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Bank Record Storage using Blockchain

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Abstract: ***Financial service providers find blockchain technology useful to enhance authenticity, security, and risk management. Several institutions are adopting blockchain in trade and finance systems to build smart contracts between participants, improve efficiency and transparency, and open up newer revenue opportunities. Blockchain's unique recording capabilities make the existing clearing and settlement process redundant. Banks and other financial entities are adopting blockchain-enabled IDs to identify people. Better results come from organisations' capacity to foresee emerging trends in financial blockchain applications and develop blockchain functionality. The transfer of asset ownership and addressing the maintenance of a precise financial ledger. Measurement, communication, and analysis of financial information are three significant areas to be focussed on by accounting professionals. Blockchain clarifies asset ownership and the existence of obligations for accountants, and it has the potential to improve productivity. This paper identifies and studies relevant articles related to blockchain for finance. This paper focuses on Blockchain technology and its importance for financial services. Further takes up various tools, strategies, and featured services in Blockchain-based financial services. Finally, the paper identifies and evaluates the significant applications of Blockchain technology in financial services. Credit reports significantly impact the financial lives of customers. Recent data breaches demonstrate the superior security of blockchain-based credit reporting over conventional server-based reporting. Blockchainbased systems enable the faster, more cost-effective, and more customised issuance of digital securities. With its adoption, the market for investors can be expanded, costs for issuers can be reduced, and counterparty risk can be reduced due to the ability to customise digital financial instruments to the demands of investors. It uses mutualised standards, protocols, and shared procedures to give network users a single common source of truth. Participants in the business network can now more easily collaborate, manage data, and agree with this technology's application.***

I. INTRODUCTION

Users can update the blockchain network using a decentralised approach provided by blockchain. Blockchain networks are free from financial institutions' intervention. Blockchains can be used to store information, and the distributed ledger technology makes it easier to share information. It can be used to have direct communication with network users. Blockchain offers a safe network for conducting transactions. Blockchain technology appeals to a variety of enterprises due to its strong security system. As a result of the independence of each company's accounting operations, data reconciliation takes time and resources . By enabling the real-time recording of transactional, contractual, and other information in a shared ledger, blockchain technology can solve this problem. It alludes to the possibility of improving the customer experience and making data transfers and identities more secure.

Wire transfers, which require time, and money, however, cannot be combined. Blockchain technology payments eliminate these issues and boost client confidence. Real-time cash transfers between financial institutions are made feasible by technology, which reduces friction and speeds up settlement. This technology is excellent for tracking transactions and has the potential for automation. Smart contracts can be used by financial service providers to track customer payments and seller deliveries This article examines blockchain technology, including its benefits, uses in banking, and tools and features.

II. BLOCKCHAIN

A blockchain comprises of blocks, chains, nodes, and master nodes. Nodes are in-charge of the network's blocks. Adding blocks to the Blockchain is a challenging operation requiring mathematical problems solving. The blockchain network's capacity to expand endlessly is constrained by the task of solving challenging mathematical puzzles. Hacking, cheating, or otherwise altering the blockchain network is virtually impossible due to the uniqueness of hash codes. Blockchain is a distributed ledger in which a copy of the ledger is kept on each connected computer. The network is called the Blockchain because it consists of interconnected blocks serving transaction records. [20–22].

A blockchain is a digital transactional ledger. Its structure, in which separate data, known as blocks, are connected in a single list known as a chain, gives rise to the name. Blockchains have numerous uses besides keeping track of monetary transactions like those involving Bitcoin.

A blockchain manages and stores data, making it hard or impossible to alter, hack, or defraud the network [23,24]. A blockchain is a network of computer systems that duplicates and distributes copies of a digital transaction record. Modern technology has long been employed in the financial industry to guarantee data and process security. Blockchain has already gained popularity in the banking sector. Blockchains allow for the safe, dependable, and verifiable conduct of financial transactions, as demonstrated by the emergence of cryptocurrencies [25, 26].

