Biometric Online Voting System in Nigeria

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Abstract

Nigeria obviously had been experiencing a high level of thuggery, insecurity and violence, less participation in its electoral processes. An alternative method to conduct its election was used during its 2015 general elections and a lot of hitches were observed. This research work presents a biometric online voting system that can enhance the electoral processes and thereby provide fast, accurate and secured election results. The result of this research work is a system that will serve as a centralized server to other nodes and will be deployed on the World Wide Web (WWW) to make the internet voting possible.

Keywords

E-voting System, Electoral process, I-voting, Internet, Online

I. INTRODUCTION

Voting in Nigeria has long been a rigorous democratic process. It is natural for man to always seek for easier ways to carry out processes. As far back as from 1959, after the election overseen by the colonial masters; the elections had been conducted manually as in [1]and it has resulted to non-credible elections; even though it has always been termed free and fair election as in[2]. There had been high level of rigging, large differences between eligible voters and accredited voters etc. It has resulted to advocacy for the use of e-voting system by policy makers in the country; in order to check transparency, integrity of the electoral process and the likes as in [2].

It is necessary to point out that the loopholes in our traditional voting system has been the reason for the exploitation of our electoral processes by partisans and mischief politicians as in Ogbaudu, Abdulhamid, AbdulMalik(2011, 2013 cited in [Sabo Ahmad et al][2]); which means that it lacks transparency, accountability, free and fair play as in Alemika(2011, cited in [Sabo Ahmad et al][2]); Reference Jega and Hillier, (2012, cited in [Sabo Ahmad] [2]) … the whole world is moving in the direction of direction of increasing the use of technology in order to have credible elections.Europe and America, have been on the top in the use of i-voting in electoral process as in [2].

Nigeria has indeed seen the need for alternative method to carry out the electoral processes; that is why introducing Information Technology was raised as in Onu and Chiamogu (2012, cited in [Sabo Ahmad et al] [2]). E-voting (Electronic Voting) has been projected as a better way to achieve good electoral process and to avoid thuggery, violence, etc. Thus, it has some potential advantages over the traditional method that has been in use. It has been proven to be more safe, better security and robust; also reduces substantial errors as in [2].

E-voting is more convenient and thereby encourages citizens to vote which is a problem with the traditional method as in Kozakova (2011, cited in). Its efficiency and effectiveness cannot be over-emphasized; which has helped to organize electoral processes with cost effectiveness. There is some level of accuracy, and verification process is possible with this method as in [5].

E-voting is a voting process where electronic technologies are used. It is recorded that for a good measure of legitimacy of a state and its relationship with its citizenry. That is guided by the rule of law, e-voting is an accepted method as in Brown(2005 cited in [Sambo Ahmad] [2]).

The idea of sourcing for an alternative method is to achieve a representative of the people' voice; and so a large number of electorates is needed which will depict an effective voting system [8].Clicking a mouse, punching a mouse or butting a mouse is an action that requires less effort; this offers a more convenient way to exercise voting rights and so more people are likely to respond or participate in a process that requires little or no effort and gives them more confidence in the process as in Burmester and Magkos(2003, cited in [Sabo Ahmad] [2]).

E-voting and I-voting systems has been in use in developed and developing countries such as USA, Japan, Australia etc. and other developing countries like India, Brazil as in [3]. However, the choice of a voting a system is very crucial and sensitive since it

poses the risk of losing trust and confidence on the system of the citizenry as in [4].

In Nigeria, the transition of traditional method of the electoral process to e-voting obviously faced a lot of challenges. It is important to note that the adoption of the legal terms and conditions to use the e-voting system in Nigeria is a challenge as in Ajayi (2003, cited in [SaboAhmad] [2]); However, ICT seem to be the major pivot to cause a great turning point in the Nigeria Vision 2020 as in [2]. This means that we are definitely on the road to a better governance because when there is a fairly transparent electoral system, probability of achieving the people's choice is one.

