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# A Short Review on the Penetration of Fingerprint Identification and Authentication Systems in Nigeria

Eze Philips and T. Enem

National Open University of Nigeria (NOUN),  
Nigeria.

Email: ifeanyig@gmail.com, enemtheophilus@gmail.com

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## ABSTRACT

*Prior to the present biometric transactions in Nigeria cyberspace, access to digital platforms, cyber or physical spaces had been through the use of cards, tokens, passwords etc. These cards could be lost while the passwords could be hacked or forgotten. The use of fingerprint biometrics has alleviated some of the issues associated with the above mentioned media. Therefore, in this paper we try to access the awareness and depth of fingerprint biometrics technology among Nigerians. A questionnaire was designed and deployed to evaluate how conversant the citizens were with biometric technology and their confidence or trust in using the system. This research work tried to cut across different age groups and academic qualifications to ascertain the effectiveness of biometric technologies in Nigeria, hence recommend sectors where the Government can focus on to improve the economy.*

**Keywords:** Fingerprint, Biometric, Deploy, Nigeria, Cyber

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## 1. INTRODUCTION

Biometrics refers to the measurement of inimitable and distinctive physical, biological and behavioural characteristics used to ascertain the identity of individuals. The concept of biometrics is not a new field of study. Biometrics had been in use since the 14<sup>th</sup> century in China. In 1879, Alphonse Bertillon, a French Police Inspector suggested the use of body measurement which included arm and foot length to identify repeated offenders. A decade later, through the work of Edward Henry, the British paved the way for the development of a fingerprint database, which up to this day remains the most preferred biometric identification system [13].

Nigeria has long known the importance of identification, though it has wrestled with developing a robust identity program. In 1978, the Department of National Civil Registration (DNCR) was set up within the Federal Ministry of Interior (FMI). DNCR was tasked with issuing national identity cards. The program lasted 18 months. In 2001, DNCR contracted a private partner to enroll people, and issue national identity cards, at a fiscal cost of US\$236.8 million. The program ran for five years, issued national identity cards to 37.3 million people, and was shelved [11].

In 2007, the government passed a law, the National Identity Management Commission (NIMC) Act, and set up NIMC as the government agency responsible for identification in Nigeria. NIMC continues to operate today.

### Fingerprint Biometric

Biometric applications in developing countries may not have a smooth sail implementation as obtained in developed countries due to infrastructural deficits. Challenges related to infrastructure and remoteness in developing countries are not identical. In Indonesia despite their more difficult geographic and climatic terrain achieved a faster registration rate than Indian's Aadhaar (biometric registration) project [4].

In South Africa, the Government mapped out strategies on how to reduce annual crime rate using ICT and biometric technology. The country had integrated biometric technologies with Internet of Things (IoT). The architecture of Internet of Things to track Parolees who had violated their bail conditions was developed. This system tracks violators irrespective of their location within the country [7].

In Nigeria, Emmanuel [8] modelled a biometric versus mobile solution for limiting corrupt practices in social safety programmes. He discovered that corruption has frustrated effort to improve the socio economic well being of vulnerable groups in Africa using Nigeria as a case study. The research applied biometric system for the documentation and

authentication of safety net beneficiaries. This limits the dissemination of information of social packages to the integrated mobile devices. The investigation resulted into a model that lessens corrupt practices in social safety nets

The US Department of Homeland Security's 'US-VISIT' program provides visa-issuing checks at ports of entry with fingerprint technology that allows the officials to authenticate the identity of those visiting the US. This large scale automated fingerprint recognition system has processed more than one hundred million visitors to the US since 2004. The system identifies terrorists, criminals, and immigration offenders by comparing a visa applicant's fingerprint with those in the watch-list databases and also verifies that a visitor at a port of entry is the same person to whom the visa was issued [6].

The Director General of NIMC in a press interview stated that the Commission has developed a 5 years strategic plan to capture about 150 million people into the NIN database. The Director General also declared that the agency is underfunded and needed about 4000 data capture centers as against the current 200 centers presently functional across the country [15].

The need to enact legislative bills was also stressed by the Legal and Regulatory framework Working Group of the Nigeria Digital Identification for Development Project [9].

