iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** XI **Month of publication:** November 2023

DOI: https://doi.org/10.22214/ijraset.2023.57026

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue XI Nov 2023- Available at www.ijraset.com

Blockchain Voting: A Step Towards Inclusive Democracy

Smita Mande[1], Purvesh Rathi[2], Parth Rathi[3], Chaitanya Rathod[4], Manish Rathod[5], Khushbu Rathod[6]
F.Y.B.Tech Students' Engineering Design and Innovation (EDAI2) Project Paper, SEM 2 A.Y. 2022-23, Department of Engineering, Sciences and Humanities (DESH) Vishwakarma Institute of Technology, Pune, INDIA

Abstract: ***The online voting system that incorporates blockchain technology aims to transform the voting process by introducing upgraded trust, transparency and security. Through the utilization of a decentralized blockchain network, the proposed system ensures that each vote is securely recorded and verified, thereby establishing an immutable and tamper-resistant voting mechanism. One of the fundamental feature of the system is eligible voter verification. By leveraging blockchain's distributed nature, the system can verify the identity and eligibility of each voter, ensure that eligible individuals can only participate in the voting system. This authentication process adds an additional layer of security and helps prevent fraudulent activities. Secure vote casting is another crucial component of the proposed voting system. Through the utilization of blockchain, each and every vote is encrypted and securely stored in a decentralized manner. This ensures that votes cannot be altered or manipulated, providing a high level of integrity to the voting process. Additionally, the system emphasizes transparent result tallying. The decentralized nature of blockchain technology allows for the public verification of votes, enabling anyone to audit the voting process. This transparency enhances trust among voters, as it provides them with the ability to independently verify the accuracy of the election results. Overall, the proposed online voting system, empowered by blockchain technology, offers a transparent, secure and tamper-resistant solution for conducting elections. By leveraging the benefits of blockchain, such as decentralization and immutability, the system addresses the challenges faced by traditional voting systems and provides a more reliable and trustworthy platform for the democratic process. It has the potential to enhance the integrity of elections, increase voter turnout, and foster trust in the electoral system.***

Keywords: Decentralized, Voting, Blockchain, Smart Contract

I. INTRODUCTION

The traditional voting systems used in democratic societies have relied on physical ballot papers and in-person voting at polling stations. However, with advancements in technology, there is a growing interest in exploring online voting systems as a means to enhance accessibility, efficiency, and voter participation. One of the promising technologies that can address the security and transparency challenges of online voting is blockchain. Blockchain, the underlying technology behind cryptocurrencies like Bitcoin, is a distributed and decentralized ledger that enables transactions characterized by both security and transparency. With the potential to transform the electoral process, it offers a tamper-resistant and auditable platform for recording and verifying votes, transforming the way elections are conducted. An online voting system using the decentralized blockchain technology leverages the characteristics of blockchain, such as immutability, transparency, and decentralized consensus, to ensure the trustworthiness and integrity of the voting process. Instead of relying on a central authority, the voting system is decentralized and distributed across a network of nodes, each maintaining a copy of the blockchain. When a voter casts a vote in an online voting system using blockchain, their vote is securely recorded as a transaction on the blockchain. Once recorded, the vote becomes immutable, making it nearly impossible to alter or manipulate without detection. This transparency and immutability provide a high level of assurance that the results of the election are accurate and reflect the will of the voters. However, implementing an online voting system using blockchain is not without challenges. Scalability, usability, and ensuring the security of the underlying technology are crucial factors that need to be carefully addressed. Additionally, regulatory and legal considerations must be taken into account to ensure compliance with existing electoral laws and regulations.

II. METHODOLGY

This section outlines the methodology for implementing a decentralized voting system, leveraging blockchain technology and decentralized networks. The methodology encompasses the following key components:

A. *System Architecture*

The system architecture is designed to establish a decentralized network that ensures the security and transparency of the voting process. It involves the design of a distributed ledger system using blockchain technology, incorporating consensus mechanisms, and implementing smart contracts to facilitate the voting process.

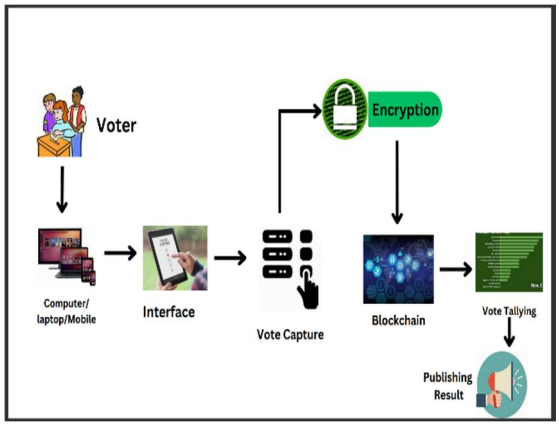

FIG 3.1 SYSTEM ARCHITECTURE

B. *Secure Vote Casting*

Secure vote casting mechanisms are employed to protect the privacy and integrity of votes. This includes the implementation of encryption and decryption techniques to ensure that votes are securely transmitted and stored on the blockchain. Additionally, measures are taken to prevent double voting or any unauthorized manipulation of the voting process.

