E-VOTING PORTAL

MINI-PROJECT REPORT

Submitted in partial fulfillment of the requirements of the degree

BACHELOR OF ENGINEERING IN

INFORMATION TECHNOLOGY

By

ASHMIT RAWAT - 09

DHRUV DHANDUKIYA - 29

PRATIK BIYANI - 17

HARDIK AGARWAL - 02

Guide

DR ARUN KULKARNI

Department of Information Technology

Thadomal Shahani Engineering College

Adv. Nari Gursahani Marg, TPS III, Off Linking Rd, Bandra West,

Mumbai, Maharashtra 400050

University of Mumbai

(Academic Year 2024-25)

CERTIFICATE

This is to certify that the Mini Project entitled **"E-VOTING PORTAL"** is a bonafide work of **ASHMIT RAWAT(09), DHRUV DHANDUKIYA(29), PRATIK BIYANI(17), HARDIK AGARWAL(02)** submitted to the University of Mumbai in partial fulfillment of the requirement for the award of the degree of **"Bachelor of Engineering"** in **"Information Technology Engineering".**

Dr. Arun Kulkarni
Project Guide

Dr. G. T. Thampi
Principal

Dr. Mukesh Israni
HOD

Mini Project Approval

This Mini Project entitled **"E-VOTING PORTAL"** by **ASHMIT RAWAT(09), DHRUV DHANDUKIYA(29), PRATIK BIYANI(17), HARDIK AGARWAL(02)** is approved for the degree of **Bachelor of Engineering** in **Information Technology Engineering.**

Examiners

1……

(Project Guide)

2……

(External Examiner)

Date:

Place: Mumbai

ACKNOWLEDGEMENT

This project has consumed a significant amount of time and resources, and we would like to thank everyone who has contributed to its success. We would like to express our deepest gratitude to the project head, **Dr. Arun Kulkarni** for his time, patience and direction, as well as for inspiring us throughout. Without their guidance and support, this project would not have been possible. Their expertise, insights, and encouragement were invaluable in helping us navigate the various challenges and complexities of this project.

We would also like to extend our sincere thanks to the many research papers that we consulted throughout the course of this project. The insights and ideas presented in these papers were instrumental in helping us develop a deeper understanding of the subject matter and in shaping the direction of our research.

We are also grateful to our colleagues and friends who provided us with valuable feedback and support throughout the project. Their encouragement and insights were invaluable in helping us refine our ideas and in pushing us to achieve our best work.

The team consisted of the following members:

ASHMIT RAWAT - 09
DHRUV DHANDUKIYA - 29
PRATIK BIYANI - 17
HARDIK AGARWAL - 02

ABSTRACT

"E-Voting Portal" represents a significant leap forward in the realm of democratic participation. By providing a secure, accessible, and user-friendly platform for voters, we aim to increase voter turnout, promote transparency, and enhance public confidence in the electoral process. We believe that this system has the potential to transform the way we vote, empowering citizens and strengthening democracy for generations to come.

The core features of "E-Voting Portal" include:

1. Voter/Admin Login:

The process begins at the Login Page where users, admins and super admins enter their U-ID (User ID), Password, and complete a CAPTCHA to access the portal. We employ advanced encryption and authentication measures to protect voter identity and ensure the integrity of the voting process.

2. Admin Role:

- System Monitoring: Admins oversee the voting system.
- Live Count: Admins monitor the live vote count.
- Terminate Election: Admins can terminate the election.
- Hold Election: Stop the election for the day.
- Show Voters: Shows list of voters who have voted.
- Download voter list: Download the list of the voters who have voted.

3. Secure Ballot Casting:

Voters can cast their ballots securely through our system.

- Timer: A timer is set for the voting process.
- Confirmation: Users confirm their vote.
- User-Friendly Interface: The system provides an easy-to-use interface.
- Feedback: After voting, users provide feedback.

4. Results Verification

After the voting period concludes, our system automatically tallies the results, ensuring transparency and accuracy. The results are publicly displayed, and any discrepancies can be easily tracked and investigated.

- Graphical Representation: Results are presented graphically.

- Statistical Representation : Results are displayed statistically.
- Cannot Be Changed: Results cannot be altered once finalized.

5. Super Admin :

- Declare Result: Declares the result on the date of result announcement.

Contents

List of figures

INTRODUCTION

1.1 Introduction

This e-voting system is developed as a secure and efficient platform to facilitate electronic voting using Java Swing, AWT, and MySQL. The system provides a user-friendly interface designed to simplify the voting process while ensuring data security and accuracy. The project integrates MySQL as the backend database to store information about administrators and users, offering reliable data management and security.

Java Swing and AWT are used to develop the graphical user interface (GUI), which allows voters to register, log in, and cast their votes securely. Administrators have additional controls to manage the voting process, verify users, and oversee the final results. Key features of the system include a secure login process, CAPTCHA verification for preventing bots, and a robust data storage mechanism.

This project aims to provide a practical solution for conducting elections in small-scale organizations, focusing on usability, transparency, and scalability. It simulates real-world voting scenarios, ensuring that votes are recorded accurately and securely, making it a valuable tool for educational or institutional use.[1]

1.2 Motivation

The motivation for this project arises from the urgent need to address the limitations of traditional voting systems. Voting methods that rely on physical ballots face significant challenges, including long wait times, restricted access to polling stations, and limited voting windows. These factors, especially for individuals with disabilities, those in remote areas, or younger generations, contribute to low voter

turnout and can lead to disenfranchisement. Furthermore, concerns about ballot manipulation and fraud undermine trust in electoral outcomes. By offering a secure, transparent, and user-friendly online platform, this project seeks to modernize voting, ensuring higher accessibility, enhanced security, and increased public confidence in the electoral process.

