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NGO Data Protection using Ethereum Blockchain Technology

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Abstract: ***A growing stream of research finds several relations between the economic growth and corruption. Government implements various strategies to diminish the corruption and also technology often plays a dominant role to face it. Among various technologies alterations, Block-chain technology that becomes an effective and efficient way to resolve these issues related to corruption. This paper represents a brief knowledge related to the Block-Chain technology as it is a kind of distributed database or public ledger of all transactions that have been executed and shared among participating parties. Each and every transaction in the public ledger is verified by a majority of the participants registered in the system. The possible risk related to current scenario and give brief idea for resolving that problem with the help of blockchain technology. Non-Governmental Organization (NGOs) which aim is to tackle some of the issues faced by the society. NGO faces difficulty in terms of maintaining and gaining the support from donors in terms of funds. In recent decades there have been multiple examples of corruption misconduct scandals impacting the public image and reputation of NGOs. It is clear that trust of the people in NGOs is affected adversely by such events.***

Doubts arise in terms of where does the donation ends up? Who is leading the organization? Is donated money are used in a proper direction? So as a part of it, a need is raised to solve such issues for the betterment of the society. For the above stated problem regarding management of funds in NGOs, we propose a solution by using the Blockchain technology among various technologies alteration available. Blockchain offers the way to eliminate the doubts by providing data security, immutability and transparency. So, Blockchain Technology can offer the NGO industry to regain the trust of public.

Keywords: Block-Chain, Metamask , Distributed system, smart contract, NGOs, Ledger, Security, Transparency.

I. INTRODUCTION

Blockchain has gained immense popularity over recent year, with its application being actively explored in several industries. At its core, it is an immutable append-only log of cryptographically signed transactions, that is replicated and managed in a decentralized fashion through distributed Donations for public welfare, NGOs, orphanages, organ transplantation are the means by which children, old age people, handicapped and the less privileged ones are able to receive facilities which they won't be able to get otherwise. This system must work very honestly and with no corruption to have actual benefit towards the betterment of society. Blockchain technology offers an innovative approach to storing important information, executing transactions, performing functions, and establishing trust in an open environment. For the all the problems regarding management of funds in NGOs, we propose a solution by using Block-Chain technology among various technologies alteration. Block chain technology eliminates all security related doubts So, Block Technology can offer the to regain the trust of public by NGO industry Block chain Technology is useful to detect and prevent corruption.

II. RELATED WORK ON THE BLOCK-CHAIN TECHNOLOGY

A. What is Block- Chain technology?

It differs from a typical database in the way it stores various kind of information; It store data in the form of blocks that can form chained together.

As new data adds in a fresh block. Once the data is filled in block it is chained with the previous block, that means the data chained together in chronological order.

Different types of information that can be stored on a blockchain but the most common use so far has been as a ledger for transactions.

Decentralized blockchains are immutable, which means, data entered is irreversible. Block chain technology accounts for issues of security and trust in many different ways.

Block chain consists of (1) Ethereum (2) smart contract (3) Distributed-ledger (4) Wallet.

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Ethereum is platform used for implementing block chain. We are able to execute our code on EVM (Ethereum virtual machine) that called smart contract by ethereum. Smart contracts are the agreement and can be written in solidity language. A ledger is some kind of database where confirmed transactions are recorded. When there is no central authority to access it then it is as called pubic ledger and if there is central authority to access ledger, at that time it is called private ledger. In private ledger for accessing any ledger we need permission of authority.

