



## Design and Analysis of Electronic Voting System in Nigeria

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### ABSTRACT

*Electronic voting system, EVC, is a system which refers to the electronic means of casting vote and counting of the same. This work is aimed at computerizing the Nigeria voting system. It is a window based application to be developed with the visual studio 6.0 and Microsoft Access 2003 Database Application Package. This application can be deployed to many polling destination and internetwork them using a router. It will enable voters to register and get accredited, as well as candidates and parties. It also allows voting, counting of votes, collation, verification, authentication and authorization of votes and hence making result of vote available on time and this eradicate fraudulent rigging and manipulation.*

**Keywords:** Application packages, Electronic voting system, Nigeria, Router, Voters

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### INTRODUCTION

Elections allow the populace to choose their representatives and express the preferences for how they will be governed. Naturally, the integrity of the election process is fundamental to the integrity of democracy itself. The election system must be sufficiently robust to withstand a variety of fraudulent behaviors and must be sufficiently transparent and comprehensible that voters and candidate can accept the results of an election [1].

Unsurprisingly, history is littered with examples of elections being manipulated in order to influence their outcome. The design of a good voting system, whether electronic or using traditional paper ballots or mechanical devices must satisfy a number of sometimes competing criteria.

Electronic voting system (also known as e - voting) is an electronic system which uses electronic ballot that would allow voters to transmit their secure and secret voted ballot to election officials over the computer [2].

Electronic democracy is a necessity in this era Communication and information technology. E -voting is one of the pillars of the e-democracy which refers to the use of computers or computerized voting equipments to ease and to tabulate ballots in an election in a trustable manner.

Due to the nature of electronic systems the security and reliability of the system should be handled properly in order to make the e-voting system an applicable alternative to the paper based voting system for the government elections [3].

Problems manifested in form of election malpractice in Nigeria includes multiple voting, stuffing of ballot box with ballot papers, absconding with ballot boxes, mutilation of election result sheets and falsification of election results and election violence.

The main aim and objectives of this study are tailored towards eliminating some of the identified problems and voting irregularities and foster a formidable structure for the Nigerian voting system by designing a comprehensible electronic voting system for the entire voting processes that eliminate election malpractices. This study is constrained to the design of software application to manage, control and monitor some of the activities of INEC that is, to register eligible voter, electoral parties and candidates.

Since 1999, Nigerians have been voting in 120, 000 polling units with the voting population between 56 million and 62 million. About 56m Nigerians actually voted during the 2007 general elections which were rated as flawed by most foreign observers and Nigerians. The level of transparency and integrity in elections in Nigeria, peaked during the 1993 elections, but has since then been declining to such an extent that citizen fear that the 2011 elections could spell doom for democracy in the country. The controversies about zoning and consensus candidate are side issues. What Nigerians are more concerned about is the voting itself whether it will be free and fair and every votes will counts so that candidates of the choice

will emerge victorious, to subsequently administer the country with a real mandate and genuine commitment to the promotion of public well being.

### **LITERATURE REVIEW**

In the past, people go to polling place and take the blank ballots, then punch a hole or append the seal. If the seal is not clear enough, or the vote is damaged by soiling, it may bring some debate on the result. In order to resolve these situations, the technology of electronic voting (e-voting) comes into existence [4]. By using information technology, E-voting system can cast and count votes with higher convenience and efficiency, even make the electoral procedures simple and reduce the mistake rate of ballot examination.

Recent years, a considerable number of countries has adopted E - voting for their official elections. In 1998, Brazil make use of the E- voting. When the voter reaches the polling place, he shows his identity card for authenticating. The Electoral officer issued the ballot for E-voting if he is an eligible voter. Brazil's E-voting systems transmit votes to electrical center immediately so that the count of votes can take place without wasting time while the voting finished [5].

Japan adopted E-voting for local election in 2002, such as mayor and councilor election of Niimi city in Okayama prefecture in June 23, 2002; mayor election of Hiroshima city in February 02, 2003; and mayor election of Kyoto city in February 08, 2004. For example, let us considered mayor and counselor election of Niimi city electoral center surveyed the voters' reliability when the election finished. There are 83% of voters considered that E-voting system is trusted. 56% of them considered that the results of E-voting and paper -based voting are the same therefore E-voting is sufficient for reliable [6]. The reasons why voters can't trust the E-voting system are voters worried about the abuses in E-voting system, and they cannot make sure their ballot are recorded correctly.