This project introduces technology that can potentially revolutionize elections by removing the barriers of time and location, thus encouraging broader participation while maintaining the integrity of the vote.[3]

1.3 Problem statement and objectives

Traditional voting methods face multiple hurdles that impact voter participation and trust. One of the key issues is low voter turnout, particularly among younger generations who find it inconvenient to vote due to long lines, limited voting hours, and physical location constraints. This discourages them from participating in elections, weakening democratic engagement.

Accessibility limitations are another concern, particularly for individuals with disabilities, those in remote areas, or people with limited mobility. These individuals may find it difficult or impossible to physically reach polling stations, further lowering voter turnout.

In addition, security concerns related to voter fraud and ballot manipulation have eroded public trust in the electoral process. Instances of potential tampering with paper ballots, mismanagement of voting data, or the risk of human error can make voters skeptical about the fairness of elections. These issues can result in contested results and a lack of confidence in the integrity of the voting system

Our project, the e-voting portal, seeks to modernize the voting process by tackling these challenges head-on. By transitioning to an online platform, we provide a secure, accessible, and transparent voting solution that not only improves voter participation but also enhances the trustworthiness of the election process. The system ensures secure ballot casting, real-time vote monitoring, and tamper-proof result declaration, making it an ideal solution for a more reliable, inclusive, and future-ready electoral process.[4]

1.4 Organization of the report

Introduction: Overview of the current voting challenges and project goals.

Problem Statement: Detailed discussion on traditional voting issues.

Existing Solutions: Examination of current voting systems like EVMs and their limitations.

Innovative Features: Description of the online voting portal's features, such as secure login, eligibility verification, and live vote tracking.

System Design: Flow diagrams and UI details.

Conclusion: How the project enhances democracy by increasing accessibility, security, and voter confidence.[2]

SURVEY AND ANALYSIS

2.1 Survey of existing system

Electronic Voting Machines (EVMs):

- Introduction: India transitioned from paper ballots to Electronic Voting Machines (EVMs) in a phased manner, starting in the 1990s, to combat issues like ballot stuffing, tampering, and long counting processes. By 2004, EVMs were used nationwide in general elections.
- Functionality: EVMs are standalone machines that record votes electronically. They consist of two units: the Control Unit (operated by the polling officer) and the Ballot Unit (used by the voter). The voter presses a button corresponding to the candidate of their choice.[2]
- **Advantages:**
- Speed: EVMs greatly reduce the time taken for counting votes.
- Fraud Prevention: EVMs are standalone, non-networked devices, reducing the chances of tampering or hacking remotely.
- Cost-Effectiveness: Once procured, EVMs reduce the recurring costs associated with paper ballots. [2]

2.2 Limitation of existing system or research gap

- **Low voter turnout**

Traditional voting methods often suffer from low voter turnout, especially among younger generations and those who find it difficult to navigate physical polling locations.

- **Accessibility limitations**

Individuals with disabilities, those living in remote areas, or those with limited mobility may face significant barriers to accessing polling stations

- **Security concerns**

Concerns about voter fraud and the potential for manipulation of ballots can undermine public confidence in the integrity of elections.[1]

2.3 Mini project contribution

1. Secure Login

- Ensures only authorized users can access the voting system via multi-factor authentication (MFA), CAPTCHA, and session management. This prevents unauthorized access and protects voter information.

2. Role-Based Access Control (RBAC)

- Limits system access based on user roles (e.g., voter, administrator, auditor). Each role has specific permissions, ensuring only authorized actions are allowed for each user, maintaining system security.

3. Eligibility Verification

- Confirms voter identity and eligibility using real-time checks against a voter database and government-issued IDs. This ensures only eligible voters can cast their votes, preventing fraud.

4. Simple & Intuitive UI

- A clean, easy-to-navigate interface with step-by-step instructions, accessibility features, and error handling ensures voters of all technical levels can use the system without confusion.

5. Ballot Preview

- Allows voters to review and confirm their choices before final submission, reducing errors and ensuring voter satisfaction.

6. Live Voting Stats

- Provides real-time updates on voter turnout, participation rates, and other non-sensitive data during elections, helping administrators monitor election progress.

7. Result Declaration

- Automates result computation and displays them transparently once voting ends, ensuring timely and accurate election outcomes.[3]

PROPOSAL

3.1 Proposed system

The E-Voting Portal is an innovative platform designed to enhance democratic participation by providing a secure, accessible, and user-friendly voting experience.

Core Functionalities from our project is:

User Authentication:

Voters and admins log in using a User ID, password, and CAPTCHA, ensuring secure access through encryption.

Admin Management:

Admins monitor the voting system, oversee live vote counts, manage elections (terminate/hold), and access voter information.

Secure Voting:

Voters cast their ballots through a secure interface with a timer, confirmation prompts, and an easy-to-navigate design. Feedback is collected post-voting.

Results Transparency:

The system automatically tallies votes, displaying results publicly in both graphical and statistical formats. Finalized results cannot be altered.

Super Admin Role:

Super admins declare election results on the specified announcement date, ensuring official closure of the voting process.

The E-Voting Portal aims to increase voter turnout, promote transparency, and strengthen public confidence in elections, transforming the future of democratic participation.[4]

3.2 Architecture / Framework

The architecture of the E-Voting Portal follows a three-tier model:

1. Presentation Layer:
    - The user interface is built using Java AWT & Swing, offering an intuitive, interactive, and user-friendly experience. This layer handles all user interactions, including login, voting, and viewing results, and ensures that data is displayed clearly to both voters and administrators.
2. Business Logic Layer:
    - The core logic of the system is implemented in Java, managing all processes such as authentication, voting validation, and election management. This layer acts as a mediator between the user interface and the database, executing commands based on user input while adhering to system requirements and business rules.
3. Data Layer:
    - MySQL is employed for database management, ensuring secure and reliable storage of user data, vote records, and election details. The data layer maintains the integrity and persistence of all information, ensuring that it can be accessed and retrieved as needed for administrative and auditing purposes.