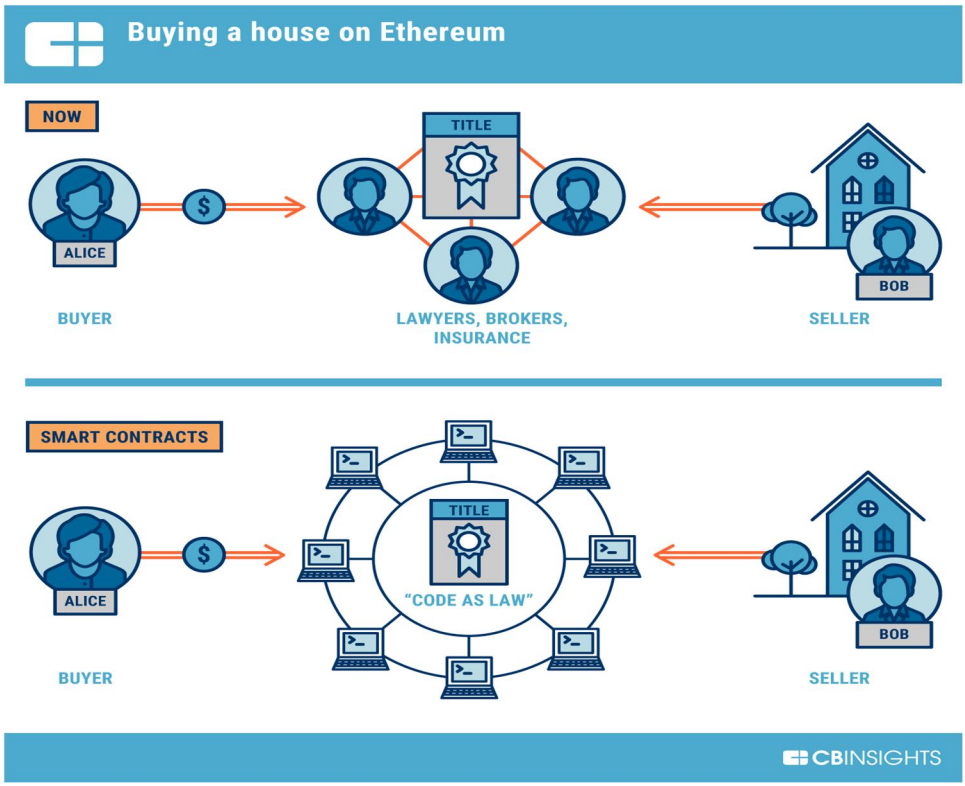
Chain means each node which is connected in a manner as like linked-list data structure. Each node contains (1) index (2) previous_hash (3) current_hash (4) transaction. The Index can identify a particular node uniquely, previous hash contains hash value of that node, current hash stores hash value of current node, transaction stores number of transactions successfully done by that node.

B. Nature of the Block-Chain

1) *Decentralized:* The decentralized nature of block chain network changes databases of the entire transaction records. Failure of single node or damage does not affect the whole network. This avoids the single point of failure and ensures high reliability of the applications.
2) *Immutability:* Block chain uses the one-way hash function which is a kind of mathematical function that take a string as input and converts that string into a fixed-length of binary sequence. The process is difficult to reverse cause, by only0 output, the input is impossible to determine.
3) *Reliability:* Block chain network makes trustable decentralized too. Unlike the centralized trust we take for granted, like central governments issuing currencies &commercial banks, Block-chain network acts like a new trust bearer with decentralized ledgers.
4) *Transparency:* As all the nodes are able to see data so that the chances of falsify is become none. Each and every node is able to see the transaction, so it kept transparency over a network.

C. How does the Block-Chain work?

In the Block-chain technology there are various nodes that are connected with each other and they create a huge network. First user request for transaction &that can be representing by the block. Then the block can be broadcasting to all nodes that means user in a network for a verification of detail of transaction. Once the verification of node is done after that block has been appended to chain and then transaction done successfully.



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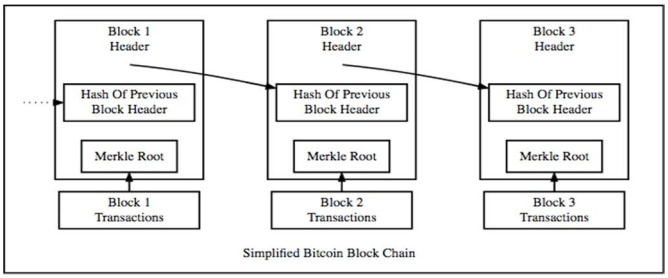
D. Key Benefits of the Block-Chain Technology

The three major advantages of the block-chain system, namely distributed architecture, immutability(un-editable) and transparency may help combat corruption and fraud occurring in the public sectors. Block chain can be used to carry out many functions of traditional regulator and assure the public that the politicians and corrupt officer are not squandering around the taxpayer money. Government and financial institutions could be use this Block chain technology as a means of combating financial crime such as money laundering and tracking any fund transferred for criminal activities such as drugs trade or terrorism. With the use of this Block chain technology, every transaction can be recorded without manipulation, making the ultimate destination transparent. Block-chain technology provide transparency over the transaction and Security with it is very hard to change some details or hack that whole network. Hash value is most important part for Decentralize Block chain technology as it detects if someone try to intercept the transaction and also prevent unauthenticated users. Hash value is generated by the input given by the user such as password or private key it is very difficult to get the algorithm to create that matching hash value. By do changes in single character the hash of that detail is totally changed. As detail from above each node contain the hash value of previous node. If some hacker wants to become part of block chain (i.e. the distributed network of client) then he should have hash value of the previous node where he wants to add his node and this is impossible in current scenario. Example: let chain of block is AB-C-D-E, suppose F is hacker and wants to become a part of chain between B and C .As all node are in block chain C have hash value of B and D have hash value of C. so if N interrupts the chain between B and C then N should have the hash value of B and hash value of N should have to store in block C. So, if N wants to intercept the block chain then all nodes check the status and it unmatched so is not able to break that chain. By this way block chain prevent unauthorized users.



