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# Blockchain Based E-Voting System (Review)

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***Abstract:*** ***New opportunities to create new kinds of digital services are being provided by blockchain. Although study on the subject is still in its early stages, it has largely concentrated on the technological and legal difficulties rather than making use of this innovative idea and developing improved digital services. In this study, we assess a distributed E-voting system implementation using block-chain as a service. The study offers a novel block-chain based E-voting system that tackles some of the drawbacks of current systems and assesses some of the well-known blockchain frameworks in order to build a block-chain based E-voting system. It has long been challenging to develop a secure electronic voting system that maintains the fairness and privacy of paper ballots while providing the transparency and flexibility given by electronic systems in present voting schemes. Through the explanation of a case study, including the election process and the implementation of a blockchain-based application, which increases security and lowers the cost of hosting a national election, we specifically assess the potential of technology.***

***Keywords: Blockchain, E-voting, Bitcoin, Voting, Cryptocurrencies, Voting Machine.***

## I. INTRODUCTION

The Internet is the best invention ever made by humans. However, the does have several shortcomings. However, the internet has some shortcomings. Consider a scenario in which there is a single point of authority, you are depositing money or casting a vote, and we are expected to trust him or her with our information, money, or vote. The current system's flaw is that there is just one point of failure or control. Whether or not the Authority is dishonest or corrupt is debatable. The answer is to adopt a decentralised, distributed system that evaluates transactions, votes, and data based on the consensus of users and peers.

A new election technology could prevent fraud while making the voting process transparent and verifiable by replacing the current pen and paper approach[1].There is no trusted central coordinator in a blockchain-based system; instead, each node that is a part of the blockchain system keeps the data block locally. The blockchain can be considered as a hypothetical third party that can be trusted for correctness and availability under the presumption that the decentralised consensus process is secure and that a sufficiently high percentage of blockchain network nodes are sincere[2].A blockchain is a growing list of blocks connected by cryptographic connections, which at first was just a chain of blocks. A hash, date, and transaction information from the preceding block are all included in each block. The blockchain was developed to withstand data loss. Blockchain technology is in its infancy when it comes to voting, thus academics are working to capitalise on features like openness, secrecy, and nonrepudiation that are crucial for voting applications[3]. In order to be obtainable to people while also guarded against extrinsic aspects preventing votes from being cast or preventing a voter's ballot from being tampered with, a more secure e-voting method is required. Many electronic voting systems use Tor to conceal voters' identities[4]. Additionally, the blockchain's decentralised structure will enable the realisation of the transparency principle. Additionally, blockchain has no single point of failure and does not require third-party trust. Additionally, blockchain is immutable, which means that any proposed addition (new block) to the ledger must refer to a previous iteration of the ledger. As a result, an immutable chain will form, giving the technology its name, and it will prohibit tampering with the integrity of earlier entries. Therefore, the utilisation of blockchain can be used to create a reliable and secure e-voting system [5].

## II. RELATED WORK

### *A. Blockchain*

Blockchain is a decentralised data management system in which data are spread across a peer-to-peer (P2P) network and subsequently stored in an encoded chain of blocks[6]. The electronic Bitcoin system put out by Satoshi Nakamoto is where the concept of blockchain was born[8] .

These are some of the main characteristics of blockchain:

*1)* Keep the consensus mechanism in place, i.e., demand proof of work (POW) down the entire chain.

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*2)* Put information into the blocks as a ledger.
*3)* Network-wide synchronisation of the entire ledger.
*4)* Provides data Decentralisation [7].

