

**18CSE421 J-E**  
**DISTRIBUTED LEDGER TECHNOLOGY**  
**PROJECT REPORT**  
**“FAKE PRODUCT IDENTIFICATION”**

*Submitted by*  
**PRATHMESH JOSHI (RA2011050010082)**  
**ROHIT GOYAL (RA2011050010085)**  
**PRINCE DALAL (RA20110500100093)**

*Under the Guidance of*  
**Dr. PRABHU KAVIN B**  
**ASSISTANT PROFESSOR, DSBS**

*In partial satisfaction of the requirements for the degree of*

**BACHELOR OF TECHNOLOGY**  
**in**  
**COMPUTER SCIENCE ENGINEERING**  
**with specialisation in Blockchain Technology**



**SCHOOL OF COMPUTING**  
**COLLEGE OF ENGINEERING AND TECHNOLOGY**  
**SRM INSTITUTE OF SCIENCE AND TECHNOLOGY**  
**KATTANKULATHUR - 603203**

**MAY 2023**



**SRM INSTITUTE OF SCIENCE AND TECHNOLOGY  
KATTANKULATHUR-603203**

**BONAFIDE CERTIFICATE**

Certified that this Project report titled **“Fake Product Identification”** is the bonafide work done by **PRATHMESH JOSHI (RA2011050010082), ROHIT GOYAL (RA2011050010085), PRINCE DALAL (RA20110500100093)** who carried out the project under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other work.

**SIGNATURE**

Dr. Prabhu Kavın B

ASSISTANT PROFESSOR

Department of DSBS

## **TABLE OF CONTENT**

<b>SL.NO</b>	<b>TITLE</b>	<b>PAGE NO.</b>
<b>1.</b>	<b>ABSTRACT</b>	<b>4</b>
<b>2.</b>	<b>INTRODUCTION</b>	<b>5</b>
<b>3.</b>	<b>OBJECTIVES</b>	<b>6</b>
<b>4.</b>	<b>SCOPE</b>	<b>7</b>
<b>5.</b>	<b>METHODOLOGY</b>	<b>8</b>
<b>6.</b>	<b>BUSINESS USE CASES</b>	<b>9</b>
<b>7.</b>	<b>SOCIAL BENEFITS</b>	<b>10</b>
<b>8.</b>	<b>LITERATURE REVIEW</b>	<b>11</b>
<b>9.</b>	<b>TECH STACK</b>	<b>12</b>
<b>10.</b>	<b>SYSTEM ARCHITECTURE</b>	<b>13</b>
<b>11.</b>	<b>IMPLEMENTATION</b>	<b>14-15</b>
<b>12.</b>	<b>OUTPUT</b>	<b>16 – 17</b>
<b>13.</b>	<b>FUTURE WORK</b>	<b>18</b>
<b>14.</b>	<b>CONCLUSION</b>	<b>19</b>
<b>15.</b>	<b>REFERENCES</b>	<b>20</b>

## **ABSTRACT**

In recent years, Counterfeit products play an important role in product manufacturing industries. This affects the companies name, sales, and profit of the companies. Blockchain technology is used to identification of real products and detects fake products.

Blockchain technology is the distributed, decentralized, and digital ledger that stores transactional information in the form of blocks in many databases which is connected with the chains. Blockchain technology is secure technology therefore any block cannot be changed or hacked. By using Blockchain technology, customers or users do not need to rely on third-party users for confirmation of product safety.

In this project, with emerging trends in mobile and wireless technology, Quick Response (QR) codes provide a robust technique to fight the practice of counterfeiting the products. counterfeit products are detected using a QR code scanner, where a QR code of the product is linked to a Blockchain. So this system may be used to store product details and generated unique code of that product as blocks in the database. It collects the unique code from the user and compares the code against entries in the Blockchain database. If the code matches, it will give a notification to the customer, otherwise it will give the notification to the customer that the product is fake.

## **INTRODUCTION**

The global development of a product or technology always comes with risk factors such as counterfeiting and duplication, which can affect the company's name, company revenue, and customer health. There are so many products that exist in the supply chain. To ensure that the product is real or fake. Because of counterfeit or fake products manufacturers facing the biggest problem and huge losses. To find the genuineness of the product we can use blockchain technology.

Blockchain is an arrangement of recording information that makes it troublesome or hard to change, hack, or cheat the framework. A blockchain is essentially a computerized record of transactions that is duplicated and distributed across the entire network of PC systems on the blockchain. Each block in the chain contains multiple transactions, and every time a new transaction occurs on the blockchain, a record of that transaction is added to every participant's record. The decentralized database managed by the number of participants is known as Distributed Ledger Technology (DLT). Blockchain is a type of DLT in which transactions are recorded with an immutable cryptographic signature called a hash.

Blockchain technology helps to solve the problem of counterfeiting a product. Blockchain technology is more secure. Once the product is stored on the network hash code is generated of that product and it is possible to maintain all transaction records of the product and its current owner as a chain will be created for that product transactions. All the transaction records will be stored in the form of blocks in the blockchain. In the proposed system we are assigning a generated QR code to a particular product and the end customer can scan that QR code to get all information about that product. After scanning the QR code we can identify that the product is real or fake.

