TRANSPARENT VOTING SYSTEM USING BLOCKCHAIN

Dr.N.Pughazendi
Professor
Department Of Computer Science and Engineering
Panimalar Engineering College
pughazendi@gmail.com

Anitha Moses V
Professor
Department Of Computer Science and Engineering
Panimalar Engineering College
annemoses2020@gmail.com

Sudharsan R, Yoganandan S, Vimal M
Department Of Computer Science and Engineering
Panimalar Engineering College
sudharsanrajasekaran@gmail.com smyoga3145@gmail.com vimalnavee2110@gmail.com

***Abstract*—The aim of this paper is to create a decentralized transparent voting and analysis system that can be implemented with blockchain to provide an efficient and highly secure justifiable method of election systems in countries where traditional physical voting with gameable securities is used, increasing the chances of rigged elections. This system is designed to focus on a secure voting system, lower costs, faster wait times, no disparities due to various erroneous proxies, high scalability, and geographic independence. Overall, an effective election mechanism to strengthen the democratic process. The proposed dApp allows voters to vote from the comfort of their own homes, saving time and reducing the number of false votes registered.**

Keywords: Blockchain-dApp-Smart contract

I. INTRODUCTION

Many elections conducted on electronic voting machines are hand-counted, and many jurisdictions that use lever voting machines tally absentee ballots by hand. Because these devices are not meant to endure a long time, they must be serviced on a regular basis by only trained mechanics. Apart from equipment maintenance issues, there has also been a problem with only a small fraction of individuals voting. For verification, most present E-voting applications rely on government-issued information, which is not the most effective means of authentication. Because when we have to store large amount of sensitive information in the local database, it is difficult to keep it secure. There is also the possibility of casting multiple ballots. To address these issues, the suggested solution includes a decentralized database and a smart contract, which allow voters avoid casting duplicate ballots.

II. LITERATURE SURVEY

Azaria, Asaph, Ariel Ekblaw, Thiago Vieira, and Andrew Lippman[1], 2016 This paper they have used the technique but for different use case which we have taken it as an inspiration for us all on the momentum for the development of the p2p based voting decentralized system.

E-Voting Systems using Blockchain[2], 2020 E-Voting or electronic voting is a means for the election process to be conducted without the use of traditional paper ballots. The e-voting process, to be implemented in a large-scale scenario, requires the addressing of concerns concerning the security and reliability of such a system. The Blockchain technology, introduced by Satoshi Nakamoto using the cryptographic currency Bitcoin in 2008, opens up possibilities of designing and developing a secure, transparent and decentralized system with the absence of a third party for access and control, in the election procedure of casting and counting of votes.

Guo, Ye, and Chen Liang[3], 2016 In this system election is represented by a set of smart contracts, which are instantiated on the blockchain by the election administrators. A smart contract for election is created and deployed on the blockchain network

for every voting district. Freya Sheer Hardwick, Apostolos Gioulis, Raja Naeem Akram, and Konstantinos Markantonakis, "E-Voting with Blockchain" An E-Voting Protocol with Decentralization and Voter Privacy".
In this system commercial protocol like Bit congress, Follow My Vote, TIVI are used as e-voting protocol. Haibo Yi, "Securing e-voting based on blockchain in P2P network".

Ikhsan Darmawan[4], 2021 Although the number of countries that have adopted e-voting has decreased lately, the number of academic publications on e-voting adoption has increased in the last two years. To date, there is no coherent narrative in the existing literature that explains the progress of the research on e-voting adoption. This article aims to answer the following research question: "How has research on the topic of e-voting adoption progressed over the last 15 years?" The article provides a semi-systematic review of 78 studies that were conducted from 2005 to 2020.

Nakamoto Satoshi[5], 2014 Complete idea of what blockchain is and how it works as a whole, this legacy is developed by Satoshi Nakamoto Indonesia has held simultaneous general elections to elect the President/Vice President and legislative members on April 17, 2019. However, there were at least 4 (four) important problems raised in this election i.e., the problem of logistics distribution, the duration of the ballot counting that is too long, the inconsistent regulation of vote counting, and the error in votes recapitulation. Blockchain technology can be a solution to deal with those problems.

