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Fake Product Detection Using Blockchain

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Abstract: ***Many applications have been developed using blockchain in recent years as its popularity has grown. The cryptocurrency Bitcoin is a well-known example of a Blockchain application since it not only solves the issue of double spendingin an efficient manner but also has the ability to independently verify the veracity of transactional data. As a result, any application that uses Blockchain technology as its fundamental architecture guarantees the integrity of its data. Since Blockchain technology is decentralised, consumers do not fully depend on merchants to verify the authenticity of their purchases. We outline a decentralised Blockchain system with product anti- counterfeiting so that producers can utilise it to deliver authentic goods without having to oversee directly owned storefronts, whichcan significantly reduce the cost of product quality assurance.***

Index Terms: Blockchain, ethereum, counterfeit.

I. INTRODUCTION

When developing technologies or products globally, there are always risks such as counterfeiting and duplication; these factors can affect an organization's reputation, revenue, and the well-being of its customers. There are so many productsin the supply chain. To make sure the product is genuine or fake or in order to know the authenticity of the product, we can use blockchain technology.

Blockchain is a data storage system that makes it harder or harder to modify, hack, or cheatthe system. A blockchain is simply a replicated distributed record of transactions that runs across an entire network of computers on a blockchain. Several transactions are containedin each block of the chain, and each time a new transaction is made on the blockchain, a record of that transaction is added to each participant's records. A decentralized database managed by the number of participants is called Distributed LedgerTechnology (DLT).

A blockchain is a type of distributed ledger technology that uses immutable cryptographic signa- tures called hashes to record transactions. It uses the keccak- 256 algorithm. Keccak 256 belongs to the SHA 3 algorithm family, where SHA stands for Secure Hash Algorithm.

The meaning of 256 in the name represents the final hash value, i.e. regardless of the size of the plaintext, the hash value is always 256 bits. The hash function is one-way and there is no way to get the full text of the resulting hash. Each block header in a blockchain contains the hash of the previous block header. This ensures that it is not possible to modify a single block in the blockchain without being discovered.

From modifying ablock, it requires generating a new version for each subsequentblock. Blockchain technology thus helps solve the problem of counterfeit products. For each product on the network, a hash code is generated and a string is created for each product transaction and its current owner. All transaction records will be stored in the blockchain as blocks. In the proposed system, we assign the generated QR code to a specific product, which customers can finally scan and get all the information about this product. After scanning the QR code, we can identify the authenticity of the product.

II. OBJECTIVES OF THE STUDY

As long as there is a brand name and reputation associ-ated with the product, there is a risk of counterfeiting and duplication, which affects the company's reputation, revenue, and customer satisfaction. As a result of fake products, orig- inal manufacturers suffer huge losses and have to deal with huge problems.

In order to ensure the identification of fake products throughout the supply chain and to overcome this Counterfeiting problem, a fully functional blockchain system is proposed. objectives of this project is to secure product details using a QR (Quick Response) code by designing Anti- Counterfeit System using Blockchain. Blockcahin providesthe decentralized platform which ensures that the Blockchain is not controlled by any one person, organisation, or even government, So no third party can entered into the systemand tampered the data.