## **OBJECTIVES**

The idea of this project came into existence because of the increase in the counterfeit products.

The objectives of this project are:

- 1.To Design Anti Counterfeit System using Blockchain.
- 2.To secure product details using a QR code.
- 3.Provide security to the clients by offering data to client.
- 4.Manufacturers can use the system to store information of products will sale and buying in Blockchain which is accessible to everyone.
- 5.To develop a flexible system that is also efficient.
- 6.To enhance the knowledge regarding applications of Blockchain.

## **SCOPE**

Blockchain technology has already shown promise in the area of product authentication, and there are many potential future applications for this technology, including interaction with IoT devices and AI, and product identification in various industries.

The creation of more sophisticated blockchain-based systems that can interact with other technologies such as the Internet of Things (IoT) and artificial intelligence (AI) is one potential route. This may make it possible for items to be tracked and authenticated in a more sophisticated manner along the supply chain, thereby reducing the risk of fraud, forgery and other product tampering.

The growth of decentralized markets is another potential use of blockchain technology in product authentication. By eliminating intermediaries such as banks or payment processors, these marketplaces would employ blockchain technology to facilitate direct transactions between buyers and sellers. By doing so, it may be possible to increase transparency, decrease transaction costs and provide a securer and more reliable infrastructure.

Food safety and traceability could both benefit from the use of blockchain technology. Businesses can make sure that food goods are secure, high-quality and fresh by utilizing blockchain to track the entire supply chain.

Moreover, blockchain technology can be applied to boost the origin and production transparency of food products, fostering consumer trust and raising the product's worth. In addition to these possible uses, blockchain technology also has a lot of other opportunities for product identification, such as in the pharmaceutical, luxury and electronics industries.

Blockchain technology can help to avoid fraud and counterfeiting, preserve consumer safety and improve overall economic performance by providing a secure and transparent record of transactions.

## **METHODOLOGY**

System is maintaining Status of product i.e., Manufacturer of product, current owner of product, and history of owners, time stamp i.e., at what time product was updated and a QR code.

### **Stage 1: Product Enrolment Process:**

Initially manufacturer will be the first owner of product. So, manufacturer will request administrator to add product on the network, at that time QR code will be generated. Administrator will enrol product and manufacturer on the network, and QR code is taken.

### **Stage 2: Ship Product to Distributor:**

In the next step manufacturer will ship the product to distributor. When distributor receives product will scan the QR code and update his details on the network, about product ownership, time Stamp and date.

### **Stage 3: Ship Product to Retailer:**

At this Stage, the retailer receives product from Distributor and scan QR code assigned to product using QR code scanner, and will update owner details of the product on the network.

### **Stage 4: End User Authentication Process:**

At the end of the chain, customer will take the product, go to website and upload QR code over there, and customer will able to get all detail about product from manufacture to last retailer. And after getting details, it his question where to buy the product or not.



## **BUSINESS USE CASES**

The Fake Product Identification project has several business use cases, including:

**1. Supply chain management:** Fake Product Identification system can be used to track and manage supply chains, enabling businesses to monitor the flow of goods and services from the source to the end consumer, increasing transparency and reducing fraud.

**2. Identity verification:** Fake Product Identification system can be used for identity verification, reducing the need for costly and time-consuming KYC (know your customer) procedures, making it easier for businesses to onboard customers.

**3. Security and Privacy:** The system's advanced security and privacy features, such as end-to-end encryption and zero-knowledge proof protocols, provide users with greater control and ownership over their digital assets, reducing the risk of theft and fraud.

**4. International Transactions:** Fake Product Identification system allow for near-instant and low-cost international payments, bypassing the need for traditional intermediaries like banks and payment processors.

## **SOCIAL BENEFITS**

The Fake Product Identification Project offers several social benefits, including:

- 1. Transparency:** The decentralized nature of blockchain technology means that all transactions are recorded on a public ledger, which makes it difficult for fraud and corruption to occur. This increased transparency can help to build trust in the financial system.
- 2. Security and Privacy:** The system's advanced security and privacy features, such as end-to-end encryption and zero-knowledge proof protocols, provide users with greater control and ownership over their digital assets, reducing the risk of theft and fraud.
- 3. Decentralisation:** The system's integration with the blockchain network promotes decentralisation, reducing the need for intermediaries and third-party custodians, and providing greater transparency and accountability in purchasing of products.
- 4. Global Accessibility:** The system's support for multiple networks and its decentralised nature enable users to conduct transactions globally, without the need for intermediaries, providing greater accessibility to services.
- 5. Innovation:** The Fake Product Identification project is built on the latest blockchain technologies and promotes innovation in this industry, offering new and exciting possibilities for trades and services.

The Fake Product Identification project provides social benefits such as financial inclusion, security and privacy, decentralisation, global accessibility, and innovation, making it a valuable addition to the Anti Counterfeit System.

