A

MINI PROJECT REPORT

ON

ONLINE VOTING SYSTEM

Submitted in partial fulfilment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY
IN

COMPUTER SCIENCE AND ENGINEERING

Submitted
By

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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(AN AUTONOMOUS INSTITUTION)

(Affiliated to Jawaharlal Nehru Technological University Hyderabad
Accredited by NBA, NAAC with A+)
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(An Autonomous Institution)

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

This is to certify that the project work entitled "**ONLINE VOTING SYSTEM**", submitted by **W.Ruthuja (21UP1A05D0), D.V.Satya Sri Ramani (21UP1A0583) , P.Harika Reddy (21UP1A05A6)** in the partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology** in **Computer Science and Engineering**, **Vignan's Institute of Management and Technology for Women** is a record of bonafide work carried by them under my guidance and supervision. The results embodied in this project report have not been submitted to any other University or institute for the award of any degree.

PROJECT GUIDE	**THE HEAD OF DEPARTMENT**
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DECLARATION

We hereby declare that the results embodied in the project entitled **"ONLINE VOTING SYSTEM"** is carried out by us during the year 2024-2025 in partial fulfillment of the award of **Bachelor of Technology** in **Computer Science and Engineering** from **Vignan's Institute of Management and Technology for Women** is an authentic record of our work under the guidance of K.Sravanthi. We have not submitted the same to any other institute or university for the award of any other Degree.

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Our sincere thanks to all the teaching and non-teaching staff of Department of Computer Science and Engineering for their support throughout our project work.

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ABSTRACT

The Online Voting System (OVS) is a secure, user-friendly platform designed to facilitate the electoral process over the internet. This system aims to simplify and enhance the efficiency, transparency, and accessibility of elections, allowing eligible voters to cast their ballots from any location using their devices. OVS addresses several critical challenges in traditional voting, such as geographic barriers, time constraints, and the risk of tampering. Key features of the system include user authentication via secure login credentials, voter registration verification, end-to-end encryption, and real-time vote tallying. Security mechanisms such as twofactor authentication, is employed to prevent fraud, ensure the anonymity of voters, and maintain the integrity of the election process. The system incorporates robust security features, including voter authentication through government-issued ID verification, biometric recognition, to prevent unauthorized access. The integrity of the voting process is further ensured which provides immutable and transparent vote storage, minimizing risks of vote tampering, double voting, or system manipulation. Votes are encrypted and stored securely, ensuring voter anonymity and protecting the privacy of individual ballots By leveraging advanced technologies such as cryptography, secure authentication, and blockchain, the system ensures the confidentiality, integrity, and transparency of the voting process. Key features include secure voter registration, real-time vote tallying, fraud prevention mechanisms, and auditability to ensure trustworthiness. The adoption of an online voting system minimizes logistical challenges, reduces costs associated with traditional voting methods, and enhances voter participation by making elections more accessible to individuals, including those residing in remote areas or with mobility constraints. However, the system also addresses potential challenges such as cybersecurity threats, digital literacy, and voter verification to uphold the democratic principles of fairness and reliability.

1.INTRODUCTION

An online voting system is a digital platform designed to simplify and modernize the voting process by allowing individuals to cast their votes electronically using devices such as computers, tablets, or smartphones. These systems provide the convenience of remote voting, making them particularly beneficial for those in remote areas or with mobility challenges. They offer features like secure voter authentication, user-friendly interfaces, automated vote tallying, and real-time results, enhancing efficiency and transparency. While online voting reduces the costs and environmental impact associated with traditional paper-based methods, it also poses challenges, such as ensuring robust security to prevent hacking and addressing the digital divide to ensure equitable access. Despite these challenges, online voting systems are increasingly being adopted for government elections, corporate decision-making, and organizational voting, making the process more accessible and efficient in the digital age.

1.1 PROBLEM STATEMENT

In democratic societies, voting is a fundamental mechanism for decision-making and ensuring representation. However, traditional voting methods, such as paper-based or physical voting systems, are often plagued by inefficiencies, inaccuracies, and logistical challenges. Issues such as long queues at polling stations, human errors in vote counting, and susceptibility to tampering or fraud compromise the integrity of the election process. Furthermore, the cost and resources required to conduct large-scale elections—ranging from printing ballots to managing polling centers—can be overwhelming, especially in densely populated or geographically dispersed regions.

The traditional systems also fail to accommodate certain demographics effectively, such as citizens residing abroad, individuals with disabilities, or those living in remote areas. These limitations often lead to lower voter turnout, undermining the democratic process. Moreover, the lack of transparency and delays in vote counting create a breeding ground for mistrust among citizens, further eroding confidence in the system.

An **Online Voting System** is proposed to address these challenges. This system will enable citizens to cast their votes securely from anywhere using their devices, significantly reducing the physical and logistical barriers associated with traditional methods. By integrating advanced security measures such as encryption, authentication, and tamper-proof mechanisms, the system aims to uphold the principles of fairness and confidentiality. Ultimately, this system seeks to empower citizens, increase voter participation, and restore trust in the democratic process by providing an efficient, transparent, and user-friendly solution.

1.2 OBJECTIVES

The primary objective of the Online Voting System is to modernize the election process by leveraging technology to make voting more accessible, secure, and efficient. This system aims to eliminate the barriers associated with traditional voting methods, such as long queues, logistical challenges, and potential fraud, while ensuring a transparent and tamper-proof election process. By introducing an easy-to-use platform, the system seeks to improve voter participation, particularly for individuals residing in remote locations or those with mobility challenges, and uphold the democratic values of fairness, confidentiality, and inclusivity.

1. **Enhanced Accessibility:** Enable citizens to cast their votes from anywhere, including remote areas and abroad, using internet-enabled devices.
2. **Improved Security:** Incorporate advanced security features such as encryption, multi-factor authentication, and tamper-proof mechanisms to ensure vote integrity and prevent fraud.
3. **Increased Transparency:** Provide a transparent voting process with real-time tracking and audit trails to enhance public trust in the election system.
4. **User-Friendly Interface:** Develop an intuitive and easy-to-navigate platform to ensure voters of all demographics, including less tech-savvy individuals, can participate without difficulty.
5. **Cost and Time Efficiency:** Reduce the costs associated with physical polling stations, paper ballots, and manual vote counting while expediting the overall election process.
6. **Higher Voter Participation:** Address barriers to voting, such as long queues and limited polling locations, to encourage higher voter turnout.
7. **Accuracy and Reliability:** Eliminate human errors in vote counting and ensure accurate and timely results through automated systems.
8. **Inclusivity:** Cater to the needs of individuals with disabilities or special requirements, ensuring that the system is accessible to everyone.
9. **Environmental Sustainability:** Minimize the environmental impact of elections by reducing the use of paper and other physical resources.
10. **Scalability and Flexibility:** Design a system that can handle elections of varying scales, from local to national, and adapt to different voting regulations and requirements.

1.3 EXISTING SYSTEM

The traditional voting system, widely used in most democracies, typically relies on manual, paper-based processes and physical polling stations. While this system has served as the foundation of democratic elections for decades, it is not without its challenges and limitations. The existing system can be summarized as follows:

1.3.1 Overview of the Existing System

1. **Manual Voting Process:** Voters are required to visit designated polling stations to cast their votes. The process involves physical verification of identity, collection of paper ballots, and manual marking of choices.
2. **Vote Counting:** Once voting is complete, election officials manually count the votes to determine the results. This process often involves multiple levels of verification to ensure accuracy.
3. **Security Measures:** Security in the traditional system typically involves physical measures such as secure storage of ballot boxes, on-site monitoring by officials, and voter identity verification through documents like voter IDs.
4. **Result Announcement:** The results are announced after vote counting is completed, which can take several hours to days, depending on the scale of the election.

1.3.2 Challenges in the Existing System

1. **Logistical Challenges:** Conducting elections requires extensive planning and resources, including setting up polling stations, transporting ballot boxes, and deploying election staff.
2. **Time-Consuming:** Manual vote counting and result compilation make the process slow and prone to delays, especially in large-scale elections.
3. **Human Errors:** Mistakes during vote counting, ballot marking, or identity verification can impact the accuracy of the results.

4. **Fraud and Security Issues:** The system is vulnerable to issues such as ballot tampering, unauthorized access, or double voting. Ensuring the integrity of the election requires constant vigilance.
5. **Limited Accessibility:** Citizens residing abroad, individuals with disabilities, and those in remote areas face significant challenges in accessing polling stations.
6. **Environmental Impact:** The reliance on paper ballots leads to substantial paper waste, contributing to environmental concerns.
7. **Low Voter Turnout:** Factors such as long queues, transportation difficulties, and rigid polling schedules discourage voter participation.

The existing system, while reliable to a certain extent, struggles to meet the demands of modern societies. It requires a digital transformation to overcome these limitations, improve efficiency, and ensure a seamless and secure voting experience for all. This lays the foundation for the need to develop an Online Voting System**.**

1.3.3 Limitations Of The Existing System

Traditional voting systems, which often rely on paper ballots or physical polling stations, present numerous challenges that hinder the efficiency, security, and accessibility of the election process. Below are the key disadvantages of the existing system:

1. Accessibility Issues

- **Geographical Barriers:** Voters residing in remote areas, overseas, or unable to travel face significant challenges in reaching polling stations.
- **Limited Mobility:** Individuals with disabilities, the elderly, and those with health issues find it difficult to access physical voting locations.

2. Inefficiency

- **Time-Consuming Process:** Manual processes, such as registration verification, ballot counting, and result tabulation, increase the time required to complete an election.
- **Long Queues:** Voters often face long waiting times at polling stations, discouraging participation.

3. High Operational Costs

- Costs associated with printing ballots, staffing polling stations, and managing logistics are substantial, especially in large-scale elections.

4. Vulnerability to Errors

- **Human Errors:** Manual handling of ballots during voting, transportation, and counting is prone to mistakes that could compromise the accuracy of results.
- **Misplacement of Ballots:** Ballots can be lost, misplaced, or mishandled during transportation or storage.

5. Security Concerns

- **Fraud and Tampering:** The potential for ballot box stuffing, tampering with ballots, and impersonation raises concerns about election integrity.
- **Lack of Confidentiality:** In some cases, voters may feel their choices are not private due to the setup of polling stations.

6. Limited Transparency

- The traditional system often lacks mechanisms for real-time tracking and verification of votes, leading to skepticism about the accuracy of results.

7. Environmental Impact

- The use of paper ballots and associated materials contributes to deforestation and generates waste, which negatively impacts the environment.

8. Low Voter Turnout

- The inconvenience of physical voting discourages many eligible voters, leading to reduced participation in elections.

9. Challenges in Conducting Large-Scale Elections

- Organizing elections in regions with large populations or difficult terrains becomes a logistical nightmare, resulting in delays or inaccuracies.

10. Susceptibility to Force or Coercion

- In some cases, voters may be subjected to coercion or undue influence at polling stations, compromising their ability to vote freely.

1.4 PROPOSED SYSTEM

The **Online Voting System** is designed to modernize and streamline the election process by addressing the limitations of traditional voting methods. This system leverages technology to provide a secure, accessible, and user-friendly platform where voters can cast their votes electronically from any location using internet-enabled devices. By integrating advanced features for authentication, data security, and result transparency, the system ensures an efficient and trustworthy electoral process while promoting greater voter participation.

1.4.1 Key Features of the Proposed System

1. **Online Voter Registration:**
   - Voters can register online by providing their personal and verification details.
   - Integration with national ID databases ensures the authenticity of voter information.
2. **Secure Voter Authentication:**
   - Multi-factor authentication (MFA), such as biometric verification, OTPs, or email confirmation, is used to prevent unauthorized access.
3. **User-Friendly Interface:**
   - A simple and intuitive interface is provided to guide voters through the voting process, ensuring ease of use for individuals with varying levels of technical proficiency.
4. **Remote Voting Capability:**
   - Voters can cast their votes from any location, eliminating the need to visit physical polling stations.
5. **Tamper-Proof Voting Mechanism:**
   - Advanced encryption techniques are used to ensure the security and confidentiality of each vote.
   - Votes are stored in a secure database that prevents unauthorized alterations.

6. **Real-Time Vote Tracking:**
    - Voters can receive confirmation after casting their vote, ensuring transparency.
    - Election authorities can monitor voting trends in real-time while maintaining voter anonymity.
7. **Automatic Vote Counting:**
    - The system automates vote counting, reducing human errors and ensuring quick and accurate results.

1.4.2 Advantages of the Proposed System

- Increases voter participation by removing geographical and physical barriers.
- Enhances security and prevents fraud through robust authentication and encryption.
- Reduces election costs by minimizing logistical and operational expenses.
- Ensures transparency and public trust in the election process.
- Provides quick and accurate results, reducing the time required for result declaration.

The proposed **Online Voting System** aims to build trust in the democratic process by delivering a modern, efficient, and reliable solution to meet the needs of voters and election authorities alike.

2. LITERATURE SURVEY

1.Jambhulakar, chakole and pradhi proposed a novel security for online voting system by using multiple encryption schemes. Provide security for cast vote when it is submitted from voting poll to voting server. Multiple encryptions to avoid DOS attack. Security provide submissive as well as active interloper. This system is to take a judgment of certain issues. This paper use cryptography concepts to take pros of digital signature. Encrypting the send forth vote to client server then send to voting server with the help of net. After sending encrypted vote then server side decrypt the vote before counting. On server side decryption of that vote is done before counting. We require two keys for this purpose one for encryption on voter system, which should be publicly known and second key for decryption of encrypted vote before counting on voting server, this key must be private. So for this purpose we need a pair of asymmetric keys. To provide security from active intruder who can alter or tamper the casted vote when vote is transferring from voter to voting server, we are using digital signature. When a voter cast his/her vote after that he/she will digitally sign on that by using his/her own private digital signature, and send this to voting server, on voting server side that signature is checked by digital signature verifier of that voter which is publicly known. For this purpose each voter should have a private digital signature and a public digital signature verifier, for this we are using a pair of asymmetric keys for each registered voter.

