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Crowdfunding using Ethereum Blockchain

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Abstract: ***The rise of Blockchain technology enables us to create secure, trusted and decentralized apps. Crowdfunding is an online money raising strategy that uses small amounts of capital from a large number of individuals which finance a new business project. Crowdfunding makes use of the easy accessibility of vast networks of people through social media and crowdfunding websites to bring investors and entrepreneurs together. The main problem with the current websites is that they don't provide the Contributor Assured Policy and they don't have control over the money they donated. So, by using blockchain we can provide a safe, secure and transparent way for crowdfunding. In this work, we have provided interactive forms for campaign creation, contribution and request approval through which both campaign creators and contributors can easily create and pool the campaigns.***
Keywords: Blockchain, Ethereum, Smart Contracts, Crowdfunding.

I. INTRODUCTION

Blockchain technology is most simply formed as a decentralized, distributed book that records provenance of a digital asset. By natural to design, the facts on a blockchain are unable to be made different, which makes it a within the law disruptor for industries like payments, cybersecurity and state of health care. blockchain is an especially hoping and revolutionary technology because it helps reduce risk, stamps out fraud and brings transparency in a scalable way. Crowdfunding approach faucets into the collective efforts of an outsized group of individuals primarily online via social media and crowdfunding platforms and helps their networks for bigger reach and exposure. Crowdfunding is actually the other of the thought approaches to business finance. Historically, if you desire to lift money to begin a business or launch a brand-new product, you'd have to be compelled to clean up your business arrange, marketing research, and prototypes, so look your plan around to a restricted group or moneyed people or establishments. In the process of raising funds, of undertow it is not easy, considering it requires trust between many parties, both the funders, intermediaries or organizations as a place to store temporary funds to the recipient of funds. Trust is the main capital for fundraising organizations to vamp funders to donate their funds to recipients of funds. Trust is their challenge in attracting contributors to contribute their money to the organization. Not a few also a non-profit organization that uses technology to make it easy for contributors to contribute funds through them. In addition to trust which is the main factor to get as many funds as possible, technology also plays a big role in this as well. The blockchain is an incorruptible digital book that records every transaction. It is a distributed system in which all the records are stored in every node in the decentralized network. Crowdfunding provides an easy way to find funds for innovative project ideas. The problem with the current crowdfunding companies is that they charge upper fees and sometimes there were scams happened. Implementing a crowdfunding strategy in blockchain will help to avoid these types of problems.

II. LITERATURE REVIEW

Online crowdfunding enables people to raise funds for their project. People who are interested in a project can donate by making an online transaction. The donated money goes to the project manager, which he uses to complete the project or to make a product. This existing method of online crowdfunding has a major drawback. It does not allow contributors to have control over the money they have contributed. Since in the existing method the project manager has all the control over the money contributed, he can very easily perform malicious activities.

Here we address this problem faced by the existing online crowdfunding platforms by using Ethereum network and smart contract. The development of Blockchain technology has allowed businesses to build decentralized models. It has derived new methods to conduct transactions and make agreements. One of the technologies that propose an alternative to the traditional model is the smart contract. A smart contract is similar to a contract in the physical world, but it is digital and represented by a tiny computer program stored in a blockchain. These smart contracts can be used to implement logic. A method has been proposed here that uses smart contract to manage all the activities performed in a crowdfunding campaign. The proposed method has been implemented and its various features are tested by funding campaigns on rinkeby test network.

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Figure below (figure. 1) shows a list of continuously growing records called blocks. Each Block is linked to each other and they were secured using cryptography. Blockchain has the characteristics of integrity, decentralization, Immutability, Security, Anonymity. Consensus protocol is what which keeps the blocks on all the node to synchronize with each other.

