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E-VOTING SYSTEM USING BLOCK CHAIN

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ABSTRACT
The E-voting system using blockchain solves the major security issues found in the conventional and electronic voting processes. Through the use of distributed ledger technology, it makes sure that no individual has the capability to alter the records of votes. Every vote is cryptographically secured and attached to the last, forming an irreversible chain of information. This openness promotes voter and election authority trust, minimizing conflicts and maximizing the integrity of election results. Moreover, voting rules are automated and enforced by smart contracts, guaranteeing adherence and ruling out human mistake. The E-voting system on a blockchain platform solves crucial security challenges found in conventional and electronic voting systems. Through the use of distributed ledger technology, it guarantees that one entity cannot tamper with the records of votes. Every vote is encrypted and linked to the last, producing an unchangeable chain of data. The transparency creates a trusting environment among the voters and the electoral officials, minimizing controversies and increasing the reliability of the outcome of elections. Smart contracts also automate and apply voting rules, guaranteeing conformity and obviating human error. Blockchain technology expands voting to wider audiences, remote and overseas voters included. Combined with digital verification of identity, voters can now vote securely at any location from anywhere, avoiding logistical costs and issues with on-site voting apparatus. While blockchain-based E-voting systems show great promise, challenges such as voter education, technical infrastructure, and regulatory compliance need to be addressed for widespread adoption. Ensuring user-friendly interfaces and robust cybersecurity measures will be crucial for public acceptance. Future advancements in blockchain technology, such as improved consensus mechanisms and quantum-resistant cryptography, will further enhance the system's efficiency and security.

1.INTRODUCTION

The development of democratic procedures has left us with a never-ending quest to improve the mechanisms by which citizens exercise their right to vote. The last few years have witnessed a significant investigation into the area of electronic voting (e-voting) systems, which promise to simplify the electoral process while enhancing its security and accessibility. The shift to e-voting has, however, faced challenges, especially in relation to the physical security of electronic voting machines. Even with these obstacles, the charm of electronic voting is its ability to fight fraud, improve traceability, and provide the verifiability of election results. In this process, the voters actually mark their selections on paper ballots with their hands, usually a pen or pencil, and later drop them into sealed ballot boxes. These ballots are counted manually by polling station officials or at a centralized vote-counting facility. Although this approach has been extensively utilized for its ease and familiarity, it is vulnerable to problems of ballot tampering, human errors in counting, and logistical complications in managing massive amounts of paper ballots. Due to the necessities of contemporary democracy, our "E Voting System Using Blockchain" project comes forward as a pioneering effort that has the potential to transform the election scenario. By tapping into the revolutionizing power of blockchain technology, our initiative seeks to overcome the

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shortcomings of conventional e-voting systems, providing a secure, transparent, and decentralized forum for vote-casting and counting. Centrally, the application of blockchain technology embodies a shift in electoral procedure, with the potential to deliver unparalleled security, integrity, and trustworthiness. Through the use of the decentralized structure of blockchain networks, our system guarantees that every vote is recorded in a secure and immutable way, eliminating tampering, fraud, and unauthorized access. Additionally, our project includes advanced capabilities such as smart contracts, Ethereum, Ganache server, and integration with MetaMask to make the voting process more accessible and user-friendly. With these innovations, we strive to make the voting process simpler for users and still uphold the highest levels of security and transparency. As we set out to shape the future of electoral technology, our project is a testament to the unwavering dedication towards the ideals of democracy. With a pledge to maintaining the fundamental principles of accuracy, anonymity, scalability, and speed, we aim to empower citizens with a voting system that is not only efficient and trustworthy but also inclusive and reliable. Let us join hands in this revolutionary mission to reshape the future of democracy through the integration of technology and civic participat

