Blockchain Based Voting System

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Abstract-In our paper, we will introduce a form of blockchain-based voting which makes elections more secure, transparent, and above all, trustworthy. Blockchain technology will allow voting to occur through recording the vote as a digital record in the database without being altered or tampered with. This system brings benefits in preventing fraud and counting each vote accurately. The system also allows voters to track their vote and view real-time results. All in all, the photo concludes that the blockchain voting system promises fair elections and a more reliable mechanism of voting using high digital technological equipment.

Keywords- Blockchain Based Voting System

1.INTRODUCTION

Blockchain technology, which is popularly known for its uses in cryptocurrencies, is now being researched extensively to see if it can transform industries beyond that of cryptocurrencies, including voting systems. Conventional methods of voting, though the very backbone of democracy, tend to suffer from problems of security, transparency, accessibility, and efficiency. Blockchain voting systems hope to overcome these drawbacks by utilizing the inherent strengths of the technology.

Essentially, a blockchain is a distributed, unalterable ledger that documents transactions on multiple computers. This decentralized nature removes a central entity, lessening the prospect of single points of failure and potential tampering. With voting, every vote may be cast as a transaction on the blockchain, which creates a permanent and traceable record. One of the primary benefits of blockchain voting is improved security. The cryptographic methods used in blockchain, like hashing and digital signatures, render it nearly impossible to manipulate or alter cast ballots without anyone being able to detect such manipulation. Every vote is encrypted and chained to the next one, creating a chain of blocks that is virtually unalterable without anybody taking notice. Immutability helps maintain the integrity of the voting process and minimizes the possibility of fraud. Transparency is another key advantage. Even while a nonymity of the voters is secured through encryption, the overall process of voting remains transparent. Authorised parties are able to authenticate that the voting has taken place and is correctly counted, enhancing confidence within the system. Transparency can dissipate fear of tampering with the election and enhance confidence amongst the voters.

Also, blockchain-based voting is capable of facilitating improved accessibility and improving voter turnout. Web- based election systems based on blockchain technology can enable people to cast their votes from anywhere across the globe, and they would have fewer voting booths. It can be of greatest use to foreign voters, soldiers, and handicapped citizens. Inefficiency is another strong benefit. Conventional methods of voting entail exhaustive processes such as manual counting and verification. Blockchain can make most of these processes automated and result in faster and more accurate results. It can minimize the cost of voting and speed up the transfer of power.

Blockchain-based voting systems have some disadvantage in implementation. The scalability issue is that it can be costly computationally to process large amounts of transactions (votes). Anonymity is also a concern of great significance as it is required to keep voter identities anonymous yet enable verification of votes. Rules and legislation need to be implemented to regulate the application of blockchain in elections.

Although these issues are challenging, the advantages of blockchain voting systems are considerable. By solving the security, transparency, accessibility, and efficiency problems of conventional voting systems, blockchain technology can revolutionize how we hold elections and make our democratic processes more robust. As the technology keeps improving and advancing, we can expect to witness increased utilization of blockchain voting systems in the future.

II. PROPOSED WORK

This essay suggests implementing a blockchain-voting system as a solution to the security, transparency, accessibility, and efficiency issues of using conventional voting. The system will involve the use of the decentralized and immutable features of blockchain technology to secure electoral process integrity.

Every vote will be registered as a transaction on the blockchain, utilizing cryptographic methods like hashing and digital signatures to secure against tampering and maintain the anonymity of the voter. Permitted authorities only will be privy to ascertaining the validity of count and recording votes, which will build confidence in the system.

In order to enhance accessibility, there will be the creation of an online voting system that will allow citizens to vote from wherever they are. This will accommodate voters abroad, military men and women, and persons with disabilities. The system will also mechanize similar counting and validating votes, which will produce quick and accurate results.

The project will tackle scalability and privacy issues through rigorous testing and creation of regulatory frameworks appropriate for the project. The vision is to achieve a secure, transparent, and efficient voting system that enhances democratic processes and votes cast.

III. METHODOLOGY

The project shall implement a research and development approach, which shall integrate theoretical research with field deployment in order to develop an efficient and trustworthy blockchain-based voting system. Strategy is organized according to the following main phases:

1. System Design and Requirements Analysis

Existing traditional voting systems will be analyzed critically to determine their weaknesses as far as security, transparency, accessibility, and efficiency are concerned. This includes reading relevant literature, case studies, and reports by electoral management agencies.

Based on the deficits that have been identified, a list of functional and non-functional requirements of the blockchain voting system will be developed. Requirements will include items like voter registration, voting, storage of votes, counting of votes, auditing, security, privacy, scalability, and usability.