2. Pashine, ninave and kelapure proposed an android platform for online voting system. This application provide diversion of long process also provide security to the voter and its voter comfort system voter no need to go polling booth easily vote for candidate in hometown itself. And also provide the option of gesture recognition but authentication is the problem of android platform. In this application which is partitioned into three panels on the basis of its users as follows: Admin Panel: This panel will be specifically used by members of election commission to administer all the electoral processes including registrations of candidates & voters; and monitor all other actions carried out by them. Candidate Panel: This panel will be specifically used by electoral candidates to interact with the election commission & voters which will help them to work efficiently not only before the election but also after the election if elected. Voter Panel: This panel will be specifically used by each individual voter who is eligible for casting his vote i. e. a person ageing 18 years or the above. These are the main users, for whom the application is developed.

3. Khasawneh Proposed An E-Voting System For Biometric Security Is Providing A Two Sided Solution Such As Server And User Side. After Casting The Vote System Will Generate Hardcopy For Voter And Also Generate Unique Number. This Unique Number And Voter Name And Identification Number Is Secured. All Content Are Stored In Special Box This Box Is Secured Box, This Information Is Used For Verifying The Vote Before Stored In Final Database. This Side Copy Is Printed With Unique Barcode That Can Be Easily Readable Automatically And Scanned Then Randomly Choose One Copy, Then This Copy Is Tested This two sided process providing verification and correctness for the system.

3. SYSTEM ANALYSIS

3.1 PURPOSE OF THE ONLINE VOTING SYSTEM PROJECT

The primary purpose of the Online Voting System is to modernize the election process, making it more accessible, secure, efficient, and transparent. Traditional voting systems have several limitations, including inaccessibility, inefficiency, and vulnerability to fraud. This project aims to overcome these challenges by developing a digital platform that enables citizens to cast their votes online, from anywhere, using a secure and user-friendly interface.

Key Purposes of the Project:

1. **Improve Accessibility:**
    - Enable citizens to vote from any location, removing geographical and physical barriers. This ensures that people in remote areas, expatriates, and individuals with mobility challenges can participate in elections.
2. **Enhance Security:**
    - Ensure the confidentiality and integrity of each vote through advanced encryption techniques and secure authentication processes, minimizing the risk of tampering, fraud, and vote manipulation.
3. **Increase Voter Participation:**
    - Make the voting process more convenient and less time-consuming, encouraging higher voter turnout and participation, especially among underrepresented groups such as the youth and elderly.
4. **Streamline the Voting Process:**
    - Eliminate long queues, manual counting, and logistical inefficiencies associated with traditional voting, making the election process faster, more efficient, and less costly.

5. **Ensure Transparency and Trust:**
    - Provide real-time tracking, auditing capabilities, and tamper-proof records to enhance the transparency of the election process, thus fostering greater public trust in the election results.
6. **Reduce Operational Costs:**
    - By replacing paper ballots and physical polling stations, the system reduces the costs of printing, staffing, and maintaining polling locations, making elections more cost-effective.
7. **Support Environmental Sustainability:**
    - Minimize the use of paper, ink, and other materials associated with traditional elections, reducing waste and contributing to environmental sustainability.
8. **Provide Accurate and Instant Results:**
    - Automate vote counting to reduce human errors and provide accurate, real-time results immediately after polls close, improving the speed of result declaration.
9. **Facilitate Future Scalability:**
    - The system is designed to handle elections of any size, from local elections to national elections, offering flexibility and scalability to accommodate future growth.

3.2 SCOPE OF THE ONLINE VOTING SYSTEM PROJECT

The scope of the Online Voting System project outlines the boundaries of the system, detailing its functionalities, target audience, and the problems it aims to solve. The project focuses on developing a secure, efficient, and accessible platform for conducting elections in various contexts, such as local, state, or national elections. Below is a detailed scope for the proposed system.

3.2.1 Functional Scope

❖ **Voter Registration**

- Voters must register on the platform to participate in the election.
- Registration will involve inputting personal details, uploading supporting documents (such as identification), and undergoing verification through a secure process.
- Integration with national databases may be utilized to authenticate voter identities.

❖ **Voter Authentication**

- Secure login mechanisms will be implemented to ensure only authorized individuals can access the voting system.
- Multi-factor authentication (MFA) methods, such as biometric verification, OTPs, or email confirmations, will be employed to prevent unauthorized access.

❖ **Voting Process**

- Voters will select their candidates or choices from a digital ballot presented on the platform.
- After casting their vote, users will receive a confirmation notification to ensure their vote was successfully recorded.

❖ **Vote Security and Privacy**

- All votes will be encrypted using advanced encryption algorithms to ensure security and confidentiality.
- Votes will be stored in a secure database, making them tamper-proof and protected against unauthorized changes.

3.2.2. Non-Functional Scope

❖ **Security**

- The system will ensure high security for voter data and the voting process through robust encryption methods, secure data storage, and secure authentication mechanisms.
- It will prevent threats such as hacking, data breaches, and vote tampering.

❖ **Accessibility**

- The platform will be designed to ensure accessibility for all voters, including those with disabilities. Features like voice guidance, screen readers, and keyboard navigation will be incorporated to make the system inclusive.
- Voters will be able to cast their votes using smartphones, tablets, and desktops.

❖ **Usability**

- A simple, intuitive user interface will be designed to facilitate ease of use for voters of all technical levels.
- Voters will be guided through each step of the voting process with clear instructions and support if needed.

❖ **Scalability and Performance**

- The system will be capable of handling high traffic volumes, especially during peak election periods, ensuring that the platform remains responsive and available.
- The platform will be scalable, able to handle elections of varying sizes, from local elections to large national elections.

❖ **Reliability**

- The system will be designed to operate without interruptions, with backup systems in place to ensure it functions smoothly during critical voting periods.
- High availability and fault tolerance will be prioritized to minimize downtime and ensure system reliability.

3.3 FEASIBILITY STUDY

❖ **Technical Feasibility**

- The system leverages readily available technologies such as cloud computing, encryption algorithms, and user authentication tools.
- It can be developed using modern programming languages, frameworks, and database management systems.

❖ **Economic Feasibility**

- The initial development and deployment costs may be high but are offset by significant savings in the long run (e.g., reduced costs for paper ballots, polling stations, and manual labor).
- The system's scalability ensures cost-effectiveness for elections of various sizes.

- ❖ **Operational Feasibility**

- The system is designed to integrate seamlessly with existing election processes and databases.
- Training modules can be developed to ensure that both voters and election officials can use the system effectively.

- ❖ **Legal Feasibility**

- The system complies with local election laws and regulations, ensuring voter confidentiality, integrity, and fairness.

3.4 REQUIREMENTS ANALYSIS

The Online Voting System must be designed to ensure reliability, security, and user-friendliness. Below is a detailed specification of the functional and non-functional requirements for the system.

3.4.1. Functional Requirements

- ❖ **User Registration**

- The system must allow eligible voters to register by providing their personal details (e.g., name, date of birth, national ID, address).
- Voter details must be verified against a national database to ensure authenticity.

- ❖ **Secure Login and Authentication**

- Voters must log in using unique credentials such as a username, password, or ID.
- Multi-factor authentication (MFA) mechanisms, such as OTP (One-Time Password), biometrics, or email verification, must be used for added security.

- ❖ **Voting Process**

- The system must display a digital ballot containing the list of candidates.
- Voters should be able to select their candidate and confirm their choice before submitting the vote.
- The system should provide a confirmation message after the vote is cast successfully.

- ❖ **Vote Encryption and Storage**

- Each vote must be encrypted to ensure confidentiality and prevent tampering.
- Votes must be securely stored in a database, with access restricted to authorized personnel only.

- ❖ **Real-Time Monitoring and Reporting**

- Election officials must be able to monitor voting statistics (e.g., turnout rates) in real-time.
- The system must automatically tabulate votes and generate results after the voting period ends.

- ❖ **Audit Trails**

- The system must maintain logs of all activities (e.g., voter logins, vote submissions) to enable post-election audits.

- ❖ **Administrative Functions**

- Administrators must have access to manage voter records, monitor system performance, and generate detailed reports.
- Admins should also have the ability to manage the list of candidates and elections.

3.4.2 Non-Functional Requirements

❖ ***Security***

- The system must use encryption protocols (e.g., AES, RSA) to secure voter data and votes.
- It must be protected against cyber threats such as phishing, Distributed Denial of Service (DDoS) attacks, and unauthorized access.

❖ **Scalability**

- The system must handle a large number of concurrent users during peak voting times without degradation in performance.

❖ **Performance**

- The system must respond to user actions (e.g., login, vote submission) within 3 seconds.
- The platform must ensure high availability with 99.9% uptime during election periods.

❖ **Usability**

- The user interface must be intuitive and easy to navigate, catering to users with varying levels of technical expertise.
- Instructions must be provided in multiple languages, as per the region's needs.

❖ **Reliability**

- The system must ensure data integrity and prevent data loss even in the event of a power failure or technical glitch.
- A backup and recovery mechanism must be in place to restore data if needed.

- ❖ **Compatibility**

- The platform must be compatible with multiple devices (e.g., desktops, laptops, smartphones, tablets) and operating systems (e.g., Windows, macOS, Android, iOS).
- It must function seamlessly across popular web browsers (e.g., Chrome, Firefox, Safari).

- ❖ **Environmental Impact**

- The system must aim to reduce the environmental footprint by eliminating the need for paper

3.5 REQUIREMENT SPECIFICATIONS

3.5.1 Hardware Requirements

1. **Server Requirements:**
    - High-performance servers with scalable cloud infrastructure.
    - Backup servers for redundancy and disaster recovery.
2. **End-User Devices:**
    - Internet-enabled devices such as desktops, laptops, tablets, or smartphones.

3.5.2 Software Requirements

1. **Server-Side Software:**
    - Operating System: Linux or Windows Server.
    - Database Management System (DBMS): MySQL(mysql-connector==2.2.9)
2. **Client-Side Software:**
    - Web browsers (e.g., Chrome, Firefox, Safari) or a custom voting application.

3. **Programming Languages and Frameworks:**
    - Frontend: HTML, CSS, JavaScript.
    - Backend: Python with Django Web Framework

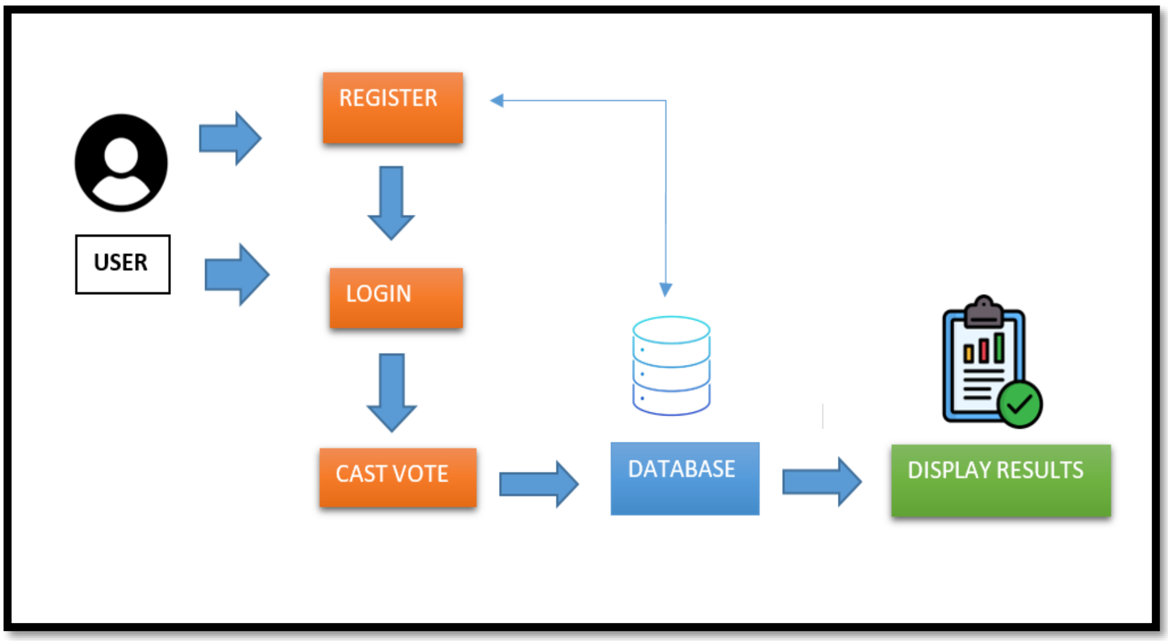
3.5.3 Additional Requirements

❖ **Training and Support**

- Election officials and technical staff must be trained to manage the system effectively.
- A 24/7 support team must be available during the election period to address technical issues.

4.SYSTEM DESIGN

4.1 SYSTEM ARCHITECTURE



4.2 DESCRIPTION

The given diagram represents the architecture of the **Online Voting System**, showcasing the flow of processes and interactions between the user, functional modules, the database, and the result display module. The system ensures secure registration, login, vote casting, data management, and result visualization, enabling a seamless and efficient voting process. Below is a detailed explanation:

1. User Interaction

- The **user** (voter) interacts with the system through a web or mobile application.
- They access various functionalities like registration, login, and vote casting via a user-friendly interface.

2. Functional Modules

The system comprises the following core modules:

- **Registration Module**:
    - Facilitates user registration by collecting and validating voter details.
    - Ensures only eligible voters are added to the system.
- **Login Module**:
    - Authenticates registered users with credentials like username and password.
    - Protects against unauthorized access by securing the voting platform.
- **Vote Casting Module**:
    - Provides users with a digital ballot to cast their vote for a chosen candidate.
    - Encrypts the vote to ensure security and stores it in the database.
    - Prevents duplicate voting by maintaining a "one user, one vote" policy.

3. Centralized Database

- The **database** acts as the backbone of the system by storing:
    - Voter registration details.
    - Encrypted votes to maintain data confidentiality.
    - Logs and audit trails for transparency and accountability.
- It supports seamless integration with the functional modules for data validation and secure storage.

4. Result Display Module

- Once voting concludes, the system aggregates and decrypts the stored votes.
- Results are displayed using visual representations like bar charts or reports, ensuring clarity and transparency for all stakeholders.

5. Workflow of the System

1. Registration: Users register and their details are verified and stored in the database.
2. Login: Users log in securely to access the voting platform.
3. Vote Casting: Users cast their votes, which are encrypted and saved in the database.
4. Result Display: Votes are decrypted, aggregated, and results are presented to users.