The National Development Planning Commission of Ghana (NDPC) proposed in 2017 the integration of wide range person-based data into the civil registration system. This included the administrative data from various government agencies, telecom providers' call details, satellite imagery, financial transaction and social media data amongst others. A high-level statistician noted that their data eco-system is not up to international standard. Like Nigeria, the Ghanaian governments had recently focused on the interoperability of these data fragments and seeking the infrastructure to harmonize them into a centralized data infrastructure [19]

It is also important to note that Nigeria is still far behind in other biometric technologies e.g. Face, Vein, and Voice etc. A recent report by financial holding business BBVA Compass has revealed that the rapid adoption of biometric authentication in smartphones shows no signs of slowing down, and has the potential to revolutionize the financial services industry [17].

The BVN (Bank Verification Number) initiative in Nigeria is a move projected to help keep customer's account secure by putting in place a mechanism to fight identity fraud. The BVN advantage is both beneficial to customers and Nigeria's banking industry in numerous ways as it serves as a

platform for a unique, verifiable and acceptable means of identification across all systems; safeguards customers against identity theft by protecting their accounts from unauthorized access with biometrics; increases efficiency in operations; facilitates easy identification of blacklisted bank customers; and creates the condition for streamlining banking operations [2].

The Kenyan Government is a government to emulate in Africa by the way they improved their electoral systems using biometric technology. McKenna [14] in 2019 conducted a critical study of Kenyan election of 2007 and 2013 and discovered huge gaps in terms of acceptance outcome and authenticity of the results. His study shows the importance of securing technology gains traction by exploring two election scenarios.

*“With the right database in place, it will guide government to plan and take critical decisions on education, health agriculture and data also will guide government to come up with effective national policies with the issue women, children and unemployment,”* said Pantami, before adding that *“as a country, we seek to use efficient ways to deploy national identity trust systems not only to deliver government services in areas such as social welfare, taxes, voting, health administration, security, and education but also to build an indigenous digital economy that will stimulate the private sector and make it thrive.”* [2]

Debrah et al in their article *“Does the use of a biometric system guarantee an acceptable election’s outcome? Evidence from Ghana’s 2012 election”* discovered that the use of biometrics in Ghana 2012 election encouraged high voters’ turnout and confidence in the electoral process. The believes of the Ghanaians was that the biometric system would serve as forensic measure against election fraud and multiple voting. However the problem caused by electronic voter verification malfunction, human error and policy manipulation by polling officials defused the efficacy of the biometric technology as a tool for attaining credible election outcome [5].

Sulovska [18] carried out a survey in Zlin Province, Czech Republic on the feelings and attitudes of the citizenry to biometric technologies and associated societal and safety issues. The survey discovered that personal privacy or safety as a vital factor in adopting biometric technologies. The respondents also raised concerns about possible misuse which may cause some privacy risks. The respondents also pointed out the need for sufficient legal frameworks to ensure public confidence and trust.

## Fingerprint Recognition

In fingerprint recognition process, the important step which affects system accuracy is matching between template and query fingerprint [12].

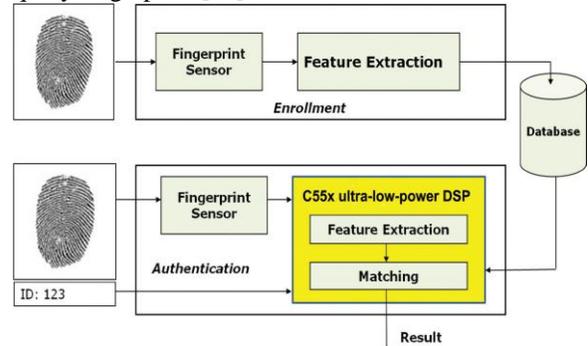
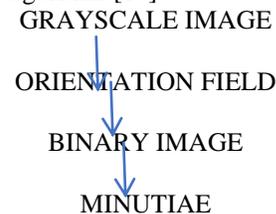


Figure 1: Fingerprint recognition process  
Source: Milind Borkar, November 2012 [3]

The following outline shows the stages of a typical minutiae feature extraction algorithm [10].