Blockchain is a digital database that enables simultaneous storage of certain operation records across numerous machines. Digital data on transactions, contracts, and contact databases are stored using this technology as a series of interconnected blocks. The absence of transparent and unambiguous financial system regulations exposes the business to common mistakes and inaccurate information interpretation [27,28]. Blockchain technology addresses the majority of these problems and dramatically lowers financial risk. The importance of Blockchain technology is becoming more widely known. It is surrounded by a small number of people trying to figure out how to adopt and use this technology's advantages in their companies. The main goal of founding banks was to unite the population and make it possible for them to engage safely and efficiently through trade and commerce. A creation that makes it easier to complete various activities on a global scale is the blockchain platform

III. NEED OF BLOCKCHAIN

The global financial system manages trillions of dollars while providing services to billions of people every day. Such lofty goals come with a number of challenges that the finance industry has been dealing with for a very long time. These problems include the cost of having many stakeholders, delays, more paperwork, and data breaches, which cause the organisation to suffer significant losses each year. Blockchain technology has the potential to tackle the problems plaguing the world financial system [32,33]. Additionally, the existence of organisations like regulators, brokers, and the stock exchange raises the cost of the existing stock market. Using a decentralised management method for stock exchanges can improve system efficacy. A blockchain can be used to generate smart contracts, so external regulators are not necessary.

The financial industry has experienced numerous problems for a very long time. Huge technical advancements have helped to solve many problems, but some of them have also created new ones. Financial service businesses may find it difficult to select the ideal fintech choice given the wide range of possibilities accessible today. They need a complete solution that can address all the urgent issues as a result. The application of Blockchain technology to financial services is very intriguing and has the ability to solve important business problems [37–39]. The financial sector is forced to distribute a substantial sum of money among several enterprises as a result of centralization. Financial service providers must make investments in accounting, database security, value transfer systems, and database maintenance.

IV. RESEARCH OBJECTIVES

Blockchain-based technologies may potentially aid in the development of capital markets. Traditional trade financing techniques have long been a source of annoyance for firms, as the lengthy processes frequently disrupt operations and make liquidity challenging to manage. Blockchain can ease cross-border operations and streamline trade finance transactions. It facilitates business transactions beyond regional or geographic boundaries in a secure manner. Blockchain is particularly suited to tasks like real-time tracking commodities as they move and change hands across the supply chain due to its immutable record. Using a blockchain gives businesses that deliver various items and possibilities. Events in a supply chain, such as allocating arriving items to different shipping containers, can be queued up using entries on a blockchain. A novel and flexible method of organising and utilising tracking data are provided by blockchain technology . The primary research objectives of this paper are as under:

1) RO1: - to brief about Blockchain technology and its need for financial service;
2) RO2: - to discuss the tools and strategies in Blockchain for financial services;
3) RO3: - to study the various featured services of blockchain technology in the financial domain;
4) RO4: - to identify and study the significant applications of Blockchain technology in finance service.

V. TOOLS AND STRATEGIES IN BLOCKCHAIN FOR FINANCIAL SERVICES

Several featured tools and methods have been observed in the broad domain of blockchain technology for financial services and its structure. Fig. 1 reflects the various tools and strategies in blockchain applications for financial services, found impressive over time. These methods and tools are pretty smart and practical for handling real-time financial issues through the concepts of Blockchain. The highlighted soft tools are parity, geth, solc, mtyhx, truffle etc. These smart and advanced tools further ensure the future of blockchain practices towards strengthening financial services and their domains [46–48].

The financial services industry has speculated about Blockchain's possibilities for the last ten years. Blockchain is essentially a ledger of recorded financial transactions. Several locations disseminate, publish, and store this ledger. When a transaction occurs, it is recorded in each ledger copy through block creation. This helps to ensure that transactions are accurately recorded [49,50]. Blockchain is practically unchangeable and incredibly secure because there are multiple copies of the ledger; to alter or falsify any section of the record, a hacker would have to alter every copy of the ledger simultaneously, which is exceedingly challenging to do. Blockchain promotes confidence among commercial partners and allows for safe, straightforward transactions. It makes creating and using deterministic smart contracts tamperproof programmes that automate business logic, boost efficiency, and promote trust. At every stage of the software stack, it provides marketleading technologies for granular data privacy, enabling selective data sharing in corporate networks [51–53].

