WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Decentralized Voting System Using Ethereum Blockchain

Aryan Verma[1], Aman Shukla[2]

[1](Student)
Admn no. - 21SCSE1011687
dept.of Computer Science Engineering Galgotias University Greater Noida, India
[2](Student)
Admn no. - 21SCSE1011658
dept.of Computer Science Engineering Galgotias University Greater Noida, India

ABSTRACT—

The Ethereum blockchain, when used for decen- tralized voting, offers a transparent, safe, and impenetrable method of online voting. Participants may cast their ballots and observe the results without the need for middlemen thanks to this decentralized application that is based on the Ethereum blockchain network. Votes in this system are stored on the blockchain, which prevents anyone from influencing or changing the outcome. The voting process is automated, transparent, and safe thanks to the usage of smart contracts. A dependable and affordable way to hold fair and trustworthy elections is to employ blockchain technology in conjunction with a decentralized system.

Introduction

Overview of Blockchain Blockchain is a distributed digital ledger technology that eliminates the need for middlemen by enabling network users to securely and transparently communicate and validate transactions. Because of the technology's decentralized architecture, data is kept on a network of computers rather than in a single database. This preserves the system's integrity and security by making it more difficult to hack or alter the data. When Bitcoin, the first decentralized cryptocurrency, appeared, the blockchain technology became well-known. But since then, the technology has been used in a number of sectors, including as voting, healthcare, supply chain management, and banking. Blockchain technology creates data chunks that are connected in a chain.The term "blockchain" refers to the fact that each block has a unique code, called a hash, that is generated based on the contents of the block and is used to link the block to the previous one, forming a chain of blocks. Once a block is added to the blockchain, it cannot be removed or altered without the consent of the network participants, making the technology immutable and guaranteeing that the data stored on the blockchain is transparent and tamper-proof. All things considered, blockchain technology has the potential to completely transform the way we store and exchange data, making it more safe, transparent, and accessible.

Blockchain-Based Decentralized Voting Election procedures could be completely transformed by a decentralized voting system based on the Ethereum blockchain. Decentralized voting systems can overcome many of the difficulties and dangers connected with conventional voting systems by utilizing the security, transparency, and immutability of blockchain technology. Every voter in a decentralized voting system has a distinct digital identity, and their vote is stored on the blockchain, making it impossible to tamper with or change. Additionally, decentralized voting methods make elections more efficient and less vulnerable to corruption or manipulation by doing away with the need for middlemen, such government organizations, to monitor the process. Additionally, because decentralized voting systems enable voters to cast their ballots from any location with an internet connection, they can boost voter turnout. A more inclusive and democratic election process with more voter participation and turnout may result from this. All things considered, a decentralized voting system built on the Ethereum blockchain might greatly improve the political process by making it safer, more open, and more accessible to all.

Literature Review

Review of the literature on blockchain-based online voting systems Aryan Verma and Aman Shukla are the authors. Advanced security techniques are required to implement a suc- cessful online voting system globally. Global elections under the traditional system pose a threat to security and openness. A single agency still oversees the centralized system used for general elections. Some issues with traditional election systems include the possibility of database manipulation by an organization with complete control over the system and database. A survey of some older voting systems that are still in use by various nations and organizations is presented in this study.

A Comprehensive Review of the Literature and Meta- Analysis of Scalable Blockchain-Based Electronic Voting Technology Numerous problems with authentication, data pri- vacy and integrity, transparency, and verifiability need to be resolved by electronic voting systems. However, blockchain technology provides a novel approach to a number of these issues. One major obstacle to achieving the potential of blockchain technology, particularly in electronic voting, is its
scalability. In addition to highlighting the problems associated with scalable Blockchain-based electronic voting systems, this study aims to predict future advancements. The assignment was finished using a systematic literature review (SLR), which resulted in the selection of 76 English-language publications from renowned databases.In order to assess time and cost, this SLR was carried out to find well-known proposals, their implementations, verification techniques, and different cryptographic solutions from earlier studies. Additionally, it lists performance metrics, the main benefits and challenges that various systems offer, and the most popular strategies for Blockchain scalability. It also lists a number of potential research directions for creating a scalable blockchain-based electronic voting system. This study offers further suggestions for scalable voting solutions and aids future research in considering all voting needs, advantages, and disadvantages of the suggested solutions before putting forward or building any solutions.