This architecture promotes modularity, allowing for easy scalability and maintenance. It also enhances security by separating responsibilities across layers, ensuring sensitive data remains secure throughout the system.[2]

3.3. User Flow

User Flow of the E-Voting System is designed to promote seamless navigation and accessibility:

1. Login Process:
    1. Users (voters/admins) navigate to the login page.
    2. Enter U-ID (User ID), password, and solve the CAPTCHA.
    3. System verifies the credentials using encryption for security.
2. Admin Functionality:
    1. Admin logs in to monitor the system.
    2. Admin views live vote count.
    3. Admin can announce results or terminate the election process.
3. Voting Process:
    1. Voter logs in and proceeds to cast their vote.
    2. A timer is set for vote completion.
    3. Voter confirms the vote, which is securely recorded.
4. Post-Voting Feedback:
    1. After voting, users provide feedback on the process.
5. Results Tally:
    1. Once voting ends, the system automatically tallies votes.
    2. Results are displayed both graphically and statistically.
    3. Final results are made publicly available and cannot be changed post-tally.[1]

3.4. DATABASE STRUCTURE

```sql
CREATE DATABASE evoting_portal1;
USE evoting_portal1;

CREATE TABLE voter (
    username VARCHAR(50) PRIMARY KEY ,
    password VARCHAR(255) NOT NULL,
    sec_answer1 VARCHAR(255),
    sec_answer2 VARCHAR(255)
);

CREATE TABLE admin (
    username VARCHAR(50) PRIMARY KEY ,
    password VARCHAR(255) NOT NULL,
    is_logged_in BOOLEAN DEFAULT FALSE
);

INSERT INTO admin (username, password) VALUES ('ashmit11', '1122');

INSERT INTO voter (username, password, sec_answer1, sec_answer2) VALUES
('hardik33', '3344', 'Mumbai', 'Black'),
('pratik55', '5566', 'Rajasthan', 'Purple'),
('dhruv77', '7788', 'Gujarat', 'Blue');

CREATE TABLE feedback (
    feedback_id INT AUTO_INCREMENT PRIMARY KEY,
    voter_username VARCHAR(50),
    rating INT CHECK (rating BETWEEN 1 AND 5),
    feedback_text TEXT,
    feedback_timestamp TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
```

3.4.1 Database structure 1

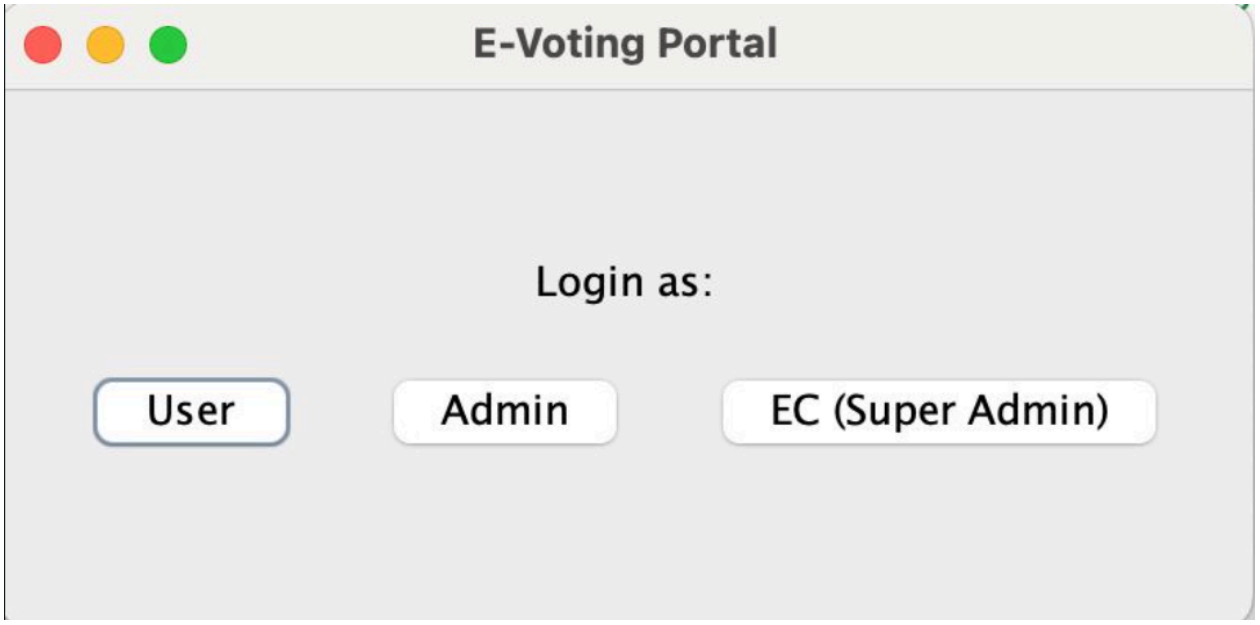
```sql
CREATE TABLE feedback (
    feedback_id INT AUTO_INCREMENT PRIMARY KEY,
    voter_username VARCHAR(50),
    rating INT CHECK (rating BETWEEN 1 AND 5),
    feedback_text TEXT,
    feedback_timestamp TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
    FOREIGN KEY (voter_username) REFERENCES voter(username)
);

CREATE TABLE votes (
    vote_id INT AUTO_INCREMENT PRIMARY KEY,
    voter_username VARCHAR(50),
    party_name VARCHAR(50),
    vote_timestamp TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
    FOREIGN KEY (voter_username) REFERENCES voter(username)
);

ALTER TABLE votes ADD CONSTRAINT unique_voter_vote UNIQUE (voter_username);

CREATE TABLE election_status (
    id INT PRIMARY KEY AUTO_INCREMENT,
    is_active BOOLEAN NOT NULL DEFAULT TRUE
);

INSERT INTO election_status (id, is_active) VALUES (1, TRUE) ON DUPLICATE KEY UPDATE is_active = TRUE;

CREATE TABLE ec_admin (
    id INT AUTO_INCREMENT PRIMARY KEY,
    username VARCHAR(50) NOT NULL UNIQUE,
```

