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VOTING SYSTEM SECURED USING BLOCKCHAIN AND BIO-METRIC AUTHENTICATION

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Abstract — Voting is the action of choosing the eligible candidate, to become a leader. During election, every citizen must cast their votes to express their opinion. But this process may include some problems such as vote rigging, database hacking, etc. Our goal is to develop an architecture which is decentralized and can support the voting system which is fair and can be verified individually. Blockchain based vote casting ensures that the voting-data cannot be altered in disguiseBlockchain provides a distributed ledger that records each digital data and it is also decentralizedassets. Using biometric based authentication, we can validate the vote casted. Hence, the approach makes the system the best way to vote and the end result will be a tamperproof voting system which isvery difficult to tamper.

Keywords— Blockchain; Decentralized; Biometric, Voting;Distributed Ledger; Transaction.

I. INTRODUCTION

Blockchain is a very promising innovation. The range of blockchain technology can be applied in various domains like health-care, multimedia sharing, education and several others. Blockchain provides the distributed ledger which is visible to and is maintained by all the nodes in the blockchain network. The Ledger is a form of linked-list, which consists of a number of "Blocks" and are linked with hash pointers. Each and every block of the ledger has the hash of previous block. Because of this hashed linking between the blocks blockchain gains its feature of tamper proof. There is no central authority to maintain all the transactions and can be viewed to all the participants in a network.

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Hence, blockchain model can be secure, transparent, decentralized and immutable. Blockchain is first used in bitcoin which ensures the security integration properties. Theproperties of the blockchain can be helpful in achieving secure and transparent voting system.

In our paper, we are trying to conduct the elections in a safe and secure manner. The votes will be transformed into transactions and will be published in the blockchain, which is visible to everyone. Since India has a literacy rate of nearly 75 percent, this approach will be suitable, because the elections in India are being held in the same way and we are suggesting an amendment of introducing fingerprint authorization and storing the data in the blockchain which is visible to everyone time to time.

II. LITERATURE SURVEY

Election Voting Using Blockchain Technology [1]

The Estonian e-voting system is a leading electronic voting system which suffers from the issues of verifiability and might need improvement of its availability. To solve the problems, in this paper we propose a blockchainbased voting system in which the Electronic Voting Machine is treated as a node in the blockchain network.

Democratic Centralism: a hybrid Blockchain architecture and its applications in Energy Internet [2]

This information states the basic implementation details of Blockchain from the very basic component to structure creation. [2] also provides us with some ideas about exploring internet.

The paper [3]proposes e-voting system based on blockchain which overcomesmost of the drawbacks in existing systems proposed for voting. The implementation given here is not suitable for large elections.

This paper [4]aims to implement voting and provide result using the concept of blockchain.In this paper, the final calculation can be approved by each and everyone since we are using open blockchain and also the results can be checked for no alteration done for the data in the blockchain.

The paper [5] provides the details of the e-voting system which is implemented using multi-chain platform. This paper provides a great evaluation of the system which is very effective in achieving end to end E-Voting system which is verifiable.

The paper[6] discuss about a way to conduct voting via web in a decentralized manner such that the voter need not go to the Election Booth to cast his vote, instead he can vote from his own device. The process involves registration of the voter which results in giving a private key to the voter to remember and use while casting the vote. Since the voting has been done from various devices instead of a single Election Booth, the devices are considered as Nodes which play a key role in decentralizing the whole election process. This approach is not feasible for a developing country with literacy rate not above ninety percent as there would be more illiterates or people who can't understand the process.Alsoit requires more computational power to be used from various devices which they might not support.

E-Voting isfaster but havehigh Risks of Security [7]

Over the past decade so many researches have been performed on E-Voting system, mainly after the dot-com revolution. The first country to implement the elections fully digital is Estonia.This article says that the electronic voting is faster but there are high chances of security threats, which ultimately puts the voters at risk.

According to [8], even the proposed system mentioned in [6]might encourage the voters to participate in the election, these proposed systems are not following the key features of blockchain.

In [9], homomorphic encryption [10]is been used in the ranked choice e-voting system. The approval voting algorithms is the parent of all the algorithms used in this paper.

