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Electronic voting machine based on Blockchain technology and Aadhar verification

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ABSTRACT

Increasingly digital technology in the present helped many people lives. This paper describes an electoral system for Indian election on blockchain technology and aadhar verification. The aspect of security and transparency is a threat from still widespread election with the current system. Some of the problems that can occur in the current system are with an organization that has full control over the database and system, it is possible to tamper with the database of considerable opportunities.

The proposed system is mainly designed for our country based on Aadhar verification where the details of the persons who are above 18years are extracted from aadhar card database since it had become mandatory in the present scenario. To ensure more security, finger print of voter is used as the main authentication resource. The system will allow the voter to vote through his finger print. As soon as they cast their vote, blockchain technology comes into existence which is integrated inside EVM. By adopting Blockchain in the distribution of databases can reduce one of the cheating sources of database manipulation. This research discusses the recording of the voting result in blockchain algorithm from every place of election.

Keywords: Aadhar Card, Biometric, Electronic Voting Machine, Fingerprint Verification, Blockchain.

1. INTRODUCTION

The use of technology has become common place at this point in helping to meet human needs. The increasing use of technology has brought new challenges in the process of democracy as most people today don't trust their governments, making elections very important in a modern democracy. Elections have a great power in determining the fate of a nation or an organization.

The voting system in present days requires a manual registration with a voter id with which voters are allowed to vote. The balloters can vote only when they provide the voter id in the pooling booth. The major drawback of voting is bogus votes. To overcome those we use many authentication standards. Aadhar is unique identification authority of India which every personal should be enrolled in it. For every governmental action performed it requires the Aadhar card provided with biometric authentication which assures that the person has all the right to perform the required action. The proposed process reduces the whole man power in the polling booth and also reduces the man power used in the counting process. All the action performed is automated. Once authentication is done, the next problem arises is the issues data manipulation, security, and transparency of each vote. These issues are solved by Blockchain technology. Blockchain technology is one solution that can be used to reduce the problems that occur in voting. The blockchain is distributed, unchangeable and transparent ledger who can't deny the truth. Consists of several blocks that are linked to each other and in sequence. The block is related because from the previous hash used in the next block making process, the attempt to change the information will be more difficult as it has to change the next blocks [6]. The database was made public, acquired by many users. The circumstances of cheating, the database owned by users who do the cheating will be different from the database owned by other users. Then the existing database on the user is not valid.

Hence the main challenges of the current system of the voting process such as security, authentication of voters, protecting voted data are solved by blockchain technology. Also, 100% voting can be achieved because in this way, nobody will be left out without getting their right to vote which fails in the existing system.

A. Issues that block-chain is going to solve with the current voting system are as follows:

Transparency, Reliability, accessibility, security, and auditability. Many of us believe that in-person voting using paper ballots is the only secure and guaranteed way to cast a vote. Although the process is generally run without incident by dedicated elections officials, any manual human-based process will lead to errors and mistakes. The current voting process is relatively transparent to elections professionals, but how do the common people know their vote was cast as deliberated and counted as cast? Recent surveys say that most of the people actually don't trust the system. We've become adapted to ordering a product online, tracking our ordered status; we know exactly when it's been shipped and when it will arrive; this is the kind of transparency we must be entitled, and therefore we can accomplish high secured system with the blockchain. Also with blockchain, we have the ability to "examine" every individual vote in real time, which is something very difficult, if not impossible, to do in today's process.

B. The blockchain is beneficial in voting by following ways:

Blockchain technology will make the voting more open that is it will be very difficult to say that administrator changes the voting result when the common people can only verify this information and provides all of the characteristics you would want in a policy that is possibly the most important part of a democratic society; it's fault-tolerant, the past cannot be changed, present hacking cannot be done, access to the system cannot be altered, each node that has access can see the exact same results, and every vote can be unquestionably tracked to its source without sacrificing a voter's vote anonymity. End to end verifiable voting systems will be provided which gives the voter the ability to verify if their vote is correctly recorded and correctly counted, for instance, it can even be detected by the voter and caught before the election is over if a ballot is missing.

