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# Product Anti-Counterfeiting System for Online and Offline Sales using Blockchain Technology

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**ABSTRACT:** Anti-counterfeit technology has attracted much attention with the development of economy, because many counterfeit products that are difficult for identification have been produced, which extremely damage the interests of consumers. The public's attitude of greedy for petty and cheap has encouraged unscrupulous manufacturers to take advantage of the opportunity to provide low-cost counterfeit products, suppress the profits of legitimate manufacturers, and also make the public lose confidence in the quality of the products. At present, the most widely used anti-counterfeiting system based on QR codes on the market. However, existing traceability systems are still mostly built in a centralized manner, and the central agency provides trust guarantees, but the public still has great doubts about the credibility of the central agency. The introduction of blockchain technology can perfectly solve the lack of existing architecture and the environment. To ensure the identification and traceability of real products throughout the supply chain, this project is the first to propose a fully functional blockchain system to prevent product counterfeiting. This project proposes the decentralized Blockchain system with products anti-counterfeiting, in that way manufacturers can use this system to provide genuine products without having to manage direct-operated stores, which can significantly reduce the cost of product quality assurance.

## I. INTRODUCTION

Counterfeiting is the manufacture, import, export, distribution, and sale of consumer goods that are not genuine but are designed and branded to look identical to the authentic products in order to deceive consumers into believing that they are authentic. In order to promote the healthy development of the market economy, effective anti-counterfeiting technology is urgently needed to prevent the current vandalism, and blockchain technology is the first choice.

Blockchain is a system of recording information in a way that makes it difficult or impossible to change, hack, or cheat the system. Each block in the chain contains a number of transactions, and every time a new transaction occurs on the blockchain, a record of that transaction is added to every participant's ledger.

Blockchain is a type of DLT in which transactions are recorded with an immutable cryptographic signature called a hash.

## II. LITERATURE SURVEY

- **Muhammad Nasir Mumtaz Bhutta; Muneer Ahmad.2021**, Secure Identification, Traceability and Real-Time Tracking of Agricultural Food Supply During Transportation Using Internet of Things, Supply chain management (SCM) benefit greatly through automation based on key technologies of IoT, Radio Frequency Identification (RFID), and Wireless Sensor Networks (WSN).
- **Yuhong Dong; Zetian Fu; Stevan Stankovski; Siyu Wang; Xinxing Li.2020**, Nutritional Quality and Safety Traceability System for China's Leafy Vegetable Supply Chain Based on Fault Tree Analysis and QR Code, This study proposes an evaluation and traceability method that can be used to track the nutritional quality of leafy vegetables. Employing the principles of the Hazard Analysis and Critical



