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DIGITAL VOTING SYSTEM

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Abstract: Digital Voting System seeks to modernize traditional voting methods and Electronic Voting Machines (EVMs). This system utilizes a web-based application, allowing voters to cast their votes from any location worldwide. By integrating facial recognition technology, it improves the precision and security of the voting process. The system includes an Admin Access feature, managed by the election commission, which is responsible for overseeing and conducting elections.For voters, the system offers Voter Access, where they can log in using their voter ID number and a password created during registration. The inclusion of facial recognition technology minimizes the likelihood of fraudulent voting and eliminates the need for manual verification, reducing human error and accelerating the process. Our system provides numerous advantages, including time efficiency, lower workload, real-time information access, and enhanced data protection. Voters can view a list of candidates in their constituency, with key details such as their background, income, and previous work. During elections, voters can log in, select their preferred candidate, and cast their vote. To ensure the integrity of the process, the system uses two-step verification, involving facial recognition and a One-Time Password (OTP), guaranteeing that only authorized individuals can vote and strengthening overall security.

1 .INTRODUCTION

The evolution of India's voting systems has transitioned from traditional paper ballots to the use of Electronic Voting Machines (EVMs). However, despite these advancements, the current systems still face significant issues regarding security and efficiency. To overcome these challenges, this paper proposes the creation of a digital voting platform that incorporates multiple layers of authentication, including Aadhar number verification, face recognition, and Voter ID validation.

Historically, voting methods have advanced from manual counting to more advanced technologies such as punch cards, optical scanners, and mechanical levers. Yet, even with these improvements, the voting process remains complicated and time-consuming, especially considering India’s large population. This complexity often leads to voter disenfranchisement, as the procedures can be cumbersome.

The proposed digital voting system seeks to simplify the voting process by allowing voters to cast their votes securely and easily online. By incorporating Aadhar-based identification, facial recognition, and Voter ID checks, this system offers a comprehensive solution to the

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issues faced by current voting methods, providing a more efficient and secure voting experience for all eligible citizens.

2. LITERATURE SURVEY

Although there is a considerable amount of research on online voting systems, we have critically reviewed and summarized recent and highly relevant studies and projects. It is evident that many of the latest works focus on addressing the challenges of online voting and integrating various information technologies. In our project, the voting process is secured through three stages: the first stage involves facial recognition, the second stage requires verification of the Election ID (EID) number, and the third stage consists of One-Time-Password (OTP) verification using the user's registered mobile phone number.

Meelis Kitsing explains the Estonian digital voting system, where voters use their ID card with a card reader to access the voting platform. They authenticate themselves by entering the personal identification number (PIN1) associated with their ID card. Once the system confirms the voter's eligibility, they can choose a candidate, and their selection is encrypted. The voter then validates their vote by entering a second PIN (PIN2), which functions as a digital signature. The main limitation of this system is the potential for unauthorized voting if someone else gains access to the ID card and PINs, as there is no additional security measure, such as a one-time password (OTP).

Micha Germann, Flurin Conradin, Christoph Wellig, and Uwe Serdül discuss the Swiss online voting system, where voters access the platform using a code found on their polling card. After submitting their vote, they can verify that it has been accurately recorded by using a verification code provided by the system. A key drawback of this system is the lack of facial recognition, which means that someone could potentially cast a vote simply by logging in, without any additional biometric verification.

Joseph D. Enoch and Nne R. Saturday describe the Nigerian digital voting system, where voters log in using a username and password, granting them access to voter registration data, candidate information, and election results. To vote, the voter must scan their fingerprint, and the system must verify it for the vote to be accepted. Administrators can log in to manage candidate and voter data. A major limitation of the system is its exclusive reliance on fingerprint authentication, without the inclusion of facial recognition or two-factor authentication, which would offer an extra layer of security.

Stradiotto et al. introduced a method known as International Direct Digital Election (ID2E). This approach uses Android smartphones and explores the concept of international voting through SMS (Short Message Service) protocols. The goal of this method is to enable secure and accessible voting worldwide by utilizing mobile technology.

A Secure Verifiable Ranked Choice Online Voting System Based on Homomorphic EncryptionIEEE Access, March 2018, Xue Chao Yang, Xun Yi, Surya Nepal, Andrei Kelarev, and Fenagling Han emphasize the need for advanced security measures to effectively implement online voting worldwide. Traditional paper-based elections consume significant resources and contribute to deforestation, which exacerbates climate change. Recent online voting trials in countries like the United States, India, and Brazil have shown that further

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research is essential to enhance security measures in future elections, ensuring the confidentiality, integrity, and verifiability of votes.

Electronic Voting Using Blockchain and Smart Contracts: Proof of Concept IEEE Latin America Transactions 10, October 2020, Faber D. Giraldo, Barbosa Milton C., and Carlos E. Gamboa discuss how blockchain technology has been proposed as a solution to address trust requirements in electronic information systems. Its successful application in cryptocurrencies has opened up opportunities to explore its potential in commercial, industrial, and service sectors, supported by the operational capabilities of Ethereum Smart Contracts and the cryptographic security provided by public and private key encryption.

