IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

FAKE PRODUCT IDENTIFICATION USING BLOCKCHAIN

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Abstract -The challenges in supply chain management, including service redundancy, poor coordination, and lack of standardization due to transparency issues, pose significant obstacles to various industries. Counterfeiting, a prevalent threat, undermines legitimate businesses and consumer trust. A promising solution to this problem is the integration of blockchain technology, offering a decentralized and immutable framework for product tracking. By assigning unique identifiers recorded on the blockchain at each supply chain stage, transparency is enhanced, and counterfeit detection becomes more feasible. Blockchain's decentralized nature ensures tamper-resistant records accessible to all stakeholders, fostering collaboration and trust. Despite potential challenges like setup costs and infrastructure integration, the benefits of improved counterfeit detection and supply chain transparency justify further exploration and refinement of blockchain-based solutions.

Keywords: Counterfeit(Fake) product, QR code, Blockchain, Supply Chain, Transaction history,Ethereum

I. INTRODUCTION

Blockchain technology has garnered significant attention and seen widespread development over the past decade. Its decentralized nature and immutable ledger system offer versatile applications across various industries. By providing a secure platform for recording, trading, and tracking assets within a business network, blockchain not only mitigates risks but also reduces costs for all stakeholders involved. Utilizing blockchain as the foundation for any application ensures the integrity and tamper resistance of the data it handles, making it a compelling solution for modern challenges.

In this paper, a decentralized application system (DApp) is introduced, leveraging Ethereum blockchain technology within its architecture. The DApp is designed to emulate real-world supply chains, facilitating the seamless transfer and recording of product ownership within the blockchain network. Furthermore, the adaptability of this system extends beyond supply chains to encompass e-commerce and retail platforms, promising enhanced transparency for consumers navigating virtual environments. By harnessing the power of blockchain, this innovative solution aims to revolutionize how transactions and asset ownership are managed across diverse industries.

While previous research has explored technologies like Radio Frequency Identification (RFID) in supply chain management, concerns regarding security and privacy persist. The blockchain-based system proposed in this paper offers a robust alternative, addressing these challenges effectively. By leveraging the inherent security features of blockchain technology, such as decentralized consensus and cryptographic encryption, the system ensures the integrity and confidentiality of supply chain data, paving the way for more secure and transparent business processes.

II. RELATED WORKS

Several researchers have suggested different methodologies for establishing supply chain management systems based on blockchain technology. One of these studies introduced a system for identifying counterfeit products using an Android application, allowing users to search for products within the blockchain network [3]. Another paper described a system for detecting fake products using blockchain, utilizing the SHA-256 Algorithm for product identification [4]. A team of researchers developed a comprehensive anti-product forgery system that employs digital signatures for verification [5].In another study, a proposal was made for a Product Ownership Management System based on blockchain, demonstrating its advantages over traditional RFID-based systems [6]. Another research project outlined a food traceability system that combines IoT and blockchain technologies, incorporating fuzzy logic to assess food quality [7]. Additionally, a paper illustrated a system that combines blockchain with RFID [8].To enhance current supply chain methodologies, researchers integrated blockchain with IoT to track product origins [9]. These various approaches highlight the increasing interest and experimentation with blockchain technology in addressing challenges within supply chains.

III. EXISTING SYSTEM

[1].Traditional Deliver Chain control: The modern system is based on traditional supply chain control techniques that have been used for decades. those strategies contain the coordination and management of numerous tactics, consisting of buying, production, distribution and retailing.[2] Challenges confronted: no matter its toughness, the conventional supply chain management machine faces numerous challenges. those demanding situations encompass carrier redundancy, wherein a couple of techniques or departments carry out similar features, leading to inefficiencies and extended expenses. some other problem is bad coordination between departments, as gaps in conversation and collaboration regularly lead to delays and errors. additionally, a loss of standardization because of transparency problems complicates supply chain control, making it difficult to accurately song and verify product information.[3]. Risk of Counterfeit products: one of the most sizeable demanding situations within the cutting-edge supply chain management system is the presence of counterfeit products. Counterfeit products pose a considerable risk to both agencies and clients as they may be of lower pleasant and probably harmful. figuring out and mitigating the presence of counterfeit merchandise inside the deliver chain is important to preserving the integrity of the machine and protecting purchaser confidence.[4] Preceding answer tries: various strategies were proposed and implemented in an try to clear up the trouble of counterfeit merchandise. those methods include Radio Frequency identification (RFID) era, which uses radio waves to music and discover products in the course of the supply chain. synthetic intelligence (AI) has additionally been used to stumble on counterfeits, which uses algorithms to analyze product capabilities and identify discrepancies. further, QR code-primarily based systems were used to provide consumers with easy access to product records and authentication.[5] Limitations of previous solutions: while these techniques have proven promise, in addition they have barriers. as an instance, RFID generation can be susceptible to copying or interference, compromising its effectiveness in detecting counterfeits. AI-primarily based systems require widespread computing electricity and may not be viable for all agencies. in addition, QR code-based structures can be copied or tampered with, undermining their reliability as counterfeit detection tools.[6] Inadequacy of the current gadget: in spite of the implementation of diverse answers, the current supply chain management machine nonetheless lacks a comprehensive and effective method to fight counterfeit products. an improved and comfy technique is needed that addresses the restrictions of current methods and offers extra transparency and authenticity all through the supply chain.

