International Journal of Engineering Inventions
e-ISSN: 2278-7461, p-ISSN: 2319-6491
Volume 12, Issue 4 [April. 2023] PP: 254-260

Real Time Digital Voting Management System

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Abstract*—The aim of the "Online Voting System" project is to simplify the process of voting in any type of election, as the traditional methods in India involve individuals visiting voting stations and casting their votes using either ballot papers or EVM machines. However, this system has drawbacks, such as people from various locations not being able to cast their votes if they don't have their voting cards and poor user validation. Additionally, the conventional voting system involves a lot of manual work, making it a time-consuming process. To overcome these issues, this project proposes the development and testing of an online voting system that is highly secure, user-friendly, and reliable. Users, candidates, and Election Commission Officers can all participate in online voting, with users registering by providing personal details and an image of their face, which is stored in a central database. Once the voting date is fixed, users receive notifications on their Android phones via Google Cloud Messaging. Upon opening the application, face authentication is done at the server-side using a One-Time Password (OTP). If the user is verified as valid, an OTP is sent to their email address, which they use to access the voting form, cast their vote, and then log out.*

Keywords*—Online voting system, Voter authentication, Biometric identification, security, AADHAAR ID based online election.*

Date of Submission: 08-04-2023 Date of acceptance: 21-04-2023

I. INTRODUCTION

The traditional voting methods are lengthy and prone to errors. A new approach has been developed that uses an Android application to improve the performance of voting systems. The proposed system allows voters to cast their votes from anywhere at the scheduled time after receiving a notification on their mobile device. The proposed model ensures efficient voter authentication by requiring users to be registered before casting their votes. Using a smartphone camera, the model captures the user's face and authenticates it; if the face matches, the authentication is successful, otherwise, the user cannot vote. This online voting system enables every voter to exercise their right to vote from any location in the country in a secure and efficient manner. A detailed description of the system's functional and performance characteristics is provided. Voters no longer have to travel

to polling stations, and can now cast their ballots with ease and security.This leads to an increase in voter turnout, which not only improves the overall percentage of voters but also enhances the safety of the voting process by reducing the risk of violence.

The current manual voting system is time-consuming for voters who have to spend a significant amount of time at a polling station to vote for their desired candidate. The process is complicated, as the election officials must first verify the eligibility of the voter to cast a vote in that particular booth, and then check their information listed on the voter list at the booth. Once that information is confirmed, the voter can cast their ballot. This manual system relies on paper ballots, making it difficult to locate a specific candidate, and some voters may even cast their vote for all candidates.In order to solve the issues related to the traditional manual voting system, a reliable web application has been developed that allows voters to cast their votes from anywhere, reducing the time and complexity of the voting process. The aim of this system is to replace the existing system. Upon receiving their voter username and password via SMS, the voter can cast their vote and confirm it by entering the OTP sent to their mobile number. The system's database contains voter information, candidate information, and the final result of the total votes. The purpose of voting is to provide voters with the opportunity to express their preferences on specific issues, laws, citizen initiatives, constitutional amendments, recalls, and/or their government and political representatives. In India, the world's largest democracy, conducting free and fair elections has always been a challenging task for the election commission. Despite spending a lot of money on ensuring that elections are free from fraud, it has become common for some groups to engage in rigging, which can result in a distorted outcome. To provide an affordable solution to this problem, a biometric system will be incorporated in this project.

II. LITERATURE SURVEY

The software being created has a user-friendly interface for universal usage, specifically for voting in an election. The process is simple, where the user logs in and selects their preferred candidate to cast their vote. The software has undergone development and testing through Ethernet. Despite the active research and development of online voting systems, the use of an insecure internet and poorly implemented systems have resulted in reported issues. These challenges must be addressed to ensure secure and convenient voting for the public. The proposed online voting system allows voters to exercise their rights from any location in the country [1].

Various methods and techniques are being developed to introduce diversity in electronic and online voting systems. While some of them provide a certain level of confidentiality and security to the system, it is still necessary to have advanced systems in place that can effectively control and manage the voting information and process to ensure the privacy and security of voters' information[2].