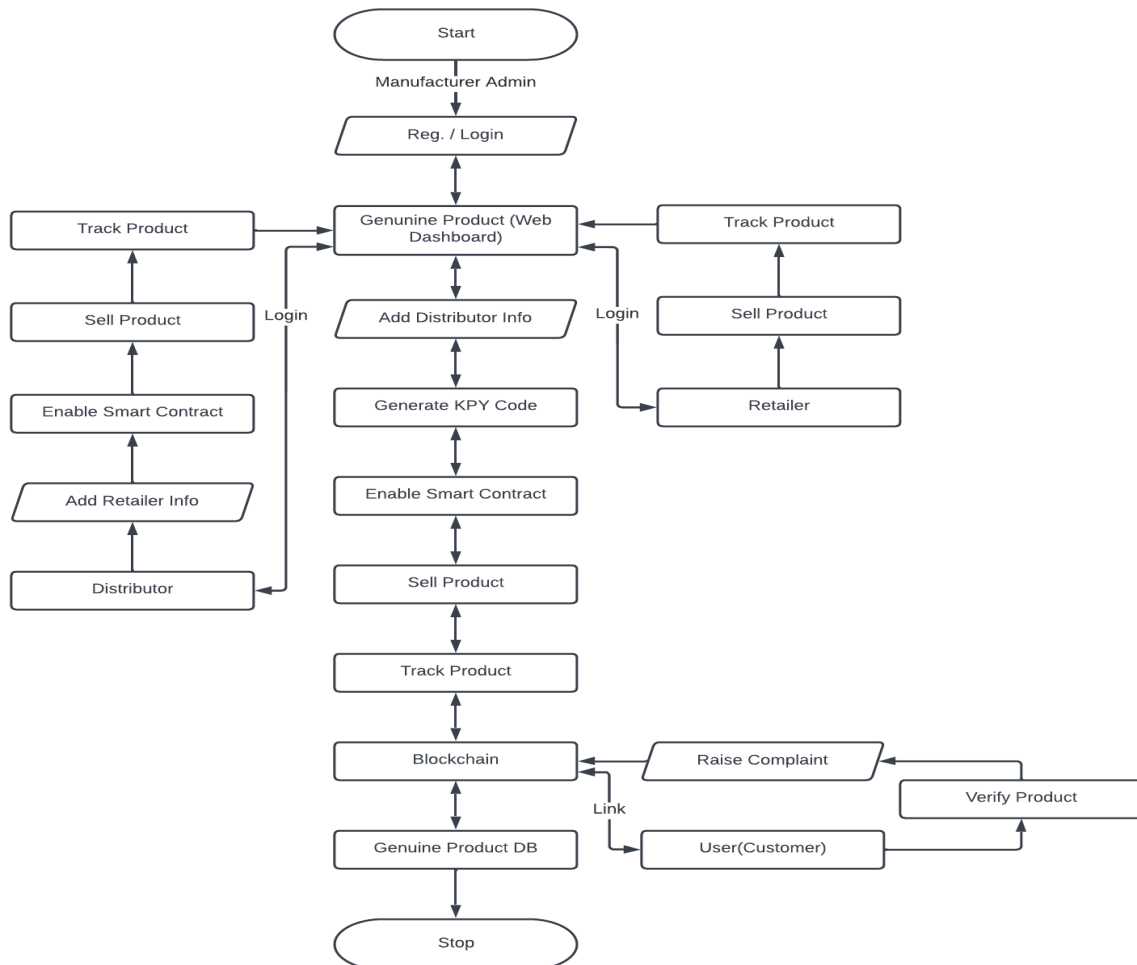
Control Point (HACCP) system combined with fault tree analysis (FTA), a traceability model for the entire production and sale process of leafy vegetables is constructed.

- **Bander A. Alzahrani,2020**, lightweight Authentication Protocol for NFC Based Anti-Counterfeiting System in IoT Infrastructure, novel authentication protocol for anti-counterfeited drugs systems based on Internet of Things (IoT) to help checking the validity of drugs “unit dosage”.
- **Stevan Šandi; Sanja Radonjić,2018**, Smart tags for brand protection and anti-counterfeiting in wine industry, The main idea behind smart tags is to utilize quick response codes and functional inks supported by the Cloud system and two-way communication between the winemaker and end-user.
- **Xiaoxiao Wang,2019**, System-Level Counterfeit Detection Using On-Chip Ring Oscillator Array, propose concurrent IC and PCB authentication (CIPA), a novel methodology that concurrently verifies the authenticity of both IC and PCB through extracting the signature pairs generated by a ring oscillator (RO) array without/with PCB cavity resonance.

### III. PROPOSED SYSTEM

Proposed method as shown below flowchart is the Product Anti-Counterfeiting System for Online and Offline Sales using Blockchain Technology.

Flowchart





consolidate interactions between suppliers, manufacturers, distributors, logistics hubs, Blockchain supply chain management solution with a built-in mechanism for counterfeit goods identification and brand protection. Automate and retailers, and consumers within the supply chain. Provide efficient tools for product lifecycle management & components' authenticity verification.