An Analysis of Blockchain Using Electronic Voting Systems Recently, there has been a lot of interest in blockchain technology as a distributed and decentralized public ledger in a peer-to-peer network. This technology enables the development of a tamper-proof digital platform for data storage and sharing by applying a linked block structure and establishing a trusted consensus process to synchronize data alterations. We believe that blockchain might be applied to a number of interactive online systems, including voting systems, supply chain systems, and the Internet of Things. This survey's objective is to provide insight into some recent developments on the security and privacy concerns related to blockchain-based electronic voting. We concluded this article with a comparison of the privacy and security of the existing e-voting systems based on blockchain.

Survey on Voting System utilizing Blockchain Technology Information technology use has, in various respects, transformed numerous industries. It is believed that voting is a representation of contemporary democracy. Although study on the subject is still in its infancy, it has primarily concentrated on the legal and technological aspects rather than utilizing this technology and putting it to good use. Comparing e-voting's usefulness to the current framework will yield the best results. Voting refers to selecting a candidate from a predetermined list to serve as the group's or organization's leader.Voting is primarily done to practice casting ballots so that each person chooses their own leader.Voting was difficult in the majority of nations, including India. In several nations, voting is still done in person. Members of the voting commitment can control this physical mode procedure, making it unsafe. Inadequate voting equipment and far-flung polling places are just two of the numerous problems. This issue is resolved by the proposed Flagship internet-based online voting system, which is backed by blockchain technology. Blockchain technology secures voting through the use of hashing and encryption techniques. Every vote is regarded as a distinct transaction in this instance. Voting transactions are stored on a private blockchain that is built via a peer-to-peer network. Because of the way this application is programmed, vote specifics are abstract from the user. Users will have ample time to cast their ballots while the system is operational. This paper's primary goal is to develop a novel, original solution that doesn't call for technical expertise. Voter turnout is expected to rise because voting will take place online. The idea of creating an electronic voting system with blockchain technology is applied in this project.

An Analysis of Blockchain-Based Intelligent Electronic Voting Systems With a population of over 1 billion, India is the largest democracy in the world. It has 543 parliamentary constituencies and more than 668 million electors. The link between the governed and the government is voting. The use of technology in the voting process has received more attention in recent years. There are numerous security flaws in the existing voting system, and it is challenging to demonstrate even basic security features. There are numerous issues with a voting method that can be shown to be accurate. Governments employ computerized technologies for a variety of reasons, including boosting electoral participation and cutting costs.Because the electronic voting system cannot determine if a user is authentic or not, nor can it secure the voting machine from criminals, there is still need for improvement in this area. To improve security and transparency among users, the suggested method would leverage blockchain technology to create a high-security voting machine that is interoperable.

Existing System

A Synopsis of the Current System In the current voting system, voters usually cast their ballots on paper by physically going to a designated polling location. After that, these votes are manually tallied and documented. Additionally, some nations have implemented electronic voting methods that enable voters to cast ballots online or using machines. However, because of possible vulnerabilities and security issues, computerized voting methods have come under fire.

Drawbacks of the current setup

1. Lack of transparency: Voters and observers in most voting systems find it challenging to verify that the vote counting procedure is fair and to determine whether their vote was tallied correctly.
2. Fraud susceptibility: Electronic voting equipment and paper ballots are both susceptible to fraud, including hacking and manipulation. When there is no paper trail or other means to audit the outcomes, this might be particularly problematic.
3. Slow results: The declaration of election results may be delayed due to the labor-intensive and time-consuming nature of counting paper votes.
4. Cost: A traditional voting system can be costly to operate because it needs poll staff, voting machines or paper ballots, and rental fees of polling places.