## **LITERATURE REVIEW**

1] A Survey of Counterfeit Product Detection by Prabhu Shankar, R. Jayavadivel. Counterfeit products are growing exponentially with the enormous amount of online and black-market. So, there is a strong need to address the challenges of detecting counterfeit products and designing appropriate technology to improve detection accuracy. This is one of the active research areas to be explored in the current world. This paper discusses various techniques for identifying counterfeit products.

2] Smart Tags for Brand protection and anti-counterfeiting in the wine industry by Steven, Marko. This paper describes a brand protection and anticounterfeiting solution for the wine industry based on smart tags and Cloud enabled technologies. 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.

3] A Blockchain-based Supply Chain Quality Management Framework by Si Chen, Rui Shi. In this paper, we propose a blockchain-based framework. This framework will provide a theoretical basis for intelligent quality management of the supply chain based on blockchain technology. Furthermore, it provides a foundation to develop theories about information resource management in distributed, virtual organizations.

4] OECD. (2019, March 18). Trade in fake goods is now 3.3% of world trade and rising. Retrieved from OECD

## **TECH STACK**

The project is built on a modern technology stack that includes several open-source blockchain technologies and programming languages. Here are some of the key technologies used in the project:

- 1. Blockchain:** The Cypher Wallet project is built on the Ethereum blockchain, which is a decentralised platform for building smart contracts and decentralised applications.
- 2. Solidity:** Solidity is the programming language used for writing smart contracts on the Ethereum blockchain. It is a high-level language that allows developers to write complex applications with advanced logic.
- 3. Web3.js:** Web3.js is a collection of libraries that allow developers to interact with the Ethereum blockchain from a web browser. It provides a simple and easy-to-use interface for interacting with smart contracts and accessing blockchain data.
- 4. MetaMask:** MetaMask is a software cryptocurrency wallet used to interact with the Ethereum blockchain. It allows users to access their Ethereum wallet through a browser extension or mobile app, which can then be used to interact with decentralized applications.
- 5. Truffle:** Truffle is a world-class development environment, testing framework and asset pipeline for blockchains using the Ethereum Virtual Machine (EVM), aiming to make life as a developer easier.
- 6. Node.js:** Node.js is a server-side JavaScript runtime that is used for building the backend of the Cypher Wallet platform. It provides a scalable and efficient way to handle network requests and data processing.

## **SYSTEM ARCHITECTURE**

The system architecture of the Fake Product Identification project is designed to provide a secure and scalable platform for managing assets. The architecture consists of several layers, each with a specific set of functions and technologies. Here is an overview of the system architecture:

**1. Identity management system:** Identity management system is responsible for managing the identity of users on the Fake Product Identification system. It ensures that users are verified and authenticated before accessing the system.

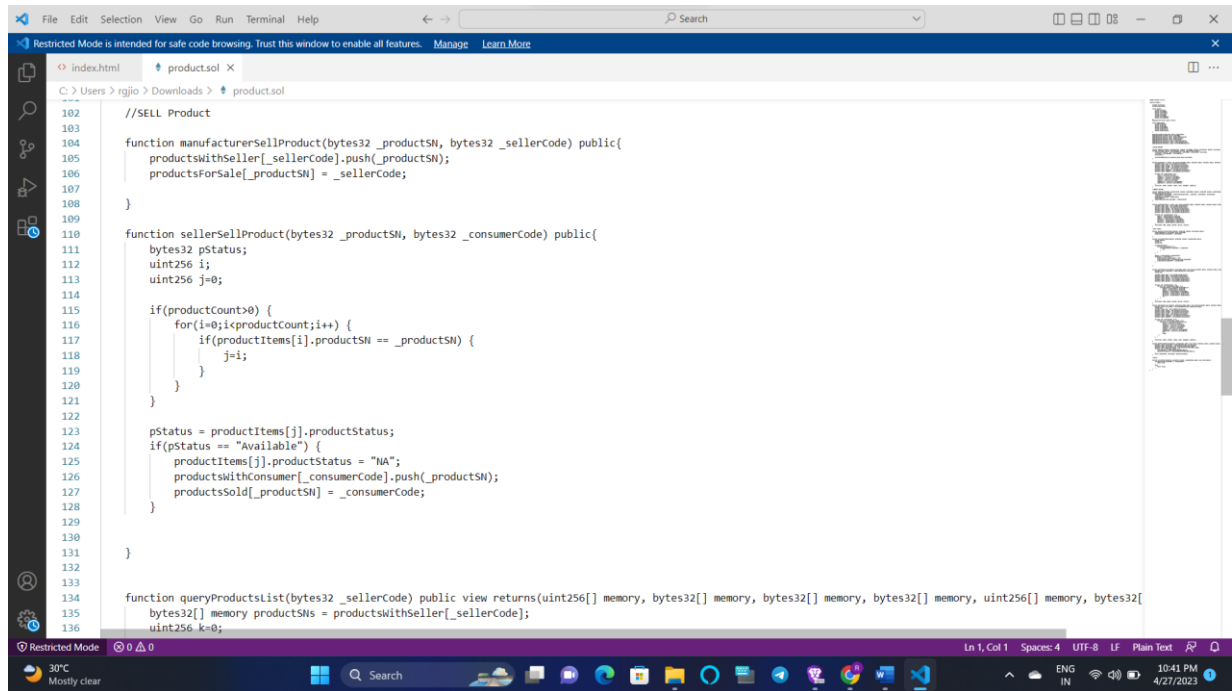
**2. Application Layer:** The application layer is the backend of the Fake Product Identification system, which handles user requests and performs the necessary business logic. The application layer is built using Node.js and interacts with the Ethereum blockchain and IPFS via the Web3.js and IPFS APIs.

