Smart Voting System Using Java Servlets

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Abstract - *The Smart Voting System is a web-based application that facilitates the online selection of representatives. This innovative system aims to eliminate the paperwork associated with traditional voting methods, offering a transparent platform for conducting elections while significantly reducing administrative costs and expediting result declarations. Employing a secure authentication system, the Smart Voting System ensures the identification of registered candidates within specific constituencies. Voters are presented with party symbols and a selection button, empowering them to cast their votes conveniently, anytime and anywhere. Once a voter has participated in a session, their account is temporarily blocked to prevent multiple voting attempts.*

Keywords: Voting, Elections, Authentication, Voter,Registered candidates,transparent platform

1.INTRODUCTION

The term "vote" signifies the act of making a choice, electing representatives, and determining outcomes. In the context of India, like many other nations, the primary objective of voting is to democratically select leaders who reflect the will of the people. However, the process of voting in India, as in other countries, faces various challenges, including election fraud, security and accessibility issues at polling stations, shortages of essential voting materials, and a lack of experienced personnel.

The Smart Voting System is designed to effectively tackle these challenges. This innovative system is structured to grant citizens in India sufficient time to participate in the voting process. Furthermore, the system offers user training to ensure that citizens are well-prepared for online voting before the actual election takes place.

One prevalent issue in India is the existence of ghost voters, individuals who do not actually exist but whose votes are manipulated by influential parties seeking to sway election results in their favor. The proposed software solution aims to provide a secure and individualized voting experience, safeguarding the integrity of the electoral process. Within this project, every eligible voter will have the opportunity to cast their votes during a designated time frame, free from external influence. Only Indian citizens who have reached the age of 18 will be permitted to participate, with each voter using a unique user ID and password for authentication. Voters will have the ability to select their specific assembly constituencies and polling stations, ensuring a legitimate and confidential casting of their votes in support of their chosen leaders..

2.LITERATURE SURVEY

The literature review represents the pivotal phase in software development, as it serves as the foundation for our project. This stage involves a comprehensive examination of prior research conducted by various authors in the field. We will carefully consider and integrate key findings from significant papers to inform and advance our work.

2.1 Literature Survey on Secure Mobile Based E-Voting System [1]

In this literature survey, electronic voting (E-Voting) using mobile devices, specifically Android phones, is explored. The study highlights the efficiency of Android mobile phones in the voting process. An Android application is developed for this purpose, enabling simultaneous voting through a distributed database. It emphasizes that a voter needs to register only once for a particular election, after which they can cast their vote from their Android phone, regardless of their location. The proposed E-Voting system aims to ensure voter confidentiality and voting accuracy, leveraging the unique identification provided by ADHAAR ID (U-ID) numbers. This online solution also makes voter and election committee information accessible to the public.

2.2 The Roadmap to the Electronic Voting System Development [2]

This paper examines the evolution of electronic voting systems, which have undergone a series of updates and enhancements. These include the shift from paper to paperless ballots, manual to technological processes, mechanical to electronic components, offline to online operations, and the move from polling stations to remote voting locations. The study delves into the development, legalization, guidelines, recommendations, vulnerabilities, hacking risks, and evolving security measures in the realm of electronic voting systems over time.

2.3 e-voting kiosk: A Network Architecture School-based Registration and Voting System [3]

In this study, the focus is on the design and development of an e-voting system that incorporates a network-based software architecture. This architecture

offers computing resources to multiple voting kiosks, providing a secure platform for voter registration and casting of votes. The research employs a quantitative descriptive research design to gauge respondents' perceptions of the traditional manual election system versus the e-voting system. The development process follows a sequential approach using the waterfall model, and specialized software applications like C# and MySQL are utilized to create a secure database for the system.

The study's results introduce a unique e-voting system with an embedded election management system, featuring an intelligent algorithm. The e-voting kiosk includes interactive ballots for voters to cast their votes securely, ensuring secured access to voter identities and real-time generation of election results.

2.4 Advanced Technology In Secured Online Voting System [4]

The paper addresses the need for India to transition from its manual election system to an online system, leveraging advanced technology to improve speed, accuracy, and efficiency. The manual system has presented challenges for both voters and the administration, leading to the proposal of an online system in this thesis. This proposed system encompasses voter registration, voting, result calculation, and result declaration, offering voters the flexibility to use their own devices or government-provided resources. Moreover, the paper emphasizes that such a transition would reduce the risk of corruption associated with the current manual system, ultimately benefiting the democratic process.