The user's image is captured by their Android device and then transmitted to a web service, which stores the image in a database. The web service then uses a face detection algorithm to validate the face in the image[3].

The application includes a user-friendly "Login Screen" where voters can log in using their Google account IDs. Voter information, such as their Google account ID, name, college roll number, and voting status (whether they have voted or not), is stored in a database. Once logged in, voters can access the "Voting Screen," which allows them to select candidates for various positions and securely submit their voting data. After submitting their response, voters cannot resubmit. The entire voting process is controlled by the System Admin, who must sign in with a predefined Gmail ID. After successfully logging in, the admin can access the "Admin Screen," which provides options for enabling/disabling voting lines and viewing results[4].

The Secured Smart Voting System using Aadhaar is an online voting system that utilizes an app and biometric technology to verify a voter's eligibility through their fingerprint. The system accesses the Aadhaar Database to retrieve and verify the voter's details, and the vote is recorded in the corresponding database. The app was developed using Android Studio, an open-source platform for creating applications for Android, and MySQL, a popular software for managing relational databases. The Aadhaar API is used for biometric identification of Aadhaar holders. This system is specifically designed to address the challenges associated with the Indian voting system[5].

This voting system involves the use of an Android app that allows voters to log in using their voter ID. The app includes a camera feature for capturing the user's face image, which is used for face detection and recognition. A local server is utilized for the AOVSAD system, and the XAMPP server is the component where the face verification process occurs. OTP is implemented to ensure that only genuine voters can cast their votes, and the Android app is designed with a user-friendly GUI specifically for voting[6].

The system being described is automated and designed to be secure by ensuring that each user can only vote once, with all eligible users' details being stored in the database. The online platform offers features such as

smart tickets, agenda features, automated vote counting and reporting, and does not require staff to carry out these functions manually [7].

The system is divided into three phases: registration, voting and tallying, and has been created to address significant issues with the current voting system. The proposed internet-based system claims to have multiple advantages, including reduced costs, less overhead and higher voter turnout[8].

The focus of the proposed system is to make voting more secure and authenticated in the future. It is a multi-purpose, platform-independent system that can be used by any organization or government to conduct elections. The system uses QR codes and OTP (one-time password) functionality, making it compatible with any operating system, including Android and iOS [9].

The proposed model is centered around a unique Aadhaar identity, making it easier to verify both voters and candidates. The Aadhaar identity number is unique for every citizen or voter in India and recognizes the constituency of the voter. The registration process is only completed after verification of all documents by a field officer and verification of the Aadhaar identity number from the main Aadhaar card database. After registration, the voter receives an auto-generated email with all the information and a system-generated password, which can be changed later. Voters can also set verification keys for added security, and a virtual/on-screen keyboard is used to type passwords or change passwords to prevent password capture in public places[10].

Online voting systems have been around for some time, and this document highlights their development. The goal is to develop voting plans that use ICT resources to provide more efficient voting services than traditional paper-based methods. Voters view themselves as consumers, and the government is expected to make voting more convenient. Over the past decade, electronic voting has gained considerable attention as an additional method of voting for remote voting, political parties, candidates, and electoral administration. It promises to improve the efficiency and fairness of the democratic process for the electorate[11].

Remote internet voting systems enable voters to cast their ballots from any internet-connected device, including home computers, work computers, mobile phones, digital TVs, and gaming machines. Online voting may either replace traditional poll site voting entirely or be used only for absentee balloting. The advent of the internet has sparked discussions about the relationship between e-democracy and electronic voting. While some early advocates believed that the internet could replace representative democracy, allowing every citizen to vote on any issue with the click of a button, these visions oversimplified the democratic process. Other proponents have suggested that e-voting could reduce costs and increase voter turnout by making the voting process more convenient[12].

When conducting a review, it is crucial to clarify the research objectives. The main objective of this study is to investigate the usability issues in e-voting, as explored by various researchers. The specific aims of this study are as follows: 1) to examine the metrics used by researchers to evaluate e-voting systems; 2) to assess the e-voting devices and interfaces used in these systems to enhance security and minimize errors; and 3) to determine how e-voting organizations can ensure the safety and protection of voters. In some elections, mobile devices such as mobile phones have been utilized as an e-voting device to replace traditional polling stations. However, studies indicate that mobile voting systems are slower than non-mobile devices[13].

