**Any Time Voting System using Blockchain**

1: Introduction:

Election is a huge administrational process that takes up a lot of time, effort and monetary resources of a state. In a country like India, where assembly elections are not held uniformly, the entire voting process demands a large scale financial need, workforce and infrastructure. Despite all the shortcomings it has, a lot of countries still follow the traditional paper ballot system, but India has adopted Electronic Voting Machines from 1999 and by 2017, EVMs have replaced paper ballots all over the country. The EVMs, even though are one of the most secure voting systems, yet are not fully foolproof.

2: Present Scenario:

The present day voting systems, be it paper ballots or EVMs, require armed forces guarding them to ensure the security of the votes casted. The election period witnesses booth capturing to confiscate ballots/EVMs, masquerading as someone else to perform fraudulent voting and many such malpractices. Elections also demand a huge number of government officials to work overtime to ensure everything is carried out as required. All these facts pose a threat to the voters and the votes casted alike.

3: Why Blockchain?

Blockchain is a decentralized distributed public ledgering system. It can be used for secure monetary transactions, data storage and retrieval. The problems of the now prevalent EVMs can be overcome if we implement voting using blockchain technology. Blockchain offers a plethora of essential security features to carry out voting in the most secure and transparent manner. It is the most secure system available now to prevent fraudulent voters and multiple voting. This problem can be solved successfully only by using blockchain as all the other implementation techniques would use a traditional database which could be compromised.

Blockchain is a disruptive technology and if e-voting is enabled using blockchain, it would disrupt the traditional election process and the working of the election commission in the country. The entire process would become simple and less complicated. The data saved in the blockchain is immutable, unlike the conventional servers. The overall expense required for the entire election process across the country could be reduced and there is no need to give a public holiday and reduce the productivity of the state on election day. Moreover, there is no need of intense security at the ATVs as votes can’t be manipulated or destroyed if the ATVs are destroyed. The counting process and result declaration is made hassle free and simple as votes are counted as they are being casted. This also follows green protocol, and is environment friendly.

4: Implementation

4.1: Voter Database

The electoral roll database can be maintained in a blockchain. The presently available biometric information from the adhaar database is taken and encrypted using SHA256 algorithm and a specific key is generated for each citizen. This cryptographically secure key is now stored in a blockchain.

From this database the citizen who meet the criteria for casting a vote are assigned with token values set as ‘true’, and are assigned with a private key, by the election commissioner, before each election is declared.

The admin will add the candidates after the nomination scrutiny and they are given a token, a private key, and wallet value initially set as zero.

4.2: Any Time Voting

The Election Commissioner decides a period of time when votes can be casted, ie; election process is not confined to a single day. Votes can be casted by eligible voters any time, using ATVs.

Any Time Voting systems (ATV) is a specially designed online platform which would be installed in multiple places in all constituencies. ATVs are equipped with biometric sensors which would be used to identify voters. The biometric information is collected from the ATV and encrypted using SHA256. This key is checked against the keys saved in the Voter database to identify voters. If the key is matched, the voting screen is enabled and votes can be casted.

4.3: Voting Process

A voter clicks on the name of the candidate and then, the token of the voter is set as ‘false’, the candidate will have a token increased in their wallet and simultaneously, the casted vote is displayed on screen.

4.4: Result Declaration

Once the election period has ended, the admin (CEC) can allow the privilege to all the voters to view the number of votes secured by each candidate.

5: Technical Implementation

Smart Contract: A computer program that controls the voting process. Each vote is considered as a transaction and each transaction is recorded into the blockchain based on this Smart Contract.  
The contract is written using Solidity and compiled using pragma solidity ^0.4.0

Ethereum Blockchain: Voting is a token based transaction, and we prefer to implement the system using Ethereum, which was developed by Vitalik Buterin.

NodeJS : The front end of the application is developed using NodeJS since it is fast and dynamic.

Ganche-cli: The personal blockchain for ethereum development

6: Future scope, Challenges

The future scope of blockchain enabled E-voting is extensive. Instead of using public ATVs, voting could be carried out using mobile phones having an internet connection. The adhaar model blockchain database could be extended to make it liked with all the personal details and thereby making the financial transactions easy and traceable. It will also make the candidate nomination scrutiny possible with one click. Administrative level implementation of the blockchain would make the working of the government transparent than ever before.

Blockchain enabled E-voting is has the potential to disrupt the whole election process and it would be challenging to implement as it is a must to win the confidence of the authorities and the general public to implement the system. Also, since it could be a potential threat to the jobs of electoral sector, some people would be against this system.

7: References

1. Sachidanand Sing and Nirmala Singh, “Blockchain: Future of Financial and Cyber Security”, 2016 2nd International Conference on Contemporary Computing and Informatics (ic3i), 978-1-5090-5256-1/16/$31.00 c 2016 IEEE
2. Nir Kshetri and Jeffrey Voas, “Blockchain-Enabled E-Voting”, IEEE SOFTWARE, 0740-7459/18/$33.00 © 2018 IEEE