5. Centralization: A lot of conventional voting systems are centralized, which means that a limited number of people control them. This may give rise to the possibility of power abuse or voting process manipulation.
6. Limited Accessibility: Voters with disabilities, limited mo- bility, or other issues may find it difficult or impossible to get to certain polling stations, which is required by certain voting systems. Voter disenfranchisement may follow.

Proposed System

A synopsis of the suggested system The Ethereum blockchain-based decentralized voting system that is being suggested seeks to offer an open and impenetrable election- conducting method. The technology ensures the integrity and immutability of the voting data while enabling safe and anonymous voting through the use of smart contracts on the Ethereum network. This would lower the possibility of fraud or manipulation and boost voter confidence in the electoral process.

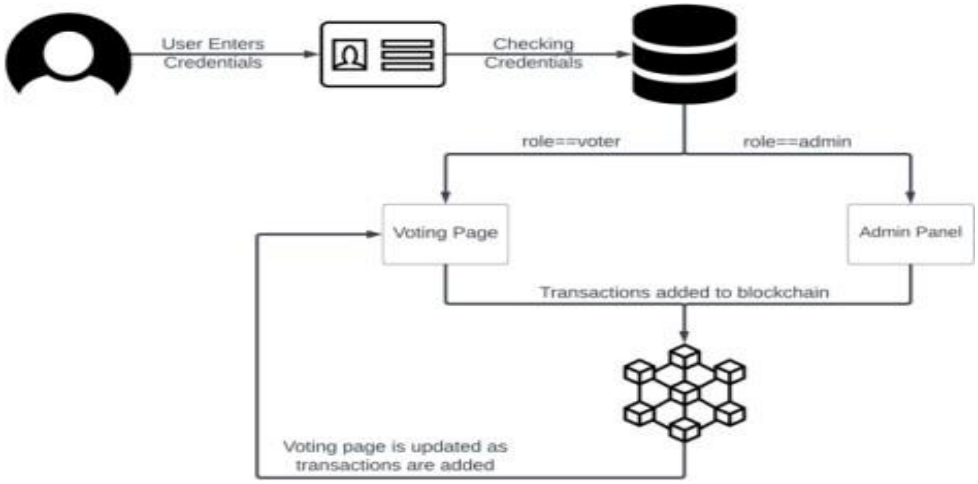
Proposed System Benefits

- Decentralization guarantees that no party controls the voting process
- Transparency throughout the voting process
- It is impenetrable
- Voters can cast ballots from anywhere in the world
- This voting method is economical
- Real-time results are provided

The Proposed Research's Objectives

1. Security: By removing the chance of vote tampering and guaranteeing clear and verifiable election outcomes, the proposed system seeks to offer a secure platform for holding elections.
2. Transparency: The goal of the suggested approach is to give voters total transparency by enabling them to observe every step of the voting procedure, including the outcomes and vote counting.
3. Accessibility: By removing the requirement for in-person attendance at a polling place, the proposed method seeks to increase voter turnout by making the voting process more accessible to all eligible voters.
4. Efficiency: By cutting down on the time and resources needed to hold elections, the system seeks to improve voting process efficiency. The technique can drastically cut down on the time and expense involved with conventional voting procedures because it is automated and does not require middlemen.
5. Trust: By offering a clear and impenetrable method for recording and tallying votes, the proposed system seeks to boost confidence in the voting process.

System Architecture



The voter ID and password that the user inputs are compared to the database. If a match is found, the user is taken to the voter or admin page based on their role and the database credentials. After logging in, the administrator can add candidates and set dates to begin the voting process. Once the voting process has begun, voters can cast their ballots. The voting website is updated with the most recent votes as soon as the voter casts their ballot, and the transaction is noted on the blockchain.

