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Combining Blockchain and Image Processing to Counterfeit Goods Detection

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Abstract: ***Fake products are a big problem since it's difficult to tell the difference between real and fake goods in today's environment. However, some people create these false goods for financial gain alone, without considering how they will affect customers or how they will influence a company's reputation, earnings, or sales. With blockchain technology, it is possible to verify the validity of a product and determine if it is real or false. Blockchain is a popular technology that is used in many applications.***

Information is maintained in the form of blocks in numerous databases that are connected by chains using blockchain technology, and no permission from outside users is needed. The immutability and security of blockchain technology are advantages.

Keywords: Counterfeit product, QR code, logo, Blockchain

I. INTRODUCTION

Risk considerations, such as counterfeiting and duplication, which can have an impact on a company's reputation, revenue, and customer satisfaction, are always present when a technology or product is developed globally. In the supply chain, there are a lot of different products. to check whether the product is authentic or fraudulent. Manufacturers are experiencing the biggest issue and significant losses as a result of counterfeit or fraudulent items. Blockchain technology can be used to determine whether a product is authentic.

Blockchain is a system for storing information that makes it difficult or challenging to alter, hack, or cheat the system. A blockchain is simply a distributed network of computer systems that duplicates and distributes a computerized record of transactions.

Under the suggested system, each product is given a generated QR code and logo, which the client can scan to learn all there is to know about that product. We can tell whether a product is legitimate or phony after scanning the logo and QR code.

A. Working of Blockchain

As a new transaction is entered, it is then sent over a global network of peer-to-peer computers. The equations are then solved by the network of computers to verify the transaction's legitimacy. They're known as miners. They are grouped together into blocks once their legitimacy has been established. The miner then receives a prize as payment for their efforts. The history of all lasting transactions is then created by chaining together these blocks. The deal has been concluded. The entire process is carried out as indicated in figure 1.

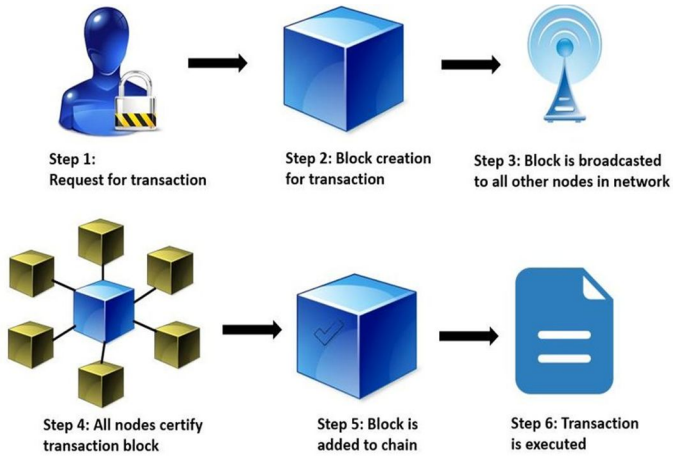


Figure 1: Working of Blockchain

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B. Blockchain features

Blockchain is able to add data entries to its database and relies on its own consensus algorithms rather than any centralized body to act as an arbitrator. Blockchain is a highly trustworthy database that is available to everyone. This is a detailed description of each characteristic of blockchain technology. Figure 2 displays the Blockchain's attributes.

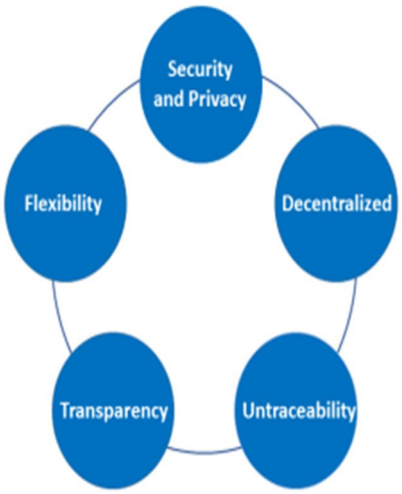


Figure 2: Blockchain features

1) Blockchain employs cryptography to secure its data for security and privacy. The data is signed using a private key, and using the public key, we can determine if the data has been altered or not and confirm its authenticity. To preserve the security of their data on blockchain, a user should protect their private key by keeping it secret, much like they would their bank's OTP and passwords.
2) *Decentralized:* No one needs to know or trust anybody else in a decentralized blockchain network. A distributed ledger that contains identical data is shared by every member of the network. The majority of the network's members will reject any altered or distorted data from a member's ledger.
3) *Untrace ability:* A block that has been added to the blockchain cannot be altered beyond that point. As a result, if a block is amended in the Blockchain, it is immediately rejected or erased.
4) *Transparency:* The participants in a blockchain can examine the data, which is entirely public.
5) *Flexibility:* One of the main benefits of blockchain is that it is open source. Users have access to a number of public and private blockchains that can be employed depending on the sort of application that has to be constructed.

II. LITERATURE SURVEY

Over the years, many research teams have conducted a number of tests. The following are a few of the groups:

1) Prabhu Shankar and R. Jayavadivel's A Study on Counterfeit Product Detection. Because there are so many things available on the black market and online, counterfeit goods are expanding tremendously. Therefore, there is a critical need to solve the difficulties of identifying fake goods and develop the necessary technologies to increase detection precision. In the modern world, this is one of the active research fields being investigated. This essay explores a number of methods for spotting fake goods.
2) By Steven, Marko, "Smart Tags for Brand protection and anti-counterfeiting in the wine business." Using smart tags and Cloud enabled technologies, this paper outlines a trademark protection and anticounterfeiting solution for the wine sector. Using quick response codes, functional inks, a Cloud-based system, and two-way communication between the winemaker and the end user is the fundamental principle behind smart tags.
3) Si Chen and Rui Shi have developed a blockchain-based supply chain quality management framework. We provide a blockchain-based paradigm in this study. This theoretical foundation will serve as the foundation for blockchain-based intelligent supply chain quality management. Additionally, it offers a platform for ideas to be developed on the management of information resources in distributed, virtual enterprises

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III. PROPOSED SYSTEM

The proposed project detects fake products by detecting the logos whether the uploaded logo is an original logo or a fake logo and have an additional functionality using blockchain. By using the proposed system, there will be an increase in the percentage of detecting fake products. Whereas, the chances of tampering with the products will be reduce. The proposed system mainly goes through two detection techniques that are listed below.

