ENSURING PRIVACY AND TRANSPARENCY IN E-VOTING: LEVERAGING BLOCKCHAIN FOR SECURE ELECTIONS

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ABSTRACT

Certain voting methods have persisted since then. Around the globe, paper ballots are the most often used format. Only in the last ten years have electronic voting techniques gained popularity, and they remain unresolved. The primary issues with e-voting systems are those of security, legitimacy, openness, dependability, and usefulness. Estonia is the leader in this area and might be regarded as the cutting edge. However, there aren't many blockchain-based alternatives. In addition to offering solutions for all of the aforementioned issues, blockchain also has certain benefits like decentralisation and immutability. The primary issues with blockchain-based e-voting solutions are their narrow focus or the absence of testing and comparison. We provide a blockchain-based electronic voting infrastructure in this article that may be used for any kind of vote. Blockchain makes full use of it, and all procedures may be completed within of it. The platform functions as a completely decentralised and autonomous voting platform after the voting process has begun, with no way to influence it. Although the data are completely open, homomorphic encryption protects voters' identities. We have used three distinct blockchains to test and compare our approach. The findings demonstrate that, except from a little speed difference, both public and private blockchains may be utilised. Our solution's primary innovation is the completely decentralised administration of the electronic voting platform via blockchain, which ensures transparency throughout the whole process while also protecting voters' privacy and security using homomorphic encryption.

I.INTRODUCTION

TThe field of electronic voting systems is still in its infancy. We selected this domain not just because it is new but also because there aren't many solutions available to deal with e-voting-related issues. Popularity is rising these days for the advancement of e-Government as well. But until key citizen services like elections are made computerised, such a system is not practical. "E-voting is one of the key public sectors that can be transformed by blockchain technology" . Electronic voting brings with it new difficulties that must be resolved. Among them is the security of the elections, which must be at least as secure as the traditional paper ballot voting methods. For this reason, we have made the decision to hold secure elections where voters won't have to worry about electoral system abuse. Blockchain technology has gained a lot of attention recently as an example of secure internet technology. Blockchain is used by our electronic voting system to oversee all election procedures. The primary benefit of this approach is that it eliminates the need for trust in the centralised body that established the elections. In our system, this authority has no bearing on the outcome of elections. The lack of transparency in the way the system operates is another difficulty for e-voting, which undermines voter trust. Blockchain technology provides a completely transparent solution to this issue, making it possible for everyone to see stored data as well as related operations like data handling. This solution is much more suited than the traditional blockchain-less electronic voting platform in terms of security.

1.1 OBJECTIVE:

Certain voting methods have persisted since then. Around the globe, paper ballots are the most often

used format. Only in the last ten years have electronic voting techniques gained popularity, and they remain unresolved. The primary issues with e-voting systems are those of security, legitimacy, openness, dependability, and usefulness. Estonia is the leader in this area and might be regarded as the cutting edge. However, there aren't many blockchain-based alternatives. In addition to offering solutions for all of the aforementioned issues, blockchain also has certain benefits like decentralisation and immutability. The primary issues with blockchain-based e-voting solutions are their narrow focus or the absence of testing and comparison. We provide a blockchain-based electronic voting infrastructure in this article that may be used for any kind of vote. Blockchain makes full use of it, and all procedures may be completed within of it. The platform functions as a completely decentralised and autonomous voting platform after the voting process has begun, with no way to influence it. Although the data are completely open, homomorphic encryption protects voters' identities. We have used three distinct blockchains to test and compare our approach. The findings demonstrate that, except from a little speed difference, both public and private blockchains may be utilised. Our solution's primary innovation is its completely decentralised blockchain-based e-voting platform administration, transparency throughout the whole process, and simultaneous voter security and privacy owing to homomorphic encryption.