3. EXISITNG SYSTEM

The existing manual election system presents various challenges, including low voter turnout, the need for physical presence at polling stations, human error in vote counting, and the inconvenience of registering manually. In addition, the use of Electronic Voting Machines (EVMs) is costly. The current system can be classified into several categories:

1. Paper-based voting: In this system, voters are provided with blank ballots and must use a pen or marker to mark their chosen candidate. These paper ballots are manually counted, which is a time-consuming process. While it is a common method, it can be labor-intensive. However, paper ballots can be retained for verification.

2. Lever voting machine: Lever machines assign a lever to each candidate, and voters pull the lever for their preferred candidate. These machines can count votes automatically, but they may require voter training due to their less user-friendly interface.

3. Direct recording electronic voting machine (DRE): DRE machines incorporate various input methods such as keyboards, touch screens, or buttons for voters to select their choices. Some DRE machines keep electronic records and count votes rapidly. However, DRE machines without voting records may raise concerns about accuracy.

4. Punch card system: In this method, voters use metallic hole punches to perforate holes on a blank ballot. The system can count votes automatically, but incomplete perforations may lead to incorrect results.

The existing manual election system necessitates physical presence at polling booths, which can be time-consuming and inconvenient for voters. Additionally, it relies on manual vote counting, which is susceptible to human error. The project aims to address these issues by introducing an online voting system, providing a more accessible, convenient, and secure method for citizens to participate in the democratic process while ensuring the integrity of elections in an increasingly digital world.

4. PROPOSED SYSTEM

Our Smart Voting System is designed to overcome these drawbacks by offering voters the flexibility to cast their ballots from any authorized location, eliminating the necessity to visit specific polling sites. This enhancement significantly improves accessibility, minimizes wait times, and streamlines the vote tallying process. The implementation of this Smart Voting System retains the convenience of kiosk voting while removing the need for physical kiosks, thereby reducing maintenance and security concerns. Additionally, it affords voters greater flexibility in securely using their own devices. Furthermore, our project addresses issues such as vote rigging, duplicate votes, and ensures prompt result generation.

Advantages of the Proposed System

Empowerment: Voting serves as the most potent means for members to exert influence over the leadership and trajectory of their organization. By allowing members to participate in fair and open elections, we empower them, fostering a sense of value, ownership, and responsibility. Diverse election methods, including online voting, are essential to reach as many members as possible.

Accessibility: With the proliferation of mobile devices, online voting offers a convenient option for numerous members, granting them access to ballots at their convenience, anytime and anywhere.

Cost Effectiveness: Online elections prove to be a cost-effective solution, especially when considering the production expenses associated with printing, postage, and mailing of paper ballots.

Security and Confidentiality: A well-designed online voting system includes robust safeguards to ensure the security of ballots and the protection of voter identities, upholding the confidentiality of the electoral process.

Transparency: Online elections, particularly those administered by impartial third parties, eliminate the potential for election mismanagement or fraud. The presence of an auditable trail bolsters voter confidence in the process. **Accuracy and Expedience:** Online voting employs electronic ballots, minimizing the risk of rejected, mismarked, or invalid votes. Results are automatically

computed, obviating the need for manual tabulation or labor-intensive recounts.

5. IMPLEMENTATION AND RESULTS

The design and implementation phase of the Smart Voting System involves turning the system's architectural blueprint into a functional, secure, and user-friendly platform. This phase is critical in bringing the online voting solution to life. Below are the key steps in this phase:

a) System Architecture Design:

The Smart Voting System consists of two primary user roles: Voters and Administrators. Voters participate in the election process by casting their votes within their respective constituencies and districts. Administrators, on the other hand, are responsible for creating voter profiles based on their Aadhar details
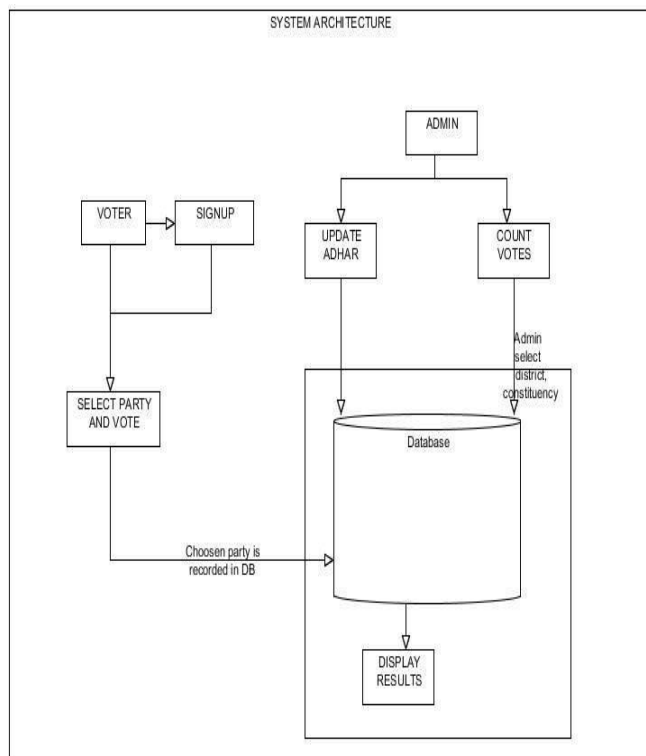
1. Administrator's Role:

- ### Adding Voter Details:

Administrators have the crucial task of populating the system's database with voter profiles.

This involves collecting and entering voters' personal information, including Aadhar number, date of birth (DOB), first name, last name, address, phone number, and most importantly, their district and constituency
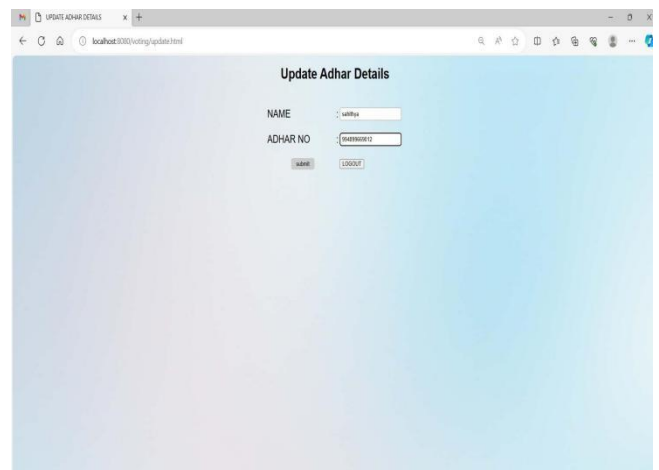

2. Voter's Role:

- ### Registration Process:

Voters can register themselves on the Smart Voting System, but this registration is contingent on the availability of their information in the database.

The system allows voters to register only within their respective constituencies, ensuring that no duplicate profiles are created, and voters can participate exclusively within their designated constituencies.
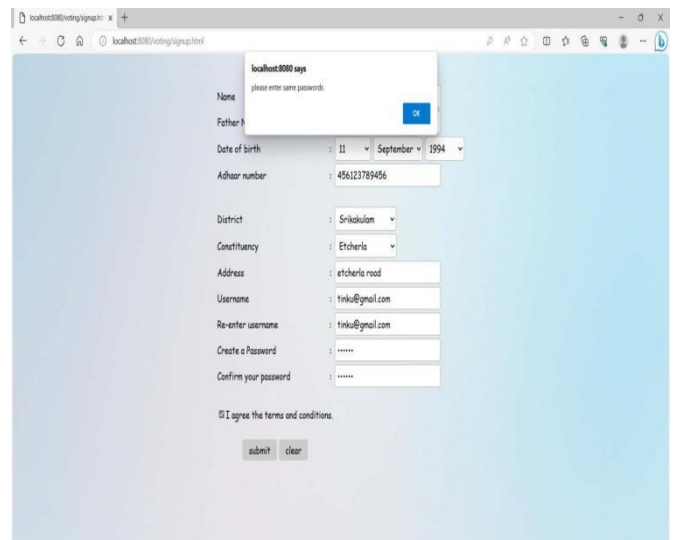
3. Casting Votes:

Once registered, voters can log in and cast their votes within their specified constituencies.