Fake Logo Detection using image processing

Fake product Detection using Blockchain

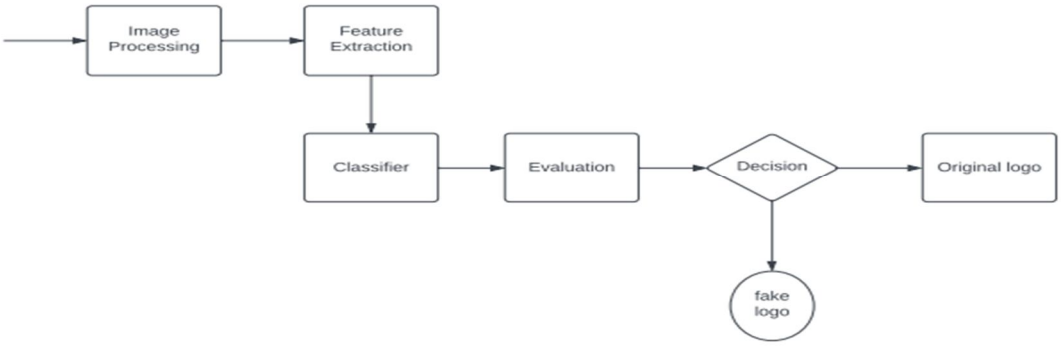


Figure 3: Architecture of Fake Logo Detection

The first technique is detecting fake logo. This will contain four steps like:

Image Processing: Image processing is a step by which we can able to remove the noise, distortion which can affect the classifier. This process includes applying filters, resizing the image etc. to remove background noise.

1) *Feature Extraction:* This process involves the extraction of features of the logo after the image processing stage. This Feature Extraction includes different techniques like edge detection algorithms etc.
2) *Classifier:* This process classifies the logo using machine learning techniques such as CNN. Which takes the extracted features as an input.
3) *Evaluation:* This process evaluates the output of classifier on the different set of images.
4) *Decision:* This process will give the decision based on the output given by the evaluation phase.

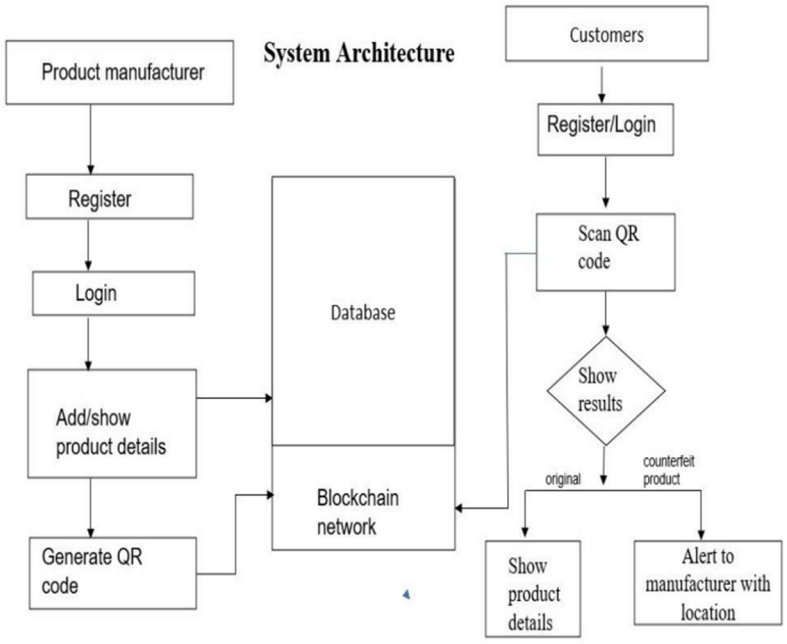


Figure 4:Architecture of Fake product detection using Blockchain

5) *Product Manufacturer:* The Product Manufacturer is the only one who create the product and adds it to the blockchain. He is the one who sells the product to the customer.
6) *Register:* The product Manufacturer and Customer should have to register to the blockchain to add the product. By registering to the blockchain He/she can able to add the product and transfer the product.
7) *Login:* Login Page is used to login for both Manufacturer and Customer to add the product and get the product with the respective logins. Manufacturer can be able to add and transfer the product. Whereas, the Customer have only right to authenticate and get the details of the product.
8) *Add/show Details:* This is used to add the product and show the product which is managed by the respective owner of the product.
9) *Blockchain Network:* Blockchain Network is used to store the data in the blockchain. With the help of MetaMask wallet we can able to perform the transactions.

IV. RESULT

The Blockchain Technology improves the efficiency of detecting the fake products and by using logo detection there is an improvement of tampering the Logo. Below are the output of the fake product detection using logo detection using image processing and blockchain.

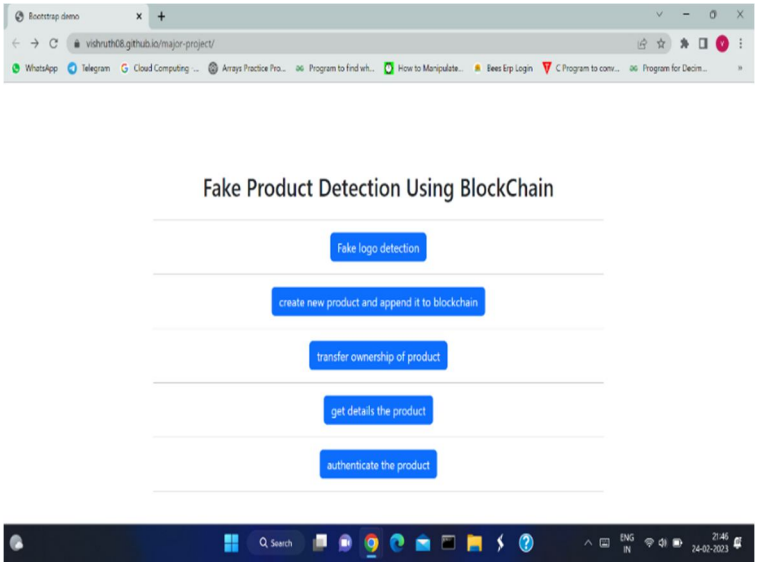


Figure 5: Home Page of Fake Product Detection using blockchain and image processing