In the proposed Blockchain-based Anti-Counterfeiting, each of the stake- holders (e.g., suppliers, producers, factories, logistics items retailers and consumers, etc.) joins as Blockchain node to make Blockchain transactions as well as participate in keeping Blockchain up to date. On joining the Blockchain, each node is given a public/private keypair to process secure cryptographic operations according to Blockchain architecture.

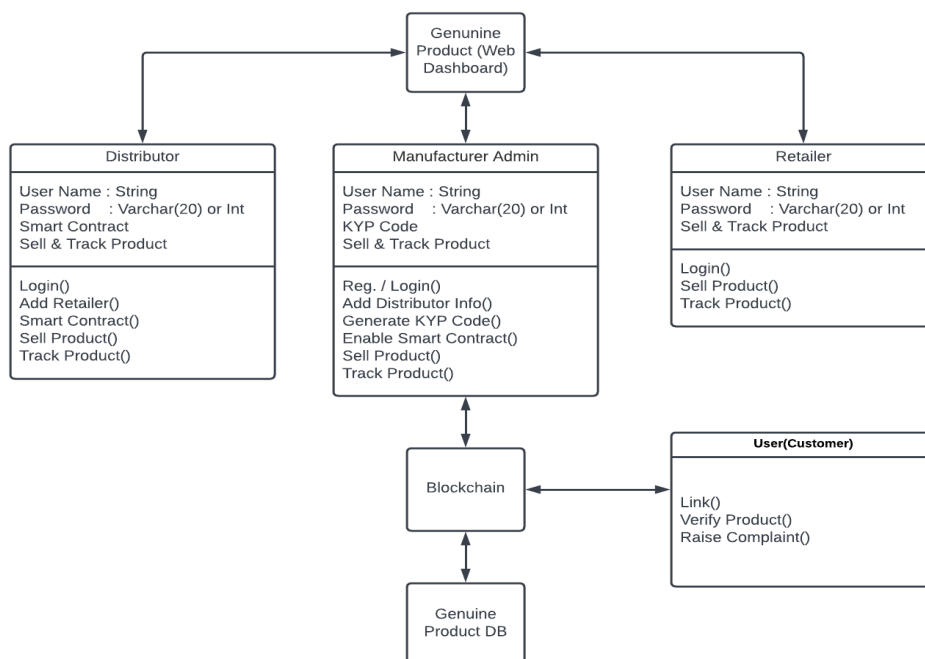
The particular transaction is first created or generated by the system passed to all stakeholders who view and authenticate it. For authentication purposes, the transaction initiator signs the transaction with its private key which is further validated by each other processing node (stakeholder) with the public key of the initiator. Once the transaction is established on the network, the transaction block is added as a new block to the existing blocks in the Blockchain by using a suitable consensus mechanism. In the proposed architecture, it is recommended to use Proof of Supply Chain Share (PoSCS) as a consensus mechanism which is based on Proof of Stake (PoS). The other popular consensus mechanism like Proof of Work (PoW) and PoS may not be suitable for Product SCM due to the high demand for computational resources and wealth in the distributed network. Each block in this chain keeps the hash address of the next neighbor. The last block in this data structure does not point to any other block. In creating and authenticating a new block, the previous block of the existing chain points to the newly created block.

We propose a decentralized blockchain with know your product code for our system. In our system there will be four stakeholders including Manufacturer, Distributor, Retailer, Consumer. To participate in the system, every stakeholder needs to generate a key pair of EOA (Externally owned Account) and KYPC. The key pair of EOA and KYPC is responsible for deploying or executing the function of the smart contracts.