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III. RELATED WORK

1) Ajay Funde, Pranjal Nahar, Ashwini Khilari, NikhilMarne, Ms. Nikhita Nerkar, "Blockchain Based Fake Product Identification in Supply Chain", International Research Journalof Engineering and Technology (IRJET) Volume: 06 Issue: 05 May 2019. In this research they are using blockchain to develop a system that can assist end users in detecting bogus items in the supply chain. End users may scan the QR code issued to a product to obtain information such as transaction history and current owner, allowing them to determine if the goods is legitimate or not. This system controls product ownership using IPFS (Inter Planetary File System), which is part of the Distributed Web. IPFS is more helpful than http because it can efficiently distribute large amounts of data and does not permit duplication. With IPFS you are allowed to address massive volumes of data and embed the immutable IPFS links in a blockchain transaction. All members in the supply chain will receive real-time updates on the safety of food items via this system. Also, the system has the potential todramatically increase the efficiency and openness of the food supply chain, which will undoubtedly improve food safety andrestore customers' faith in the food sector.
2) Toqeer Ali Syed, Ali Alzahrani, Salman Jan, Muham- mad,Shoaib Siddiqui, Adnan Nadeem and Turki Alghamdi, "A Comparative Analysis of BlockchainArchitecture and Its Ap- plications: Problemsand Recommendations", : IEEE Access. Volume: 7/ 04 December 2019. Here, in this paper depicts a comparative examination of the underlying principles of blockchain technology, as well as its applications in three key industries: the Internet of Things (IoT), business, and the automotive sector. It goes in depth about the problems and suggestions made by the scientific community and businessfor each topic. This research studies also displays the fullblockchain ecosystem. The paper focuses on how Blockchain can be used in IOT, Healthcare and various other businesses.Ablockchain offers consensus techniques that allow for the solution of the aforementioned issue without jeopardising the privacy of other entities, including parties and digital assets.

IV. EXISTING SYSTEM

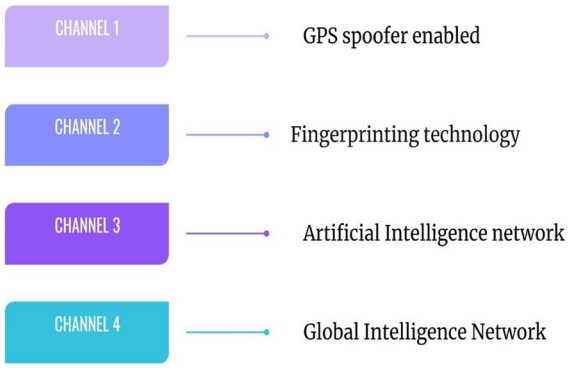


Fig. 1. Existing System

As you can see from the diagram above, these are techniquesused in existing systems. GPS spoofing occurs when someone uses a radio transmitter. It sends fake GPS signals to the receiver antenna to counter legitimate GPS satellite signals. The majority of navigation systems are built to utilise the most powerful GPS signals, with false signals overwhelming weakerbut legitimate satellite signals. Fingerprint recognition is the process of verifying the identity of a person by comparing their fingerprints with previously registered samples. The best example we've researched is Shield, a third-party web application that primarily provides security for organizations. Instead of using artificial intelligence and global intelligence, we use blockchain, so everything will be decentralized.

V. PROPOSED MODEL

In our system we are enabling communication between the customer and manufacturer of the product. We decen- tralize this service with a smart contract using the Ethereum blockchain. This decentralized application will use IPFS, the Ethereum Ecosystem, ReactJS, Express, and Bootstrap. Reac- tJS to develop our frontend for this application, by creating user friendly GUI for the customer to see their details. This blockchain-based system that traces the authenticity of goods and products. Blockchain data storage replaces a commoncentralized database to ensure traceability and authenticity ofa product.

It uses QR code for authenticating the productoriginality, if the scan QR code shows the details of the productwhich includes the

description, product name, manufac- turer name, company name, unique product id, and others then we can say that product is authentic. Scanning the product QR code does not reveal any details, so we can assume the product data is not stored in the blockchain system. So, we might conclude that the item is a fake.

