FAKE PRODUCT DETECTION USING BLOCKCHAIN TECHNOLOGY

N. SRINIVASA RAO,MOHANA SIVA HANUMAN SAI ADAPA

Assistant Professor, DEPT. of MCA, SKBR PG COLLEGE, AMALAPURAM, Andhra Pradesh
Email: -naagaasrinu@gmail.com
PG Student of MCA, SKBR PG COLLEGE, AMALAPURAM, Andhra Pradesh
Email:- hanumansai923@gmail.com

ABSTRACT

Counterfeit products pose a significant threat to businesses and consumers worldwide, leading to financial losses and potential risks to consumer safety. Traditional methods of detecting and preventing fake products have proven to be inadequate in the face of ever-evolving counterfeit operations. However, the emergence of blockchain technology offers a promising solution to tackle this issue. This research explores the application of blockchain in fake product detection and proposes a unique system that leverages the decentralized, transparent, and immutable nature of blockchain to ensure the authenticity of products. By utilizing smart contracts and digital identities, manufacturers can register their products on the blockchain, creating an incorruptible record of each item's origin, manufacturing details, and distribution history. Consumers can then verify the authenticity of a product by scanning its unique identifier, providing them with confidence and trust in their purchase. This paper examines the benefits and challenges of implementing blockchain-based fake product detection systems, including enhanced transparency, reduced fraud, and increased collaboration among stakeholders. The research concludes that blockchain technology has the potential to revolutionize the fight against counterfeit products, protecting businesses and consumers from the harmful effects of fakes and fostering a more secure and reliable marketplace.

Keywords: : Blockchain, Decentralized, Ethereum, Smart Contract, Counterfeited Product, QR Code. Analysis.

I. INTRODUCTION

Counterfeit products present a significant problem for industries and consumers worldwide, resulting in financial losses and potential safety hazards. Traditional methods of detecting and preventing fake products have proven insufficient in effectively addressing this issue. However, the emergence of blockchain technology offers a promising solution for detecting and combating counterfeit products. This paper explores the application of blockchain in fake product detection and proposes a system that leverages the unique characteristics of blockchain to ensure product authenticity. The objective is to develop a robust framework that provides a secure and transparent platform for identifying, tracking, and verifying the legitimacy of products throughout the supply chain. By utilizing smart contracts and digital identities, manufacturers can create an immutable record of each product's origin, manufacturing details, and distribution history. Consumers can then verify the authenticity of a product through a unique identifier, enhancing their confidence in their purchases and protecting against counterfeit goods. Implementing blockchain technology in fake product detection offers numerous benefits, including increased transparency, reduced fraud, improved consumer trust, and enhanced collaboration among supply chain stakeholders. However, there are challenges to consider, such as scalability, interoperability, and regulatory compliance. In conclusion, integrating blockchain technology into fake product detection has the potential to revolutionize the fight against counterfeit products, ensuring a more secure and trustworthy marketplace for businesses and consumers. By leveraging the decentralized and transparent nature of blockchain, we can establish effective measures to combat the growing counterfeit market.

II. METHODOLOGY

Data Collection: Collect accurate and reliable product data, including unique identifiers, manufacturing details, and supply chain information. This data can be obtained from manufacturers, suppliers, and other trusted sources. QR Code Generation: Generate a unique QR code for each product, containing encrypted information related to its authenticity and traceability. Product Registration: Register the product data on the blockchain using smart contracts, associating the QR code with the relevant information. This ensures the immutability and integrity of the registered data. Supply Chain Tracking: Utilize the QR code scanning process to track the

movement of products throughout the supply chain. Each scan updates the product's status on the blockchain, providing transparent and traceable information. Blockchain Consensus: Leverage the consensus mechanism of the blockchain to achieve agreement among network participants regarding the authenticity and integrity of the registered product data. This consensus process ensures the accuracy and reliability of the information stored on the blockchain. QR Code Verification: Implement a QR code verification mechanism that allows consumers, retailers, or interested parties to scan the product's QR code. The system retrieves the associated data from the blockchain and verifies its authenticity, ensuring the product's legitimacy. Fraud Detection: Employ algorithms or AI-based systems to analyze the registered data for patterns or anomalies that may indicate counterfeit products. These fraud detection mechanisms identify suspicious activities, such as duplicated QR codes or inconsistent supply chain records. Reporting and Remediation: Establish a reporting mechanism for consumers or stakeholders to report suspected counterfeit products. Upon receiving such reports, investigate and take appropriate actions, such as removing counterfeit products from circulation or initiating legal proceedings. Collaboration and Transparency: Foster collaboration among supply chain stakeholders by granting them access to the relevant product data on the blockchain. This transparency promotes trust and accountability, enabling proactive measures against counterfeit products. Continuous Monitoring and Updates: Regularly monitor the blockchain system for potential vulnerabilities or emerging counterfeit trends. Implement updates and improvements to enhance the system's security, performance, and efficiency.

