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DECENTRALIZED ONLINE VOTING SYSTEM USING HASHED BLOCKCHAIN

D. Manasa[1], M. Harshitha[2], K. Nithyasree Reddy[3], K. Sai Rakshith[4]

[1]Assisstant Professor, Information Technology, ACE Engineering College, India.

[2,3,4]Information Technology, ACE Engineering College, India.

ABSTRACT

In the digital era, the integrity and security of online voting systems are paramount, especially in populous democracies like India. This project introduces a pioneering online voting system designed to leverage blockchain technology, ensuring a transparent, secure, and immutable voting process. By integrating encrypted hash blocks, the system guarantees the authenticity and confidentiality of each vote cast. Central to our approach is the use of India's Aadhar card for user registration and authentication, facilitated through a one-time password (OTP) verification mechanism.

This not only simplifies the authentication process but also ensures that each vote is uniquely tied to a verified Indian citizen, thereby preventing fraudulent activities and duplicate voting. The blockchain framework under pinning our system stores votes as encrypted hash blocks, making it virtually impossible to alter votes once they have been recorded. This assures participants of the unimpeachable integrity of the voting process. The system is designed with a user - friendly interface, allowing voters to easily explore candidates and cast their votes securely to their preferred candidates. On the administrative side, the system empowers election officials to manage elections efficiently, including candidate registration and the allocation of voting symbols. Furthermore, the system provides real – time access to election results for both administrators and users, promoting transparency and trust in the electoral process. By addressing the critical challenges of security, transparency, and user authentication in online voting, this project sets a new benchmark for digital democracy in India. It showcases how blockchain technology can revolutionize the electoral process, making it more accessible, secure, and trustworthy for millions of Indian voters.

Keywords: Blockchain, Online voting system

1. INTRODUCTION

The advent of digital technology has transformed numerous aspects of daily life, including how democratic processes are conducted. In populous democracies like India, where the scale of elections presents unique challenges in terms of logistics, security, and voter accessibility, the need for innovative solutions to enhance the electoral process is paramount. This project introduces a state-of-the-art online voting system that capitalizes on the advancements of blockchain technology to address these challenges. Blockchain, renowned for its robust security features, offers a novel approach to ensuring the integrity, transparency, and reliability of online voting systems. Central to this project is the deployment of a blockchain-based framework that records votes as encrypted hash blocks, thereby ensuring that once a vote is cast, it becomes immutable and tamper-proof.

This key feature addresses longstanding concerns over vote security and fraud, which have historically undermined the credibility of electronic voting methods. Additionally, the system leverages India's Aadhar card a unique identification number provided to Indian citizens as a means of user registration and authentication. This integration, coupled with a one-time password (OTP) verification mechanism, aims to streamline the voter authentication process, ensuring that each vote is securely tied to a verified identity, thereby eliminating opportunities for duplicate voting and other fraudulent activities. The online voting system designed through this project is not just about enhancing security; it also focuses on user experience. By providing a user-friendly interface, the system facilitates easy navigation for voters, enabling them to explore candidates and cast their votes with confidence to their preferred candidates. On the administrative side, the system equips election official's effective tools for managing the electoral process, including candidate registration and the allocation of voting symbols. Moreover, the real -time access to election results it offers enhances transparency, allowing both administrators and voters to monitor the election outcomes as they unfold. The purpose of the project underscores its significance in pioneering a new era of digital democracy in India. By leveraging blockchain technology to surmount the critical challenges of online voting— namely security, transparency, and user authentication — the project sets a groundbreaking precedent.

It not only demonstrates the potential of blockchain to revolutionize electoral processes but also represents a significant step toward making voting more accessible, secure, and trustworthy for millions of Indian voters.

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2. LITERATURE SURVEY

As part of the Literature Survey, we have referred few project papers and the findings from them are:

A remote and cost-optimized voting system using blockchain and smart contract: Mohammad Nabiluzzaman Neloy, Md. Abdul Wahab, Sheikh Wasif, Abdulla All Noman, Mustafizur Rahaman, Tahmid Hasan Pranto, A. K. M. Bahalul Haque, Rashedur M. Rahman 2023 [1]

This paper addresses the significance of sharing the traditional voting procedures are non-remote, time-consuming, and less secure. While the voter believes their vote was submitted successfully, the authority does not provide evidence that the vote was counted and tallied. In most cases, the anonymity of a voter is also not sure, as the voter's details are included in the ballot papers. Many voters consider this voting system untrustworthy and manipulative, discouraging them from voting, and consequently, an election loses a significant number of participants. Although the inclusion of electronic voting systems (EVS) has increased efficiency; however, it has raised concerns over security, legitimacy, and transparency. To mitigate these problems, blockchain technology has been leveraged and smart contract facilities with a combination of artificial intelligence (AI) to propose a remote voting system that makes the overall voting procedure transparent, semi-decentralized, and secure. In addition, a system that aids in boosting the number of turnouts in an election through an incentivization policy for the voters have also developed. Through the proposed virtual campaigning feature, the authority can generate a decent amount of revenue, which downsizes the overall cost of an election. To reduce the associated cost of transactions using smart contracts, this system implements a hybrid storage system where only a few cardinal data are stored in the blockchain network.