VI. SYSTEM DESIGN

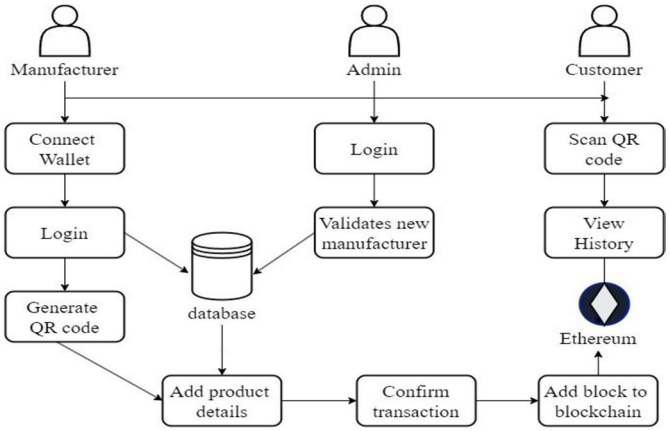


Fig. 2. Work Flow Diagram

The suggested solution would be a decentralised application (Dapp) that is constructed utilising the Ethereum Network as the primary blockchain for preserving all the records and managing the transactions related the goods of the companies registered on Dapp. The major objective of this suggestedapproach is to preserve the originality of the product by assisting the consumer in identifying counterfeit goods on the market. Using blockchain, the system gives customers the ability to access all of the product's details from manufacturer to customer. The Manufacturer role, the Admin role, and the Customer role are the three roles that make up this Blockchain- based system for preventing product counterfeiting. In the proposed system there will be three modules- USER, MAN- UFACTURER AND ADMIN. Firstly there will be a reg- istration page which needs to be filled in order to proceed to login. Manufacturer logs into the manufacturer account, generates a QR code for the product, adds any additional information that is needed, and then uses his Ethereum wallet to submit a block to the Ethereum blockchain. Portis is acting like an admin over hear. Portis is the platform which helps to make decentralized application and it act as a wallet which stores the encrypted private keys necessary for blockchaintransaction. It take cares of every transaction without installingany third party plugins because every action perform inside browser itself. A consumer can scan the QR code provided with each product and verify the genuineness of the product. The customer is flexible to use any scanner to scan the QR code. Here user is customer who will check if the productis fake or genuine. after scanning the QR code it will checkif the product is present in the blockchain if its there then it will show the details of the product including name of the product, price and id of the product or we can say the product is genuine else it will show the product is fake.

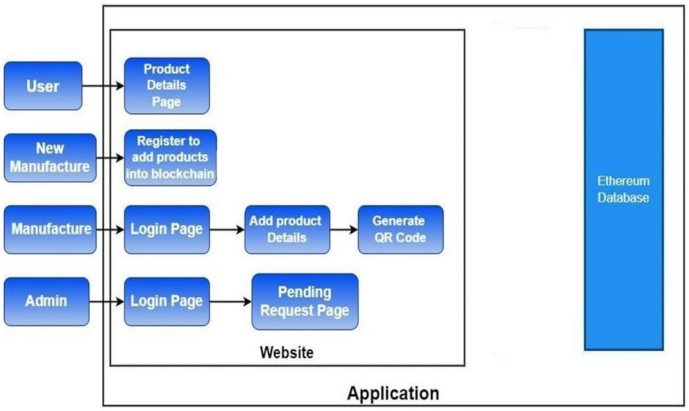


Fig. 3. System Architecture

VII. MODULES

A. User

1) The customer is flexible to use any scanner to scan the QR code. Here user is customer who wants to confirm whether the product is legit or not.

2) The unique scanned code from the customer will be compared with the code produced by the manufacturer inblocks. Then the user will be notified with authenticityof the product.

3) There is an option for customers to check product de- tails/information like name, price, and ID of the product.

B. Manufacturer

1) Manufacturer logs into the manufacturer account.

2) Add the details of the product such as product name, product price and product id. and then uses his Ethereum wallet to submit a block to the Ethereum blockchain.

3) Once product added successfully it generates a QR code for the product.

4) If the userid of our local database and the wallet address of the entity are mapped together, then only the block willbe added to the digital ledger whenever a manufacturer logs in using his own account and uses his own wallet.

C. Admin

1) Portis is acting like an admin over hear. Portis is the platform which helps to make decentralized application

2) It act as a wallet which stores the encrypted private keys necessary for blockchain transaction

3) It take cares of every transaction without installing any third party plugins because every action perform inside browser itself.