Modules

Section 5.1: Modules1. Voter: The voter module is intended for anyone who is qualified to cast a ballot. It guarantees the security and integrity of the votes and offers features associated with the voting process. The voter module's primary attributes consist of:

a) Voters can use their individual login credentials to safely authenticate themselves and access the voting system.
b) The names, parties, and other pertinent information about the candidates vying for different seats are available to voters.
c) Voters can confirm that their selections are appropriately reflected in the blockchain and check the progress of their votes.

Admin: The admin module is intended for election officials or administrators who are in charge of running and supervising the voting system. It offers features for setting up and keeping an eye on the voting procedure. The admin module's primary attributes consist of:

a) Administrators have the ability to configure the system's parameters, including candidate registration, voting period start and end dates, and other administrative settings.
b) The administrator can initiate the voting process and manually confirm the candidate.

Conclusion And Future Enhancements

Conclusion

For safe elections, decentralized voting using the Ethereum Blockchain provides a reliable and open alternative. It offers a tamperproof platform and guarantees the integrity of votes by utilizing blockchain technology. It has the potential to transform democracy and enable citizens to take part in a reliable and effective voting system with further improve- ments, such as increased scalability, enhanced user experience, and integration with other cutting-edge technology. It is an important step in creating a society that is more accountable and democratic.

Future Enhancement

Further features like real-time vote counting, secure voter identification procedures, sophisticated data analytics for voter insights, and integration with cutting-edge technologies like biometrics and artificial intelligence can be added to the decentralized voting system in subsequent iterations. These improvements will significantly improve the voting process's effectiveness, security, and accessibility, making it more reli- able and inclusive.

REFERENCES

1. Han, J., Kamber, M., and Pei, J. (2011). Data Mining: Concepts and Techniques (3rd ed.). Morgan Kaufmann. o This book provides a detailed explanation of machine learning techniques, including precision, recall, and the use of accuracy in model evaluation.

2. Burez, J., and Van den Poel, D. (2009). Handling class imbalance in customer churn prediction. Expert Systems with Applications, 36(3), 4626-4636. https://doi.org/10.1016/j.eswa.2008.05.027 o This paper discusses the issues related to class imbalance in churn prediction and explores techniques like SMOTE to balance datasets.

3. Fawcett, T. (2006). An introduction to ROC analysis. Pattern Recognition Letters, 27(8), 861-874
. https://doi.org/10.1016/j.patrec.2005.10.010 Provides a comprehensive overview of ROC curves and AUC, explaining how these metrics can be used to evaluate classification models.

4. Kohavi, R., and Provost, F. (1998). Glossary of terms for evaluating machine learning models. Machine Learning, 30(2- 3), 271-274. https://doi.org/10.1023/A:1017181826899
Defines key terms like precision, recall, and accuracy in the context of machine learning model evaluation.

5. Chawla, N. V., Bowyer, K. W., Hall, L. O., and Kegelmeyer,
W. P. (2002). SMOTE: Synthetic minority over-sampling technique. Journal of Artificial Intelligence Research, 16, 321- 357. https://doi.org/10.1613/jair.953 Introduces the SMOTE algorithm, a widely used technique for handling class imbalance in machine learning.

6. Chen, T., and Guestrin, C. (2016). XGBoost: A scalable tree boosting system. Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, 785-794. https://doi.org/10.1145/2939672.2939785 This paper details the workings of XGBoost, which was used for model building in the context of customer churn prediction.

7. Powers, D. M. W. (2011). Evaluation: From precision, recall, and F measure to ROC, informedness, markedness, and correlation. Journal of Machine Learning Technologies, 2(1), 37-63. o Discusses various performance metrics like precision, recall, F1 score, and ROC-AUC, which are critical in model evaluation.

8. Davis, J., and Goadrich, M. (2006). The relationship between precision-recall and ROC curves. Proceedings of the 23rd International Conference on Machine Learning,233-240. https://doi.org/10.1145/1143844.1143874 This paper explains the trade-off between precision and recall and how it relates to the ROC curve in the evaluation of