A Secure End-to-End Verifiable Internet-Voting System Using Identity-Based Blind SignatureIEEE Systems Journal, June 2020, Mahender Kumar, Satish Chand, and C. P. Katti discuss the challenges of implementing end-to-end (E2E) verifiability in internet voting systems. E2E verification allows voters to confirm their ballot is recorded correctly, and the public to verify the accuracy of vote counting. The paper highlights security as a key issue in such systems. It presents an E2E verifiable voting system that offers voter mobility, ensures privacy when voting on public computers, and enables early voting. The system uses the voter's unique ID and biometric features, and introduces a new identity-based blind signature scheme to protect voter anonymity.

A Smart Contract System for Decentralized Borda Count Voting Author - Somnath Panja; Samiran Bag; Feng Hao; Bimal Roy, IEEE Transactions on Engineering Management, Nov. 2020 introduced a decentralized e-voting protocol for ranked-choice voting using the Borda count, which is self-tallying and does not require a trusted setup or a tallying authority. Voters interact via a public bulletin board, ensuring the process is verifiable. The protocol involves two phases: first, voters publish their public keys, and in the second phase, they submit randomized ballots. Voters also provide Non-interactive Zero Knowledge (NIZK) proofs to confirm they followed the protocol without disclosing their votes. At the end, anyone, including third-party observers, can compute the final tally without a central authority.

3. EXISTING SYSTEM

The existing voting system relies on a combination of machines and paper ballots, demanding extensive manpower and resources. This system also faces significant challenges in the vote-counting process, as the tallying is done manually. In the current setup, ballot machines display symbols representing various political parties, and voters cast their ballots by selecting the symbol corresponding to their chosen party. However, the use of counterfeit voter ID cards by individuals poses a risk to the integrity of the process. Additionally, voters are often required to travel considerable distances to reach their designated polling stations. Maintaining order and security at these locations necessitates a large workforce, making it imperative to conclude the election within a single day. The voting schedule and locations are fixed in advance, with polling stations typically remaining open for a minimum of 8 hours on election day.

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4. PROPOSED SYSTEM

The proposed system is designed considering all the drawbacks listed in the existing system.The system supports two groups of users, administrator and voters. Administrator has the permission to create the contestant database and the voter database.Based on the configuration, the voter can use the system for polling.

The system maintains the voting status for every voter. Once voting is completed by the user, the system will not allow again voting for that polling. If a voter makes an incorrect choice, the system allows correcting it. The system can also be configured to announce the results based on timer setting.

This digital voting application incorporates distinct features:

Voter ID Card Verification and OTP: At this verification phase, the system matches the entered voter ID number with the database records. Upon a successful match, a One-Time Password (OTP) is sent to the voter's registered mobile phone number.

Facial Recognition: This step employs facial recognition technology to authenticate the voter's identity by comparing their current image with the one stored in the system database. The application is compatible with Android devices, and voting is restricted to the official election day, as determined by the administrator. For elections with multiple phases, the app will activate and allow voting only on the designated days.

5 METHODOLOGY

To begin using the voting application, it is essential that your voter ID is pre-registered on the website by the administrator, who will handle all user data. If your information is not registered in the system, you will not be able to log in or cast a vote. To log in, users will need to use their voter ID as the username and their date of birth as the password.

Once logged in, the system will require two levels of verification for identity confirmation:

Facial Recognition Verification: Upon selecting this option, your device's camera will activate to capture an image of your face. If the system matches your face with the registered data, you will be granted access to the voting section.

OTP Verification: After selecting this option, you will need to enter your Election ID number. A One-Time Password (OTP) will be sent to your registered mobile number, and upon successful verification, you will be able to proceed to vote.

After completing the verification steps, you will be directed to a page displaying a list of candidates. To cast your vote, simply click on the button next to your preferred candidate. Once you vote, you will be automatically logged out of the system.

At the end of the voting period, the admin will automatically tally the votes and announce the results. The winning candidates will be displayed on the home page, and users can log in again to view the results.

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6. RESULT

The proposed digital voting system brings many benefits. It uses face recognition, OTP verification, and voter ID to confirm voter identity. Only verified voters can cast their vote, which ensures that each person votes only once, preventing double or fake voting. The system allows voting only during a specific time, improving the security of the election. Since there's no need for physical polling stations, the risk of violence is reduced. This automated system simplifies the election process, making it more cost-effective and time-efficient. Voting results are generated quickly and automatically, making the system reliable and easy to use.

7. CONCLUSION

Digital voting system offers several advantages over traditional methods, including reduced costs, faster result generation, improved accessibility, higher accuracy, and lower chances of human or mechanical errors. However, developing a secure and private voting system remains a challenging task. With internet access and a webcam, voters can participate in elections from the comfort of their homes without the need to visit a voting booth. Implementing an online voting system that incorporates facial recognition technology can enhance accessibility, convenience, and security in elections. This technology can help verify voter identities, prevent fraud, and streamline the voting process. Nevertheless, it is crucial to design and implement such a system in a way that protects voters' privacy and personal information, while also preventing bias or discrimination. Additionally, alternative options should be available for those who may lack access to or feel uncomfortable using facial recognition technology. In conclusion, while online voting with facial recognition offers significant improvements, ongoing development should focus on creating a user-friendly system that ensures the security and privacy of votes through proper authentication and processing. By adopting this system, voter turnout can increase, while the time and cost associated with the voting process are reduced. It is also simple to use and time-efficient, with easy debugging capabilities.

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