**3. Smart Contract Layer:** The smart contract layer is the layer that handles the smart contracts on the Ethereum blockchain. The smart contracts are written in Solidity and are responsible for executing the business logic of the Fake Product Identification system platform, such as managing digital assets, enforcing security, and enforcing business rules.

**4. Blockchain Layer:** The blockchain layer is the underlying layer of the Fake Product Identification system platform, which provides a secure and decentralised platform for managing digital assets. The blockchain layer is built on the Ethereum blockchain, which provides a reliable and secure way to store and manage digital assets.

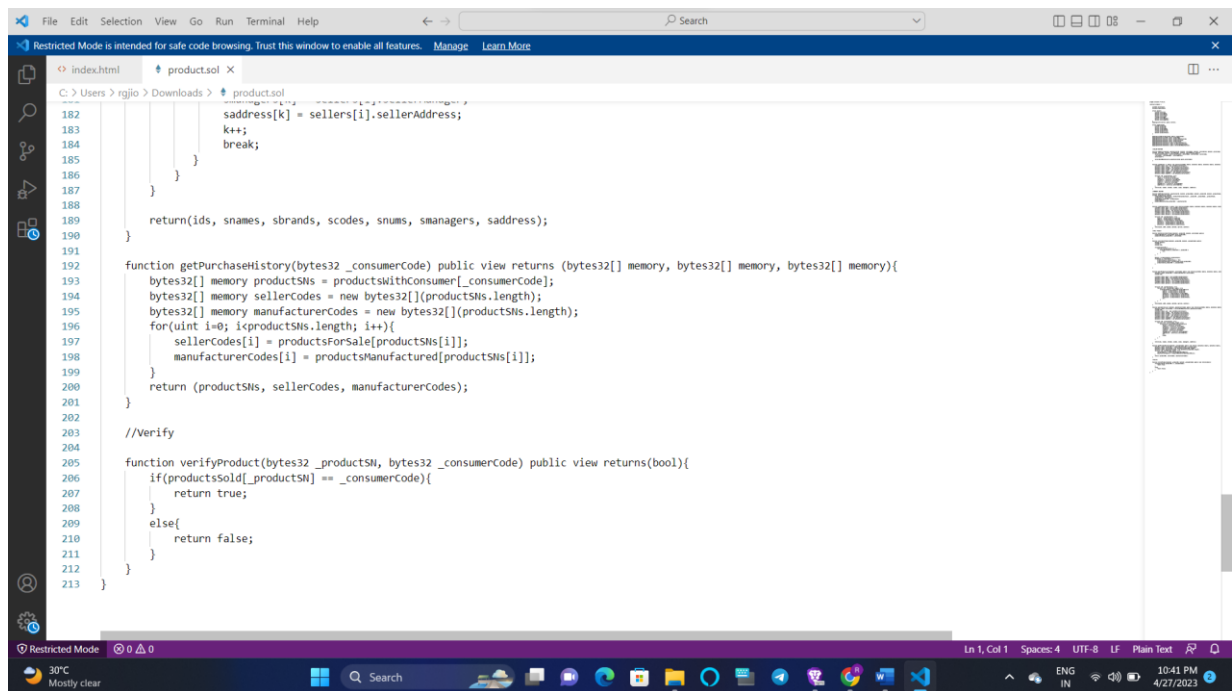
**5. Decentralised Storage Layer:** The decentralised storage layer is the layer that handles the storage of files on the IPFS network. IPFS provides a secure and decentralised way to store and access files on the Fake Product Identification system platform, without relying on centralised servers.

# IMPLEMENTATION



The screenshot shows a code editor window with a file named `products.sol` open. The code is written in Solidity and implements a function `sellerSellProduct` that takes a product SN and a consumer code as input. The function checks if the product is available and updates its status to "NA" if it is. It also updates the `productsSold` array with the consumer code. The code is as follows:

```
102 //SELL Product
103
104 function manufacturerSellProduct(bytes32 _productSN, bytes32 _sellerCode) public{
105     productsWithSeller[_sellerCode].push(_productSN);
106     productsForSale[_productSN] = _sellerCode;
107 }
108
109
110 function sellerSellProduct(bytes32 _productSN, bytes32 _consumerCode) public{
111     bytes32 pStatus;
112     uint256 i;
113     uint256 j=0;
114
115     if(productCount>0){
116         for(i=0;i<productCount;i++){
117             if(productItems[i].productSN == _productSN){
118                 j=i;
119             }
120         }
121     }
122
123     pStatus = productItems[j].productStatus;
124     if(pStatus == "Available"){
125         productItems[j].productStatus = "NA";
126         productsWithConsumer[_consumerCode].push(_productSN);
127         productsSold[_productSN] = _consumerCode;
128     }
129
130 }
131
132
133
134 function queryProductsList(bytes32 _sellerCode) public view returns(uint256[] memory, bytes32[] memory, bytes32[] memory, bytes32[] memory, uint256[] memory, bytes32[
135     bytes32[] memory productSNs = productsWithSeller[_sellerCode];
136     uint256 k=0;
```