In the bid to transit from the traditional method of voting to e-voting, Nigeria has experimented partial use of e-voting system in 2015 general elections; it is termed partial e-voting system because the actual ballot casting was done manually [6]. However, as a sign of progress on transition to e-voting system, the senate, on Thursday, 30th March, 2017 approved the use of electronic voting in subsequent electoral processes as in [9].

II. Related Works

Electoral processes in Nigeria has been very tedious and full of endless reruns in some regions of the country. These negative occurrences has dampened the interest of the citizenry to participate in the electoral processes. As in [10] developing countries often adopt off-the-shelf implementations that have technological gap in the reality of these countries, this is a challenge that can be resolved by adopting implementation that are in the context of these countries; for example, Nigeria.

Reference [4] has proposed a framework for adoption of an electronic voting system in Nigeria. It has the capability of electronically handling ballots on presidential, gubernatorial, legislative etc. It also has features including integrity. In this framework, the ballot casting is through Direct Recording Electronics (DRE) voting machines that is networked with private network addresses. It involves biometric registration. It is a very good framework that would likely be efficient when implemented. This framework has the pitfall of not providing a redundant central server (backup server) in the case of an incident on the central server because it will be housing very critical national information.

Reference [7] reviewed the e-registration exercise by INEC (Independent National Electoral Commission) in order to propose an Integrated Voting System that consists of an e-voting machine, Wired Internet and Mobile Internet; stating that e-ballot reduces the chances of multiple voting emanating from multiple thumb-printing as a of folding the paper or mistaken thumb-printing. Its submission is that e-voting involves networking of machines and interoperability and ability to transfer data from amongst node in the network. Similarly, I-Voting involves remote voting through the web; and M-Voting brings about maximum participation since mobile devices are widely used. This submission would be robustly efficient since it has options in the mode of voting but is deficient on the absence of registration of voters and verification process.

Reference [11] proposed work plans to widen security on mobile phone voting. Their proposed work involves integration of location services with an encryption algorithm. The algorithm reviewed is the Apriori algorithm in order to achieve the functionality of gathering voters' information from any location. Also, the K-Means algorithm was also revieweda statistical clustering technique is used to retrieve voters' details at different projected locations and also candidates' votes for each location. The work plan on these algorithms did not include the security aspect of the data gathered such as integrating AES or KeyGen encryption algorithm to achieve secured electoral results.

III. Analysis and Design

The analysis of the proposed biometric online voting system is done by using a Use Case Diagram, Flowcharts and Entity Relationship Diagram. The Use Case diagram as shown in figure 1 shows the interaction between the actors; Administrator, System User and the System. The system has two Actors: Administrator and System User where the both actors can log on to the system, create voters' data, close web application. The Administrator can also enter each party candidates and party information into the system. The program flowchart is shown in Figure 2 and figure 3 detailing the biometric voting system and the processes, activities during registration respectively. The Fingerprint mechanism and the processing of a fingerprint is analyzed for the purpose of integration into the system. This is shown in figure 4.