III. LITERATURE SURVEY

3.1 Literature Survey

Table -3.1: Deep Literature Survey of Blockchain Based Systems

Sr No.	Paper Title	Publication Details	Author Name	Limitations	Challenges
1	Fake Product Detection using Blockchain	IEEE-Access 2020	Tejaswi ambe, Sonali Chitkala	Limited Coverage	Data Accuracy
2	Detection of Counterfeit Products using Blockchain	IRJMETS 2022	Kunal Won-Shik, Isha Sondawale	Cost	Privacy and confidentiality
3	Identifying Counterfeit Products using Blockchain Technology in Supply Chain System	IJARIIE 2022	Pramit Dutta	Technical Complexity	Scalability
4	Fake Product Detection Using Blockchain Technology	IJARCE 2022	Sri Krishna Shastri C, Vishal K	Lack of Standardization	Efficiency
5	Blockchain based product identification system.	ITM Web of Conference 2022	M.Suhana S. Sujatha	Less Secure	Privacy and confidentiality
6	Anti-Counterfeiting Blockchain Using a Truly Decentralized, Dynamic Consensus Protocol	PDX Scholar	Naif Alzahrani, Nirupama Bulusu	Technical Complexity	Complexity of algorithm
7	Fake Product Identification System Using Blockchain	IEEE 2022	Anita Kanavalii, Kushagara Gupta	Technical Complexity	Data Accuracy
8	A Blockchain-Based Fake Product Identification System	IEEE 2022	Yasmeen Dabbagh, Reem Khoja	Cost	Efficiency

a. ALGORITHMIC SURVEY

Table -3.2: Algorithmic Survey of Research Studies

Sr No.	Algorithm Used	Time Complexity	Space Complexity	Advantages	Disadvantages
1	Secure Hash Algorithm (SHA)	O(n)	O (1)	Strong Security, Large key space.	Deterministic.
2	Proof of Work (PoW)	Slower than Proof of Stake	Slower than Proof of Stake	Decentralized, Simple Design.	Consumes large amount of energy,
3	Proof of Stake (PoS)	Faster than Proof of Work	Depends upon network size and traffic	Consume less amount of energy.	Security risk.

b. LIVE SURVEY

Table -3.3: Live Survey of Recent Blockchain Based Systems on Various Organizations

SrNo.	Organization Name	Year Established	Stated Word	Algorithm used	Time & Space Complexity
1	Real Items Foundation	2017	REAL Items are verifiable products with a blockchain smart labels each with a digital identity stored on blockchain with Non-Fungible Tokens.	NFT Standard Algorithms	Directly dependent on number of input n and network size.
2	IBM Research	2018	Developed supply chain system for tracking specific goods and medicine tracking system help developing countries.	Proof of Work, SHA algorithms for Security	Lesser as compared to standard system due to limited network size.

IV. RESULTS AND DISCUSSION

V. CONCLUSION

Through the use of blockchain, manufacturers can create a unique and immutable digital identity for each product, enabling the traceability and verification of product information throughout the supply chain. This allows consumers to easily verify the authenticity of a product, reducing the risk of purchasing counterfeit or fake products. Manufacturers and Suppliers can use the system to store product details in Blockchain which offers certain properties such as security and privacy of the data on the network. The customer views the good's supply chain history and verifies if the goods are genuine. Customers can be sure about the integrity of the goods they purchase. This system helps to lower the rate of counterfeiting and boost the economy. Further system can be extended to avoid frauds done in healthcare, voting system, online shopping, banking, and so on.

Moreover, these real-time systems can enable the creation of decentralized marketplaces that prioritize authenticity and transparency, reducing the risk of fraud and counterfeiting in online transactions.

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