VIII. RESULT ANALYSIS

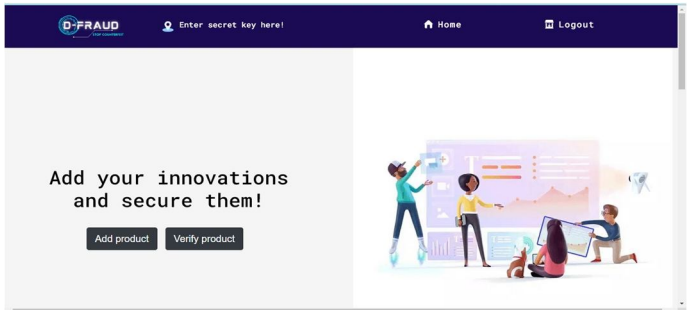


Fig. 4. HOME PAGE

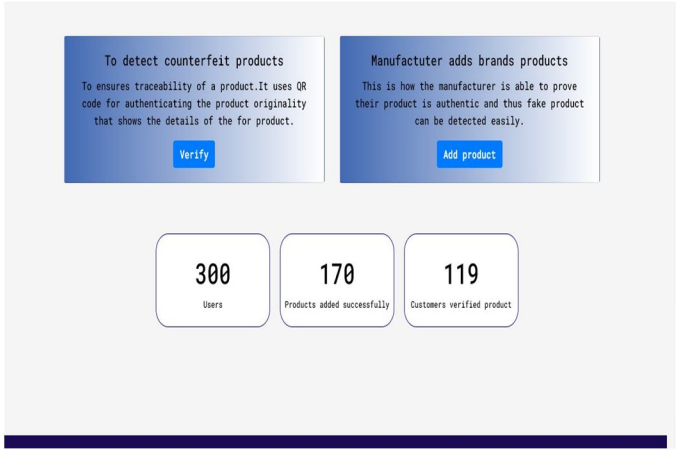


Fig. 5. HOME PAGE

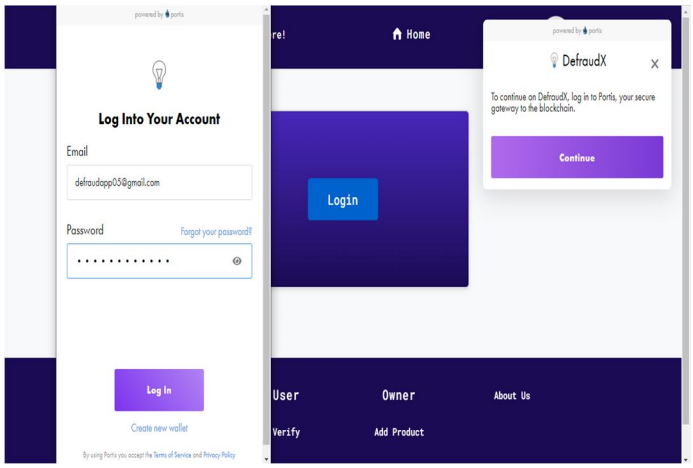


Fig. 6. LOGIN PAGE

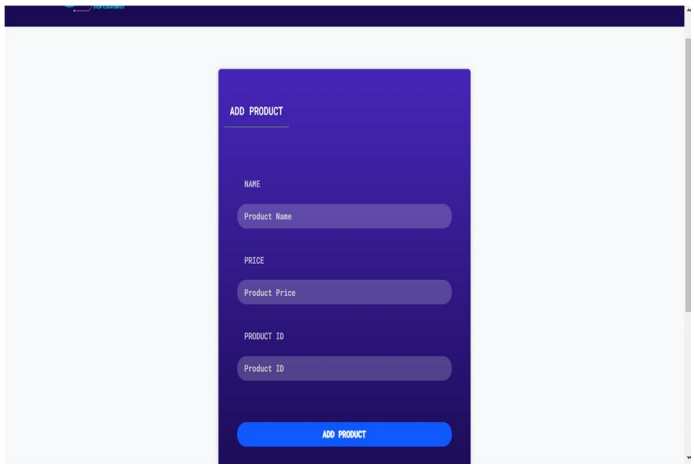


Fig. 7. ADD PRODUCT PAGE

IX. SOFTWARE REQUIREMENTS

1) *Solidity:* The Solidity programming language is de-signed specifically for implementing smart contracts. It's high level programming language.