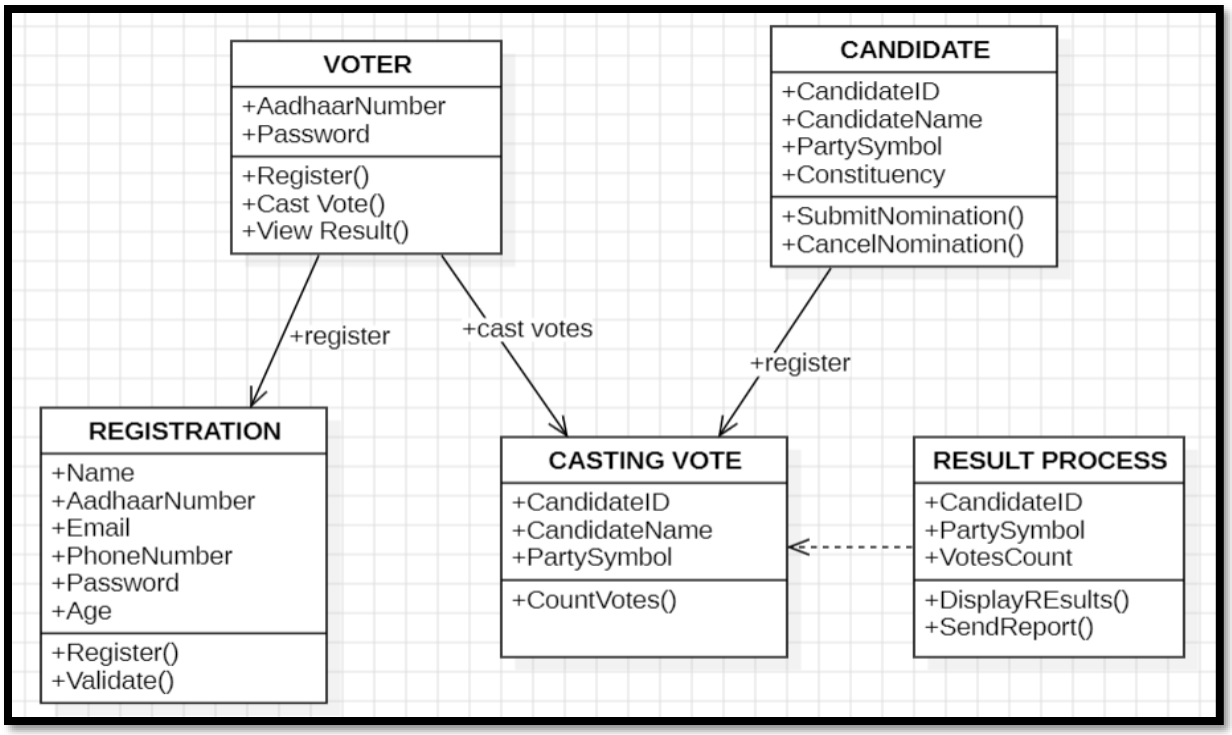
6. Security Features

- End-to-end encryption ensures vote confidentiality.
- Multi-factor authentication safeguards user access.
- Centralized audit trails maintain election transparency.

This architecture ensures a secure, scalable, and user-friendly platform for conducting elections online while upholding the integrity and confidentiality of the process.

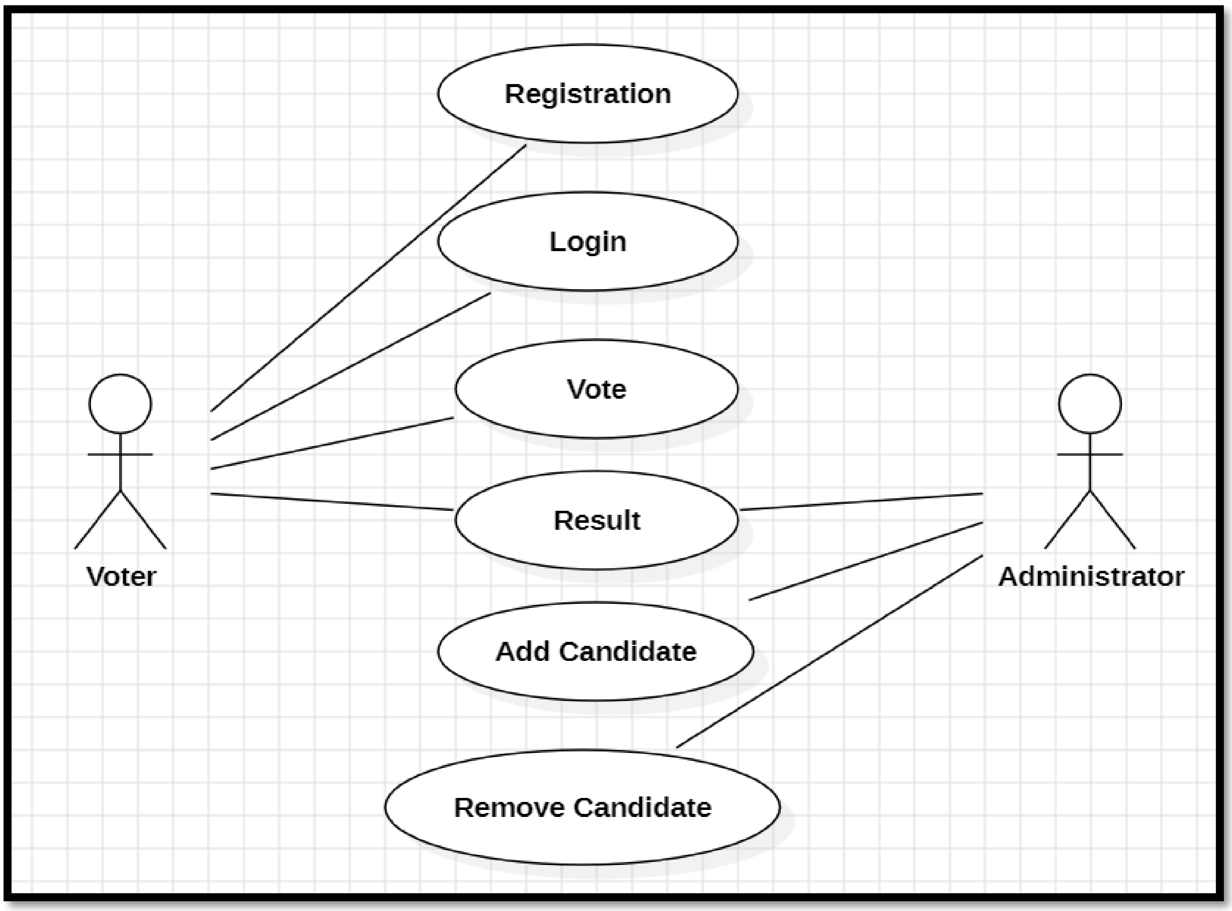
4.3 UML DIAGRAMS

4.3.1 CLASS DIAGRAM



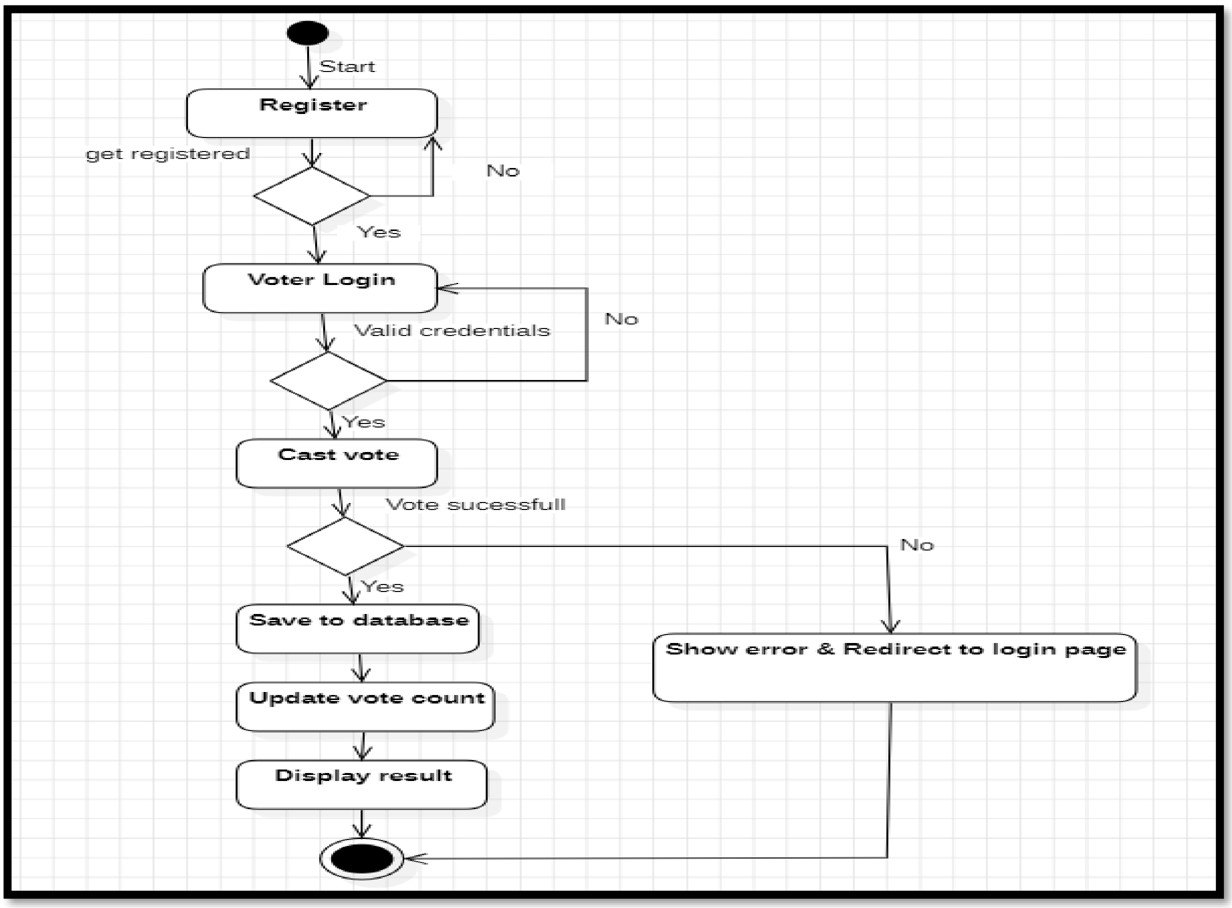
The UML diagram depicts a voting system with three main entities: Voter, Candidate, and Result Process. Voters can register with their Aadhaar number and password, and then cast votes for candidates. Candidates can submit or cancel nominations, and their information is stored along with their party symbol and constituency. The Result Process entity keeps track of each candidate's ID, party symbol, and votes count. It also includes methods for counting votes, displaying results, and sending reports. The relationships between these entities show how voters register and cast votes, and how candidates register and submit/cancel nominations. The Result Process entity is linked to both Voter and Candidate entities, indicating its role in aggregating and processing voting data.

4.3.2 USE CASE DIAGRAM



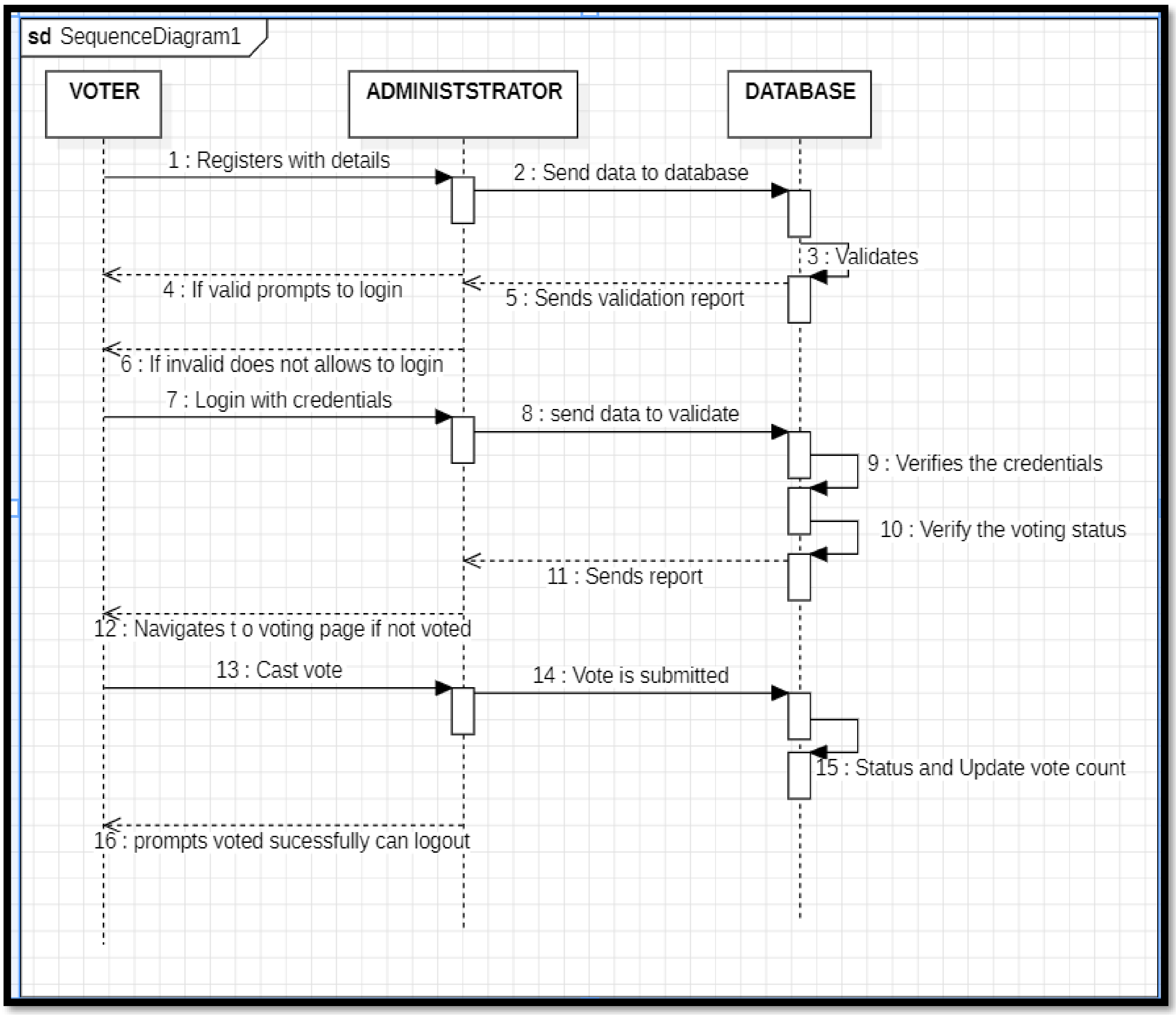
The UML diagram illustrates a use case scenario for a voting system. It shows two types of users: Voters and Administrators. Voters have the ability to register, login, vote, and view results. Administrators, on the other hand, have the additional functionalities of adding and removing candidates. This diagram visually represents the interactions between the users and the system, highlighting the different use cases and their relationships.