3.4.2 Database structure 2

```sql

CREATE TABLE votes (
    vote_id INT AUTO_INCREMENT PRIMARY KEY,
    voter_username VARCHAR(50),
    party_name VARCHAR(50),
    vote_timestamp TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
    FOREIGN KEY (voter_username) REFERENCES voter(username)
);

ALTER TABLE votes ADD CONSTRAINT unique_voter_vote UNIQUE (voter_username);

CREATE TABLE election_status (
    id INT PRIMARY KEY AUTO_INCREMENT,
    is_active BOOLEAN NOT NULL DEFAULT TRUE
);

INSERT INTO election_status (id, is_active) VALUES (1, TRUE) ON DUPLICATE KEY UPDATE is_active = TRUE;

CREATE TABLE ec_admin (
    id INT AUTO_INCREMENT PRIMARY KEY,
    username VARCHAR(50) NOT NULL UNIQUE,
    password VARCHAR(50) NOT NULL,
    is_logged_in BOOLEAN DEFAULT FALSE
);

INSERT INTO ec_admin (username, password, is_logged_in) VALUES ('ec00', '0011', FALSE);
```

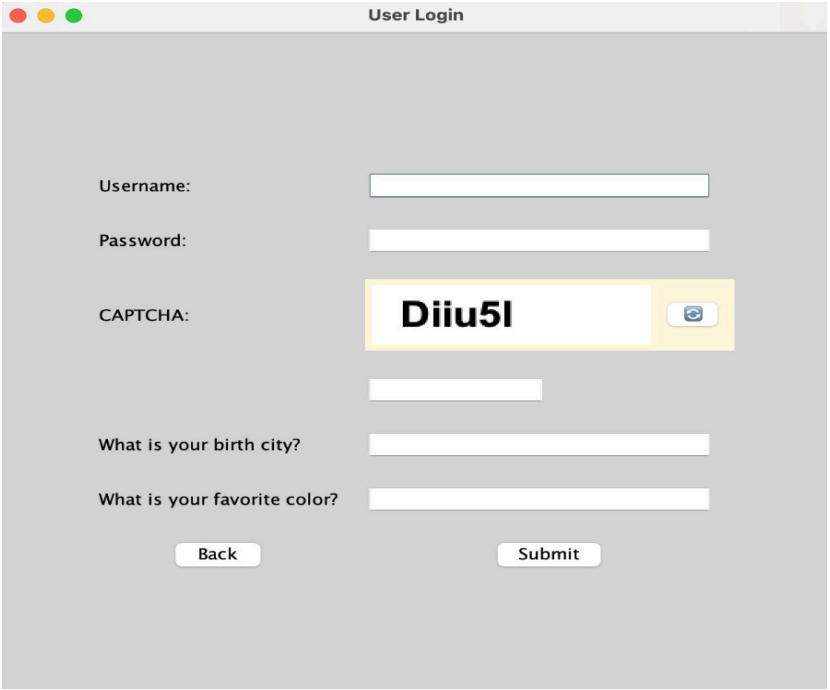
3.5. RESULTS

The UI screen has a simple design with a title at the top reading "E-Voting Portal." Below this, there is a prompt labeled "Login as:" followed by three rectangular buttons. Each button represents a login type: "User," "Admin," and "EC (Super Admin)." The buttons are aligned horizontally and evenly spaced, with minimal visual embellishments for a clean look.