Homomorphic Encryption and Applications [10]

In [10] a homomorphic encryption algorithm is stated. This can be used according to the users requirement which keeps the message secret, but with very large computational power this can be decrypted using Brute Force attacks.

III. PROPOSED SYSTEM

The main objective is to develop a solution based on blockchain with fingerprint authentication to conduct fair and rig proof elections. The future of any nation depends on great leaders, so that fair elections are mandatory to develop a nation and also elections represents the existence of democracy. But in now-a-days, election process is not trustable due to some malpractices and hence a transparent system is necessary to conduct trust-worthy elections.

Figure 1 describes the proposed system.

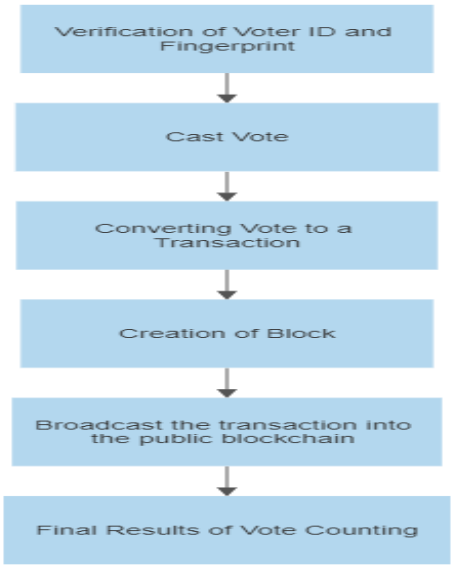

Figure 1:Flow of Election Process

A. Verification of Voter ID and Fingerprint

The voter should have his voter ID and Aadhar Card which says the person is eligible for voting.

Now we want to verify the voter's identity to prevent any malpractices to happen. Also every voter must have completed the biometrics as required by the Government. As every voter has his/her voter Id and Aadhar card linked we can use fingerprints of that voter for identification purpose so that only that voter can cast his vote and no others can cast it.

B. Cast Vote

On the day of elections, the voters have to reach the Government decide place to cast their vote. Voters will cast

their vote in Electronic Voting Machines (EVM) only if the voter is a valid voter. Now, the vote will be converted into a transaction and will be broadcasted to the public Blockchain where only the vote counts are visible to everyone time to time. Now the voter is marked as 'voted' and cannot vote again.

C. Results of the Voting

We can count the votes from the public blockchain as every vote is casted and also before announcing the results, we can also check the blockchain for double entries or invalid blocks. Since the counting process is done programmatically, the results will be faster.

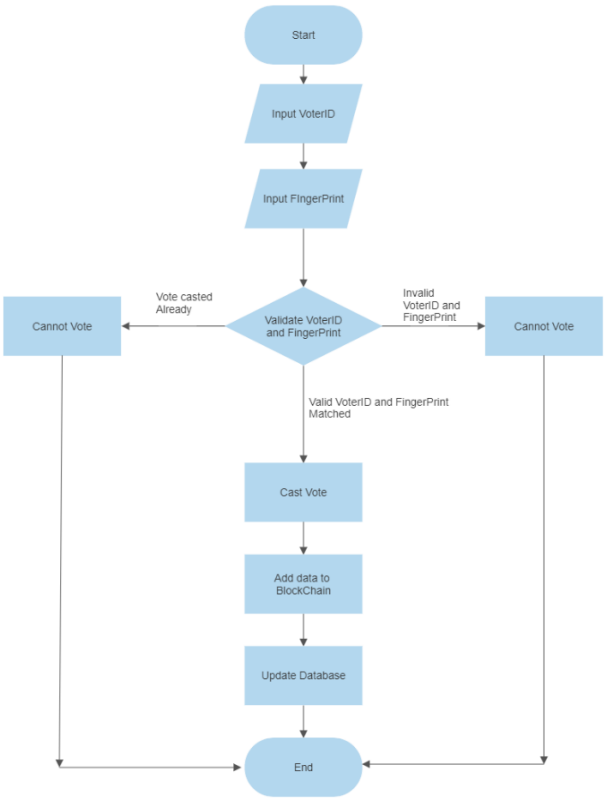

Figure 2: Process of Election

IV. RESULTS AND ANALYSIS

Fig. 3 represents taking the fingerprint from the voter and if the fingerprint and voter id verified successfully Fig.4 will be shown. Fig.5 and Fig. 6 will be shown if the voter is not valid. If the voter id and fingerprint impression matched then the voter can cast his vote and Fig.7 will be shown as output. Fig. 8 will be shown if the voter is trying to vote again which is not allowed in the election process.

