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Secure Digital E-Voting System using Blockchain Technology

Lokesh Rane¹, Vaibhav Patil², Ritik Chaturvedi³, Shadmaan Sikalgar⁴

^{1, 2, 3, 4} Students, Sandip Institute of Technology & Research Centre, Nashik, India

Abstract: Technology has great positive impacts on numerous aspects of our social life. Designing a globally connected architecture enables simple access to a range of resources and services. Furthermore, technology rather just like the internet has been a fertile ground for innovation and creativity. The blockchain technology is presented as a game-changer for several existing and emerging technologies. With its immutability property and decentralized architecture, it's taking center stage in many services as an equalization factor to the current parity between consumers and big corporations/governments. one among the fields during which blockchain application is used is E-voting. The target of such a scheme would be to produce a decentralized architecture to run and support a voting scheme that's open, fair, and independently verifiable. this might propose a possible new e-voting protocol that utilizes the blockchain as a transparent box. The protocol helps to attain fundamental e-voting properties additionally as offer a degree of decentralization.

Keywords: Blockchain, ECC Algorithm, DSS, SHA-3, E-Voting, Cryptography, Merkle Tree.

I. INTRODUCTION

A. What is Blockchain?

Blockchain as the name suggests is a chain of blocks. In which, “block” means digital information and “chain” means public database. So “Blockchain is secure, decentralize, a distributed database managed by a cluster of computers.” it's a shared and immutable ledger. The information in blockchain is open for anyone and everybody to work out. Blockchain could be a technology that doesn't use third parties in data exchange. Third-party cannot temper blockchain data because it is stored on thousands of machines. Blockchain is public and personal type, A public blockchain is readable and writable for everybody where private blockchain sets restrictions on who can read or interact with it. Blockchain is that the backbone technology of Digital Cryptocurrency Bitcoin. Blockchain technology was first utilized in Bitcoin. It is a public ledger of all transactions. A blockchain stores these transactions in an exceedingly block, when more transactions are distributed the block eventually becomes completed. as an example, in Bitcoin, since the wallets are in an exceedingly distributed structure, the overall amount of coins and transactions followed clearly.

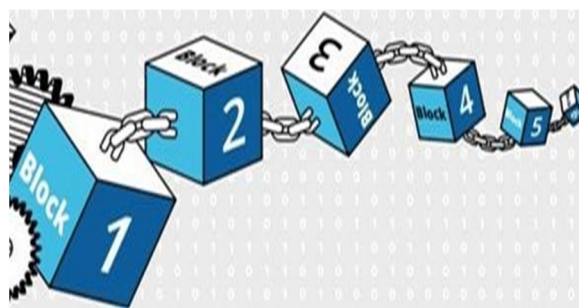


Fig 1: Blockchain

B. Key features of Blockchain

- 1) More Accessibility
- 2) Empirical
- 3) Lucidity
- 4) Constancy
- 5) Unified
- 6) High Security

C. Current Voting System

Electronic Voting Machines ("EVM") are getting used in Indian General and state elections to implement electronic voting partially from 1999 elections and recently in 2019 Vidhan Sabha Elections. Before EVM, vote counting was done by paper ballot but with the advancement in technology, electronic voting machines came into the image. Paper ballots have been replaced by EVMs in local, state and general elections in India.



Fig 2: EVM Machine

There are two units in EVM: the control unit and also the balloting unit. These units are joined along with the assistance of cable. The control unit of the EVM is kept with the leader or the polling officer. The balloting unit is kept in voting department for the voters to give their votes. Because of this, the polling officer is able to verify your identity. With the EVM, rather than issuing a ballot paper, the polling officer will press the Ballot Button which enables the voters to give their votes. A listing of candidate's names and/or symbols are available on the machine with a blue button next to that. The voter can press the button next to the candidate's name they need to vote for.

None of the part of the EVM is "networked". This is the most significant thing. EVM machines are very simple machines, like pocket calculators, with no connection to the net, no software system and no way to get altered without physical access to the machine.

1) Disadvantage of current voting system or EVM

- a) Vulnerability to hacking.
- b) Susceptibility to fraud.
- c) Malicious programming.
- d) The time gap between the voting and votes counting is huge which may cause to tampering.

Due to the direct access to the EVM Machine, the third force can break in and alter the counts of votes.

D. Proposed System

The system is an online voting system. We provide an online voting platform, which is a web-site. The proposed system consists of three parts: the Voter, the Election Administrator, and the Process.

- **Voter:** Voter is a major part of the process that participates in the election process. He subscribes to the program by providing his personal information.
- **Election Manager:** Managing all data from voters during registration and the electoral process, the electoral officer has worked. It also generates public and private keys for voters.
- **Election Process:** In this process the voter selects the candidate to vote and then votes for the candidate.