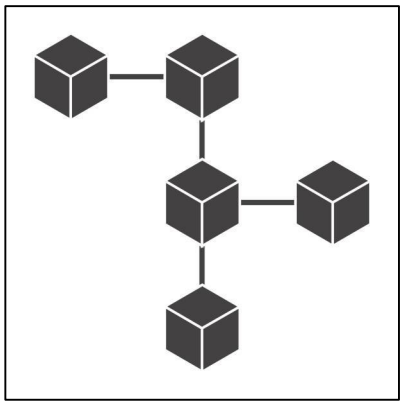


Figure. 1

III. IMPLEMENTATION AND DISCUSSION

Blockchain technology is one solution that can be used to reduce the problems that occur in crowdfunding. Blockchain has the characteristics of integrity, decentralization, Immutability, Security, Anonymity. Ethereum is an open-source, public, blockchain based distributed platform and operating to featuring smart contract functionality. Ether is a cryptocurrency which is generated and used by the Ethereum platform. Ethereum provides a decentralized operating system which can execute an application on the public nodes. The contract is written in such a way that all the money will be added to the pool. When the request meets the specified condition then all the money will be transferred to the vendor. Figure. 2 shows the architecture of the system.

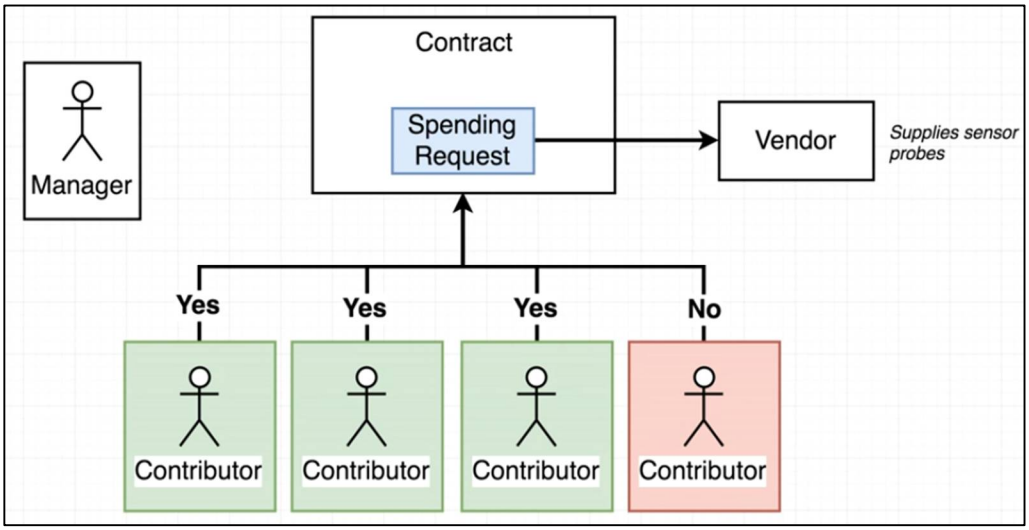


Figure. 2

All the contract code are written in solidity that is used to deploy a contract in blockchain platform. The Campaign Factory is built and used to deploy the contract in the network. With the help of campaign factory, the new campaigns can be created. Whenever a campaign factory is deployed a very small amount of gas fee is needed. The creator or manager of the project will request money for buying some accessories related to that project. He will then create a request with the help of the request form. This form will be recorded and stored in the blockchain. If necessary, all the contributors need to approve the request. If not then they can reject the request. Once the voting is done then the request will be finalized and to finalize the request the number of approvers count must greater than half the total number of approvers that have contributed in the campaign. If it meets the requirement then the money will be transferred to the vendor.

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There are basically three main Modules:

1) *Campaign Creation:* A new campaign is created by making an instance of the Campaign factory. To create a campaign, we need to provide minimum contribution. After creating a campaign, the manager needs to create a request with campaign description, recipient address and the amount of money needed by the manager to transfer money to the recipient. For every transaction, a specific amount of gas fee is charged for processing. Thus, when the manager clicks on "Create" button new campaign will be created. After 15 to 30 seconds the transaction will be completed and a new campaign block will be created. Figure. 3 shows the Create Campaign Module.