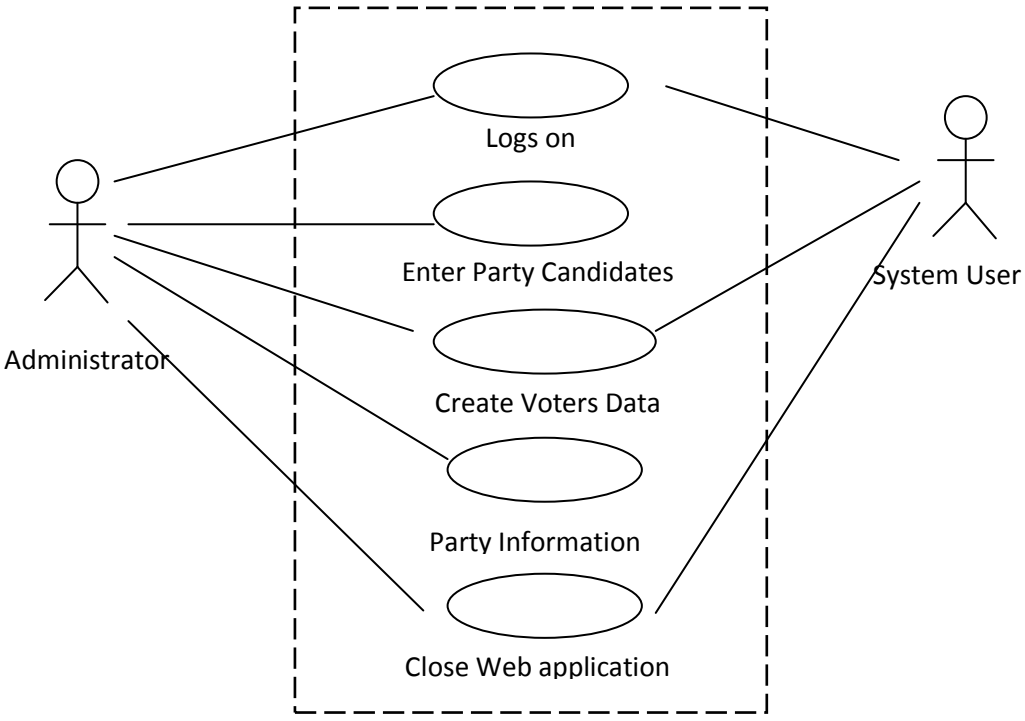

Figure 1. Use Case Diagram for Biometric Online System