Simplified Bitcoin Block Chain

E. How Block-Chain Becomes Secure?

Block-chain technology refers to the hash value to uniquely identify one block over chain of the block. Example: This method is called proof of work. which is a responsible for that. In this method we can set some indexes of hash value of the blocks. we can set hash value as it followed by first four '0000', so now our hash value becomes '0000kjdvvb.....'. Now, let we assume that if someone tries to change data of blocks and try to increase their value of coins/number of coins then data is a being modified, data is change it is directly related to hash value. Hence, the hash value for a modified data changed and it is not match with our condition as above. So modified that data is not allowed by the block chain and also changing in any attributes of a block also make changes in hash value and any block should not be accepted until it fulfill the condition of proof of work method.

III. ALGORITHM FOR BLOCK-CHAIN TECHNOLOGY FOR NGO

Nowadays corruption is the big problem and due to corruption, trust towards the NGOs of people is become diminished. There is also Slender technical capabilities, lack of credibility, lack of integrity, lack of single point user and poor strategic planning due to several complicated Donation and fund management methods etc. then Generally several type of question arise in people mind that (1) How NGO or Government use their donated money? (2) Where their money is actually used in? (3)Is their money is being corrupted or stolen by someone ? (4) Who is responsible for securely transaction of their donated money from NGOs? While they donate their money to any NGO it is basically a Non-Governmental Organization which does not control by any government authorities. Diagram shows the current flow system of NGO. As per the diagram related current scenario for donation in NGO, Actors are Donors who donates money to the NGO in several ways as per requirement of NGO and according to their capacity. Nowadays, fund system is being handled manually so it checks whether the fund is sufficient or not. If the fund is sufficient as per requirement of the campaign then it will be accepted. After that whatever the payment is done, distributions of fund to needy one and making of statement for balance is being done manually as it is centralized system. There are also possibilities of funds can be non-sufficient. At that time the process is goes under a number of loops causes many problems and harm the system Environment.

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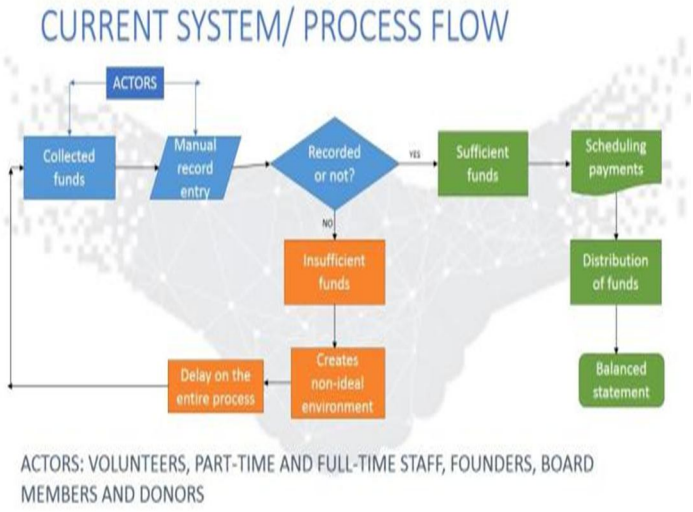

We clearly see that there will be chances of the record being not sufficient. So, it should not be accepted and creates non ideal environment which causes delay in process. Here also chances of fraud because the records the manually generated and it can be fake as the system is centralized.

To overcome such type of problems related to NGO this illustrates paper represents an idea as follows.

1) *All-over Idea about System:* To overcome problems of NGO organization by implementing block-chain technology as back end. The Aim of the technology is to provide security and transparency to NGO Management. As Block-Chain technology is Decentralized means there is no central authority. Node is used to implement a node and smart contracts written in solidity and crypto currency (NGO coin) are made up in programming language either in python or in JavaScript.

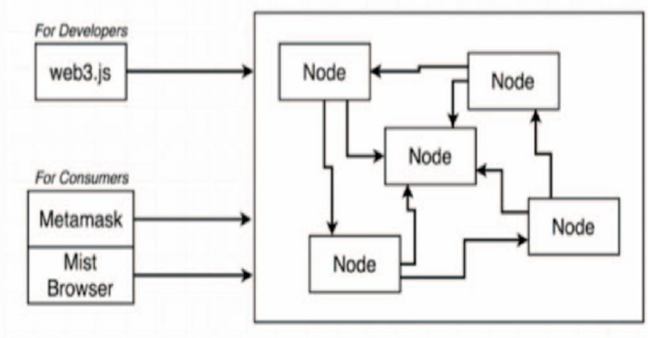

Fig. 2. Interfacing with an Ethereum Network.

