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Blockchain Based Voting System

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Abstract: The increasing use of technology in modern democracy brings new challenges as people lose trust in their governments. Elections play a crucial role in determining the fate of nations, but flawed electoral systems and concerns such as vote rigging and hacking persist. Blockchain technology offers a decentralized and distributed solution to enhance various industries. By expanding e-voting into blockchain, current concerns can be eliminated, ensuring safer, more secure, and transparent voting systems. Smart contracts integrated into the blockchain provide the necessary logic for developing such systems. Ethereum, with its widespread use and smart contract capabilities, emerges as a suitable platform. Our project implements and tests an e-voting application as a smart contract on the Ethereum network using Solidity language.

Keywords: Blockchain, Voting, Cryptography, API

I. INTRODUCTION

Elections play a crucial role in democracy, but the lack of trust in the electoral system is a major concern. Flawed systems and issues like vote rigging, EVM hacking, and election manipulation persist in major democracies like India, the United States, and Japan. This project proposes an online-voting system using the Ethereum blockchain to ensure security, privacy, and tamper-proof voting. Voters receive authenticated personal IDs and cast their votes anonymously through token transfers.

The blockchain preserves anonymity while allowing public inspection. This cost-effective and stable system aims to enhance electoral integrity and voter participation. Electronic voting systems using decentralized networks can overcome issues associated with a central authority and offer legitimacy, accuracy, and convenience. Blockchain technology provides end-to-end verification benefits, making it suitable for electronic voting systems.

II. PROBLEM STATEMENT

In democracies around the world, voting is considered a fundamental process for the citizens of a country to have a say in the people who represent them or an issue that impacts them. In days after American independence, voting usually took place via viva voce, or by voice vote. Later on in 1634, Massachusetts became the first state to elect its governor using paper ballots.

For many years, democracies around the world stayed with paper ballots and later moved on to electronic voting machines. Despite system checks, safeguard procedures, and election protocols, these machines are not tampered proof. The critics believe that the proprietary code by which the electronic voting machines operate are secret and can be manipulated. As a result, governments around the world have been exploring blockchain as a medium to make the general elections tamper proof and transparent. A system where everyone trusts the data as it is since counterfeit is not possible.

III. MODEL IMPLEMENTATION

Implementation of electronic voting:
Solution:
In comparison to the conventional voting methods, e-voting has enhanced both the efficiency and the integrity of the process. Because of its flexibility, simplicity of use, and cheap cost compared to general elections, electronic voting is widely utilised in various decisions.

Despite this, existing electronic voting methods run the danger of over-authority and manipulated details, limiting fundamental fairness, privacy, secrecy, anonymity, and transparency in the voting process. Since the e-voting procedures are centralised, licensed by the critical authority, controlled, measured, and monitored in an electronic voting system, is a problem itself for a transparent voting process. Recent controversies in modern democracies such as USA and India amplify the argument.

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It is essential to ensure that assurance in voting does not diminish. In this project we will try to leverage blockchain to fix shortcomings in today's method in elections and make the polling mechanism clear and accessible, stop illegal voting, strengthen the data protection, and transparent outcome of the polling process. Because of the distributed structure of the blockchain, a smart contract based electronic voting system reduces the risks involved with electronic voting and allows for a tamper-proof for the voting system.

Requirements

1. Aadhar card as user unique identification.
2. Smart Contract consisting of all the rules and protocols required for e-voting.
3. Blockchain Network to deploy the Contract.
4. Website for user Interface where voter can vote. We have created webpage with React & Native Base.

Assumptions:

1. Digital print of the Voters (Aadhar card) containing all the info with voting eligibility data like age, state, district and constituency codes, Indian Penal Code information etc updated by Govt. of India.
2. Eligible voters must register themselves in the constituency where they live, upon which Govt. will update all the info to Aadhar card. Individuals are not permitted to participate in the electoral process if they have not registered or do not possess an Aadhar card.
3. Only Election Chief can start/update Voting timelines.
4. One nation one election

Hardware & Software

Software Requirements
Technology/ Other Tools used:

1. Front-End: ReactJS, HTML, CSS, JavaScript
2. Back-End: Solidity, Web3, Ethereum, Firebase, NodeJS, ExpressJS, Ganache, Truffle, GitHub, Solidity
3. OS: Windows 10
4. Platform: Ethereum
5. Tools: Visual Studio, Remis IDE
6. Server: Localhost
7. TestNet: node.js
8. Libraries: Web3.0, React.Js

Hardware Requirements

1. Processor: Intel Quad core 1.7 GHZ Processor or above.
2. HD: Minimum 10 GB of HD.
3. RAM: Minimum 8 GB of RAM.

IV. CONCLUSION

The concept of integrating online voting systems to make the public election process more affordable, efficient, and convenient is highly compelling in today's society. By making the electoral process cheaper and faster, it becomes normalized in the eyes of the voters, removes certain barriers between the electorate and elected officials, and adds pressure on elected officials to be accountable. Moreover, it paves the way for a more transparent form of democracy, where voters can express their opinions on specific bills and initiatives. In this project, we have implemented an online-based blockchain voting framework that utilizes smart contracts to ensure secure and cost-effective elections while preserving voter confidentiality. Our research demonstrates that blockchain technology offers a new opportunity for democratic nations to transition from traditional pen-and-paper or paperless direct-recording electronic voting methods to a more efficient and cost-effective approach, while enhancing the security measures of the existing systems and providing greater accessibility.

This paper explores the potential of blockchain technology and its applicability in the e-voting domain. The blockchain is designed to be publicly verifiable and distributed in a way that prevents corruption. Adapting digital voting systems to create a more affordable, faster, and easier public electoral process is a compelling concept in modern society. By making the electoral process cost-effective and efficient, it becomes normalized in the eyes of the voters, eliminates certain power barriers between voters and officials, and adds a level of accountability for the officials. It also opens up possibilities for a more direct form of democracy, enabling voters to express their preferences on individual bills and propositions.

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