Securities of the Aadhar Based E-Voting system The main goal of a voting process is to ensure the privacy of the voters and of the votes. A proposed voting system satisfies the following requirements,

- **Eligibility:** only votes of legitimate voters shall be taken into account.
- **Anonymity:** votes are set secret.
- **Accuracy:** cast ballot cannot be altered. Therefore, it must not be possible to delete ballots nor to add ballots, once the election has been closed.
- **Fairness:** partial tabulation is impossible.
- **Vote and go:** once a voter has cast their vote, no further action prior to the end of the election.
- **Public verifiability:** anyone should be able to readily check the validity of the whole voting process.

2. PROPOSED SYSTEM

The work aims to provide a higher security in polling machines that overcomes the bogus votes. The electronic voting machine is accessed by matching the biometric data with the Aadhar card information. To reduce the man power and time consumption we introduce blockchain which creates a block for every vote and each is connected to each other. Hence data cannot be altered once data has added to the ledger in the blockchain.

The vote casting phase is a real-time hardware set up organized in a polling booth with which the voters are allowed to cast their vote. Granting of access to the electronic voting machine is provided when the biometric of the user is match with their aadhar card details. Unique Identification Authority of India (UIDAI) is a data collection center where the details of the Aadhar holder are maintained. Here the voter first gives his aadhar card for QR reading operator. The elector is allowed into the ballot box room when the QR reading/UID authentication the digital display in EVM displays as "VOTE". The elector has to scan his/her thumb, the biometric and providing the thumb data that are scanned is matched with the pre-loaded server information the elector can permit to forge the vote.

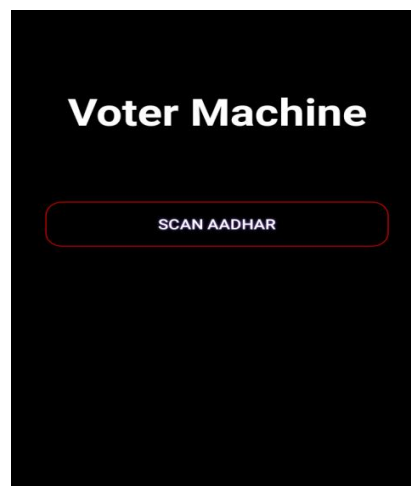


Fig 2.1: Screen 1



Fig 2.2: Screen 2

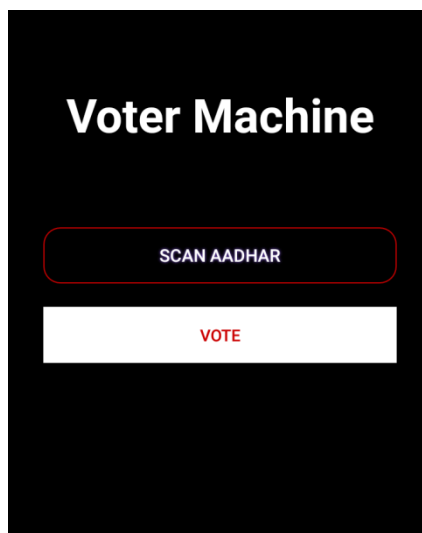


Fig 2.3: Screen 3

After verifying and approving the ballot they are allowed to vote by accessing the electronic voting machine.

The next phase is protecting the vote, security of vote which is achieved by blockchain technology. The blockchain is integrated into the EVM machine. As the name indicates, blockchain is a block of chain that contains the information. This technique is originally described in 1991 by a group of researchers and originally intended to timestamp digital documents so it's not possible to tamper with them almost like a notary.

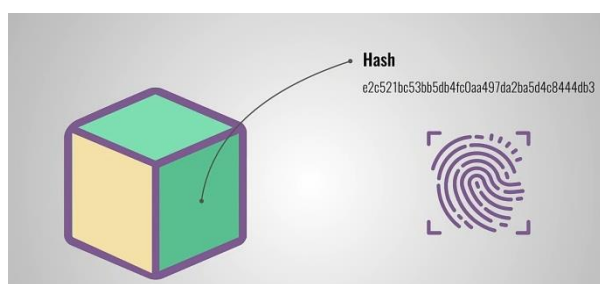
The blockchain is a distributed ledger that is completely open to anyone. They have an interesting property, once data has been recorded inside a blockchain it becomes very difficult to change it.