After casting their vote, voters will be automatically logged out, and any attempt to re-vote or re-register using the same credentials will be denied. This mechanism ensures the prevention of vote rigging and multiple votes by individual voters.
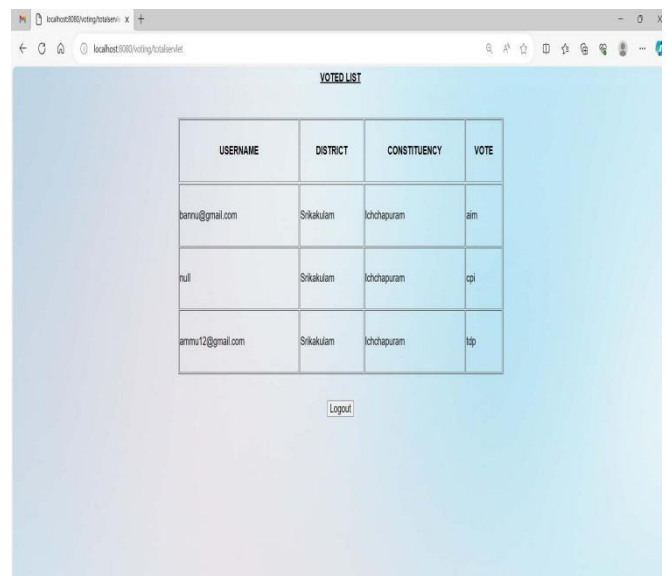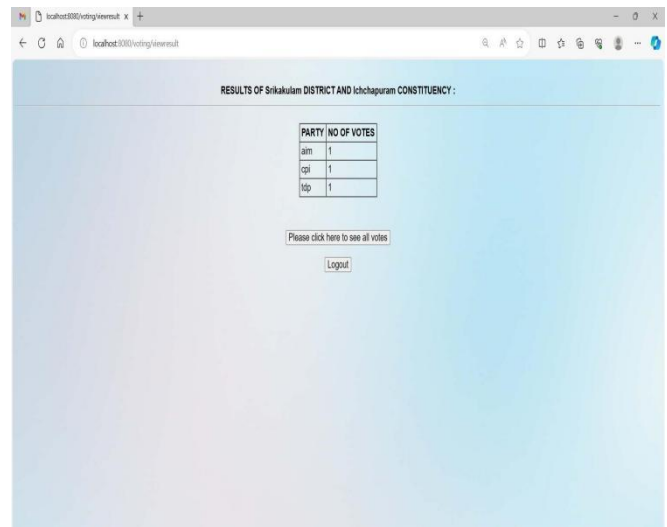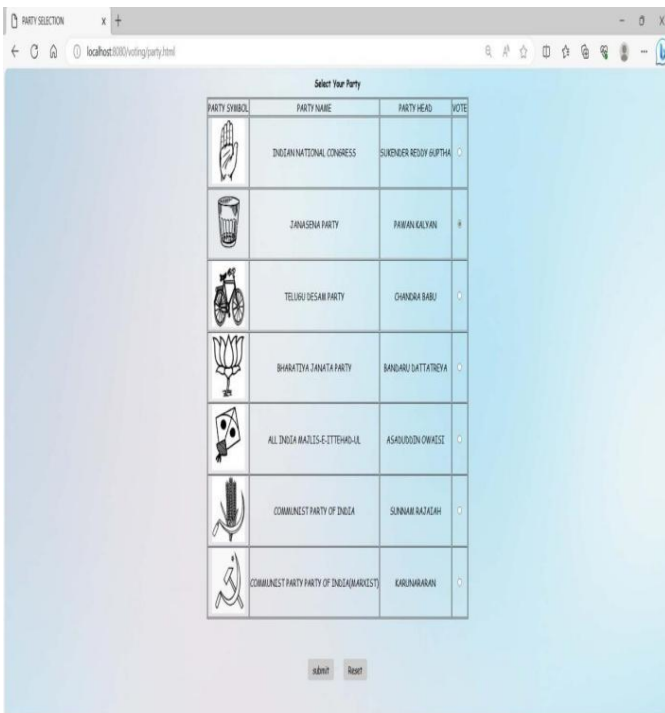
4. Election Result Verification:

● Administrative Verification:

After the completion of the voting process, administrators will log in to their accounts to verify and compile the election results.

This process is simplified and streamlined, requiring only a single click. The system will display the election winners across each district and constituency.The verified results will be promptly published for public access.

This overall system design ensures the integrity and security of the voting process by allowing only eligible voters to participate within their designated constituencies. It provides a transparent and efficient election system that benefits both administrators and voters.

b) User Interface Design:

The user interface design of the Smart Voting System has been meticulously crafted to ensure an intuitive and user-friendly experience for both voters and administrators. Here are some key aspects of the design:

1. Voter Registration:

Voters will find a straightforward and easy-to-navigate registration page where they can input their personal details.

The system will validate this information in real-time against the database to confirm eligibility within their respective constituencies.