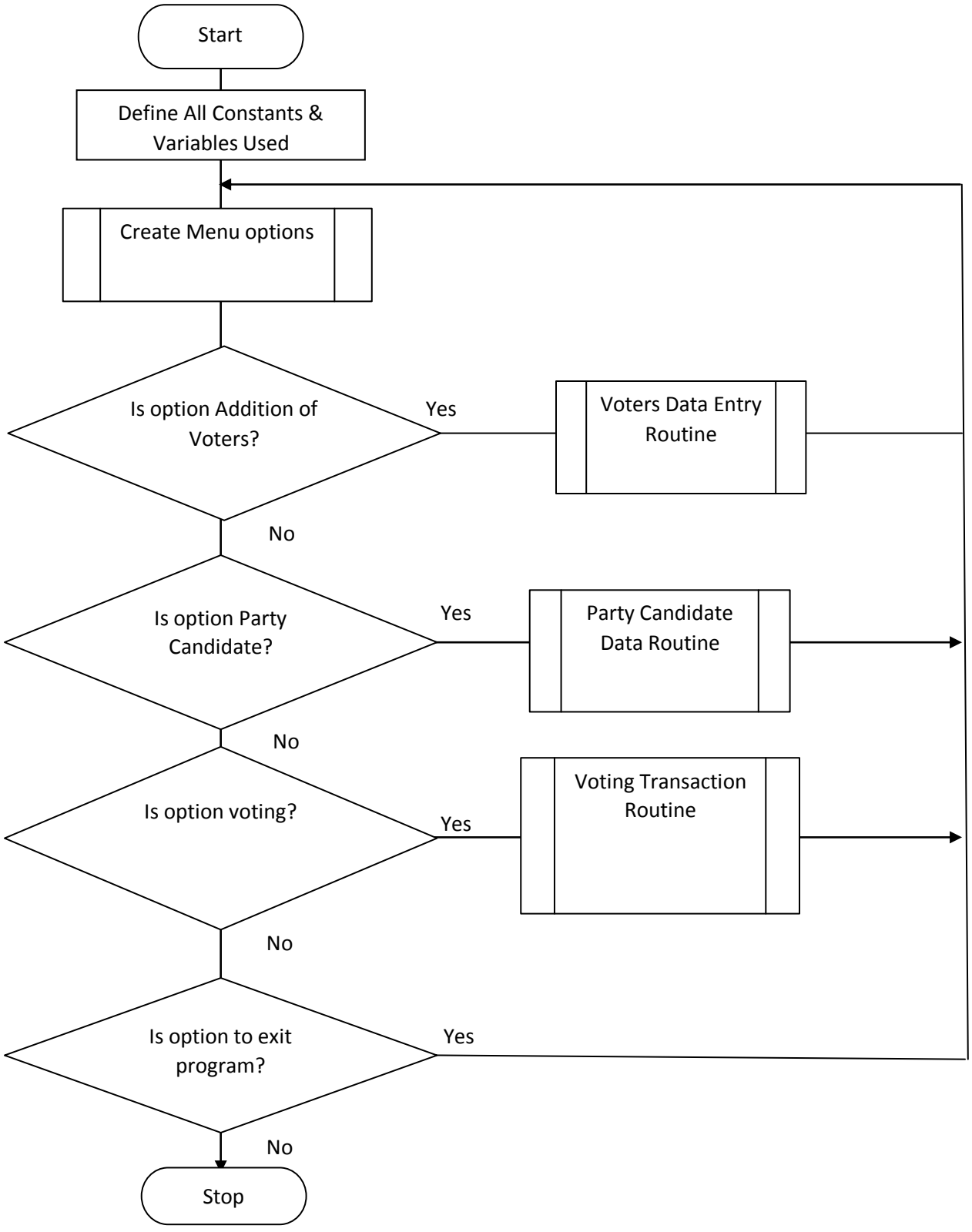

Figure 2. Flowchart of the Biometric Voting System

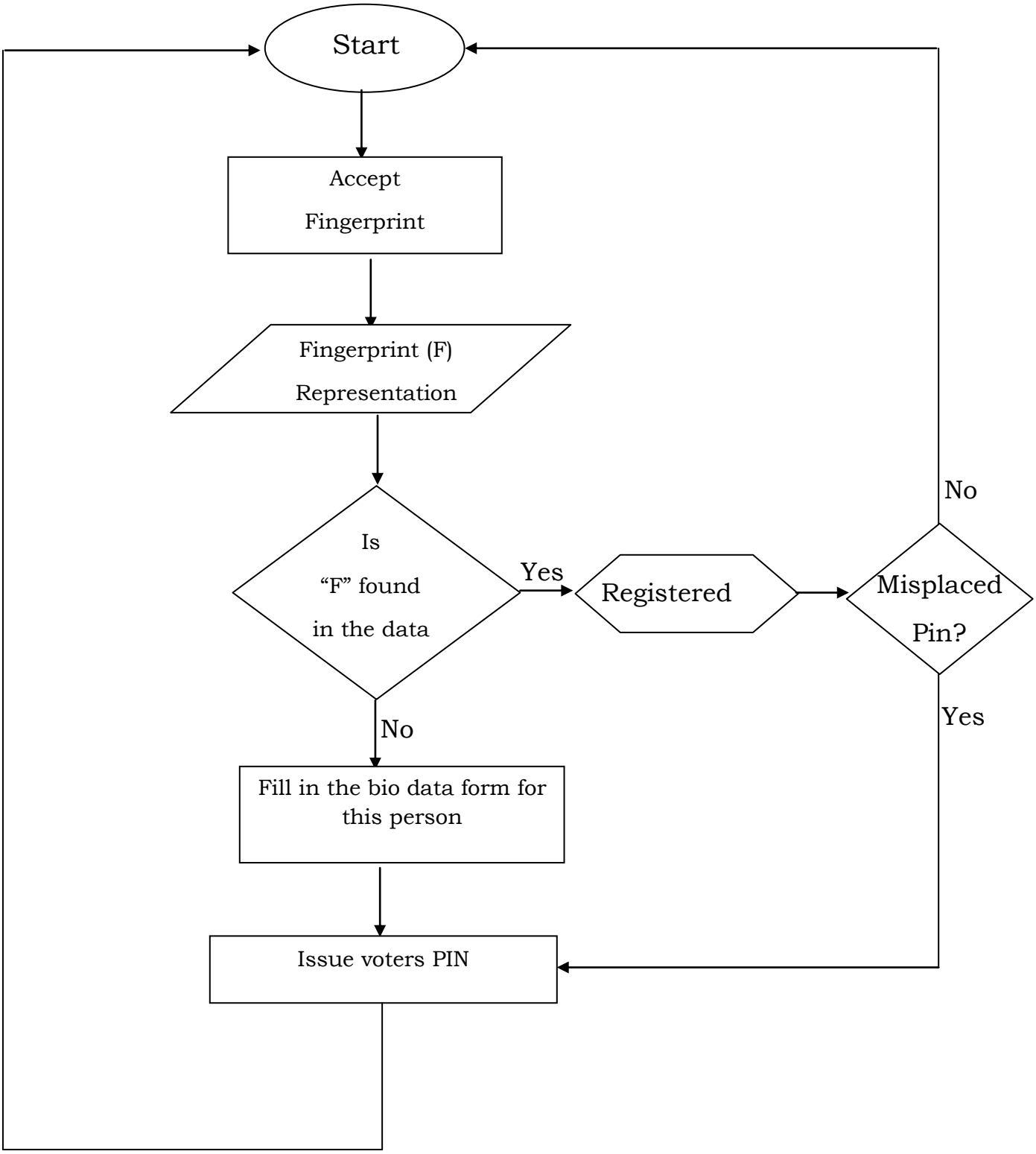

Figure 3. Flowchart showing the various processes and activities during voter's registration

