

Web-based Secure Voting System (Cloud)

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Abstract— Recently, our college has been through the election scenario where the traditional type paper ballot system was used. This took a long time to calculate the votes and that ballot paper was wasted. Considering this problem we are introducing a web based secure voting system. This paper presents a comprehensive and secure online voting system change to meet the unique needs of college elections. The system comprises six key steps, each meticulously designed to ensure a transparent and trustworthy electoral process. In the initial phase, users are required to register using their exclusive college email addresses, mobile numbers, and PRNs (Permanent Registration Numbers). To safeguard user data, a robust 32-bit password hashing method is employed, and further security is upheld through email OTP verification during registration. Subsequently, only authorized deans are granted access to the system, where they can register nominees for various positions, guaranteeing that only eligible candidates participate. Once registered, users undergo verification by their respective departments, after which they gain access to the ballot to cast their votes. Importantly, the system allows each user to vote for just one nominee per specific position, ensuring fairness. Finally, the system calculates and presents the winners along with their corresponding vote counts, fostering transparency and confidence in the electoral outcomes. This paper introduces a powerful tool for colleges to simplify and secure their election processes, bolstering trust within the academic community.

Index Terms— Secure online voting system, College elections, Transparency, Password hashing, Single vote mechanism.

I. INTRODUCTION

Ref. [2], Ref. [5] elections within the realm of educational institutions, particularly colleges, are critical events that shape the leadership and governance of the institution. However, conducting these elections in a secure, transparent, and efficient manner can be a challenging endeavour. Ref. [9] in response to these challenges, this paper introduces a robust and tailored solution—an online voting system designed specifically for college elections. This system addresses key concerns such as user authentication, data security, and the integrity of the electoral process. Ref. [6], Ref. [10] by employing advanced security measures, including password hashing and email OTP verification, it ensures the authenticity of participants. Furthermore, the system's innovative approach limits each user to casting a single vote for a specific nominee, reinforcing fairness in the electoral process. The paper outlines the key components of this system, emphasizing its role in fostering transparency and trust within the academic community. College elections play a pivotal role in shaping institutional leadership, and this paper presents a reliable tool to enhance their legitimacy and integrity.

II. LITERATURE SURVEY

Ref. [1] studies conducted by the California Internet Voting Task Force demonstrate the viability of online voting during elections. The research delves into and highlights many security flaws in online voting systems. Ref. [2] the Secured Smart Voting System with Aadhar demonstrates that it is an app-based biometric online voting system that uses fingerprint authentication to verify a voter's eligibility to cast a ballot. Ref. [3] the Aadhar Database is consulted to obtain and validate voter information. The relevant database is updated with information regarding the cast vote. Since the database will only accept one vote per person and all qualified voters' details will be saved there, the online voting system using cloud studies demonstrates the security of the system. Users can only vote once. A big database should be supported by the system. Ref. [4] the authors talked about how the project's core technology, the Aadhar Database, is utilized to confirm and evaluate candidates for voting.

