

# Blockchain Enabled E-Voting System

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**Abstract**— Technology is revolutionizing every day have a positive effect on us social life. And it's always networked globally Networks provide access to various resources light. One such revolution is blockchain and peculiarities of immutability and Distributed architecture, many services are Move towards it. Possible applications Blockchain can be found in electronic voting systems. it has Building a voting system that meets all legal requirements has long been a challenge. Distributed ledger knowledge makes it likely to Offers infinite possible applications. this paper Describes the framework for electronic voting systems by using blockchain. blockchain is Bringing benefits to electronic voting systems such as immutability, system security, real-time Validate and update global vote counts.

**Index Terms**— Block-chain, Transparency, Traceability, Immutability, Efficiency, Decentralized system, Intermediaries, Data management, Infrastructure, Technology, Sustainability.

## I. INTRODUCTION

Shining like stars when you enter, widely used blockchain technology. The acceptance of Bitcoin, the first cryptocurrency in people's daily lives, has become one. It's a hot topic in today's software world. Initially, blockchain used in financial and commercial transactions, but research is beginning to suggest that it can be used in. Due to the high level of transparency in this organization, more areas will expand over time.

For example, the wallet has a decentralized structure, so the total we can instantly track the amount of coins in the world and the instantaneous trading volume surely. No central authority is required to approve or finalize operations this p2p based system. For this reason, not only remittances, but all kinds of Structural information can be kept in this distributed chain with some help.

Cryptographic procedures help keep your system secure. It can be a lot of information such as certificates, bankbooks, medical information, etc. It will be recorded in this system with appropriate changes.

Ethereum coin (Ether), another cryptocurrency developed for multiple purposes. A few years after Bitcoin, the environment will be characterized by the actual block-chain meaning that this technology can create software that can contain information.

Software programs are written that are enforced by smart contracts are Embedded in the blockchain and immutable can't even be deleted or tampered. It is written So they can function properly autonomously and transparently forever without any problems external stimulus.

Blockchain technology can address many issues beyond digital commerce. that is extremely a good solution for e-voting project.

Blockchain has the potential to become a decentralized, immutable, unchallengeable public ledger.

This new technology works Four main functions:

1. Ledgers are in different places: there will no single point of failure when sustaining a distributed record.

2. There is decentralized control where new transactions are attached to the ledger.

3. Each “new block” projected onto the register must position a earlier type of the ledger. An immutable chain wherever the blockchain goes This prevents the integrity of previous entries from being tampered with.

4. A popular of system nodes must reach harmony before a new block of proposed entries becomes a everlasting portion of the record.

This paper assesses the employment of block-chain as a deal to implement the secure evoting system.

## II. BACKGROUND

The use of blockchain technology has become increasingly popular in recent years due to its ability to provide a secure and transparent way to store and transfer data. It is used in a variety of industries, including finance, healthcare, and supply chain management. Blockchain technology can be used to create digital currencies, facilitate smart contracts, and provide secure data storage. It is also used to create decentralized applications (dApps) that are built on top of the blockchain network.

The blockchain enabled voting system involves the admin which includes candidates, and the peoples to vote the candidates and to view the vote to every person publicly. The traditional voting system lacks transparency, making it difficult to count the votes. In addition, there are challenges such as fraud, counterfeiting, and ddos attack concerns.

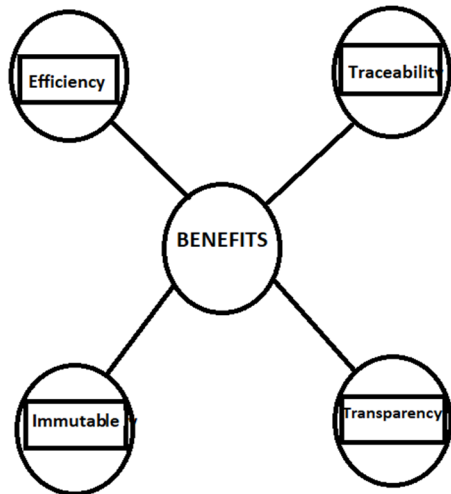


Fig 1 Benefits of Blockchain

### III. BENEFITS OF PROPOSED FRAMEWORK

The proposed framework provides several benefits, including:

- 1) *Transparency*: The framework provides transparency by enabling voter to cast their vote.
- 2) *Traceability*: The framework enables voters to see the votes and also how many votes have been casted for the particular candidate who is standing for the election.
- 3) *Immutability*: The framework ensures that the data recorded on the blockchain cannot be altered or deleted, providing a secure and tamper-proof system.
- 4) *Efficiency*: The framework can streamline the process by eliminating intermediaries and reducing transaction costs. With the blockchain-based system, all parties can access the same data, reducing the need for intermediaries.

