International Journal of Synergy in Engineering and Technology
IJSET
Journal homepage: https://tatiuc.edu.my/ijset/index.php/ijset/ e-ISSN: 2735-0622

COLLEGE COMMUNITY ONLINE VOTING SYSTEM

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KEYWORDS

Online Voting

Academic Institutions

Digital

ABSTRACT

This article examines the creation and execution of a College Community Online Voting System, aimed at modernising the election process in academic institutions through the use of digital technology to improve participation, security, and administrative efficiency. The main aim of this system is to offer a seamless, accessible, and secure platform for executing diverse voting activities, such as student elections, faculty surveys, and decision-making procedures. Through the resolution of the drawbacks associated with conventional paper-based voting, including difficulties with administration, vulnerability to fraud, and restricted accessibility, this technology seeks to enable a more equitable and effective voting process. The project involves developing a web-based application that includes characteristics necessary for a democratic voting process, such as secure user authentication, real-time vote tracking, and robust data protection methods. The system utilises sophisticated cryptographic methods and stringent security rules to guarantee the integrity and confidentiality of each vote, alleviating concerns regarding data tampering and unauthorised access. The system's efficacy and user-friendliness have been demonstrated through a pilot implementation in a college context, which has resulted in significant improvements in administrative workflow and voter engagement. Feedback from this pilot indicates a substantial improvement in the overall voting experience, with users valuing the system's user-friendliness and the dependability of the voting process. The innovation of the proposed system resides in its customised strategy for meeting the distinct requirements of academic institutions, integrating modern web technologies with specific security protocols to develop a platform that is both versatile and secure. This method establishes a standard for future advancements in digital voting systems and enriches the wider discussion on the incorporation of technology in democratic practices within educational settings. The College Community Online Voting System demonstrates the capacity of technology to enhance democratic participation and administrative effectiveness in educational environments.

Received 10 October 2024; Revised 27 January 2025; Accepted 31 August 2025; Published 31 October 2025

1.0 INTRODUCTION

As technology continues to advance and digital solutions become more common, updating traditional systems is becoming increasingly important. This project aims to create an online voting system for our college community. The goal is to make voting more accessible, increase participation, and improve voter engagement. Voting methods have come a long way, from counting hands to using paper ballots, punch cards, and electronic machines [1]. Modern electronic voting systems offer benefits like better accuracy, convenience, flexibility, and mobility [2]. However, these systems also have some issues, such as taking a lot of time, requiring a lot of paperwork, lacking direct oversight, and having problems like machine damage or difficulties with updating multiple items at once. An Online Voting System can address these problems. It allows voters to cast their votes from anywhere in the country without having to go to a polling booth. This secure method of voting helps reduce the risk of violence and is likely to increase voter turnout [3]. The Online Voting System presents a significant improvement over traditional and electronic voting methods by addressing their limitations and offering numerous advantages [4]. By enabling voters to cast their ballots from any location, the system increases accessibility, particularly for those who may face challenges in reaching physical polling stations. Enhanced security measures, such as encryption, protect the integrity of the voting process, reducing the risk of tampering and fraud [5]. Additionally, the system streamlines the voting process, cutting down on the time and paperwork involved, and facilitates quick and accurate vote counting [6]. This convenience not only encourages higher participation rates but also makes the voting process more efficient and cost-effective by minimizing the need for physical materials and staffing. To ensure the successful implementation of the Online Voting System, it is important to focus on several key areas [7]. The development and rigorous testing of the platform are essential to confirm its functionality and security. Comprehensive training for both voters and election officials will be necessary to ensure smooth adoption and use of the system [8]. Ongoing support and maintenance will be required to address any issues and keep the system operational. By effectively addressing the shortcomings of traditional and electronic voting methods [9], the Online Voting System can provide a more inclusive, secure, and efficient voting experience, leading to greater voter engagement and participation within the college community.

2.0 LITERATURE REVIEW

The integration of online voting systems into college communities represents a significant evolution in democratic participation within educational institutions [10] ,[11]. By shifting from traditional paper-based voting to electronic platforms, colleges and universities can offer a more accessible, efficient, and secure way for students to engage in decision-making processes [12]. This literature review examines existing research on online voting systems, focusing on their application within college settings. Key areas discussed include the advantages of online voting, security concerns, challenges in implementation, and the role of technology in ensuring a transparent and trustworthy system.

