A BLOCK CHAIN BASED E-VOTING SYSTEM FOR INDIAN-ADDRERSSING SECURITY CHALLENGES WITH AADHAR CARD AUTHENTICATION

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ABSTRACT: The integrity, transparency, and security of the voting process are critical for a functioning democracy. In India, challenges such as voter fraud, tampering, and identity verification issues hinder the efficacy of the traditional electoral system. This paper proposes a blockchain-based e-voting system that aims to address these security challenges while ensuring transparency and tamper-proof voting processes. The system integrates Aadhaar card authentication for voter identity verification, ensuring that only eligible and verified voters can cast their ballots. Blockchain technology is utilized to record each vote in an immutable and transparent ledger, preventing unauthorized tampering and ensuring end-to-end security. Smart contracts are employed to automate the voting process, further enhancing the system's efficiency. The proposed system is designed to provide a secure, transparent, and cost-effective solution for the Indian electoral process, ensuring voter privacy and reducing the risks associated with fraudulent activities. The research highlights how combining blockchain with Aadhaar card authentication can effectively mitigate common security concerns, such as identity theft and vote manipulation, making the electoral process more reliable and efficient.

KEYWORDS: Blockchain, E-voting System, Aadhaar Card Authentication, Security Challenges, Voter Authentication, Transparency, Smart Contracts, Digital Voting, Indian Elections, Voter Privacy, Tamper-Proof Voting, Identity Verification, Secure Elections

1. INTRODUCTION

In free countries, the election process is very important because it lets people choose their leaders and shape the direction of government [1]. But keeping the honesty of this process is very important for protecting

the basic ideas of democracy. Concerns about the safety and dependability of old voting methods have led to a review of election systems around the world in recent years. Voting on paper has been the rule for a long time, but the rise of technology has made it possible for online voting systems to appear, which offer a new way to participate in democracy [2].

Many things about online voting systems are better than traditional voting methods [3]. These include everything from setting up the system to counting the ballots. These methods are appealing in modern election settings because they can make voting easier for everyone, speed up the process, and make results public faster. But switching to online voting comes with some problems and things to think about. The most important thing to talk about when talking about online voting is security, which is very important for making sure that poll results are reliable and legal [4].

It is even more important to deal with security issues in the voting process right away because of ongoing threats like Maoist strikes and vote-rigging in some areas, which threaten both the fairness of the elections and the safety of voters [5]. Voters have been kept from voting because of

threats like these, which shows how important it is to have a stronger and safer voting system that protects people's rights and safety. With this in mind, using online voting methods could help lower security risks and make the election process stronger against outside threats [6].

Security in online voting methods is important for more than just voters' safety; it's also important for keeping the election process private and honest [7]. A key part of voting legitimacy is privacy, which means keeping votes secret and not letting people change or sell votes. In the same way, integrity means making sure that election results are reliable and that votes are counted correctly, so that the outcome of the election can't be changed [8].

Because of these needs, the suggested online voting system aims to meet them by giving people a safe and easy way to exercise their voting rights [9]. The system protects the privacy and accuracy of votes by using advanced encryption and identification methods. This builds trust in the voting process. Also, because online voting is digital, it can be checked and audited in real time, which makes election management more open and accountable [10].

Because of these things, the use of online voting methods is a big change in how elections are run. It opens the door to more fairness, speed, and safety in the political process [11]. With the world changing all the time, using new technologies in voting methods is becoming more and more important to protect the democratic ideas of participation and influence [12].

In the parts that follow, this paper will get into the specifics of online voting methods and look at their possible pros, cons, and effects on the integrity of elections. Through a thorough investigation, we hope to show how online voting has the potential to change the way democracy works and strengthen the roots of modern government.

2. LITERATURE SURVEY

Electronic Voting Machines (EVMs) have been the subject of a lot of study that aims to make voting safer, faster, and easier for everyone. A lot of different methods have been looked at in different studies. These include Raspberry Pi and image processing-based EVMs [1], smart card-based systems [2], mobile-based facial recognition with OTP verification [3], biometric fingerprint authentication with Aadhar cards [4], and facial recognition systems [5].

With the idea put forward by Islam et al. [1], using Raspberry Pi and image processing methods in EVMs shows how cheap technology and powerful image processing algorithms can be used to make voting systems more reliable and useful. Similarly, Keerthana et al. [2] talk about how adding smart card technology can make voting and proving who you are safe and easy, meeting the needs of a diverse group of voters who use different kinds of technology.

Face recognition systems that work on mobile phones, like the one suggested by Mandavkar and Agawane [3], take advantage of the fact that smartphones are so common to make voting safe and easy. This method makes sure that both biometric identification and transaction security are met by mixing face recognition with one-time password (OTP) verification. This makes the vote process more trustworthy.