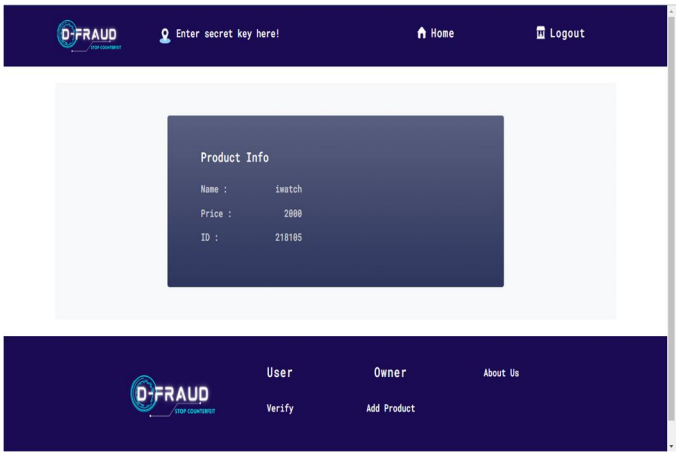


Fig. 8. ADD PRODUCT PAGE



Fig. 9. QR GENERATION PAGE

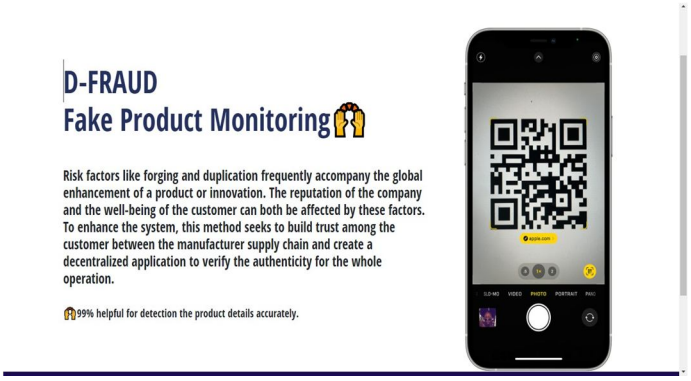


Fig. 10. ABOUT US PAGE

2) *Truffle:* We use truffle to compile Smart contracts. We need to deploy the Solidity code on Ganache, we needto turn it into machine-readable code.
3) *Ethereum:* Decentralized applications can be built and deployed using Ethereum, which is a blockchain-based computing platform.
4) *ReactJs:* The React.js framework is an open-source JavaScript framework and library which allows you to build interactive user interfaces and web applications quickly and efficiently.
5) *NodeJs:* Node.js is a single-threaded, open-source, cross-platform runtime environment for building fast and scalable server-side and networking applications.
6) *Portis:* Portis is the platform which helps to make decentralized application. It act as a wallet which stores the encrypted private keys necessary for blockchain transaction. It take cares of every transaction without installing any third party plugins because every action perform inside browser itself.
7) *MongoDb:* MongoDB is a non-relational database that provides support for JSON-like storage.
8) *Visual Studio Code:* Visual Studio Code is a code editoruse for writing, editing debugging and running yourcode. It is useful to code any programming language.

X. CONCLUSION

This system provides a friendly graphical user interface, provides reliability, system and data security whic makes it efficient. This platform will provide decentralized application which ensures that the blockchain is not governed by an individual, group, or even the government, So no third party can entered into the system and tampered the data. also ensuresthe genuinity of the product so, customer can able to buythe original products which will also help the manufacturerto maintain the reputation of the company providing genuine products to the customer. Therefore, the proposed system will provide hassle-free platform where user can check the genuinity of the product.