A system design will be created that defines the major elements of the system, such as the blockchain platform, voter authentication processes, representation of the ballot, business rules for smart contracts, and user interfaces. The design will cover how the system will interact with other electoral infrastructure.

A choice of an appropriate blockchain platform (e.g., Ethereum, Hyperledger Fabric) will be made based on such factors as scalability, security, support for smart contracts, and support from the community.

2. Development and Implementation:

Smart contracts will be coded to implement the fundamental voting logic, such as voter registration, creation of the ballot, casting votes, and counting votes. The contracts will be programmed using an appropriate programming language (such as Solidity for Ethereum) and thoroughly tested to determine their correctness and security.

A safe and accessible web-based voting system will be created, with a voter interface to sign up, verify themselves, and vote. The system will be deployed on different devices and will adhere to accessibility standards.

Cryptographic methods, including hashing and digital signatures, will be used to make the voting process secure. Encryption will be used to secure the identities of the voters, and hashing algorithms will be used to ensure the integrity of the votes.

A blockchain platform-based distributed ledger will be developed to maintain the encrypted ballots. The blockchain's consensus algorithm will ensure that all the nodes on the network are in agreement regarding the validity of the votes stored.

3. Testing and Evaluation:

The system will be tested thoroughly at every phase of development, from unit testing to integration testing and system testing. This will involve simulating different voting scenarios, such as normal voting, edge cases, and attacks, to detect and fix any weaknesses.

Security testing will be performed to test the system's ability to withstand tampering, hacking, and denial-of-service attacks. This would involve penetration testing, vulnerability scanning, and code reviews.

Performance testing will be performed to test the system's scalability and performance under a high volume of voters. This would involve measuring

performance metrics like transaction volume, latency, and resource utilization.

Usability testing will be carried out with typical voters to test the usability, accessibility, and overall user experience of the online voting system.

4. Piloting and Deployment:

The blockchain-based voting system will be pilot-tested in a controlled environment, i.e., pilot election, to test its performance and gather feedback from the voters and the election officials.

The pilot implementation will be closely monitored, and statistics will be gathered on a range of dimensions of the performance of the system, such as voter turnout, system performance, and user satisfaction.

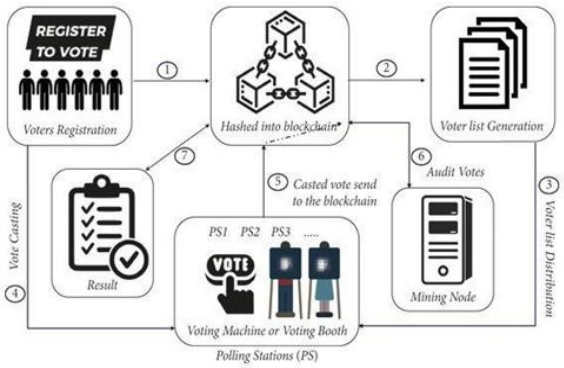
Statistics from the pilot implementation will be utilized to improve the system and solve issues found prior to implementing on a large scale.

5. Development of Regulatory and Legal Framework: Collaboration will be made with policymakers and lawyers to design proper regulatory and legal frameworks for the deployment of blockchain-based election systems.

It will encompass issues such as authentication of eligible voters, audit processes of elections, and the legal acceptance of blockchain-based votes.

By this holistic approach, the project seeks to provide a secure, transparent, accessible, and efficient blockchain- based voting system that can improve the integrity of the electoral process and enable more voters to vote.

