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Electronic Voting Machine Based On Blockchain Technology and Aadhar Verification

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Abstract – *The idea is to use blockchain and aadhar verification to make a simplified voting process. Scanning the QR code on voters Aadhar, the Aadhar information is obtained. This information is checked and verified whether the voter is from the right state, is the age 18 and above , and whether he/she has already cast his/her vote. If the information is verified to be valid, the vote can cast his/her vote. This vote is then documented in a blockchain ledger. This process is repeated for further voters.*

This system runs on a private network, where the chief of the electoral committee has the liberty to decide the commencing time of the voting process. The process follows a distributional approach in a way that any eligible citizen can vote for his/her ward from anywhere in the state.

Keywords- Aadhar Card, Biometric, Electronic Voting Machine, Fingerprint verification

INTRODUCTION

We are at a crossroads in our democracy. Current voting system highly lacks in a technology though there is a lot of ways to make the process easier. Going digital is one of accountability - citizens are losing their trust in the democratic system increasingly.

Elected candidates must explore the technology to make voting more transparent and easier. Citizen also don't know what is the process inside the EVM machine like how it is working, whether it is considering the vote as we have casted etc. This is the reason Why political Parties blaming the voting machines. Yes, they might be true because the present EVM machines are "BLACK BOX" since we also have no idea what is exactly happening inside a machine. We just believe the result at the end of the process what the machine is giving us.

As we know, everywhere Election is a basic process of democracy which allows people to select desired candidate. In India, voting system should be fair, transparent and fully secure for the better democracy. There could be a chance of cheating at the time of voting process due to lack of transparency. Hence the challenges of current system are voting process security, authentication, protecting the data.

Our proposed voting system is based on aadhar verification because it is mandatory in India. It generates the list of the people in the state who are 18years and above decides whether he/she is eligible or not. And blockchain is integrated in EVM which helps to check if the vote is recorded as it is without any modification, counts every single vote correctly and prevents tampering.

Thus, in this way effective and accurate voting process can be achieved because no one will be left out without getting their right to vote for their desired candidate.

II. SYSTEM REQUIREMENTS

Our proposed Voting Machine will include few main requirements that can be illustrated as shown below:

- **Authentication:** Registration process is not required in our system. Registration usually requires verification of certain information and documents to comply with current laws, which could not be done in a secure manner. Therefore, the system should verify voter's identities based on aadhar card, biometric and then let them vote only once.
- **Anonymity:** Voter must always be anonymous in the voting process.The system must aim at achieving the political privacy.
- **Accuracy:** Accuracy is maintained forevery vote and every vote must be counted, and can't be

duplicated, removed.

- **Verifiability:** The system should verify that all votes are counted properly. Our solution support flexibility, efficiency and mobility along with the main requirements.
- **Transparency:** The system must maintain transparency such that every citizen must know what is happening inside the machine, how the vote vote is considered and counted.

III.DESIGN

Blockchain technology helps to keep away voter fraud by providing a clear record of the votes and it prevents tampering of any vote. Using this technology, we ensure that the person who is voting is who he/she say they are and they are legally eligible to cast a vote if they are eligible.

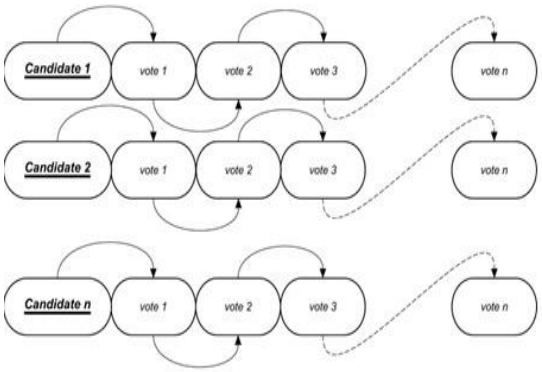


Figure 1: A Simple Representation of the Blockchain Structure

To ensure that the system is secure, the block will contain the previous voter's information. If any of the block's data get changed, then it would be veryeasy to find since all blocks are interconnected to each other. Hence data cannot be altered; no failure exists. The Blockchain is where the actual voting takes place. The user's vote gets sent to one of the nodes on the system, and the node then adds the vote to the Blockchain.