The algorithm firstly estimates the friction ridge orientation and frequency from the image. Based on these values, it then performs contextual filtering to improve the image quality and facilitate ridge extraction. The algorithm then obtains binary ridge skeletons from the enhanced image by tracing the ridge lines. Ridge endings and bifurcation points are obtained from the ridge skeleton and referred to as minutiae [10].

A recent study conducted at the Kaduna State Tertiary Institutions noted that since the biometric technology is still evolving, public enlightenment should be intensified to boost general acceptability among the populace. They discovered that their respondents expressed reservations following the performance of card readers in recent concluded elections. They propose that before the deployment of any new technology, public acceptance analysis should be conducted. User’s confidence should first of all be instilled before deployment [16].

In the Northeastern State of Gombe in Nigeria, the State Commissioner for Finance stated that the biometrics auditing system has helped in curbing excess spending by detecting 668 ghost workers. Hence saving the State of about N37million (US\$97,000 dollars) monthly [1].

## 2. DISCUSSION

In the process of this research, hundred questionnaires were deployed amongst people of different strata (age and education, gender) in Kaduna State Nigeria. A total of ninety five questionnaires were returned. From the administered questionnaire we discovered that the concept of fingerprint biometrics is no longer a new topic among the Nigerian populace. There are government Institutions whose works involves fingerprint biometric data capture. These Institute through public education and enlightenment have created enough publicity on biometric technologies to the citizenry. Institutions like Federal Road Safety Commission (FRSC), National Identity Management Commission (NIMC), Joint Admission and Matriculation Board (JAMB), West African Examination Council (WAEC), Independent National Electoral Commission (INEC), Banks etc. have made fingerprint acquisition one of their prerequisite demands.

Therefore an average Nigerian who has finished secondary education, sat for Joint Admission Matriculation Examination, acquired National Identification Numbers (NIN), Drivers' License, International Passport, Voters Card or opened a bank account must have had their fingerprints captured and stored in databases

Experts in the IT industry are calling for the synchronization of these databases for effective government planning and policy formulation. This could also be deployed to area of population census.

In the graphs below; Figure 2 shows the age distribution of questionnaire respondents while Figure 3 shows their academic qualifications.

The graph below (Figure 2) shows that 60% of the respondents are between 26 and 39, which is a vibrant age that could champion the deployment of biometric technologies in Nigeria.

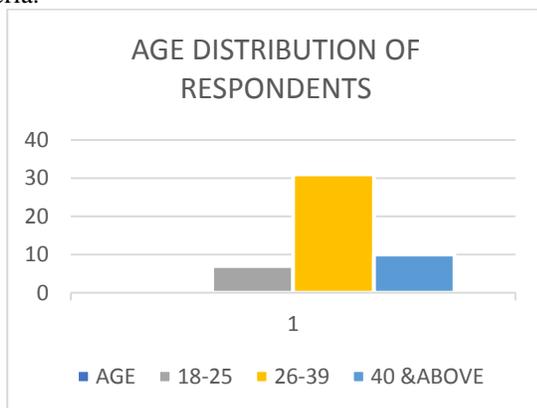


Figure 2: AGE

18-25	7
26-39	31
40 & ABOVE	10

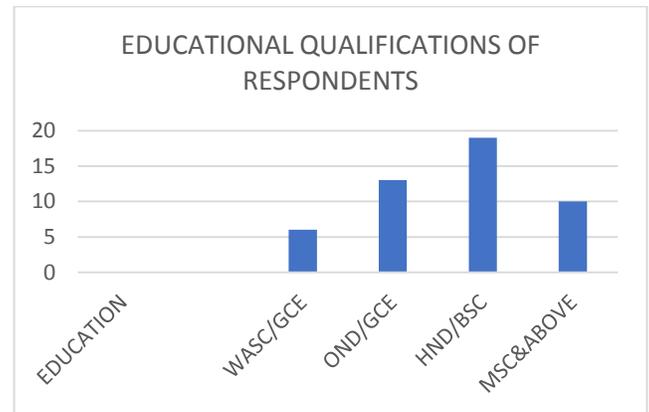


Figure 3: EDUCATION

WASC/GCE	6
OND/GCE	13
HND/BSC	19
MSC&ABOVE	10

From Figure 3, above (Educational Qualifications) 20% of the respondents have finished their second degree while 38% have finished their first degree.

