Decentralized Voting System Using Blockchain Technology

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Abstract – Blockchain verifies security using a distributed mechanism. For several new and developing products and services, blockchain technology is touted as a game-changer. Providing a distributed architecture to manage and sustain an open voting system would be the aim of such a plan. A system called blockchain stores data in a way that makes it difficult or almost impossible to make changes to it. The sharing economy may be benefited by a very wide variety of applications made possible by blockchain technology. That will be used to quantify how blockchain technology may be used to facilitate distributed electronic voting. The suggested solution implements a voting mechanism using the Aadhar API on an Ethereum network on a blockchain platform. Electronic voting is expected to promote openness, and voters are required to lessen dishonesty and irregularities in the voting procedures. Voters will be able to cast their ballots from home by using this technology. The technology seeks to improve voting process transparency and strengthen fraud prevention by supplanting the conventional pen and paper method.

Key Words: Blockchain, Distributed General Ledger, Ethereum, Smart Contracts, P2P network, Consensus Algorithm, PoW Algorithm, Cryptography, Voter Privacy, Trustless Environment, Electrical integrity.

1.INTRODUCTION

Blockchain-based voting systems function according to the security, transparency, and immutability features of the technology. Voters who meet the requirements are first given a distinct digital identity on the blockchain that secures their personal data cryptographically. Voters use this digital identity to authenticate themselves when they want to cast a ballot, usually by using a private key or biometric verification. The ballot for the election is generated as a blockchain-based smart contract that includes the list of candidates or voting alternatives. Voting is encrypted and recorded on the blockchain as a transaction by the voter. Crucially, the voter's identity is kept private, guaranteeing the privacy of their vote. By verifying and appending new transaction blocks, the blockchain's consensus process improves security and forbids tampering. Voting as they do, they are counted automatically by several nodes in the decentralised network. By eliminating single points of failure, this distributed method improves security. The outcomes are easily accessible on the blockchain following the voting period's completion, enabling third-party verification. Votes cannot be changed after they are recorded thanks to the blockchain's immutability, making the record reliable for audits or future reference. While issues like regulatory compliance and identification verification need to be addressed. There are several benefits to a voting system built on blockchain, including increased security, transparency, and electrical process efficiency. In the proposed Digital Voting System, voters may cast their ballots via smart devices. Voters without smartphones are still able to cast their ballots at a designated polling place.

2. PROPOSED METHODOLOGY

Rect.js and Node.js will be used by the proposed system to create the election system's front end, a solidity smart contract. We will be using Firebase's PhoneAuth Api to simulate the Aadhar number verification process in order to authenticate a specific user. Prior to using the website, the user must register. The user will then be able to cast a vote after visiting the voting page and entering the OTP. Following their vote, the user will receive a prompt indicating that their vote was successfully cast. After casting a vote, the user can finally log out.

2.1 ETHEREUM AND SMART CONTRACT

A blockchain is an ongoing ledger with several blocks connecting it. Mining is the process of examining hundreds to thousands of transactions every block that are bundled and sent to the end of the main chain after being validated by miners on the blockchain network.

Miners can validate transactions and package them for transport to the end of the main chain by using a consensus technique called mining. Every block has a hash value from the preceding block, thus once it is formed, it is difficult to tamper with the internal information. Any member of a blockchain network can inquire about or confirm the details of transactions to guarantee nonrepudiation because the ledger is kept open and visible to all. Ethereum has enhanced the architecture of Bitcoin and resolved the issue of its restricted flexibility. The primary feature of Ethereum is the SC, which lets users run programmes on a private chain. Ethereum is a platform whose application is a SC that has enhanced the architecture of Bitcoin.

High level languages like Serpent or Solidity are used to programme SCs. They can increase operating speeds and efficiency and lessen the workload associated with processing insurance claims and salary payments by reacting and processing outside communications according to prewritten programme logic. The primary technology used by SCs is blockchain, and all information on the SC is transparent and available to the public. Confidential information ought to be encrypted outside of the contract before being incorporated if it must be included in the SC. Ethereum also creates the contract's address, which allows a user to send messages to and receive messages from the contract.

2.2 SYSTEM ARCHITECTURE

The registration procedure is the initial stage of our design; confirming a voter's identity is crucial to building system security. Verifying that someone's identity is not being used fraudulently is crucial, particularly when voting is involved because every vote counts. Our proposed service allows users to register to vote by using recognition devices and a valid identification card number to cross-check if the user is entitled to vote and is present in the database. After that, the voter receives a special hash address to use to cast a ballot. Every hash receives ethers, enabling him to cast one vote. When the voter visits the polls on election day, he or she will first go through a verification procedure. After casting a ballot using the provided address, the voter will instantly log

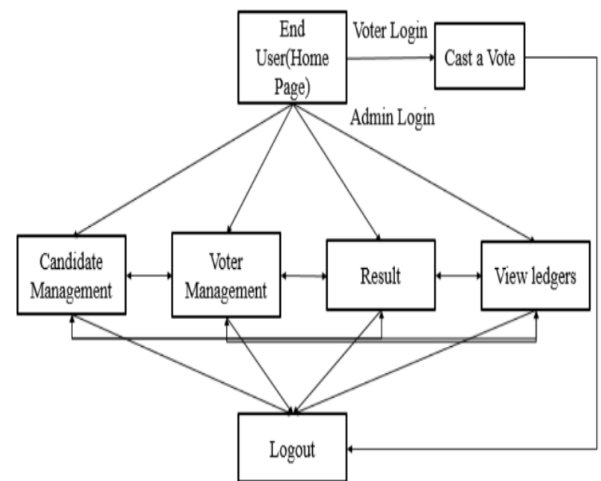out. Voters will also receive real-time voting status updates.