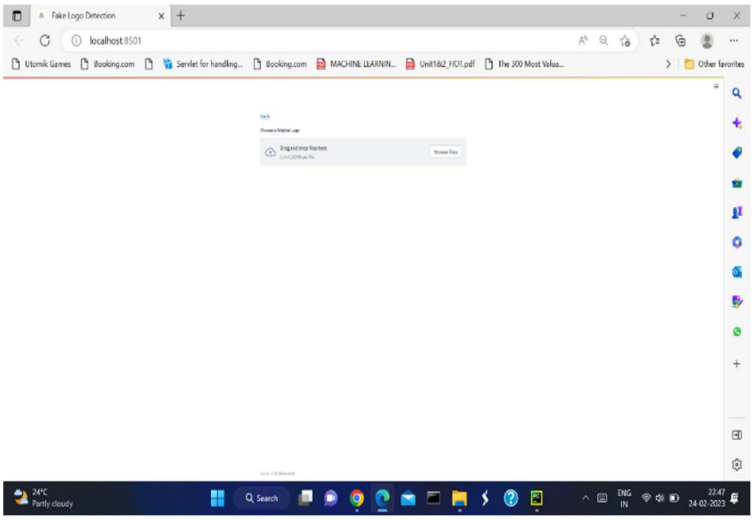


Figure 6: Home Page of Fake logo Detection

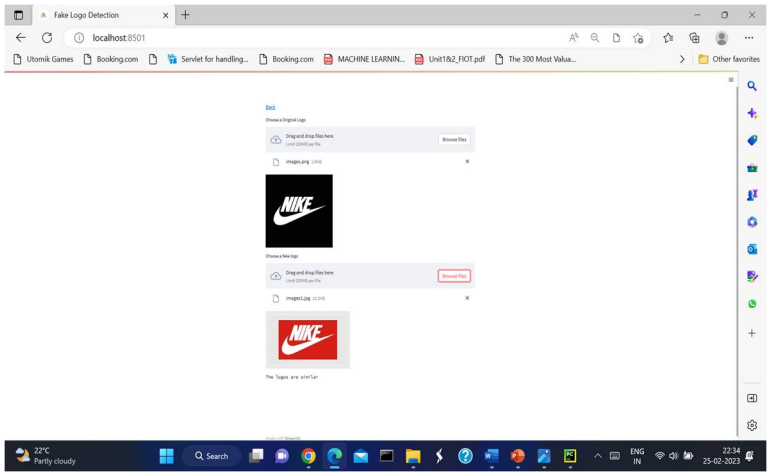


Figure 7: Output of Original Logos

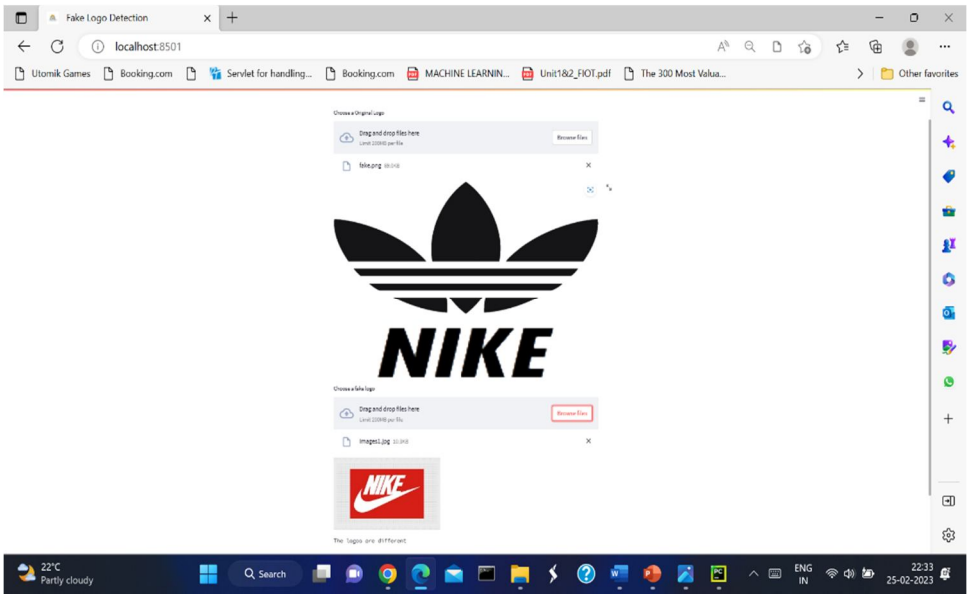


Figure 8: Output of Fake Logos

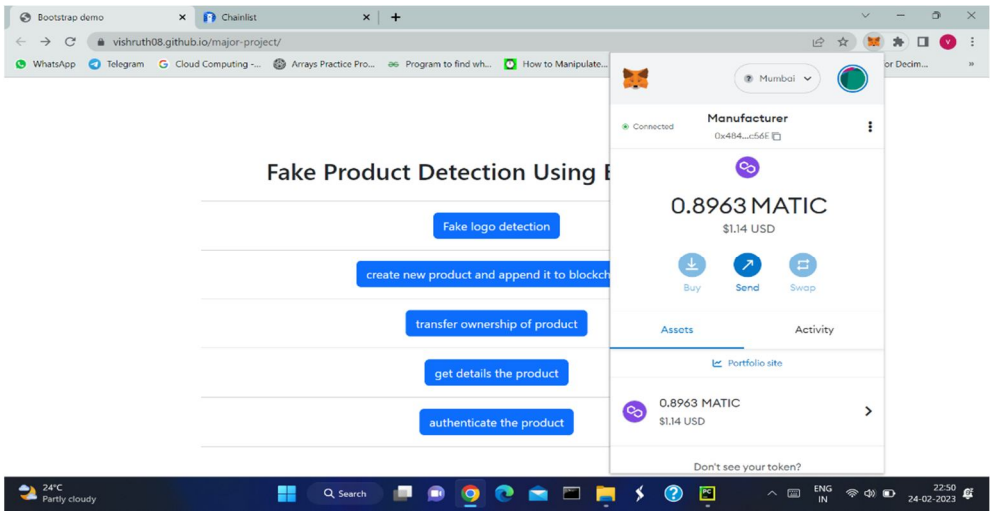


Figure 9: Connecting to the MetaMask wallet