A.*End To End Design*

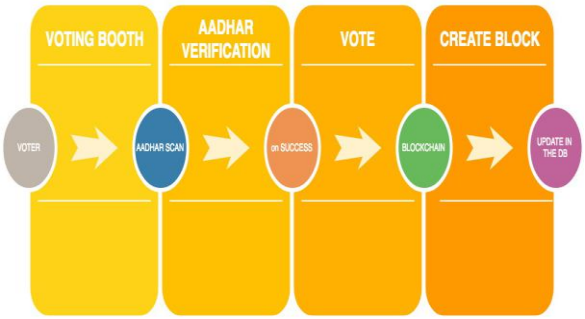
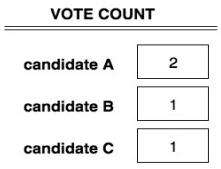


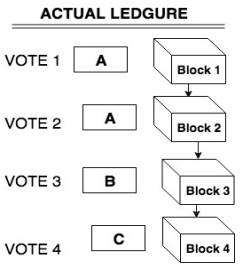
Figure 2. Representation of end to end design

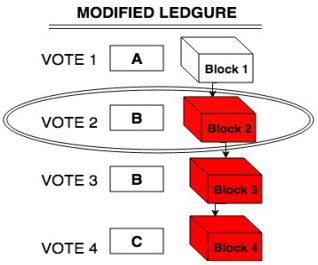
The above diagram show ,the design of our approaching system. In this process the user will go through the sequence of process that will make a transaction in the block chain. The user or the citizen will arrive at the voting booth to vote, once he/she arrives at the voting center he will be allowed to scan his Aadhar card for the verification, the verification will be done using biometrics. The verification process also checks for his/her age and home state for validation. After the successful validation if the user is allowed to vote he will be proceeding to vote in the voting machine. Once the vote has been received block will be created in the blockchain ledger which contains the block number, transaction ID information.

This process will be repeated for all the users. Blockchain concept starts once the voter vote for thei r candidtate. For each vote a block would be instantiated and every vote in a block is stored on ledger which is distributed and they are connected to each. Once data recorded in the ledger, data can neve r be erased.Hence to maintain transparency and security of every vote, blockchain is integrated inside the EVM machine.

EXAMPLE:







The above example explains us how the system is secured if we apply blockchain . The vote count diagram shows the exact vote count of the candidates, the second diagram shows the sequence in which the votes have registered. In the third diagram the vote is modified, the block which shown in red color are identified as error votes but simple to identify where the tamper has occurred hence it is very simple and easier to find where the error happened and it is easy to fix it.

Nodes that experience interference can perform manual data or system broadcast can be repeated to make the data updation when the process has reached the last turn node. Each previous hash that is used by the block in the system has proven The same as the value of hash on the calculation results using the data in the preceding block. Each hash value in the previous block has been added in the calculation of hash values by the block that gets a turn on the system, making anyone who tries to change the data in the database of voters will have difficulty because if one data is changed it makes following data to change on other blocks.