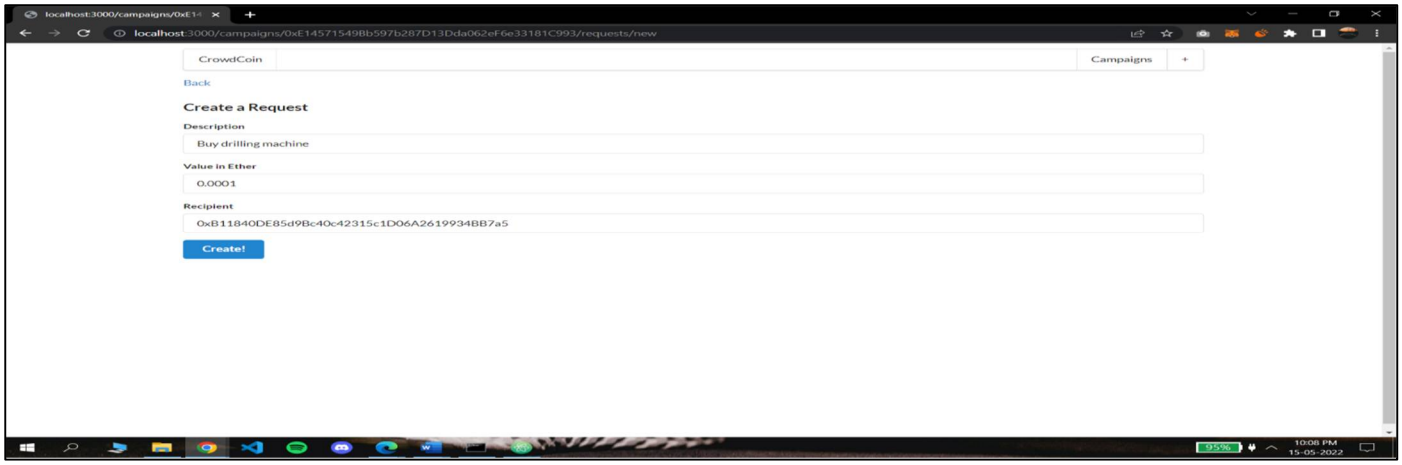


Figure. 3

2) *Request-Approval Module:* The campaign manager will create a request for spending money to buy some accessories or anything with proof for the campaign. Then all contributors will be notified that the manager needs to spend some money. So, the contributors need to approve the request if they want. A contributor can vote only once to approve a request. All the request approval will be recorded and stored in the block. Figure. 4, 5 shows the Request- Approval Module.