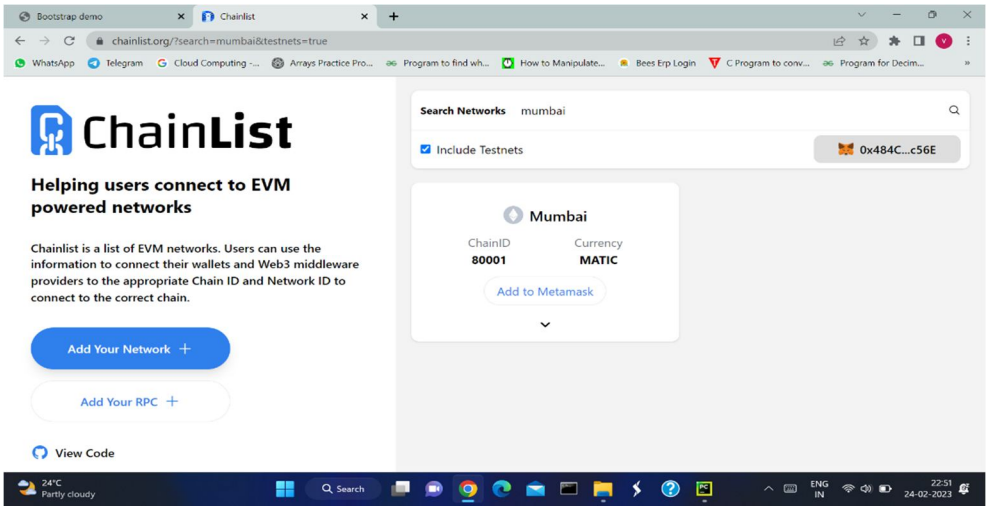


Figure 10: Adding The Test net as Mumbai in chainList

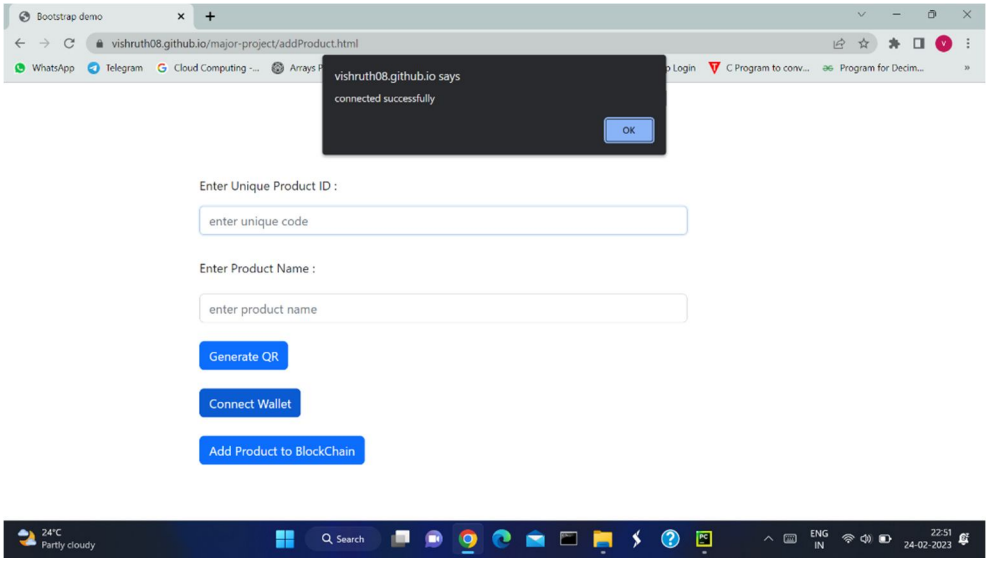


Figure 11: Connect to the MetaMask Wallet by clicking the connect wallet Button

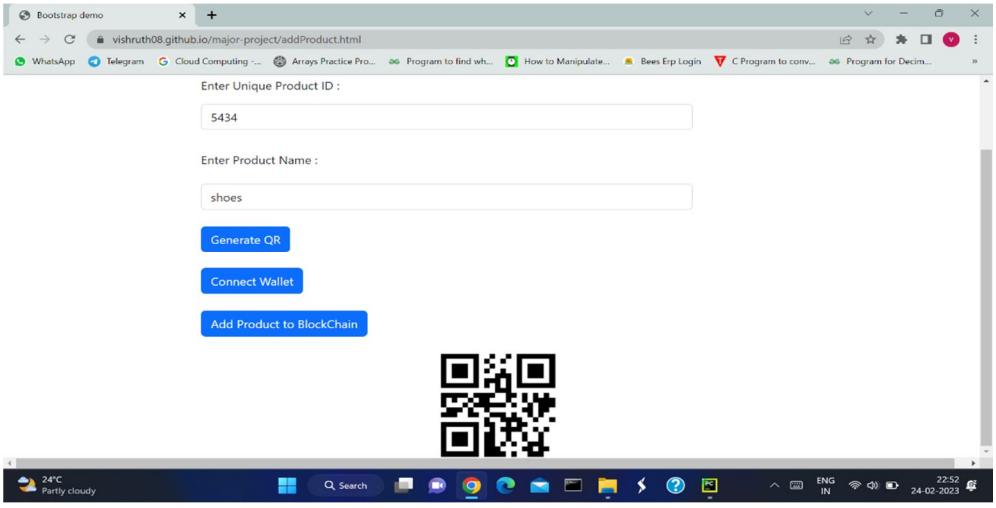


Figure 12: Add The product details in the fields (done by Manufacturer) and generate QR code