2. LITERATURE SURVEY

The terrain of election systems has undergone a transformation towards digitalization, and there have been many proposals supporting the adoption of online voting systems.[1] presents an internet-based voting system where the voters can access a centralized server operated by the Election Commission of India to vote. The system is expected to save costs, time, and make the process of voting simpler. In the same vein, [2] emphasizes the need to shift conventional voting systems onto online platforms in order to curb malpractices and violations. They advocate for a system based on SQL server and Microsoft Azure cloud, with the key feature being the validation of voter IDs prior to registration. In turn, [3] suggests a web-based system aimed at conserving processing time, preventing human errors, and stopping tampering with votes. This system uses individual student registration IDs for voter authentication to ensure the integrity of voters and avoid proxy voting. [4] proposes an online voting system that can be accessed from anywhere, thereby increasing voter turnout. Authentication is performed through QR codes and OTPs to ensure that only authenticated voters can vote. Furthermore, [5] stresses the need for voter anonymity in online voting systems, with the necessity to maintain confidentiality and avoid any connection between voters and their votes. In the context of technological advancements, blockchain technology is seen as a promising solution to revolutionize conventional industries, such as online voting systems. [6] offers insights into blockchain's decentralized nature and its possible applications in different areas. With its decentralizing, transparency and tamper-evident record-keeping as its hallmark, blockchain technology can potentially bring online voting systems to a whole new level. Collectively, these literature entries reflect the call and need for movement towards online voting systems, together with a keen awareness of strong security requirements and privacy features. In addition, they point out the promise of blockchain technology in solving the issues and limitations of conventional voting systems, providing a decentralized and open alternative for the holding of elections. Through our college project, we seek to expand on these observations and make a contribution to the current discussion on the creation and deployment of secure, transparent, and inclusive online voting systems. Shah et al,[1]: This article gives an introduction to a Blockchain Enabled Online Voting System, which was being deliberated upon at the International Conference on Automation, Computing and Communication 2020 (ICACC-2020). The authors discuss a system using blockchain technology that allows secure and transparent online voting processes. The system intends to overcome the difficulties related to traditional voting systems through increased security and integrity in the electoral process. Ayed et al, [2]: In this international paper in the International Journal of Network Security and Applications, the author discusses the idea of e-voting systems based on blockchain technology. The researcher examines the security features and advantages of using blockchain for electronic voting. The paper offers insights on the design and implementation of secure e-voting systems. Tyagi et al,[3]: Authors present a Blockchain and Aadhaar based Electronic Voting System in this paper at the 2020 4th International Conference on Electronics, Communication and Aerospace Technology (ICECA). The paper investigates the application of blockchain technology and Aadhaar authentication to build a secure electronic voting system. It emphasizes how blockchain can be used to improve the transparency and security of the voting process.

3.PROBLEM STATEMENT

The implementation of internet voting systems brings with it a range of issues that need to be met for the sustainability of integrity and credibility in electoral processes.To begin with, transparency is critical in making each step of the voting process observable and comprehensible to stakeholders such as voters and election

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officials. In the absence of proper measures of transparency, there is a possibility of suspicion and distrust over the impartiality and precision of election results. Second, security comes first to fend off unauthorized entry, tampering, or voting and voter manipulation. Security holes in web voting systems threaten gravely the sanctity of polls and public belief in the voting process. The voters directly connect with the blockchain network through apps like Meta mask and Ganache in this computerized voting system. With secure authentication and cryptographic techniques, voters are able to vote remotely with assurance of the integrity and transparency of the process. This example shows the move towards using blockchain technology to make elections more secure, accessible, and efficient. Apart from transparency and security issues, other essential features of online voting systems are end-to-end verification, privacy, decentralization, efficiency, and immutability. End-to-end verification processes are required to confirm the integrity and accuracy of votes from casting through counting. Privacy protections need to be established to secure voter anonymity and avoid coercion or intimidation. Decentralization of voting systems ensures the spreading of control and minimizes manipulation risk. Efficiency features simplify the voting process to make it accessible and convenient for voters. Immutability guarantees that the votes will not be deleted or modified after being cast, maintaining the integrity of the voting record. Solutions to these issues are necessary in order to create online voting systems that promote transparency, security, and dependability in democratic voting.

