# A Blockchain Based Mobile Application For Land Ownership Record And Product Anti - Counterfeiting

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*Abstract*—Nowadays with the advancement of technology people come up with new ways of duplicating a product and selling it for the same price as the original. Same is the case with land fraud as there are cases of forced land acquiring through fake documents. This project aims to solve this problem by providing a mobile application with Blockchain technology as the base architecture ensures that the contents of its data are tamper-proof. The mobile application displays a list of sources distributed by the product/country, so you can be sure that your end distributor is selling a genuine product. Blockchain guarantees transparency and reliability because the technology is decentralized over a shared network. That is, you cannot change the data. You can take ownership of land / real estate in the same application. In this case, large parties such as governments can act as a source to verify reliability and place data on the blockchain through applications. Therefore, a digital signature is assigned to the owner to ensure the security of the owner's ownership. As blockchain is a decentralized and distributed network there is no single point of failure, which makes it much harder to corrupt. Hacking into one part of the system cannot affect other parts. Hence it maintains the asset ownership of the user. The proposed system involves the use of a mobile application for the end user along with Blockchain technology in the backend as the base architecture ensures that the contents of its data are tamper proof.

*Keywords—Blockchain, Supply Chain, Ethereum, DApps.*

## I. INTRODUCTION

The authenticity and ownership of the product has always been at risk of being tampered as the records can easily be duplicated and modified or a fake product can be replaced with it. Hence to solve this problem Blockchain technology is used as the data which are uploaded in the chain cannot be tampered or changed. As blockchain is a decentralized and distributed network there is no single point of failure, which makes it much harder to corrupt. Hacking into one part of the system cannot affect other parts. Hence it maintains the asset ownership of the user. This project aims to solve this problem by providing a mobile application with Blockchain technology as the base architecture ensures that the contents of its data are tamper-proof. The proposed system involves the use of a mobile application for the end user along with Blockchain technology in the backend as the base architecture ensures that the contents of its data are tamper proof. The mobile application will allow the user to scan the qr code on the product. On scanning, the app will display a list of the verified distributors through which the product has been. Since every distributor has to scan and transfer the ownership before selling to the next distributor. Hence the app tracks the authenticity of a product. Finally the end user can scan and verify the manufacturer and the last owner of the product which should be the seller. Hence, authenticity of product is ensured.

## II. System Analysis

### A. Existing System

In the case study for product traceability , and the implemented system is named originChain. This system applies traceability of product by replacing normal centralized database with Blockchain data storage. The main idea of this system is to record the lab's product sample-testing results. A product ownership management system published in 2017 presents a system that implements Ethereum to provide the holding certificate of the consumer and combined the RFID of products to make sure that the product has its own identity stored in the Blockchain. On the business side, a company called Seal Network is combining Blockchain technology and Near-field communication (NFC) to develop a product authentication platform. This company inserts NFC chips into each item and use them as the certificates of the product. The NFC data is uploaded into the company's Blockchain.

### B. Proposed System

The proposed system involves the use of a mobile application for the end user along with Blockchain technology in the backend as the base architecture ensure that the contents of its data are tampered proof.The mobile application will allow the used to scan the qr code on the product.On scanning, the app will display a list of the verified distributors through which the product has been. Since every distributor has to scan and transfer the ownership before selling to the next distributor. Hence the app tracks the authenticity of a product. Finally the end user can scan and verify the manufacturer and the last owner of the product which should be the seller. Hence, authenticity of product is ensured.

## III. Literature Survey

**Designing blockchain systems to prevent counterfeiting in wine supply chains: a multiple-case study [1] -** It identifies three broad categories of approaches that companies use to mitigate product counterfeiting: product /packaging-related, customer information/education-related and process-related measures. Like track-and-trace systems, BC can be considered a measure to prevent both upstream and downstream counterfeiting (Schmidt and Wagner, 2019). Unlike the other measures and in common with traditional track-and-trace systems, it allows customers to autonomously verify the authenticity of each product without need to involve specific equipment/competencies or perform destructive chemical/physical/organoleptic analyses.

**Blockchain Technology Implementation in Logistics [2] -** The supply chain is tied to the complex processes of creation and distribution of goods. Depending on the product, the supply chain can include many phases, multiple geographic locations, several accounts and payments, several individuals, entities, and means of transport. Therefore, procurement of supplies can be extended over several months. Because of the complexity and the lack of transparency of traditional supply chains, it is of great interest for the stakeholders involved in the logistics process to introduce and develop blockchain technology to enhance the logistics processes in the supply chain, making them more sustainable

**Blockchain-empowered sustainable manufacturing and product lifecycle management in industry 4.0: A survey [3] -** The transparency characteristics enabled by blockchain shows promising for enhancing the sustainability of manufacturing networks. Sustainability is a pressing need, as well as an engineering challenge, in the modern world. Developing smart technologies is a critical way to ensure that future manufacturing systems are sustainable. Blockchain is a next-generation development of information technology for realizing sustainability in businesses and industries. Much research on blockchain-empowered sustainable manufacturing in Industry 4.0 has been conducted from technical, commercial, organizational, and operational perspectives.