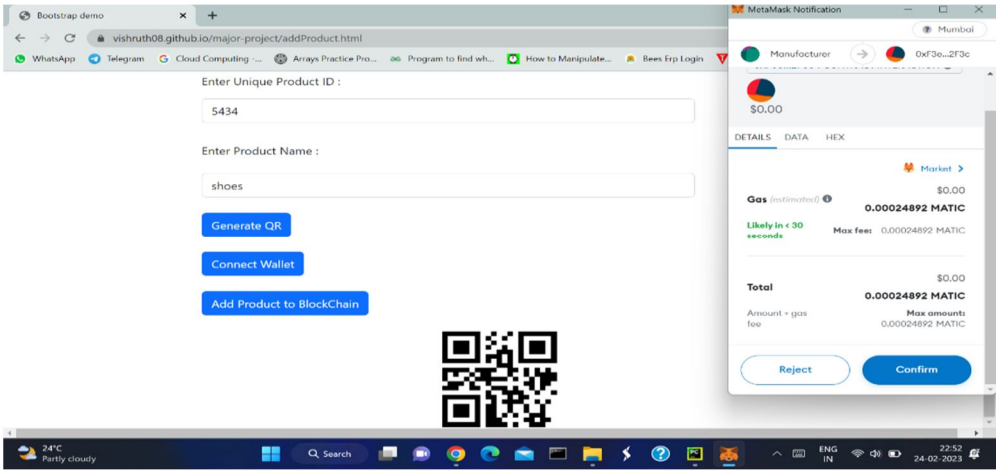


Figure 13: Then adding the product and confirming it in MetaMask wallet

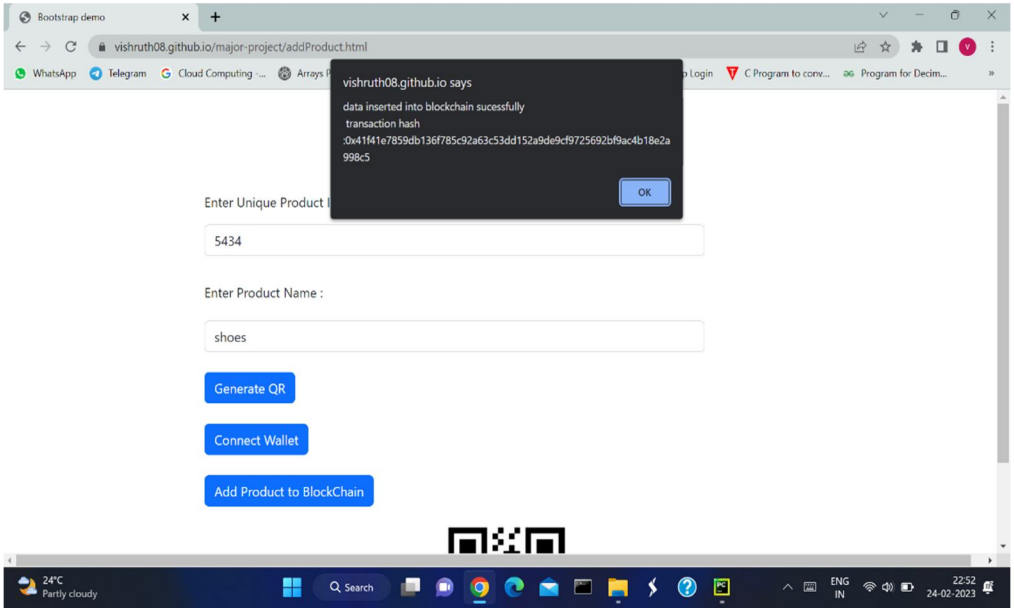


Figure 14: Popup After the product is added

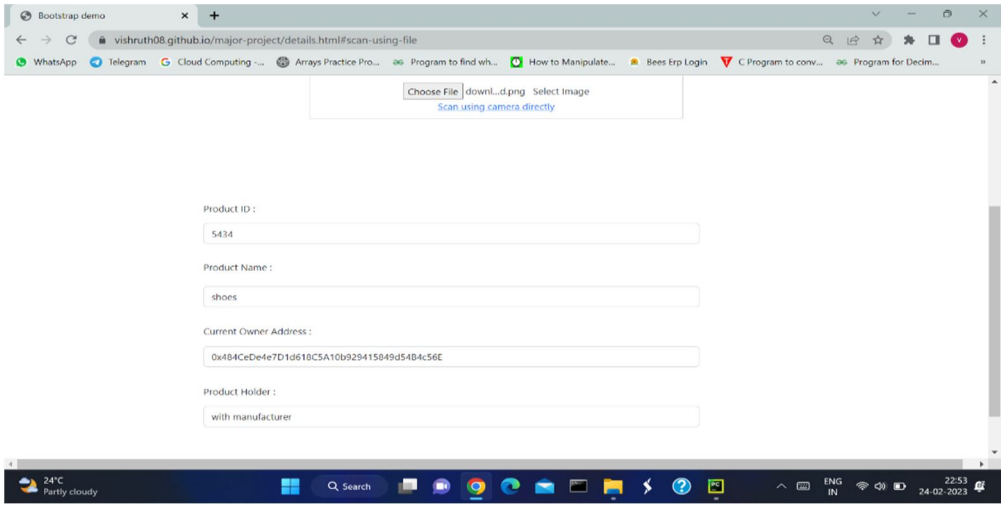


Figure 15: Getting the Details by uploading the QR code

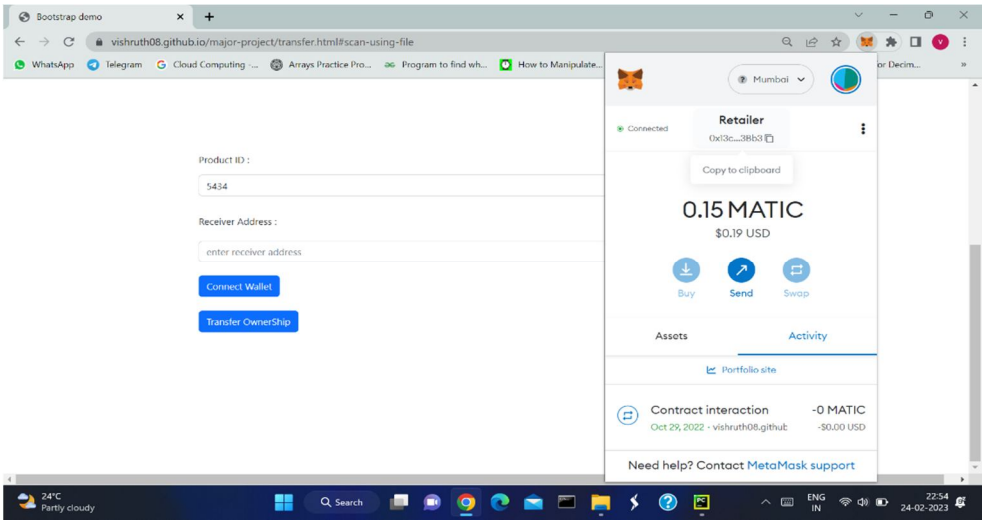


Figure 16: Copying the receiver address to transfer the product

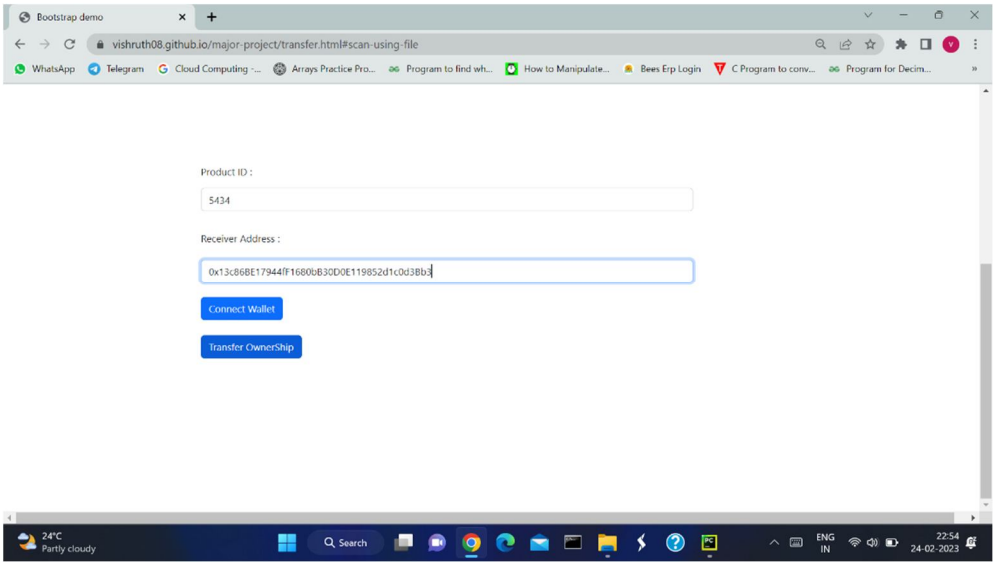


Figure 17: Transferring the product to the retailer by adding retailer address