Figure -1: System Architecture

The implementation of the entire system is divided into two sub-system a registration system and a voting system.

REGISTRATION SYSTEM:

A voting registration system is built with an HTML/CSS front-end and a SQL back-end that already stores the user's personal information, such as an Aadhar database.

VOTING SYSTEM:

One way to think about the voting system is as an EVM substitute. With a blockchain back end and an HTML or Bootstrap front end, it is a decentralised application. The smart contract is written in Solidity. The candidate's name and symbol appear in the smart contract. The voting system's whole functionality is included in a smart contract. People who are registered to vote in their local election district and who possess the right to vote are known as voters. A current list of registered voters is maintained by the Election Commission.

2.3 MATEREIAL RECQUIRED

- Software Requirements

Operating System	Windows 7
Programming Language	Solidity, HTML, Bootstrap
Database	MySQL

- Hardware Requirements

Processor	3.5 GHz Intel
HDD	1TB
RAM	8 GB

3. FUTURE SCOPE

Elections in schools and universities may also be conducted using this technology, in addition to trade. As an alternative to human polling, blockchain technology provides a decentralised node for electronic or online voting, increasing election dependability. Furthermore, supply chain management, cryptocurrencies, voting systems, and smart contracts are only a few uses for it. We are able to build secure, decentralised systems that are impervious to fraud and manipulation with these. We plan to keep refining our technology and investigating its potential in the future. Some implementations, however, continue to function with our system. Developing a more sophisticated and effective electronic voting system is our primary objective through the use of blockchain technology and related variable tools..

LITERATURE OF REVIEW

Paper Title and its Author Details of the Publication Findings:

1. Survey on Voting System using Blockchain technology

Authors : Mayur Shirsath, Mohit Zade, Ritesh kumar Talke, Praful Wake, Maya P. Shelke Published on IJSREM, July 2023 in which they finds Blockchain servers as a ledger that allows transactions to take a place in a decentralized manner.

2. A Comparitive analysis on e- voting system using blockchain

Authors : Kanika Garg, Pavi Saraswat, Sachin Bisht, Sahil KR Aggarwal, Sai Krishna Kothuri. Has published in IEEE, 2019.In which they find that the the public's attention is shifting towards a simple, safe, and anonymous voting procedure through the use of a decentralised system. When using electronic voting, we must deal with well-known issues of fraud and maintenance.

3. Decentralized E-Voting system based on Smart Contract by using Blockchain Technology

Authors : Ali Mansour, Ashok T Gaikwad, Vivek Mahale, Zeyad AT Ahmed has published on IEEE, 2020. In which they finds that it provide an E-voting system with high security by using blockchain. Blockchain offers a decentralised architecture that enhances the network's flexibility, safety, dependability, and capacity to accommodate real-time services.

4. Distributed E-Voting and E-Bidding Systems Based on Smart Contract

Author: Raylin Tso, Zi-Yuan Liu and Jen-Ho Hsiao has published in Electronics, 2019. In order to create a distributed electronic voting system that allows voters to take part in the invoicing phase and increases election efficiency, this work integrates a SC with privacy-protection encryption. Voter ballot data must be absolutely private before the billing phase starts as all information on the blockchain is publicly accessible and open.

CONCLUSION

In this project, we implemented an electronic voting system built on the blockchain that makes use of smart contracts to ensure voter privacy while facilitating safe and economical elections. Election security and integrity may now be ensured by a new way of overcoming the drawbacks and adoption hurdles of electronic voting systems: blockchain technology. By exploiting every feature of the smart contract, hundreds of transactions may be sent into the blockchain each second using an Ethereum private blockchain, reducing the burden on the network. In order to facilitate voting for both voters and the election committee, an online application that allows for the seamless and secure conduct of a college election has been built. In the future, this project may be expanded to integrate the genuine Aadhar API, offering a greater degree of validity. To offer an example for a college election, a feature that shows voters just candidates from the IT department may be included. This feature would allow voters to see various candidates depending on their voting district. By utilising an electronic device, the user can cast his valuable vote from the comfort of his home, ensuring that the election receives the maximum number of votes from eligible voters. This allows the majority of the population to choose their leader and ultimately determine their own fate.

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REFERENCES

[1] Author "Albin Benny", "Aparna Ashok Kumar", "Abdul Basai", "Betina Cherian" and "Amol Kharat' written in July 11, 2020 for Blockchain based E-Voting System from University of Mumbai, Pillai college of Engineering.

[2] "International Journal of Scientific Research in Science and Technology" in May 2020 has published by "Prof. Mrunal Pathak", "Amol Suradkar", "Ajinkya Kadam" and "Akansha Ghodeswar".

[3] Prof. Anita A, Junaid Patel, Talif Pathan and Prathmesh Potdar on "ITM Web of Conference 32 in 2020".

[4] Author "Syda Tasmia Alvi", "Mohammed Nasir Uddin", "Linta Islam" and "Sajib Ahamed" in Journal of King Saudi University on 14 october, 2021 to ensure the security of digital voting system.

[5] Author "Aanchal Mani", "Samarjeet Patil", "Sohan Sheth" and "Lakshmi Sudha Kondeka" from department of Information Technology, SIES Graduate school of Technology, Nerul Navi Mumbai published on ITM Web of conference in 2022 for project College Election System Using Blockchain Technology.

[6] Article " Distributed E-Voting and E-Bidding System based on Smart Contract" has published on 11 April, 2019 in MDPI whose Authors is "Raylin Tso", "Zi-Yuan Liu", and "Jen-Ho Hsiao".