C. *Result Tallying*

Result tallying in the decentralized voting system is designed to be transparent and verifiable. Consensus mechanisms, such as Proof-of-Stake or Proof-of-Work, are utilized to validate and record the votes on the blockchain. The tallying process ensures that the election results are accurate and cannot be tampered with. Furthermore, the system provides transparency and auditability features, allowing stakeholders to independently verify and audit the election results.

The proposed methodology for implementing a decentralized voting system addresses several challenges and considerations, such as scalability, privacy, usability, and legal compliance. These factors are essential for the successful acceptance and execution of the decentralized voting system. By following this methodology, researchers and practitioners can develop robust and trustworthy decentralized voting systems that enhance the integrity of the democratic process.

III. RESULTS AND DISCUSSIONS

The results and discussions of the decentralized voting system indicate significant progress in ensuring the security, trustworthiness and transparency of the voting process. In terms of eligible voter authentication, the system effectively verified and registered the identities of voters, guaranteeing that only eligible individuals were able to participate. This authentication process is crucial in maintaining the integrity of the voting system and preventing fraudulent activities. The secure vote casting mechanism implemented in the decentralized voting system proved to be robust and reliable. By leveraging blockchain technology, each vote was encrypted and securely stored, making it tamper-resistant and ensuring the privacy of the voter's choice. The implementation of encryption and decryption mechanisms added an extra layer of security, preventing unauthorized access to the votes and ensuring the integrity of the voting process. Result tallying in the decentralized voting system was a transparent and verifiable process. Through the utilization of consensus mechanisms on the blockchain, the integrity and accuracy of the election results were guaranteed. The decentralized nature of the system enabled public verification and auditability, allowing stakeholders to independently verify the tallying process and build trust in the results. While the system demonstrated promising results, scalability and performance considerations need further exploration. Scaling the system to accommodate a large number of voters is a challenge that requires optimization techniques and improvements in the underlying blockchain infrastructure. Ensuring efficient performance in real-world elections is vital to encourage for widespread adoption of decentralized voting systems. Privacy and confidentiality were given due consideration in the decentralized voting system. The advanced encryption techniques employed preserved the anonymity of voters, preventing the linkage of votes to specific individuals. However, further research is necessary to explore privacy-enhancing technologies, such as zero-knowledge proofs, that can further strengthen the privacy measures and instill confidence among voters.

Usability and accessibility were highlighted as important factors in the success of the decentralized voting system. While the system offered enhanced security and transparency, efforts should be made to ensure that the system is user-friendly and accessible to individuals with diverse technological backgrounds. Incorporating intuitive interfaces and following user-centered design principles will contribute to a seamless and inclusive voting experience. Legal and regulatory considerations were addressed in the decentralized voting system. Compliance with existing electoral laws and regulations was ensured, and necessary amendments were identified to accommodate the unique aspects of blockchain-based voting systems. Collaboration between technologists, legal experts, and policymakers is essential to navigate the complex legal landscape and foster the wider adoption of decentralized voting systems. In conclusion, the results obtained from the decentralized voting system demonstrate significant advancements in ensuring the security, trustworthiness and transparency of the voting process. However, further research and development are necessary to address scalability, privacy, usability, and legal considerations for the widespread adoption of such systems in real-world elections. The decentralized voting system holds great potential to revolutionize democratic processes, and continuous improvements will pave the way for more reliable and trustworthy elections in the future.