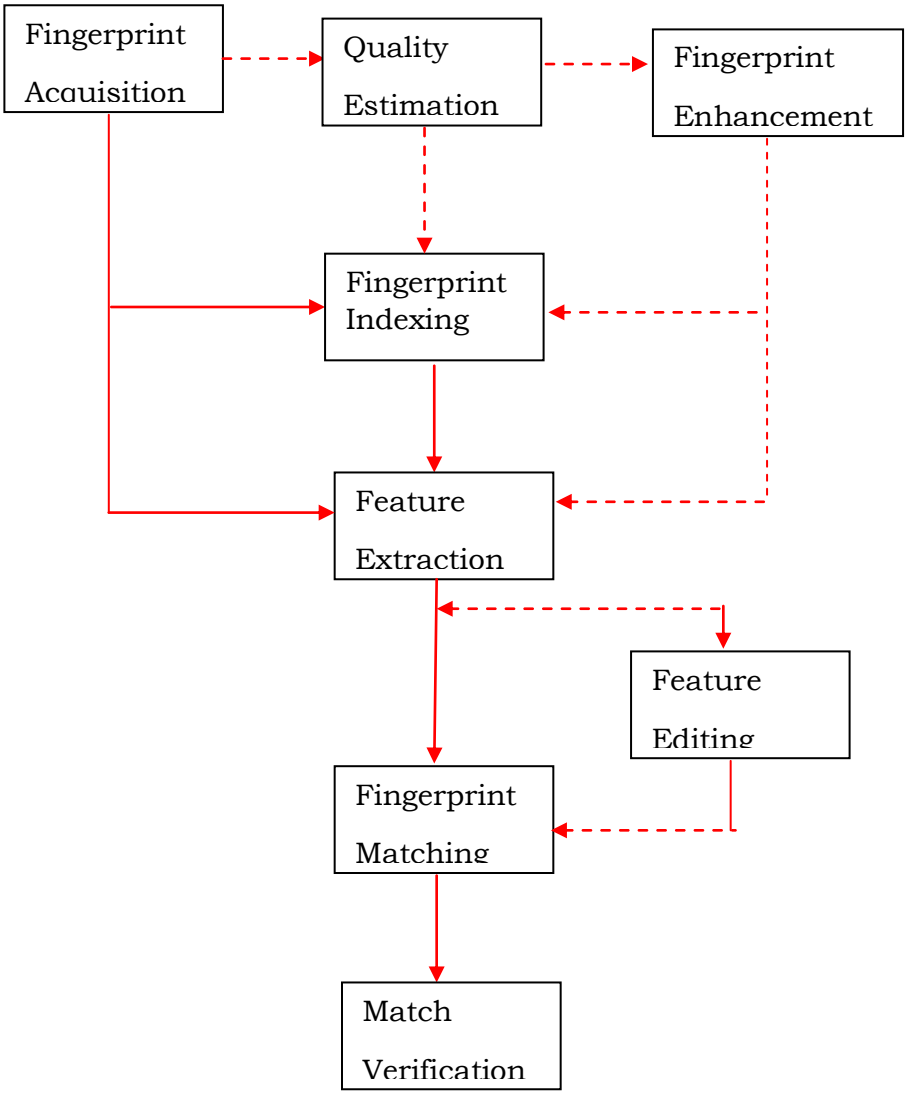

Figure 4. Functional block diagram of an Automatic Fingerprint Identification System

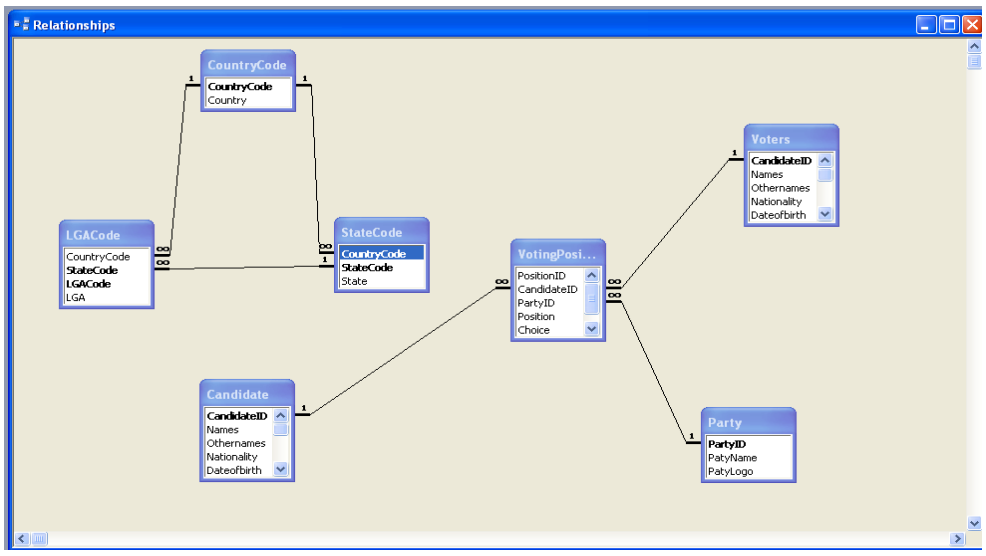

Figure 5. Entity Relationship Diagram for the Biometric System Database

IV. System Graphical Interfaces

The following interfaces shows the implementation of the Biometric Online Voting System. The User Login screen is shown in figure 6; a user must input a username and password in order to access other parts of the system. Figure 7 shows the landing page, this is to enable the user perform activities like register voters, Electoral candidate data, Assigning voting codes etc. Figure 8 shows complete data of an electoral candidate. Figure 9 and figure 10 are elected candidate report and election result summary respectively.