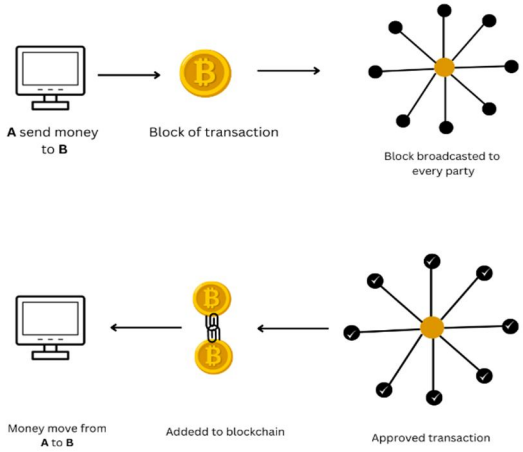



Fig.1 Introduction to Blockchain Diagram

Modern cryptocurrencies were developed in 2008 using the blockchain concept in conjunction with a number of other technologies and computing ideas. These digital currencies are Rather than a centralized system or source, cryptosystems are used to secure data. Bitcoin was the first such blockchain-based cryptocurrency[13]. A cryptographic address is associated with information that represents electronic cash on the Bitcoin blockchain. Users of Bitcoins can digitally agree to and move ownership of that data to a different user, with a public record of this transfer on the Bitcoin, enabling every connection users to independently confirm the authenticity of the exchanges. A dispersed group of individuals stores, upkeeps, and cooperatively manages the Bitcoin blockchain. Bitcoin deployments are typically developed with a specific objective or purpose in mind. Examples of these features include distributed ledger systems between businesses, cryptocurrencies, smart contracts (software loaded on a blockchain and executed by machines running that chain), and smart contracts themselves. A continual stream of innovations in the ledger technology sector have been made, and as the market landscape changes, new platforms are frequently unveiled.

*a) Voting Methods*

In a democracy, there are several ways to cast a ballot. Many nations have switched from straightforward elections with ballots on paper to computerised voting machines over time. The following are the most popular techniques[11]:

- *Ballot Paper*

The act of writing down your preferences on a piece of paper and submitting it is one of the most basic election mechanisms. This is referred to as ballot paper voting. In the table's first column, which is left vacant for voters to express their preferences, are the names of the candidates and the parties running in the election. The guidelines are quite basic. You can mark your choice of candidate with a cross, place the paper in the voting booth after folding it. The Ballot Box must be taken care of and monitored by the Election Authority in charge of overseeing the election[11].

- *Vote over Internet*

With such a method, we can vote in the convenience of our own homes. Contrary to other internet-based services, this platform has received harsh criticism for the way it operates. The administration has repeatedly asked teams of cybersecurity specialists from around the world to evaluate its voting platform. The testing team has frequently come to the conclusion that not only can they alter the vote total, but they can also erase all evidence that they ever existed. There won't be any digital fingerprint that can be used to identify them in the system[12]. This has sparked considerable division among the populace. Justice for everyone was a key democratic principle. One of the major democratic celebrations is the right to vote. Therefore, it is the responsibility of the government to make sure that the public has complete faith in the system and that any problems are resolved.

- *Electronic voting Machine*

The Ballot button on the control unit is pressed by the electoral authority in charge of overseeing the election, which initialises the EVMs. When a voter presses a button that corresponds to the candidate he wishes to support, the voting system will then turn on an LED light to let him know that the vote was accurately recorded. The machine then locks by itself. Now, when a new voter casts their ballot, the lock can only be opened by a fresh ballot number, which the person in charge will push once more. This will prevent a single person from casting numerous votes.

- *Biometric voting Machine*

They devised a voting system based on fingerprints, where a biometric machine helps identify the voter. Numerous investigations have established the uniqueness of each person's fingerprint. When casting a vote, this can be used to identify the voter. The entire process concludes fast and painlessly. The government must establish a nationwide scheme for voter registration, whereby everyone is fingerprinted and a final list of all eligible voters is compiled. In conclusion, because voters can cast ballots from any location in the world, we may run into a similar authentication issue while designing a blockchain-based system. Thus, to ensure that the voters who cast their votes are authentic, we may utilise biometric sensors or even face recognition software[11].