4.3.3 STATE CHART DIAGRAM



The UML diagram depicts the workflow of an online voting system. The process begins with a voter registering for the system. Once registered, the voter can log in. If the login credentials are valid, the voter is allowed to cast a vote. If the vote is successful, the system saves the vote to the database and updates the vote count for the corresponding candidate. Finally, the system displays the results of the voting. If any step in the process fails, the system redirects the voter to the login page with an error message.

4.3.4 SEQUENCE DIAGRAMS


sd SequenceDiagram1
VOTER
ADMINISTSTRATOR
DATABASE
1 : Registers with details
2 : Send data to database
3 : Validates
4 : If valid prompts to login
5 : Sends validation report
6 : If invalid does not allows to login
7 : Login with credentials
8 : send data to validate
9 : Verifies the credentials
10 : Verify the voting status
11 : Sends report
12 : Navigates t o voting page if not voted
13 : Cast vote
14 : Vote is submitted
15 : Status and Update vote count
16 : prompts voted sucessfully can logout

The UML sequence diagram illustrates the interactions between a Voter, Administrator, and Database in an online voting system. The voter begins by registering with their details, which are sent to the database for validation. The administrator receives a validation report and, if valid, prompts the voter to login. Upon successful login, the voter can navigate to the voting page and cast their vote. The system then updates the vote count in the database and displays a success message to the voter.

5.IMPLEMENTATION

5.1 SOURCE CODE

```
from django.shortcuts import render, reverse, redirect
from voting.models import Voter, Position, Candidate, Votes
from account.models import CustomUser
from account.forms import CustomUserForm
from voting.forms import *
from django.contrib import messages
from django.http import JsonResponse, HttpResponse
from django.conf import settings
import json
from django_renderpdf.views import PDFView

def find_n_winners(data, n):
    final_list = []
    candidate_data = data[:]
    # print("Candidate = ", str(candidate_data))
    for i in range(0, n):
        max1 = 0
        if len(candidate_data) == 0:
            continue
        this_winner = max(candidate_data, key=lambda x: x['votes'])
        # TODO: Check if None
        this = this_winner['name'] + \
            " with " + str(this_winner['votes']) + " votes"
        final_list.append(this)
        candidate_data.remove(this_winner)
    return ", &nbsp;".join(final_list)
```

```
class PrintView(PDFView):
    template_name = 'admin/print.html'
    prompt_download = True

    @property
    def download_name(self):
        return "result.pdf"

    def get_context_data(self, *args, **kwargs):
        title = "E-voting"
        try:
            file = open(settings.ELECTION_TITLE_PATH, 'r')
            title = file.read()
        except:
            pass
        context = super().get_context_data(*args, **kwargs)
        position_data = {}
        for position in Position.objects.all():
            candidate_data = []
            winner = ""
            for candidate in Candidate.objects.filter(position=position):
                this_candidate_data = {}
                votes = Votes.objects.filter(candidate=candidate).count()
                this_candidate_data['name'] = candidate.fullname
                this_candidate_data['votes'] = votes
                candidate_data.append(this_candidate_data)
            print("Candidate Data For  ", str(
                position.name), " = ", str(candidate_data))
            # ! Check Winner
            if len(candidate_data) < 1:
                winner = "Position does not have candidates"
            else:
                # Check if max_vote is more than 1
            if position.max_vote > 1:
                winner = find_n_winners(candidate_data, position.max_vote)
            else:

                winner = max(candidate_data, key=lambda x: x['votes'])
                if winner['votes'] == 0:
                    winner = "No one voted for this yet position, yet."
                else:
                    count = sum(1 for d in candidate_data if d.get(
                        'votes') == winner['votes'])
                    if count > 1:
                        winner = f"There are {count} candidates with
{winner['votes']} votes"
                    else:
                        winner = "Winner : " + winner['name']
        print("Candidate Data For  ", str(
            position.name), " = ", str(candidate_data))
        position_data[position.name] = {
            'candidate_data': candidate_data, 'winner': winner, 'max_vote':
position.max_vote}
    context['positions'] = position_data
    print(context)
    return context


def dashboard(request):
    positions = Position.objects.all().order_by('priority')
    candidates = Candidate.objects.all()
    voters = Voter.objects.all()
    voted_voters = Voter.objects.filter(voted=1)
    list_of_candidates = []
    votes_count = []
    chart_data = {}
    for position in positions:
    list_of_candidates = []
    votes_count = []
    for candidate in Candidate.objects.filter(position=position):
        list_of_candidates.append(candidate.fullname)
        votes = Votes.objects.filter(candidate=candidate).count()
        votes_count.append(votes)
    chart_data[position] = {
        'candidates': list_of_candidates,
        'votes': votes_count,
        'pos_id': position.id
    }

    context = {
    'position_count': positions.count(),
    'candidate_count': candidates.count(),
    'voters_count': voters.count(),
    'voted_voters_count': voted_voters.count(),
    'positions': positions,
    'chart_data': chart_data,
    'page_title': "Dashboard"
    }
    return render(request, "admin/home.html", context)


def voters(request):
    voters = Voter.objects.all()
    userForm = CustomUserForm(request.POST or None)
    voterForm = VoterForm(request.POST or None)
    context = {
    'form1': userForm,
    'form2': voterForm,
    'voters': voters,
    'page_title': 'Voters List'
    }
    if request.method == 'POST':
    if userForm.is_valid() and voterForm.is_valid():
        user = userForm.save(commit=False)
        voter = voterForm.save(commit=False)
        voter.admin = user
        user.save()
        voter.save()
        messages.success(request, "New voter created")
    else:
        messages.error(request, "Form validation failed")
    return render(request, "admin/voters.html", context)


def view_voter_by_id(request):
    voter_id = request.GET.get('id', None)
    voter = Voter.objects.filter(id=voter_id)
    context = {}
    if not voter.exists():
    context['code'] = 404
    else:
    context['code'] = 200
    voter = voter[0]
    context['first_name'] = voter.admin.first_name
    context['last_name'] = voter.admin.last_name
    context['phone'] = voter.phone
    context['id'] = voter.id
    context['email'] = voter.admin.email
    return JsonResponse(context)
```

```
def view_position_by_id(request):
    pos_id = request.GET.get('id', None)
    pos = Position.objects.filter(id=pos_id)
    context = {}
    if not pos.exists():
        context['code'] = 404
    else:
        context['code'] = 200
        pos = pos[0]
        context['name'] = pos.name
        context['max_vote'] = pos.max_vote
        context['id'] = pos.id
    return JsonResponse(context)


def updateVoter(request):
    if request.method != 'POST':
        messages.error(request, "Access Denied")
    try:
        instance = Voter.objects.get(id=request.POST.get('id'))
        user = CustomUserForm(request.POST or None,
instance=instance.admin)
        voter = VoterForm(request.POST or None, instance=instance)
        user.save()
        voter.save()
        messages.success(request, "Voter's bio updated")
    except:
        messages.error(request, "Access To This Resource Denied")

    return redirect(reverse('adminViewVoters'))


def deleteVoter(request):
    if request.method != 'POST':
        messages.error(request, "Access Denied")
    try:
        admin = Voter.objects.get(id=request.POST.get('id')).admin
        admin.delete()
        messages.success(request, "Voter Has Been Deleted")
    except:
        messages.error(request, "Access To This Resource Denied")

    return redirect(reverse('adminViewVoters'))



def viewPositions(request):
    positions = Position.objects.order_by('-priority').all()
    form = PositionForm(request.POST or None)
    context = {
        'positions': positions,
        'form1': form,
        'page_title': "Positions"
    }
    if request.method == 'POST':
        if form.is_valid():
            form = form.save(commit=False)
            form.priority = positions.count() + 1  # Just in case it is empty.
            form.save()
            messages.success(request, "New Position Created")
        else:
            messages.error(request, "Form errors")
    return render(request, "admin/positions.html", context)



def updatePosition(request):
    if request.method != 'POST':
        messages.error(request, "Access Denied")
    try:
        instance = Position.objects.get(id=request.POST.get('id'))
        pos = PositionForm(request.POST or None, instance=instance)
        pos.save()
        messages.success(request, "Position has been updated")
    except:
        messages.error(request, "Access To This Resource Denied")

    return redirect(reverse('viewPositions'))



def deletePosition(request):
    if request.method != 'POST':
        messages.error(request, "Access Denied")
    try:
        pos = Position.objects.get(id=request.POST.get('id'))
        pos.delete()
        messages.success(request, "Position Has Been Deleted")
    except:
        messages.error(request, "Access To This Resource Denied")

    return redirect(reverse('viewPositions'))



def viewCandidates(request):
    candidates = Candidate.objects.all()
    form = CandidateForm(request.POST or None, request.FILES or None)
    context = {
        'candidates': candidates,
        'form1': form,
        'page_title': 'Candidates'
    }
    if request.method == 'POST':
        if form.is_valid():
            form = form.save()
            messages.success(request, "New Candidate Created")
        else:
            messages.error(request, "Form errors")
    return render(request, "admin/candidates.html", context)


def updateCandidate(request):
    if request.method != 'POST':
        messages.error(request, "Access Denied")
    try:
        candidate_id = request.POST.get('id')
        candidate = Candidate.objects.get(id=candidate_id)
        form = CandidateForm(request.POST or None,
                             request.FILES or None, instance=candidate)
        if form.is_valid():
            form.save()
            messages.success(request, "Candidate Data Updated")
        else:
            messages.error(request, "Form has errors")
    except:
        messages.error(request, "Access To This Resource Denied")

    return redirect(reverse('viewCandidates'))


def deleteCandidate(request):
    if request.method != 'POST':
        messages.error(request, "Access Denied")
    try:
        pos = Candidate.objects.get(id=request.POST.get('id'))
        pos.delete()
        messages.success(request, "Candidate Has Been Deleted")
    except:
        messages.error(request, "Access To This Resource Denied")

    return redirect(reverse('viewCandidates'))


def view_candidate_by_id(request):
    candidate_id = request.GET.get('id', None)
    candidate = Candidate.objects.filter(id=candidate_id)
    context = {}
    if not candidate.exists():
        context['code'] = 404
    else:
        candidate = candidate[0]
        context['code'] = 200
        context['fullname'] = candidate.fullname
        previous = CandidateForm(instance=candidate)
        context['form'] = str(previous.as_p())
    return JsonResponse(context)


def ballot_position(request):
    context = {
        'page_title': "Ballot Position"
    }
    return render(request, "admin/ballot_position.html", context)


def update_ballot_position(request, position_id, up_or_down):
    try:
        context = {
            'error': False
        }
        position = Position.objects.get(id=position_id)
        if up_or_down == 'up':
            priority = position.priority - 1
            if priority == 0:
                context['error'] = True
                output = "This position is already at the top"
            else:
                Position.objects.filter(priority=priority).update(
                    priority=(priority+1))
                position.priority = priority
                position.save()
                output = "Moved Up"
        else:
            priority = position.priority + 1
            if priority > Position.objects.all().count():
                output = "This position is already at the bottom"
                context['error'] = True
            else:
                Position.objects.filter(priority=priority).update(
                    priority=(priority-1))
                position.priority = priority
                position.save()
                output = "Moved Down"
        context['message'] = output
    except Exception as e:
        context['message'] = e

    return JsonResponse(context)



def ballot_title(request):
    from urllib.parse import urlparse
    url = urlparse(request.META['HTTP_REFERER']).path
    from django.urls import resolve
    try:
        redirect_url = resolve(url)
        title = request.POST.get('title', 'No Name')
        file = open(settings.ELECTION_TITLE_PATH, 'w')
        file.write(title)
        file.close()
        messages.success(
            request, "Election title has been changed to " + str(title))
        return redirect(url)
    except Exception as e:
        messages.error(request, e)
        return redirect("/")


def viewVotes(request):
    votes = Votes.objects.all()
    context = {
        'votes': votes,
        'page_title': 'Votes'
    }
    return render(request, "admin/votes.html", context)


def resetVote(request):
    Votes.objects.all().delete()
    Voter.objects.all().update(voted=False, verified=False, otp=None)
    messages.success(request, "All votes has been reset")
    return redirect(reverse('viewVotes'))
```

```
#Administrative Page
from django.urls import path
from . import views

urlpatterns = [
    path('', views.dashboard, name="adminDashboard"),
    # * Voters
    path('voters', views.voters, name="adminViewVoters"),
    path('voters/view', views.view_voter_by_id, name="viewVoter"),
    path('voters/delete', views.deleteVoter, name='deleteVoter'),
    path('voters/update', views.updateVoter, name="updateVoter"),

    # * Position
    path('position/view', views.view_position_by_id, name="viewPosition"),
    path('position/update', views.updatePosition, name="updatePosition"),
    path('position/delete', views.deletePosition, name='deletePosition'),
    path('positions/view', views.viewPositions, name='viewPositions'),

    # * Candidate
    path('candidate/', views.viewCandidates, name='viewCandidates'),

path('candidate/update',views.updateCandidate,name="updateCandidate"),
    path('candidate/delete', views.deleteCandidate, name='deleteCandidate'),
    path('candidate/view', views.view_candidate_by_id,name='viewCandidate'),

    # * Settings (Ballot Position and Election Title)

path("settings/ballot/position",views.ballot_position,name='ballot_position'),
    path("settings/ballot/title/", views.ballot_title, name='ballot_title'),

path("settings/ballot/position/update/<int:position_id>/<str:up_or_down>/
", views.update_ballot_position, name='update_ballot_position'),
    # * Votes
    path('votes/view', views.viewVotes, name='viewVotes'),
    path('votes/reset/', views.resetVote, name='resetVote'),
    path('votes/print/', views.PrintView.as_view(), name='printResult'),


]

#First page
from django.contrib.auth.models import AbstractUser, UserManager
from django.db import models
from django.contrib.auth.hashers import make_password
from django.db.models.signals import post_save
from django.dispatch import receiver


class CustomUserManager(UserManager):
    def _create_user(self, email, password, **extra_fields):
        email = self.normalize_email(email)
        user = CustomUser(email=email, **extra_fields)
        user.password = make_password(password)
        user.save(using=self._db)
        return user

    def create_user(self, email, password=None, **extra_fields):
        extra_fields.setdefault("is_staff", False)
        extra_fields.setdefault("is_superuser", False)
        return self._create_user(email, password, **extra_fields)

    def create_superuser(self, email, password=None, **extra_fields):
        extra_fields.setdefault("is_staff", True)
        extra_fields.setdefault("is_superuser", True)
        extra_fields.setdefault("user_type", 1)
        extra_fields.setdefault("last_name", "System")
        extra_fields.setdefault("first_name", "Administrator")

        assert extra_fields["is_staff"]
        assert extra_fields["is_superuser"]
        return self._create_user(email, password, **extra_fields)


class CustomUser(AbstractUser):
    USER_TYPE = ((1, "Admin"), (2, "Voter"))
    username = None
    email = models.EmailField(unique=True)
    user_type     =     models.CharField(default=2,     choices=USER_TYPE,
max_length=1)
    created_at = models.DateTimeField(auto_now_add=True)
    updated_at = models.DateTimeField(auto_now=True)
    USERNAME_FIELD = "email"
    REQUIRED_FIELDS = []
    objects = CustomUserManager()

    def _str_(self):
        return self.last_name + " " + self.first_name
```