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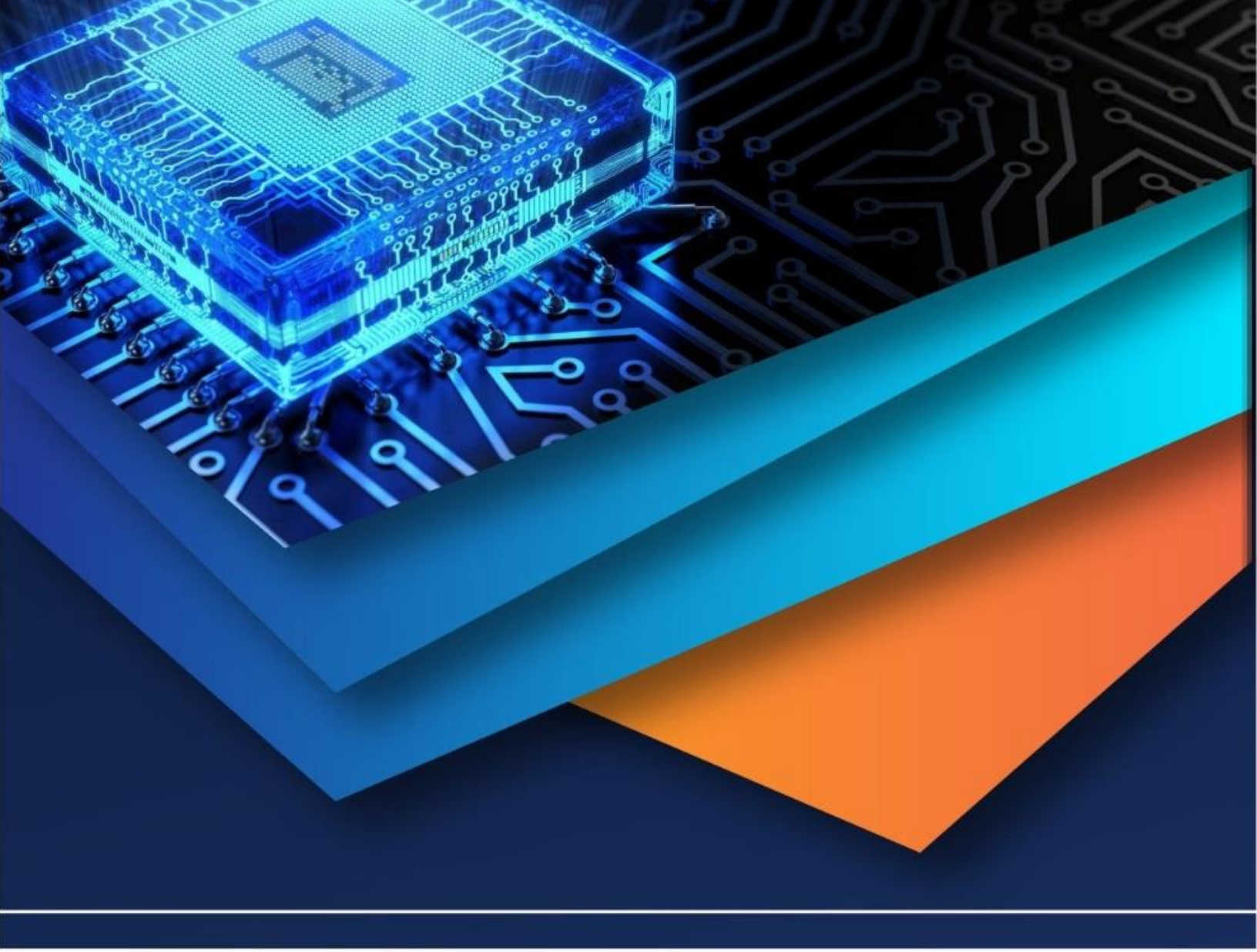
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