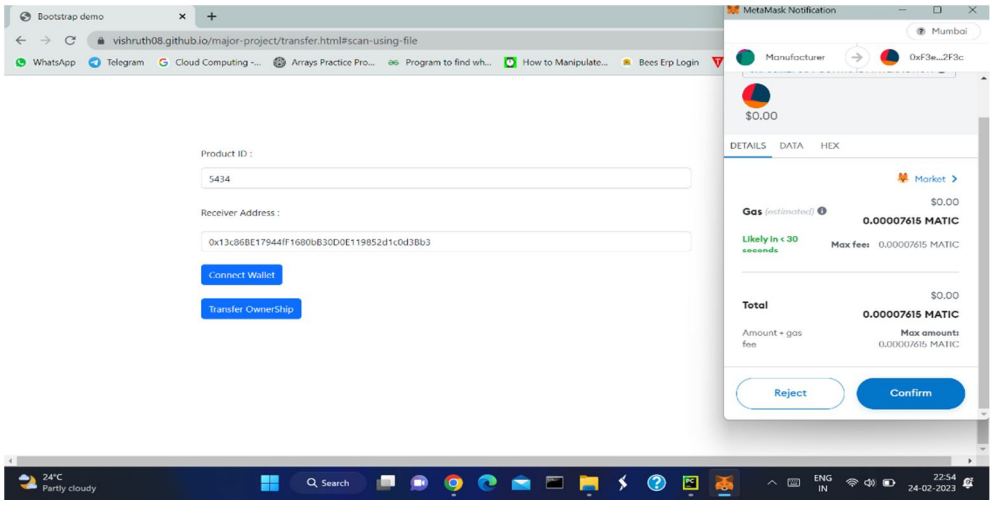


Figure 18: Completing the transaction

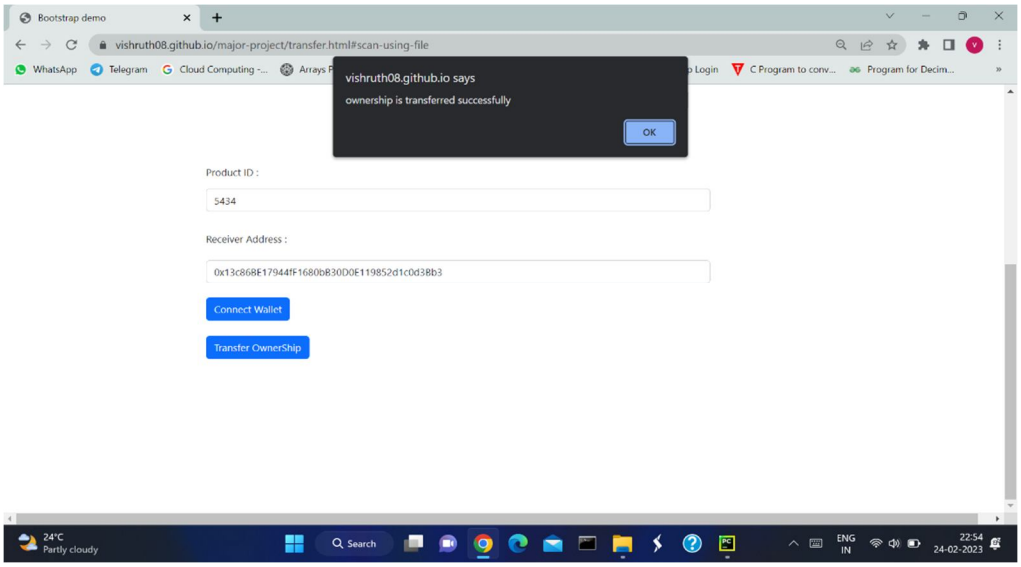


Figure 19: Popup after transferring the product

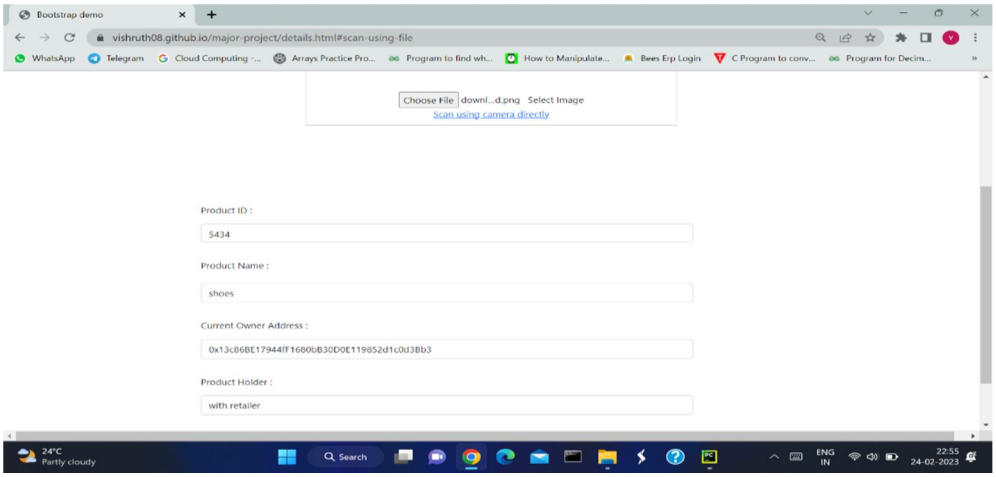


Figure 20: Getting the product details by uploading the QR code

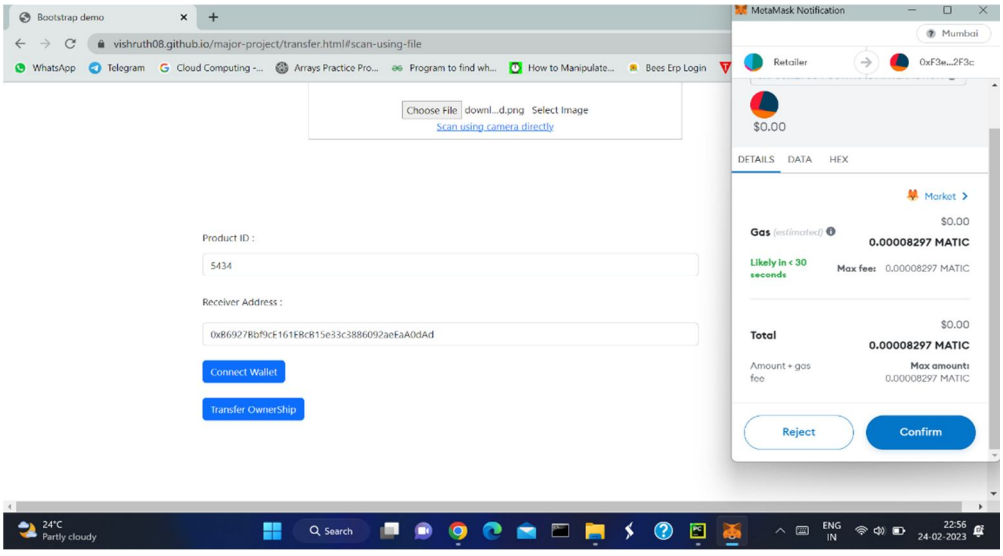


Figure 21:Completing The Transaction of transferring to the customer

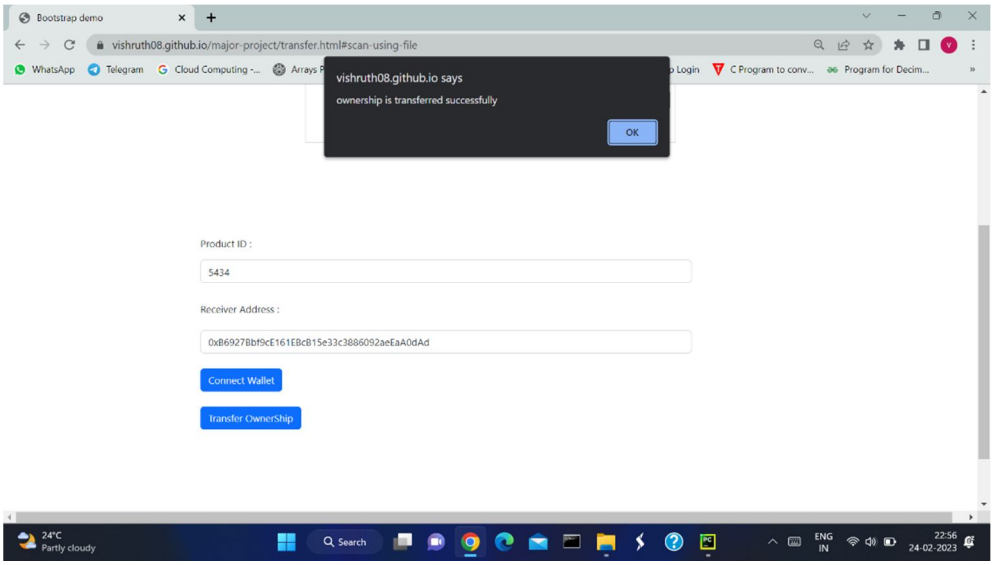


Figure 22: After completing the transaction

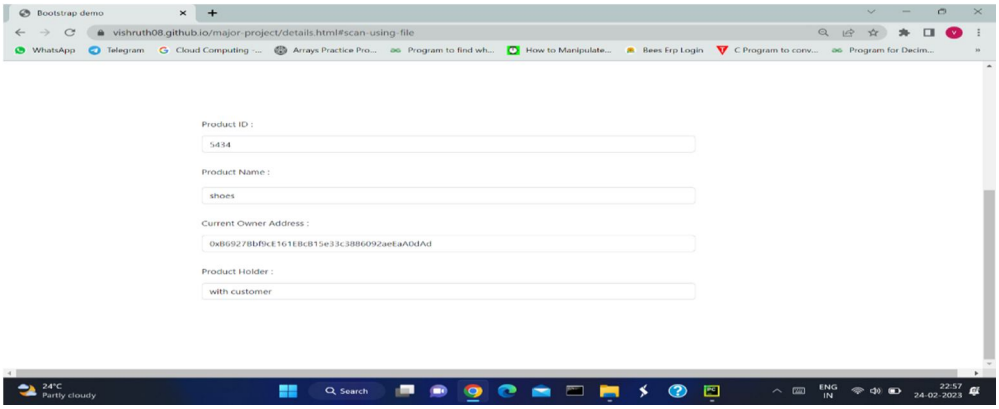


Figure 23: Getting the product details

