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# Online Voting System using Blockchain Technology

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**ABSTRACT:** Elections hold significant importance within modern democracies; however, a considerable portion of society worldwide lacks trust in their election systems, posing a significant concern for the democratic process. Key issues plaguing the current electoral system include vote rigging, EVM hacking (Electronic Voting Machines), election manipulation, and booth capturing. In light of these problems, a diligent examination of the flaws inherent in the current voting systems is underway, proposing an E-voting model as a potential solution.

Presently, elections are conducted using EVMs, which store voter data in a centralized database. However, this centralized approach raises concerns as the data becomes vulnerable to hacking and tampering. To address this, blockchain technology is employed to develop a decentralized application, making data tampering nearly impossible. By utilizing decentralized algorithms for data storage, blockchain ensures that data is dispersed across multiple locations, enhancing security. The paper provides a comprehensive evaluation of the e-voting system incorporating blockchain, demonstrating its efficacy in establishing an end-to-end verifiable e-voting scheme.

**KEYWORDS:** Blockchain, E-Voting Platform and E-voting, Decentralized application

## I. INTRODUCTION

Voting constitutes a vital pillar within any democratic framework. The existing method of voting, specifically through Electronic Voting Machines (EVMs), possesses a robust foundation; however, it exhibits numerous deficiencies. The absence of transparency and independent validation procedures in EVMs erodes confidence in the electoral system. Tampering and hacking vulnerabilities further compromise the validity and integrity of election results. Additionally, individuals with disabilities or limited technology familiarity face barriers in using EVMs. Given the importance of voting as a fundamental process, the participation of every individual within a nation or organization is anticipated. Nonetheless, the fixed positioning of polling stations at certain venues presents significant challenges. Citizens often have to withstand extended lines to participate in their democratic duty.

This is where the proposed solution emerges, a virtual alternative to facilitate the electoral process. While internet-based voting seems like a straightforward solution to implement, it's not without its drawbacks. A standard centralized approach would inherently be prone to security risks and flaws. The proposed solution diverges from standard approaches by harnessing the potential of blockchain technology to bolster the security of the application. In addition to addressing mobility concerns, this solution strives to match the security standards of existing offline voting systems by encompassing various aspects of a comprehensive voting system, such as voter confidentiality, security, transparency, and more.

## II. LITERATURE REVIEW

This study suggests a system that employs appropriate hash functions to ensure data protection. The concepts of block creation and block sealing are introduced within this work. The application of the block sealing principle allows for blockchain's adaptability to the requirements of voting processes.[1]

This article delves into the use of blockchain technology for e-voting systems. It investigates the advantages of blockchain, such as security, transparency, and privacy, and how it can mitigate the constraints of conventional voting mechanisms. The research suggests a blockchain-powered e-voting system that assures secure, cost-efficient electoral processes while maintaining voter confidentiality.[2]

This article offers a secure and transparent Blockchain-based mechanism for gathering data from multiple sources for elections. It guarantees safety, reliability, and privacy, ensuring an accurate tally of participating candidates. Utilizing the secure hash algorithm and a decentralized database, the system facilitates secure electronic interactions among users within a peer-to-peer network.[3]

This article introduces a decentralized national e-voting system leveraging blockchain technology to guarantee the safety and precision of the voting procedure. The system features an administrative panel for candidate management, scheduling votes, and announcing results. Eligibility verification is conducted through Aadhar card ID and phone number checks, while supervision is accomplished via webcam.[4]

This article reveals an Ethereum-based e-voting system that employs blockchain technology to counter the constraints and security concerns of centralized voting systems. The researchers designed a decentralized voting application utilizing smart contracts and launched it on a local blockchain. The application ensures the integrity of the voting process, avoids repeat voting, and provides real-time results.[5]

This literature review explores the application of blockchain technology in e-voting systems. It discusses the potential of blockchain to enhance trust and security in transactions, demonstrates a proof of concept for an e-voting system employing blockchain, and assesses its value as an alternative to existing voting systems.[6]

This article showcases a platform-agnostic, secure, blockchain-based voting system, emphasizing its capacity to ensure transparency, immutability, and security in the voting process, thus presenting a promising solution for reliable and trustworthy elections.[7]