Compared to regular securities, digital securities can be issued faster and more efficiently. Customised digital financial instruments can be created by issuers and directly matched to investor demand. These are fractionalised ownership of real-world assets, tokenised microeconomies, safe, scalable, and rapid asset transfers, and more. [54–56]. Venture capital, private equity, real estate funds, and specialist markets are under pressure to strengthen liability risk management, implement more dynamic decision-making frameworks, and address the increasing complexity of ever-changing rules.[57,58].

For instance, smart contracts might be used by an insurance firm to speed up the claim's procedure. The codes built into the Blockchain will automatically assess claims when a client submits one. The smart contract will be carried out, and the client will be compensated if it is valid. Most financial institutions demand that their clients undergo an identity verification process to prevent fraud and money laundering. A digital ledger is produced when a new block is created for each transaction and added to the chain . The potential for blockchain use in finance has increased with the significant benefits of blockchain ledgers over conventional digital ledgers. A distributed digital ledger can be created using blockchain technology. As a result, processing and storing transaction data are not needed by a single third party. Due to the absence of a centralised repository for keeping transaction data with a unique security mechanism, using Blockchain can eliminate the potential of transaction data hacking

Blockchain applications in banking may be easier to use and less expensive. Security with blockchain technology is among the many aspects that encourage using this technology in banking. Blockchain secures its transaction ledger via encryption. As a result, the data was only accessible to those with a unique key code. Many different fintech solutions are currently available in the financial sector. As a result, financial service providers typically struggle to find the correct answer to their problems. Blockchain applications in finance can help solve some of the industry's biggest problems All around the world, financial services are still run in a conventional, centralised, and multilayered fashion. Most financial data is kept in centralised systems and must go via several intermediaries, and transparency is compromised. Furthermore, database security and intermediaries are the only factors that affect data security. On the other hand, even databases with the highest levels of security are susceptible to hacking and data breaches. Because no one is aware of any disparities until a data breach or other system error is found, a lack of transparency usually results in complex security issues

Policymakers might support the creation of teaching materials on blockchain technology. Users might be able to avoid frequent blockchain frauds, and businesses might find additional capacity to deploy the technology. Policymakers may use blockchain technology to accomplish their own unique goals. This could help organisations in public, and private sectors decide whether the technology can help solve particular issues . Organisations attempting to integrate blockchain technology with their current systems may find this to be more accessible as a result. Based on blockchain technology, policymakers could explain current laws and regulations or create new ones.

This would lessen the ambiguity surrounding the potential regulation of various technological implementations, increasing the comfort level of businesses and others in embracing blockchain solutions

Blockchain applications use two types of security keys: private and public keys. All network users have access to the public key, but only the participants in a transaction can access the private key. As a result, users inside a network can see the transaction, while participants can only access the transaction's specifics. Blockchain can preserve financial system transparency while safeguarding the private financial data of transaction stakeholders]. Nearly every industry in the world could experience a fundamental shift in how business is conducted due to blockchain technology. As the technology and its use cases develop and advance, Blockchain enables businesses to create better transparency, traceability, and operational efficiency for various business transactions and contracts. Financial institutions are looking at ways to use Blockchain to its full potential, including identifying product opportunities, resolving regulatory issues, and overcoming challenges in recognising/assessing risks and corresponding controls

VI. VARIOUS FEATURED SERVICES OF BLOCKCHAIN TECHNOLOGY IN THE FINANCIAL DOMAIN

Apart from the various developments and advancements made in the scope of blockchain practices for the finance sector, there are several featured services, too, for making financial services impactful in real-time applications. Fig. 2 exemplifies the several featured services, such as; cross-border financial transactions, trade finance platforms, proper reporting of credits, clearing and settlements, and digital identity verification. These featured services and developments in the blockchain sector will offer a capable blockchain-based financial sector

Authorities in the financial sector and Blockchain specialists claim that by bringing visibility and reducing friction along the lengthy list of transactions that typically precede financial interactions, Blockchain is enhancing security, reducing risk, and saving money. These blockchain benefits save financial institutions expenses to some extent. Financial institutions have typically acted as a bridge between different parties, involving labour-intensive, complicated processes that slow down transactions.Given the immutability of Blockchain, it is simple to understand why the technology is perfect for financial applications since it allows for safe, simple transactions and promotes trust between participants. Technology can automate and optimise services while lowering fraud, so even banks stand to gain significantly. Through Blockchain, a financial institution can secure identity information, and financial institutions can boost consumer confidence while preventing fraud and accelerating the verification process .