II. LITERATURE SURVEY

"Block-chain-Enabled E-Voting,"

Blockchain-enabled e-voting (BEV) could reduce voter fraud and increase voter access. Eligible voters cast a ballot anonymously using a computer or Smartphone. BEV uses an encrypted key and tamper-proof personal IDs. This article highlights some BEV implementations and the approach's potential benefits and challenges.

"Voting Process with Block-chain Technology: Auditable Block-chain Voting System,"

There are various methods and approaches to electronic voting all around the world. Each is connected with different benefits and issues. One of the most important and prevalent problems is lack of auditing capabilities and system verification methods. Blockchain technology, which recently gained a lot of attention, can provide a solution to this issue. This paper presents Auditable Blockchain Voting System (ABVS), which describes e-voting processes and components of a supervised internet voting system that is audit and verification capable. ABVS achieves this through utilization of blockchain technology and voter-verified paper audit trail.

"Bitcoin: A Peer-to-Peer Electronic Cash System,"

A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.

III.SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

Certain voting methods have persisted since then. Around the globe, paper ballots are the most often used format. Only in the last ten years have electronic voting techniques gained popularity, and they remain unresolved. The primary issues with e-voting systems are those of security, legitimacy, openness, dependability, and usefulness. Estonia is the leader in this area and might be regarded as the cutting edge. However, there aren't many blockchain-based alternatives. In addition to offering solutions for all of the aforementioned issues, blockchain also has certain benefits like decentralisation and immutability. The primary issues with blockchain-based e-voting solutions are their narrow focus or the absence of testing and comparison.

3.1.1 DISADVANTAGES OF EXISTING SYSTEM:

- Less Security.

- More paper work required
- Time cosuming

3.2 PROPOSED SYSTEM

We provide a blockchain-based electronic voting infrastructure in this article that may be used for any kind of vote. Blockchain makes full use of it, and all procedures may be completed within of it. The platform functions as a completely decentralised and autonomous voting platform after the voting process has begun, with no way to influence it. Although the data are completely open, homomorphic encryption protects voters' identities. We have used three distinct blockchains to test and compare our approach. The findings demonstrate that, except from a little speed difference, both public and private blockchains may be utilised. Our solution's primary innovation is its completely decentralised blockchain-based e-voting platform administration, transparency throughout the whole process, and simultaneous voter security and privacy owing to homomorphic encryption.

3.2.1 ADVANTAGES OF PROPOSED SYSTEM:

- More Security.
- faster

3.3 PROCESS MODEL USED

UMBRELLA MODEL

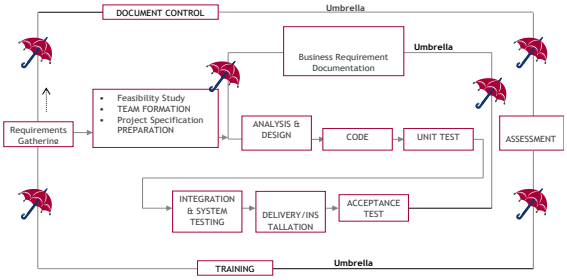


Figure 3.1: SDLC Model

SDLC is nothing but Software Development Life Cycle. It is a standard which is used by software industry to develop good software.

IV.SYSTEM DESIGN

4.1 MODULES DESCRIPTION:

4.1.1 ADMIN MODULE:

This user responsible to add new party and candidate details and can view party details and vote count. Admin login to system by using username as 'admin' and password as 'admin'.

4.1.2 USER MODULE:

This user has to sign up with the application by using username as his ID and then upload his face photo which capture from webcam. After registering user can go for login which validate user id and after successful login user can go for cast vote module which execute following functionality

- First user will be connected to his PC webcam and then image will be capture
- Using OpenCV application will detect face and then using CNN application will predict user identify and if user identity matched with CNN predicted face then application will display all voting candidates list.
- If user not casted vote then user can give vote to desire candidate by clicking link beside party name or candidate name.
- Upon giving vote application will capture voter and candidate details and then encrypt the data and then store in Blockchain.