Figure 3: Taking fingerprint impression from voter

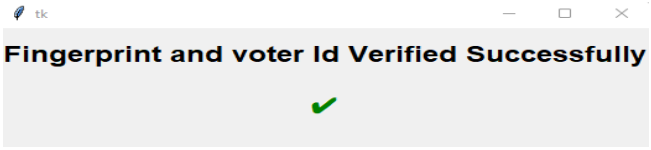

Figure 4: If the voter is valid

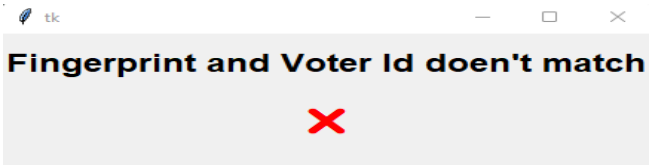

Figure 5: If the voter id and fingerprint is not valid

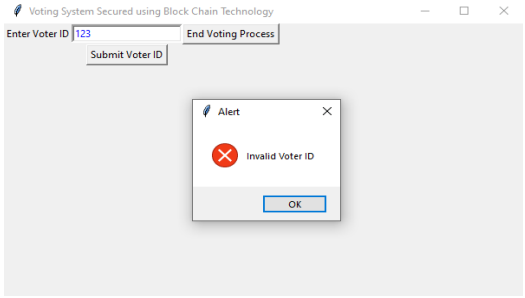

Figure 6: If the voter id is not valid

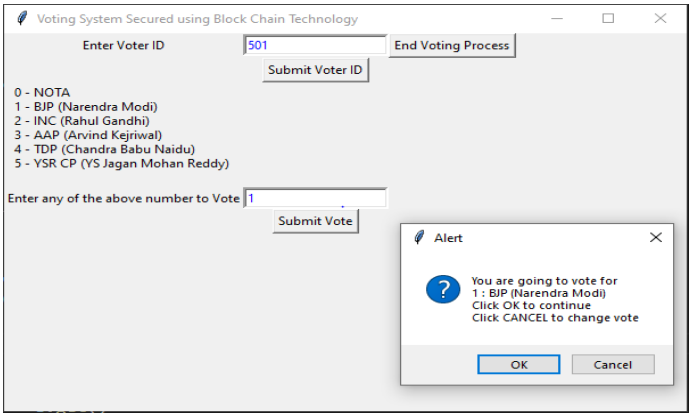

Figure 7: Output for successful verification of Voter Id

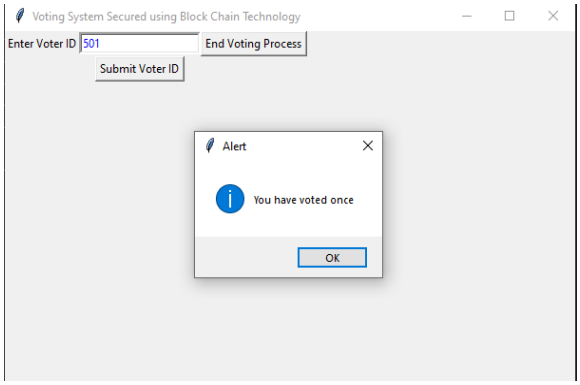

Figure 8: Output If the voter is trying to vote again

V. CONCLUSION AND FUTURE WORK

Blockchain is ideal for election process since it provides us with the distributed ledger which is also tamper proof and also visible to everyone. Since we have everything linked with the Aadhar the implementation of the process with the biometric is not difficult.

We can improve the system by designing a simple and very secure system and also we can make the process completely online where every voter can vote from his home with a mobile which has either facial recognition or fingerprint authentication linked to their Aadhar card, so that no need of physical elections using Electronic Voting Machines(EVM).

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