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To Enhance Election Voting using Blockchain

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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. The operating assumption for Hyperledger developers is that business blockchain networks will operate in an environment of partial trust. Thus, the voting-based algorithms are advantageous in that they provide low-latency finality. When a majority of nodes validates a transaction or block, consensus exists and finality occurs. Because voting-based algorithms typically require nodes to transfer messages to each of the other nodes on the network, the more nodes that exist on the network, the more time it takes to reach consensus. This results in a trade-off between scalability and speed.***

This paper aims to evaluate the use of blockchain technology to build distributed electronic voting system. The problem with people living far from the native and not able to migrate for voting is one of the issues. This leads to the smaller number of votes in elections. More generally we aim to build a system that not only improve the voting but also ensure transparency of the process and will also build trust among the people.

Index Terms: Blockchain, distributed ledger, decentralized, Hyperledger (Etherium).

I. INTRODUCTION

In every country, when it comes to election the security of election plays an 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.

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 that uses EVMs are as follow:

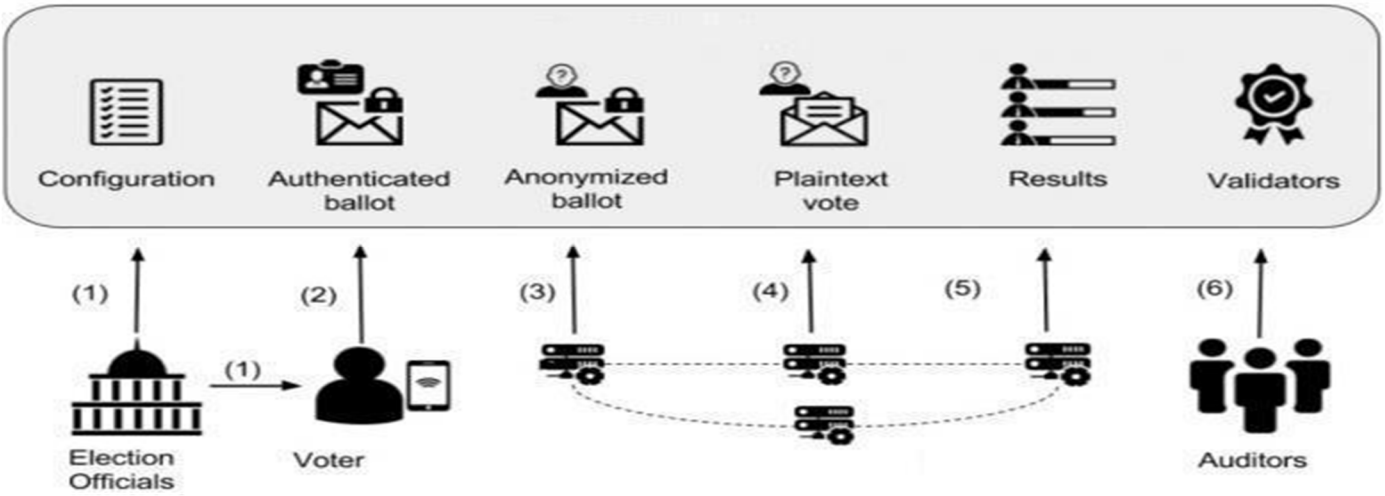
This paper is regarding to the security measures use in blockchain[17]. It mentioned the security measures related to data usage in blockchain. In this it doesn't consider about the entry of any data by the patients or any another person in blockchain network for the usage of the data by different faculties and industries who uses different data which is present in blockchain network. This is only focusing on the security and authentication of data. And it uses cloud networking to store the data for direct use and the to provide the security to blockchain network but in using the cloud it requires every time an access to it which may be very costly to regular use for a person.

In this it mainly concentrates on the sharing, transferring and modification of data in medical healthcare[19] only it does not related with other fields related to medical field and it only focuses on the one aim patients data collection it may be also get concentrates on the supply chain of medicine and drug prescription management which are also very helpful for the patient in other means. In this they only focus on the data sharing of the user to the medical institutions to the patient's family and vice-versa.

