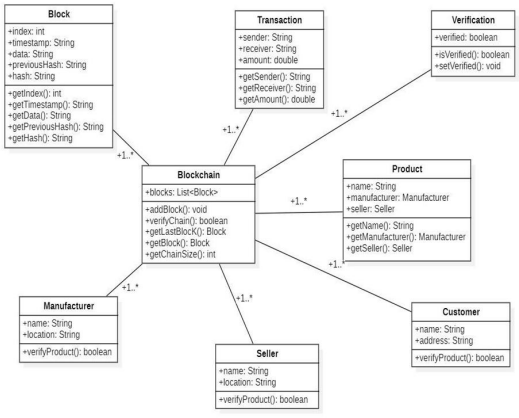

Fig 4: Class diagram

i. ACTIVITY DIAGRAM:

An activity diagram describes how activities are coordinated to provide services at different levels of abstraction. Generally, an event must be performed by some action. In particular, the activities that requires the coordination of different tasks, how the events of the same case relate to each other (especially through cases and activities) and cross and need coordination. It is also useful for modelling how a collection of use cases can be coordinated to represent a business workflow.

Functional diagrams provide a high-level understanding of system performance. Before drawing a functional diagram, you need to know exactly which components you are going to use. The main purpose of working in a system of thought is to keep working. Activities are actions performed by the system under consideration. After defining your activities, you need to know how to relate to their constraints and conditions.

Ject-oriented system into the smaller components, so as to make them more manageable. It models the physical view of a system such as executables, files, libraries, etc. that resides within the node.

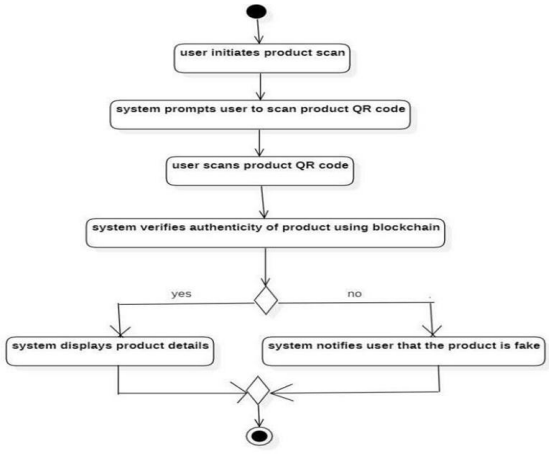

Fig 5: Activity diagram

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VI. IMPLEMENTATION

Implementing a fake product identification system using block chain at a student level canbe a challenging but rewarding project. Below, I'll outline a simplified approach to implementing such a system:

Choose a Block chain Platform: Select a block chain platform suitable for your project. Ethereum is popular for educational purposes due to its smart contract functionality, but you can also explore other platforms like hyper ledger Fabric or Stellar. Define Smart Contracts: Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller being directly written into code. In your case, you would need smart contracts to handle product registration, verification, and tampering detection.

Product Registration Smart Contract: This smart contract should allow manufacturers to register their products on the block chain by providing product details such as ID, name, manufacturer details, etc. Upon registration, the contract should emit an event indicating successful registration.

Product Verification Smart Contract: This smart contract should allow anyone to verify the authenticity of a product by providing its ID. The contract should retrieve the product details from the block chain and verify its authenticity based on predefined criteria. It should then return a result indicating whether the product is genuine or fake.

Tampering Detection Smart Contract: This smart contract should store the history of product details on the block chain. Whenever there's an attempt to modify the product details, the contract should check for inconsistencies or unauthorized changes. If tampering is detected, it should raise an alert.

BLOCK CHAIN OVERVIEW:

Block chain is a decentralized and distributed ledger technology that records transactions across multiple computers transparently and transparently. A block chain is a block of data that is linked together to form a chain of time

Each block contains a time stamp and a reference to the previous block, creating a secure and immutable record. One of the unique features of block chain technology is its logic. This is the process by which a transaction is validated and added to the block chain. . The most popular method is Proof of Work (PoW) used by Bit coin, but there are other innovative methods such as Proof of Stake (PoS), Delegated Proof of Stake (DPoS) and Practical Byzantine Fault Tolerance. PBFT). These processes ensure the integrity of the block chain without the need for a central authority.