Figure illustrates the collaboration among front –end with back-end and also represent interaction between two nodes of two different user logged in from front-end. It has been seen that, there is chain of block is generated and smart contract is nothing but the agreement is also shown.

Two types of users can login after filling require details. After Login there will be Dashboard provide information like balance of NGO coin, no. of wallet using by user, no. of bank account using by user, payments received by user, all transactions done by user and also shows recent transactions done by user. A Public ledger in which confirmed transactions are recorded. Each node has a copy of ledger. Transactions contain information like amount of NGO coin to be send, hash key of sender and receiver. User can also able to see the transactions filter by type such as NGO coin issued, NGO coin transferred, NGO coin received, NGO coin redeemed in addition with the issued date of NGO coin, date of transactions. User is not allowed to make change in this critical information like amount of transactions. If someone is going to add fake information by changing value of amount then it directly affect the hash key of that particular node which becomes totally different as it was. Following node that contains the hash key of previous node, but hash key is changed so it generates an error in all nodes followed by the changed node.

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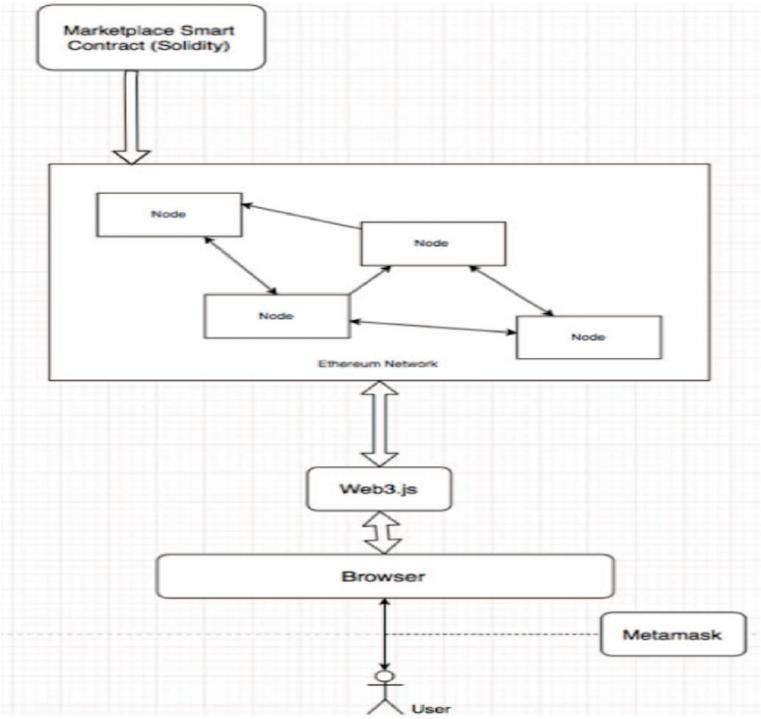
2) All Types of Users" A websiteportal considered as front end which supports two types of user accounts which are 1) NGOs 2) Vendors/Suppliers. On behalf of NGO, representative of NGO can sign up to portal with official email along with few requirements for verification and approval process. Vendors and Suppliers that work with NGO can sign up with their email. Portal will set up a unique address for them on Ethereum Block-chain for do and receive NGO coins.

3) NGO coin: NGO coin is a crypto currency made up in python on platform on Ethereum. Vendors and NGOs accounts will have access to NGO coin wallet on portal with they can easily and instantly send and receive NGO coins anywhere and anytime in the world. Each Wallet have their unique address on Ethereum block chain. There will be a private key which use to protect the address of wallet and each wallet has that key. From the wallet, NGOs and vendors can purchase NGO coins using bank transfers or credit/debit cards in US dollars. The value of one NGO coin is equivalent to 1 US dollar. After completing the banking process deposited money will be converted to the equivalent NGO coins and will be reflected in the balance of wallet. NGOs and Vendors now can easily do sufficient transactions. If they need more NGO coins then have to follow same process as above and if want their money back then simply make a withdraw request in order to get their money back.



NGO coin process flow.

IV. OBJECTIVES

To implement the Blockchain Technology for keeping the record and tracking the funds.
To provide a system that maintain transparency and optimize efficiency, which the current system is not providing.
To provide an immutable system, which the management can effectively use this system as one record is saved, nothings can be edited or deleted.
This crowd funding platform attracts more donors, as the system is more transparent.