IV. PROPOSED SYSTEM

Product Registration Module:

The product registration module serves because the preliminary step in integrating a product into the blockchain-based totally authentication tool. Its number one characteristic is to facilitate the registration of products inside the machine. Upon registration, the module generates a clever agreement that delineates the phrases of the product's authentication. This clever contract performs a pivotal function in making sure that the product's authenticity can be confirmed efficaciously in the course of its lifecycle. thru embedding particular authentication parameters and situations inside the smart settlement, the module establishes a standardized framework for authenticating merchandise within the gadget. through this manner, the module no longer simplest permits the seamless integration of products into the authentication machine but also lays the basis for subsequent verification strategies.

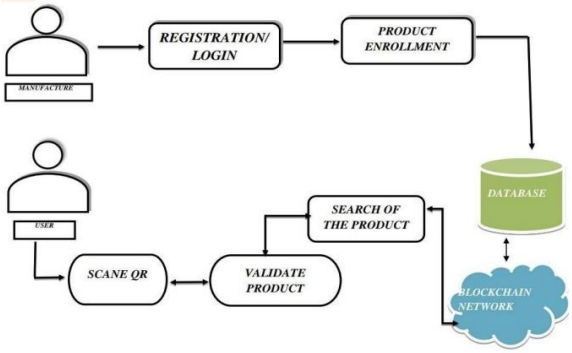

Figure.1.Block Diagram

Verification Module:

The verification module represents the middle capability of the authentication system, chargeable for verifying the authenticity of registered merchandise. while a customer purchases a product, they could provoke the verification procedure with the useful resource of scanning the product's QR code or manually getting into its particular identifier into the system. Leveraging the statistics stored at the blockchain, the module conducts a whole evaluation to envision the product's authenticity. If the product is determined to be right, the related smart settlement is performed, triggering a notification to the purchaser confirming the product's authenticity. Conversely, if the product is diagnosed as counterfeit, the smart agreement stays inactive, and the customer is right away notified of the product's illegitimacy. thru this rigorous verification manner, the module plays a critical function in safeguarding customers in opposition to counterfeit products and retaining the integrity of the authentication device.

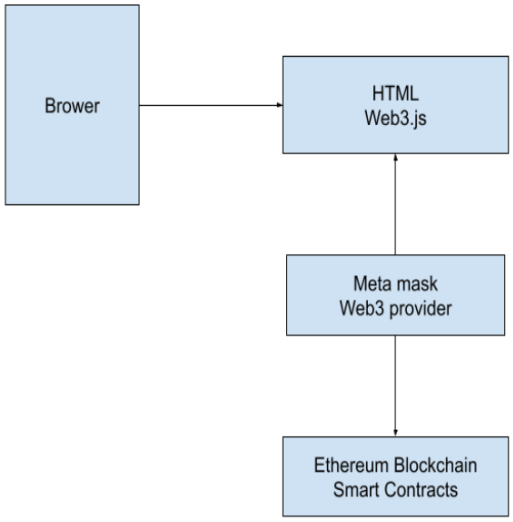

Figure.2.Working of Smart Contracts

Consumer Interface Module:

The individual interface module serves because the number one interface thru which customers have interaction with the authentication system. Designed to be intuitive and consumer-friendly, the module offers consumers with seamless get admission to to key functionalities, inclusive of product registration, verification, and counterfeit reporting. thru the interface, purchasers can effortlessly sign on their purchased products in the device, taking off the authentication manner. furthermore, the module lets in consumers to verify the authenticity of merchandise through scanning QR codes or getting into specific identifiers, empowering them to make knowledgeable shopping for alternatives. within the occasion of encountering a counterfeit product, clients can make use of the interface to document the incident, thereby contributing to the non-prevent improvement and efficacy of the authentication system. with the aid of prioritizing usability and accessibility, the person interface module enhances client engagement and fosters believe in the authentication procedure, in the long run fortifying the integrity of the entire machine