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Another feature of block chains is smart contracts, self-executing contracts, and contractual terms written directly in code. Smart contracts automatically enforce the terms of the contract, eliminating the need for intermediaries and reducing the risk of fraud or manipulation.

Block chain technology has many applications beyond money. We are exploring this in supply chain management, healthcare, voting systems, identity verification and more. For example, in supply chain management, block chain provides transparency and accessibility, allowing customers to track a product's journey from manufacturer to storage .

platform. Public block chains, such as Bit coin and Ethereum, are open for anyone to enter and confirm transactions, while private block chains restrict access to only authorized participants. This flexibility makes block chain suitable for many use cases, from open-source projects to enterprise solutions.

Despite its potential, block chain technology still faces challenges such as scalability, cooperation and legal problems. However, research and development efforts are underwayto address these issues and harness the power of block chain across various industries

VII. OUTPUT SCREENS

Screens

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System Abstract

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fig 9: In above screen click on 'Admin Login Here' link to get below login.

Fig 10: In above screen admin is login using username and password as 'admin and admin' and after login will get below admin Home page.

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Product ID	Product Name	Product Price	Manufacturing Details	Company Details	Date & Time	Barcode Digital Signatures
1	Vijaya Milk	50	2023-03-17	Vijaya Diary	2023-03-18 00:05:03.335577	0581f05d476831a7d1e4e0a71b8501c38019ed643ee74f6648b4921b0b6610b3

Fig 18 : In above screen user can view all product details of Given ID and now click on 'Authenticate Scan' link which allow user to upload Product Barcode and then application will generate Digital Signature and verify with Blockchain signature and if signatures valid then will get product details else authentication get failed.

Product ID	Product Name	Product Price	Manufacturing Details	Company Details	Date & Time	Barcode Digital Signatures
Uploaded Product Barcode Authentication Failed						

Fig 20: In above screen in blue color text we can see fake barcode authenticationgot failed. Similarly you can add any number of product details and perform authentication using Block chain.

VIII. CONCLUSION

In conclusion, implementing block chain technology for fake product identification offers a unique and robust solution to combat counterfeit goods. By leveraging block chain's immutable ledger and decentralized nature, consumers can verify the authenticity of products with confidence, while manufacturers can ensure the

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integrity of their supply chains. This innovative approach not only safeguards consumer trust but also fosters transparency and accountability across industries,ultimately contributing to a safer and more trustworthy marketplace.

IX. FUTURE ENHANCEMENT

One future enhancement in fake product identification using block chain technology could involve the integration of Internet of Things (IoT) devices and RFID (Radio-Frequency Identification) tags with block chain-based systems.

By combining IoT sensors and RFID tags with block chain, every product could be assigned a unique digital identity recorded on the block chain at the point of manufacture. This digital identity would include information such as the product's origin, manufacturing details, and supply chain journey.

Throughout the product's lifecycle, IoT sensors embedded in the product or its packaging could continuously collect data such as temperature, humidity, location, and other relevant parameters. This data would be securely recorded on the block chain, providing an immutable record of the product's journey from production to consumption.

When a consumer purchases a product, they could scan an RFID tag or use a mobile app to verify the product's authenticity by accessing the block chain record. This would enable consumers to instantly verify if the product is genuine or counterfeit, reducing the risk of purchasing fake or substandard goods.

Additionally, smart contracts could be employed to automate processes such as warranty validation, product recalls, and after-sales service. For example, if a product is found to be counterfeit or defective, the smart contract could automatically trigger a refund or replacement, enhancing consumer trust and satisfaction.

Furthermore, block chain-based systems could facilitate collaboration among stakeholders in the supply chain, including manufacturers, distributors, retailers, and consumers. By providing transparency and access, block chain technology can help identify and eliminate counterfeit products at all stages of the supply chain, ultimately protecting consumers andbrand reputation.

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