### IV. LITERATURE SURVEY

#### 4.1 Existing System Survey

Earlier work has been measured with many different structures and their significant features are deliberated below.

It sounds like the paper describing is a systematic literature review that aims to investigate and analyse the current state of knowledge on Blockchain technology. The paper aims to achieve its objective by closely analysing the collected documents along seven key research queries. These queries are not specified in your prompt, but they are likely related to the various aspects of Blockchain technology, such as its security, scalability, interoperability, and adoption. Finally, the paper provides a brief insight into the open challenges and potential future advancements in the field of Blockchain[1]. Similarly [2] In recent years, the decentralization, secrecy, and non-tampering features of Blockchain technology have positioned it as a promising solution for addressing the concerns of electronic voting. This study proposes an online voting system based on Blockchain technology, which enables voters to cast their ballots using a mobile device from anywhere in the world. This approach differs from traditional and online voting systems. [4] authors put forward an innovative model That current voting systems used in our country involve either paper ballots or Electronic-Voting Machines. However, both these systems are susceptible to various forms of tampering or hacking. Therefore, there is a need for a more secure, transparent, and user-friendly alternative. To address this, we propose utilizing Blockchain technology, which offers a innovative solution to these challenges. By incorporating smart contracts into the Blockchain, we can ensure that the voting process is conducted securely and efficiently at each stage of the update. This approach offers a more cost-effective and safer option compared to traditional voting systems.[5] The objective of our research paper is to create an e-voting system that utilizes Blockchain technology. Our proposed system leverages Blockchain to establish a safe and well-organized platform for leading online elections while ensuring voter secrecy. To achieve this, we randomly map voter accounts to public keys of accounts on the Blockchain. [9] the authors highlighted the potential of blockchain technology to revolutionize The unique features of Blockchain technology, such as its decentralized structure, ability to maintain anonymity, and resistance to tampering, have made

it a strong candidate for addressing the challenges associated with electronic voting. To this conclusion, our study introduces a novel online voting system based on Blockchain technology that allows voters to cast their ballots using a mobile device from any location in the world. This approach represents a departure from conventional online and traditional voting systems.

#### 4.2 Limitations of Existing System

Here are some common limitations of current existing e-voting systems:

1. *Security vulnerabilities:* E-voting systems are vulnerable to cyber-attacks and hacking, which can compromise the integrity of the voting process and result in fraudulent activities.
2. *Lack of transparency:* Many e-voting systems lack transparency in terms of how the votes are collected, stored, and counted. This can lead to doubts and mistrust among voters about the accuracy and fairness of the election results.
3. *Accessibility issues:* E-voting systems may not be accessible to everyone, especially those who do not have access to technology or the internet. This can result in a digital divide and limit the number of people who can participate in the voting process.
4. *Reliability concerns:* E-voting systems may not be as reliable as traditional paper-based voting systems, as technical glitches, malfunctions, and software errors can occur, leading to incorrect vote counts and results.
5. *Legal and regulatory challenges:* E-voting systems may face legal and regulatory challenges, as they need to comply with various laws and regulations related to data privacy, security, and election transparency

#### 4.3 Problem Statement

Our main aim is to address the limitations of current e-voting systems by leveraging Blockchain technology. With a Blockchain-enabled e-voting system, we can mitigate voter fraud and increase accessibility for voters. This is achieved by creating a secure and transparent platform that ensures the integrity of the voting process, thereby boosting voter confidence and participation

### V. PROPOSED SYSTEM

Our proposal involves integrating Blockchain technology into the existing online voting system to allow users to vote from anywhere in the world, as long as they are citizens of the country. By storing the voting data on the Blockchain, we can ensure that the voting process is tamper-proof and secure.

Moreover, by eliminating the need for voters to wait in line, our solution saves time and reduces the workload for election officials.