So, how does it work?

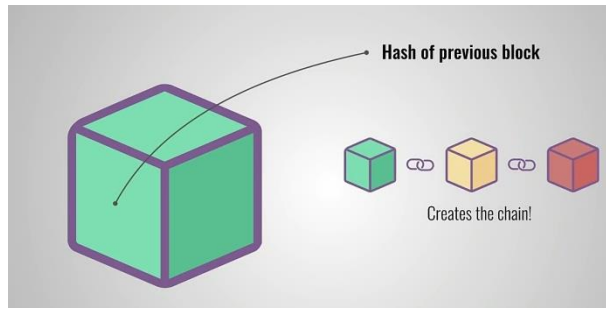
Let's consider a block, each block contains data, a hash of the block and hash of the previous block.

Data : It contains the voting information.

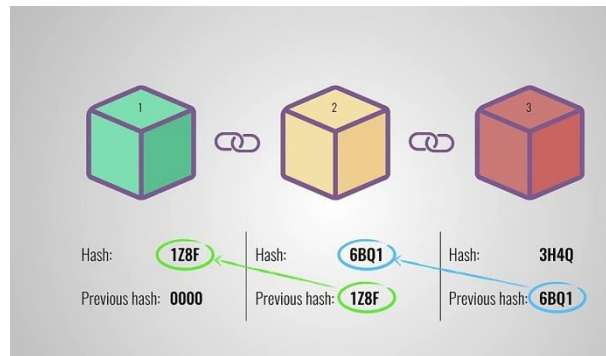
Hash: You can compare the hash to fingerprint, it is always unique. Once a block is created its hash been calculated, changing something inside the block will cause a hash to change. In other words, the hash is very useful when you want to detect changes to block. If the fingerprint of block changes, it no longer is the same block.



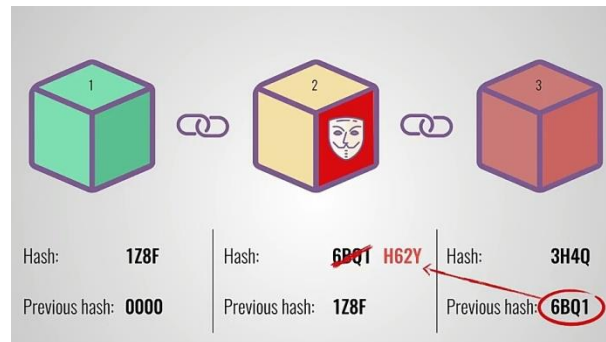
Hash of the previous block: This effectively creates a chain of the block and this technique makes the block so secure which contains the voting information



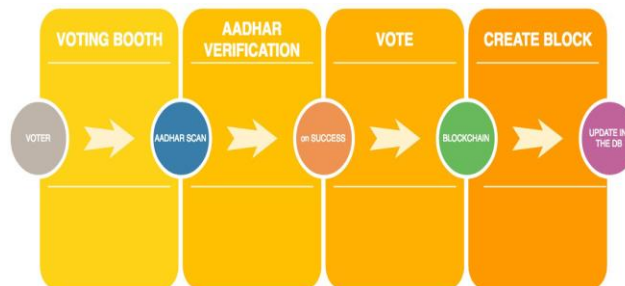
Let's consider an example, here we have a chain of three blocks. As you can see each block has hash and hash of the previous block. So block3 points to block2 and block2 points to block1. The first block is bit special, it cannot point to the previous block because it's the first one. We call this block as Genesis block.



Now let's say, you tamper with the second block, this causes the hash of the block to change as well. In turn, it will make block3 and follow block invalid because they no longer store a valid hash of the previous block. So changing a single block will make all following block invalid. Since they are a limited set of the candidate, you can change the value of the block and make the block valid such that every further block from the tampered block become valid. This is how transparency, accuracy, and security of the voting system are achieved.



3. ARCHITECTURE DESIGN



4. CONCLUSION

A nation with less voting percentage will struggle to develop as choosing a right leader for the nation is very essential. Our proposed system designed to provide a secure data and a trustworthy election amongst the people of the democracy. Since aadhar card is the most needed for a person identity hence deploying an election process using it is highly recommendable. Blockchain will be publicly verifiable and distributed in a way that no one will be able to corrupt it.