The screenshot shows a code editor window with a file named `products.sol` open. The code is written in Solidity and implements a function `getPurchaseHistory` that takes a consumer code as input and returns an array of product SNs, seller codes, and manufacturer codes. It also implements a `verifyProduct` function that takes a product SN and a consumer code as input and returns a boolean value. The code is as follows:

```
182         address[k] = sellers[i].sellerAddress;
183         k++;
184         break;
185     }
186 }
187
188
189 return(ids, snames, sbrands, scodes, snums, smanagers, saddress);
190 }
191
192 function getPurchaseHistory(bytes32 _consumerCode) public view returns (bytes32[] memory, bytes32[] memory, bytes32[] memory){
193     bytes32[] memory productSNs = productsWithConsumer[_consumerCode];
194     bytes32[] memory sellerCodes = new bytes32[](productSNs.length);
195     bytes32[] memory manufacturerCodes = new bytes32[](productSNs.length);
196     for(uint i=0; i<productSNs.length; i++){
197         sellerCodes[i] = productsForSale[productSNs[i]];
198         manufacturerCodes[i] = productsManufactured[productSNs[i]];
199     }
200     return (productSNs, sellerCodes, manufacturerCodes);
201 }
202
203 //Verify
204
205 function verifyProduct(bytes32 _productSN, bytes32 _consumerCode) public view returns(bool){
206     if(productsSold[_productSN] == _consumerCode){
207         return true;
208     }
209     else{
210         return false;
211     }
212 }
213 }
```