V. METHODOLOGY

The system proposed then uses MetaMask cryptocurrency portmanteau for deals and and the smart contract then has been stationed in the Rinkeby Test Network of the EthereumBlockchain.The DApp is grounded on three major stakeholders, the Manufacturer, the dealer and the Consumer

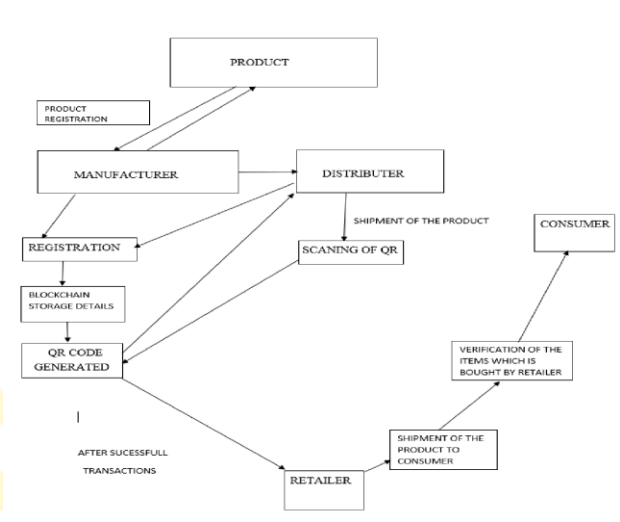

Figure.3. System Architecture

It depicts the system illustration of the proposedDApp.Every stoner of the DApp has to be authenticated before logging in. This authentication system has been enforced using Firebase which is a platform handed by Google for developing interactive mobile and web operations. After successful authentication, the manufacturer can add their company to the DApp and enroll products of the company. The contract address of the company is handed to the manufacturer and all the company data as well as manufacturer's account address are stored in the blockchain network. After a product has been included in the blockchain, it's assigned a QR law for verification. The merchandisers can buy products from manufacturer after enrollment . The power transfer of the product can be tracked through the QR law.

Manufacturer

The manufacturer's functions include adding the company to the blockchain by furnishing company name and setting the minimal enrollment figure to come a dealer or retailer for the company. The manufacturer solely preserves the rights to enroll products in the network. The manufacturer can also control the distribution status of products and transfer power after a dealer has bought the product stock. The manufacturer performs two major functions videlicet adding and distributing products in this system.

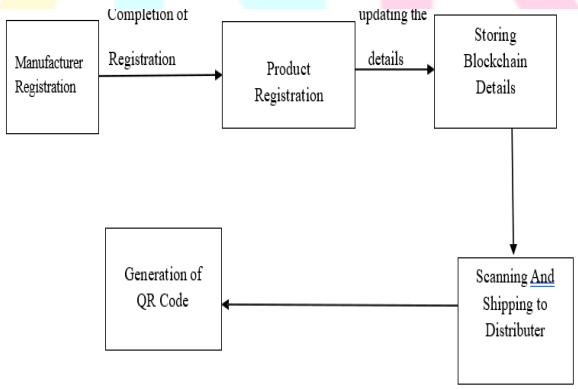

Figure 4.Manufacture Module

Seller

A dealer can pay the minimal figure set by the manufacturer and register for the company. After registering formerly, the dealer can buy

any product as well as track its distribution. A product status is set from ' Ready To Go ' to ' packed ' after the manufacturer vessels it out to the dealer

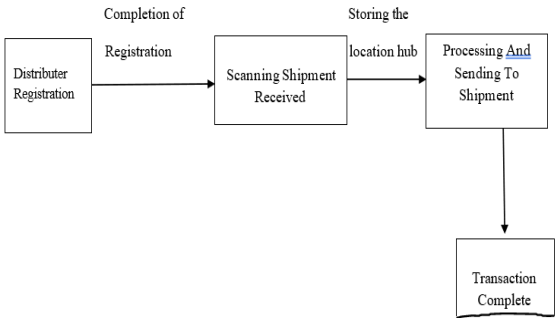

Figure.5.Seller Module

Consumer

A consumer can overlook the QR law handed with each product and corroborate the transfer of power of product from manufacturer to dealer. The consumer can also corroborate the name of the current proprietor of the product and check its distribution status.