B. *Working flow of proposing system*

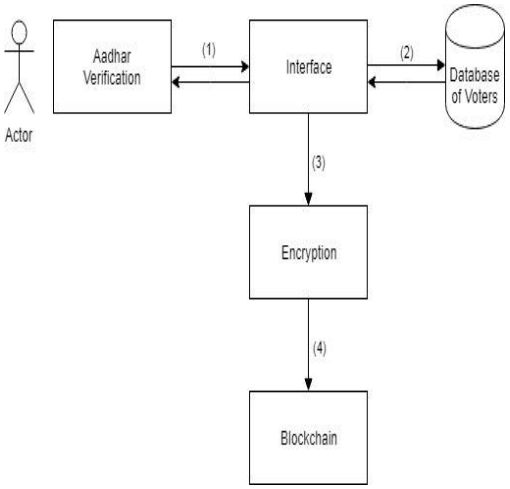


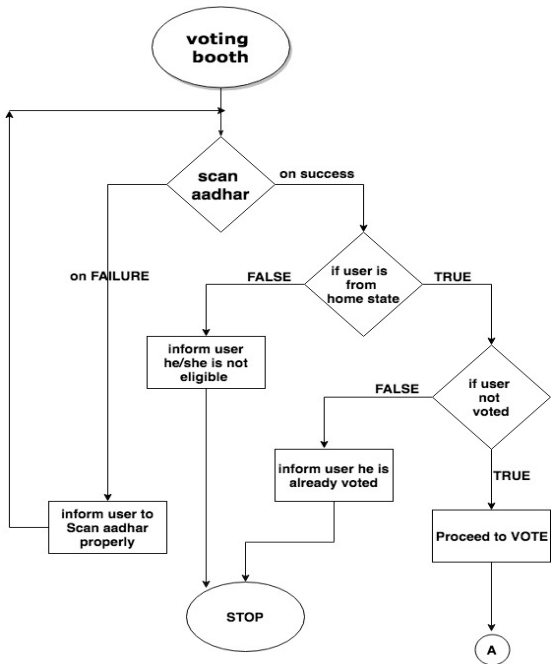
Figure 3: Working flow of proposed system

1. **Requesting to vote:** The user will have to go the voter booth with his/her aadhar card, which is used for manual verification of the voter. In this case, the system scans barcode which is on aadhar card and use his Aadhar Number and uses biometric for verification. This can therefore eliminate the path forfake voting, problems in uncertain credentials, use of fake identities multiple times by same person for votingat more than one centers.
2. **Casting a vote:** Voters will have to choose to either vote for one of the candidates or cast a vote. Vote casting would be done through a friendly manner. It ensures that electoral fraud will not happen and the transparency will be achieved.
   While casting, the sytem ensures that the person is not voted yet. If the person has already voted, then the message will be displayed as the person is already voted. Or else the person will be allowed to vote for their desired candidate.
3. **Encrypting votes:** After the a person vote, a block is instantiated and immediately hash value is calculated for the corresponding block, hash of the current vote as well as the hash of the previous block will be stored. This way each input will be unique and ensure that the encrypted output will be unique as well. Block header records all the encrypted information of each vote cast. SHA-256 encrypts all the information related to every vote, and it is not possible to find the encrypted hash function which is a one way hash function.
4. **Adding the vote to the Blockchain:** In this step, once a person completed his voting, his/her vote will be added to blockchain. Each block gets linked to previously cast vote. Such that the vote cannot be modified. If a person completed his voting, his/her vote will be added to blockchain. Each block gets linked to previously cast vote. Such that the vote cannot be modified. If one block gets modified or tampered then the further blocks from the tampered block will also be changed. Hence tampering is impossible in blockchain.

Information in the blockchain is put up in an organized way and stored in blocks. Each block has :

1. the set of changes to be made to the data
2. a time stamp of the block
3. a reference to the block

The third point, every block contains the reference to the preceding block, which is the main feature of Blockchain. This reference helps to connect and create relations between every block. Blockchain can be solution to solve the problems that occur in the voting system.



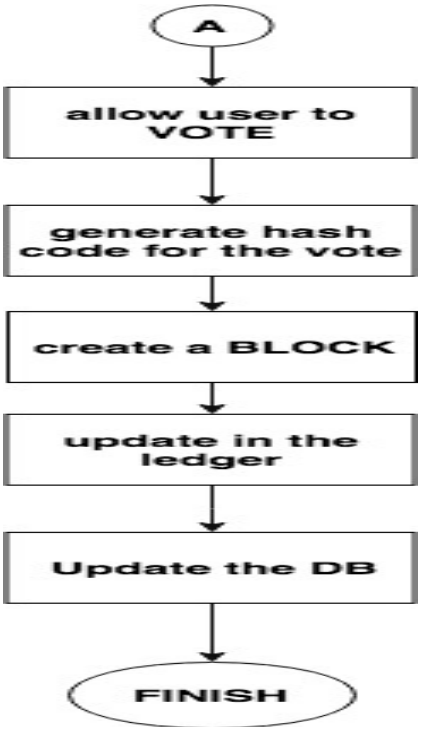


Figure 4: Flow diagram of detail design

CONCLUSION

We have proposed an electronic voting system based on the Blockchain technology and Aadhar Verification. Most of the people in India has an Aadhaar than a voter id. This approach increases the voting percentage overall and gives a more accurate, transparent and fair election system. This proposed system ensure transparency in the process of voting as well as make the system tamper proof and also ensure that electoral frauds do not happen in the process. The corruption in voting system is reduced and it's a faster and there would be no conflict in the process for calculating and declaring result.

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