2. Voting Process:

Once logged in, voters will access a clear and intuitive ballot interface, making it easy to select their preferred candidates.

User-friendly features, such as clear candidate information and an option to review selections, will enhance the voting experience.

3. Administrator Dashboard:

Administrators will have access to a well-organized dashboard that streamlines the process of adding voter profiles and verifying election results.

Intuitive menu options and data entry forms will ensure administrators can efficiently perform their tasks.

4. Result Display:

The election results will be presented in a visually clear and concise manner, allowing for easy public access.

Provided visual representation of the winners across districts and constituencies.

c) Database Design:

The database design is structured to ensure efficient data management and security. Key elements of the database design include:

1. Voter Profile Data:

The database will store comprehensive voter profile data, including Aadhar numbers, date of birth, names, addresses,phone numbers, and constituency assignments.

2. Election Data:

Election-specific data, such as candidate information and voting records, will be meticulously organized within the database.

d) Security Measures:

The Smart Voting System will implement robust security measures to safeguard the integrity of the electoral process. These measures will include:

1. Authentication and Authorization

Role-Based Access Control: Different user roles will have distinct access privileges. For example, administrators will have access to the administrative dashboard, while voters will only have access to the voting interface.

2. Real-Time Verification

Voter Eligibility Check: The system will perform real-time checks against the voter database to ensure that voters are eligible and registered within their designated constituencies before they can cast their votes.

Duplicate Vote Prevention: The system will actively prevent voters from casting multiple votes by cross-referencing voting records in real-time. If a voter has already cast their vote, any subsequent attempts will be denied.

6. FUTURE SCOPE

Expanding the Smart Voting System with a deployment on Amazon Web Services (AWS) opens up a range of possibilities and benefits for enhancing the security, accessibility, and scalability of the application. Here are some of the future scope and benefits:

1. Geographical Access Restrictions:

Deploying the application on AWS allows for the use of services like AWS CloudFront and Amazon Web Application Firewall (WAF) to restrict geographical access to the application. This means that the system can enforce access only from voters within their respective districts and constituencies, further enhancing the system's security against unauthorized access.

2. Enhanced Security:

AWS provides robust security features, including DDoS protection, data encryption, and Identity and Access Management (IAM) for fine-grained control over who can access the system and what they can do.

Regular security updates and patch management ensure the system's protection against evolving threats.

3. Scalability:

AWS's cloud infrastructure allows for easy scalability based on demand. As the user base grows, the system can effortlessly handle increased traffic and data storage requirements.

This scalability ensures that the system remains efficient and responsive during peak voting periods.

4. High Availability:

AWS offers high availability and redundancy options to prevent system downtime. With features like AWS Auto Scaling and Multi-Availability Zone (Multi-AZ) deployments, the system can continue to function even in the face of hardware or software failures.

7. CONCLUSION

The Smart Voting System represents a significant leap forward in modernizing the electoral process, ensuring a secure, transparent, and efficient means for citizens to exercise their democratic rights. Through meticulous planning and development, this system addresses the challenges of traditional voting methods and offers a promising solution for the future of elections.

The journey began with a thorough examination of the limitations of conventional voting systems, which often resulted in low voter turnout, logistical difficulties, and the need for adaptable solutions in times of crisis. These inadequacies underscored the necessity for an innovative and robust system like the Smart Voting System.

The proposed system not only mitigates the shortcomings of traditional methods but also introduces numerous advantages. It empowers voters, enhancing their sense of value and responsibility in the democratic process. The system's accessibility through mobile devices provides convenient access to ballots, anytime and anywhere. Moreover, it offers cost-effectiveness by eliminating the expenses of printing and mailing paper ballots.

security is a paramount concern, and the Smart Voting System incorporates authentication, data validation, real-time verification, and regular security audits to ensure the utmost protection of voter data and the election process. The future scope of deploying the system on Amazon Web Services further enhances security, scalability and accessibility, allowing for geographical accessrestrictions, advanced technology integration, and block chain for immutable voting records.

In conclusion, the Smart Voting System is more than a technological advancement; it is a beacon of hope for modern democracies. It empowers citizens to participate securely in the electoral process, fosters transparency, and paves the way for accessible, efficient, and secure elections. As the democratic world evolves, the Smart Voting System stands as a testament to progress, emphasizing the importance of voter participation and the safeguarding of democracy.

8. ACKNOWLEDGEMENT

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