**Blockchain Technology in Healthcare: A Comprehensive Review and Directions for Future Research [4] -** Blockchain technology is redefining data modeling and governance deployed in many healthcare applications. This is mainly due to its adaptability and abilities to segment, secure and share medical data and services in an unprecedented way.

Blockchain technology is at the centre of many current developments in the healthcare industry. Emerging blockchain-based healthcare technologies are conceptually organized into four layers, including data sources, blockchain technology, healthcare applications, and stakeholders. Emerging blockchain-based healthcare technologies are conceptually organized into four layers, including data sources, blockchain technology, healthcare applications, and stakeholders

**Anti-Counterfeit Product System Using Blockchain Technology [5] -** Whenever a user requests a transaction on blockchain, the requested transaction is passed to the P2P network where it is broadcasted to the nodes on the network There will be a user section where each user who is registered with the network has the ability to find the details of all the products that are owned by them. Also, they will have the authority to transfer the ownership of the product if they want to sell the product to someone else. There will be a feature given To the user to scan the QR code or enter the product id to fetch the details of that particular product which they want to buy in Future or want to check the authenticity and other information of the product. This helps user develop a sense of trust and reliability.

**Blockchain Technology for Supply Chain Management [6] -** Blockchain technology offers important opportunities for the supply chain management. This paper aims to overview the employment of blockchain technology in the field of the supply chain. Although the technology has been widely associated with cryptocurrencies, non-financial applications such as supply chain, power, and food industry are also promising.

Blockchain can provide a permanent, shareable, auditable record of products through their supply chain, which improves product traceability, authenticity, and legality in a more cost-effective way. In this chapter, the potential improvement expectations via blockchain technology for the case of agribusiness were discussed. The proposed case for automotive manufacturing-micro factory with blockchain technology was also introduced.

**Supply Chain Management based on Blockchain: A Systematic Mapping Study [7] -** Groundbreakingly, blockchain technology (BCT) has gained widespread acceptance and importance in the last few years. Implemented in different areas of applications such as social and legal industries, finance, smart property, and supply chain networks. This technology assures immutability and integrity of data without the need of a third trusted party. Furthermore, BCT could guarantee a transparent and decentralized transaction system in businesses and industries. Even though general research has been done in the BCT, however, there is a lack of systematic analysis on current research challenges regarding how BCT is effectively applicable in supply chain management (SCM). A systematic literature review (SLR) of SCM based on blockchain does not exist yet. This work aims to explore and analyse the state-ofthe-art on the BCT applications for SCM. We synthesize existing evidence, and identify gaps, available in the literature. The survey uses a systematic mapping study (SMS) method to examine 40 extracted primary studies from scientific databases.

## IV. PROJECT MODULE

There are two modules in this project. The module discusses the creation of the mobile application using flutter. The mobile application acts as the interface through which the users access the blockchain network. The other module is creation of a smart contract which is accessed through the mobile application. This smart contract interacts with the blockchain after verification.
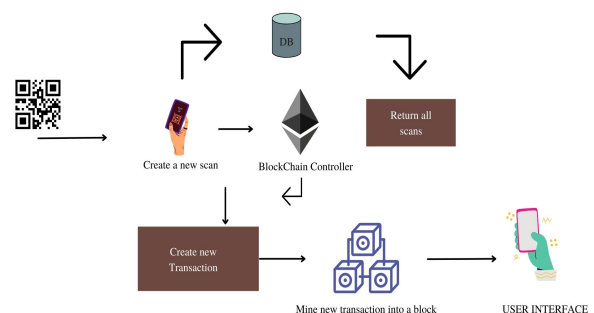


### A. Mobile Application using Flutter

Blockchain is a backend process, but to let the user interact with blockchain we need a user interface. In this case we create a mobile app using Google's framework called Flutter. After successful installation, a flutter code is written to create the ui of the app which then will be accessed by the smart contact.

## B. Creation Of Smart Contract

Since a smart contract acts as a single source of automated verification of the blocks, it is to be created first. Using a programming language called Solidity and an editor called Remix this can be done. Remix provides a stimulated blockchain environment for testing purposes with multiple accounts and 100 Ethers each.