4.2 SYSTEM ARCHITECTURE:

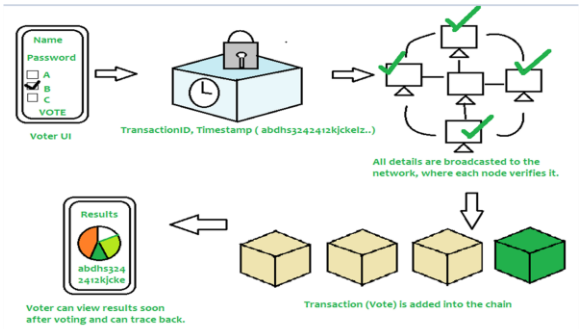
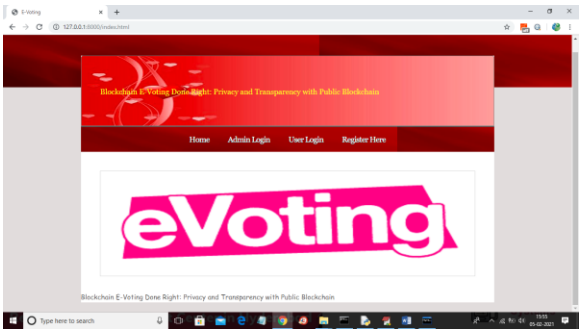
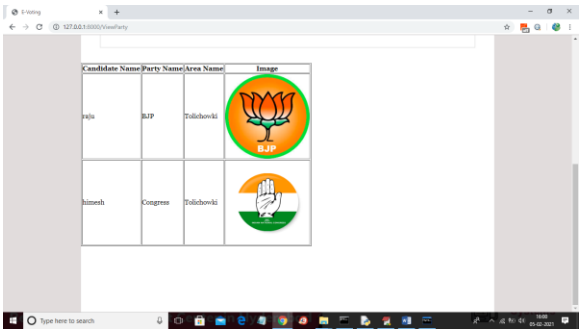


