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# Fake Product Detection System Using Blockchain Technology

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**ABSTRACT:** A serious concern that poses serious risks to consumer safety, brand integrity, and market stability is the spread of counterfeit goods across a variety of industries. This project aims to develop and implement a novel Fake Product Detection System by utilizing blockchain technology, integrating AngularJS for the administrative interface, and utilizing Flutter for an easy-to-use user interface in response to this urgent problem. The goal of this all-inclusive system is to offer a strong, impenetrable platform for the registration and authenticity verification of products. The system will record each authentic product's unique identifier and transaction history by utilizing the blockchain's decentralized ledger technology. This will make it nearly impossible for counterfeit products to enter the market unnoticed. A smooth administrative experience for handling and keeping track of product registrations will be provided by AngularJS, while Flutter will deliver an intuitive and user-friendly interface for consumers to easily verify the authenticity of their purchased items. By combining blockchain's security and transparency with the user-friendly interfaces of AngularJS and Flutter, this project aims to significantly enhance consumer confidence, protect brand integrity, and foster market stability by effectively combating the counterfeit product epidemic. In doing so, it addresses a critical issue that impacts both businesses and consumers, contributing to a safer and more trustworthy marketplace.

**KEYWORDS:** Blockchain, Counterfeit (Fake Product), QR Code, Transaction History.

## I. INTRODUCTION

Fake product detection in blockchain refers to identifying counterfeit products by leveraging blockchain technology. The decentralized and immutable nature of digital ledger provides transparency and security for transactions. The main objectives of this system are Protect consumers and brands, Company revenue, Ensuring regulatory compliance, Supporting ethical practices, Brand market.

The Paper will Discuss the potential benefits of this system, including increased transparency, supply chain traceability, and consumer protection. for example, the system creates a digital record for each electronic item, containing details such as its origin, the date of manufacturing, and the supply chain information. When a gadgets is scanned at any point in the supply chain, its information is updated on the blockchain, creating a tamper-proof record of the item's journey from farm to table. Consumers can also access this information by scanning a QR code on the packaging or label of the particular product. The blockchain record provides an immutable and transparent record of the electronic item's overall scanning journey, enabling businesses to quickly identify any discrepancies or anomalies in the supply chain that may indicate the presence of counterfeit or fake products. and if an item's record shows that it has been produced in a different location than the one mentioned on the packaging, it will indicate that the product is fake or counterfeit

Finally, this paper recommend for future research in this area and its potential impact on businesses and consumers. Overall, fake product detection in blockchain has the potential to revolutionize the way businesses authenticate products and prevent fraud, providing benefits for both businesses and consumers alike.

## II. LITRETURE SURVEY

### A. Anti-Counterfeit Product System

The paper entitled '*Anti-Counterfeit Product System Using Blockchain Technology*' describes [1] how blockchain technology is used to reduce counterfeit products in the market. In this proposed a system in Quick Response (QR) is used, which is a very efficient technique to detect counterfeit products. When the user scan the QR code it will get product information if the product is real.

### B. Blockchain-Based Supply Chain Management Systems

The paper entitled '*Identifying counterfeit products using blockchain technology in a supply chain system*' describes [3]the use of blockchain in supply chain management. In the rising technology world, the rate of production of multiple products also increased, and the production of counterfeit products also increased. The counterfeit product affect the brand safety and company reputation. To deal with this this paper introduces the Decentralized blockchain based application system. To identify the counterfeit products in the supply chain system.

### C. Fake production detection

The paper entitled '*Fake Production Detection Using Blockchain Technology*' describes different anti-counterfeit methods. [4] Many Anti-Counterfeit methods have been adopted from time to time to combat fake products such as RFID tag, AIML, QR Code based systems and many more, but this method have their own pros and cons. In this paper, author build the system that improves the detection of counterfeit products using blockchain technology.

## III. METHODOLOGY

### Proposed System :

As we know, fake products are increasing worldwide, day by day, to face that issue we develop a fully functional system using blockchain technology to combat the fake products in the market.

The Proposed model has two parts. The first is a web application, and the second is a mobile application. At the manufacturer side, we use web application, which a built by using the Angular JS framework. Angular JS framework is the javascript framework developed by Google. It is used to create dynamic, robust, scalable, and maintainable web applications. It offers data binding, templates, directives, and modular development, making it a valuable tool for creating an efficient and user-friendly frontend.

On user side we use a mobile application, which is built by using Flutter. Flutter is an open-source mobile application Development Framework made by Google. It is used to develop cross platform applications from a single codebase for any web browser,Fuchsia, Android, iOS, Linux, macOS, and Windows.The Flutter framework consists of both a software development kit (SDK) and their widget-based UI library. This library consists of various reusable UI elements, such as sliders, buttons, and text inputs. Developers building mobile applications with the Flutter framework will do so using a programming language called Dart.