2.1 Overview of Online Voting System

Online voting systems have been implemented across various domains, from governmental elections to private sector decision-making processes. [13] In the context of college communities, these systems offer a modern alternative to traditional voting methods. Electronic voting (e-voting) systems are defined as digital platforms that allow voters to cast their ballots electronically through the internet or an intranet system. These systems have gained traction in college environments due to their ability to enhance convenience and accessibility, particularly for students who may be geographically dispersed or have time constraints [14]. The primary goal of an online voting system is to ensure that the democratic process remains as accessible as possible while maintaining the integrity and security of the voting process. According to [15], an online voting system for a college

community must meet several key criteria: it should guarantee voter anonymity, ensure that eachvoter casts only one vote, and provide transparency in the voting process. These criteria are essential to the development of a secure and reliable voting platform for academic communities.

2.2 Online Voting in College Communities

The use of online voting systems in colleges and universities has been linked to an increase in voter participation, particularly among younger voters who are more accustomed to digital technologies. Research suggests that implementing an online voting system within a college community can improve accessibility and convenience, encouraging more students to engage in elections and referendums [12], [15]. Furthermore, online platforms enable students who are off-campus or have limited availability to cast their votes without having to physically attend voting booths, thereby removing barriers to participation. [11], [16] conducted a case study on the implementation of an online voting system at a university, demonstrating that the transition to an electronic voting platform increased voter turnout by 15%. The study found that students were more inclined to vote when provided with an easy and accessible way to do so. This increase in voter participation is a significant advantage for college communities, where fostering democratic engagement among students is a key objective.

2.3 Security and Privacy Concerns

While online voting systems offer numerous benefits, they also pose significant security and privacy challenges. Ensuring that votes are cast anonymously and securely, without the possibility of manipulation or fraud, is critical for maintaining trust in the system. The literature on e-voting highlights several security measures designed to protect the integrity of the voting process. These include encryption, digital signatures, and end-to-end verifiable voting protocols [16] argues that any online voting system, particularly those used in sensitive environments like college communities, must be designed with a strong focus on security. The author emphasizes the importance of verifiable secret-ballot elections, where voters can confirm that their vote was cast correctly without revealing their choice to anyone else. This is particularly important in college elections, where transparency and fairness are critical to maintaining student trust in the election process.

2.4 Technology solutions for Secure Voting

The technological framework of an online voting system plays a crucial role in ensuring its reliability and security. Blockchain technology, in particular, has emerged as a potential solution for addressing security concerns in e-voting systems. Blockchain's decentralized nature ensures that all votes are recorded transparently and securely, making it difficult for any single entity to alter or manipulate the results [17] proposes a blockchain-based architecture for online voting systems, highlighting its potential to enhance transparency and security. The study shows that blockchain can provide an immutable record of votes, allowing participants to verify that their vote was counted correctly without compromising their anonymity. In the context of college communities, implementing a blockchain-based voting system could significantly reduce the risk of fraud and ensure that the election process is fair and transparent.

2.5 Challenges in Implementation Online Voting Systems

Despite the benefits of online voting systems, there are several challenges associated with their implementation. Technical issues, such as system downtime, software bugs, and difficulties in ensuring user accessibility, can hinder the smooth operation of an online voting platform. Furthermore, concerns about voter fraud, hacking, and data privacy remain prevalent in the literature on e-voting systems [18] explores the risks associated with online voting, cautioning that without proper safeguards, these systems can be vulnerable to attacks. The author identifies several risks, including hacking, phishing attacks, and the potential for vote manipulation by external parties. For college communities, addressing these challenges is crucial to ensuring the success of an online voting system. Implementing robust security protocols, conducting regular system audits, and providing user training are essential steps in mitigating these risks.

2.6 Enhancing Student Engagement Through Online Voting

One of the key advantages of online voting systems is their potential to increase student engagement in the electoral process. Research has shown that online voting platforms can encourage higher levels of participation, particularly among younger voters who are more comfortable using digital technologies [18]. In college communities, where student engagement in elections is often low, online voting systems can provide a more accessible and appealing way for students to get involved. [19] highlights how digital platforms can enhance civic engagement, noting that younger voters are more likely to participate in elections when they can do so online. In the context of a college community, offering an online voting option could increase participation in student government elections, club leadership elections, and referendums, thereby promoting a more democratic and engaged campus environment.