In Belgium, election for the federal Parliament was held in May 18, 2003. In order to assist voters in being familiar with E-voting system, electoral center held short term training. Counting efficiency in the election with E-voting systems was faster than convention [7]. Belgium's compulsory voting system and E-voting complement each other, voters' satisfaction and attending willingness of join voting are improved obviously.

### **THE VOTING STRATEGY OF NIGERIA ELECTORAL SYSTEM**

Nigeria, one-third larger than Texas in area and the most populous country in Africa, is located on the gulf of Guinea in West Africa. It is bordered by Niger and Chad to the north, Cameroon to the east, and Benin to the west. The lower course of the Niger River flows south through the western part of the country into the Gulf of Guinea. Swamps and mangrove forests border the southern coast, while in land are hardwood forests.

The Nigeria Electoral system is the single member constituency type with competitive multiparty and the first past the post winner system. The method of voting used in four out of five past elections, that is, in 1979, 1983, 1999 and 2003 was the Open Ballot System (OBS) in which the prospective voter goes through a process of accreditation, receives a ballot paper from the appropriate poll official and thereafter makes the confidential thumb impression in favour of the political party or candidate of choice in a secret voting compartment before dropping the ballot in the box positioned in the open, in the full glare of officials, security and party agents.

The modified open ballot system was adopted in the 1993 elections in which voters filled behind the party symbol or photograph of the candidate of choice. Voters were physically counted at the close of polls and the results declared to officials, security and party agents. Although the method is simple and produced what many in Nigeria have often described as the fairest and most peaceful elections in the country, the election was unsuccessful.

The independent National Electoral Commission (INEC) is a non -partisan Nigerian government agency charged with the conduct and supervision of elections. In the late 1990s, the agency began modernizing its information technology infrastructure by migrating from an outdated legacy voting system heavily dependent on inaccurate paper records and polling cards to the newer Electronic Voting System (EVS) [8]. At the heart of EVS is the Electronic Voter Register (EVR), which, by capturing the names of all eligible voters, eliminates duplication and thereby minimizes discrepancies in the electoral process. As such, EVR is viewed as a means of ensuring free and fair elections in Nigeria.

As part of the modernization process, INEC needed to inventory and spatially locate the agency's 120,000 polling locations scattered around the country. These locations and their attributes needed to be linked to EVR.

The current system of voting as at 26<sup>th</sup> of April, 2011 was the Open Ballot System (OBS) and the current system has not giving the desired result intended. Rigging has been the common problem that is facing the general electoral system; these and many others are manifested as follows:

Ballot paper hijack, Incorrect thumb print rendering the vote void, Lack of voters security confidentiality, Delay of electoral materials resorting a large queue, hence discourage the voters interest in the voting process, Inaccuracy in counting and collating of the electorate votes.

Although the current system has mitigates some of the election malpractice as described above, and was able to provide some level of democratic dividend to about thirty to forty percent (30%-40%) but yet to meet up with the international standard for the provision of viable, successful and generally accepted electoral system for democracy.

## METHODOLOGY

### THE PROPOSED SYSTEM

The main components of the system include the Electronic Voter's Register- a database of eligible Voters with complete photographs, cryptographic data (voter identification, VID and personal identification Number, PIN) and other bio data such as age, sex, address, unit register, state of origin etc; voter Accreditation and Authentication prior to voting period (Figures 1.0 and 2.0). This will be based on the use of a secure VID and the photograph on the cards.

Importantly, Electronic Voting System however allows immediate collation and transmission of election results directly from each of the polling unit at the close of polls to designated collation centre nationwide [9]. It is the hope of the independent National Electoral Commission, INEC that given the culture of election violence including ballot snatching, impersonation, ballot stuffing and vote rigging the introduction of electronic voting system will reduce to the barest minimum these unwholesome electoral malpractices. In particular the direct transmission of results will eliminate to a very great extent the opportunity for vote rigging which usually occur between the close of ballot and the collation of results.