Decentralized-Voting-System: Krish-Depin 2023 [2]

This paper introduces the employment of blockchain technology Decentralized voting using Ethereum blockchain is a secure, transparent and tamper-proof way of conducting online voting. It is a decentralized application built on the Ethereum blockchain network, which allows participants to cast their votes and view the voting results without the need for intermediaries. In this system, votes are recorded on the blockchain, making it impossible for anyone to manipulate or alter the results. The use of smart contracts ensures that the voting process is automated, transparent, and secure. The use of the blockchain technology and the implementation of a decentralized system provide a reliable and cost-effective solution for conducting trustworthy and fair elections.

Create a Secure Voting System using Blockchain: Phong Tran 2021 [3]

This thesis explores implementing a secure voting system using Ethereum Smart Contracts on blockchain technology to prevent result manipulation. Blockchain's immutability ensures transparency post-voting. The theoretical section covers blockchain data storage, verification, tamper-resistance, and the Ethereum ecosystem. The practical section provides application specifications and creation steps, using ReactJS for the front end, NodeJS for the back end, and Solidity for the smart contract.

E-Voting using Blockchain Technology: Abhishek Subhash Yadav, Ashish Uttamrao Thombare, Yash Vandesh Urade, Abhijeet Anil Patil 2020 [4]

Democratic voting is a crucial and serious event in any country, the current voting scheme in any country is through ballot paper or by use of EVM. These processes have many drawbacks such as transparency, low voter turn-out, tampering of votes, distrust in the election body, forging of unique Id (voter id card), delay in giving out results and the most important is security

issues. Security of digital voting is always the biggest concern when considering to implement a digital voting system. With

such monumental decisions at data and defend against potential attacks. One way the security issues can be potentially solved is through the use of blockchain technology. Blockchain technology offers infinite number of applications. Blockchain is a distributed ledger technology that allows digital assets to be transacted in a peer-to-peer decentralized network. A distributed ledger technology is an exciting advancement in this regard. Block is a collection of all the transactions. Blockchain possess salient features such as immutability, Decentralization, Security, Transparency and anonymity. Blockchain with smart contracts emerges as a promising candidate for building a safer, secure and transparent E-voting systems. In this paper we have implemented and tested sample e-voting application as a smart contract for the Ethereum network using the blockchain

technology through wallets and the Solidity language. Limited amount of token(gas) is given in the wallet which is exhausted

when the user votes thus preventing duplicity of votes. This paper also highlights the pros and cons of using blockchain

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technology and also demonstrates a practical system by showcasing a webapp for voting and its limitations.

Blockchain-based electronic voting systems: A case study in Morocco:

Tarik Chafiq , Rida Azmi , Ouadoud Mohammed 2024 [5]

This research examines the feasibility of implementing blockchain-based electronic voting systems in Morocco to enhance electoral transparency and integrity. The study employs a methodology that combines Distributed Permission Ledger Technology (DPLT) and the Solana blockchain, resulting in a multilayered system. The main findings highlight the effectiveness of blockchain technology in mitigating electoral fraud and manipulation when implemented with precision, underscoring the importance of meticulous design and execution. These findings contribute significantly to discussions surrounding the modernization of electoral processes in the digital age and support the hypothesis that blockchain can address vulnerabilities in traditional voting methods. Moreover, the study mark a significant step toward modernizing elections, preserving democratic principles, and reinforcing the role of technology in addressing persistent electoral challenges, ultimately enhancing accessibility, security, and transparency in elections and strengthening democracy in the digital era.