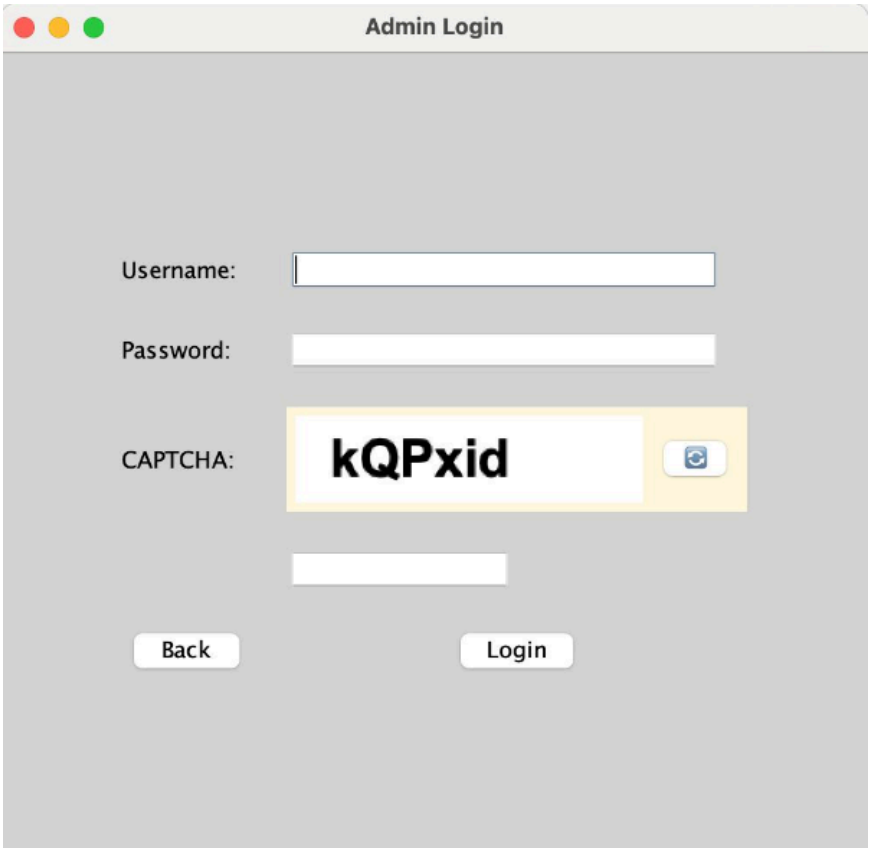
3.5.1 Home page

This screen is labeled "**User Login**" at the top, indicating it is for standard users. There are fields for entering the username and password, as well as a CAPTCHA image with a reload button beside it. Additionally, two security questions are presented: "What is your birth city?" and "What is your favorite color?" Below these, two buttons are visible: "Back" and "Submit."



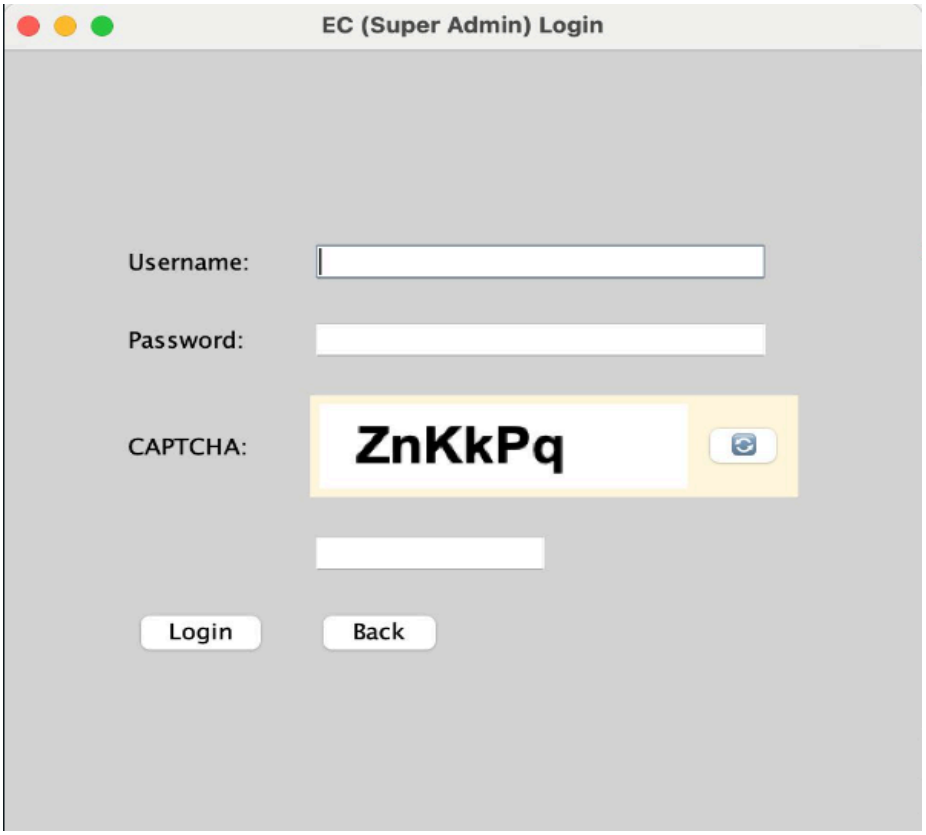
3.5.2 User Login Page

The **Admin Login** screen is designed specifically for administrators who manage aspects of the e-voting portal. At the top, the screen title "Admin Login" provides clarity on the login type. Below this title, there are input fields for **Username** and **Password**, allowing the admin to enter their credentials securely. A **CAPTCHA image** is placed below the password field to add an extra layer of security and prevent automated login attempts. Next to the CAPTCHA image, a **reload button** allows the user to generate a new CAPTCHA if needed.