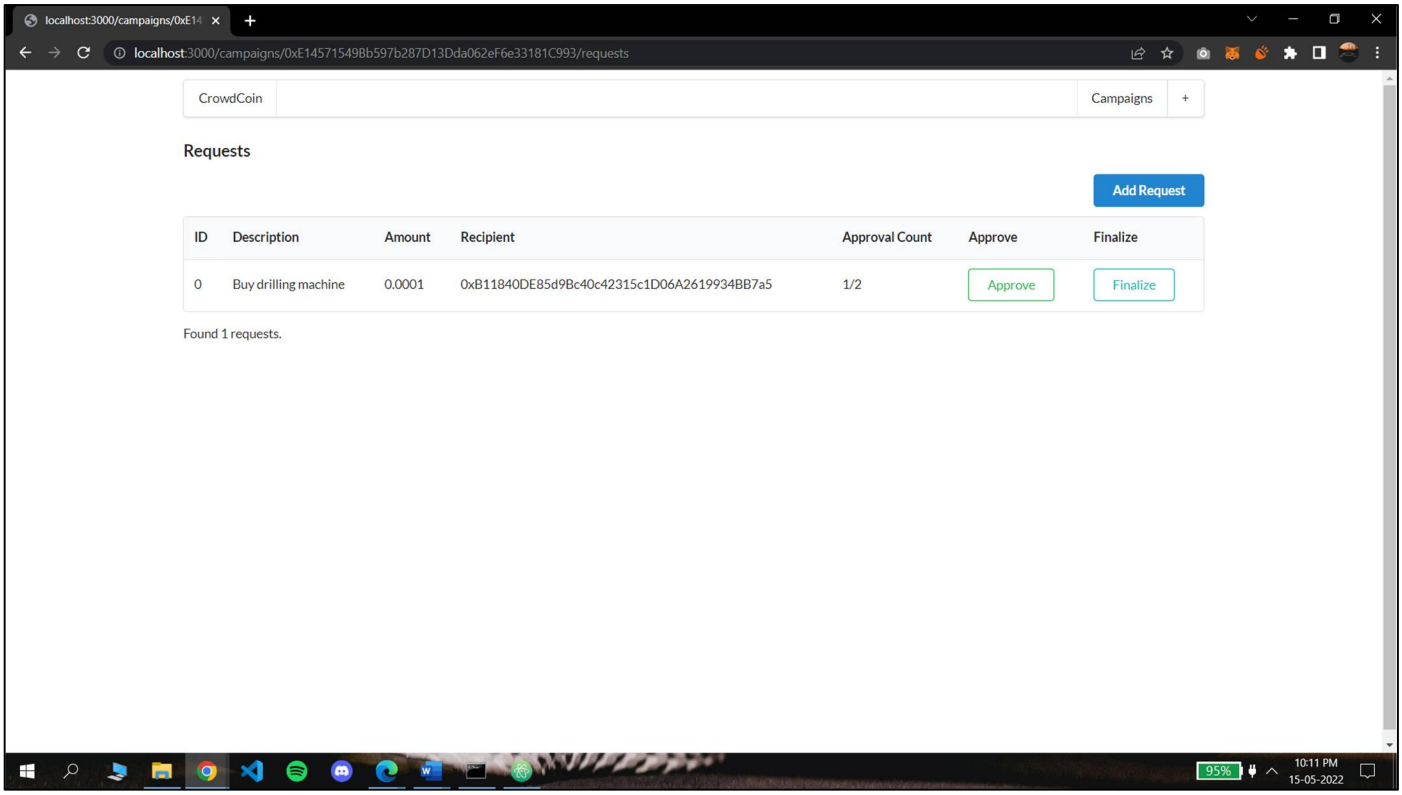


Figure. 4

3) *Finalize Module:* After the voting is done. If the approval count is more than the specified condition then the money will be transferred to the Vendor that the manager wants to send. The manager should specify the address of vendor correctly to which the money is to be transferred. After money is transferred the campaign detail with summary will be displayed in the campaign show section. Figure. 5 shows the detailed summary of the campaign.