6.SYSTEM TESTING

System testing ensures that the developed Online Voting System meets its requirements and works as expected. Below is a detailed outline of the testing process for this project:

6.1. OBJECTIVES OF SYSTEM TESTING

- Verify the system's functionality against specified requirements.
- Ensure the application is free from critical bugs.
- Validate the integration between different modules like registration, login, voting, and result display.
- Check for system reliability, scalability, and security.

6.2. TYPES OF TESTING

A. Functional Testing

- **Objective**: Validate each functional module independently.
- **Tests**:
    - **Registration Module**: Ensure the system properly validates input fields, such as mandatory details (e.g., name, email) and prevents duplicate registrations.
    - **Login Module**: Verify that only valid users can log in, and invalid credentials are rejected.
    - **Vote Casting**: Ensure a user can vote only once and vote data is securely recorded in the database.
    - **Result Display**: Validate that the results are displayed accurately after voting concludes.

B. Integration Testing

- **Objective**: Ensure that all modules interact correctly.
- **Tests**:
  - Verify seamless interaction between registration, login, and vote-casting modules.
  - Test database integration with the front-end and result computation system.

C. Usability Testing

- **Objective**: Evaluate the user-friendliness of the system.
- **Tests**:
  - Ensure the UI is intuitive and accessible for all users.
  - Check the responsiveness of the design on different devices and browsers.

D. Performance Testing

- **Objective**: Test the system's performance under varying conditions.
- **Tests**:
  - **Load Testing**: Measure the system's behavior when multiple users attempt to access the platform simultaneously.
  - **Stress Testing**: Simulate scenarios where the system handles peak loads or unexpected spikes.

E. Security Testing

- **Objective**: Verify that the system is protected against vulnerabilities.
- **Tests**:
  - **Authentication**: Ensure unauthorized users cannot access the system.
  - **Vote Tampering**: Validate that votes cannot be altered after submission.

- **Data Encryption**: Ensure sensitive data, such as credentials and votes, is encrypted.

F. Regression Testing

- **Objective**: Ensure that new updates do not introduce bugs.
- **Tests**:
  - Retest all previously validated modules after code changes or new feature additions.

6.3. TEST CASES

A. Registration Module

Test Case ID	Test Description	Input Data	Expected Result	Actual Result
TC_01	Validate mandatory fields	Blank fields	Error message: "Fields cannot be blank."	Pass
TC_02	Register with valid credentials	Valid user details	User is registered successfully.	Pass
TC_03	Duplicate email	Duplicate email	Error message: "Email already registered."	Pass

Table 1

B. Login Module

Test Case ID	Test Description	Input Data	Expected Result	Actual Result
TC_01	Login with invalid credentials	Wrong email/pwd	Error message: "Invalid credentials."	Pass
TC_02	Login with valid credentials	Valid email/pwd	User is logged in successfully.	Pass

Table 2

C. Vote Casting

Test Case ID	**Test Description**	**Input Data**	**Expected Result**	**Actual Result**
TC_01	Voting without logging in	None	Error message: "Please log in to vote."	Pass
TC_02	Duplicate voting attempt	Valid vote data	Error message: "You have already voted."	Pass

Table 3

D. Result Display

Test Case ID	**Test Description**	**Input Data**	**Expected Result**	**Actual Result**
TC_01	Display results after voting ends	None	Accurate result data displayed.	Pass

Table 4

4. Testing Tools

- **Automated Testing**: Selenium for testing the front-end.
- **Load Testing**: Apache JMeter to simulate multiple user interactions.
- **Security Testing**: OWASP ZAP for vulnerability detection.
- **Database Testing**: SQL scripts to validate data integrity.

5. Expected Outcomes

- All modules should work as expected, meeting functional and non-functional requirements.
- The system should handle concurrent users efficiently during elections.
- The voting data should remain secure and immutable.
- The results should be accurately computed and displayed to authorized users.

7.SCREEN SHOTS

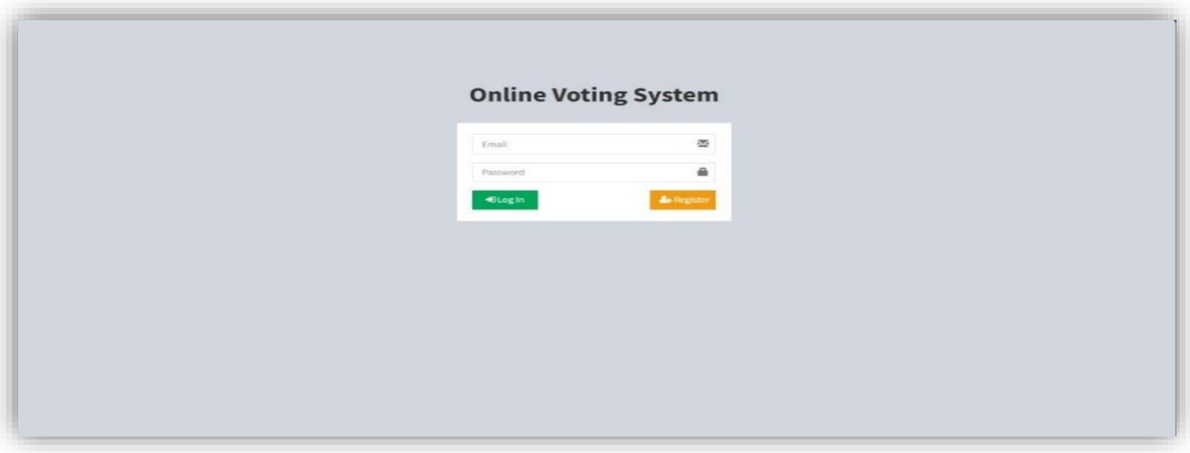


Fig 1 Login Interface

The image displays a simple login interface for an online voting system. It features two input fields for email and password, along with a "Login" button and a "Register" button for new users.

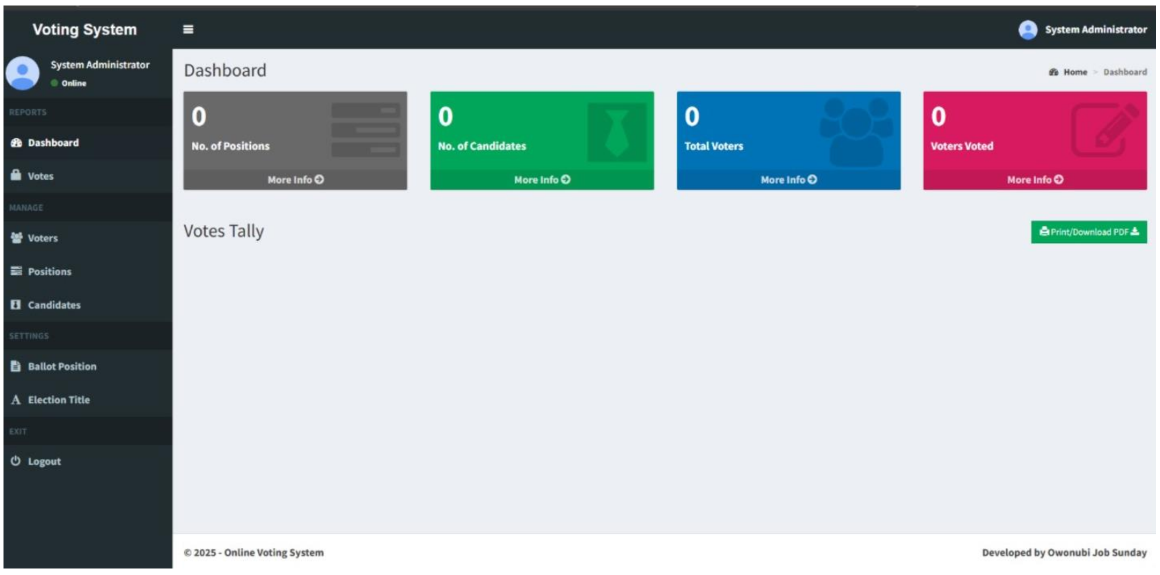
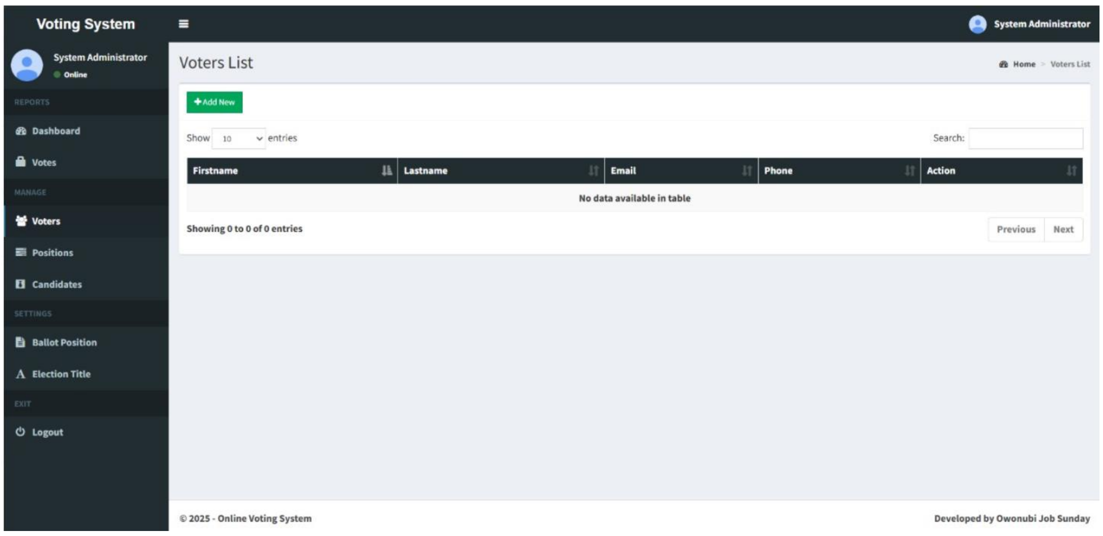


Fig 2 Dashboard

The image shows the dashboard of an online voting system. The dashboard displays key statistics, including the number of positions, candidates, total voters, and voters who have already cast their votes. The system also provides features to manage voters, positions, and candidates, as well as ballot positions and election titles.



Voters List

Firstname	Lastname	Email	Phone	Action
No data available in table				

Showing 0 to 0 of 0 entries

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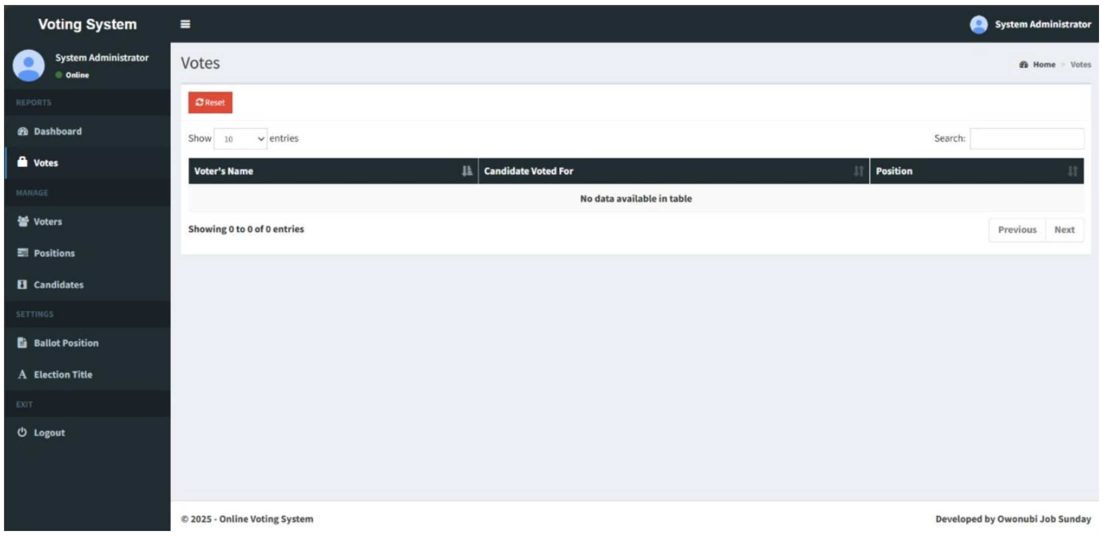
Fig 3 Voters List

The image depicts the "Voters List" page of an online voting system. The page displays a table with columns for Firstname, Lastname, Email, Phone, and Action. Currently, no data is available in the table, indicating that no voters have been registered yet. The page also includes a search bar and options to add new voters and filter the list.