On the registration of electorate, each voter is expected to provide his/her relevant bio data, photograph and the system automatically generate voter identification number, VID which the user shall use to create his/her personal identification number, PIN on accreditation which shall be done by the individual voters themselves for the purpose of security and confidentiality.

The system captures the electoral candidates' profiles as well as maintaining the parties' information. Consequently, on each polling day, the voter can easily login with his/her PIN to cast the vote for his/her prospective party / candidate and the voter can also verify if their vote counts or not. Once a vote is submitted, a voter cannot go back and vote the same candidate again because the system will not allow multiple voting.

After the voting exercise the result of the winner will be announced and each voter can also verify and view the detail of the votes as cast for transparency.

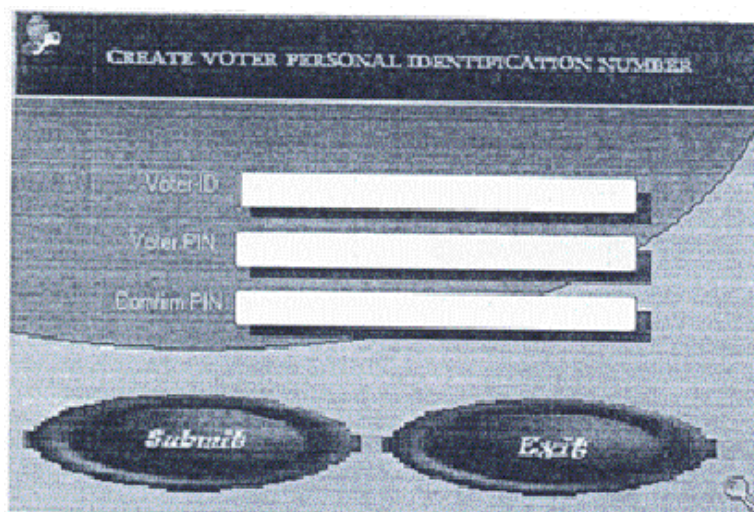
The image shows a software interface for creating a voter's personal identification number. At the top, there is a title bar that reads "CREATE VOTER PERSONAL IDENTIFICATION NUMBER". Below the title bar, there are three text input fields. The first field is labeled "Voter ID", the second is labeled "Voter PIN", and the third is labeled "Confirm PIN". Each field has a white rectangular input area. Below the input fields, there are two large, dark buttons. The left button is labeled "Submit" and the right button is labeled "EXIT". The interface has a dark background with light-colored text and buttons.

fig 1.0 Personal identification interface



Fig 2.0 Voter's authentication interface

### EVALUATION, IMPLEMENTATION AND TESTING OF THE PROPOSED SYSTEM

Undoubtedly, the productivity and reliability of this new system cannot be in any way compared with that of the current system. Consider some of its indelible merits that make it meet up with the democratic requirement for electoral process.

These include: High level of security, confidentiality and authenticity, Accuracy of result, Effective, reliable and eliminate stress of queuing, Eliminating all forms of electoral malpractices, In case of dispute, election results can be compared from each computer servers for verification.

Despite the merits to electronic voting system, critics of electronic voting argue about the security issues and the unequal literacy levels of the electorate are the major drawbacks to the system [10].

Apparently, for Nigeria to achieve her vision 20/20, it therefore means that the electoral system must be fortified and more so, we have to embrace information technology as the catalyst that will facilitate the paradigm shift to the system generally.

System implementation is the next stage after the completion of the system analysis design stage; the system has to be implemented from the development phase to the production phase of the system life cycle. The production phase is the second phase of the system life cycle where the EVS system will be ready for use and to perform the operation as was aimed and purposed for.

System testing refers to the thorough examination and assessment to which the system was subjected to in order to ensure its void of errors and bugs. As part of the implementation of the new system, expected of one to test the effectiveness of the designed and ensuring that it is impeccable and to be void of design time or runtime error before changing over to the new system as requested by for the commission.

This system effectively traverses through these stages of testing:

Unit testing, integration testing, functional testing, system testing, system integration testing, performance testing, acceptance testing. In this process, the real sample data is used in testing the system so as to ensure the system function effectively.