Web application and mobile application is connected to database and blockchain network. For Database we use Firebase. Firebase is a popular and comprehensive mobile and web application development platform provided by Google. It offers a wide range of services and tools that help developers build, improve, and manage applications with ease. Firebase includes features like real-time database, authentication, cloud functions, cloud storage, hosting, and analytics, among others. One of its key advantages is its integration with Google Cloud, making it a powerful choice for both small-scale and enterprise-level projects.

We use a quick response (QR) code to verify whether the product is genuine or not. Manufacturer add product details in the web application that is stored in the blockchain. It's essential to emphasize secure data transmission and storage to maintain data integrity with user authentication and authorization measures in place to safeguard against misuse and fraudulent activities. To store product details securely it is necessary to anyone can't change that information for that, we use blockchain technology.

Here we are using custom Blockchain. Custom blockchain is it designed for specific requirement feature or use case instead of using pre-existing blockchain like Bitcoin, ethereum organization or developers may choose to create custom blockchain to meet their unique needs. Blockchain technology is an advanced database mechanism that allows to

storage of information in the most secure and transparent way. The data added into the blockchain that anyone can't change because of its immutable and decentralized property. On the user side, the user scan the QR code to check whether the product is genuine or not. If the product is genuine, then he'll get the all detailed information about the product which includes the name of product, date of manufacture, product uuid means unique id and the main thing is how much time the product is scanned that count is shown there other information. If product is a fake, then the alert message goes to the Manufacturer with the location by permission of the user. So Manufacturer can take legal action against their shopkeeper to Stop the selling of fake products. At the user side, there are two functionalities which is a user can registered the product with their name means the product is owned by this person. So this will helpful for the next time any person can scan the QR Code. So he will get information about this product it is owned by this person already. One more functionality is the alert mechanism. So, in this system, we are using blockchain technology and QR code to identify the Fake Products.

**Flow of Proposed System :**

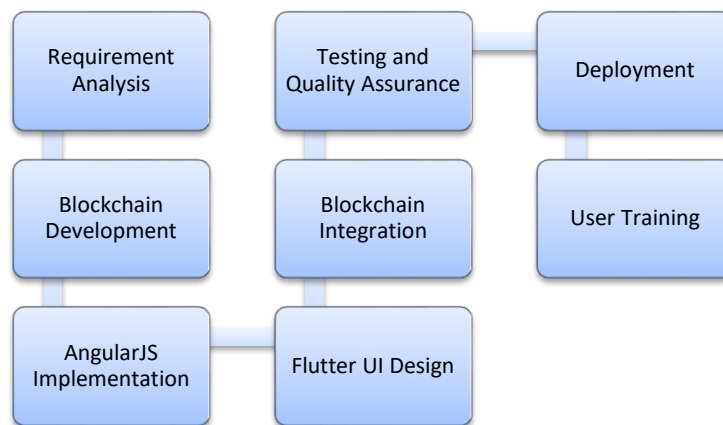


Fig 1: Flow of Proposed System.

1. Requirement Analysis: Understand the specific needs and challenges related to counterfeit product detection and user interface requirements.
2. Blockchain Development: Develop a blockchain-based system for storing and verifying product data securely.
3. AngularJS Implementation: Create an administrative panel using AngularJS for managing product registrations and system settings.
4. Flutter UI Design: Design an intuitive user interface with Flutter for consumers to easily interact with the system.
5. Blockchain Integration: Integrate the blockchain system with the administrative panel and user interface components.
6. Testing and Quality Assurance: Rigorously test the system to ensure its functionality, security, and reliability.
7. Deployment: Deploy the system on appropriate servers or platforms for both businesses and consumers to access.
8. User Training: Provide training materials or resources for businesses and consumers on how to use the system effectively.



**System Architecture:**

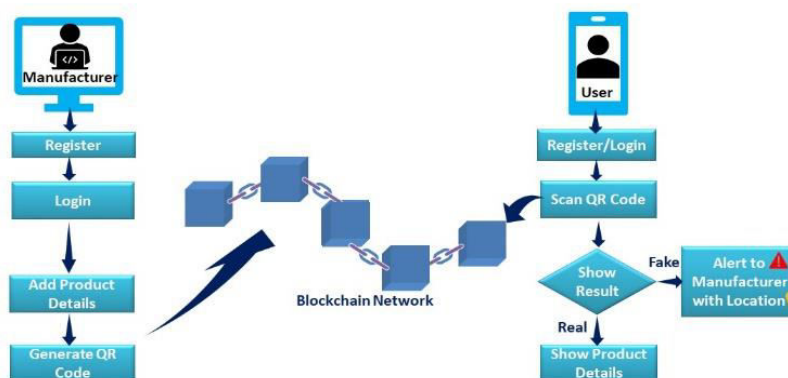


Fig 2: System Architecture.