Votes

Voter's Name	Candidate Voted For	Position
No data available in table		

Showing 0 to 0 of 0 entries

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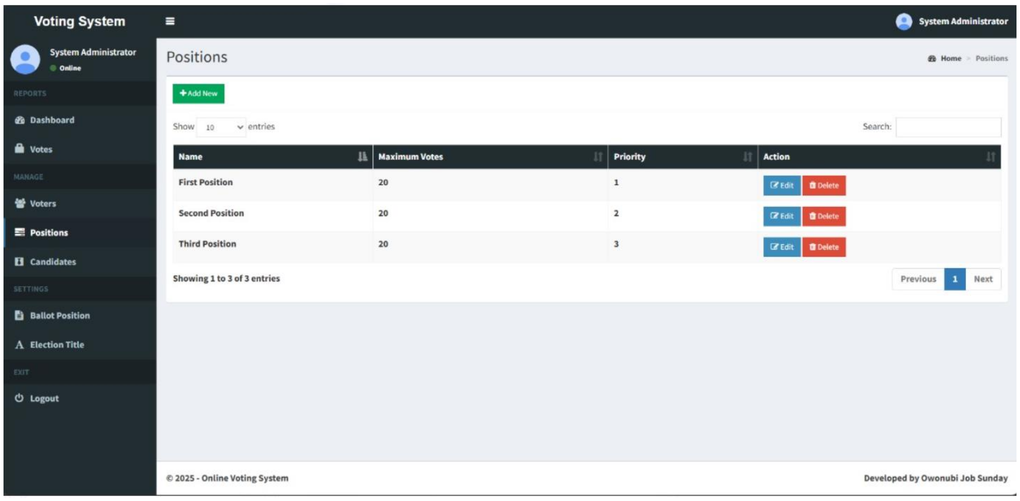
Fig 4 Votes Page

The image displays the "Votes" page of an online voting system. The page is designed to show a list of votes cast, including the voter's name, the candidate they voted for, and the position. However, the table is currently empty, indicating that no votes have been recorded yet. The page also includes a search bar and options to filter the list and adjust the number of entries displayed per page.



Name	Maximum Votes	Priority	Action
First Position	20	1	Edit Delete
Second Position	20	2	Edit Delete
Third Position	20	3	Edit Delete

Showing 1 to 3 of 3 entries

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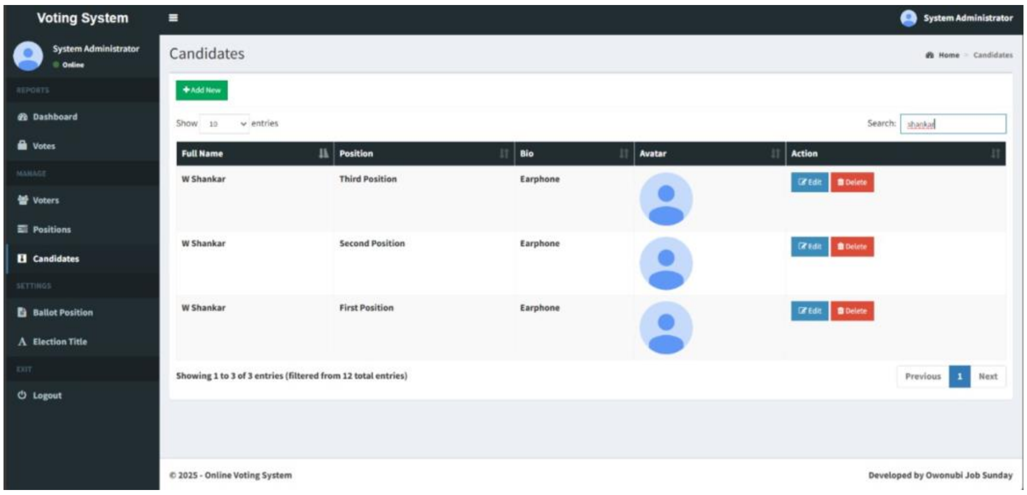
Fig 5 Positions Page

The image displays the "Positions" page of an online voting system. The page shows a list of positions in the election, including their names, maximum votes allowed per position, and priority. The system administrator can add new positions, edit existing ones, and delete positions as needed. The page also includes a search bar and options to filter the list and adjust the number of entries displayed per page.



Full Name	Position	Bio	Avatar	Action
W Shankar	Third Position	Earphone		Edit Delete
W Shankar	Second Position	Earphone		Edit Delete
W Shankar	First Position	Earphone		Edit Delete

Showing 1 to 3 of 3 entries (filtered from 12 total entries)

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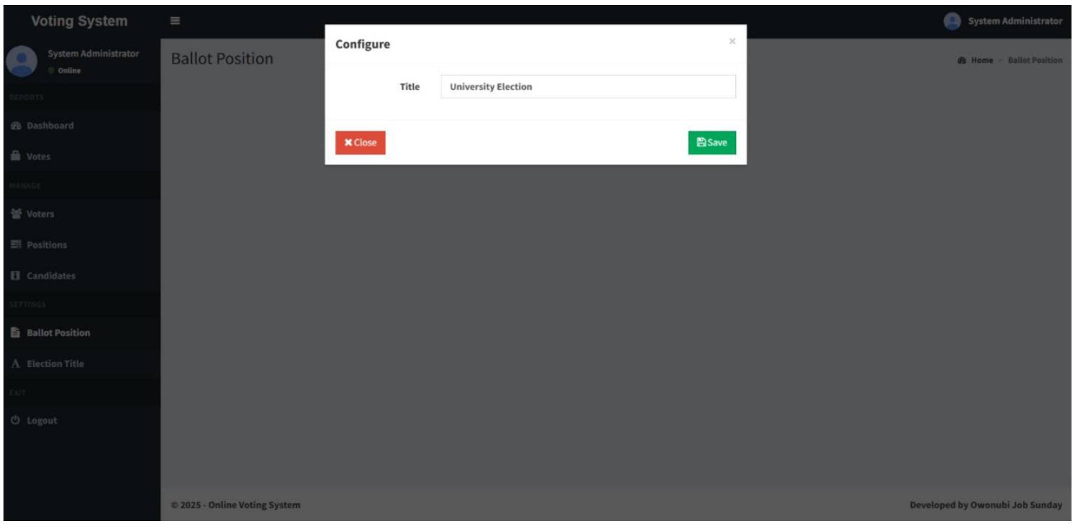
Fig 6 Candidates Page

The image displays the "Candidates" page of an online voting system. The page shows a list of candidates running in the election, including their full names, positions, bios, and avatars. The system administrator can add new candidates, edit existing ones, and delete candidates as needed. The page also includes a search bar and options to filter the list and adjust the number of entries displayed per page.



Title: University Election

Fig 7 Title Page

The image shows a pop-up window within the "Ballot Position" section of an online voting system. This pop-up is likely used to configure or edit the ballot position settings.The window has a single field labeled "Title" with the text "University Election" already entered. This suggests that the administrator is setting or changing the title of the ballot position.Below the field are two buttons: "Close" to cancel the configuration and "Save" to confirm and apply the changes made.

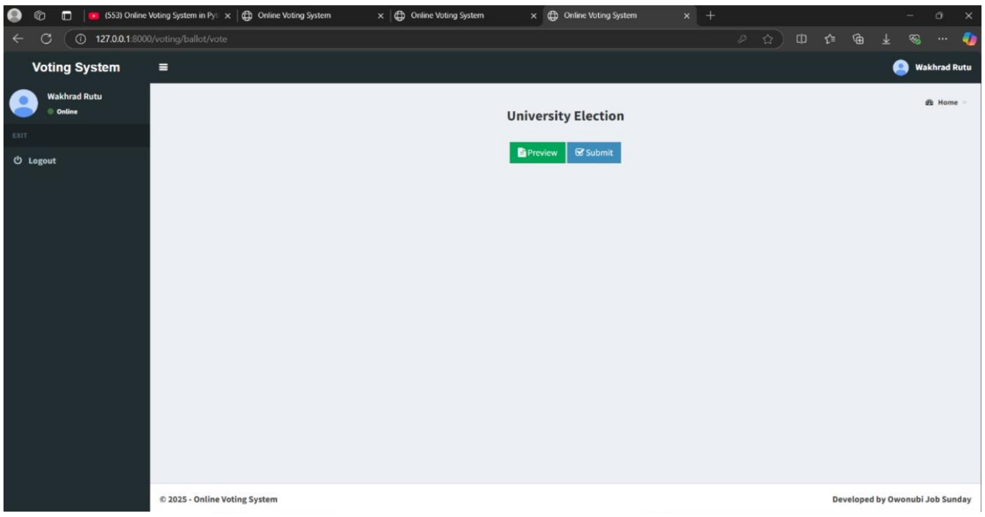


Fig 8 Name of Election

The image shows the voting interface of an online voting system. The user, "Wakhrad Rutu," is currently viewing the "University Election" ballot. The user has the option to "Preview" the ballot before submitting their vote.

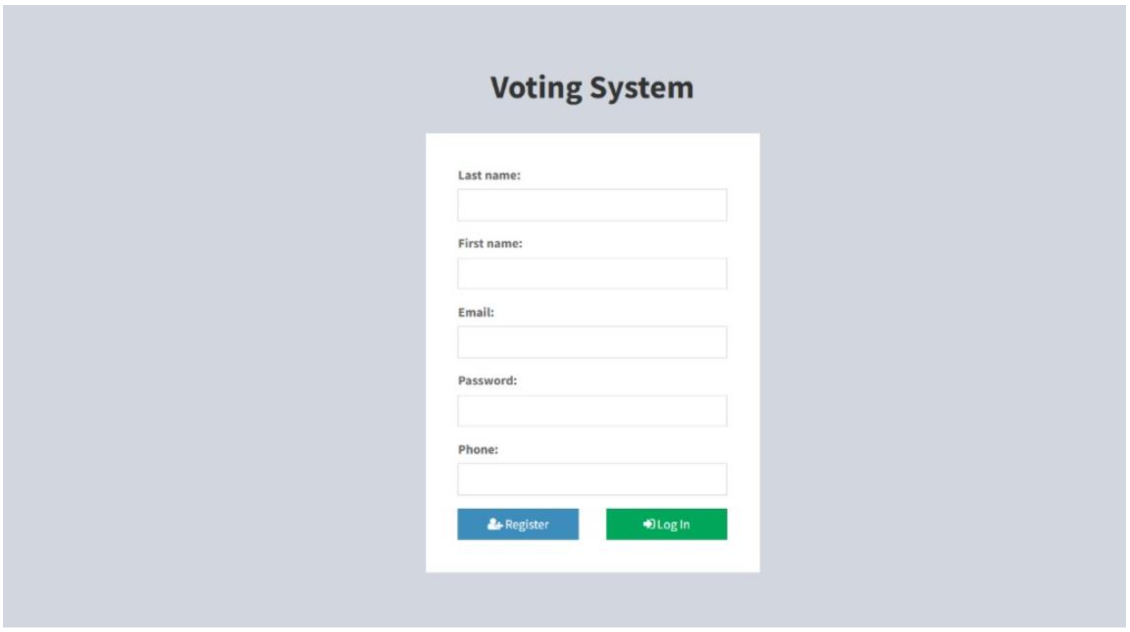
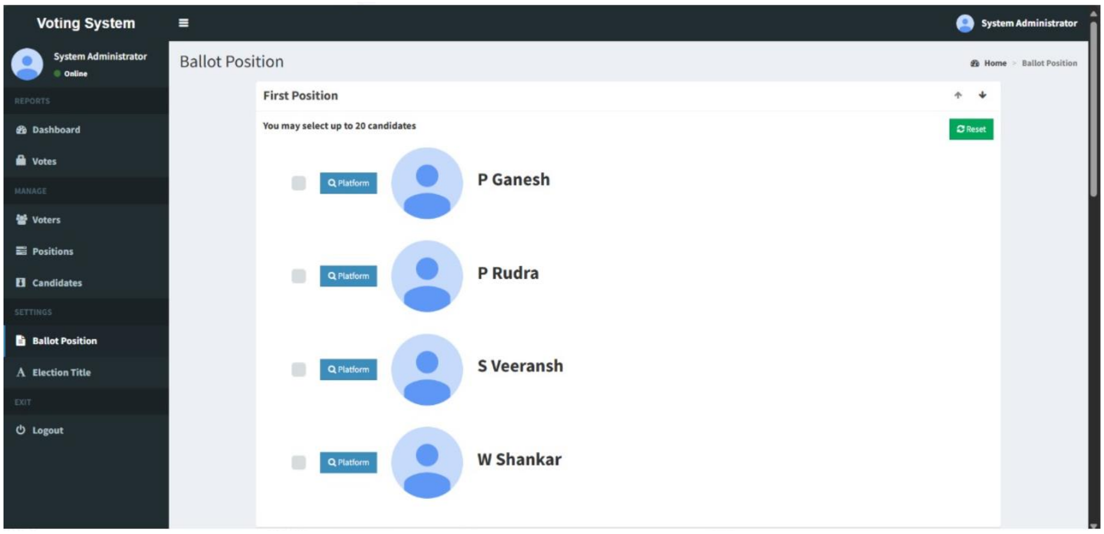


Fig 9 Registration Form

The image shows a simple registration form for a voting system. It asks for the user's last name, first name, email, password, and phone number. The user can then choose to register a new account or log in with existing credentials.



First Position

You may select up to 20 candidates

P Ganesh

P Rudra

S Veeransh

W Shankar

Fig 10 Ballot Position

The image shows the "Ballot Position" page of an online voting system. The page displays a list of candidates running for the "First Position" with their names and avatars. The system allows the user to select up to 20 candidates for this position.