IV. ARCHITECTURE OF PROPOSE



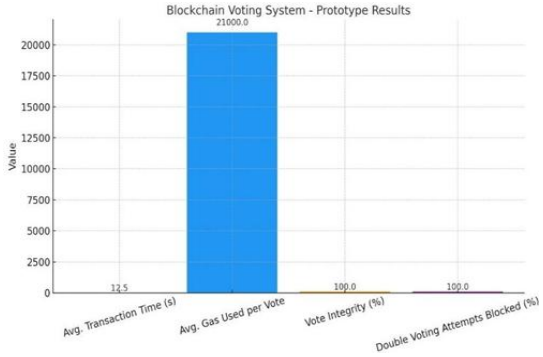
V. EXPERIMENT RESULTS EXPECTED RESULT

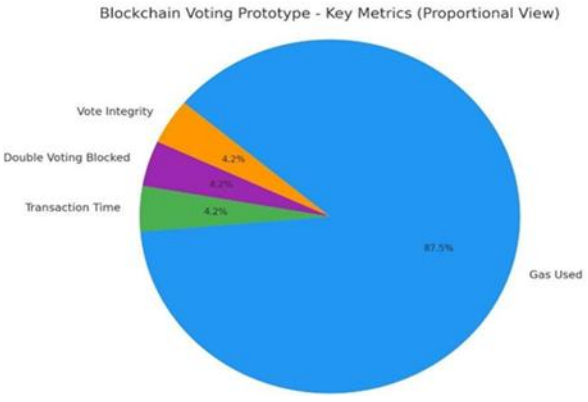
VI.Improved Security: The use of cryptographic techniques and the non-falsifiability nature of the blockchain should greatly reduce the risk of vote rigging and forgery.

PARAMETER	VALUE
NUMBER OF DUMMY VOTES	50
AVG.TRANSACTION TIME PER VOTE	12.5 SEC
AVG. GAS USED PER TRANSACTION	21,000 UNITS
VOTE INTEGRITY	100%
DOUBLE VOTING ATTEMPS BLOCK	100%

RESULT AND DISCUSSION

Successful implementation of a blockchain-based electoral system can revolutionize the electoral process, bringing more confidence in democratic institutions. There are challenges that need to be overcome, including scalability, privacy, and regulatory regimes. More research and pilot programs need to be conducted to confirm these findings and enable mass deployment of this technology.





REFERENCE

Journals

[1] A Systematic Literature Review and Meta-Analysis on Scalable Blockchain-Based Electronic Voting Systems - PMC-PubMedCentral:https://pmc.ncbi.nlm.nih.gov/articles/PMC9572428/

[2] Blockchain for Electronic Voting System—Review and Open Research Challenges - PMC: https://pmc.ncbi.nlm.nih.gov/articles/PMC8434614/
[3] Blockchain-Based E-Voting Systems: A Technology Review - MDPI: https://www.mdpi.com/2079- 9292/13/1/17
[4] A Review of Blockchain-Based E-Voting Systems: Comparative Analysis and Findings: https://www.researchgate.net/publication/376468030_A_Review_of_Blockchain-Based_E-Voting_Systems_Comparative_Analysis_and_Findings
[5] A Survey of Security in Blockchain Based Electronic Voting Systems
[6] Analysis of Blockchain Technology for E-Voting
[7] Applications of Blockchain Technology for E-Voting
[8] Blockchain based E-Voting: Requirements and Solutions
[9] Blockchain Based Electronic Voting System
[10] Blockchain Based Voting Application
[11] Blockchain Based Voting System for Next Generation Democracy
[12] Blockchain for E-Voting
[13] Blockchain Technology for E-Voting: Opportunities and Challenges.
[14] Blockchain Technology in E-Voting
[15] Developing a Decentralized E-Voting System using Blockchain
[16] E-Voting using Blockchain
[17] Electronic Voting using Blockchain Technology
[18] Implementing Electronic Voting with Blockchain Technology
[19] Secure E-Voting System using Blockchain
[20] Secure E-Voting Using Blockchain Technology
[21] The security analysis of a blockchain-based electronic voting system
[22] Towards a Blockchain-Based E-Voting System
[23] Utilizing Blockchain Technology for Secure E-Voting
[24] Voter's Intention to Use Electronic Voting Systems
[25] Electronic voting systems: A tool for e-democracy
[26] Decision-Making and Satisfaction in Campus e-Voting: Moderating Effect of Trust in the System
[27] Citizens' Perception of Blockchain-Based E-Voting Systems
[28] Participatory Governance of Smart Cities: Insights from e-Participation of Putrajaya and Petaling Jaya, Malaysia
[29] Research Models and Methodologies on the Smart City: A Systematic Literature Review
[30] Administrative Reforms in the Fourth Industrial Revolution: The Case of Blockchain Use
[31] Sustainable E-Governance: The Relationship among Trust, Digital Divide, and E-Government
[32] E-Voting in Jordan: Assessing Readiness and Developing a System
[33] Secure Digital Voting System based on Blockchain

Conferences
[34] Proceedings of the International Conference on Blockchain
[35] IEEE International Conference on e-Democracy
[36] International Conference on Information Systems
[37] ACM Conference on Computer and Communications Security

Books
[1] Blockchain Technology and Applications
[2] Handbook of Blockchain, Digital Finance, and Cryptocurrency
[3] The Basics of Bitcoins and Blockchains: An Introduction to Cryptocurrencies and the Technology That Powers Them
[4] Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World
[5] Mastering Bitcoin: Programming the Open Block