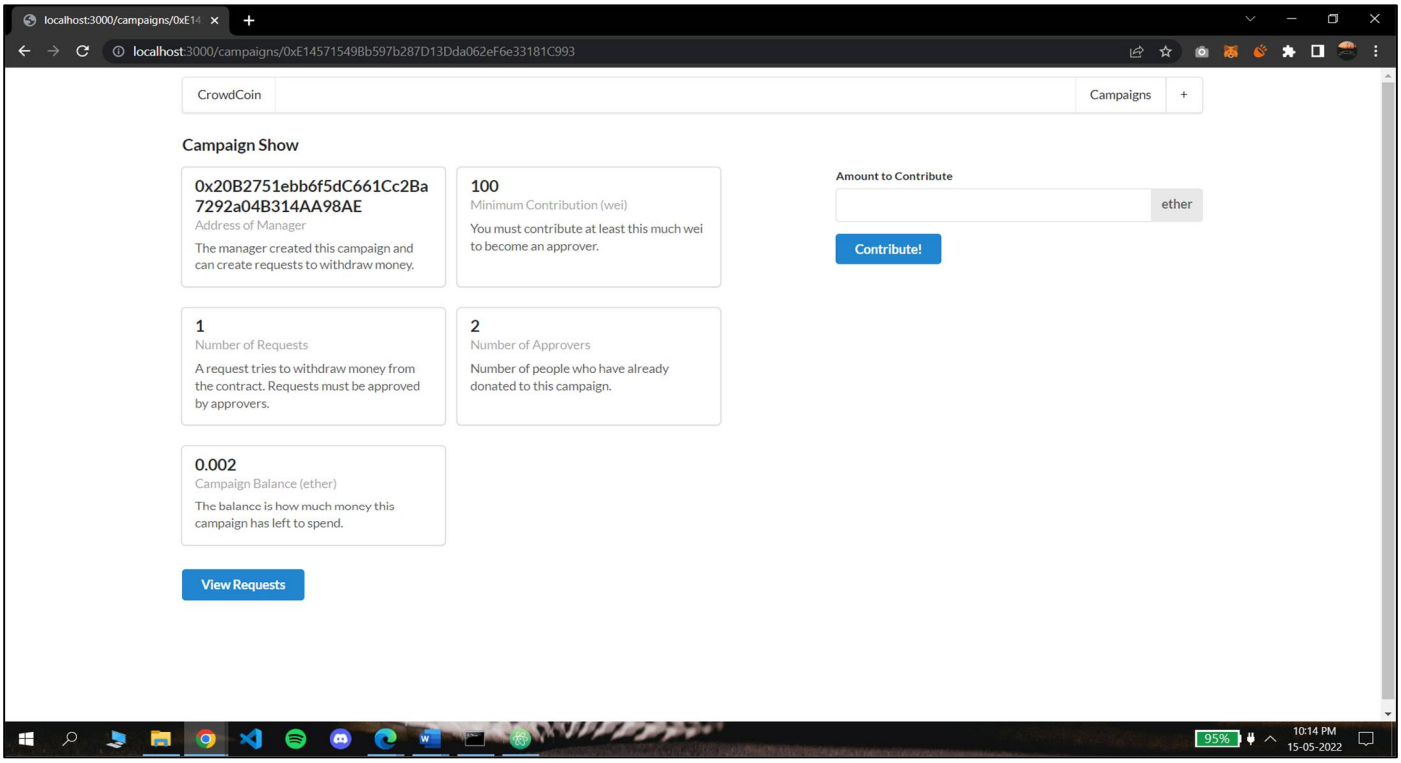


Figure. 5

A. Tools

Following are the tools with which our prototype application is built and tested:

1) *Solidity:* Solidity is an object – oriented, high-level language for implementing smart contracts. Solidity is statically typed, supports inheritance, libraries and complex user defined types among other features. With Solidity, users can create contracts for uses such as voting, crowdfunding, blind auctions and multi-signature wallets. Solidity is influenced by C++, Python and JavaScript. Solidity is known as Decentralized Application and is known for its contract-oriented language.
2) *Ethereum:* Ethereum is the community-run technology powering the cryptocurrency ether (ETH) and thousands of decentralized applications. Ethereum is open access to digital money and data-friendly services for everyone – no matter your background or location. Ethereum is a decentralized blockchain platform that establishes a peer-to-peer network that securely executes and verifies application code, called smart contracts.
3) *Node.js:* It is a free, open-source, cross-platform runtime environment that runs on JavaScript. It is mainly for the server-side platform that runs on JavaScript. Node.js was developed by Ryan Dahl in 2009. It is an asynchronous event-driven JavaScript runtime and is designed to build scalable network applications.
4) *Mocha:* Mocha is a feature-rich JavaScript test framework running on Node.js and in the browser, making asynchronous testing simple and fun. Mocha tests run serially, allowing for flexible and accurate reporting, while mapping uncaught exceptions to the correct test cases.
5) *Next.js:* Next.js is a JavaScript framework built with React.js, webpack, and babel. Next.js helps the developer easily create a static generation (SSG) and server-side rendering (SSR) website. It's also considered as one of the fastest-growing React frameworks, perfect to work with static sites.
6) *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.

IV. CONCLUSION

In this piece of work, we endeavored to leverage the existing crowd funding methods of raising funds to more secure, transparent and verifiable way. We were also successful in achieving this with the help of Ethereum network. The security issues in crowdfunding platforms can be answered by the introduction of the blockchain technology which functions on a trust-free system.

With the help of Ethereum network the money doesn't go directly in the hands of the campaign initiator, whereas it is been stored on an Ethereum account. Before utilizing any assets from the account, the campaign initiator needs to create a request, mentioning where and how much money he wants to spend. He can only proceed further when his request gets a significant number of approvals from the contributors, thus making the system more reliable and transparent. When a request gets a sufficient number of approvals that is more than half of the total contributor, the campaign initiator then can finalize the request, and carry forward the transaction.

Blockchain technology provides easy, secure and a convenient means for the exchange of information and transfer of funds. There are challenges with Crowdfunding in relation to abuse, trust and confidentiality and the adoption of blockchain technology in Crowdfunding contracts could provide the much-needed solution. The technology is programmable and can be extended to cater for any other requirement in the Crowdfunding contract where necessary.

Although the blockchain technology is seen by the utopian view, it can solve most problems of secure transactions and increase the transparency of the system. In this work we tried to explain the possible contribution of the blockchain technology in a blockchain-based Crowdfunding contract. Currently the technology can be used to modify the role of the platforms, in future the technology could be used to execute Crowdfunding contracts without even the need for the institutional platforms.