Blockchain technology is a tamper-proof log of sensitive activities that are efficiently and securely created. Therefore, it is perfect for money transfers and international payments. One can automate the entire procedure on the Blockchain, increasing the process efficiency while reducing the number of intermediaries traditionally needed in these transactions. Blockchain technology can lower the cost of payments by removing the requirement for banks to settle transactions The majority of regulatory supervision relies on recordkeeping, but there is no disputing that the repercussions of not maintaining records are much harsher. As a result, firms cannot compromise on compliance. By using Blockchain, regulators and corporations may access real-time record updates, reducing delays and making it easier to spot irregularities. Blockchain's central encryption is particularly beneficial for record administration because it eliminates duplication, fraudulent entries, and other issues

Furthermore, when banks work together on a Blockchain, the total cost of the Blockchain and its supporting ecosystem may be greater than the individual expenses related to managing transactions at a specific bank. However, because the costs are shared among all participating institutions, there is a significant cost reduction. When used by banks and other financial institutions, smart contracts improve the fulfilment of contractual terms since they automatically execute once certain pre-established conditions are met [94–96]. These smart contracts must be firmly rooted in the law and follow all relevant legislation, including when necessary cross-jurisdictional compliances. Blockchain can be useful in the transfer of complicated financial assets that are governed by a set of unchanging business rules that can automatically resolve some types of disputes. Blockchain makes peer-to-peer transactions possible. Blockchain technology applications in finance service

Blockchain technology shows potential applications for financial services. Transaction fees, which traditional financial institutions profit from, could be reduced or eliminated by blockchain technology. Consumers must rely on banks or outside organisations to conduct transactions involving money transfers. The implementation of blockchain technology may avoid intermediaries like banks, thereby removing fees and other expenses related to these services . As a result, banks can experience problems with volume and transaction based revenue. It makes it possible for private and public chains to communicate. By enabling previously unheard-of degrees of connectedness and programmability among goods, services, assets, and holdings, the digitisation of financial instruments, which includes digital assets, smart contracts, and programmable money, extends the advantages of blockchain technology. Digitisation permits asset provenance and complete transaction history in a single shared source of truth while guaranteeing data integrity. Increased automation improves operational effectiveness overall. The real-time settlement, auditing, and reporting are made possible, and processing durations, the chance of error and delay, and the number of stages and intermediaries involvement are required to reach the same levels of trust as conventional processes are all decreased .

Blockchain is a technology that makes a readily available, secure, and impenetrable record of online transactions. Like the internet, a blockchain is a shared record of transactions dispersed across an extensive network of users and lacks a central authority. It is made up of several data blocks, each of which contains a collection of transactions. The blocks are said to be connected and protected by cutting-edge cryptography. Major stock exchanges are looking into how Blockchain could enable almost instantaneous stock settlements by lowering transaction times and overhead

Blockchain technology can reduce costs for financial services providers and end users while enhancing payment transparency, efficiency, trust, and security. Before the advent of blockchain technology, payments between banks could take up to a week to transfer. Through digital currencies and distributed ledger technologies, payments are quicker, less expensive, and more convenient .Central banks are testing the possibility of incorporating distributed ledger technology into redesigned payments.

Leaving a digital trace on the Blockchain will also help items whose provenance determines their worth. A platform for truth and trust is an immutable, unhackable, distributed ledger of digital assets. The consequences are enormous for practically every sphere of society, not just the financial services sector. There is a significant demand for blockchain software engineers, which drives up the cost of creating and maintaining blockchain-based products. Although there are many benefits to using blockchain apps, it can be challenging to integrate them with older systems and off-chain data. There are some obstacles that developers must overcome before they can link their applications with services offered by different blockchains.