4. PROPOSED SOLUTION

The suggested blockchain voting system modernizes the conventional voting procedure using the benefits of blockchain technology. With greater transparency, improved security, and enhanced accessibility, the system provides a secure and tamper proof voting experience. By using strong voter authentication, tabulating results automatically, and having an immutable record of votes, the proposed system provides effective and real time results. Also, the system can potentially lower costs incurred by conventional methods while establishing trust, accountability, and citizen participation in the electoral process. Keeping in mind the current technology, blockchain could develop one of the most major alternatives to existing voting in respect of security, uniformity and speed. As one is making a chain for voting in an overpopulated country, then the system needs to be safe. There should be many considerations to make the blockchain-based electoral system secure. Human is the first factor in such a system. In the solution, the interference of human is strictly avoided. The suggested system will be a closed system of nodes (computers as in design) to human intrusion. Any data which cannot be defined as vote will be dismissed in this system. Stealing votes or modifying votes are completely stopped for such a system. Second problem is protection of the system from hackers. Hackers should come inside the system as a citizen for manipulation of votes. Also, it is ensured that a citizen can vote only once. When citizen voted, e-government system will be notified without disclosing any information regarding vote. Then, e-government system marks the individual as voted. Because the system gets electorate data from e-government, it is impossible for a marked individual to vote again. Even if a hacker is acquired the citizen data and input to the system, he cannot vote twice. In a blockchain system, each transaction has a relation to the previous transaction. Therefore, it is impossible to modify an accepted transaction in such a system. Because of the consistency of the blockchain, data will be consistent at all times and voting will be trustworthy. In manipulation of the system like changing the vote or stealing votes, the other network nodes associated will be synchronized. So the manipulated data will get recognized in the snap time. The information regarding the system has been mentioned below after describing and providing a use case diagram about the system.Typical use case of election system is concerned about citizen vs government. Government in this framework merely offers the permission of employing a leveled architecture are discussed below in detail. Additionally, consensus of the system is met utilizing DPoS algorithms.

5. EXPERIMENTAL SETUP

Hardware: Graphics Processing Interface, 8 GB RAM, Graphic (Card Minimum 2GB), Storage,

Software: Blockchain Frameworks, Operating system Windows, HTML, CSS, Json, React js for Frontend Solidity for Backend, Web Browser (Google Chrome, Microsoft Edge, Mozilla Firefox) we look at current electronic voting systems, both blockchain-based and non- blockchain-based, evaluate their respective suitability for the implementation of a national e-voting system.According to this, we designed a blockchain-based electronic voting system, optimizing for the identified requirements and considerations.In the next subsection, we begin by defining the roles and component for executing an e- voting smart contract and then we compare various

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blockchain frameworks that can be utilized to realize and deploy the election smart contracts. In the final subsection, we discuss the design and architecture of the proposed system

6. APPLICATIONS AND FUTURE SCOPE

Although our project has set the foundation for the application of blockchain in e-voting, there remains a significant amount of room for research and development in this area.Possible avenues for future work include: Scalability: Increasing the scalability of blockchain networks to facilitate mass-scale e-voting activities involving millions of users.Privacy: Deploying sophisticated cryptographic methods to protect voters' confidentiality while preserving the integrity and openness of the voting process Accessibility. Creating simple, intuitive interfaces and mobile apps to provide e-voting for more people, including people with disabilities or limited technical access. Regulatory Framework: Collaborating with policymakers and legal experts to establish a regulatory framework for e-voting that addresses legal, ethical, and governance issues. Resistance of Political Leaders: Central government, including election commissions and government departments, will be diverted from conducting elections using blockchain-based electronic voting. Therefore, political figures who have benefited from the current election system are bound to resist the technology since blockchain will give social resistance power through decentralized autonomous organizations Testing and Validation: Implementing rigorous testing and validation of e-voting systems to find and correct potential vulnerabilities and ascertain their reliability and security in real-life situations. Voter Education and Awareness: Initiating awareness programs and education to make voters aware of the advantages and significance of e-voting and establishing faith in the technology. .Transactional Privacy: Transactional anonymity and privacy are challenging to achieve in blockchain technology. Yet, transactional secrecy and anonymity are a necessity in an election system because of the existence of the transactions involved. For this, a third-party authority needed but not centralized, this third-party authority must check and balance on privacy.

7. CONCLUSIONS

In summary, the use of e-voting through blockchain technology has many benefits over conventional voting systems. Through the use of the immutability, transparency, and security properties of blockchain, e-voting can solve most of the problems of conventional voting systems, including fraud, manipulation, and logistical problems.We have proven the viability and potential of e-voting on a blockchain platform through our project.We have established a safe and secure voting system that maintains the integrity of the voting process while offering voters ease and accessibility. With votes being stored on a distributed ledger, we have abolished the possibility of tampering and given voters a verifiable record of their votes. In addition, our project has underlined the significance of cooperation between policy makers, experts in technology, and electoral commissions in establishing e-voting systems. Concerns about security, privacy, accessibility, and inclusion need to be addressed in order to achieve success and approval for e-voting programs.

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