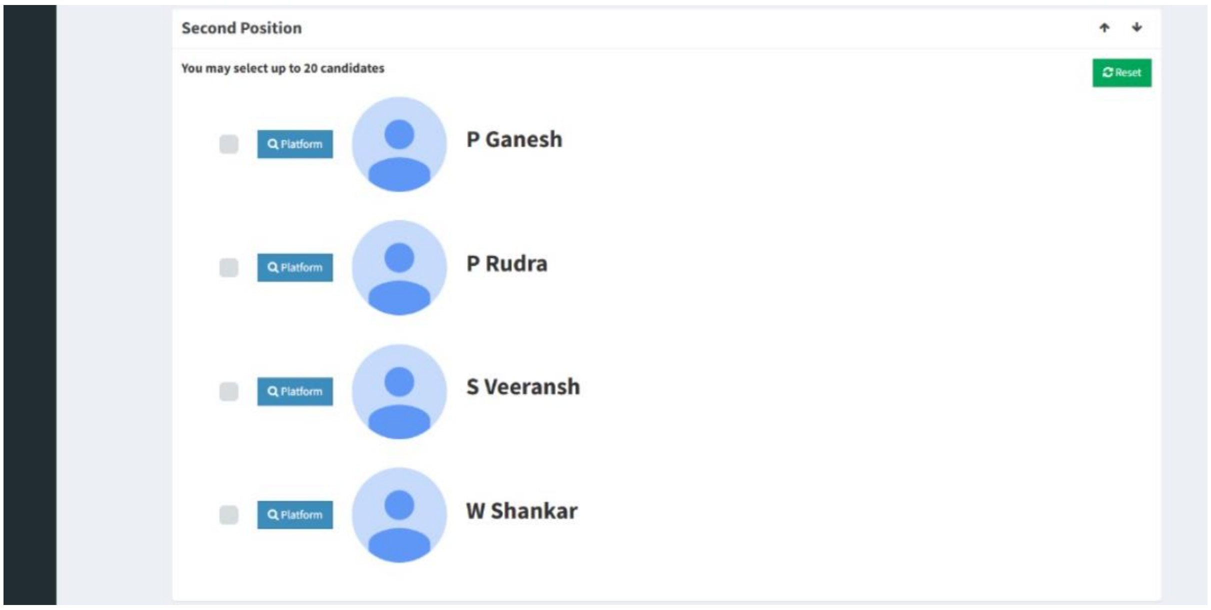


Fig 11 Second Position Section

The image displays the "Second Position" section of an online voting system. A list of candidates for this position is shown, along with their names and avatars. Voters can select up to 20 candidates for this position.

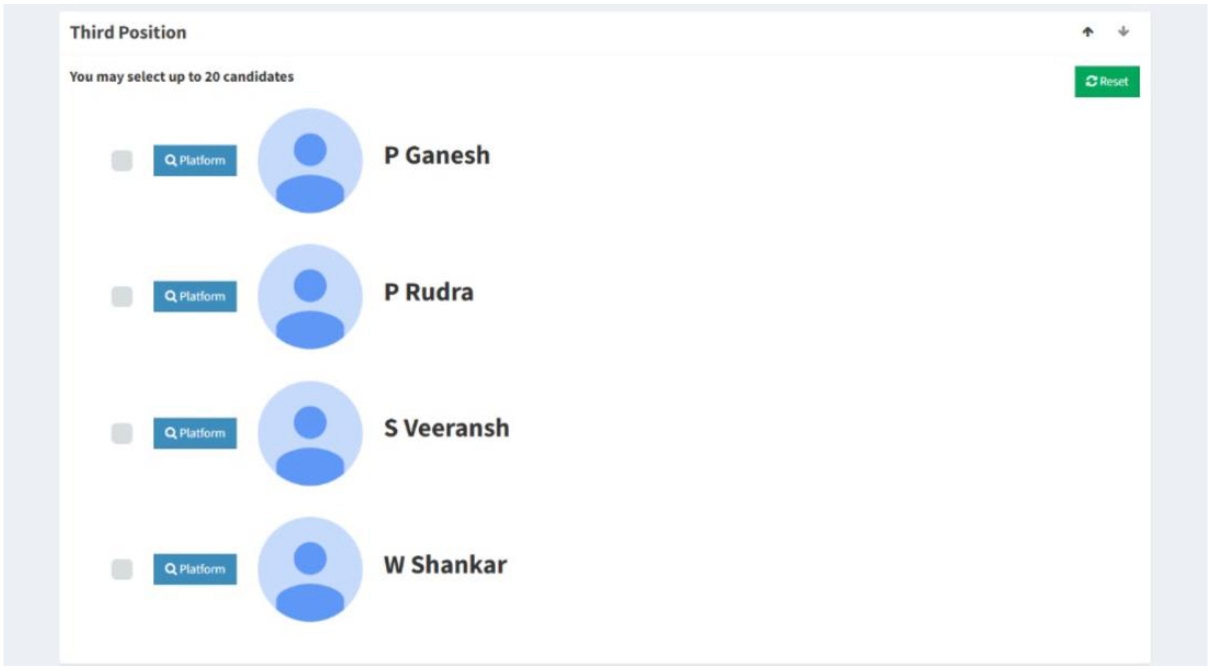
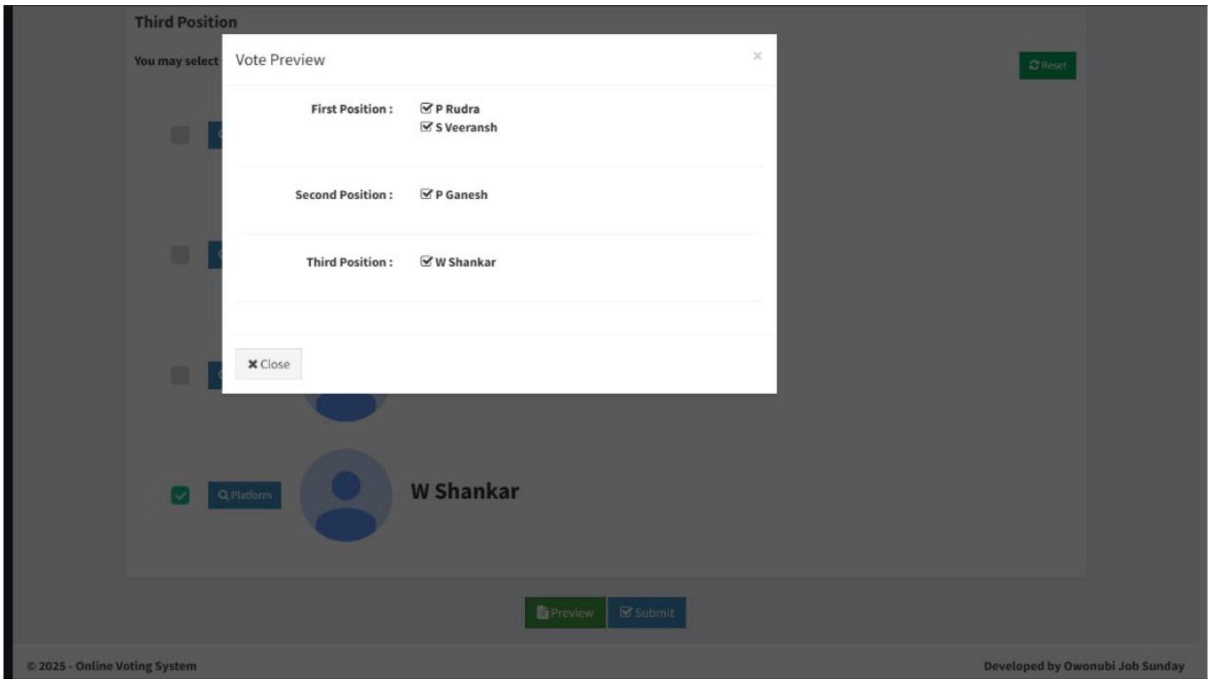


Fig 12 Third Position Section

The image shows the "Third Position" section of an online voting system. A list of candidates for this position is shown, along with their names and avatars. Voters can select up to 20 candidates for this position.


Third Position

You may select

Vote Preview

First Position : P Rudra, S Veeransh

Second Position : P Ganesh

Third Position : W Shankar

Close
Reset
Platform
W Shankar
Preview
Submit
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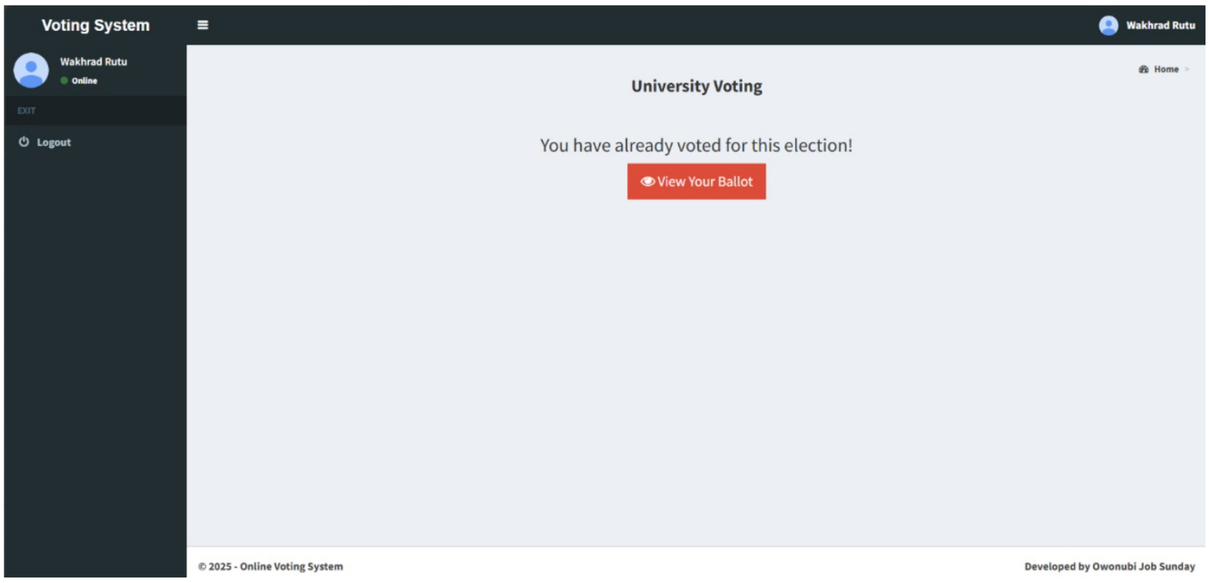
Fig 13 Preview Of Voter

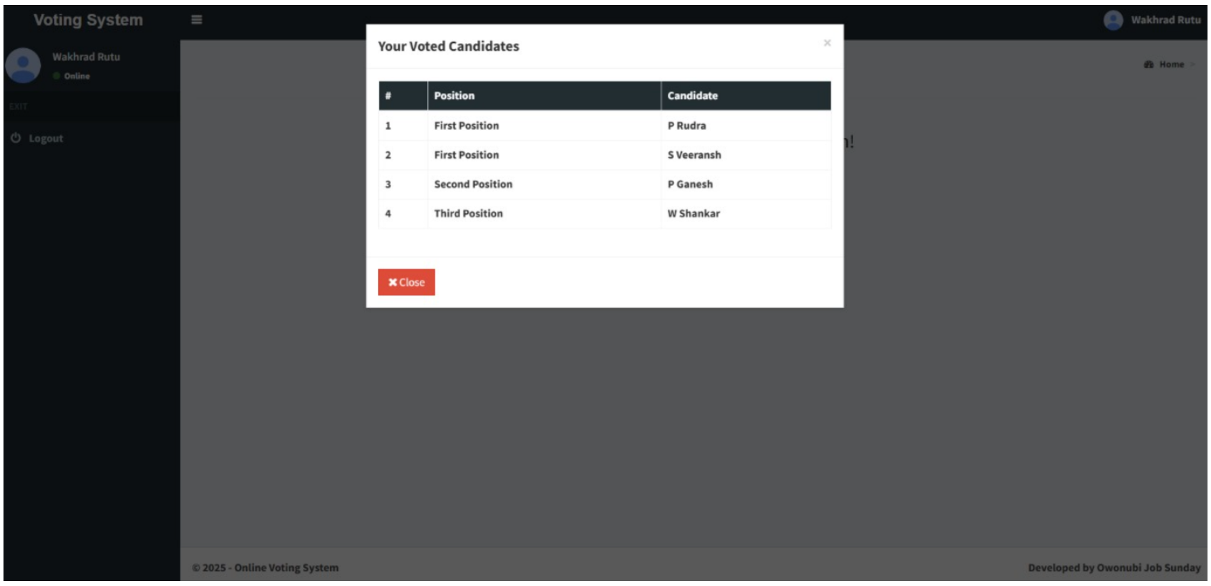
The image shows a preview of the selected votes for the First, Second, and Third Positions. The voter has chosen P. Rudra and S. Veeranesh for the First Position, P. Ganesh for the Second Position, and W. Shankar for the Third Position.


University Voting

You have already voted for this election!

Fig 14 Display Message

The image shows that the vote has been already taken


Voting System
Wakhrad Rutu
Online
EXIT
Logout
Home
Close
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Developed by Owonubi Job Sunday

Your Voted Candidates

#	Position	Candidate
1	First Position	P Rudra
2	First Position	S Veeransh
3	Second Position	P Ganesh
4	Third Position	W Shankar

Fig 15 Voter's Selected Candidates

The image shows a pop-up window displaying the voter's selected candidates. The voter has chosen P. Rudra and S. Veeranesh for the First Position, P. Ganesh for the Second Position, and W. Shankar for the Third Position.