V. CONCLUSION

Nowadays, Block-Chain is relatively new technology and new innovations are taking place due to certain changes in block-chain technology. By choosing the Ethereum platform for developing the NGO coins as a Ethereum is a most trending and widely used block-chain platform today with an active support for the developers and for the innovators. We have seen that, by implementing system as we can reduce the possible risk and the frauds related to the NGO. As the transaction becomes more secure and transparent so that the donors feel free to donate their money to the NGO because they get information about how and where their money is going to be used. Donors get back their trust towards the NGO by doing transaction which is implementing by the block-chain technology. Sothat, the system can offer the NGO industry to regain the trust of public.

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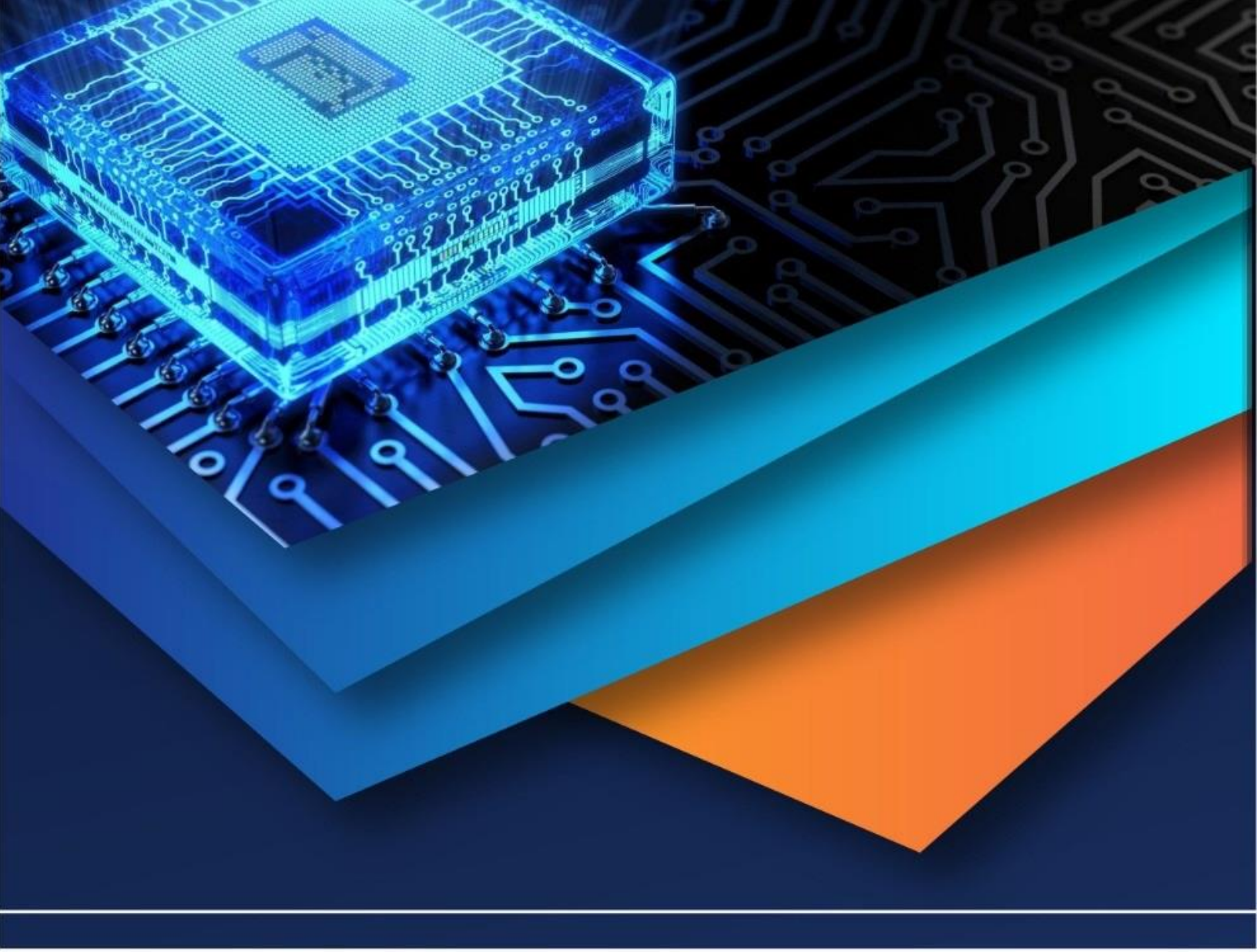

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