VII. DISCUSSION

The financial services sector could profit significantly from the development of blockchain-based solutions. Decentralised finance was made possible by the use of Blockchain in financial services. It is a form of financing that employs smart contracts and blockchain technology to do away with middlemen from the financial services industry. Various financial institutions and organisations can benefit from Blockchain to build trust, promote transparency and cut expenses. Blockchain technology can be used by businesses in many vital areas, including financial software and systems . Banks are reluctant to discuss possible blockchain applications in public, but some have just ordered studies to figure out where they can. Financial technology companies have developed into a sizable segment of the financial services sector by enabling investors to open accounts with virtual advisors and make their own financial decisions. The importance of fintech in the global financial system and its relationship to Blockchain will grow together. Because investors get more value for their money and there is a balance between automation of financial services and cheaper costs, this innovation may benefit consumers. Financial services are still centralised and multi-layered on a global scale. Financial information is usually stored in centralised systems and must pass via a number of middlemen, including the front office, back office, and other locations. Data protection is solely dependent on middlemen and database security, and the system lacks transparency. Even if the databases are well-protected, there is a high likelihood of data leaks and server hacking. Blockchain technology powered by digital currency has the potential to be applied to both domestic and international fund transactions. Banks are probably hesitant to implement blockchain technology locally since they have already made substantial investments in centralised systems, but they would greatly benefit from it internationally. The huge disparities in laws, regulations, and IT systems between countries make international transfers advantageousof blockchain technology and its use in the financial services sector are still in their infancy. The two most crucial blockchain innovations to keep an eye out for are our transaction processing and interoperability advancements, as both will increase the technology's utility for financial institutions. It is doubtful that blockchains will replace current financial systems in the foreseeable future. Instead, financial institutions will test out Blockchain to gauge its potential before implementing it gradually as an addition to their current systems. The development of Blockchain is still in its early phases. It has several difficulties due to continuing changes. On the Blockchain, data updates are not authorised. Information from other blockchains cannot be exchanged or used by one Blockchain. They are unable to converse with one another as a result. Interoperability solutions must be prioritised in blockchain networks. It is expensive and time-consuming to make the switch to blockchain technology. This is true because there are not many skilled blockchain engineers. Smaller financial institutions can therefore be reluctant to make investments in addition to current system changes. These include the potential for technology to be used to facilitate illicit behaviour, hazards to users, and the financial system brought on by the current dearth of consumer protections. Blockchain may not adequately handle most of the significant issues related to each application.

VIII. FUTURE SCOPE

There are difficulties in putting blockchain technology into practice. Despite various challenges, it can be used by hundreds of financial institutions, and blockchain stocks are accepted forms of investment. It is evident that the financial sector is aware of the potential advantages of Blockchain and that it will play a more significant role in financial services in the future. Blockchain technology uses a decentralised ledger and is a form of distributed ledger technology that is secured with public and private security keys. The public key is available to all network users, and the transaction's stakeholders access the private key. As a result, the stakeholders and transaction details will only be visible to those who possess the private key, while the transaction will be visible to all network users with the help of the public key. It will guarantee system transparency while safeguarding the private financial data of the stakeholders. The financial sector has attempted to test Blockchain by duplicating its current asset transactions. This gives some flexibility in how a blockchain solution will affect efficiency but ignores how it will affect the ecosystem. Blockchain software is used as infrastructure for realtime digital asset transfer between market participants. Blockchain enables the redrawing of procedures and challenging established business model orthodoxies. This technology will significantly increase transparency among market participants, thereby levelling the playing field. Blockchain's function in the banking sector in the following years is imperative to consider as blockchain applications proliferate across numerous industries.