## C. Migration Of Smart Contract In App

Third party tools like TRUFFLE are installed using the node package manager which will provide us with blockchain stimulation for our mobile app testing. Along with that we install a software called Ganache where we can access all the key,accounts etc

Once adding the solidity code in the app project level file, try to compile it locally using 'truffle compile'.
Then connect the solidity function with the application ui for a streamlined communication. Once the transaction takes place it can be seen in ganache for reference. We can see some ether being reduced from a particular account. It is nothing but a gas fee which means the transaction was successful in blockchain.

From the app the admin can add the product details and assign the ownership to a particular address. First the data is hashed and stored in a smart contract for the respective address. Then the remaining data is stored in the database for additional data information of the product. Products is the hashed key which is assigned to the owner address id.



After migrating the smart contract is further deployed in the blockchain network in this case the ethereum network on successful compilation. The deployment usually consumes a gas fee which is deducted from you account. The gas fee is a reward in cryptocurrency for the miners who have added our contract to the blockchain network. The image represents the ganache environment which is a simulation of the blockchain network. The ganache tools offer various test accounts with around 100 etheres which we can use during the creation and testing of smart contracts.

## D. Output
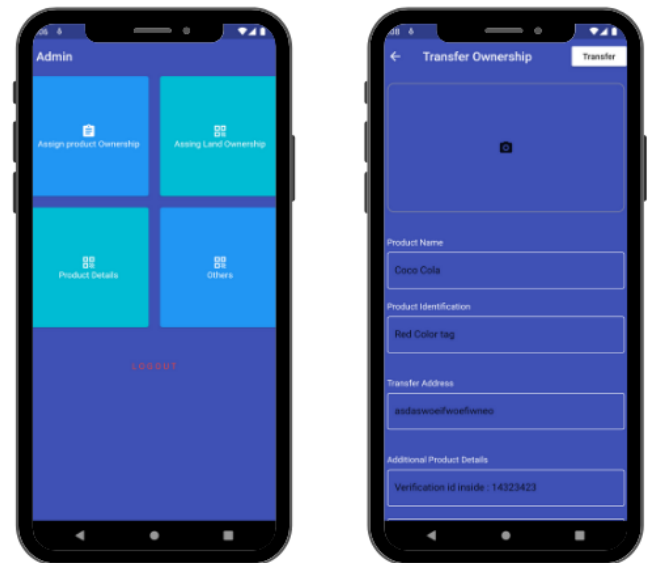


The admin is given the access to add the genesis block of the particular assets. That is, the first owner assignment is done by the admin only. This is done to maintain the authenticity from the initial block itself. The admin verifies all the document and verifies the ownership of the product to be added. The product key is encrypted using the sha256 algorithm and is transferred to the owner's account.

The admin gets a unique login credentials which cannot be access by other users. The admin can be the officials from the government or top management faculty of an organization who gets the credentials details directly.
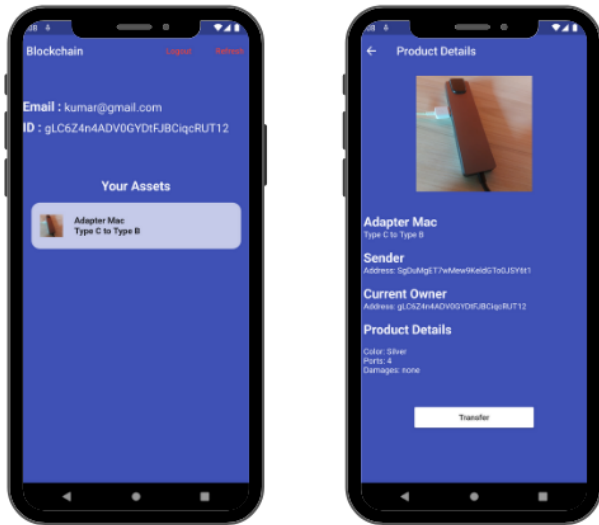
## V.    CONCLUSION

Thus an Blockchain based product anti counterfeiting application was successfully made. Following extensive testing, comparing results revealed that the model generates expected results which is an important strategy for application in open contexts. The application can be used in other business use case like supply chain management. With the future expansion of the model it can be more efficient. Future expansion of the system could include adding Bluetooth low energy devices to the product and an NFT based product identification software. Each asset can be assigned with a Bluetooth low energy device that would emit a radio wave which can be identified by the mobile application. That would further improve the authenticity and transparency and would help to ease the process of supply chain and management. Since the current model works on the QR code it can be further transformed to NFT for assets where bluetooth low energy can be used.

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