- 1) **Working Of Propose System:** Proposing a plan as mentioned earlier to register himself. At the time of registration it takes a unique ID number. Unique identity for creating a unique public and private key for all voters. So here problem of double voting is solved. After taking all the necessary information from the voter, if the voter is eligible for the voting process then only system will accept voter registration. Thereafter the system i.e. the electoral officer generates public and private keys to vote
- 2) **Public Key and Private Key:** Private Key and Public key information has unreadable hash data. During the election process for the purpose of logging in and voting, public key and personal secret key is required. It is the login id and password for this voting process. But the voter cannot always bring it to mind because it includes a high value. After successful registration these keys are sent to user's registered mobile number or Email. And during the voting process these keys are also used for encryption and decryption of data. D) After proving successful authenticity and producing a pair of public and personal keys,

the voter logs into the system using the keys. When a voter enters the system he or she receives an inventory of all the candidates. The voter selects the candidate and gives the vote. This vote is additionally a block which will be added to the blockchain and distributed across the system. Every voter follows this process and every one's blocks are added to the blockchain and therefore the hash value of every block is calculated. All blocks contain the previous hash value of the block. So all blocks are connected by the hash value of the previous block. because the blockchain is being distributed and therefore the blockchain is being built across all computer systems within the network. Therefore, blockchain hacking and detail spraying aren't possible. Once the complete election process is over, all votes are counted and results are announced.

- 3) *Process of Blockchain Creation:* All blocks have data, block hash and previous block hash. When a new block is created then the hash of the previous block is stored in this block and the hash of the new block is calculated and stored in it. In this way a blockchain is created

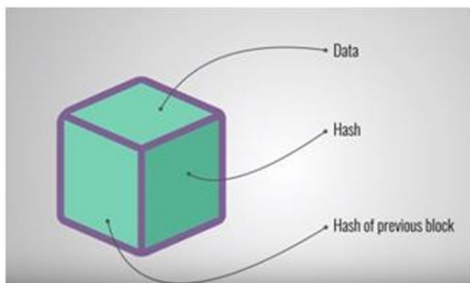


Fig 3: Block Representation

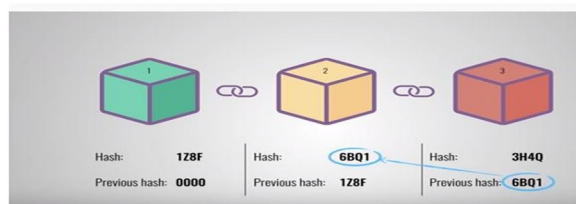
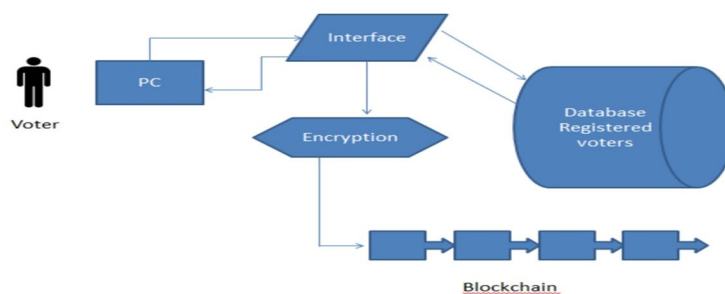


Fig 4 : Blockchain creation

E. Architecture of Proposed System



1) Advantages of Propose System

- a) Blockchain offers a completely new and secure system.
- b) Transparency allows votes to be tracked, counted, and compiled from a variety of sources.
- c) An anonymous transaction in blockchain maintains the privacy of voters.
- d) As it is distributed by the system, the data is stored on multiple devices on the networks. The problem of data loss is therefore avoided.

Voting in Blockchain is one of the many ways to use blockchain technology. As the world develops, the emergence of voting is crucial.

With the current voting system flawed and scrutinized, the blockchain aims to introduce a new way for people to vote and communicate in their local and international elections.

F. Transparency

Without transparency, people will be frustrated by the legitimacy of their votes and may result in questions on interference and false results. Transparency helps to attain transparent process for elections that results in the most effective results from the polls.

G. Security

Everything that happens within the blockchain is encrypted and will be verified that the information has not been altered. Also, it's decentralized. So it's very safe.

H. Anonymity

People want privacy while voting and also don't want to disclose their votes. This anonymity is obtained employing a private key. This might encourage more people to participate within the voting process and implement an electoral system.

I. Processing Time

Current voting systems often take time to gather and count votes. When polling stations are located in several locations and also the offices don't seem to be together, it will be difficult to assemble all the knowledge quickly and effectively resulting in time and value problems. Rather than looking ahead to an outsized number of individuals to attach manually, all editors are able to see the immediate effect on the blockchain.

Results will be collected and processed as soon because the voting is complete

J. Algorithm Used

- 1) Python's Django Framework is employed for pre-termination.
- 2) During this program the information structure used is a single linked list because the Blockchain structure is comparable to single linked list.
- 3) Another practical use is a DS called the hash table where data is stored together.
- 4) The hash function is employed to draw the dimensions data against fixed size values.
- 5) During this program, the Algorithm used is SHA-3. SHA-3 (Secure Hash Algorithm Version 3), also referred to as Keccak, is an invalid function to get digital printings of the chosen length (standard accepts 224, 256, 384 or 512 bits) from input details of any what size. with the blending function by pressing the chosen size "cryptographic sponge".

II. CONCLUSION

- A. Blockchain-based voting system utilizes the cryptographic hash function to enable secure and cost-efficient election while guaranteeing voter's privacy.
- B. Blockchain technology offers a new possibility to overcome the limitations and barriers of the voting system which ensures the election security and integrity and lays the ground for transparency.

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