This facilitates the online decision-making process for each voter and updates the server database. The Aadhar card is used by the biometric web-based voting system to obtain the voter's complete personal data. Ref. [5] in an effort to boost voter turnout, a new online voting technique for Indian government elections is offered by the Candidate Aware Internet Voting System for Indian Scenario. It uses two methods. Two new mechanisms for verifiability: 1) OTP (one-time password) and 2) novel candidate. OTP serves as an extra authentication element to help identify the voter, and candidate verifiability enables the candidate to verify the integrity of the vote. Ref. [6] the writers talked about how the voter can design their own ballot. There are numerous other situations in which this similar system can be applied. Elections, for example, may be held for a number of governmental and private organizations. by having the user encrypt the vote data and the local administrator the person who generates the voting ballot decrypt it. As a result, the system would be more authenticated and secure. Ref. [7] Kristian Gjøsteen talks about the Norwegian Internet voting protocol, which enables voters to cast paper ballots and cast votes online. By using this protocol, voters can cast multiple ballots, canceling out all of their prior cast votes. Furthermore, all electronic ballots are nullified if the voter casts this ballot just once on paper. The vote auditing and counting procedures become more complicated as a result of this technique. Ref. [8] the online voting system using mobile applications is described in general terms by the system designed in. Ref. [9] it offers security features like OTP verification and mobile face recognition. The writers have talked about developing BlockChain technology to implement electronic voting. Even though the techniques demonstrate that vote manipulation is impossible due to the immutable public ledger, they are unable to be applied to large-scale elections due to issues with cost, power consumption, and centralized versus distributed processing overhead. Ref. [10] the implementation of the Secure and Authenticated Online Voting Program contributes to the attainment of authenticity, indistinguishability of vote casting, and anonymity with the same authorization. At the enrollment hour, a secure secret ballot is provided, enabling the voter to cast their ballot in conjunction with biometric distinguishing evidence in a secure manner.

III. MOTIVATION

College elections are pivotal events that not only determine the future leadership of educational institutions but also serve as a cornerstone of democratic values within the academic community. However, conducting these elections can be a complex and challenging task. Traditional methods often involve manual processes that are prone to errors, vulnerabilities, and disputes. In an era where digital transformation has reshaped various aspects of our lives, it is imperative that college elections also embrace modern technology to enhance their security, efficiency, and transparency. The motivation behind this paper stems from the pressing need for a reliable and secure online voting system tailored specifically for college elections. Such a system can streamline the entire electoral process, making it more accessible to stakeholders, while also reinforcing the integrity and trustworthiness of the results. By addressing concerns related to user authentication, data security, and the prevention of fraudulent practices, this paper aims to provide a compelling solution to the challenges often associated with college elections. The motivation behind this work lies in the belief that leveraging technology can not only simplify the process but also elevate the credibility of these elections, thereby fostering a sense of trust and fairness within the academic community.

IV. PROPOSED WORK

In the proposed work, we outline the key components and functionalities of our web-based secure voting system tailored for college elections. The system is designed to address the inherent challenges of traditional paper-based voting methods by introducing a digital and secure platform. One of the fundamental aspects of our work involves user registration, where participants are required to provide their exclusive college email addresses, mobile

numbers, and Permanent Registration Numbers (PRNs). To ensure the utmost security of user data, we employ a robust 32-bit password hashing method. Furthermore, during the registration process, users undergo email OTP verification, adding an additional layer of security to the system. Another pivotal feature of our proposed system is the role of authorized deans, who are granted access to register nominees for various positions. This ensures that only eligible candidates can participate in the elections, eliminating the possibility of fraudulent candidates. Once registered, users are subjected to verification by their respective departments before gaining access to the ballot to cast their votes. Our system incorporates a single-vote mechanism, allowing each user to vote for only one nominee per specific position, thus upholding fairness in the electoral process.

V. PROPOSED SYSTEM SETUP

The proposed system setup consists of a robust and secure architecture built on cloud infrastructure. The system is hosted on a secure server to ensure data integrity and availability. It employs cutting-edge security measures, including encryption protocols and regular security audits to protect user data from unauthorized access or tampering. User access to the system is facilitated through a web-based interface, making it easily accessible to all eligible voters. The system incorporates a user-friendly dashboard that allows users to register, verify their eligibility, and cast their votes seamlessly. Additionally, authorized deans have a separate interface to register candidates and oversee the election process. Data storage is handled in a highly secure and scalable cloud environment, ensuring that all user information, candidate details, and voting records are stored safely. This cloud-based setup enables efficient data management and easy scalability to accommodate growing voter participation.