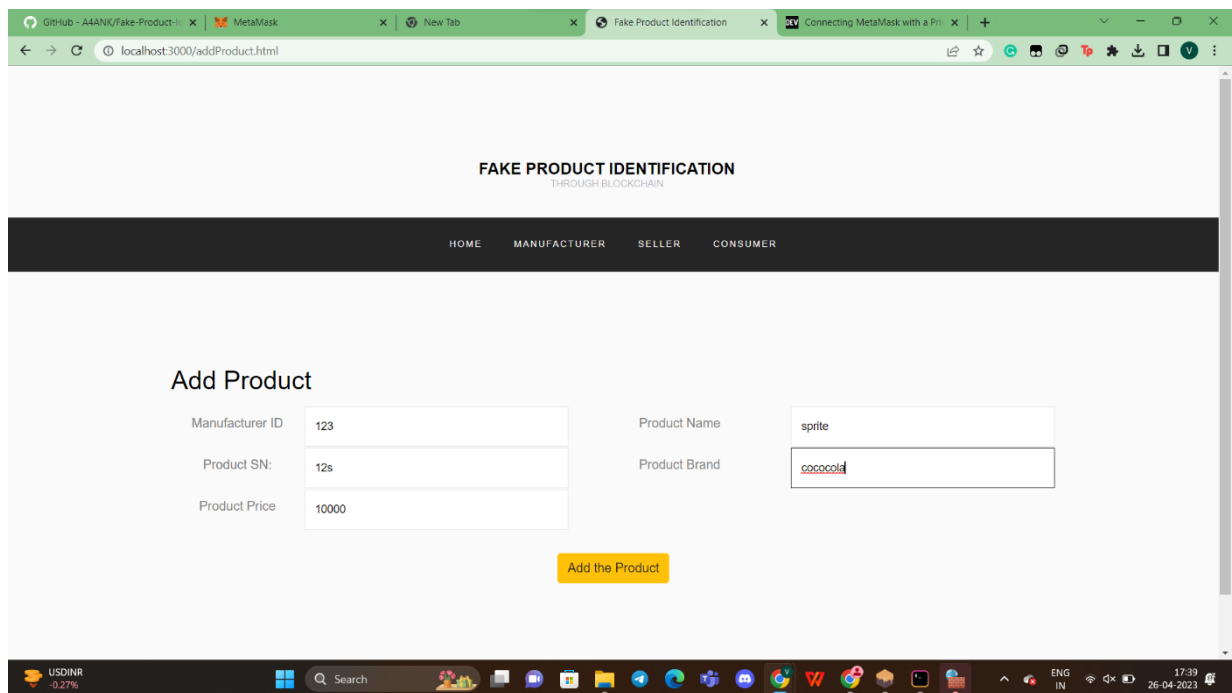
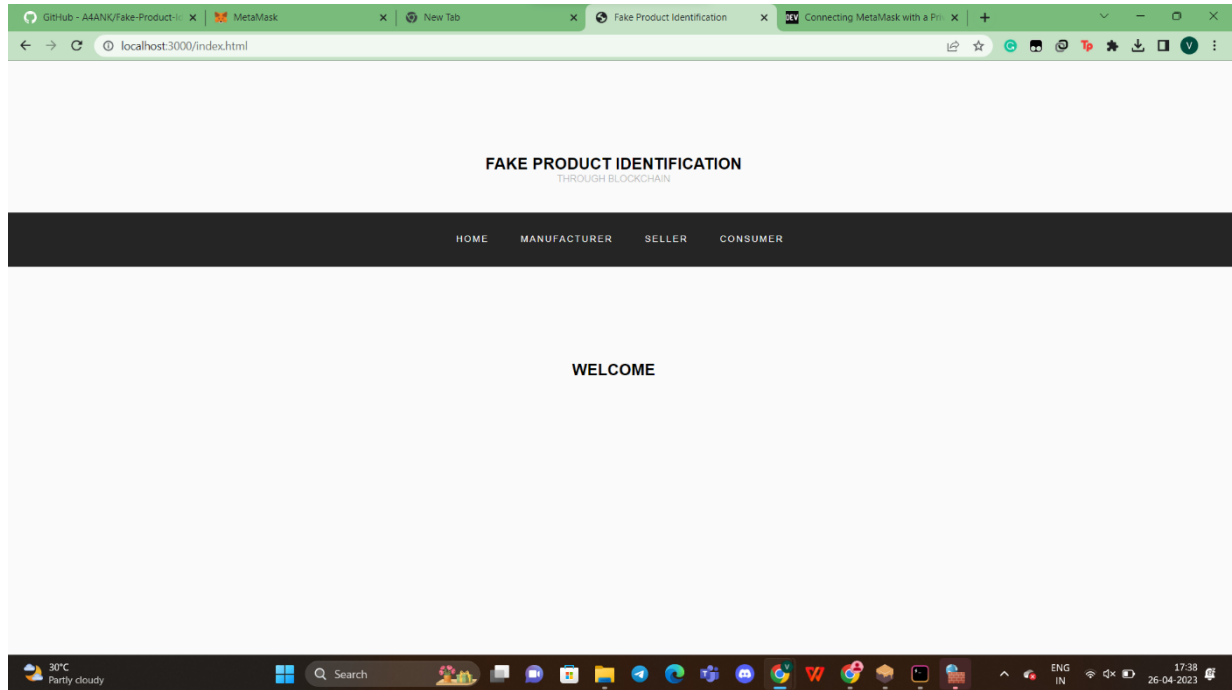
```
File Edit Selection View Go Run Terminal Help
Restricted Mode is intended for safe code browsing. Trust this window to enable all features. Manage Learn More

index.html X product.sol
C:\Users> rgio Downloads > index.html > ...
1 <!doctype html>
2 <html lang="en">
3 <head>
4 <title>Fake Product Identification</title>
5 <meta charset="utf-8">
6 <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">
7 <link href="https://fonts.googleapis.com/css?family=Roboto:400,100,300,700" rel="stylesheet" type="text/css">
8 <link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/font-awesome/4.7.0/css/font-awesome.min.css">
9 <link rel="stylesheet" href="css/style.css">
10
11 </head>
12 <body>
13 <section class="ftco-section">
14 <div class="container-fluid px-md-5">
15 <div class="row justify-content-between">
16 <div class="col-md-8 order-md-last">
17 <div class="row">
18 <div class="col-md-6 text-center">
19 <a class="nav-bar-brand" href="index.html">Fake Product Identification <span>through Blockchain</span></a>
20 </div>
21 <div class="col-md-6 d-md-flex justify-content-end mb-md-0 mb-3">
22 <form action="#" class="searchform order-lg-last">
23
24 </form>
25 </div>
26 </div>
27 </div>
28 <div class="col-md-4 d-flex">
29 <div class="social-media">
30
31 </div>
32 </div>
33 </div>
34 </div>
35 <nav class="navbar navbar-expand-lg navbar-dark ftco_navbar bg-dark ftco-navbar-light" id="ftco-navbar">
36 <div class="container-fluid">
```