3.0 METHODOLOGY

The system design and architecture for this paper focus on delivering a secure, user-friendly, and efficient platform.

3.1 System Flow

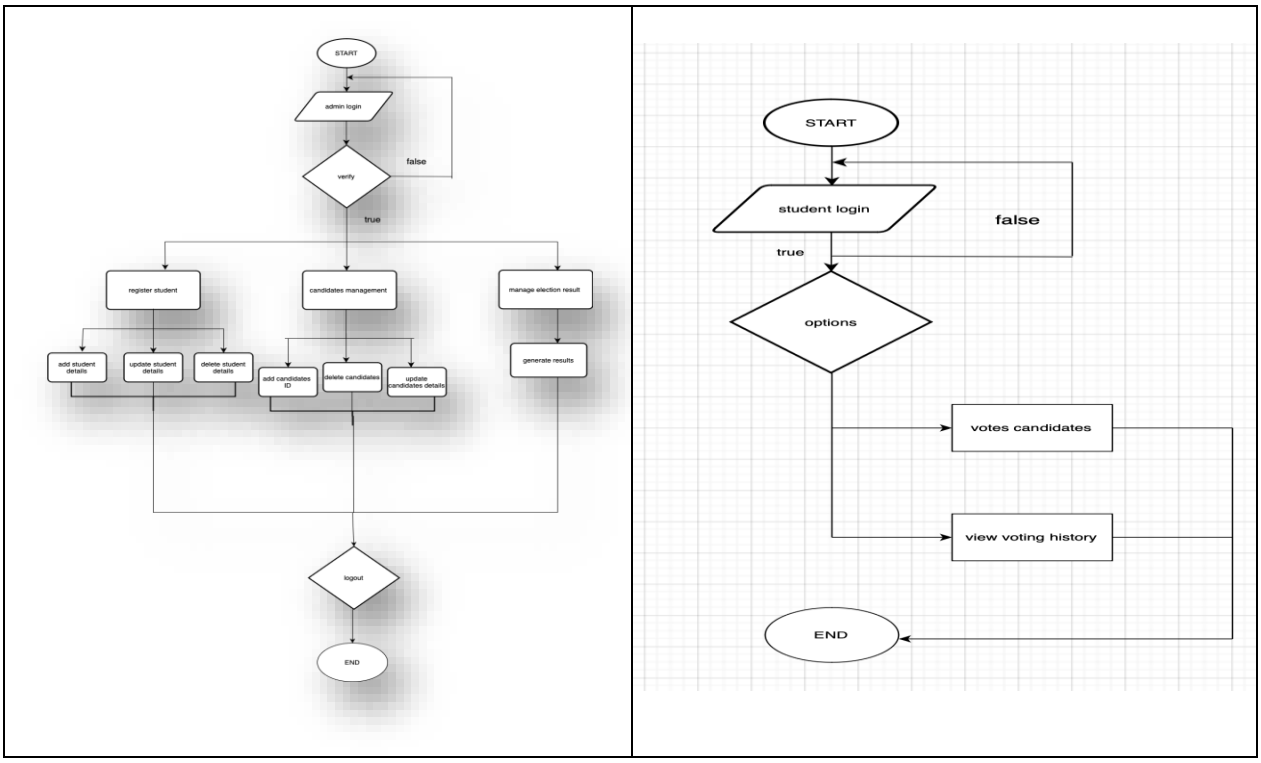

Figure 2 illustrate the system flow for the Online voting system.

3.2 Design

In the design phase, the blueprint for the online voting system is created. This includes outlining the system's features, user interface, and security measures [20]. During this phase, the project team would design the layout of the voting platform, develop user workflows, and determine how to handle

security and data protection. This phase ensures that the system's design is user-friendly, secure, and meets the project requirements established during the analysis phase.