Biometric identification, especially fingerprint recognition linked to Aadhar cards, looks like a strong way to make sure voters are who they say they are and stop fraud. Mishra et al. [4] describe an EVM that uses digital fingerprint identification and Aadhar card verification to make sure that voters are who they say they are and that the voting process is fair.

A lot of people are also interested in facial recognition technology because it could make voting easier and safer. Vetrivendan et al. [5] suggest a smart voting system that uses face recognition to make voter verification easy to use and effective. Face fingerprints are used in this system to lower the risks of identity theft and fraud, which protects the integrity of the vote process.

Also, improvements in technology have made it easier to create online voting systems, which give voters more ease and access than ever before. R et al. [6] describe a smart voting system that uses online tools to let people vote from anywhere, breaking down barriers of distance and increasing the number of people who vote.

Adding fingerprint identification to online voting platforms makes the voting process even safer and more trustworthy. Naik and Patil [8] suggest a smart voting system that uses face recognition technology to make sure voters are who they say they are and stop people who aren't supposed to be there from getting to the voting platform. Similarly, Prabhu et al. [9] describe an online voting system that uses fingerprint identification to make voting safe and easy for anyone, anywhere.

Advanced security methods and artificial intelligence (AI) programs are used along with fingerprint identification to make online voting systems more strong and reliable. Arputhamoni and Saravanan [10] suggest an online smart voting system that uses biometrics, picture processing, and convolutional neural networks (CNNs) to make sure voters are who they say they are and find cases of fraud. This method uses AI to recognize faces and fingerprints, which makes voting more accurate and safe. It also makes sure that election results are accurate.

Overall, the research shows how important it is to use new technologies like fingerprint identification and online platforms to make voting systems safer, more efficient, and easier for everyone to use. These improvements have the huge potential to protect the democratic ideals of openness, fairness, and inclusion, which will lead to more trust and participation in the voting process.

3. METHODOLOGY

a) Proposed Work:

The suggested work aims to create a safe online voting system with strict security means to keep people from getting in while people are voting. The computer design of

the system makes sure that power is spread out so that votes can't be manipulated. When computer vision methods are used to identify people, the system is safer and more accurate. By putting these steps into action, the suggested online voting system hopes to make the voting process more open and trustworthy, which will build trust among voters and other important people involved.Apply hashing technique for data hiding.surrounding person counting if more than one person detect then our model close webcam if one person detected then we can go for face recognition.After person count clarification only we can move into face recognition,this time person count will stop.
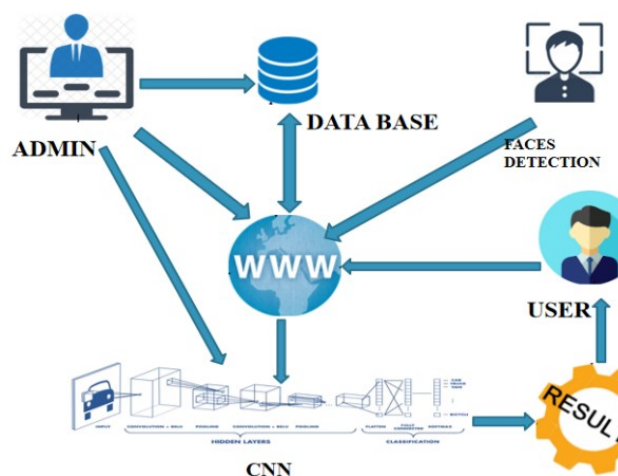
b) System Architecture:

Fig 1 Proposed Architecture

Advanced security measures and deep learning methods are built into the suggested system design for the online voting system to make sure that the voting process is safe and quick. The user interface, the server base, and the login engine are the three main parts that make up the system.

It is easy for voters to safely cast their votes online thanks to the user interface. It has features like multi-factor login and private communication routes to keep out people who aren't supposed to be there and protect voters' privacy.

The server system handles processing and storing voting data, and uses methods for spread power to keep votes from being tampered with. In addition, computer vision methods are used to identify people, which makes the vote process more accurate and safe.

Deep learning techniques are used in the identification module for fingerprint authentication. This makes sure that the accuracy of voter name verification. Using these technologies, the suggested system aims to make the voting process more open, secure, and trustworthy, making the way for a better and more reliable voting system.

c) Modules:

i) Admin:

The admin is in charge of keeping and watching over the system, and they are very important to how it works.

1. Login: the admin logs in to the system safely by using valid passwords. This makes sure that only authorized users can view the data and that the data is safe.

2. Select Candidates: The administrator sets up the list of candidates who are qualified to vote, making sure that the process is accurate and thorough.