Haven't ensured that the system is well tested and evaluated, then the training of the user and management on how to use the designed system for their operation sets in, this primarily addresses two categories of audience: the user of the system and the personnel responsible for operating the designed system. This training can be done by either one-on-one training or through seminar presentation.

### INSTRUCTION FOR OPERATING THE SYSTEM

- Start the program by double clicking on the billing system icon on the desktop or through program by clicking on start button on the task bar.
- You will be required to login the security file to disallow unauthorized user from operating the system.
- After the successful log in of the user name and password, then it will load the main file which contains all operations or task that you might want to work with.
- Click exit/quit to terminate the program or click home to return to the main menu bar.

The Choice of Programming Language: is the development tool employed to design the electronic voting system. The programming language (i.e. the front end) used for the development of this system is Microsoft visual basic 6.0 and the database which represent the back end is Microsoft Access 2003.

The motivation behind the selection of Microsoft visual basic 6.0 over other programming language to design and develop the system own to its features which include:

Flexibility, Modular programming, Easy debugging and evaluation, User friendliness, Skill and familiarity to the language, Object oriented programming

### **SYSTEM SPECIFICATION, REQUIREMENT AND MAINTENANCE**

System specification and requirement are very important in that they support the new system to function efficiently and effectively. These are: Software and Hardware requirements of the system.

Software Requirement: this refer o the abstractive component of the system which cannot be seen but their effect felt. These are: Operating system should be from any version of Microsoft window XP to the latest one, Application package include: Microsoft office especially MS Access for the database., Software utilities like Antivirus, .Net frame work, version from 2.5 upward [11].

Hardware Requirement: The configuration of the system's hardware could be DVD/CD ROM, Intel Pentium IV and above, 20GB Hard disk, 512Mb of Ram, A printer.

The operating mode of the system is the real time operation. This is because as the operation is being carried out immediately it is also being process to generate the result of the vote cast at the central system. This mode of operation is useful in that it tries to avoid all sorts of malpractices and to avoid delay in the voting processes.

The maintenance of the system is the process of preserving and correcting any form of damage or errors that might interrupt or disrupt the effectiveness of the system. This is to ensure that the system retains its durability and optimum functionality as though it was new.

Regardless to how well designed constructed and tested a system or application may be error or bug will inevitably occur. These can be caused by: Poorly validated requirement, incorrectly implemented requirement or designed, Simple misuse of the system.

### **RECOMMENDATION**

For credibility, integrity and accountability of the independent National Electoral commission, INEC to ensure a free and fair electoral process in Nigeria, it is recommended that the commission should embrace and integrate Electronic Voting System to the current voting system.

Apparently, the adoption of EVS to Nigerian electoral system in this information age will cause a rapid paradigm shift which will directly or indirectly affect the common man on the street. INEC should once more canvass for the full use of the Electronic Voting System. With the Electronic Voters Register now in place, the masses should all go out to support the system.

However INEC should always employ competent (computer literate) adhoc staff to carry out any future electoral activities. The mind set of electoral officers and Assistant electoral officers need to be alienated to the new order.

### **CONCLUSION**

There is no doubt that a comprehensive Electronic Voting System will enhance the standard of elections in the country. Literarily speaking, the future is in our hands. While accepting that there are problems with election in Nigeria, it is equally true to say that the people must work hard to overcome them. Election is a process involving many stake holders who are expected to perform their expected functions at the right time. These stakeholders are the government, the electoral committee, political parties, security agents, civil society and the electorate. The stake is certainly not an easy one, but with proper focus and hard work electronic voting process can be achieved.

To sum up the discussion above, this paper clarifies the requirements and key elements of E-voting system and our implementation provide the following features. To begin with, the accuracy of voter's identity and ballot card are ensured with this voting system. Next, voter's identities are not written in the ballot card to protect voter's privacy and confidentiality. This system will validate whether the ballot card is to protect voter's privacy and confidentiality. The system will validate whether the ballot card is authorized or not, to make sure only legal user can vote, and voter's authorities are limited in order to prevent his violation.



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