Blockchain Technology Use Cases in Healthcare[18] -In this the authors only focuses on the data gathering from the users by different hardware machines but in some way, it is not beneficial for the poor people to afford the hardware to get used to this technology. In other way it only transfers the data which is collected from users by mobile phones, laptops etc.
It does not consider the safety of data that has being given by users and the data, if the patients have gone some medical care then the data has to updated again for the further use to medical institutions but it can always be done by the users only so the manual entry load is increased
A blockchain-based approach to health information exchange net-works[11] -It refers to only the sharing of data to the medical institutions rather than the other companies related to it. It assumes that the updated data by patients are already present in the blockchain network to work on it. It shows only working structure of blocks in sharing of data and the arrangement of data in a particular block using hash tables and hash values. It refuses to taking the value and only sharing of data to the medical institutions rather than any other equally require company at time of medical claims.
It is developed on the consensus mechanism "proof of concept [12].It has been used in Sierra Leone election in 2018 It is yet permissioned and public ledger as per company.. 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.

A. Proposed System

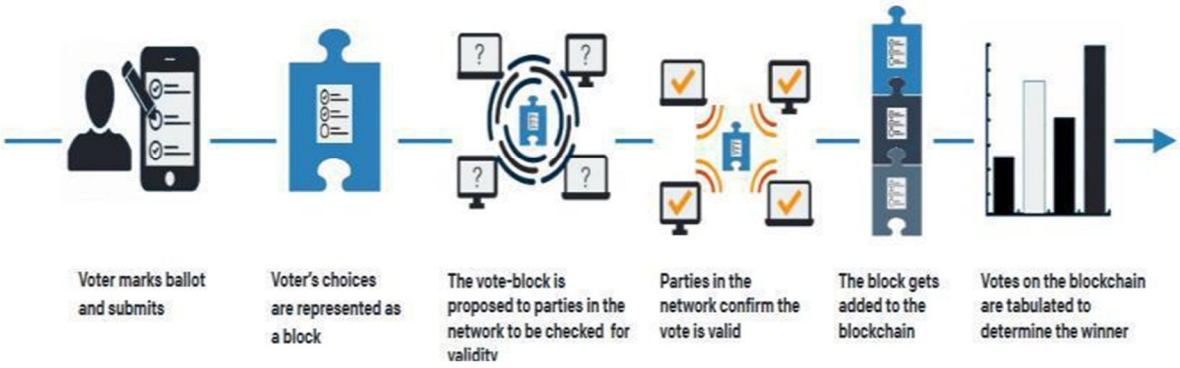
Our goal is to develop a system without disturbing the process of the existing Election System. Our system aims to replace the EVMs. The election process would be same but in place of EVMs we place our device which would be connected to the internet securely (independent Modem in device OR over router/ Wi-Fi connection. There would be slight change in the process before and after then voter votes at booth. Like the voter needs to update its voter id before election with newly generated Voter ID card.
This cannot be undone or irreversible as the nature of blockchain is irreversible and each and every record written to the ledger cannot be reversed.
We use Blockchain to develop our System. Using public ledger exposes the public information and doing that would leads many issues. It provides permissioned blockchain which has both private as well as public property. In other blockchain platform like Ethereum there is term called smart contract.
This application Uses a decentralized environment. Once the 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.



Figures 1

B. System Overview

The fig 2) show a general flow of how voting process going to be held. Here the Voter verify his identity and with the given voter id card and then proceed to cast vote on the touch device. The votes of voter will be combined in the block of size of 10 votes and each block will need to be verified by the parties in the chain. After the verification by the parties that the votes in the following block are unique and valid then only, they are allowed to get added to the ledger which stores hem permanently and are irreversible.



Figures 2

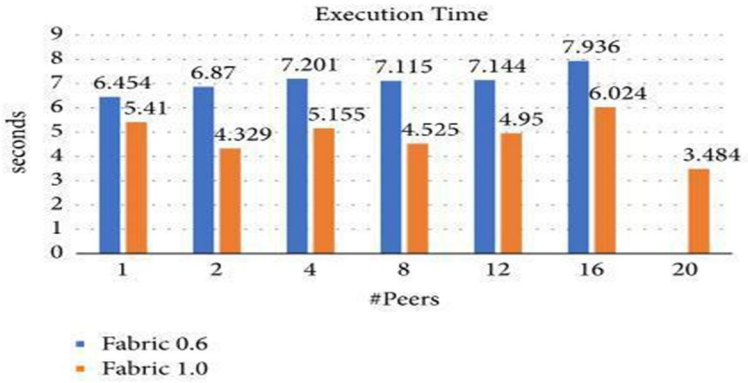
C. System Entities

1) Election Office: In our system EC will be responsible to deploy smart contract.

2) User / Voter: They need to carry their unique new voter ID card along with them to get verified at the election booth which allow them to vote.

3) Parties: Parties can be anyone who deploy servers / node to contribute for processing in the chain. They can be either the parties standing for the vote OR These can be done by Election office

III. RESULTS AND DISCUSSION



Figures 3

As a result of using blockchain for voting it not only provide security and decentralized ledger but also will increase the performance of the system.

