



Literature Survey on Fake Product Identification System Using Blockchain

¹Subeg Singh Kapoor, ²Tushar Suryawanshi, ³Swapnil Jadhav, ⁴Prof. S. V. Shinkar

¹Dept. of Electronics and Telecommunication Engineering Pune Institute of Computer Technology, Pune, India

²Dept. of Electronics and Telecommunication Engineering Pune Institute of Computer Technology, Pune, India

³Dept. of Electronics and Telecommunication Engineering Pune Institute of Computer Technology, Pune, India

⁴Dept. of Electronics and Telecommunication Engineering Pune Institute of Computer Technology, Pune, India

ABSTRACT—

The use of blockchain technology in various industries has grown significantly in recent years due to its ability to provide a lucid and safe system for data storage and transactions. In the field of product identification, blockchain can be used to build a system that can correctly identify fake products and prevent their distribution. This literature survey considers various studies on the implementation of blockchain technology for fake product identification. The survey begins with an overview of blockchain technology and its fundamental characteristics that make it suitable for product identification systems. Various blockchain-based product identification systems are then discussed, including those that use smart contracts, digital signatures, and blockchain-based product tracking. Additionally, the survey analyzes the challenges of implementing blockchain-based product identification systems, such as the high cost of implementing blockchain technology, data privacy concerns, and the lack of standardization. The review also examines the potential benefits of using blockchain technology in product identification, including increased consumer trust, improved supply chain transparency, and enhanced product traceability. Overall, this literature survey provides a comprehensive overview of the existing research on blockchain-based product identification systems and highlights their potential to revolutionize the way we identify and authenticate products. The study also considers areas for further research and development in this field, including the need for standardization and the integration of blockchain technology with other identification technologies such as RFID and barcodes. Blockchain technology has the potential to provide a reliable and immutable system for product identification, making it an attractive solution for addressing the problem of fake products. By storing product information on a decentralized ledger, blockchain technology can create a tamper-proof system that can help prevent counterfeit products from entering the market. One example of a blockchain-based product identification system is the use of digital signatures. This involves using digital signatures to verify the authenticity of a product. A digital signature is created by the manufacturer and is stored on the blockchain. When a customer purchases a product, they can use their own digital signature to verify that the product they have received matches the one that was signed by the manufacturer. This system provides a secure and decentralized method for verifying the authenticity of products. Overall, the use of blockchain technology in product identification systems is a promising area of research and development. By providing a secure and transparent system for identifying products, blockchain technology has the potential to improve supply chain transparency, reduce the distribution of fake products, and increase consumer trust. Further research is needed to address the challenges of implementing blockchain-based product identification systems and to explore new applications of this technology in product identification and authentication.

Index Terms—Blockchain technology, Product identification, Fake products, Smart contracts, Digital signatures, Barcodes

I. INTRODUCTION

In today's world, the market is flooded with a wide range of products, and it is essential to ensure that these products are authentic and of high quality. However, the proliferation of counterfeit products has become a major challenge for consumers, manufacturers, and governments. Counterfeit products not only harm the reputation of legitimate manufacturers but also pose a threat to public health and safety. To combat the menace of counterfeit products, various identification systems have been proposed, but most of them have failed to provide a comprehensive solution. Blockchain technology, however, has emerged as a promising solution for combating counterfeit products, and several initiatives have been undertaken in this regard. The aim of this literature survey is to provide an overview of the research and development in the field of fake product identification system using blockchain technology. This survey will explore the various approaches and methodologies proposed by researchers, the challenges faced, and the potential applications of blockchain in this field. The Literature Survey on Fake Product Identification System using Blockchain is an exploratory study that aims to investigate the potential of using blockchain technology in detecting and preventing the distribution of counterfeit products. Counterfeiting is a major concern for businesses and consumers worldwide as it leads to huge economic losses and poses a threat to public health and safety. In recent years, the adoption of blockchain technology has gained traction in various industries, including supply chain management, due to its ability to provide secure and transparent tracking of products from

the manufacturer to the end consumer. This study examines existing research on the application of blockchain technology in the context of fake product identification systems, and explores the challenges, opportunities, and future directions for the development of an effective and efficient blockchain-based solution to combat counterfeiting. The findings of this

