**PROJECT PROPOSAL ON A**

**MOBILE BASED REALTIME E-VOTING APPLICATION FOR ELCOM COMPUTER SCIENCE KADUNA POLYTECHNIC**

**BY**

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**1.1 BACKGROUND OF STUDY**

Voting is the process that allows the general public or the people to choose their leaders and articulate views on how they will be governed.

Real-time refers to a system in which input data is processed within milliseconds so that it is available virtually immediately as feedback to the process from which it is coming.

E-Voting refers the application of electronic technology to cast and count votes in an election. One of the fundamental mechanisms for democracy is election. It is the way to collect the public opinions to form a democratic government. The traditional process of election is quite tedious, time consuming and has a cumbersome procedure in preparation and tallying phases. To overcome these difficulties Real-time Electronic voting system (REVS) is introduced. REVS continues to grow as long as the world becomes more dependable on the new technologies. REVS provides a lot of benefits than traditional voting systems. It tries to enable efficient and secure elections. REVS is inexpensive because its resources are reusable. Also it does not require any geographical proximity of voters, and it provides better scalability for large elections. Mishra et al. (2019)

In various Nigerian tertiary institutions, student elections are carried out every session. There are basically three arms of government in which student representatives or executives are usually elected; the Students Union Government (SUG), Departmental and Hostel levels. They are elected by students only. Lecturers are believed to have no influence as to who emerges successful in such elections. In other words, for any students-election, students of any given tertiary institution vote their fellow students who have shown interest in the above-listed posts. Elections have been in use to resolve various questions in the past 2000 years. Through the participation of a population, election allows public decisions to be made.

Election first started from the oral voting system to raising of hands, to the Kudavolai system (formerly utilized in the ancient India). In the ancient Greece, people would put either a white or a black ball/stone in a bucket. Oral voting was then substituted by the paper ballot first in Rome (139 BC) according to Douglas Jones. Okpara et al. (2019)

**1.2 STATEMENT OF THE PROBLEM**

The voting/polling process by students of a computer science Kaduna Polytechnic seems to be cumbersome since there are thousands of students. So many cases of authentic students not participating in the voting process due to unfavourable voting time, conditions, environment, unbearable queue or the mammoth crowd at the voting place which is not accommodated in the period scheduled for voting. There are also scenarios where non-academic students flock the polling centre’s to participate in the voting process adding to the unbearable queue. Before anyone can vote, he must be accredited. Such scenario could be totally avoided if students (voters) votes online using real-time e-voting application. This, allows the voters to vote from anywhere in the globe and see the result almost immediately the votes are casted, saving time and avoiding the cost of moving to polling area.

**1.3 AIMS AND OBJECTIVES OF THE STUDY**

**The aim of this project is to build a** mobile-based real-time e-voting application for elcom computer science at Kaduna Polytechnic**.**

**OBJECTIVES**

The objectives of this research work are as follows:

1. The student data set will be extracted from the department and the application will be generally hosted so that the general audience (students) can have access to it.
2. Modern technology like Flutter will be employed in creating interactive user interfaces and experience.
3. To ensure effectiveness and efficiency several system test will be carried out

**2.1 LITERATURE REVIEW**

Article Title: Design and Development of Real-Time E-Voting System with High-Security Features.

Authors: Mishra, A., & Ofujeh, A. (2019)

**Summary of the work**

This research introduces an Electronic Voting System (E-Voting) as a modern and efficient alternative to traditional voting methods. It aims to provide a convenient and effective way for organizations to conduct elections, overcoming the limitations of conventional approaches. The system is developed using web APIs and follows the Dynamic Systems Development Method (DSDM) combined with an object-oriented methodology, representing a significant step towards improving the voting process.

**Methodology**

The methodology employed in this project adheres to the Software Development Life Cycle (SDLC), a framework that outlines the events and tasks completed at each step of a software development project. In the case of this project, a software application is developed using web APIs, and it is built by applying the Dynamic Systems Development Method (DSDM) in conjunction with an object-oriented methodology. This comprehensive approach ensures the systematic development of the application.

**Recommendation**

Based on the successful development and testing of the electronic voting system, it is recommended that this system be deployed for election purposes. Further improvements can be made to enhance its user-friendliness and security features. Additionally, user training and awareness campaigns should be conducted to ensure the smooth adoption of this technology in real-world election scenarios.

**Research Gap**

There is still a research gap regarding the large-scale implementation and security challenges associated with electronic voting systems in real-world elections.

Article Title: Development of a Mobile Android Voting App for Tertiary Institutions in Nigeria.

Authors: Okpara R., Otugeme E. and Osuagwu O. (2019).

**Summary of the work**

This research presents an innovative solution in the form of an Android voting app to address the challenges associated with voting in tertiary institutions, particularly in Nigeria. These challenges include vote-rigging, overcrowded polling centers, and the need for secure and accessible voting arenas. The Android app provides a user-friendly platform for students to cast their votes efficiently and securely, ensuring a smoother election process. This technology offers the potential to streamline voting procedures, save time, and enhance the overall electoral experience for students, reducing the likelihood of irregularities.

**Methodology**

The methodology employed in the development of the Android voting app was a comprehensive approach that leveraged various software and tools. The project was web-based and incorporated essential technologies, including HTML for creating the user interface framework, CSS for controlling the layout and styling of web pages across different devices, SQL for managing the database and handling data transactions, PHP for server-side scripting and data manipulation, Java as the primary programming language for Android app development, and XML for structuring and exchanging data.

**Recommendation**

The Android voting app has the potential to streamline the voting process in educational institutions, but further user testing and feedback collection are recommended to improve usability and accessibility. Expanding compatibility to support a wider range of Android OS versions and providing alternative secure authentication methods can enhance adoption and effectiveness.