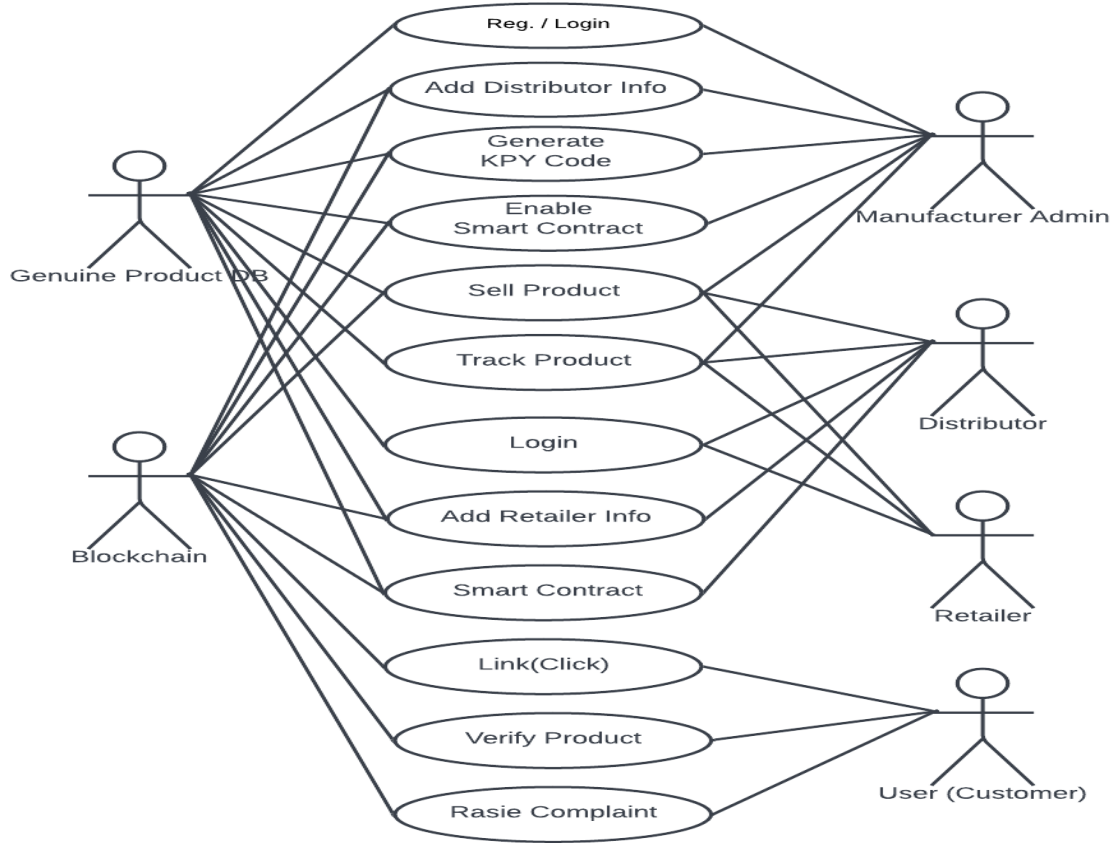
**Know Your Product Code Blockchain-Enabled Product Anti-Counterfeiting** -Each and every product will have a pair of global Id and unique Id in the manufacturing unit to identify the product in the Manufacturing Unit generated using KYPC Generator anti-counterfeiting identification code, and other information of the product are added to the blockchain.

**Block Genuine verify** is powered by an advanced blockchain protocol that ensures secure storage of data on the product's manufacturer and origin. It allows tracking and monitoring products from production lines to distribution centres to the point of sale and the consumers.