### III. PROPOSED SYSTEM

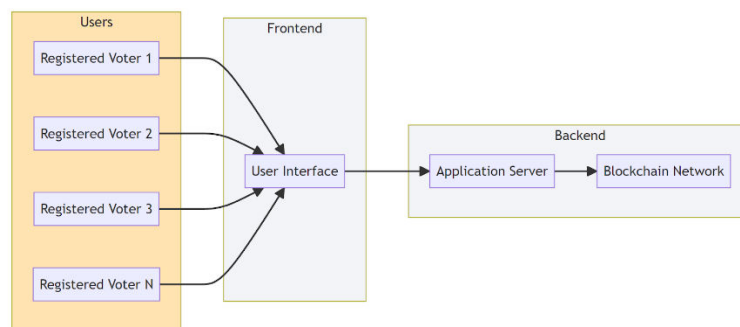


Figure 3.1 Architecture Diagram of Online Voting system using blockchain technology

The figure depicts how the three components interact with each other. Voters interact with the web application to register to vote, cast their votes, and verify the results. The frontend then sends the votes to the backend, which stores them in the blockchain network. The blockchain network is a distributed ledger that ensures that the votes are secure and tamper-proof.

An advanced and enhanced system is suggested, promising better accessibility and stronger security through the deployment of a web application. This web application incorporates robust measures for authentication, authorization, and verification. To participate in the voting process, voters/users are required to register by completing a registration form within the web application. Upon submission of the registration form, the provided information is securely stored in a centralized database. Subsequently, registered participants can access the application and take part in the voting procedure actively.

Once logged in with valid credentials, users gain access to a personalized dashboard that dynamically retrieves and presents relevant information from the centralized database. This efficient method guarantees that participants can conveniently access relevant information. In addition, rigorous security protocols safeguard the reliability of both user data and electoral information throughout the entire infrastructure.

It's crucial to highlight that the suggested setup aims to adhere to the tenets of fairness, transparency, and trustworthiness in the voting process. By merging ease of use and powerful security provisions, this system seeks to improve the general voting experience and cultivate trust in the democratic procedure.

The proposed online voting system incorporates various tools like Ganache, truffle framework, npm, and Metamask. Truffle is responsible for importing intelligent contracts onto the blockchain, while Ganache manages the internal blockchain accessed through Metamask. To participate, users will need a certain amount of Ether, the cryptocurrency of Ethereum, to create an account with a wallet address. Writing transactions to the blockchain requires users to pay a fee known as gas. Once votes are cast, a network of miners completes the process by competing to finalize the transaction.

The miner who successfully completes the transaction is rewarded with Ether, which users have paid for their votes. In this system, Ganache software is employed for mining purposes instead of using traditional nodes.

Additionally, it is worth mentioning that the Ganache software provides a user-friendly interface and simplifies the mining process, making it more accessible to participants.

#### IV. METHODOLOGY

Our proposed model can be implemented using 64-bit hardware/machine running Windows 7 or later. The implementation requires specific dependencies and tools, including NPM (Node Package Manager), Truffle framework, Ganache, Metamask, and coding languages such as Solidity, HTML, JavaScript, and CSS.

**NPM:** NPM (Node Package Manager) is a command-line tool used for managing, installing, updating, and uninstalling Node.js packages in an application. It operates in two modes: local mode, which affects a particular directory of an application, and global mode, which affects all Node.js applications.

**Truffle:** The Truffle framework serves as a potent instrument for handling Ethereum-based smart contracts. It facilitates compilation, deployment, and linking of smart contracts, provides a testing platform for automated contracts, and manages networks and packages.

**Ganache:** Ganache, previously known as Testrpc, is a virtual blockchain that provides ten standard Ethereum addresses with preloaded private keys and simulated one hundred ether each. It operates without mining, automatically confirming every transaction. Ganache operates smoothly with various operating systems, including Windows, Linux, and macOS.

**Metamask:** Metamask is an open-source tool with a user-friendly graphical interface for conducting transactions in Ethereum. It allows running Ethereum DApps without requiring a complete Ethereum node on the system. Metamask acts as a bridge between the browser and the Ethereum blockchain.

**Solidity:** Solidity is a high-level programming language with JavaScript-style syntax specifically designed for writing smart contracts. It compiles the code into EVM (Ethereum Virtual Machine)-level instructions and supports data types such as Boolean, Integer, Address, and String.

#### Working:

The voter logs on to the voting website and logs in with the Chrome Extension of Metamask to connect to the local blockchain. After successful connection, the page is refreshed, displaying the candidates and current vote counts. The voter selects a candidate to vote for and clicks on the vote button. A Metamask pop-up appears, specifying the Ethereum transaction that needs to be made. Upon clicking the vote button, the vote is registered for the selected candidate, provided the voter has not already voted. If an attempt is made to vote again after already casting a vote, the transaction fails, and the additional vote is not counted.