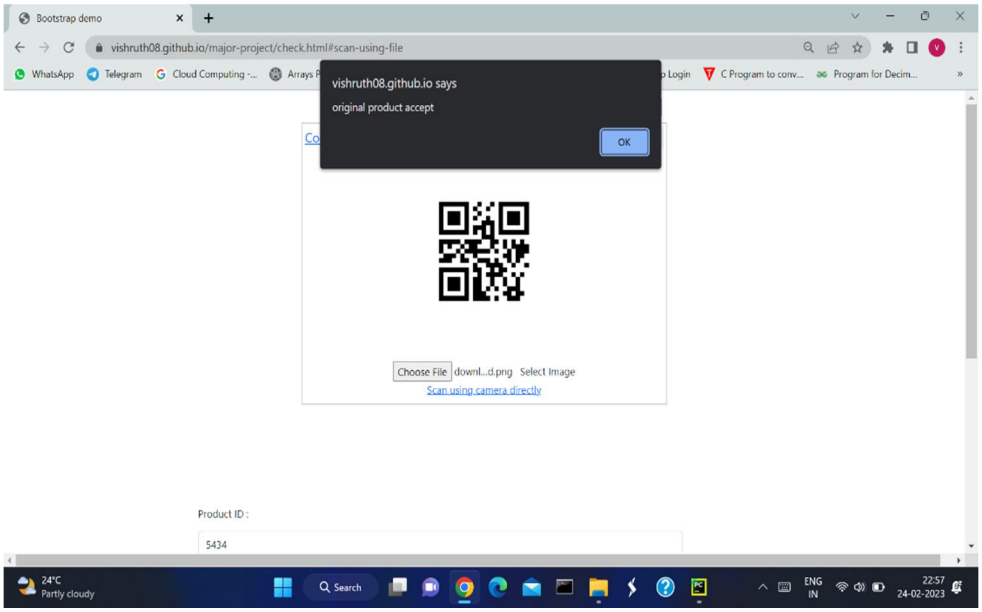


Figure 24: Authenticating using the customer's account

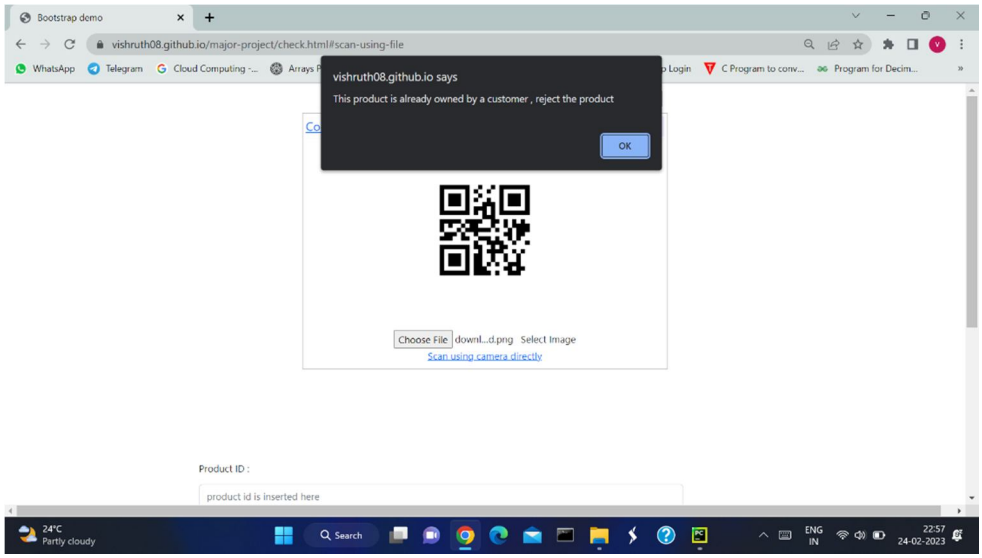


Figure 25: Authenticating using the Fake Customer's Account

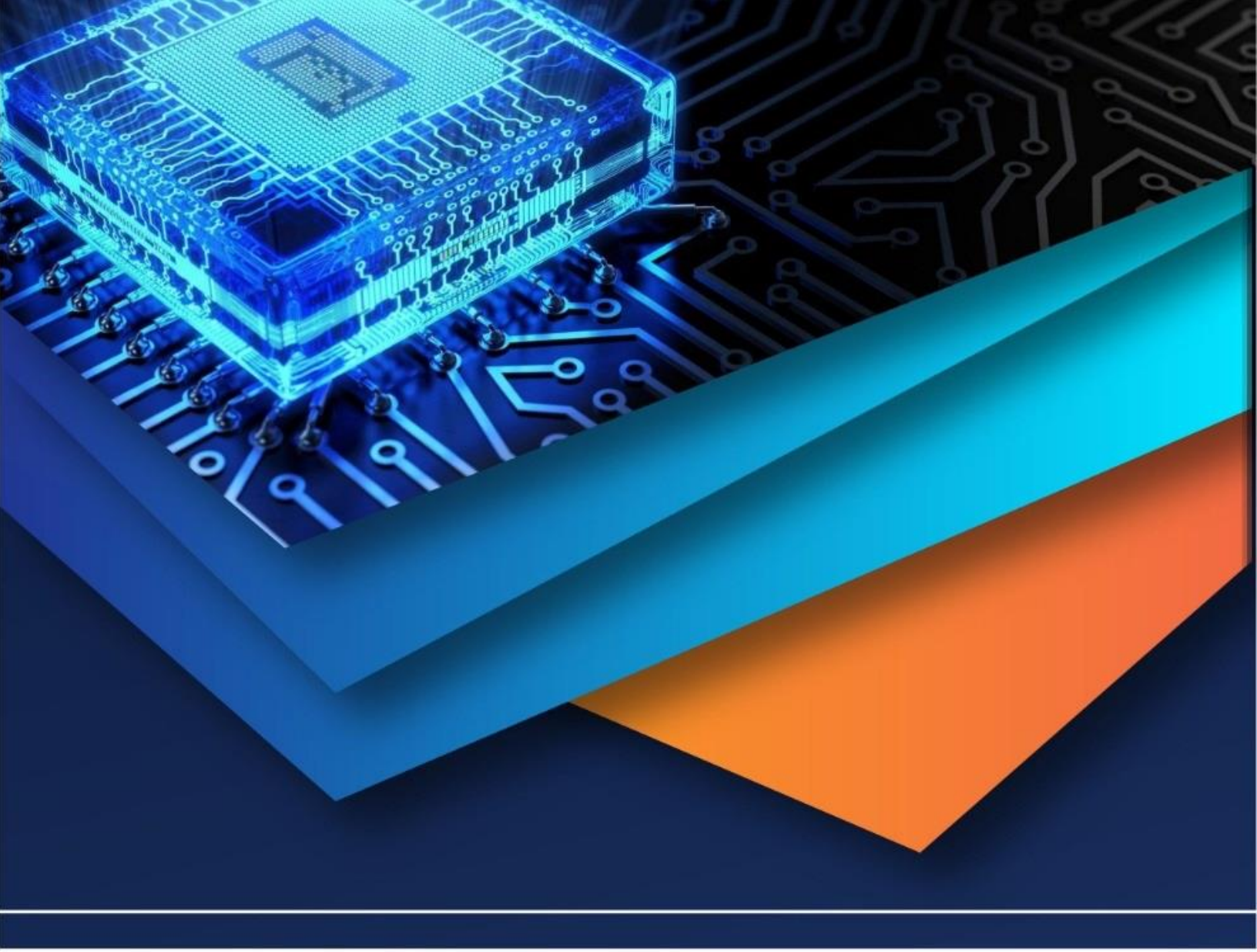
V. CONCLUSION

With the vast variety of things available online, counterfeit goods are expanding tremendously. So, there is a critical need to identify phony goods, and blockchain technology is employed to do so. Moreover, a QR code with the information has been created. Consumers and users can identify bogus products by scanning the logo and QR code. With blockchain technology, product-related digital data can be saved as blocks. The Firebase cloud can be used to store the data.

Hence, the suggested system helps the buyer identify bogus goods in the supply chain. Consumers can scan QR codes and logos allocated to products to obtain information such as transaction histories and the current owner, which end users can use to determine whether the product is authentic.

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