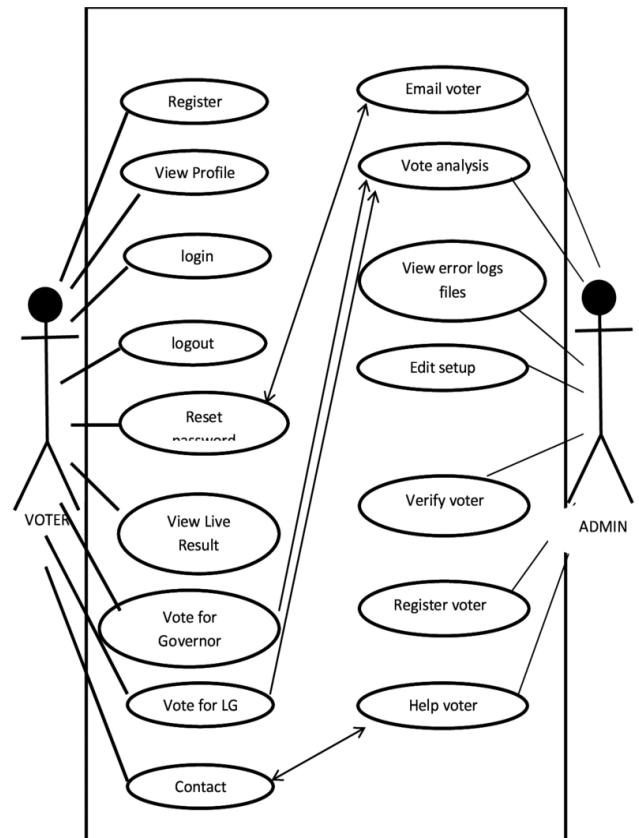


Fig 2 Use Case Diagram

To implement our solution, we developed two sets of modules: one for the Election Commission and another for the voter. The Election Commission module allows for the creation of elections and the addition of registered candidates and parties for contesting the election. Using an Ethereum Blockchain API, this information is displayed at the front-end of the voter's module for casting the vote. The vote is then stored on our Blockchain framework, from which the Election Commission can retrieve the vote count. One limitation of our approach is that our Blockchain framework cannot run on the main net, and a separate web3 provider is required to interact with it. Additionally, the lack of a public API for voter ID means that there is no authentication mechanism for voters, which can be seen as a drawback.

5.1 Details of Hardware and Software

A Requirement Specification document outlines the external requirements for a system. To identify these requirements, the analysis phase involves communication with clients to understand their needs. Input may be collected from various sources, although it may not always be consistent. The ultimate goal of the Requirement phase is to transform client ideas into a structured, formal document.

5.1.1 Hardware Requirements

- *Processor type:* Intel core i5 and above
- *Processor speed:* Minimum 2.00 GHz and above
- *RAM:* 4-10 GB
- *HARD DISK:* 250 GB or more
- *Monitor:* 800x600 or higher resolution
- *Keyboard:* 110 keys enhanced

5.1.2 Software Requirements

- *Operating System:* Windows 10 (64 bit) and Above
- *Development Environment:* Solidity Programming, ReactJS, NodeJS
- *Scripting Language:* Solidity Programming, Java Script
- *Decentralized Applications:* Ethereum Framework ie. Truffle and Ganache
- *Browser:* Google Chrome
- *Software:* Visual Studio Code

5.2 Design Details

1. *Voter UI:* The voter user interface comprises registration and login features. To participate in the election, the voter must first login with all their details and await approval from the admin. Once approved, they can log in and cast their vote during the election.
2. *Admin UI:* In the admin user interface, the administrator can log in and access the list of voters who have requested approval. The administrator has the authority to grant permission for the voters to log in to their accounts. Additionally, this section includes the registration of the political candidates standing for the election. The candidate's details are recorded here and displayed in the Voter UI for the voters to cast their vote
3. *Transaction id and Timestamp :* In this Backend section, we record every action such as authentication, registration, approval, and candidate registration as a transaction with a timestamp to keep track of the session's information. Additionally, the blockchain records the timestamps of the added information to the block.
4. *Verification of details by all the nodes :* In a decentralized system, the advantage is that all block information must be synchronized across all nodes in the Ethereum computational network, ensuring successful verification of the block.
5. *Updating the chain with the information :* Once all the nodes have verified the information, the block is added to the chain. It can be further verified by requesting verification from the nodes.
6. *Results :* Once the election process is finished, the admin dashboard will calculate and display the final results. These results can then be made public by the organization.