**Research Gap**

Research gaps include the exclusion of students without Android devices and internet access. Addressing offline voting options and exploring solutions for non-Android users can make the system more inclusive. Additionally, further research on security, encryption, data privacy, and scalability to different institutions is needed for a comprehensive electronic voting system.

Article Title: Development of an Efficient and Secured E-Voting Mobile Application Using Android.

Authors: Sherine, A., Peter, G., Stonier, A. A., Leh Ping, D. W., Praghash, K., & Ganji, V. (2022).

**Summary of the work**

This research focuses on harnessing the potential of smart technologies, particularly the Internet, to introduce an innovative approach to voting known as e-voting. Recognizing the need for security in online voting, the study has developed a user-friendly Android application that incorporates a robust three-step security process to prevent phishing attacks. This application empowers students to cast their votes conveniently and securely from any location using their mobile devices

**Methodology**

The research focuses on enhancing online voting system security using network-wide cryptography integration. It strengthens authentication with password security and face recognition, creating a mobile app prototype for e-voting featuring three security levels. Android Studio is the primary development tool, and the study discusses interface design and functionality, showcasing a preliminary user interface with sections for accounts, home, elections, and messages, along with distinct login, registration, and election pages. Open-source tools in Android Studio facilitate the project's development.

**Recommendation**

The study highlights a 3-step security method against phishing, featuring a captcha, phone OTP, and fingerprint verification. Future enhancements could include pre-vote verification and notifications for related field votes. Additionally, result features like pie graphs, real-time updates, and percentages should be incorporated.

**Research Gap**

Despite the system's overall effectiveness, there are still areas for further research and development. These include enhancing the voting process with additional verifications, providing users with notifications for relevant field votes, and introducing comprehensive result reporting features like pie graphs, real-time updates, and percentage breakdowns.

Article Title: Secure Mobile Internet Voting System Using Biometric Authentication and Wavelet-Based AES

Authors: S., A., & AnilKumar, K. S. (2021).

**Summary of the work**

This paper presents a secure mobile internet voting system with biometric authentication to address the growing use of mobile devices for various applications. The biometric image can be encrypted and sent to the server or processed on the mobile device to generate a biometric template. A wavelet-based AES algorithm is proposed to optimize this process, improving encryption speed and reducing mobile device CPU usage. The study underscores the effectiveness of biometric authentication in mitigating mobile-based threats in the proposed Internet voting system.

**Methodology**

The methodology involves key components: client-side applications (voter and verification), a central system (server, database, and vote-counting), and separate databases for voter and candidate lists. Biometric templates are stored in the Aadhaar CIDR Database. Key management handles private and public keys, with auditing applications tracking system activities for dispute resolution.

**Recommendation**

The findings of this research suggest that the wavelet-based AES encryption method significantly improves the mobile-based internet voting system's performance, enhancing both CPU utilization and execution time. However, it's important to address the limitations in terms of security regarding biometric templates.

**Research Gap**

One notable research gap is the need for more comprehensive studies and real-world implementations of secure mobile phone-based internet voting systems. While this research demonstrates the effectiveness of biometric authentication in defeating mobile-based threats, further investigations should focus on scalability, user experience, and the integration of such systems into existing electoral processes.

Article Title: Secure Voting System through SMS and using Smartphone Application.

Authors: Selvarani, X. I., Shruthi, M., Geethanjali, R., Syamala, R., & Pavithra, S. (2019).

**Summary of the work**

The research presents a mobile voting system that revolutionizes the traditional voting process by allowing voters to securely cast their votes through a smartphone application. The system entails three key steps: online voter registration, the casting of votes, and result display via SMS. This innovative approach greatly enhances voting efficiency, as it permits voters to participate from any location and at any time through the internet. Notably, the system prioritizes security, ensuring the confidentiality of each vote by implementing OTP (one-time password) authentication for every login.

**Methodology**

The methodology employed in this research revolves around the development of a mobile voting system that integrates advanced security measures and streamlines the voting process. The system's core components include online voter registration, secure voting through OTP (one-time password) verification for each sign-in and login, and result display via SMS. To ensure robust security, the system relies on the RSA encryption algorithm. This encryption method safeguards the integrity of the voting process and guarantees that each vote remains confidential.

**Recommendation**

It is recommended to focus on security measures to ensure the integrity of the voting process and explore scalability to accommodate a larger number of users or applications in diverse settings.

**Research Gap**

Further research can delve into refining encryption methods, access control, and authentication processes to make the system even more robust and resistant to potential vulnerabilities. Additionally, exploring ways to adapt and customize the system for various contexts and user groups can contribute to its broader applicability and impact.

**3.1 PROPOSAL METHODOLOGY**

This kind of in-depth examination is part of the research strategy, which aims to learn new facts or details about the current system. The department and the internet were used as primary sources of data for this investigation.

**3.1.1 INTERVIEW**

The main objective of using interviews as a method of data collection is to obtain information in a thorough and rigorous way. Based on the questions the researcher provided, the researcher met with the elcom of the department and acquired reliable information.

**3.1.2 DIRECT OBSERVATION**

This method allows varied degrees of control over the context in which they are used, and the meticulous inspection highlighted the obvious shortcomings in the current system. It was utilized to gather information/data for this study by looking at how the manual system was used.

**3.1.3 INTERNET**

In order to get a useful result, the internet will be used as a technique of data collecting. Information on areas that seem challenging or confusing will be sourced online.

**3.2 CHOICE OF PROGRAMING LANGUAGE**

HTML and CSS will be employed in designing the front-end, Python and JavaScript technology will be used as the scripting language; SQLite will be used as the database (backend), Django will be used as the backend. The combination of the above will help build a very robust platform that will be useful, fast, and handy

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