stake, there can be no doubt about the system's ability to secure

3. COMPARISION ANALYSIS

S.No	Paper Title	Work done on paper	Future work	Drawbacks
1	A remote and cost-optimized voting system using blockchain and smart contract: Mohammad Nabiluzzaman Neloy, Md. Abdul Wahab, Sheikh Wasif, Abdulla All Noman, Mustafizur Rahaman, Tahmid Hasan Pranto, A. K. M. Bahalul Haque, Rashedur M. Rahman 2023	voter anonymity issue has been solved using an intermediate server which is integrated with the main smart contract, thus making the system a semi-decentralized one. Voter verification has been improved with an extra layer of security, and the voters are confirmed about their vote submission with a tally through a transaction receipt in real-time.	In the future, this system can be improved further to make it more reasonable by allowing for the addition of more than two candidates on a single poll, protecting by strengthening the authentication process with a multilayer of protection using voice recognition and fingerprint matching and optimizing by running an analysis on the system when the smart contract is uploaded on a main net.	online campaign system can't provide awareness among the people.
2	Decentralized-Voting-System: Krish-Depin 2023	It is a decentralized application built on the Ethereum blockchain network, which allows participants to cast their votes and view the voting results without the need for intermediaries.	Proper authentication should be implemented furtherand the results should be visible to a particular authorized people.	No Verification was used and Results will be displaying for user immediately.
3	Create a Secure Voting System using Blockchain: Phong Tran 2021	The original task of building a secure voting system. This application does not allow any mutations to the voting result, and it is the original goal of this application. With blockchain and Smart Contracts involved, the system can be decentralized and there is	It can be enhanced by multiple level authentication for security for checking the voters.	No verification of voter, casting of vote multiple is known at last.

		no need to worry about finding a trustworthy person to manage the database.		
4	E-Voting using Blockchain Technology: Abhishek Subhash Yadav, Ashish Uttamrao Thombare, Yash Vandesh Urade, Abhijeet Anil Patil 2020	For casting of vote Ethereum network is used almost all the security concerns, like privacy of voters, integrity, verification and non-repudiation of votes, and transparency of counting.	authentication of voters requires additional mechanisms to be integrated, such as use of biometric factors.	no cross verification of age, Users can verify their votes using their own public key.
5	Blockchain-based electronic voting systems: A case study in Morocco: Tarik Chafiq, Rida Azmi, Ouadoud Mo hammed 2024	multilayer architecture built upon the robust Solana blockchain. This architecture comprises two fundamental layers a Distributed Permission Ledger Technology (DPLT) layer responsible for data verification and validation and a Solana blockchain layer dedicated to ensuring data immutability and decentralization. for the secure and verifiable voting environment throughout the electoral process.	updating the nodes and cross verifying it.	complex architecture, updating the nodes, verifying the votes on ballet accuracy.

4. FUTURE SCOPE

The current project is built for small organization, but the in future we would build it as a national voting system. In addition to the present fingerprint module which is used for authorization a facial recognition module would be incorporated for better security. A blockchain-based e-voting system with a small number of voters is less costly than a system with a large number of voters, which results in a longer transaction confirmation time. However, this search has some limitations and issues that offer opportunities for future work. First, the issue of accessibility of blockchain-based e-voting to all eligible voters. This should be more important when considering voters who are not accustomed to accessing the Internet.

5. CONCLUSION

In conclusion, the proposed online voting system utilizing blockchain technology represents a significant leap forward in addressing the longstanding challenges of electoral integrity, security, and accessibility in populous democracies such as India. By integrating advanced technological solutions such as encrypted hash blocks for vote recording, Aadhar-based authentication, and a user-friendly interface, this system not only enhances the security and transparency of the voting process but also significantly broadens electoral participation. The incorporation of blockchain technology ensures that each vote is immutable, transparent, and verifiable, addressing concerns over vote tampering and fraud that have plagued traditional voting systems. The use of Aadhar for voter registration and authentication streamlines the identification process, making it more efficient while safe guarding against unauthorized voting activities. Moreover, the system's accessibility from remote locations via a simple internet connection democratizes the voting process, enabling wider participation from all segments of society, including those in remote areas and the diaspora.

6. REFERENCES

[1] A remote and cost-optimized voting system using blockchain and smart contract : Mohammad Nabiluzzaman Neloy, Md.

[2] Abdul Wahab, Sheikh Wasif, Abdulla All Noman, Mustafizur Rahaman, Tahmid Hasan Pranto, A. K. M. Bahalul Haque, Rashedur M. Rahman 2023.

[3] Decentralized-Voting-System: Krish-Depin 2023.

[4] Create a Secure Voting System using Blockchain: Phong Tran 2021.

[5] E-Voting using Blockchain Technology: Abhishek Subhash Yadav, Ashish Uttamrao Thombare, Yash Vandesh Urade, Abhijeet Anil Patil 2020.

[6] Blockchain-based electronic voting systems: A case study in Morocco: Tarik Chafiq Rida Azmi Ouadoud Mohammed 2024.