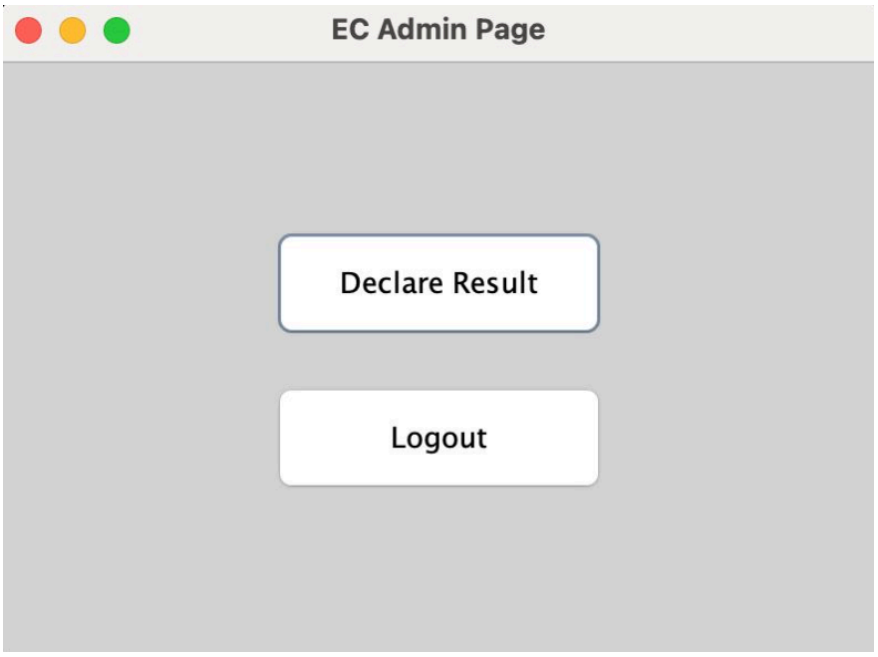


3.5.3 Admin Login Page

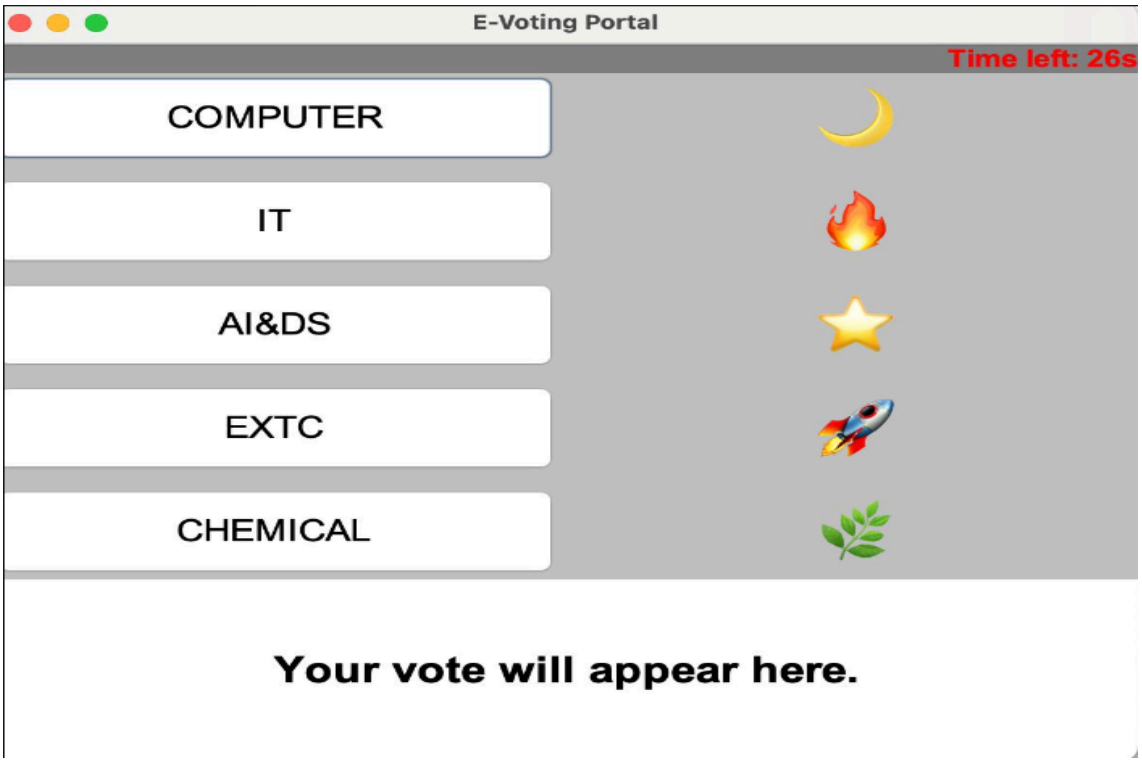
The **EC (Super Admin) Login** screen is tailored for the highest level of access, likely for an election commission official or super admin responsible for overseeing the entire portal. The screen is labeled "EC (Super Admin) Login" at the top, clearly identifying it as the login interface for super administrators. Similar to the Admin Login, there are fields for entering **Username** and **Password**. Additionally, a **CAPTCHA image** is displayed below the password field, accompanied by a **refresh button** that allows the user to load a new CAPTCHA if needed.