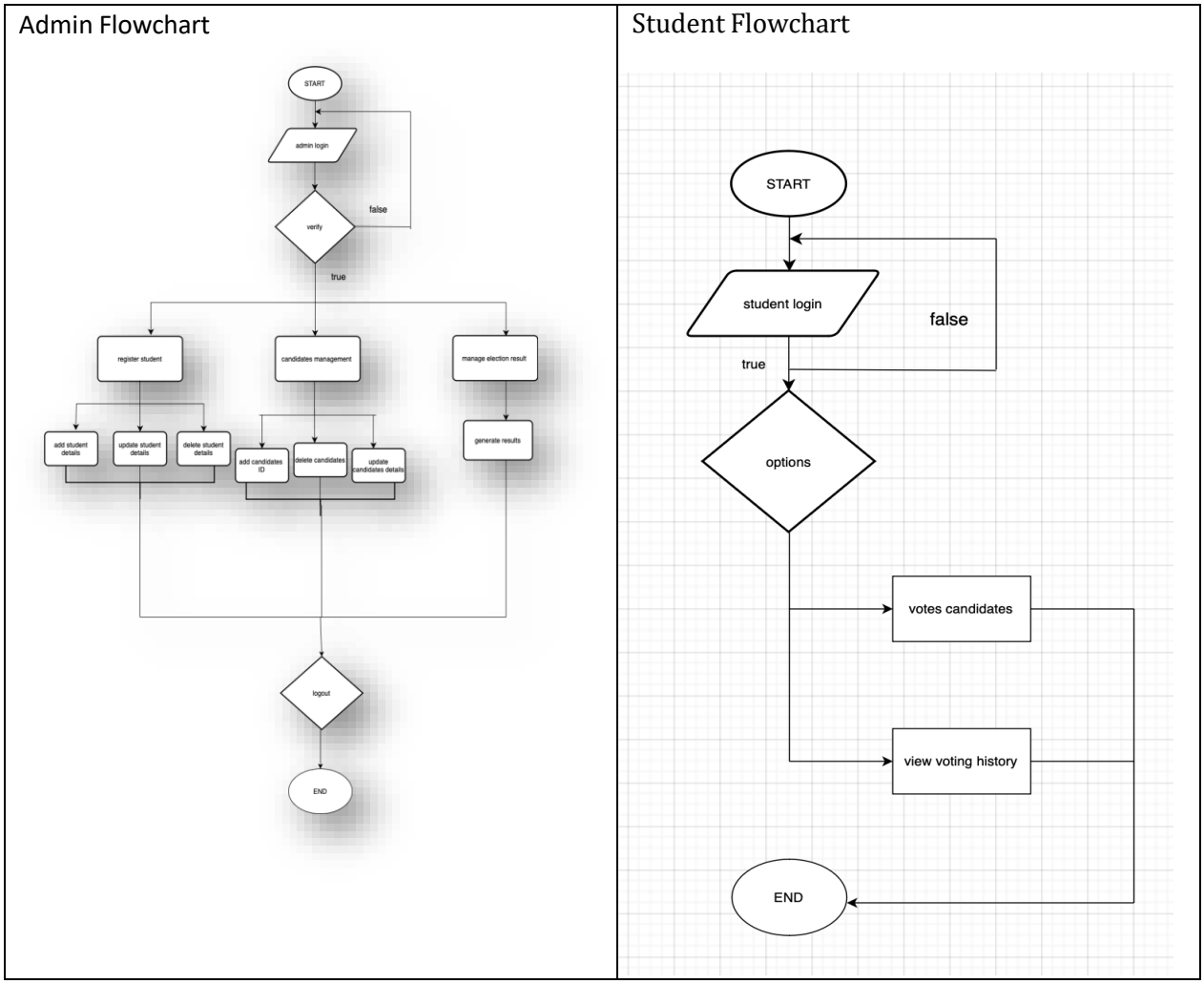

Figure 2: Admin and student flowchart

3.3 Development

This phase involves the actual creation of the online voting system. It includes coding, configuring software, and integrating the designed features into a functional platform. The development phase also encompasses testing the system to ensure it works as intended and making any necessary adjustments [21], [22]. For this project, development ensures that the system is built according to the design specifications and is ready for deployment. Below is hardware and description for development this project.

Table 1: Hardware development

HARDWARE	**DESCRIPTION**
Laptop	Macbook Air M1
RAM and System Type	8 GB
OS	Macos ventura 13.5.1
Processor	ARM processor
Input device	Apple mouse

Table 2: Software configuration

SOFTWARE	DESCRIPTION
MySQL	Is a relational database management system
Flutter	Google's portable UI toolkit for crafting beautiful, natively compiled applications for mobile, web and desktop from a single codebase.
XAMPP	Is a free platform that allows developers to test their code locally on their own computers

3.4 Implementation

During the implementation phase, the online voting system is rolled out to the college community. This includes setting up the system for use, providing training for voters and election officials, and offering support during the initial use of the system [23], [24], [25]. Implementation ensures that the system is effectively integrated into the existing voting process and that users are able to use it confidently.