This application ensures anonymity by assigning each user a single and random ID upon login, which is not linked to any personal information. This eliminates the need to specify which candidate the user voted for. The focus is on providing visual aids for better understanding, and the interface is kept simple with only basic functions. The device can be used by following these steps: 1) Scan your fingerprint to verify your identity with the server. If successful, you will be automatically directed to the voting window. 2) The ballot screen displays the logos and names of all candidates running for the post. Simply click on the vote button next to your preferred candidate. If a user decides not to choose a candidate, they can log out using the provided logout option. 3) Once a vote has been cast, the auto-logout feature will take over, and the main login screen will be restored[14].

Numerous efforts have been made to introduce different techniques and methodologies in electronic and online voting systems, aimed at providing variations and improving security and confidentiality to some

extent. However, there is still a need for advanced systems to manage and control the voting process and information, ensuring the utmost security and privacy of both voters and their information [15].

An innovative solution for secure voting is the online voting system, which operates over the internet via a web browser. This system allows individuals from around the globe to cast their votes securely. However, security concerns arise when implementing online voting systems. In general, password protection is strong, but phishing attacks pose a threat to website users.Therefore, to ensure privacy, anonymity, eligibility, equity, verification, and security in online voting protocols, it is necessary to implement appropriate security measures.To achieve a reliable, transparent, accurate, and unique e-voting system, cryptographic algorithms can be used. Two millionaire couples have created an end-to-end verifiable, Identity-based blind signature Internet voting system using elliptic curve cryptography and a functional digital signature called the BLS short signature system. This system protects votes against any unauthorized changes and allows for the issuance of blank ballots to voters.To address the future of voting, a feasibility study of a verifiable Internet vote from end to end has been conducted. This study outlines the specifications required for such a system to be successful. In conclusion, online voting systems can provide a secure and convenient means for individuals to participate in elections, provided that appropriate security measures are in place[16].

The developers of this software have designed it with a user-friendly interface that can be easily navigated by anyone. The software serves the purpose of allowing individuals to cast their vote in an election. The process is quite simple; the user logs in and selects their preferred candidates to register their vote. The software has been developed and tested on Ethernet. While online voting systems have gained significant attention in recent times, the use of insecure internet connections and documented cases of incorrect implementations have been major concerns. To ensure that the public can vote securely and conveniently, it is crucial to address these challenges. The proposed online voting system aims to provide a secure and convenient platform for voters to exercise their voting rights from any location within the country. The system includes a database containing voter information, including names, ID numbers, and passwords, as well as a record of each voter's vote. The system is designed to verify the accuracy of the information provided by voters and discard any false information. Each voter's information is then transmitted to the election commission for processing and tabulation of the total number of votes cast[17].

In order to improve the efficiency of the voting process, wireless and web technologies have been implemented. Online voting systems offer a secure, easy, and safe way to capture and count votes during elections. One such system, which is based on Aadhaar ID, uses it as the key authentication method. While this system is a great improvement over traditional methods, its main weakness lies in authentication, as biometrics are not used.To address this issue, the paper "Secure Authentication for Online Voting System" proposes a non-traceable and integral method for voting. The author suggests using smart cards to prevent users from casting multiple votes, and biometric authentication to authenticate voters. However, relying solely on smart cards and voter ID cards is not practical since they can be lost or damaged. Additionally, the use of multiple cards makes the system expensive and time-consuming to implement, as generating cards for each voter can take a considerable amount of time[18].

While voting systems have various features that aim to ensure accuracy and fairness, the issue with online voting is that there is always a risk of malpractice due to the online nature of the system. To address this issue, an author proposes an online voting system that uses multiple forms of authentication such as personal identification number, thumb impression, and secret key. Additionally, security techniques like cover image creation and secret key expansion are utilized to securely send data to servers and authenticate voters. Although this system is robust and ensures both authentication and security of voter data stored in the server, the main challenge is managing the vast amount of data that such a system would encounter during election periods while being online. The congestion during casting votes may pose a challenge to the system's efficiency[19].