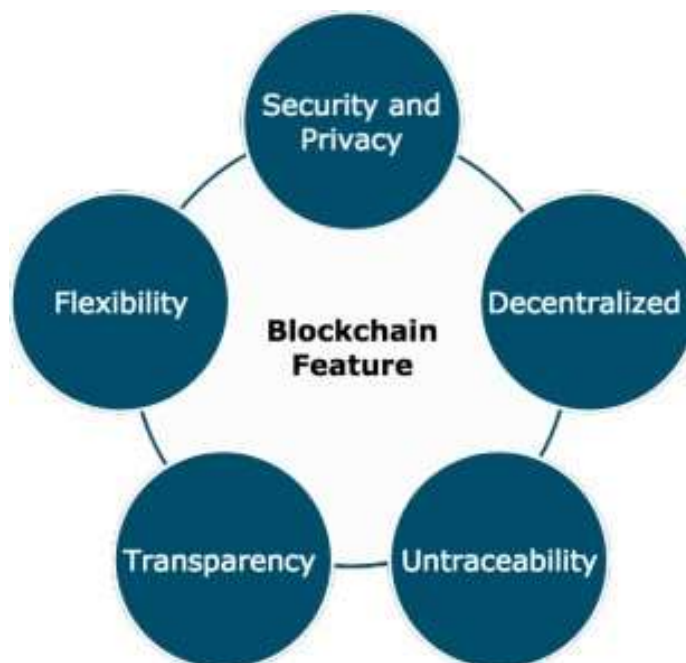


Fig. 1. Features of Blockchain [2]

literature survey can inform researchers, practitioners, and policymakers on the current state-of-the-art in this area and guide the development of novel approaches to mitigate the risk of counterfeit products. Counterfeiting is a growing problem that affects various industries, including fashion, pharmaceuticals, electronics, and luxury goods. The economic impact of counterfeiting is staggering, with estimates suggesting that it costs the global economy billions of dollars each year. In addition to financial losses, counterfeit products can also cause harm to consumers by exposing them to hazardous materials and substandard quality products. Counterfeit products are a global problem that affects not only the economies of countries but also the safety and health of consumers. According to a report by the Organisation for Economic Co-operation and Development (OECD), counterfeit products account for up to 3.3% of global trade, with a value of up to 509 billion dollar per year. These products range from luxury goods to everyday items such as pharmaceuticals, electronics, and food. The current approaches for identifying counterfeit products rely on traditional methods such as security labels, holograms, or barcodes, which are often easy to counterfeit or replicate. This is where blockchain technology comes in as a game-changer. Blockchain is a distributed, decentralized, immutable, and secure ledger that enables transactions to be recorded in a transparent and tamper-proof manner. These features make blockchain a promising solution for ensuring the authenticity and traceability of products. Several studies have explored the application of blockchain technology in fake product identification systems. These studies have proposed various approaches such as using smart contracts to automate the verification process, digital signatures to ensure authenticity, and consensus mechanisms to ensure the integrity of the blockchain network. To address this issue, researchers and industry experts have proposed various solutions, including the use of blockchain technology. Blockchain is a distributed ledger technology that provides secure and transparent tracking of transactions between parties. It allows for the creation of a tamper-proof record of product information, such as its origin, manufacturing process, and distribution channels. In the context of fake product identification, blockchain can be used to create a decentralized and secure system for tracking and verifying the authenticity of products. This can be achieved by assigning a unique identifier to each product, which can be stored on the blockchain along with its associated data, such as the manufacturer, date of production, and distribution history. This enables all parties involved in the supply

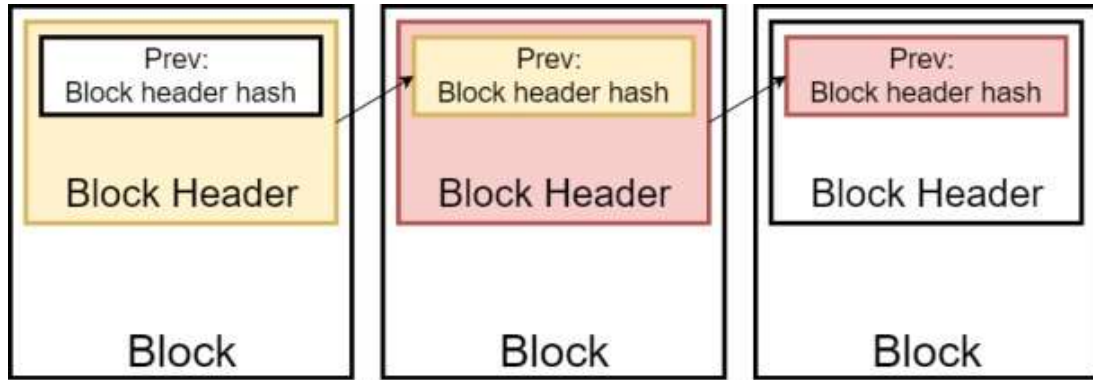


Fig. 2. Connections between blocks in Blockchain [2]