Figure 3: User interface admin login

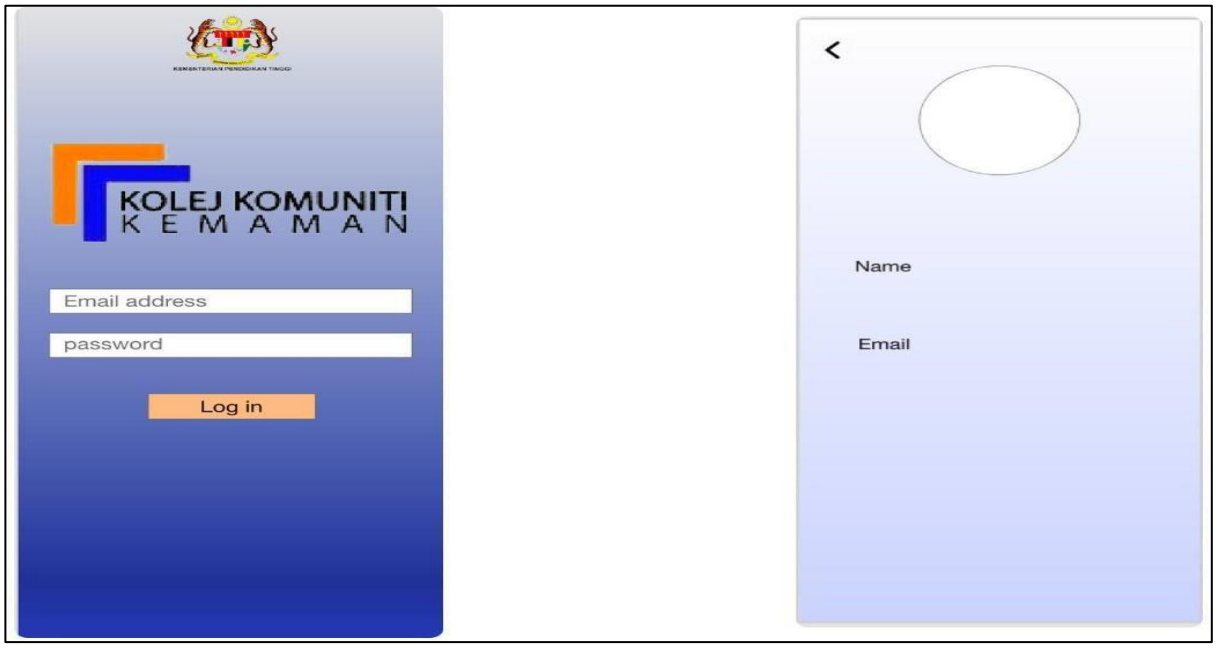

Figure 4: User Interface admin logout

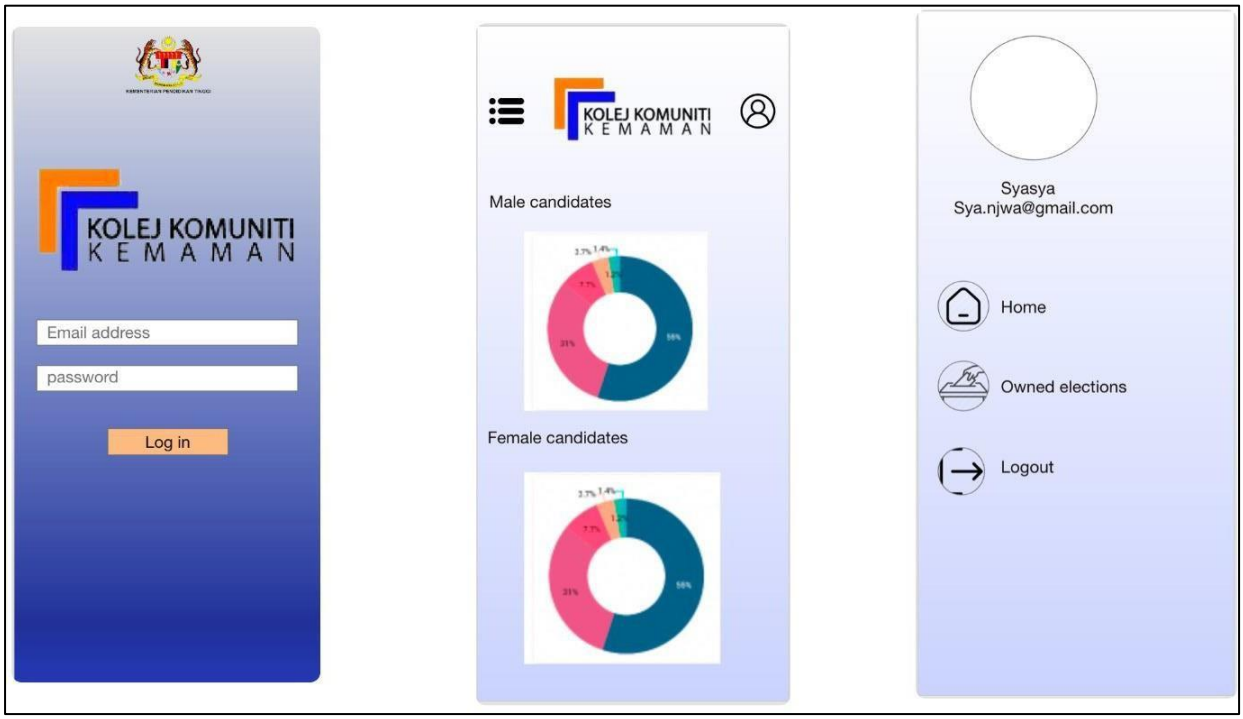

Figure 5: Candidate login

Figure 6: Candidate and student logout

Figure 7: Homepage and sidebar

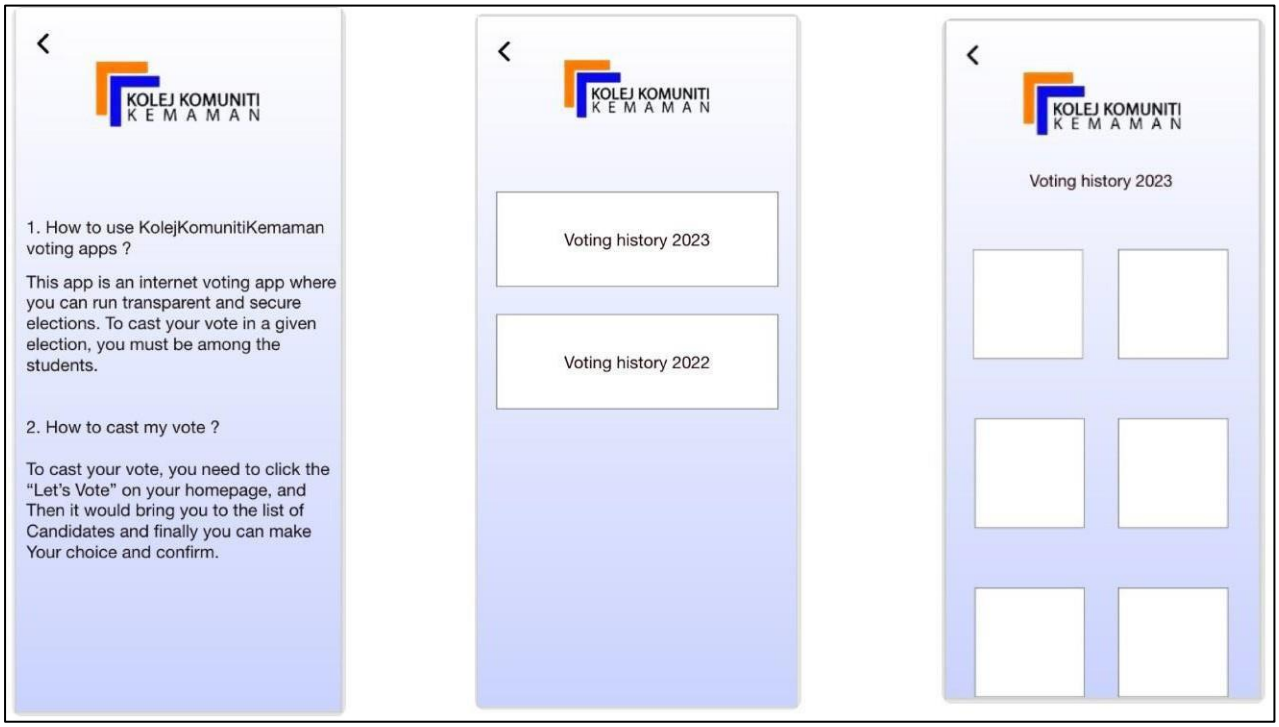

Figure 8: User interface FAQ and voting history page

3.5 Evaluation

The final phase involves assessing the effectiveness of the online voting system. This includes collecting feedback from users, evaluating system performance, and identifying any issues or areas for improvement [22], [26]. Evaluation ensures that the system meets its goals, such as increasing voter participation and improving security, and provides a basis for making any necessary adjustments or enhancements.