In order to streamline the process, a local blockchain is set up using Ganache, and Metamask is tailored to communicate with it. The Truffle framework facilitates the transfer of smart contracts, written in Solidity, to this local blockchain. When an individual places a vote, Metamask enables the Ether transaction from one account to another. Every voter is given a distinctive Ethereum ID and private key, and an identical amount of Ether is allocated to all voter accounts. Once a vote is placed by a user, Ether is moved from their account to that of the candidate. All transactions get documented on the blockchain, granting voters the transparency to confirm their votes. If an attempt is made by a user to vote twice, the transaction fails due to the alteration in the Ether balance of the account. While other nodes perform the mining, Ganache takes care of the mining process on their behalf.

#### V. CONCLUSION

In the modern context, the concept of leveraging online voting techniques to expedite, streamline, and cut costs in the public election process is quite compelling. As an innovative advancement in voting systems, blockchain technology has proven to be more reliable and precise than its predecessors, given its safety, security, and efficiency in terms of both time and cost. In this research, the focus was on implementing electronic voting grounded in blockchain



technology and guided by smart contracts, which set the rules for how parties should interact and settle agreements. The execution involved the use of diverse technologies such as Ganache, the Truffle framework, NPM, and Metamask. Because blockchain technology is decentralised, it is quite possible to tamper with and change such systems. By enabling voters to connect to a system with an intuitive user interface, our suggested system offers convenience to voters by enabling them to cast their vote by importing their account information and to simply review their vote. As a result, voters gain greater assurance that their votes are being recorded and safeguarded securely. Despite being lauded as a solution to a multitude of problems, blockchain technology may indeed find its rightful place in the realm of electronic voting systems.

#### REFERENCES

- [1] Basit Shahzad and Jon Crowcroft. Trustworthy electronic voting using adjusted blockchain technology. *IEEE Access*, 7:24477–24488, 2019
- [2] Ashish Sharma, Chavikant, Takshi Singh, Tushar Aggarwal, Dhyanendra Jain, Prashant Singh; Blockchain based E-Voting System- 2021 International Conference on Advances in Computing, Communication Control and Networking (ICAC3N)
- [3] M. Ramalingam, D. Saranya, R. ShankarRam; An Efficient and Effective Blockchain-based Data Aggregation for Voting System- 2021 International Conference on System, Computation, Automation and Networking (ICSCAN)
- [4] Abhishek Parmar, Sagar Gada, Trunesh Loke, Yash Jain, Sujata Pathak, Sonali Patil; Secure E-Voting System using Blockchain technology and authentication via Face recognition and Mobile OTP -2021 12th International Conference on Computing Communication and Networking Technologies (ICCCNT)
- [5] Ali Mansour Al-madani, Ashok T. Gaikwad, Vivek Mahale, Zeyad A.T. Ahmed; Decentralized E-voting system based on Smart Contract by using Blockchain Technology 2020 International Conference on Smart Innovations in Design, Environment, Management, Planning and Computing (ICSIDEMPC)
- [6] Fábér D. Giraldo, Barbosa Milton C., Carlos E. Gamboa; Electronic Voting Using Blockchain And Smart Contracts: Proof Of Concept- 2022 4th International Conference on Advances in Computing, Communication Control and Networking (ICAC3N)
- [7] Umut Can Çabuk1, Eylül Adıgüzel2, Enis Karaarslan; A Survey on Feasibility and Suitability of Blockchain Techniques for the E-Voting Systems. *International Journal of Advanced Research in Computer and Communication Engineering* 2018
- [8] Aayushi Gupta, Jyotirmay Patel, Mansi Gupta, Harshit Gupta; Issues and Effectiveness of Blockchain Technology on Digital Voting. *International Journal of Engineering and Manufacturing Science*. ISSN 2249-3115 Vol. 7, No.1 2018
- [9] Pavel Tarasov and Hitesh Tewari; the Future of E-Voting. *IADIS International Journal on Computer Science and Information Systems* Vol.12, No. 2, pp. 148-165 I – 2018
- [10] Bin Yu, Joseph K. Liu, Amin Sakzad, Surya Nepal, Ron Steinfeld; Platform-independent secure blockchain-based voting system. *International Conference on Information Security*. Springer, Cham, 2018.
- [11] Scott Wolchok, Eric Wustrow J., Alex Halderman, Hari K. Prasad Arun Kankipati, Sai Krishna, Sakhamuri Vasavya Yagati; Security analysis of India's electronic voting machines. *Proceedings of the 17th ACM conference on Computer and communications security*. ACM, 2022



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