*B. Blockchain Based E-voting*

Due to the rise in popularity of currencies, blockchain, the technology that underpins them, is receiving increased attention from researchers[9] . Numerous e-voting methods have been implemented in conjunction with blockchain. Electronic voting is the term used to describe voting that relies on gear or software that is electronic. Such systems may be able to support/implement a wide range of tasks, from the voting process' startup to the storage of votes. There are many different types of method, including computers, mobile devices, and kiosks seen at voting offices[10]. For govt and organisations to polling devices, Agora [9] was created. It is an end-to-end verifiable blockchain-based voting system. Agora used tokens to identify eligible voters in elections, and each eligible voter received a token from an institution. However, in order to oversee the voting process, each of these methods leaned on reliable outside sources. The third party could collaborate with the candidates to manipulate the election. Additionally, the public can access and see the data that is kept in the blockchain. This compromises the security and dependability of Using block chain for voting. Blockchain-based voting's protocols incorporate smart contracts and encryption algorithms to address this issue. The third party was typically replaced using smart contracts. Smart contracts enabled the Open Vote Network, an identity protocol. The following procedures were part of the E-voting systems: The first stage is voter registration (registration). Officials check voters' IDs on election day (verification and authentication). People who are qualified to vote may do so in the following phase (casting collation). The vote ought to be verified and encrypted. The votes' correctness, confidentiality, and anonymity must all be ensured and cannot be modified in any manner. The final step in the counting process for electronic voting systems is to add up all the votes in accordance with the design (counting display of results) . The majority of e-voting applications use central authority control. Such systems have a number of shortcomings and perceived hazards. The majority of e-voting applications use centralized government control. Such systems have a number of shortcomings and perceived hazards. For instance, there are no standards for electronic voting systems, security and reliability risks, fraud and hacker vulnerabilities, expensive machine costs, and insecure transaction storage.

E-votings Systems process:

Setup: Enter the security parameters or values, then encrypt (or decode) the processes after producing the private (or public) pair of keys.

Register: Give the identifiers as IDs to generate the secret (or public) passcode as an outputs[14].

Vote: After establishing a vote element or component, the electors calculates the cypher text and matching approval.

- Credible: This helps to authenticate voting is integrity in the election server by selecting the input as a vote- .
- Validate Vote: Following the voting phase, voters may submit requests for the bitcoin contracts they voted at the time of polling advertising is occurring, and by entering the public parameters, voter status, and privacy information, they could confirm the outcomes given. Results the other legitimate or untrue when they are returned.
- Counting up: After all votes have been cast and verified, the results are tallied with the input being the necessary secret key and the output being the polled box element. The system returns False if the result is incorrect.
- Verify: When the publicity phase's public parameters are entered, a vote is authenticated as having been cast in accordance with the ballot's outcome in a valid and accurate manner[15].