4.0 RESULTS AND DISCUSSION

The implementation of the College Community Online Voting System has provided significant insights into its performance, security, and overall effectiveness. The system has shown impressive operational reliability, maintaining high uptime throughout its deployment. Usability evaluations reveal that the majority of users found the interface to be intuitive and effective, contributing to a positive overall user experience. Feedback from participants consistently highlighted the system's ease of use and the efficiency with which it facilitated the voting process. Regarding security, the system has employed advanced encryption and multi-factor authentication to safeguard against unauthorized access and ensure the integrity of the voting data. Comprehensive security audits were conducted, confirming that the system successfully protected against tampering and maintained data confidentiality. Integrity checks demonstrated that the system reliably recorded and counted votes without evidence of data corruption, thereby affirming the robustness of its security measures. The online voting system has markedly improved accessibility, allowing participants to vote from any location and significantly reducing physical barriers associated with traditional polling stations. Preliminary data suggests an increase in voter participation compared to previous election cycles using paper ballots and electronic machines. This improvement is attributed to the enhanced convenience and wider reach of the online platform, which facilitates greater engagement from a diverse range of voters. Efficiency and cost-effectiveness have also been enhanced by the system. The transition to an online platform has streamlined the voting process, reducing the time and resources required for election administration. The elimination of paper-based procedures and automation of vote counting have minimized administrative overhead and reduced the potential for human error. Feedback from administrative staff indicates that these changes have led to a more accurate and timely vote tallying process. Implementation challenges included technical issues and initial resistance from users familiar with traditional voting methods. These challenges were addressed through iterative updates and comprehensive training, which resolved technical problems and facilitated smoother adoption. Integration with existing administrative systems was achieved, further enhancing operational efficiency. In summary, the College Community Online Voting System has demonstrated considerable improvements over traditional and electronic voting methods. It has enhanced accessibility, security, and efficiency, offering a valuable model for future digital voting solutions within academic institutions. The positive feedback from users and the operational benefits observed underscore the system's effectiveness in meeting its objectives.

5.0 CONCLUSIONS

The development and implementation of the College Community Online Voting System represent a significant advancement in the modernization of electoral processes within academic institutions. This study highlights the system's effectiveness in addressing many of the limitations inherent in traditional and electronic voting methods. By providing a secure, accessible, and efficient platform for

voting, the system not only enhances the convenience for voters but also improves administrative efficiency and accuracy. The results of this project demonstrate that the online voting system successfully achieves its primary objectives: increasing voter participation, improving engagement, and ensuring the integrity of the voting process. The high operational reliability and positive user feedback reflect the system's effectiveness in creating a user-friendly and reliable voting experience. Enhanced security features have proven to safeguard the integrity of the votes, while the improved accessibility has facilitated greater inclusivity and participation among the college community. Moreover, the system has proven to be a cost-effective solution, reducing the administrative burden associated with traditional voting methods and minimizing the potential for errors in vote counting. The transition to a digital platform has streamlined election processes and significantly cut down on the logistical and financial resources required for conducting elections. However, the implementation of the system also highlighted some challenges, including initial technical difficulties and user adaptation issues. Addressing these challenges through iterative improvements and comprehensive training has been crucial for the successful deployment of the system. These experiences offer valuable insights for future digital voting implementations and underscore the importance of ongoing support and system maintenance. In conclusion, the College Community Online Voting System exemplifies the potential of digital solutions to enhance democratic processes within educational settings. By providing a more accessible, secure, and efficient voting mechanism, the system sets a precedent for future developments in online voting technology. The positive outcomes observed in this project suggest that similar systems could be beneficial in other academic and organizational contexts, contributing to more effective and inclusive democratic practices.

Author Contribution

Muhamad. Rostan: Supervision, methodology, investigation, writing and editing. Nur Syasya Najwa: Methodology, conceptualization and Development.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

The authors acknowledge the University College TATI for providing the equipment that makes this work possible.

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