Figure 4.1: System Architecture

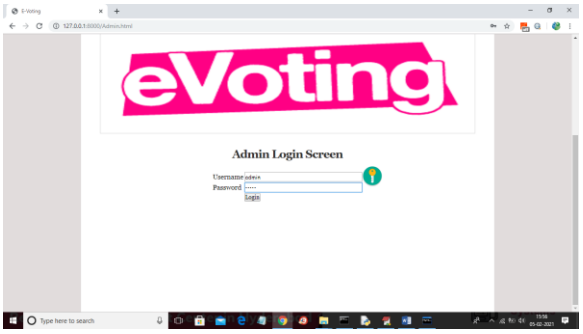
V.SCREENSHOTS



Screen Shot : Home Screen

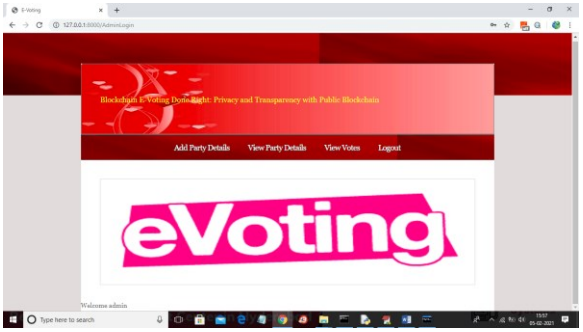


Screen Shot : List of Candidates Added

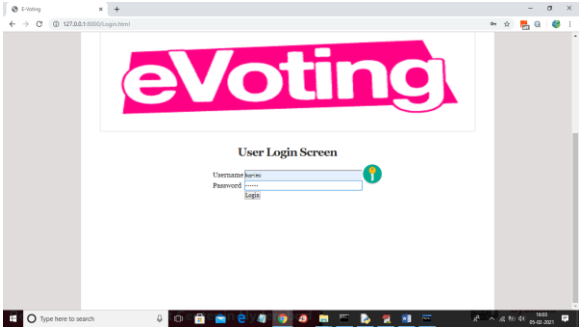


Screen Shot : Admin Login Screen

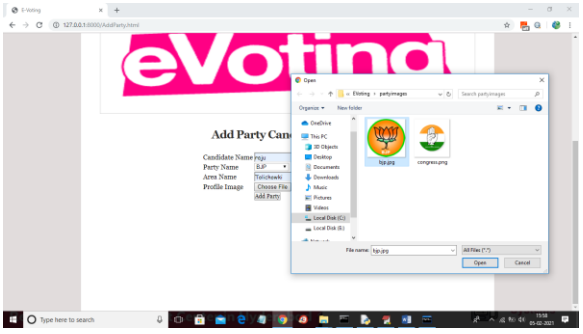
Screen Shot : User Registration



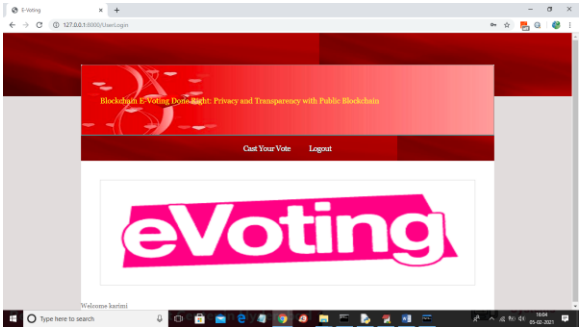
Screen Shot : Add Party Details



Screen Shot : User Login

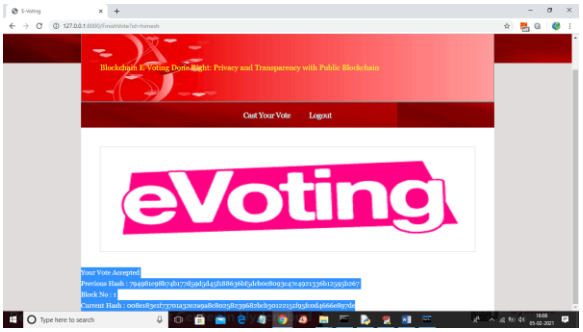


Screen Shot : Party and Candidate Details

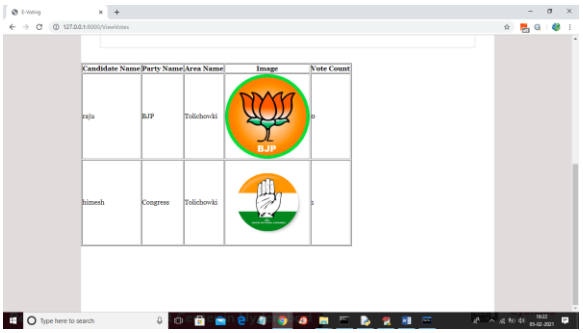


Screen Shot : User Page

Screen Shot : User Casting Vote



Screen Shot : Vote Casted



Screen Shot : Counting Votes

VII.CONCLUSION & FUTURE SCOPE

7.1 CONCLUSION

Public blockchain offers greater benefits in such an election system since its data is accessible and anybody can observe it in real time, even if we can detect very tiny variances in network delays. Although a private blockchain operates quicker, its partial centralization—that is, it only operates where the authority directs it—detracts from the whole system's legitimacy. The data indicates that the following are the average timings to add one voice: Ethereum Ropsten 17.75 s (median 17.93 s), Hyper ledger Composer 6.05 s (median 6.04 s), and Ganache 6.32 s (median 6.34 s). Both the block time and the consensus method in use have an impact on these periods.

7.2 FUTURE SCOPE:

Creating electronic voting systems is a problem since maintaining ballot confidentiality, a fundamental component of free and fair elections, is just as important as security. Over the last several years, India has been investigating the viability of putting in place a remote voting system using technology like blockchain. The Election Commission has embraced this concept wholeheartedly and has been putting effort into projects that may result in the implementation of a blockchain-based remote voting system.

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