Nicole J. Goodman; Jon H. Pammett[6], 2014 Internet voting developments in Canada are growing quickly, with activity focused in local elections, political party leadership votes and unions. In some instances, the federal structure of the Canadian state facilitates Internet voting use, while in others it inhibits it. The result of this system of divided jurisdiction is that Internet voting use in Canada resembles a patchwork, showing strong concentration in some areas and no penetration in other places.

Rafer Cooley; Shaya Wolf; Mike Borowczak[7], 2018 Students at the University of Wyoming designed two blockchain-based voting systems during a class offered only once at the University. The first system (re-use) branched Ethereum to leverage its security and privacy benefits. The second system (re-invent) created a new blockchain voting system which used two separate chains, one for validating voters and another for securing votes.

R.S. Yashank[8], 2020 E-Voting or electronic voting is a modern alternative for the traditional voting system involving paper ballots. For the large-scale implementation of electronic voting, the design of the proposed system has to support reliability as well as security. A secure, transparent and decentralized e-voting system is proposed using the HyperledgerSawtoothblockchain framework. Restricted access of the system through election polling stations allows voters to cast their votes, which are recorded in the immutable blockchain state.

Yaqoob, E. Ahmed, I. A. T. Hashem, A. I. A. Ahmed, A. Gani, M. Imran[9], 2017 Recent years have witnessed tremendous growth in the number of smart devices, wireless technologies, and sensors. In the foreseeable future, it is expected that trillions of devices will be connected to the Internet. Thus, to accommodate such a voluminous number of devices, scalable, flexible, interoperable, energy-efficient, and secure network architectures are required.

Blockchain,
Distributing key functions across several entities - so-called trustees - is a popular technique to protect the security of voting schemes. While election authorities undertake therole of trustees in most election settings, elections in small groups, such as board elections, can be designed so that all voters are also trustees. This is the best scenario for an election because trust is distributed widely. The voters have trustees thanks to our secure network. This procedure would be great for blockchain, which is a distributed ledger technology. The blockchain network can be permissionless, like Bitcoin or Ethereum, where anybody can interact with it, or permissioned, like Hyperledger Fabric, Hyperledger Sawtooth, or Exonum, where only known members can engage with it.

Another significant issue to overcome is the voter's anonymity. This data is vulnerable to discovery and manipulation as a result of increased research and innovation in the field of big data analytics. One- time

ring signatures and homomorphic encryption can be used to solve this problem. The term "blockchain" refers to a network of interconnected nodes that each have a copy of the distributed ledger that stores the history of all transactions. Mining is the process of processing data and storing it in a block. Every block contains a hash of the previous block, forming a chain of blocks, with the genesis block being the first. As a result, ittakes the shape of a linked list. A number of ledgers on the blockchain can only be appended to, not destroyed or tampered with. As a result, it is unchangeable. Anyone can read or write data onto a blockchain, or it might be private (permissioned), in which case only a few select individuals can view or write data.

III.PROPOSED SYSTEM

The suggested system features a secure blockchain architecture, as well as well-protected security layers ensuring that data is safe from all threats. In the proposed system, the authentication phase will be predefined, and the voting and result phases will be run simultaneously, allowing the proposed system to realize the main notion of openly showing live results to each and every voter and prevent people from voting twice. The web application in the proposed system is also built utilizing the React8 framework, which makes the system scalable. It is also efficient in terms of loading speed and performance because of the usage of React JS.

Disadvantage of Existing System,

The current system lacks a secure blockchain architecture, and existing E-voting applications rely on government-issued data, which isn't the most reliable method of authentication. And also, for an election process to take place, the existing blockchain voting system comprises three phases: authentication, voting, and counting. Where several user's authentication and voting can be done in concurrently, and the counting phase begins only after the voting phase is completed.