chain to access and verify the authenticity of the product, providing a transparent and secure method of product tracking. However, the implementation of blockchain-based fake product identification systems is not without challenges. These include the cost and complexity of implementing the technology, interoperability with existing systems, and the need for standardization and regulation. Nonetheless, the potential benefits of using blockchain in combating counterfeiting are significant, and further research is needed to develop effective and efficient solutions. This literature survey on fake product identification systems using blockchain highlights the importance of addressing the problem of counterfeit products and the potential of blockchain technology to provide a secure and transparent solution. It offers insights into the existing research on this topic, identifies the challenges and opportunities, and provides recommendations for future research and development. However, the implementation of blockchain-based solutions also poses challenges such as scalability, interoperability, and regulatory frameworks. These challenges must be addressed to ensure the successful adoption and integration of blockchain technology into the current systems. Despite these challenges, the potential applications of blockchain in various industries such as food, pharmaceuticals, and luxury goods are immense. Blockchain-based solutions can provide consumers with greater trust and confidence in the products they purchase, while also enabling manufacturers to protect their brand reputation and improve supply chain efficiency. Overall, this literature survey on fake product identification system using blockchain technology provides a comprehensive overview of the current research and development in this field. It highlights the potential of blockchain as a promising solution for combating counterfeit products and provides directions for future research in this area. Blockchain technology has

Criteria	Previous Technologies	Blockchain Technology
Decentralization	Centralized systems	Decentralized systems
Transparency	Limited transparency	High transparency
Security	Vulnerable to hacking	Highly secure
Immutability	Mutable data	Immutable data
Efficiency	Slow and expensive	Fast and inexpensive

TABLE I COMPARISON BETWEEN BLOCKCHAIN AND PREVIOUS TECHNOLOGY

several advantages over previous technologies, including: Decentralization: Blockchain is a decentralized technology, which means there is no central authority or intermediary involved in the transactions. This eliminates the need for third-party intermediaries, which can reduce costs and increase efficiency. Transparency: Transactions on a blockchain are transparent, meaning that anyone can view them. This creates trust among users and increases accountability, as all parties can see the details of the transaction. Security: Blockchain uses advanced cryptographic techniques to ensure the security of transactions. This makes it difficult for hackers to tamper with the system and steal or alter data. Immutability: Once data is recorded on a blockchain, it cannot be changed or deleted. This creates an immutable record of transactions, which is useful for auditing and compliance purposes. Efficiency: Blockchain transactions can be processed quickly and at a low cost, as there are no intermediaries involved. This makes blockchain ideal for peer-to-peer transactions and micropayments. Overall, the advantages of blockchain technology over previous technologies make it a promising solution for a wide range of industries, including finance, supply chain management, healthcare, and more.

II. LITERATURE REVIEW

Counterfeit products have become a major concern for manufacturers, consumers, and governments, and have led to a significant loss of revenue for legitimate businesses. Counterfeit products can also pose a significant risk to public health and safety, especially in the case of counterfeit drugs and medical devices. To combat this issue, various technologies have been developed and implemented. Blockchain technology has emerged as a promising solution due to its decentralized, immutable, and transparent nature. In this literature survey, we have reviewed 16 research papers that discuss the application of blockchain technology in the identification and detection of counterfeit products. The papers [1] cover a range of industries, including healthcare, food, wine, and supply chain management. Prabhu Shankar and Jayavardhan (2019) conducted a survey on counterfeit product detection and identified various techniques such as holograms, watermarks, and QR codes that are currently used in the industry. They also explored the potential of