IX. CONCLUSION

Blockchain technology is being adopted by factories worldwide as they get more and more connected. The future factory will comprise a vast network of equipment, accessories, goods, and value-chain partners, like equipment suppliers and logistics companies. The main goal of this technology is to develop a tamper-proof ledger for digital assets like cryptocurrencies. Blockchain applications maintain data integrity, enabling marketers to target the relevant consumer segments and musicians to obtain fair royalties for their original compositions. This technology is gaining ground in banking payments. People exchange money mainly through their bank accounts; therefore, payments are crucial. Banks have long been at the forefront of the digital revolution, accepting disruptive developments in exchange for reliable payments and printing their digital currencies. Blockchain technology allows banks to track every transaction in real-time. This technology will enable banks to settle transactions on a public blockchain. Banking executives need to fulfil several requirements to become a widely used technology in the banking sector. Blockchain's ability to share information and temporarily make the property available to someone else would dramatically change our mobility. By utilising intelligent contracts over the Blockchain, it would be feasible to directly pay for and utilise a car while finding solutions to issues like electromobility. Smart contracts can be used by businesses using Blockchain in finance to upload invoices to the Blockchain. The Blockchain can contain data like payment due dates, amounts, and client information. The smart contract updates the invoice status to paid when the customer pays the bill and notifies the businesses that the payment has been received. Blockchain in financial services can assess a client's trustworthiness before trading. In the future, blockchain will play an important role and manage various activities in the finance sector.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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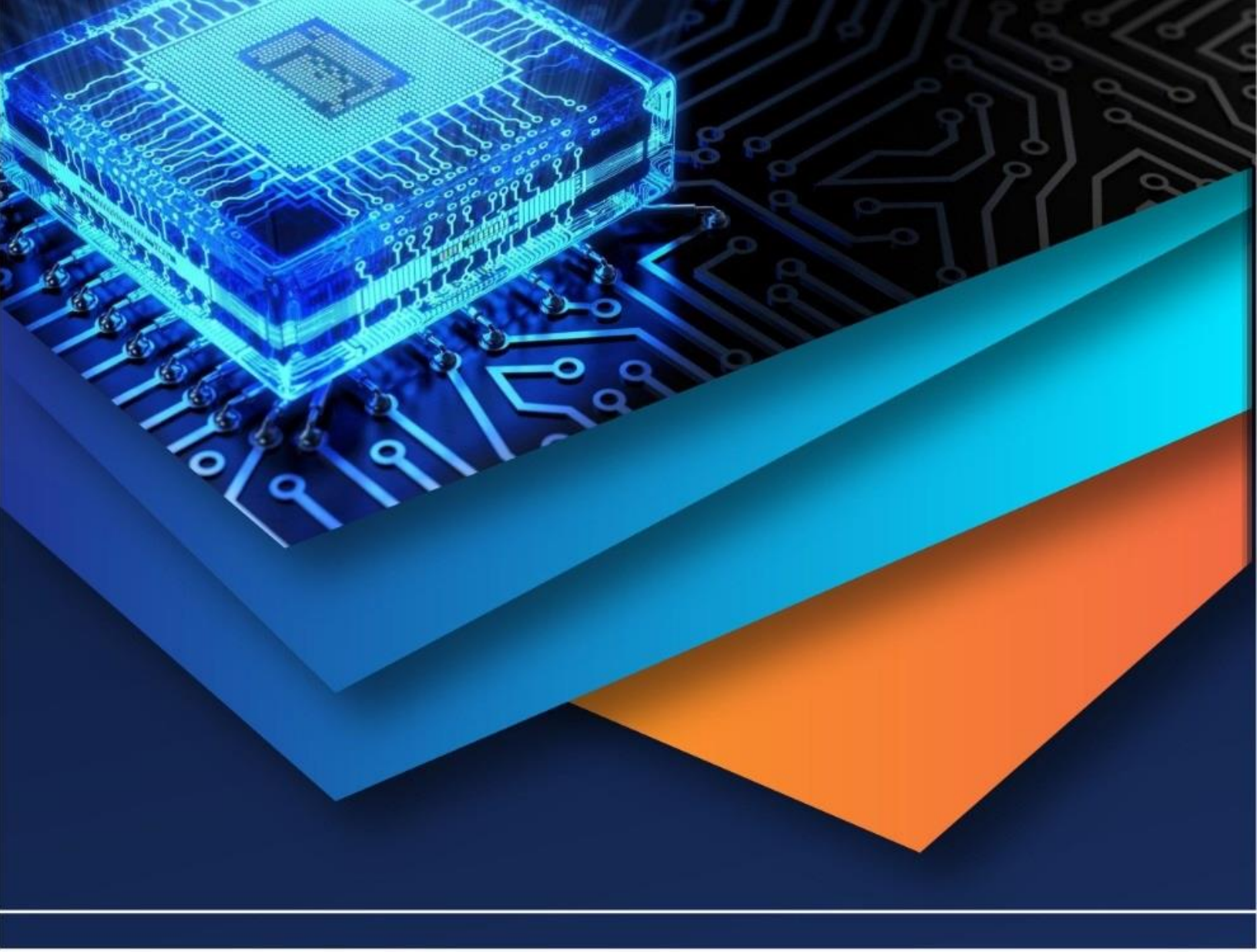

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