In order to implement an online voting system, it was essential to examine the existing electronic voting systems or machines utilized in various nations. Some advanced countries such as the United States and Australia have already implemented online voting systems [20].

III. PROPOSED SYSTEM

In this proposal, we suggest developing an Android application for an Online Voting System that uses SMS. This system will handle the information of voters and candidates, allowing voters to log in and exercise their right to vote. The system will manage data effectively and provide reliability, speed, accuracy, and ease of use compared to traditional manual systems. By automating the process, the system will reduce errors in the voting process.

The following system comprises of three primary modules as outlined below.

1. ADMINISTRATIVE MODULE: Online voting enables voters to exercise their right to vote from any location in India. The online voting system for an association comprises a database that contains voters' information, names with unique IDs, and votes. The system also calculates the total number of votes. The following operational tasks are performed in the online voting system: recording voters' information in the voter database, verifying the information provided by voters, and discarding any false information. Additionally, the system administrator is responsible for maintaining each information entry.

2.NOMINEE CANDIDATE MODULE: The administrator will be responsible for updating the candidate information for the positions of board of director and manager. The candidates will provide their details, which the administrator will review and upload accordingly. The background information of each candidate will be maintained by the administrator, and made available for public viewing by the voters.

3.USER/VOTER MODULE: Only registered users can log in to cast their votes. The users will be presented with information and pictures of the candidates for the board of directors and the association manager before casting their vote. Each vote will be counted, and users will not be able to log in and vote again once they have cast their ballot.

IV. METHODOLOGY

The process of developing the system followed the Waterfall model of software development, which involves a series of distinct phases, such as requirements gathering, design, implementation, testing, and maintenance. In this case, the primary focus was on developing a complete system that could be tested thoroughly to ensure its effectiveness. The requirements for the system were obtained through an extensive review of the existing literature on online voting systems.To design the system, the data, workflows, and user interface flow of events were analysed in detail, taking into account the requirements gathered earlier, as well as the end-users' workflow. Based on these analyses, the necessary features were implemented in the Android platform to ensure a seamless experience for both administrative users and voters. Additionally, various libraries were utilized to implement hash algorithms for secure data encryption.To evaluate the system's effectiveness, sample data were used to conduct experiments and end-user testing. These tests were carried out to ensure that the system worked as expected and to identify any issues or areas for improvement. Overall, the development process of the online voting system involved careful planning, design, implementation, and testing to ensure its effectiveness and usability.