V. ACKNOWLEDGEMENT

This study is a part of broader research related to crowdfunding applications, and we would like to thank all who helped us a lot in completing our project work. Hopefully, it will help to reduce the scams, frauds in the upcoming future.

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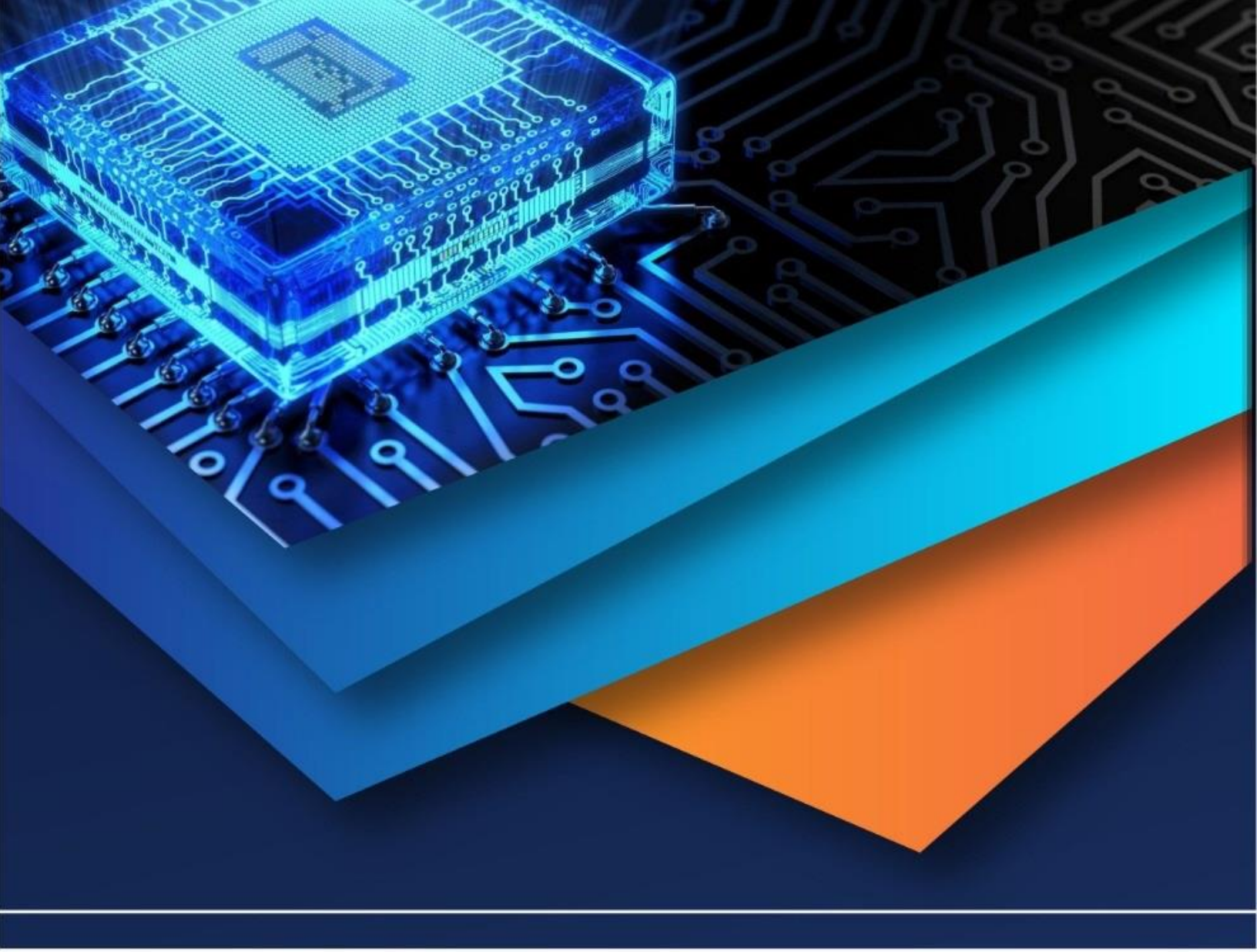
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