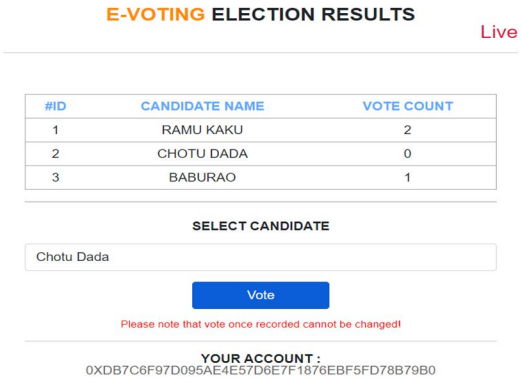

FIG 4.1 RESULT

IV. CONCLUSION

The execution of an online voting system using blockchain technology holds great promise for revolutionizing the democratic process by providing enhanced trustworthiness, security and transparency. The decentralized and immutable nature of the system addresses some of the key challenges faced by traditional voting systems, such as tampering, fraud, and lack of transparency. By leveraging cryptographic techniques and distributed consensus, blockchain ensures that each vote is recorded in a transparent and tamper-resistant manner. By leveraging the transparency of the blockchain, the voting process becomes independently verifiable, fostering trust and confidence in the election results. Additionally, the blockchain's immutability guarantees that votes remain unaltered and tamper-proof, strengthening the system's integrity even more.. The use of blockchain in online voting systems also addresses concerns related to voter authentication and privacy. With secure cryptographic protocols, eligible voters can be authenticated without compromising their anonymity. This safeguards the privacy of individual voters while ensuring that only authorized participants can cast their votes. While the potential benefits of online voting systems using blockchain are substantial, challenges still exist. Scalability, usability, regulatory compliance, and the need for robust security measures are important considerations that require careful attention. Ongoing research, development, and collaboration among various stakeholders are crucial to address these challenges and refine the implementation of online voting systems based on blockchain. Overall, the adoption of blockchain technology in online voting system holds the promise of transforming the democratic process radically, making it more accessible, secure, and transparent. By leveraging the advantages of blockchain, such as decentralization, immutability, and transparency, we can build a foundation for trustworthy and efficient elections in the digital age. Continued exploration, innovation, and collaboration will be vital to realize the full potential of blockchain in transforming the way we conduct democratic elections.

V. ACKNOWLEDGEMENT

The (Vishwakarma Institute of Technology), Pune, backs this project. We extend our heartfelt gratitude to Dr. C. M. Mahajan (Head, DESH) & Prof. Smita Mande (Guide) for their invaluable guidance and supervision. Additionally, we acknowledge our college for providing essential resources for our project.

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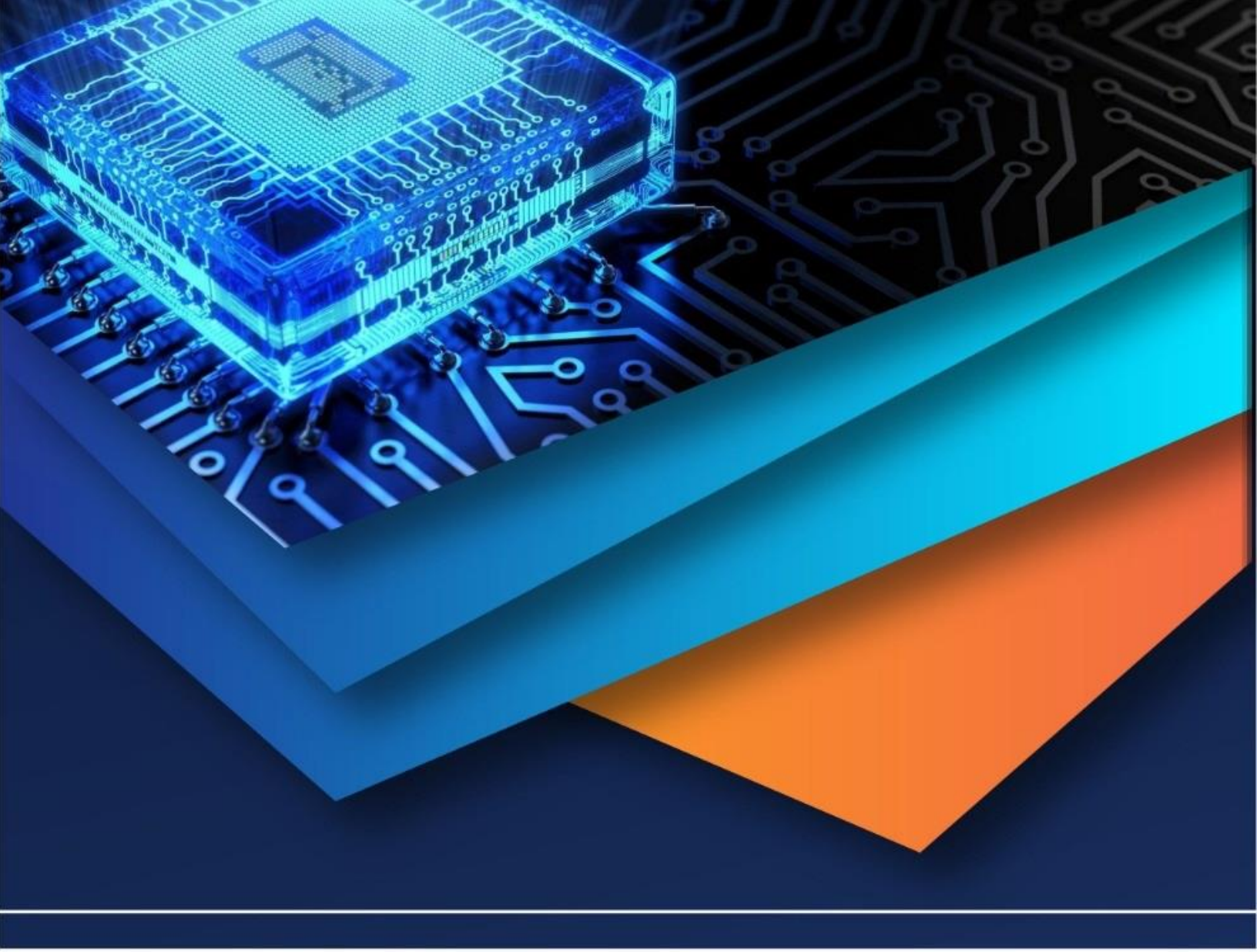

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