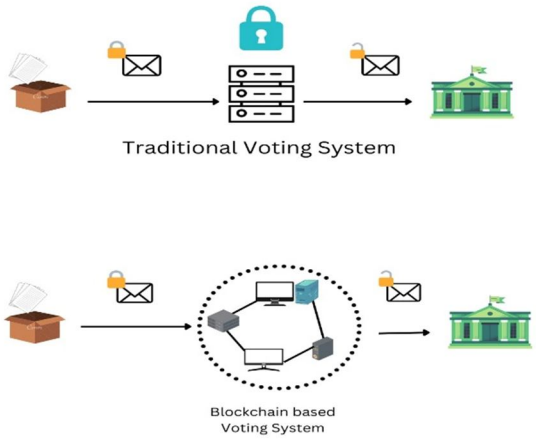


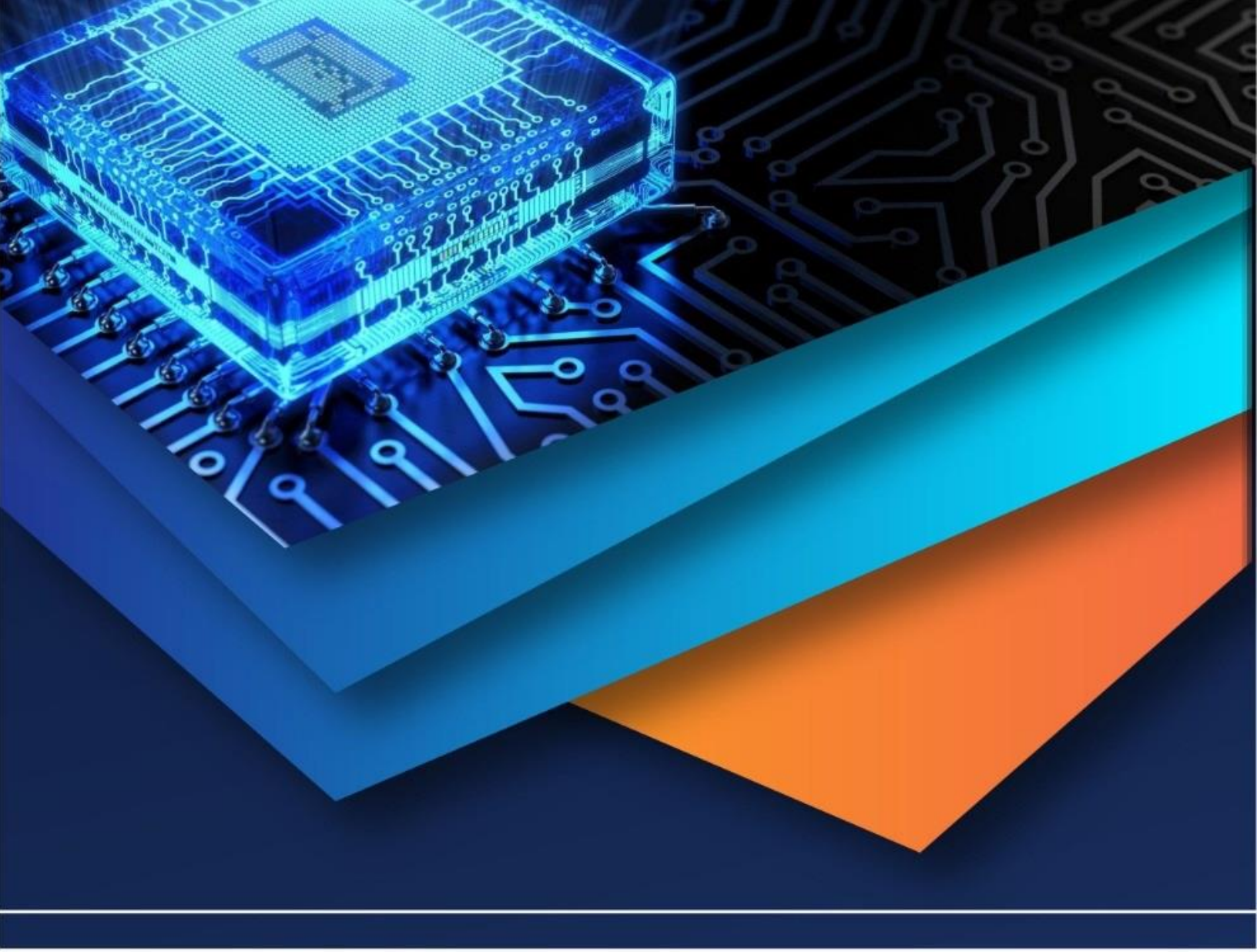

Fig 2. Block-chain based E-Votings System

## III. CONCLUSION

In this work, we Study an E-votings systems based on block-chain that protects voters' privacy while enabling secure and affordable elections. We have demonstrated how the blockchain technology offers a fresh way to get over electronic voting methods' drawbacks and adoption difficulties, ensuring election security and integrity and laying the groundwork for transparency. Utilizing every feature of the smart contract to lighten the load on the blockchain, it is possible to send hundreds of transactions per second onto an Ethereum private blockchain. Additional steps would be required for larger countries to support higher transaction throughput rates per second.

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