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Blockchain on Voting System in Africa

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Abstract- Voting system, in Nigeria has received a major setback over the years where the citizens has stopped believing in its system as free, reliable, tamperproof, without interference and credible. The present system of voting in Nigeria has led to incessant riot, given rise to election rigging, double voting, ballot snatching, rigging by tampering with results, third party interference, increase in death rate and unfavorable atmosphere for business and tourism. The traditional system of voting in Nigeria is paper ballot voting, where citizens come out and line up to do a paper thumb print on the ballot paper of their preferred candidate, this system is not reliable, had been tampered with over the years, leads to double voting, loss of ballot boxes and snatching by third party interference, it is also rigorous as most registered voters end up not exercising their franchise. Nigeria, needs a voting system that is tamperproof, disallows double spending, can keep accurate record of voters, and does not allow third party interference, hence the need for blockchain technology.

Keywords: *blockchain, Ethereum, smart contract, voting.*

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The aim of this proposed research study is to build blockchain application and use it as a tool to secure voting system in the Nigeria election environment.

Keywords: blockchain, Ethereum, smart contract, voting.

I. Introduction

Africa as a continent, over the years has not gotten its voting system right, taking Nigeria as a case study, when elections are conducted, the fear to come and express individual franchise is there, because most elections are marred with irregularities and violence which in turn leads to loss of life and property [2].

Election is an integral part of a country, it is important to get its voting system right, because it will determine who governs, makes decision and this decision affects the gross domestic product, standard of living and cost of living of its citizens. Election is the process through which leaders are elected and it is done through voting. The traditional system of voting in Nigeria is manual (ballot papers) voting system, which has been greatly influenced by human factors [3]. It is rigged/ tamper with, ballot boxes carted away and leaders forcefully impose their successors without a transparent voting system.

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According to Muhumuza, (2019), 80,004, 084 registered voters for the presidential election of 2019 in Nigeria but only 37% of this said voters only came out to express their franchise, this clearly shows that the people of the country has lost confidence in the voting system. Table 1.1 indicates the statistics of the two runner up, who gulped 98% of the votes.

Table 1.1: Election result of 2019 election in Nigeria

Nominee	Muhammad buhari	Atiku Abubakar
Party	APC	PDP
VOTES	15,191,847	11,262,978
TOTAL VOTES CASTED	26,454,825	

The table 1.1 indicates that the total vote casted is 26,454,825 which represent 98% of the total vote casted in 2019 presidential election. If only this number voted out of a total of 80, 004,084 registered voters of a country of almost 200million, it can only be said that the election was decided by minority of the countries registered population.

Nigeria needs a voting system they can believe in, Nigeria as a country cannot continue to use traditional means of voting [2, 3], a country referred as giant of Africa should lead by example in every facet of is system. Election being a determent factor and great influencer to how the country turns out to be, should be paid rapt attention to and the voice of the people should truly be heard through the voting system. Blockchain technology, proposed to build voting system application will provide a standardized and reliable means of voting.

II. Importance of Proposed Blockchain Voting System over Traditional System (Polling Unit Ballot)

Public record keeping: [2], discusses blockchain as a ledger for keeping public records. Blockchain technology serve as a database for keeping public record. This is a great advantage for the country to have adequate population census of its citizens. With blockchain technology application use for voting, the present National identity number given to every citizens carries our data. It is stated in the constitution that only citizen of age 18 and above can vote. The national identification center would provide the data of its citizens above 18 years of age, infuse it in the blockchain technology, also being a public type of blockchain

citizens can easily access the system to verify if their details are accurate and no one is omitted. For the traditional system it is almost impossible to get accurate data of the citizens who are eligible to vote.

Anonymous: Blockchain technology is anonymous and does not need a third party interference [5]. One of the beauty of election is to make it completely anonymous in other to prevent victimization of voters as to who and why they voted for a particular candidate. Blockchain system takes care of the anonymity aspect of the voting system. As every participant is given an Identity that is not traceable to a particular participant. With this citizens who repose confidence in the system of voting and be willing to express their franchise. The traditional means is ballot system where you have to tick a paper and put in the ballot box, this is not anonymous and often a time citizens are influenced on who they must vote for its also bring about void votes in cases where voters thick more than one candidate on the ballot paper, this has also given rise to double voting.

