

## Blockchain based Voting System

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**Abstract**— Developing an electronic voting system that satisfies the legal requirements of legislator. Our current Election system inherit the use of EVMs which in various source have been proven to be hackable & not tampered proof. This makes the candidate & citizen not trust the Election System. This paper aims to evaluate the use of blockchain technology to build distributed electronic voting system.

**Key words:** Blockchain, Distributed Ledger, Decentralized, Hyper Ledger, Voting

### I. INTRODUCTION

In every country, when it comes to election the security of election is important factor to be considered. The Computer Security field for decades have studied the various way of doing electronic voting, with increasing the security and minimizing cost of the system. Election in India used to happen before EVMs via paper ballot. Paper ballot system was replaced by EVMs in local, state and general (parliament) election in India. The Paper Ballot system was easily tampered and manipulated while election i.e. like adding additional votes, changing of ballot box, etc. Vulnerabilities can be found through the voting process from start to end. Security of ballot box while transferring or at Election booth. So, use of Electronic Voting Machine EVMs came into existence in late 90s. The EVMs were first time used in general election in GOA in 1999. Then later in 2003, all by-election and state election started using EVMs, encouraged by this election commission decided to use only EVMs for Lok Sabha Election in 2004.

Electronic Voting machine have been viewed as flawed by the security community. Anyone with physical access to the machine can manipulate it, thereby affecting all votes casted on the machine. There are cases when the losing candidate trying to blame the EVMs for their loss. EVMs have never built trust among the Candidates in the Election. When the independent security expert analyzed the machine, they said the machine can be hacked easily i.e. one can open it and change the display easily to print wrong number of votes and other way was changing the buttons sensors to vote for wrong candidate when being pressed for particular one. There are various studies on how EVMs can be tampered or hackable. Our current Election System lacks to build trust among the candidate standing in the election. People voting for candidate aren't 100% assured that their votes are reaching desired candidate correctly i.e. it also lacks in transparency to the voters.

We inherit the use of blockchain technology. Blockchain in simple words means distributed ledger due to this the records in blockchain are immutable and are linked to one another. Main features of Blockchain:

1) The ledger exists in various different location: A single node failure wouldn't stop the ledger from working.

- 2) Due to distributed control new record is verified by all node then added to the ledger
- 3) A "new block" always reference to the previous version of the ledger, creating an immutable chain from where the blockchain gets its name and thus preventing the record from getting tampered.
- 4) Before new block entry gets permanently added to the ledger the network nodes must reach a consensus.
- 5) The consensus is an algorithm which makes all the node agrees to particular decision before adding the record to the ledger.

### II. LITERATURE SURVEY

The various other existing system except paper ballot & EVMs are as follow:

#### A. Estonia i-Voting:

Estonia was the first country to implement election via internet enable using smartphone or computers. The voters needed to log in to the application using the government issued ID cards and cast votes. Only 30% used the i-voting. As it uses internet and websites to cast votes from remote location. The various issues such as buying of votes or votes by forcing, malware in voter's system, etc are found by the security community.

#### B. Votem:

It uses Digital Voting mechanism. Developed using Ethereum Blockchain using ERC20 Token. In VOTEM one need to have a smartphone and need to download app from Appstore or play store. VOTEM use VAST Token to cast votes i.e. user have VAST Token and they send those tokens to candidate they wish to elect. Ethereum uses proof of work concept to process the blocks which contains the votes casted to the candidate to be verified. Thus, any party with 51% more processing/mining power are able to manipulate the blocks and also be able to double spend the votes. Also, POW algorithm require a lot of processing power to process large number of votes per second. So, using limited power comes limited processing of votes and that may delay result of election.

#### C. Agora:

It is swiss Protocol Company developed a custom blockchain. It is developed on the consensus mechanism "proof of concept". It is yet permissioned and public ledger as per company. It has been used in Sierra Leone election in 2018. Working of Agora: - People uses paper ballot to select candidate and then that paper ballot would be used to store the record on the distributed ledger. It is nothing but a Distributed databased like functionality.

There are various such projects shows how blockchain can be used in voting process. Each and every one has their own drawbacks and limitations.

### III. PROPOSED SYSTEM

Our main goal is not to disturb the existing voting system and enhance it to provide transparency, immutability, and scalability. Our system will provide a registration page so that user/voter can enter their details and login. After login voter/user will be granted a Digital Identity which they have to print so that they can use that further while voting into the system. Digital Identity will consist a x.509 certificate which will be generated by hyperledger fabric blockchain platform. X.509 will be used to validate user identity and will work as login into the voting system.

By making use of blockchain we aim to build this system which will consist feature such as scalability, transparency, immutability, robustness.

IBM provided hyperledger fabric platform is used for building this system. Voter & candidate would be called a participants in the network, where assest will be votes or vote tokens and transaction will be created if voter votes for to the candidate.

This all will be stored in decentralized chain in the network. Where there can be many peers acting as a nodes to confirm / validate transactions and add those transaction to the chain.

Smart Contract/Chain code: - Smart Contract are trackable and irreversible application that executes in a decentralized environment. Once the smart contract has been deployed nobody can edit the code or change it execution behaviour. Smart contract execution guarantees to bind parties together to an agreement as written. This creates a new powerful type of trust that does not rely on single party. Smart Contract enables better management for realizing and administering digital agreements because they are self-verifying and self-executing. The Chain code and smart contract is the same thing. Only difference is chain code is used in Hyperledger and smart contract is used in Ethereum.

### IV. CONCLUSION

The idea of adapting digital voting system to make the public election process cheaper, faster and easier. It also opens the door for a more direct form of democracy, allowing voters to express their will on individual bills and proposition.

In this paper, we introduced a unique, blockchain-based electronic voting system that utilizes smart contract to enable secure and cost-efficient election while guaranteeing voters privacy. By comparing to previous work, we have shown that blockchain technology offers a new possibility for democratic countries to advance from the pen and paper or EVMs election scheme, to a more cost and time efficient election scheme while increasing the security of today's scheme and offer a new possibility of transparency.

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