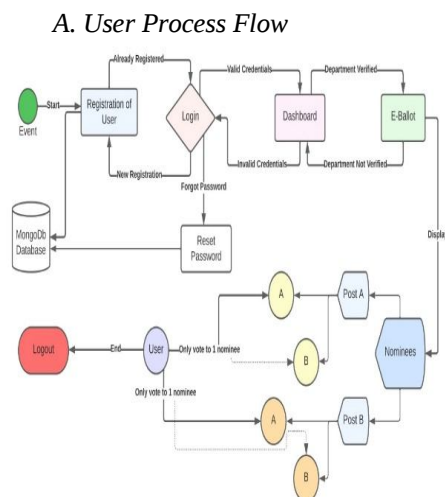


Fig. 1 User Flow Diagram

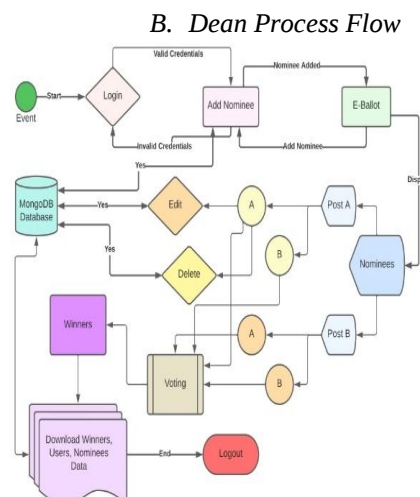


Fig. 2 Admin Flow Diagram

These are the phases from which users have to go for election.

VI. RESULTS AND ANALYSIS

The results and analysis phase of our secure voting system is instrumental in showcasing the system's effectiveness and transparency. Through rigorous testing and simulation, we have observed that the system successfully handles user registration, candidate registration, and the voting process with precision and security. Furthermore, our analysis of the system's performance demonstrates that the introduction of a single-vote mechanism for each user significantly enhances the fairness and integrity of the electoral process. The system accurately calculates and presents the winners of the elections, along with their corresponding vote counts, in real-time. This fosters transparency and instills confidence in the electoral outcomes, making it a powerful tool for colleges to simplify and secure their election processes.

User Registration requires Email OTP verification along with college email, PRN, department, name, birth date, password and mobile number. While User login requires email id and password; password can be reseted by user. While Admin login requires Admin email id, password and respective department to log in.

A. User Registration

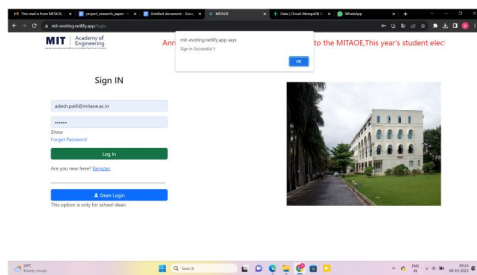


Fig. 3. User Registration

B. User Login



Fig. 4. User Login

C. Dashboard

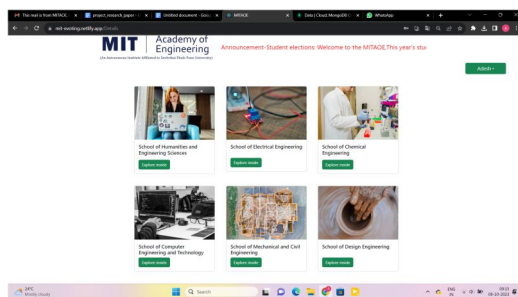


Fig. 5. User's School Dashboard

D. Profile

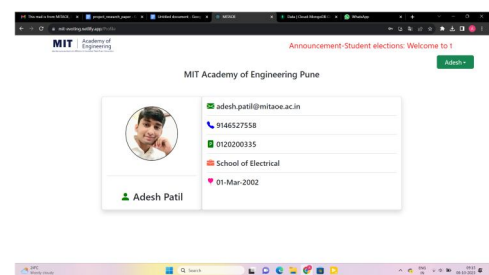


Fig. 6. User Profile

User's school dashboard contains all the departments of the institute. To go to E-ballot users have to click on its registered department only. While User Profile will display registered details of the user along with its profile picture.