CONCLUSIONS

the use of Ethereum in a blockchain-enabled e-voting system provides numerous advantages, including decentralization, immutability, transparency, and security. By leveraging smart contracts and timestamped transactions, the system can ensure the integrity and accuracy of the voting process while reducing the potential for fraud or manipulation. With a user-friendly interface and efficient backend processes, the system can streamline the election process and enable voters to cast their ballots remotely, making voting more accessible and inclusive. Overall, blockchain-enabled e-voting systems using Ethereum hold great potential for improving the democratic process and ensuring fair and trustworthy elections.

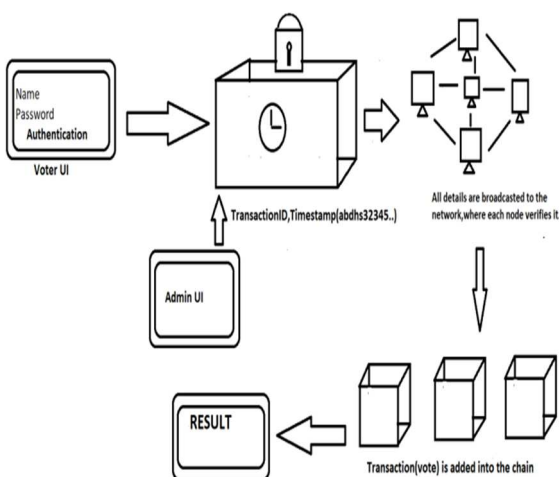


Fig 3 Design Architecture

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## REFERENCES

- [1] Online Voting System Using Blockchain, 2022 International Conference on Electronics and Renewable Systems by S. Drakshayani, U. Vijayalakshmi, S.R.Sri,A.Srivani and A.Vyshnavi, 2022, pp. 886-891A..
- [2] De-Centralized Voting System using Blockchain, by A. Jangada, N. Dadlani, S. Raina, V. Sooraj and A. R. Buchade 2022 IEEE International Conference on Blockchain and Distrubuted Systems Security ,2022, pp. 1-5.
- [3] Block voting : An Online Voting System Using Block Chain, by D.K and C.K 2022 International Conference on Innovative Trends in Information Technology, 2022, pp. 1--6
- [4] E. Androulaki, A. Barger, V. Bortnikov, C. Cachin, K. Christidis, A. De Caro, D. Enyeart, C. Ferris, G. Laventman, Y. Manevich et al., "Hyperledger fabric: a distributed operating system for permissioned blockchain," in Proceedings of the thirteenth EuroSys conference, 2018, pp. 1–15.
- [5] Blockchain-Based Online E-voting System," 2023 by Y. A. F. Ali, O. T. M. Ahmed, M. A. M. Diab, M. A. E. Sayed, M. K. Abd Elaziz and B. W. Aboshosha, International Conference on Smart Computing and Application (ICSCA), Hail, Saudi Arabia, 2023, pp. 1-8
- [6] Blockchain implimentation on E-voting System, by A. Khandelwal 2019 International Conference on Intelligent Sustainable Systems (ICISS), Palladam, India, 2019, pp. 385-388
- [7] An Integrated and Robust Evoting Application Using Private Blockchain, by L. P. K., M. N. K. Reddy and L. M. Manohar Reddy, 2020 4th International Conference on Trends in Electronics and Informatics (ICOEI)(48184), Tirunelveli, India, 2020, pp. 842-846
- [8] Security analysis of current voting systems, by A. L. Abba, M. Awad, Z. Al-Qudah and A. H. Jallad, 2017 International Conference on Electrical and Computing Technologies and Applications Ras Al Khaimah, United Arab Emirates, 2017, pp. 1-6
- [9] A decentralized and trustless e-voting system based on blockchain technology, by D. Golnarian, K. Saedi and B. Bahrak, 2022 27th International Computer Conference, Computer Society of Iran, Tehran, Iran, Islamic Republic of, 2022, pp. 1-7,
- [10] Trusted Vote: Reorienting eVoting using Blockchain, by A. K. Goel, A. Rai, A. Narain, A. Richard and K. Kumar 2022 Sixth International Conference on I-SMAC, Dharan, Nepal, 2022, pp. 129-138,