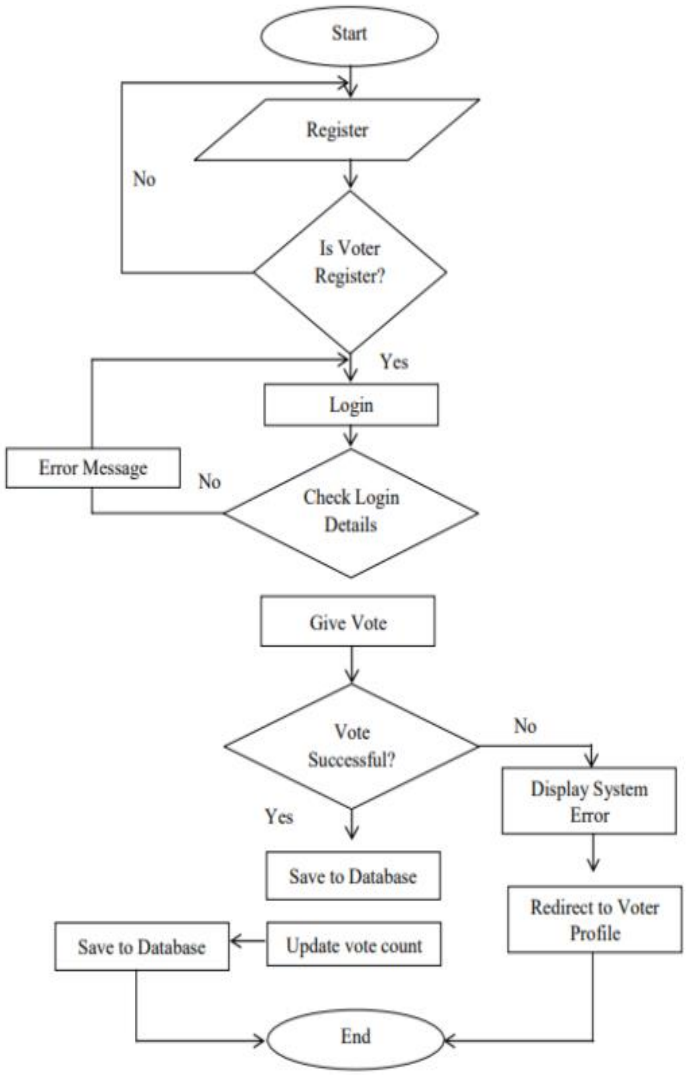

Fig. 1. Flowchart of the System

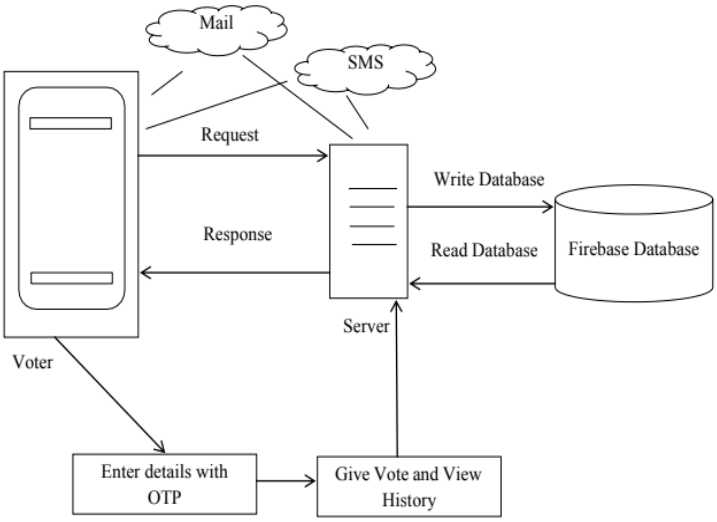

Fig. 2. Architecture of the System

V. CONCLUSION

In summary, online voting systems offer a promising solution to improve the accessibility and convenience of the electoral process. The introduction of online voting systems can bring about significant progress in the way elections are conducted, by increasing voter turnout, providing more accessibility to voters, and reducing the costs associated with traditional voting methods. Additionally, the online voting system can enhance the transparency and accountability of the election process, as it allows for easy verification and audit of the voting results. However, it is crucial to ensure that such systems are designed and implemented in a way that guarantees the integrity and confidentiality of the vote and maintains public trust in the democratic process.Online voting has the potential to revolutionize the way we conduct elections, making it more convenient and accessible for citizens to cast their votes. This means that more people will be able to participate in the democratic process, which is essential for a healthy and thriving democracy. Moreover, the introduction of online voting systems can help to reduce the costs associated with traditional voting methods, such as printing and distributing ballot papers, renting polling stations, and paying staff to work on election day. This means that the resources saved can be utilized in other areas that require attention.Another important benefit of the online voting system is that it can improve the transparency and accountability of the electoral process. The online voting system allows for easy verification and audit of the voting results, which can help to build trust and confidence in the democratic process. Additionally, the online voting system can reduce the likelihood of errors and discrepancies, which can further enhance the credibility of the electoral process.However, despite the numerous advantages of online voting systems, there are also concerns regarding their security and integrity. Ensuring that online voting systems are designed and implemented with the highest level of security measures is crucial to protect the confidentiality and privacy of the votes cast. Measures such as encryption, multi-factor authentication, and blockchain technology can be used to enhance the security of the online voting system.

In conclusion, online voting systems have the potential to revolutionize the way we conduct elections, making them more accessible, convenient, and transparent. However, it is important to ensure that such systems are designed and implemented in a way that guarantees the integrity and confidentiality of the vote and maintains public trust in the democratic process. By implementing the right measures and utilizing advanced technologies, online voting systems can provide a secure and reliable alternative to traditional voting methods, ensuring that every citizen's voice is heard.

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