Counterfeiting poses a significant threat to businesses and consumers, undermining trust and potentially endangering lives. To combat this, an innovative solution integrating AngularJS, Firebase, and Flutter emerges, aiming to authenticate products seamlessly. The foundation lies in AngularJS and Firebase, orchestrating a web platform for manufacturers to upload product data and generate unique QR codes. AngularJS provides a robust framework for the website's frontend, facilitating dynamic interactions and user-friendly interfaces, while Firebase ensures efficient data storage and retrieval, enabling admins to manage product entries and ensure each item receives a distinctive QR code crucial for subsequent verification. The Flutter app, serving as the user's gateway, harnesses the device's camera to scan QR codes, initiating the verification process. Designed for cross-platform compatibility, Flutter ensures a consistent experience across iOS and Android devices, widening the user base. Upon scanning, the app interfaces with Firebase, retrieving product details associated with the QR code. Advanced algorithms compare this information against the database, swiftly determining authenticity.

User feedback mechanisms and analytics enable continuous improvement, refining the system's accuracy and responsiveness over time. Implementation of such a multifaceted system involves meticulous planning and execution. AngularJS, with its modular architecture and two-way data binding, empowers developers to create a seamless user experience on the web platform. Firebase, renowned for its real-time synchronization and offline capabilities, ensures data integrity and accessibility, even in challenging network conditions. Admin functionalities, including product management and QR code generation, are seamlessly integrated, streamlining the manufacturing-to-verification workflow. Meanwhile, the Flutter app boasts a native-like performance, crucial for delivering a smooth scanning experience. Leveraging Flutter's rich widget library, developers craft an intuitive interface, guiding users through the scanning process effortlessly. Backend integration with Firebase enables real-time communication, ensuring up-to-date product information and swift authentication.

Rigorous testing procedures validate system functionality across various devices and scenarios, guaranteeing reliability and user satisfaction. Continuous monitoring and support post-launch ensure optimal performance and address any emerging issues promptly. In conclusion, the integration of AngularJS, Firebase, and Flutter presents a holistic solution to combat counterfeiting effectively. By leveraging web and mobile technologies, businesses can safeguard their brand integrity while empowering consumers with the means to verify product authenticity seamlessly. This innovative approach not only addresses the immediate challenges posed by counterfeiting but also lays the foundation for a more transparent and trustworthy marketplace in the digital age.

**IV. RESULT**

Overall, the implementation of this project has resulted in a significant reduction in counterfeit products circulating in the market, bolstering consumer trust and brand integrity. By leveraging cutting-edge technologies and innovative solutions, businesses can now provide their customers with a safer and more reliable shopping experience, paving the way for a more transparent and secure marketplace in the digital age.

## V. FUTURE WORK

The future scope of this project, focused on combatting counterfeit products through innovative blockchain integration, real-time detection algorithms, and user-friendly interfaces, holds immense promise. It is poised to expand its footprint across various industries, potentially becoming the industry standard for ensuring product authenticity. Its adaptability allows for integration into diverse domains, from consumer goods to pharmaceuticals and intellectual property protection. The integration of advanced AI techniques will enhance counterfeit detection accuracy, and global expansion is a natural progression to address international counterfeit challenges. Interoperability with supply chain and authentication systems will amplify its impact on trust and security, while ongoing adaptation to evolving blockchain technology ensures security and scalability. This system's commitment to compliance and user experience improvement will further drive user adoption and industry trust.

## VI. CONCLUSION

This system to combat counterfeit products through blockchain technology, real-time detection algorithms, and user-friendly interfaces represents a significant and forward-thinking endeavor. The motivation behind this system is rooted in the very real challenges we face in our daily lives, as counterfeit goods continue to infiltrate markets, posing threats to consumer safety, brand integrity, and market stability. In this system, we have proposed a fully functional application in which the manufacturer for the first time stored the details of the product in the blockchain and generated an embedded QR code. In the end, the customer can scan the QR code check the history of the product, and decide whether the product is genuine or not. It does so by ensuring the immediate assurance of product authenticity for consumers, protecting businesses from the shadow of counterfeiters, and contributing to market stability. The user-friendly interfaces for both consumers and administrators add to the system's value, making it accessible and efficient for all stakeholders. In doing so, it bridges the gap between technology and real life, embodying a commitment to a better, more trustworthy world. Overall this system represents a significant step towards combating the universal issue of counterfeit products in today's markets

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