3. View: The administrator keeps an eye on and reviews the results of the votes, which promotes openness and helps people make smart decisions.

4. Logout: When an administrator is done with their work, they safely log off to protect the system's security and privacy.

ii) User:

The user, who is also called the voter, is an important part of the voting process because they are practicing their political rights and duties.

1. User Register: Users sign up for the system by giving the information needed for identification and validation. This makes sure that users are eligible to vote and keeps the system's security.

2. User Login: Users safely log in by using fingerprint identity with a video stream or a picture of their face. This makes sure that only allowed people can access the system and protects data.

3. User Vote: Users choose which party or candidate to vote for, which makes them active participants in the election process and changes the results of elections.

4. Logout: When users are done choosing, they safely log out of the app. This protects their privacy and keeps the system running smoothly.

4. EXPERIMENTAL RESULTS
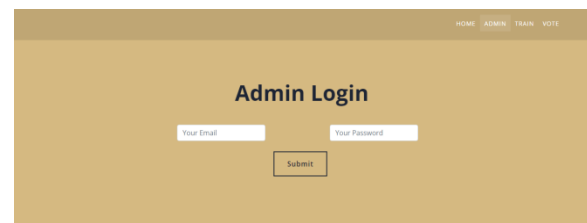

Fig 2 Home Page

Fig 3 Login Page – Admin

Fig 4 Home Page – Admin

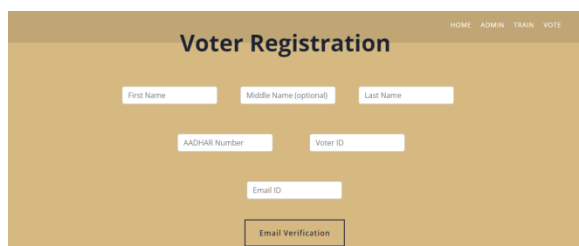Fig 5 Add Nominee Page

Fig 6 Voting Results Page
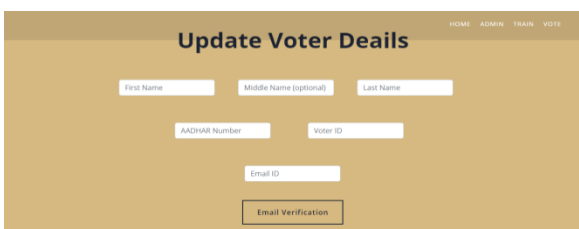

Fig 7 Voter Registration Page
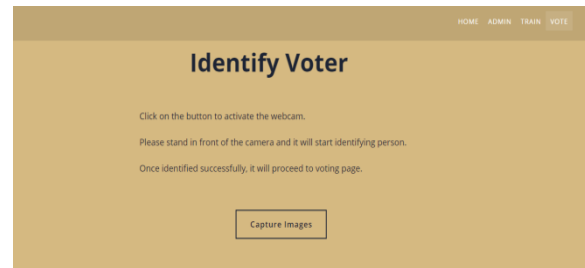

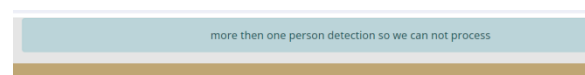Fig 8 Update Voter Details

Fig 9 Identify Voter Page

Fig 10 Surroundings Person Count

5. CONCLUSION

In conclusion, the creation of our online voting system is a big step forward in election technology. It provides a safe, quick, and easy way for people to participate in democracy. By adding new features like face picture registration and email verification with OTP, the vote process is made more secure and open to more people.

Using Frontal Face Haarcascading for face embedding generation makes sure that registered users are correctly identified, which lowers the chances of theft and impersonation. Also, the fact that the administrator has to retrain the model for every new entry shows how serious we are about keeping the system accurate and safe.

We improved the system's speed by using computer vision for picture preparation and video streaming. This makes it possible for users to have smooth experiences and for identification processes to happen in real time.To enhance security we apply hashing techniques for data hiding in the database.

Overall, our online vote method is a big step toward making the voting process more current and open to everyone.Additionally,the system includes a feature to count the number of people in the surroundings before proceeding to face recognition. We are still committed to following the values of democracy and making sure that the voting process is fair for everyone, even as we continue to improve and tweak the system.

6. FUTURE SCOPE

We can add more advanced biometric registration methods, like eye recognition or fingerprint scans, to our online voting system in the future to make it even safer and more accurate. Adding blockchain technology could also provide audit trails that can't be changed, which would protect the accuracy of vote data. The system could also be expanded to support elections at all levels, from the local to the national. It could also be grown up to suit bigger voting

groups. Ongoing study and development can also focus on making features more accessible for a wider range of people, which will lead to more participation in the political process and better inclusion.

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