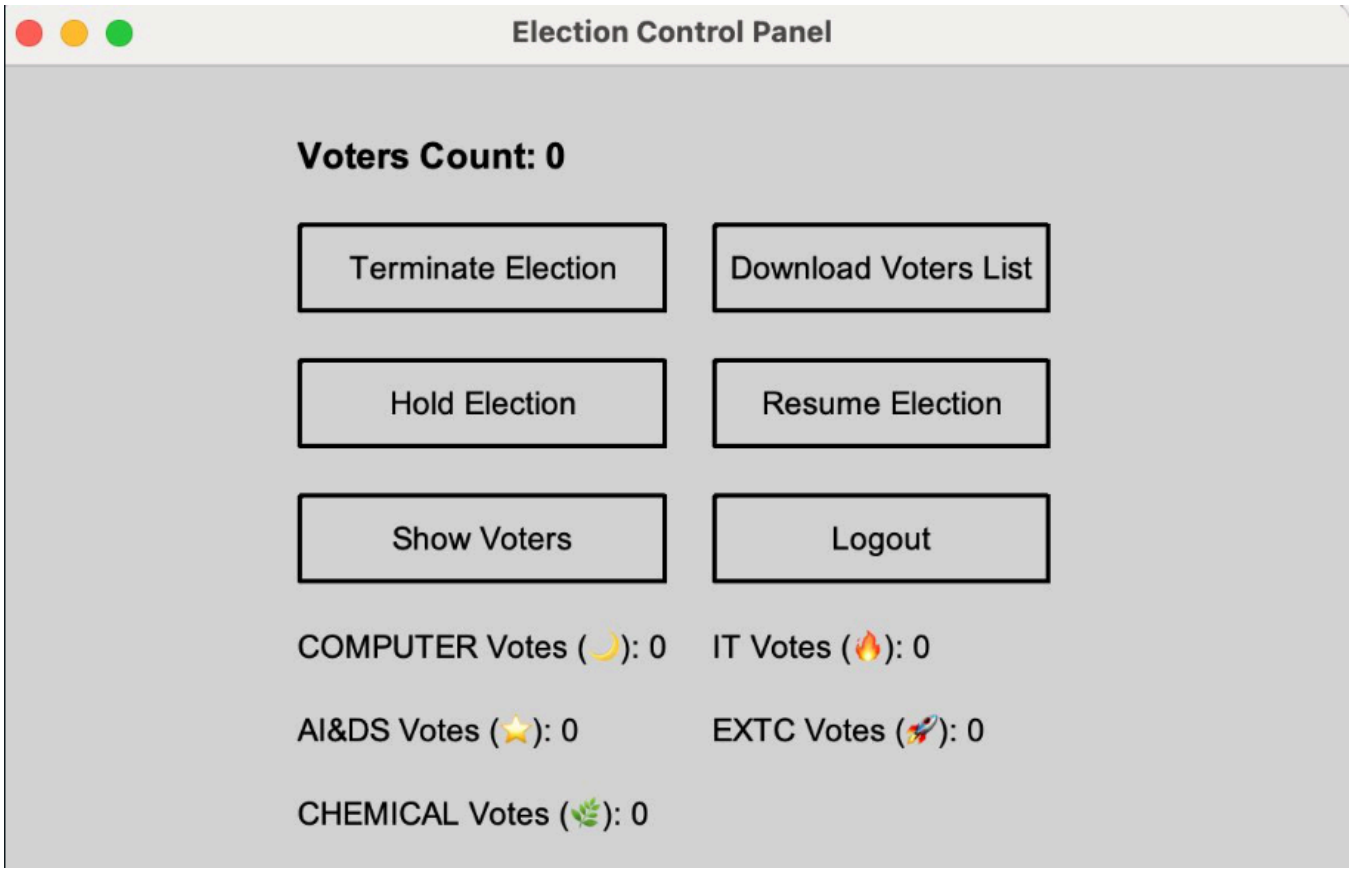
3.5.4 SuperAdmin Login Page



3.5.5 Declaration Page

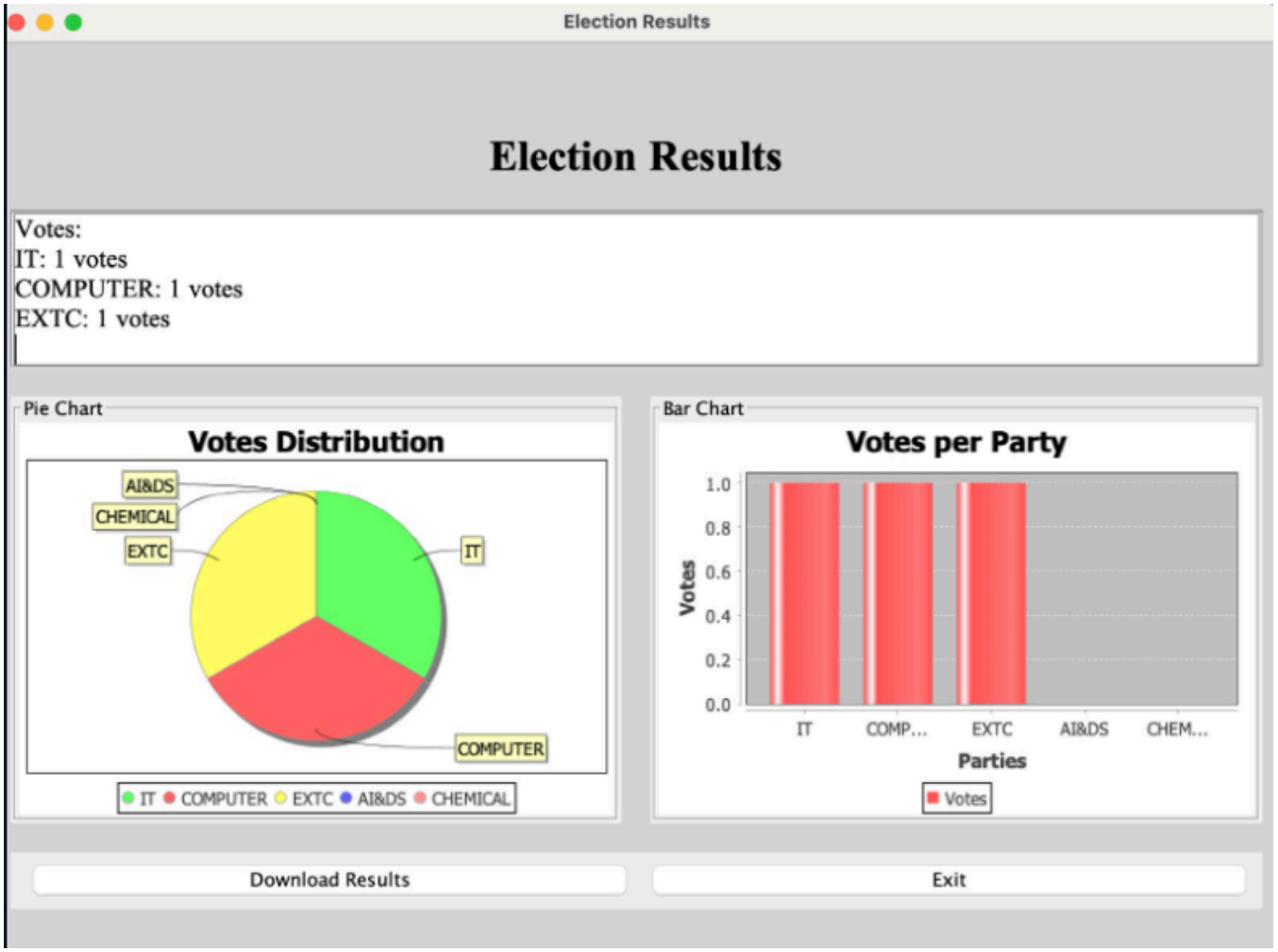


3.5.6 Voting Page



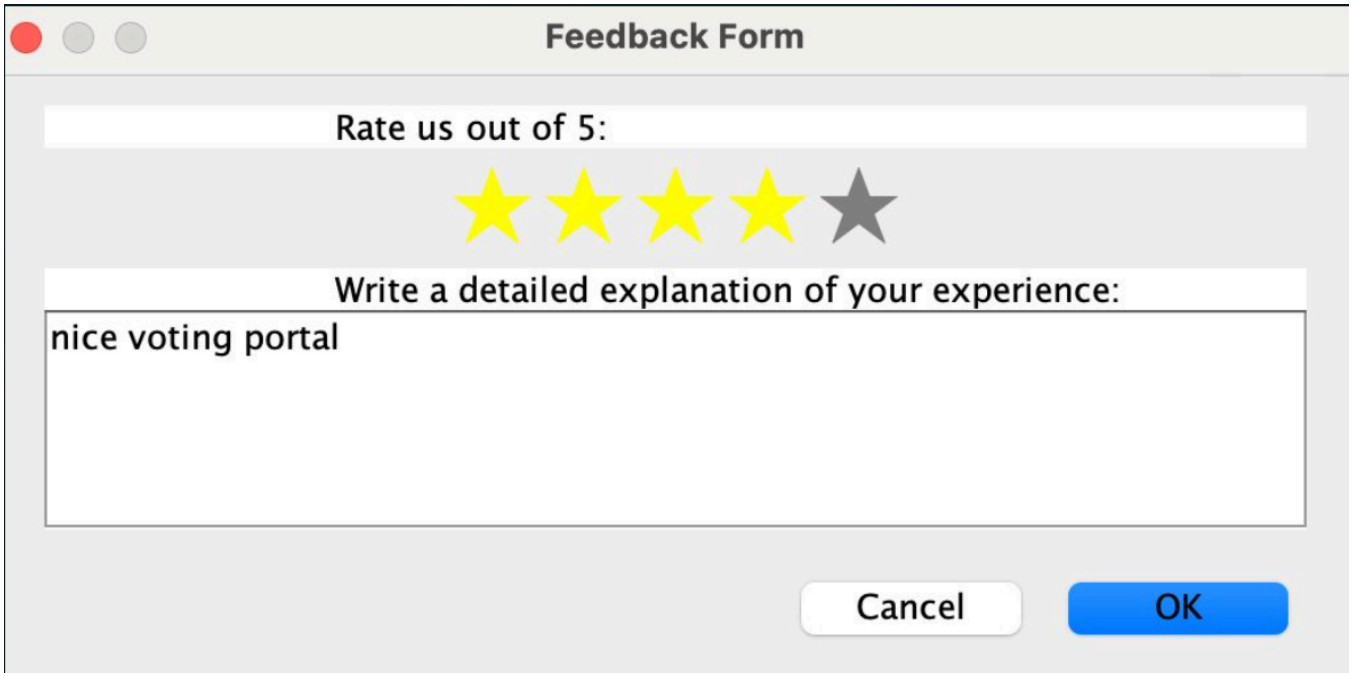
3.5.6.1 Election Control Panel

The screen is titled "**Election Results**" at the top, with two types of data visualizations below. On the left, a pie chart labeled "Votes Distribution" displays different categories or groups (e.g., IT, COMPUTER, EXTC, AI&DS, CHEMICAL) in distinct colors. On the right, a bar chart titled "Votes per Party" shows a comparison of vote counts across various categories. Below these charts, two buttons—"Download Results" and "Exit"— allow the user to either save the data or exit the results page.



3.5.6.2 Election Results

This screen is labeled "Feedback Form," designed to collect user feedback. A rating system with five stars is visible at the top, with four out of five stars highlighted. Below, there is a text box prompting the user to write a detailed explanation of their experience. At the bottom, two buttons— "Cancel" and "OK"— allow the user to either discard their input or submit the feedback.



3.5.6.3 Feedback

3.7 CONCLUSION AND FUTURE WORK

Our e-voting system marks a groundbreaking advancement in democratic engagement. By offering a secure, accessible, and intuitive platform, we strive to boost voter participation, foster transparency, and elevate public trust in the electoral process. This system holds the potential to revolutionize how elections are conducted, empowering citizens and reinforcing the foundations of democracy for generations to come.

As we continue to enhance and innovate the platform, we remain dedicated to integrating user feedback and embracing emerging technologies to ensure its continued success and reliability.

3.8REFERENCES

1 https://www.researchgate.net/publication/380230553_Online_Voting_System_Project

2 https://www.evoting.nsdl.com/

3 https://www.viit.ac.in/images/Research/Publications/26-20118_20118_YOGESH_publication_875_1685159366313.pdf.pdf

4 https://www.slideshare.net/slideshow/voting-project-mini-project-pdf/261385591