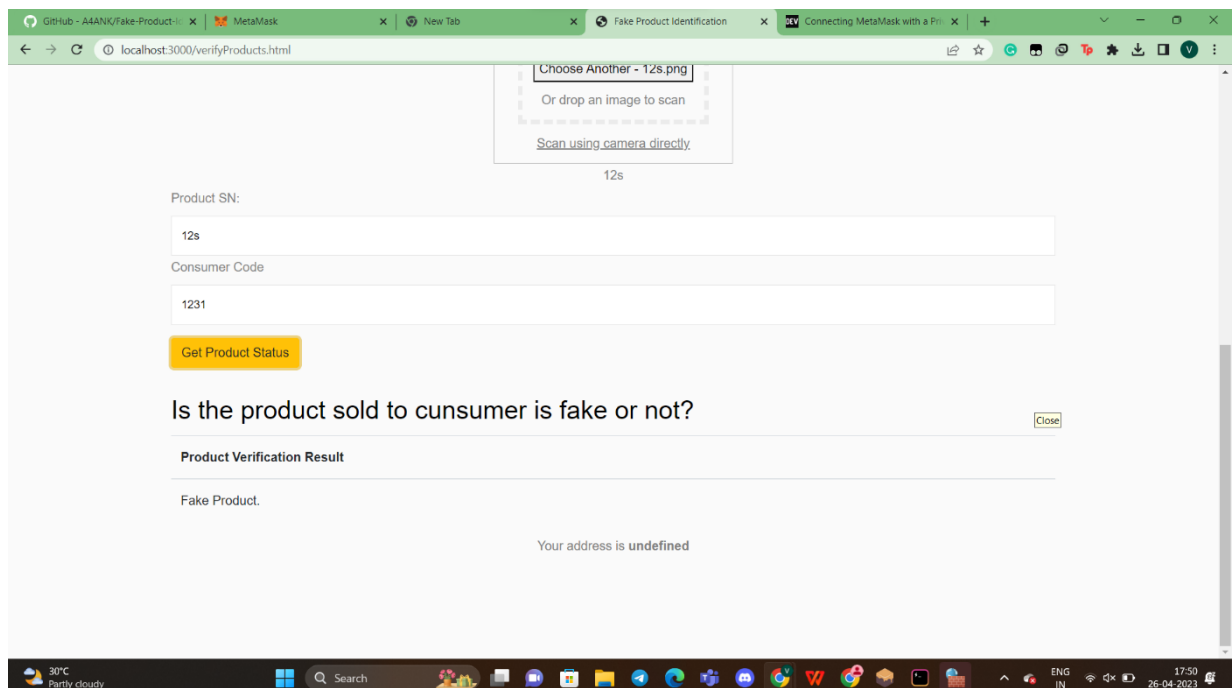
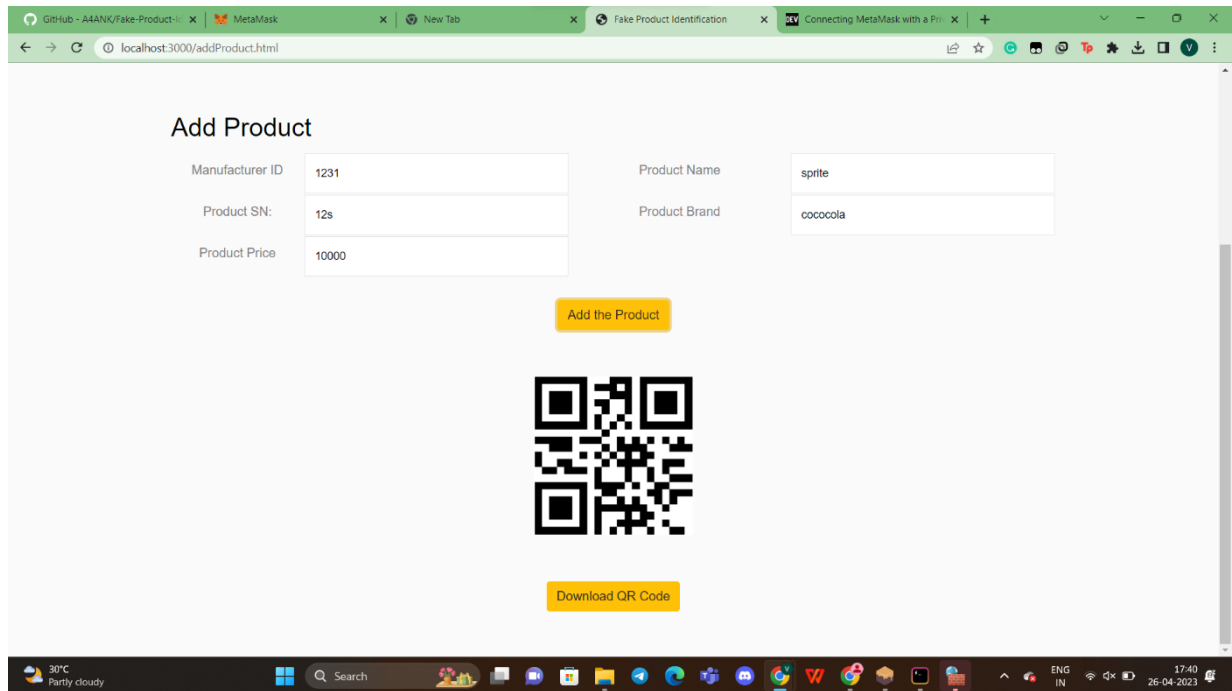
```
File Edit Selection View Go Run Terminal Help
Restricted Mode is intended for safe code browsing. Trust this window to enable all features. Manage Learn More

index.html X product.sol
C:\Users> rgio Downloads > index.html > ...
34 </div>
35 <nav class="navbar navbar-expand-lg navbar-dark ftco_navbar bg-dark ftco-navbar-light" id="ftco-navbar">
36 <div class="container-fluid">
37
38 <button class="navbar-toggler" type="button" data-toggle="collapse" data-target="#ftco-nav" aria-controls="ftco-nav" aria-expanded="false" aria-label="Toggle na
39 <span class="fa fa-bars"></span> Menu
40 </button>
41 <div class="collapse navbar-collapse" id="ftco-nav">
42 <ul class="navbar-nav m-auto">
43 <li class="nav-item"><a href="index.html" class="nav-link">Home</a></li>
44 <li class="nav-item"><a href="manufacturer.html" class="nav-link">Manufacturer</a></li>
45 <li class="nav-item"><a href="seller.html" class="nav-link">Seller</a></li>
46 <li class="nav-item"><a href="consumer.html" class="nav-link">Consumer</a></li>
47 </ul>
48 </div>
49 </div>
50 </nav>
51 <!-- END nav -->
52
53
54 </section>
55
56 <div class="container-fluid px-md-5">
57 <div class="row justify-content-between">
58 <div class="col-md-12 order-md-last">
59 <div class="row">
60 <div class="col-md-12 text-center">
61 <a class="nav-bar-brand" href="index.html">WELCOME </a>
62 </div>
63 <div class="col-md-6 d-md-flex justify-content-end mb-md-0 mb-3">
64 <form action="#" class="searchform order-lg-last">
65
66 </form>
67 </div>
68 </div>
69 </div>
```