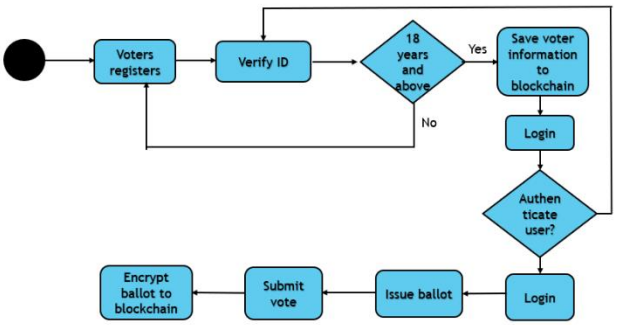

Fig:1 Proposed system flow chart

IV.METHODOLIGES

Ethereum blockchain,

Here we use Ethereum blockchain which comes under public blockchain where we can create dApps (Decentralized Application)

A blockchain is a distributed database that is shared among the nodes of a computer network. As a database, a blockchain stores information electronically in digital format. Blockchains are best known for their crucial role in cryptocurrency systems, such as Bitcoin, for maintaining a secure and decentralized record of transactions. The innovation with a blockchain is that it guarantees the fidelity and security of a record of data and generates trust without the need for a trusted third party. Ethereum is a platform powered by blockchain technology that is best known for its native cryptocurrency, called Ether, or ETH, or simply Ethereum. The distributed nature of blockchain technology is what makes the Ethereum platform secure, and that security enables ETH to accrue value. The Ethereum platform supports Ether in addition to a network of decentralized apps, otherwise known as dApps. Smart contracts, which originated on the Ethereum platform, are a central component of how the platform operates.

Smart contract,

Here we use Smart Contract, Smart Contracts refer to computer protocols that digitally facilitate the verification, control, or execution of an agreement. Smart contracts run on the blockchain platform, which will process all the transactions in a contract; hence, middle men are not required for executing the transactions. This is written using Solidity (Programming language). Following are the reasons to consider this algorithm. Open Access - Anyone in the

Network can access and cast their vote. Security - As we use Ethereum Blockchain technology each and every action(transaction) will be stored in the network in a secured way(hashing). Anonymity - One can participate without revealing his identity. Here each and every one will be represented using an address. Accuracy - Using smart contracts results in the elimination of errors that occur due to manual filling of numerous forms. Verified Transactions - Transactions will be verified and validated by the network.

V.SYSTEM ARCHITECTURE

The diagram below illustrates the various entities that have been integrated into the system. It brieflyoutlines how the proposed system's complete voting process will work, from the administrator initiating a fresh ballot for election through numerous voters casting their votes. It also depicts their interrelationships and includes a series of decision-making procedures and steps. This graphic also explains functional correspondences.

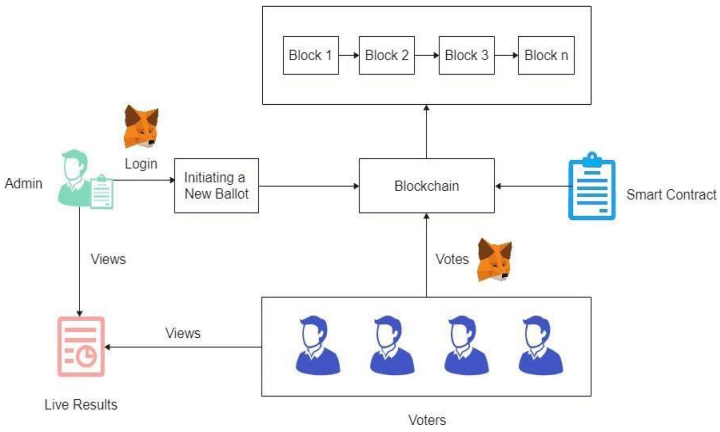

Fig:2 Transparent Voting System Architecture

The modules involved are

1) Login
2) Initiating a new ballot
3) Voting process
4) Live results

Unlike traditional web2 applications where the user logs in to their account using a username and a password, web3 applications use wallets to connect to a user account. The public key of an account uniquely identifies the user whereas the private key is used for authorization. However, with the proposed voting dApp, voters can log in with meta mask wallet, which is available as a browser plugin, and connect the app to an account directly from the wallet. Only admin can start a new ballot by specifying the information regarding the ballot and by authorizing the transaction using the wallet. The transaction is sent to the blockchain network and upon success is appended to the ledger permanently. The ballot creator has to add a list of addresses (public address of user accounts) that are eligible to vote. A user who is eligible to vote can connect their accounts in a similar manner using metamask. The ballot results are available to both administrators and voters at any time.