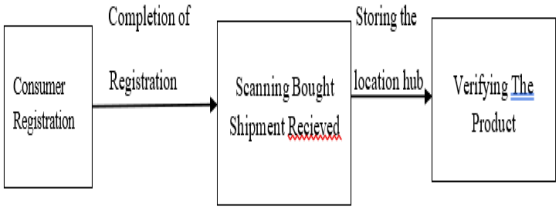

Figure.6.Consumer Module

Ethereum DApp Architecture

The stoner interface(UI) then has been developed using ReactJS. However, the DApp will use Web3, If the stoner wants to interact with the smartcontract.js which communicates with MetaMask through its provider. MetaMask creates a sale and signs it with the stoner's private key. This sale is also transferred to Ethereum network. The sale is reused, vindicated and added to a block in the network. The private keys of the stoner are no way recorded in the process so stoner can safely interact with the network

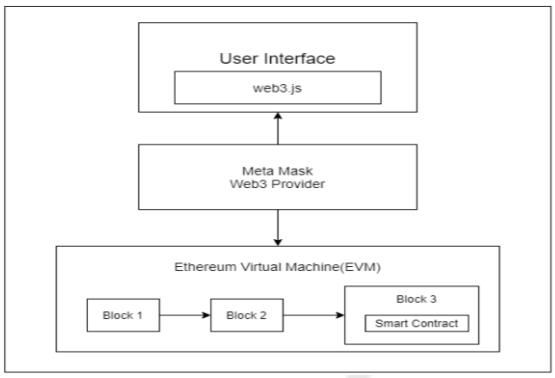

Figure.7.Etherum DApp Architecture

VI. RESULT AND DISCUSSION

Exchanging information to the Blockchain comes with a few cost appertained to as exchange fetched. Mineworkers tend to prioritize bargains with progressed costs. exchange taken a toll is measured in gas and gas cargo are paid in Ethereum's local money ether ETH. The table demonstrates the exchange taken a toll and gas freights demanded for the proposed system. also CoinMarketCap[10] was utilized to change over Ether to US bones. Remix which is a web cyber surfer IDE for developing DApp was utilized decide the gas needs. MetaMask was used for contract commerce and deciding the costings.

Sl No.	Function Description	Transaction Cost (gas)	Gas Fee (ETH)
1	Deploy Contract of our system	133405	0.001333
2	Adding New Company	1068597	0.001069
3	Seller Registration	45755	0.000046
4	Product Enrollment	208571	0.000209
5	Buying Product	41581	0.000042
6	Product Distribution	55578	0.000056
Total=0.002755 ETH/ $8.56			
Deploy= $4.14			

Table.1.Cost Calculation

The fetched for planting our contract in the Rinke by Test Arrange is ETH which is unique to4.14 US bones. The overall going for the framework is lower than 10 US dollars which demonstrates the taken a toll viability of the proposed show. The product control exchange as well item quality assurance costs are too diminished too compared to current ask trends to authenticate item realness. A buyer can ignore the QR law and authenticate the control exchange of the item. The manufacturer's account address, the dealer's account address and title as well as the status of item is recorded in the QR the item exchange is If the item status is ' stuffed '. veritable and the arrange is set to ' total ' in the blockchain. The QR law is given with dupe-sensitive computerized image pattern

VII. CONCLUSION

Control shadowing framework is being reshaped through disseminated checks of Blockchain innovation. Due to rapid-fire changes in the Ecommerce and trade segments, the current trends of constrain chain are being influenced. The DApp created at that point guarantees lesser translucency in the drive chain operation and can moreover be depended for utilize in Ecommerce. As comparative, official costs and complicated strategies are excluded by this handle. either, the fetched for selecting each product in the proposed demonstrate is only 0.000209 ether which is unique to 0.65 US bones that can adequately reduce costs for huge chain stores. The show moreover guarantees end user confirmation framework through a QR law and deals then can be vindicated on Etherscan as well. As unborn work of the proposed demonstrate, the capacities included can be bettered further to bring trustability in the drive chain operation.

VIII. FUTURE WORK

The proposed framework truly makes a difference the retail request, manufacturers, and shoppers from forging products but the framework fizzled when a QR law is taken from a genuine product and given to a fake item moreover the item which is vended to begin with come veritable it doesn't tally it's a genuine product or fake item but another item is treated as a fake product. Moreover putting away the drive chain of each product bear a colossal quantum of memory which is going to make this system precious. The unborn work is to apply this demonstrate and attempt to resolve the confinement comparative as bedding a few fabric in the product so that when a individual tries to take the QR law, the chip or commodity will shoot the flag

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