# OUTPUT







## **FUTURE WORK**

The proposed system really helps the retail market, manufacturers, and consumers from counterfeiting products but the system failed when a QR code is taken from a genuine product and given to a fake product then the product which is sold first become genuine it does not matter it is a genuine product or fake product but another product is treated as a fake product. Also storing the supply chain of every product require a huge amount of memory which is going to make this system expensive. The future work is to implement this model and try to resolve the limitation such as embedding some material in the product so that when a person tries to take the QR code, the chip or something will send the signal.

**1. Integration with Decentralised Exchanges:** Decentralised exchanges (DEXs) are becoming increasingly popular, and integrating this system with DEXs could provide users with a seamless and secure way to trade digital assets.

**2. Improved Security Features:** While the Fake Product System is already designed to be secure, there is always room for improvement. In the future, the project could be improved with additional security features, such as multi-factor authentication, biometric authentication, and hardware wallet support.

**3. Enhanced User Experience:** The user experience of the Fake Product System can be further improved by adding more features and improving the existing ones. For example, adding a more intuitive interface, more advanced trading features, and better integration with other applications.

**4. Decentralised Identity Management:** As the use of blockchain technology expands, there will be a growing need for decentralised identity management systems. The Fake Product System could be expanded to include a decentralised identity management system, which would provide users with greater control over their digital identities.

The future work of Fake Product System is focused on expanding the functionality and improving the user experience of the platform, while maintaining the highest levels of security and decentralisation.

## **CONCLUSION**

Counterfeiting 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 QR code. Customers or users scan the QR code and then they can detect the fake product. Digital information of product can be stored in the form of blocks in blockchain technology.

Thus, in this proposed system and the solution to fight against the malpractices of counterfeiting of the products, and proposed the system which is useful for end user to detect whether the product is fake or not by checking the throughout history of the product in the supply chain. End user can scan QR code assigned to a product and can get all the information that has been put up throughout the supply chain in the blockchain on which end to end user can check whether the product is genuine or not.

## **REFERENCES**

- [1] Si Chen, Rui Shi, Zhuangyu Ren, Jiaqi Yan, Yani Shi, Jinyu Zhang, “A Blockchain-based Supply Chain Quality Management Framework”, 14th, IEEE International Conference on e-Business Engineering, 2017.
- [2] Mitsuaki Nakasumi, “Information Sharing for Supply Chain Management based on Block Chain Technology”, 19th Conference on Business Informatic, IEEE, 2017.
- [3] Daniel Tse, Bowen Zhang, Yuchen Yang, Chenli Cheng, Haoran Mu, “Blockchain Application in Food Supply Information Security”, 2017 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM).
- [4] Feng Tian, “A supply chain traceability system for food safety based on HACCP, blockchain & Internet of things”, 2017 International Conference on Service Systems and Service Management
- [5] Freya Sheer Hardwick, Apostolos Gioulis, Raja Naeem Akram, Konstantinos Markantonakis, “E-Voting with Blockchain: An E-Voting Protocol with Decentralisation and Voter Privacy”, 2018.
- [6] Neo C.K. Yiu, Member, “Toward Blockchain-Enabled Supply Chain Anti-Counterfeiting and Traceability” IEEE Department of Computer Science, University of Oxford.
- [7] A Blockchain-Based Application System for Product Anti-Counterfeiting Jinhua Ma, Shih-Ya Lin, Xin Chen, Hung-Min Sun, Yeh-Cheng Chen, (Graduate Student Member, IEEE) and Huaxiong Wang
- [8] A Novel Blockchain-Based Product Ownership Management System (POMS) for Anti-Counterfeits in the Post Supply Chain Kentaroh Toyoda, (Member, IEEE), P. Takis Mathiopoulos, (Senior Member, IEEE), Iwao Sasase, (Senior Member, IEEE), And Tomoaki Ohtsuki, (Senior Member, IEEE).