Transparency: [11] Discovered that blockchain system is highly transparent where nobody can influence any decision. It is a decentralized system that gives power to every participant and not just one person. That is why it has private and public key digital encryption, where the private key is own by the election team who declares the election process open and every citizen of age to vote/ participant has the public key to verify the voting. The traditional system of voting is not so transparent and it is influenced a lot, either by monetary or forceful influence.

Secured: An important aspect of voting system is for it to be secured. Blockchain in the voting system adoption, is highly secured everyone doesn't need to come out to vote just as it is done the traditional way, all you need do is stay as you were and vote electronically., discusses how blockchain transaction is secured [7]. This in a way help to prevent every form of possible violence and death which over time has been recorded during election processes.

Tamperproof: Blockchain technology is tamperproof [9, 12]. A vital point that should be considered when election is being conducted is how tamperproof the system is. Blockchain system is known to be tamperproof which gives it as good advantage over the traditional system, where most times, ballot boxes are carted/ stolen and in turn elections are rigged and tampered with to favor a candidate against others.

Durability: Keep record of documents used in an election is important for proper documentation. Blockchain technology provides an electronic archive that will serve as a reference point over the years [1, 13]. Elections conducted through proposed blockchain voting system would automatically has its records durable and there won't be unnecessary loss of records as it is presently experienced through the traditional system of archives in national electoral commission office.

III. Blockchain the Game Changer for Independent National Electoral Commission (INEC)

Blockchain technology is here to change the voting system in Africa. Independent national electoral commission (INEC), is the electoral umpire that supervises the electioneering of Nigeria [6]. The body is expected to stand independent without taking orders from the government in favor of any particular candidate. The present system used by INEC for voting is not completely transparent, not tamperproof, and it is greatly influenced by external forces [14]. The following are the necessary procedures in achieving a blockchain e-voting system as indicated in figure 3.1

Citizens are assumed to be private persons, seeking to vote in an election year in the proposed blockchain system in this research simply called INEC. INEC are assumed to be trained professionals, in possession of a state-issued license and authorization to oversee elections. The requirements are described in a less formal way in Figure 3.2, where the different users are shown interacting with the proposed blockchain voting system, which the smart contracts is written, actions needed to be able to performed by each actor in the system, requirements that apply to the general system and not just to one user specifically. Some of them are described in part by the user stories, but for the sake of exhaustiveness and application to users not in the system, they are explicitly written below.

- It impossible, for a non-admin account, to connect to the identity of a citizens, INEC without the consent of the citizen in question.
- Only those permitted to should be allowed to connect to the network.
- There must be an immutable traceability built into the system, where it is possible to see:

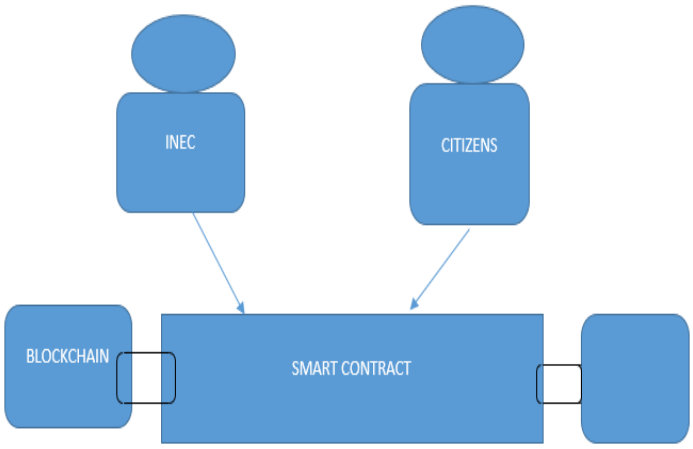

Figure 3.1: Overview of users and their interactions with the blockchain and system of smart contracts which exist on the blockchain

Roles

1. INEC
   - Secure login
   - Oversee election
2. Citizens
   - Secure login
   - Edit personal information
   - Vote
3. Smart contract
   - Validate vote
   - Voting result
   - Repel any form of tamper