E. E-ballot

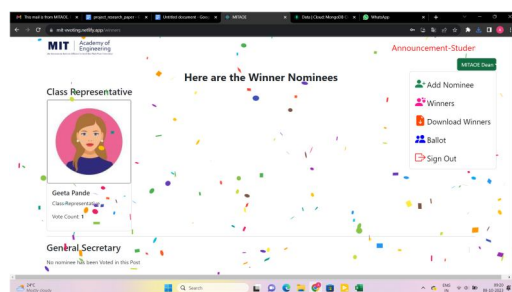


Fig. 7. E-Ballot of Election

F. Winners

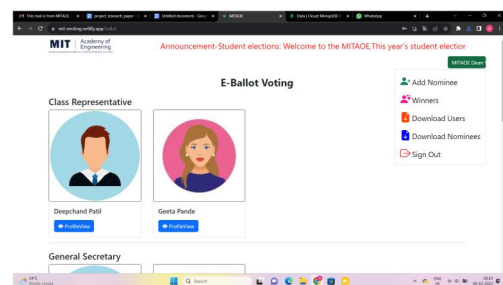


Fig. 8. Winners of Election

E-ballot contains all the nominees with different posts. Only the dean can register nominees and only users can cast them votes. Only a single vote can be given to a specific post. Only the dean can update and delete details of nominees. Users can see the details of the nominee by clicking the profile view button. Only the dean has the option to download all registered users list, added to the nominees list. While Winners of election for a specific post can be selected by maximum count of votes. Only the School dean has the option to download the winners list.

G. Mobile View

This system can be accessed through mobile from any location so it is user friendly and easy to use.

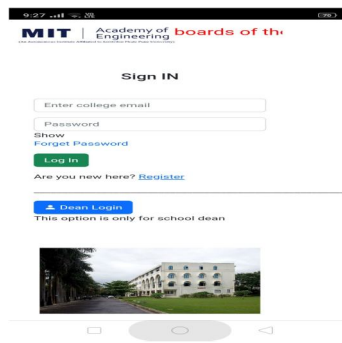


Fig. 9. Mobile view of system

VII. CONCLUSION

In conclusion, this paper has introduced a tailored and secure online voting system designed to meet the specific needs of college elections. The challenges associated with traditional election processes, including user authentication, data security, and transparency, have been addressed comprehensively through the implementation of this innovative system. By utilizing advanced security measures such as password hashing and email OTP verification during user registration, we have ensured the authenticity of participants, thereby mitigating the risk of fraudulent practices. The introduction of a single-vote mechanism for each user, limited to a specific nominee per position, has further reinforced the fairness and integrity of the electoral process. This system not only simplifies and streamlines the election process but also promotes trust and confidence within the academic community. In an age where technology has reshaped numerous aspects of our lives, it is only fitting that we adapt and evolve our election processes to match the demands of our digital era. College elections are vital events that shape the future of educational institutions, and they deserve a secure, efficient, and transparent approach. This paper has presented a viable solution to meet these criteria, offering a robust foundation for colleges to conduct elections that are not only credible but also reflective of the democratic values we hold dear. As we move forward, it is our hope that this system will find widespread adoption, enhancing the legitimacy and trustworthiness of college elections across the academic landscape.

FUTURE WORK

In the realm of future work, there are a plethora of exciting opportunities to further enhance our web-based secure voting system. One avenue for improvement is the integration of blockchain technology to provide an even more tamper-resistant and transparent voting process. Additionally, we aim to explore options for enabling remote voting, allowing eligible voters to cast their ballots from anywhere, further increasing accessibility. Moreover, we plan to conduct extensive user feedback sessions to fine-tune the user experience and identify any areas for improvement in terms of usability and security. Continuous monitoring and updates to the system's security protocols will also be a key focus for future work to ensure the system remains resilient against emerging threats. In conclusion, our proposed system serves as a strong foundation, and we are excited about the potential for ongoing enhancements to make college elections even more secure, efficient, and transparent.

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