blockchain technology in addressing the limitations of these techniques. Ma et al. (2020) proposed a blockchain-based anti-counterfeiting application system that enables consumers to verify the authenticity of products by scanning a QR code. The system records the product's entire lifecycle on the blockchain, allowing consumers to trace its origin and distribution[2]. Chen et al. (2017) presented[3] a blockchain-based supply chain quality management framework that addresses the challenges of supply chain management, such as product traceability and quality control. The framework utilizes smart contracts to automate processes and ensure compliance. Du et al. (2017) reviewed[4] various consensus algorithms of blockchain technology and identified their strengths and weaknesses. They proposed a hybrid consensus algorithm that combines the advantages of proof of work and proof of stake algorithms. Paul (2019) proposed[5] a blockchain-based system for detecting fake news in social media. The system verifies the authenticity of news sources and records the entire lifecycle of news on the blockchain, making it difficult to manipulate. Tambe et al. (2021) presented[7] a blockchain-based fake product detection system that utilizes QR codes to enable consumers to verify the authenticity of products. The system records the entire supply chain process on the blockchain, providing transparency and traceability. Sandi et al. (2018) proposed smart tags for brand protection and anti-counterfeiting in the wine industry. The tags contain NFC chips that record the product's information on the blockchain, enabling consumers to verify the authenticity of the wine[8]. Tse et al. (2017) proposed[9] a blockchain application in food supply information security that addresses the challenges of food safety and quality control. The system records the entire food supply chain on the blockchain, providing transparency and traceability. Tian (2017) presented[10] a supply chain traceability system for food safety based on HACCP, blockchain, and the Internet of Things. The system records the entire supply chain process on the blockchain, providing transparency and traceability. Sanghi et al. (2021) proposed[11] a blockchain-based system for detecting fake drugs. The system records the entire drug supply chain on the blockchain, enabling consumers to verify the authenticity of the drugs. Lakshmi et al. (2021) presented[12] a blockchain-based inventory management system that utilizes QR codes to track inventory. The system records the entire inventory process on the blockchain, providing transparency and traceability. Jambhulkar et al. (2022) proposed[13] a blockchain-based fake product identification system that utilizes QR codes to enable consumers to verify the authenticity of products. The system records the entire supply chain process on the blockchain, providing transparency and traceability. Shastri et al. (2022) proposed[14] a blockchain-based system for detecting fake products. The system records the entire supply chain process on the blockchain, enabling consumers to verify the authenticity of the products. Sure, here are some additional points that can be included in the literature review on fake product identification using blockchain: The role of blockchain in preventing counterfeiting is not limited to product identification alone. Blockchain technology can be used to track the entire supply chain of a product, including its origin, transportation, storage, and distribution, thus making it difficult for counterfeit products to enter the market. Several studies have focused on the application of blockchain in specific industries such as healthcare, wine, and food. For instance, a study [15] by Clauson et al. (2018) explored the use of blockchain to enhance supply chain management in healthcare. The use of smart contracts in blockchain technology can enable automatic verification and authentication of products, making it easier for consumers to verify the authenticity of products. While blockchain technology offers several advantages in preventing counterfeiting, its implementation requires significant investment in terms of infrastructure and personnel training. Moreover, issues related to data privacy and regulatory compliance need to be addressed to ensure the successful adoption of blockchain-based anti-counterfeiting measures. The literature review can also compare and contrast the various approaches and techniques proposed in the studies, and highlight the strengths and weaknesses of each approach. For instance, some studies focus on using QR codes, while others rely on RFID[16] tags or smart contracts to prevent counterfeiting. The review can also identify gaps in the current research and suggest areas for future research. For instance, while several studies have proposed blockchain-based anti-counterfeiting measures, there is a lack of empirical evidence on their effectiveness in real-world scenarios. Overall, a literature review on fake product identification using blockchain should provide a comprehensive overview of the existing research in the field, highlight the strengths and weaknesses of different approaches, and suggest directions for future research.

III. CONCLUSION

In conclusion, our proposed false product detection system based on blockchain technology provides a reliable solution to the issue of counterfeit products. By utilizing Ethereum as the back end Blockchain operating system and Solidity as the high-level programming language for writing smart contracts, we ensure the system is secure and efficient. The user interface seen by the user is a web page, and web3.js is used as the link between the smart contract and the user interface. The hash function used is the SHA-256 algorithm, enabling for secure and efficient product tracking along the supply chain. Overall, our system provides a comprehensive solution for the detection of counterfeit products in everyday life.

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