The consensus is an algorithm which makes all the node agrees to particular decision before adding the record to the ledger. This will help cut the number of people required to audit the votes at the end of the day, here in fig 2) we can see that in Hyperledger it takes 5-8 sec to process 1000 transaction. Whereas Bitcoin does 5 TPS / Sec and Ethereum does 15 TPS / Sec. This leads to the huge increase in the scalability of the voting system i.e. the system would be able to cast 700-1000 votes per 5-8 seconds depending. The results me vary with respect to the chain code and security procedure the blocks have to go through.

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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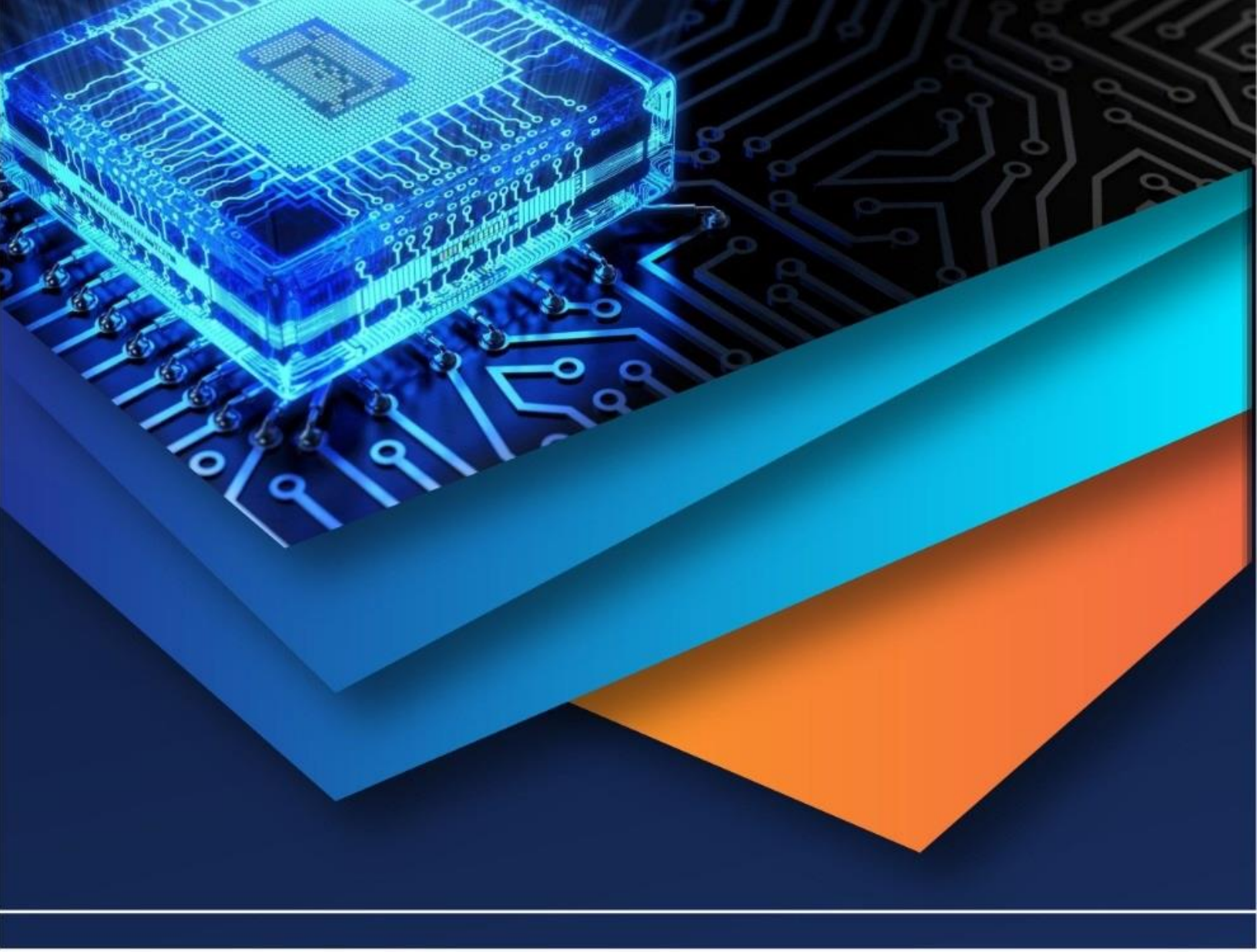

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