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ATM-Based Voting System

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Abstract **- Voting is a critical element of any election which involves the processes of electing leaders or representatives into positions of authority in a democratic system of government. In most developing countries of the world, this process is usually marred with challenges of confidentiality, Integrity, availability and auditability such as falsification of results, identity theft, stolen of ballot boxes, multiple voting problems, over voting, and electoral fraud. This paper presents a framework for Automated Teller Machine-based voting system that solves the aforementioned challenges of the current voting system by using the existing Automated Teller Machines and debit cards issued for voting. Going further to implement the solution proposed in this paper will enhance and guarantee the credibility of the electoral processes and show a true reflection of the wishes of the people.**
Keywords: **E-Voting, Automated Teller Machine, Bank Verification Number, National Identity Number**

I. INTRODUCTION

Over the years, nations governed by democracy have taken giant strides toward strengthening democratic processes, which ensure that each citizen has the right to make their own decisions, especially when it comes exercising their freedom in electing leaders who represent them in government. However, in Nigeria, a lot of people are of the opinion that the electioneering processes are fraught with vices such as imposition of candidates, vote rigging, voter intimidation, vote buying, ballot snatching, ballot box stuffing and manipulation of results. This opinion is substantiated by the reports from Transition Monitoring Group (TMG), the Carter Center, National Democratic Institute (NDI), International Republican Institute (IRI) and the European Union Election Observer Mission (EU-EOM) during the 2003, 2007 and 2011 general elections respectively. Furthermore, the will of the voters have not been adequately captured since 1999 [1], [2], [3], [4], [5], [6], and the declining quality of general elections in Nigeria, is a threat to democratic consolidation [7].

II. REVIEW OF LITERATURE

A. Review of Electronic Voting (E-Voting) Systems

E-Voting systems were initially developed as a panacea for the problems inherent in the paper-based voting system. Several solutions have been proposed, and these solutions are examined in this section. A historical trend of voting systems in Nigeria was highlighted by [8] after which a secured voting system that was not prone to manipulation, rigging and complaints from citizens and political parties was designed. However, it was able to achieve only authentication but was not able to achieve confidentiality, integrity, transparency, convenience and auditability of functional and security requirements hence, it was impracticable to use. [9] provided a solution to the security issues of online voting systems with user biometric and password features for authentication. It was achieved by using the voter's fingerprint and password to achieve authentication while the least significant bit (LSB) was used to hide the results and Message-Digest algorithm 5 to achieve integrity. The research achieved the authentication and confidentiality requirement of e-voting systems but could not solve the problem of convenience and audit ability.

In order to solve the problem of time wastage when it comes to counting ballot paper and wastage of resources and manpower [10] proposed an advanced microcontroller-based biometric authentication voting machine. The downside of this work was that it could not also achieve confidentiality, integrity, secrecy, transparency, convenience and audit ability of e-voting functional and security requirements.

Due to the problems of impersonation that eventually leads to false results, [11] developed a secure e-voting system where a KY-M16 fingerprint sensor was used to capture the voter's fingerprints and WINCE 6 environment was leveraged on to interface the ARM processor. Formulation of a fingerprint pattern technique to achieve authentication in fulfilling the security requirements of the electronic voting system was achieved. However, the solution failed to achieve confidentiality, integrity, transparency and convenience and audibility. [12] also addressed the problem of rigging and impersonation with another biometric fingerprint solution using the FIM 3030N scanner for extracting, processing and storing the ridges of the prints in a database. The work was able to achieve a reasonable level of authentication however; it also failed in the areas of confidentiality, integrity, convenience and audit ability. To prevent impersonation in a situation of a stolen voter's ID

the aforementioned vices based on the following premises: the banks already have attributes that uniquely identify every citizen thus ensuring integrity and audit ability of the election process and confidentiality is ensured since all the ATM terminals can be connected to a central repository.

In order to fully harness the advantages of the proposed system, the following are recommendations are being made

1. The level of literacy among citizens concerning the need to get their Bank Verification Number and National Identity Number should be improved as this form the basis upon with the ATM based voting system will run.
2. A high level of security should be maintained by electoral bodies in order to have more confidence and independence of the system
3. Further study can be carried out towards implementing the solution proposed in the paper.

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