NIC: The NIC stands for national identity centre, this is an organization in Nigeria where data's of every citizen is kept [4], with the introduction of NIC to the voting system in Nigeria, it will make voter registration a lot easier where citizen would no longer need to do physical registration by lining up but details of citizen who are eligible to vote would be transferred to INEC

INEC: Independent national electoral commission, as the name implies the body is expected to becompletely independent [10], blockchain technology is transparent, no need for third party interference and highly secured is the technology at this time for INEC to adopt for the voting system. Once INEC takes the data from NIC as against the old way of manual registration, it will make their work more simplified, voters would be registered and accredited. After this the public would be informed of their participation in the blockchain network voting system, there by sensitizing the citizen on how to use this e-voting technology.

Smart contract: this is an executable contract that is written in solidity high level language in an ethereum blockchain [17, 19]. The smart contract is written to serve as a policy guidance in the voting system. The smart contract controls the whole system and can't be tampered by any one. It follows the encrypted instructions then set a voting time and standard. Once the voting is done, it sends message across to every voter in the system and consider the digital signature of every participant as a validation of whom they voted for, there by counting and declaring the result by broadcasting it to every participant of such an election.

Electoral candidates: this are the citizens contesting for a particular position, INEC as a body first does their voters registration because they also have the right to vote, then accredit them to vote. After this the smart contract goes through its policy to confirm if this said candidate has the eligibility to contest, by checking the policy of the executable contract.

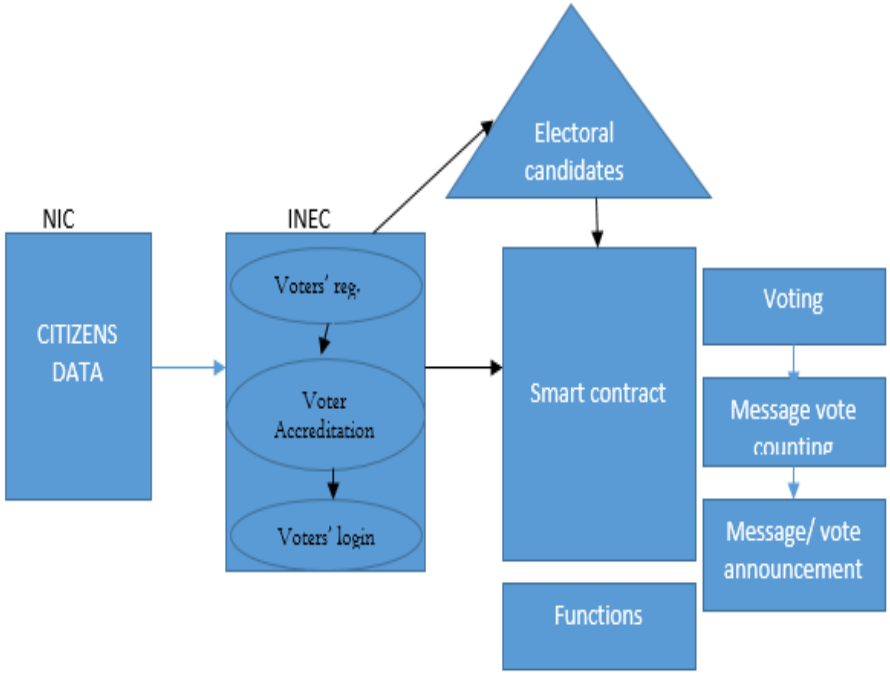

Figure 3.2: Blockchain e-voting system structure

Blockchain technology is decentralized system that can't be influenced by a particular person, every participant has a public key to verify, and this is what a voting system needs. The will of electorates and not a doctored result.

IV. Conclusion

The proposed blockchain voting application if adopted would solve the challenges of traditional means of voting in Nigeria. Election as earlier mentioned has great impact on how the economy of a country goes, its leadership either has a good economic team or otherwise, hence a good system that can yield result is needed. The will of the people to vote a particular leader is their satisfaction that he or she is capable to move the nation forward, for their franchise to be fully expressed e-voting system is best at a time like this and blockchain technology is the best. The world is moving at a fast pace, is either we as Africans join the moving technological train or we fall behind. The proposed Blockchain voting application, is the solution to voting issues in Nigeria and Africa at large if adopted.

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