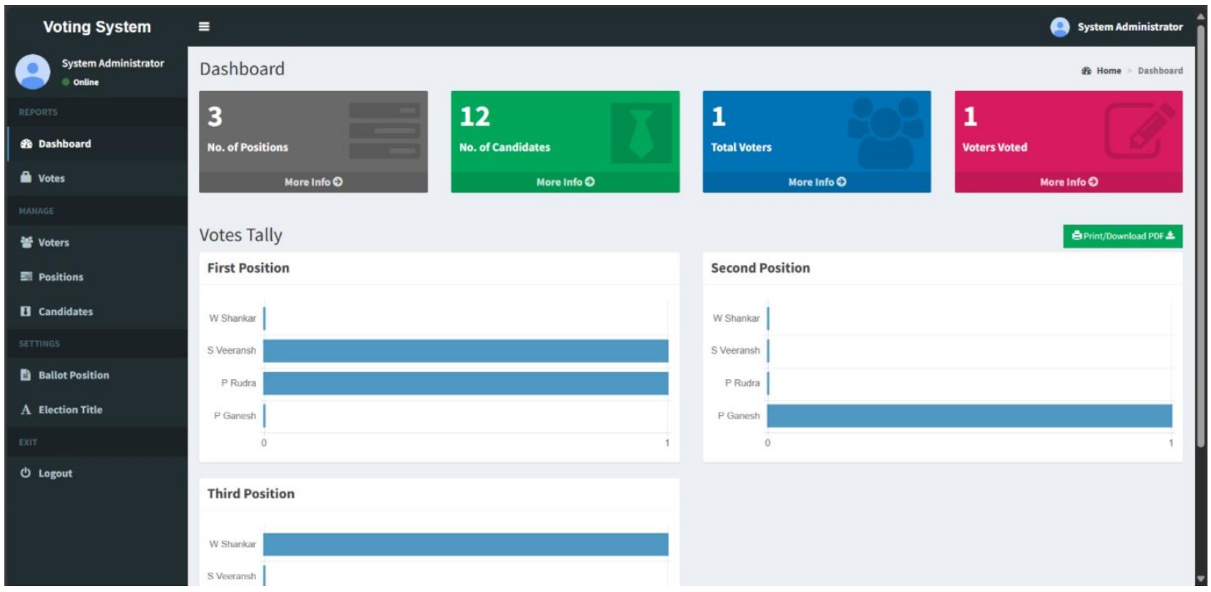
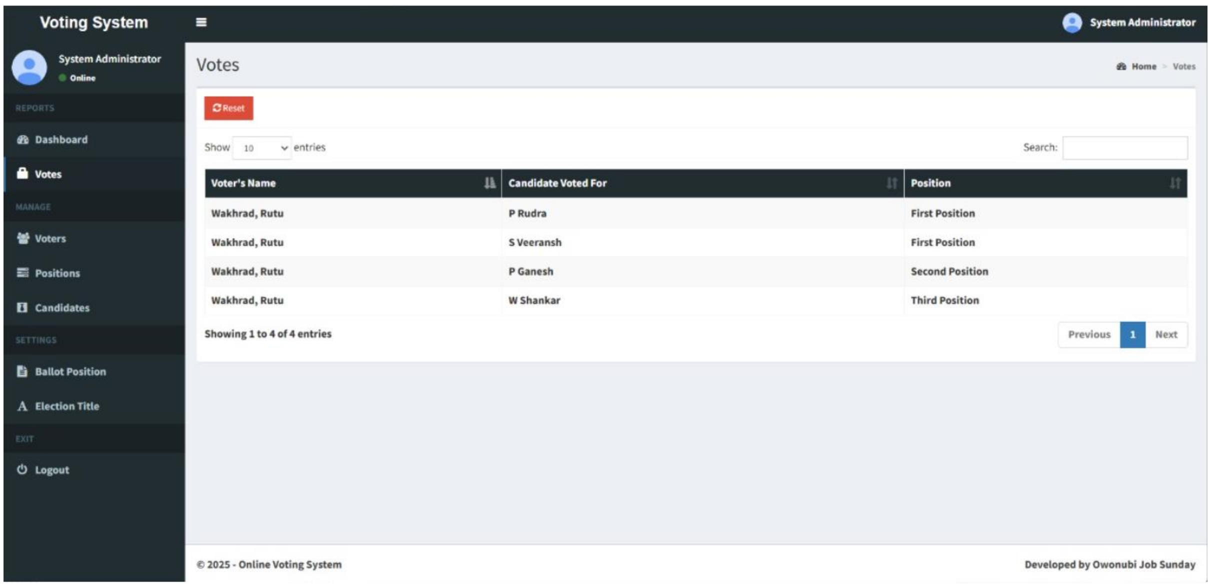


Fig 16 Dashboard After Voting

The image shows the "Dashboard" of an online voting system. It displays key statistics like the number of positions, candidates, and voters. Additionally, it provides a visual representation of the vote tally for each position using bar graphs.



Voter's Name	Candidate Voted For	Position
Wakhrad, Rutu	P Rudra	First Position
Wakhrad, Rutu	S Veeransh	First Position
Wakhrad, Rutu	P Ganesh	Second Position
Wakhrad, Rutu	W Shankar	Third Position

Showing 1 to 4 of 4 entries

Previous 1 Next
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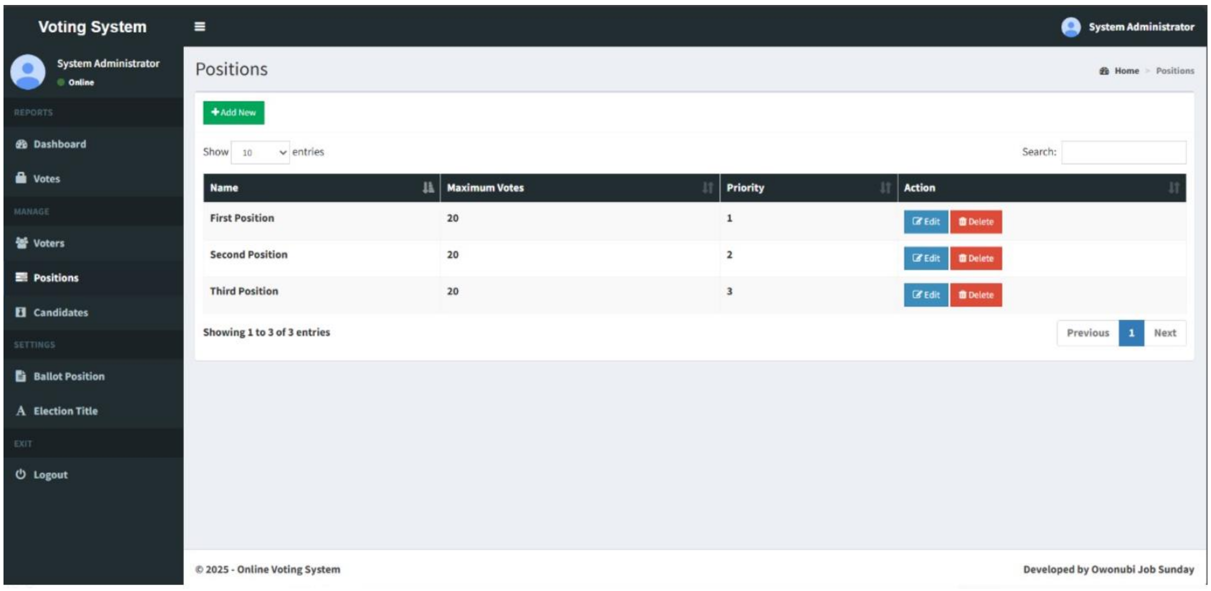
Fig 17 Votes Count Page

The image shows the "Votes" page of an online voting system. A table displays the votes cast, including the voter's name, the candidate they voted for, and the position. The system shows that "Wakhrad Rutu" voted for P. Rudra and S. Veeranesh for the First Position, P. Ganesh for the Second Position, and W. Shankar for the Third Position.



Name	Maximum Votes	Priority	Action
First Position	20	1	Edit Delete
Second Position	20	2	Edit Delete
Third Position	20	3	Edit Delete

Showing 1 to 3 of 3 entries

Previous 1 Next
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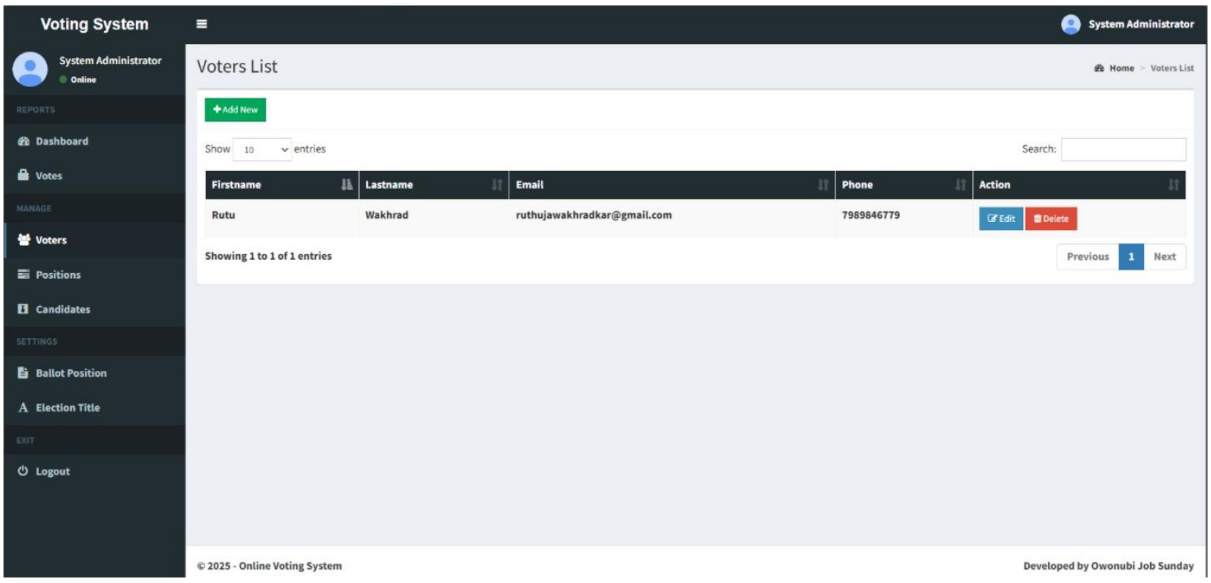
Fig 18 Positions Page After Voting

The image shows the "Positions" page of an online voting system. A table displays the positions in the election, including their names, maximum votes allowed, priority, and options for editing and deleting each position.



Voters List

Show 10 entries Search:

Firstname	Lastname	Email	Phone	Action
Rutu	Wakhrad	ruthujawakhradkar@gmail.com	7989846779	Edit Delete

Showing 1 to 1 of 1 entries

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Fig 19 Voters List

The image shows the "Voters List" page of an online voting system. The page displays a table with columns for Firstname, Lastname, Email, Phone, and Action. Currently, one voter is registered: "Rutu Wakhrad" with their email and phone number. The system administrator can edit or delete this voter record.

8.CONCLUSION

Online voting systems offer the potential to modernize and improve the electoral process, but they also present significant challenges that must be carefully addressed. A thoughtful and measured approach is necessary to ensure that any implementation of online voting systems safeguards the integrity of elections, promotes voter participation, and maintains public trust.

- **Increased Accessibility:** Online voting systems can significantly increase voter turnout by making voting more convenient for individuals who face barriers to traditional polling places (e.g., distance, mobility issues, long wait times).
- **Potential for Cost Savings:** Implementing online voting systems could potentially lead to cost savings in the long run due to reduced staffing needs at polling locations and fewer paper ballots to print and transport.
- **Enhanced Security and Transparency:** Modern online voting systems can incorporate robust security measures like encryption and blockchain technology to ensure the integrity and confidentiality of votes. Transparent audit trails can also increase public trust in the election process.

❖ Potential Benefits

- **Improved Voter Experience:** Online voting can offer a more user-friendly and engaging experience, potentially leading to increased voter satisfaction.
- **Greater Inclusion:** Online voting can make it easier for marginalized groups to participate in elections, including those with disabilities, overseas voters, and those living in remote areas.

- **Real-time Results:** Online systems can potentially enable faster and more accurate reporting of election results, reducing uncertainty and speculation.

❖ Challenges and Considerations

- **Security Risks:** Ensuring the security and integrity of online voting systems is paramount to prevent fraud and maintain public trust. This requires robust security measures and ongoing monitoring.
- **Digital Divide:** Access to technology and internet connectivity varies across populations. Ensuring equitable access to online voting systems is crucial to avoid disenfranchising certain groups.

- **Voter Confidence:** Building public trust in online voting systems is essential for their success. This requires transparency, clear communication, and rigorous testing to demonstrate the security and reliability of the technology.
- **Legal and Regulatory Frameworks:** Clear legal and regulatory frameworks are needed to govern online voting systems, including issues such as voter authentication, system security, and accessibility.

9.FUTURE SCOPE

1. Enhanced Security and Privacy

- **Blockchain Integration:** Implementing blockchain technology can enhance security and transparency by creating an immutable and tamper-proof record of votes.[1]
- **Biometric Authentication:** Utilizing biometric authentication methods like fingerprint or facial recognition can further strengthen voter verification and prevent identity fraud.[2]
- **Homomorphic Encryption:** This advanced encryption technique allows for calculations to be performed on encrypted data, ensuring vote privacy while still enabling vote counting.[3]

2. Improved Accessibility and Inclusivity

- **Multilingual Interfaces**: Providing voting systems in multiple languages will cater to diverse linguistic communities and improve accessibility for non-native speakers.
- **Assistive Technology:** Integrating assistive technologies like screen readers and text-to-speech for visually impaired voters will ensure inclusivity for all citizens.
- **Mobile Optimization:** Ensuring seamless and secure voting experiences on mobile devices is crucial for reaching a wider demographic.

3. Enhanced Voter Experience

- **Personalized Information:** Providing voters with tailored information about candidates and ballot measures based on their interests and location.
- **Interactive Tutorials:** Offering interactive tutorials and support resources to guide voters through the online voting process.[4]
- **Gamification:** Incorporating gamification elements to make the voting process more engaging and encourage participation.

4. Smart Contract Integration

- **Automated Vote Counting:** Utilizing smart contracts on blockchain platforms can automate vote counting and verification processes, reducing the risk of human error and increasing efficiency.[5]
- **Conditional Voting:** Smart contracts can enable conditional voting scenarios, such as allowing voters to cast votes based on specific conditions or outcomes.

5. Integration with Other Systems

- **Government Databases:** Integrating with government databases to verify voter identity and eligibility can streamline the registration and voting processes.
- **Civic Engagement Platforms:** Connecting online voting systems with civic engagement platforms can encourage voter education and participation.

6. Continuous Research and Development

- **Usability Testing:** Conducting regular usability testing and user feedback sessions to identify areas for improvement and ensure the system is user-friendly and accessible.
- **Security Audits:** Regular security audits and penetration testing to identify and address potential vulnerabilities and ensure the system's resilience against cyberattacks.

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