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COMPARATIVE ANALYSIS OF ELECTRONIC VOTING SYSTEM

Year	IEEE Paper	Author	Technology
2012	Electronic Voting Machine – A Review	D. Ashok Kumar and T. Ummal Sariba Begum	<ul style="list-style-type: none"> • Biometric-based EVM
2013	Online Voting System for India Based on AADHAAR ID	Himanshu Agarwal and G.N.Pandey	<ul style="list-style-type: none"> • AADHAAR ID
2014	Design Imperatives for E-voting as a Sociotechnical System	Steve A. Adeshinl and Adegboyega OjO	<ul style="list-style-type: none"> • e-Voting
2014	Development of Electronic Voting Machine with the Inclusion of Near Field Communication ID Cards and Biometric Fingerprint Identifier	Syed Mahmud Hasan, Arafa Mohd. Anis, Hamidur Rahman, Jennifer Sherry Alam, Soheli Islam Nabil and Md. Khalilur Rhaman	<ul style="list-style-type: none"> • NFC ID Card • Optical fingerprint sensor
2014	Verifiable E-Voting System with Receipt-Freeness	Marwa Mahmoud Badr, Hatem abdulkader and Amany Mahmoud Sarhan	<ul style="list-style-type: none"> • For Encryption (AES, Blowfish and Threefish) • Skein 512 and SHA-1 hashing algorithm • Receipt
2015	Secured Electronic Voting Machine using Biometric	Anandaraj S, Anish R and Devakumar P.V	<ul style="list-style-type: none"> • GSM(Global System for Mobile) module • Fingerprint module
2016	Electronic Voting With Biometric Verification Offline and Hybrid EVMs Solution	Ansif Arooj and Mohsin Riazz	<ul style="list-style-type: none"> • Biohash base fingerprint matching algorithm.
2016	Development of a Credible and Integrated Electronic Voting Machine Based on Contactless IC Cards, Biometric Fingerprint Credentials and POS Printer	Syed Mahmud Hasan, Md. Tahmid Rashid, Md. Shadman Sakib Chowdhury and Dr. Md. Khalilur Rhaman	<ul style="list-style-type: none"> • Contactless IC Cards • Biometric Fingerprint • POS(Point Of Sale) Printer.
2016	Desisting the fraud in India's voting process through Multibiometrics	Vidyasree.P Dr. S.Viswanadha Raju and Dr. G.Madhavi	<ul style="list-style-type: none"> • Enrollment phase • Verification Phase
2017	Biometrically Secured Electronic Voting Machine	Rahil Rezwan, Huzaifa Ahmed, M. R. N. Biplob, S. M. Shuvo,	<ul style="list-style-type: none"> • Arduino • Finger Print Scanner

		and Md. Abdur Rahman	
2017	A Proposed Framework for Biometric Electronic Voting System	Md. Mahboob Karim, Nabila Shahnaz Khan, Ashratuz Zavin, Shusmoy Kundu, Asibul Islam and Brazab Naya	<ul style="list-style-type: none"> • NID(National Identity Card) • Fingerprint • SMS
2017	Secure voting system through SMS and using smart phone Application	X.Ignatius Selvarani, Shruthi.M, Geethanjali.R, Syamala.R, and Pavithra.S	<ul style="list-style-type: none"> • Online Registration • OTP (one time password) • RSA encryption algorithm. • SMS
2017	Smart Electronic Voting System Based On Biometric Identification-Survey	J.Deepika , S.Kalaiselv, S.Mahalakshmi, and S.Agnes Shifani	<ul style="list-style-type: none"> • FingerPrint • Wireless authentication using Zigbee • RFID (Radio Frequency Identification) • Biohashing
2017	Developing Multifactor Authentication Technique for Secure Electronic Voting System	Oke B. A, Olaniyi, O. M, Aboaba A. A, and Arulogun O. T	<ul style="list-style-type: none"> • Feistel block cipher • Biometrics fingerprint • Cryptographically secured smart card
2017	Blockchain Based E-Voting Recording System Design	Rifa Hanifatunnisa and Budi Rahardjo	<ul style="list-style-type: none"> • Blockchain