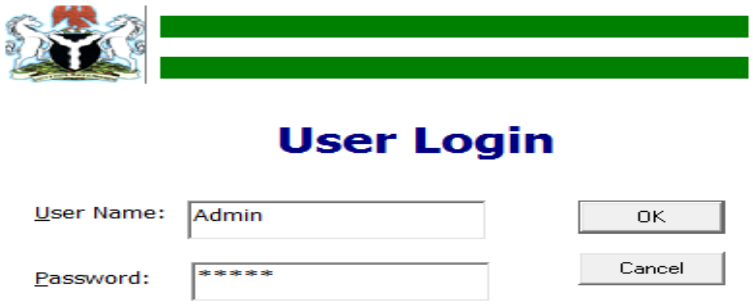

Figure 6. User Login Interface

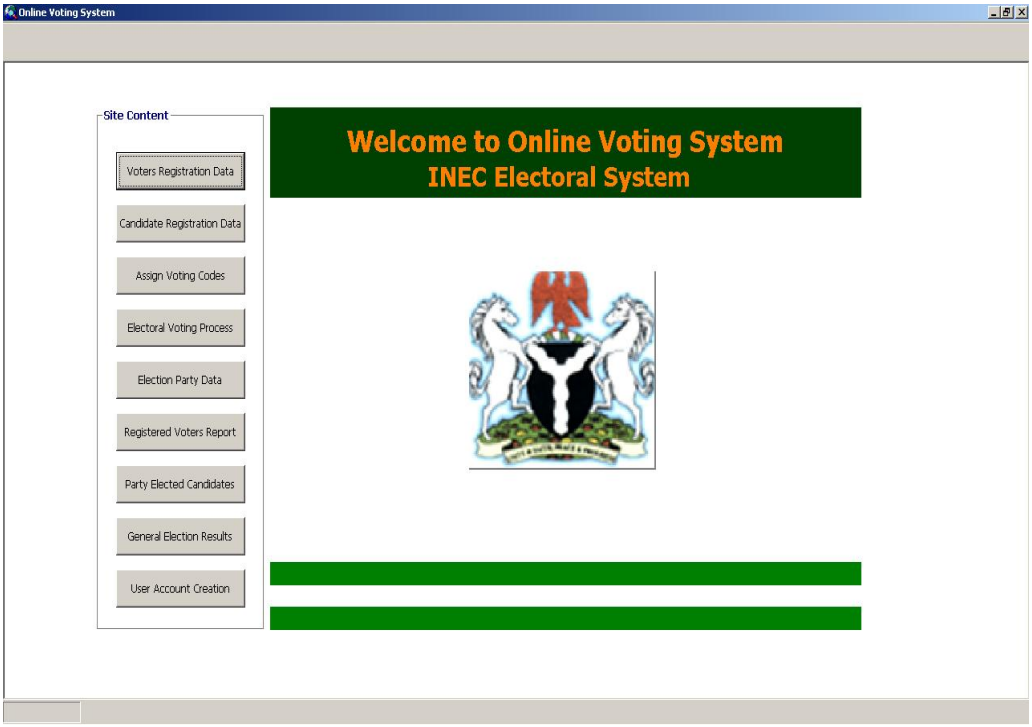

Figure 7. Home Page of Biometric Online Voting System

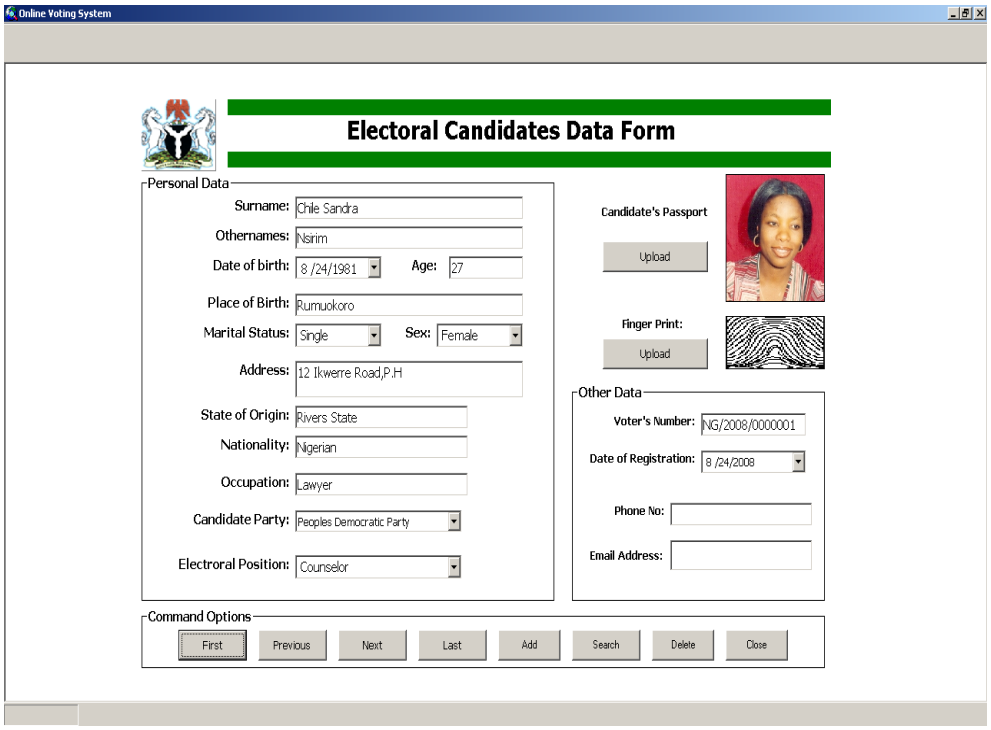

Figure 8. Electoral Candidates Data Form

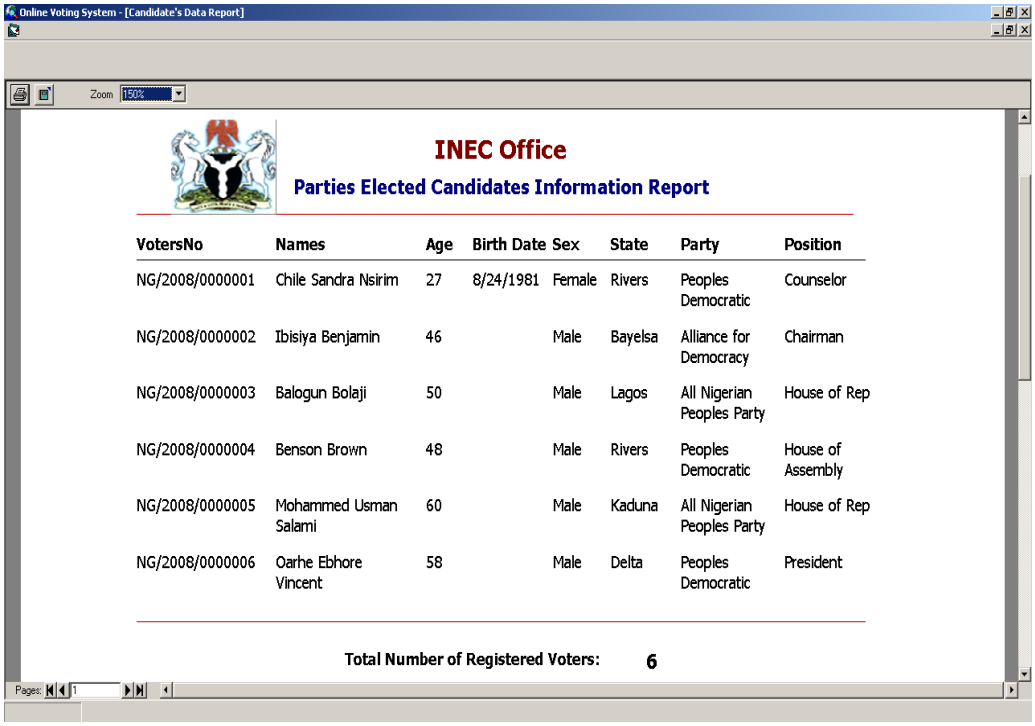

Figure 9. Elected Candidates' Report

Figure 10. Summary of the Election Result.

V. Conclusion and Recommendation

Nigeria is in the process of integrating an alternative method of voting in the electoral process. Some frameworks have been proposed and also a semi-manual system was used during the 2015 general elections. This research work provides a biometric online voting system that can help to ease and increase participation in the electoral process in Nigeria; with the following features adequate security for voters, fast vote counting and release of result, convenient participation and check on the problem of disenfranchisement, long term cost effectiveness, easy to modify and user-friendly.

We are recommending that this system be implemented by the INEC and other electoral body to enhance secured voting, providing conducive voting environment for voters and electorates in any nation. This will enhance paperless electoral process and reduce rigging of elections.

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