Fig:3 Restriction of multiple votes from same voter ID

VII.RESULTS

The outcome indicates how blockchain technology can be utilized to remotely conduct elections. We investigate the role of blockchain technology in the smart contract of a transparent voting system. For an election process to take place, the existing blockchain voting system comprises three phases: authentication, voting, and counting. Where several user's authentication and voting can be done in concurrently, and the counting phase begins after the voting phase is completed. In the proposed system, the authentication phase will be predefined, and the voting and result phases will be run simultaneously, allowing the proposed system to realize the main notion of openly showing live results to each and every voter. This allows individuals to choose their preferred leader. The contrast between the present and proposed systems is shown in the following figures.

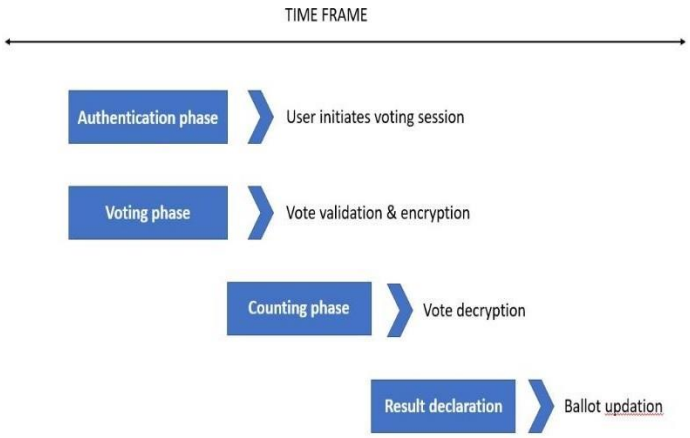

Fig:4 Working of existing system based on time frame

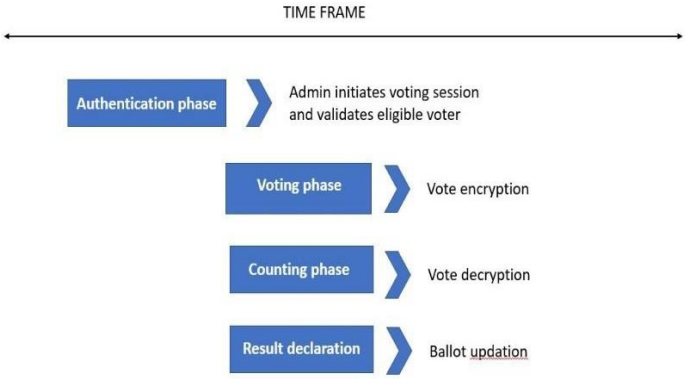

Fig:5 Working of proposed system based on time frame

VIII.CONCLUSION

The system is implemented using blockchain and a smart contract as a decentralized voting system. The system will employ candidate or voter information in the voting process. Smart contracts will be used to manage the voting methods and outcomes. This strategy also increases the efficiency of the validation and voting assignment phases. The main goal is to use blockchain technology and its associated variable tools to provide a more efficient and complete method to achieving Transparent Voting System.

Fig:6 voter's page at the end of polling

The image above depicts how the page will look after the voting time has ended. Following then, no one will be allowed to vote.

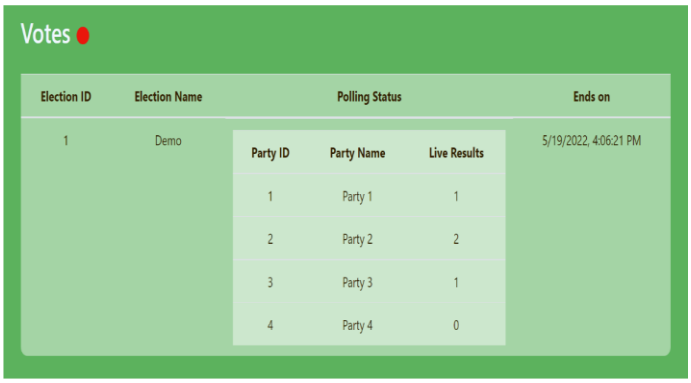

Fig:7 Admin's final results page

The figure above depicts the realtime results that admin can see. Every vote cast by a voter is simultaneously displayed on his screen.

IX. FUTURE ENHANCEMENT

Integration of the Machine Learning concept by adding a facial recognition system is one of the project's planned developments. Face recognition would be a great addition because it improves security and prevents duplicate and forged votes. The application can additionally contain two- factor authentication; this way, even if the voters' credentials are lost, the use of two-factor authentication will prevent proxy votes from being cast.

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