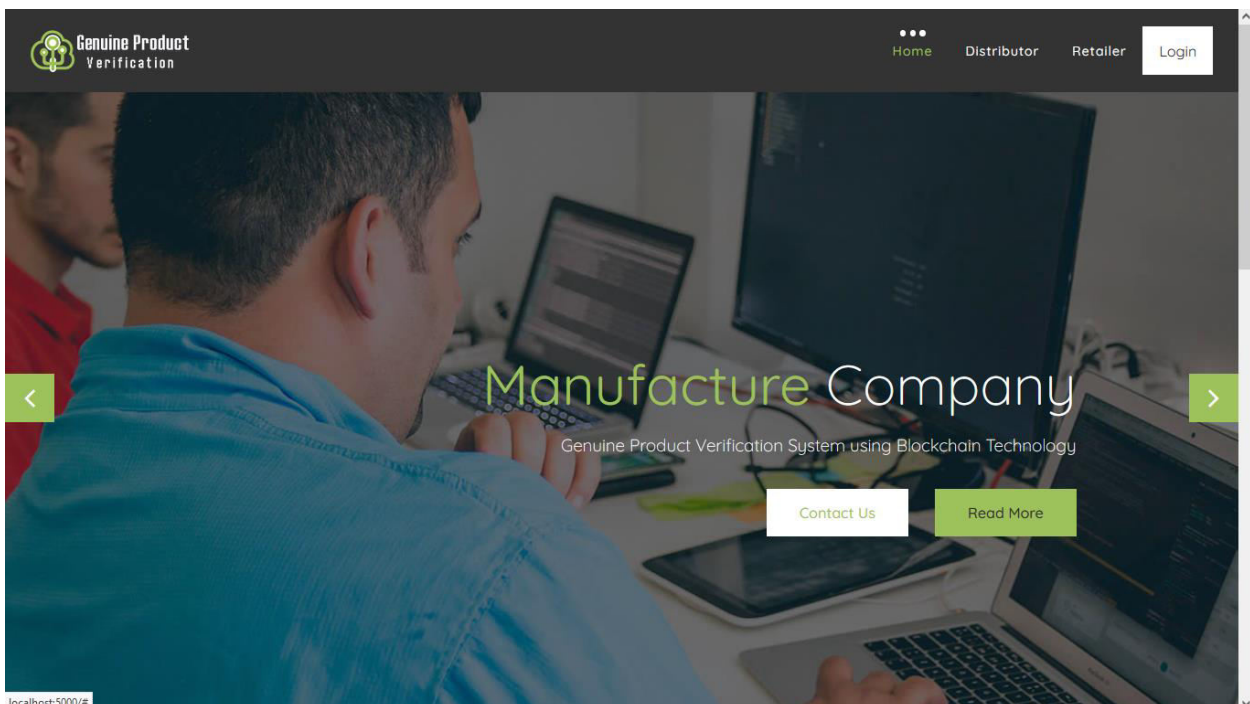
UML  
Class Diagram

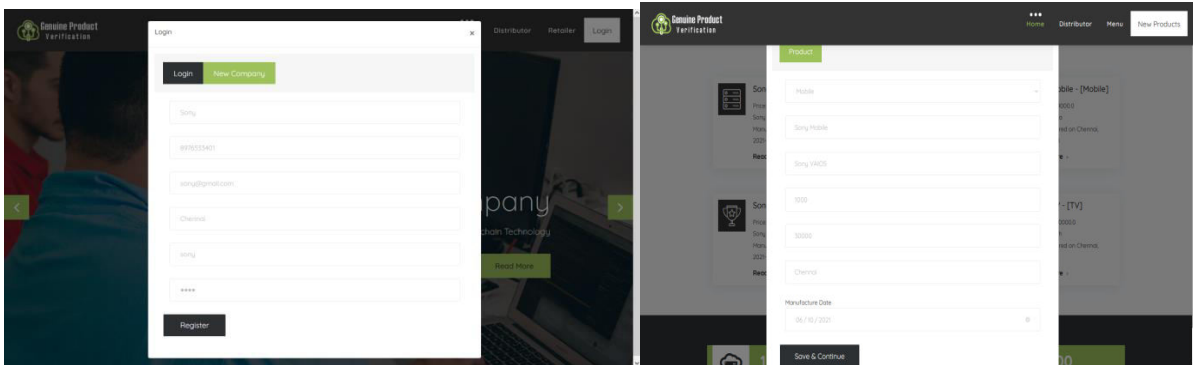


### Usecase Diagram

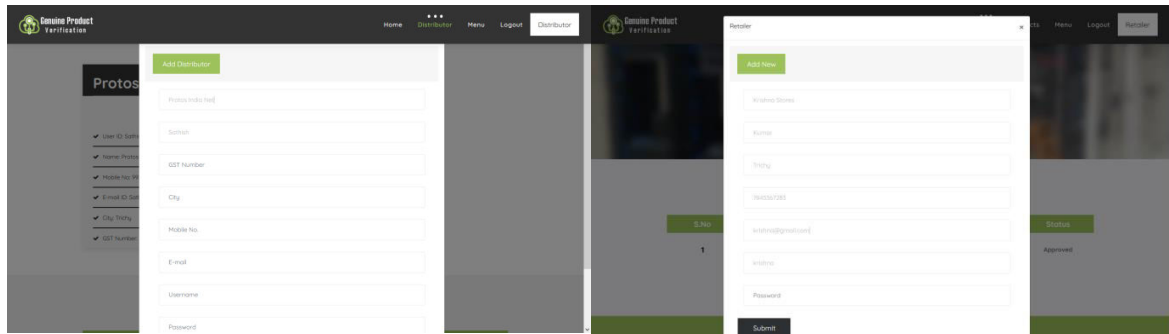


### IV. RESULT





Manufacture Company and Product Registration Page



Distributor and Retailer Registration Page

Genuine Product Verification

Home Products Menu Logout

### Manufactured Products

S.No	Product	Model	Price	No. Of Pieces	KYP Code	Balance	Distribute	Require
1	TV - Sony TV	Sony 32inch	20000.0	500	K0001P001 to K0001P500	200	300	Send Request
2	TV - Sony TV	Sony TV 40 inch	27000.0	500	K0002P001 to K0002P500	0	0	Send Request
3	TV - Sony TV	Sony TV 28 inch	15000.0	500	K0003P001 to K0003P500	0	0	Send Request
4	Mobile - Sony Mobile	Sony Xperia	14000.0	1000	K0004P0001 to K0004P1000	0	0	Send Request
5	Mobile - Sony Mobile	Sony XAVAX	28000.0	1000	K0005P0001 to K0005P1000	0	0	Send Request
6	Mobile - Sony Mobile	Sony VAIOS	30000.0	1000	K0006P0001 to K0006P1000	0	0	Send Request

KYP Code Generation



**Genuine Product Verification** Home Distributor Retailer Login

K0004P0189

### Find Your Product

With our Genuine product search here, search by KYP code

S.No	Product Information from Blockchain
1	PID:4, Product:Sony Mobile, Company:sony, Manufacture:2021-09-08,KYP Code:K0004P0001 to K0004P1000, RegDate:24-11-2021

Manufactured Information	
Company	Sony
Location	Chennai
Product	Sony Mobile
Model	Sony Xperia
Price	Rs. 14000.0
Manufacture Date	2021-09-08

**Result for Genuine Product**

**Genuine Product Verification** Home Distributor Retailer Login

K0008P0321

### Find Your Product

With our Genuine product search here, search by KYP code

Product Not Available

CHIPPY'S MIGHTY FURNITURES GOLDEN GOLDEN avant garde LIFEGUARD FASTLANE

**Result for Fake Product**



## V. CONCLUSION AND FUTURE SCOPE

Counterfeit products are growing exponentially with the enormous amount online. So, there is a strong need to detecting counterfeit products and blockchain technology is used to detect fake products. Furthermore, the information is encoded into a KYP code. Customers or users can use the KYP code and then they can detect the fake product. Digital information of products can be stored in the form of blocks in blockchain technology. Thus, the proposed system is useful for the customer to detect fake products in the supply chain. Customers can use the assigned KYP code of a product and can get all the information like company, location, price, current owner based on which end-user can check whether the product is genuine or not.

Blockchain technology's future scope majorly lies in the field of Cybersecurity. Although, the blockchain ledger is open and distributed, the data is secure and verified.

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