Research and technological focus has made it obvious that biometrics would be the future of personal/individual identification systems. Hence, developing countries like Nigeria should take urgent and decisive actions towards implementing biometrics-oriented processes and transactions to meet up with the rest of the world. This should be done by synchronizing all the activities of the various biometric acquisition and management agencies. Nigerian and other African countries should tap into the digital identity systems operational in developed countries.

The Nigerian Government should provide the necessary infrastructure for the full deployment of fingerprint biometrics in the country. Legal backings should be legislated to back the entire process.

Future work should be done to integrate biometrics with birth registration and population census and control.

### 3. CONCLUSION

Presently, the need for faster, more convenient and accurate identity authentication and identification has never been so great. Continuous mobile connectivity, the ubiquity of the Internet, the growing popularity and acceptance of e-commerce and many other factors all accentuate how critical and difficult it can be to authenticate someone's identity. Modern biometric systems powered by advanced processing architectures are moving identity authentication beyond yesterday's methods toward fast, accurate and secure systems that identify individuals based on unique characteristics.

Nigerian Government should expedite actions through policies, programs, legislation and investment in biometrics in order to catch up with the developed countries that are leveraging on this technology to fight crime and ease up processes.

They have also expressed confidence on the system and enjoined the government to provide the enabling conditions for the full implementation of the biometrics technology.

Appropriate legislations should be promulgated to back the new emerging technology to boost the confidence of the users and as well biometric business institutions.

### REFERENCES

- [1] M. Ayang. /nigerian-president-wants-centralized-biometric-database-before-2023-polls., 2021 Retrieved from <https://www.biometricupdate.com/>: <https://www.biometricupdate.com/202109/nigerian-president-wants-centralized-biometric-database-before-2023-polls>
- [2] M. Ayang. *Integrated Biometrics' mobile solution deployed for Nigeria's bank ID initiative*. 2021 Retrieved from Biometricupdate.com: <https://www.biometricupdate.com/202102/integrated-biometrics-mobile-solution-deployed-for-nigerias-bank-id-initiative>
- [3] M. Borkar. User Identification Systems Leverage Smarter Technoogies. *Texas Instrument White Paper*, 1-6, 2012.
- [4] C. Burt. *Biometrics in the Developing World*. 2017 Retrieved from Biometric, Update: <https://www.biometricupdate.com/201707/biometrics-in-the-developing-world>
- [5] E. E. M. Debrah. Does the Use of a biometric system guarantee an acceptable election's outcome? *African Studies*, 78(3), 347-369, 2019.
- [6] DHS. *US-VISIT, Biometrics and You*.2021. Retrieved from Department of Homeland Security: <https://www.dhs.gov/xlibrary/assets/usvisit/>
- [7] N. Dlodlo, P. Mbecke, M. Mofolo, & M. Mhlanga. The Internet of Things in Community Safety and Crime Prevention for South Africa. *Innovations and Advances in Computing, Informatics, Systems Sciences, Networking and Engineering p* (pp. pp531-537). Pretotia: Springer Cham Online, 2014.
- [8] O. Emmanuel, O. Incorporating biometric and mobile systems in social safety nets in sub-saharan africa. *covenant journal of informatics and communication technology*, Vol 1, No 1, 2015.
- [9] F. Hersey. *Nigeria sets 5-year biometric enrollment target for whole population to national ID system*. 2020. Retrieved from Biometric Update: <https://www.biometricupdate.com/202009/nigeria-sets-5-year-biometric-enrollment-target-for-whole-population-to-national-id-system>
- [10] A. K. Jain. Latent fingerprint matching. *IEEE Transactions on pattern analysis and machine intelligence*, 33(1). *Institute of Electrical and Electronics Engineers*, 88-100. 2010. Retrieved from <https://ieeexplore.ieee.org/abstract/document/5432204/>
- [11] M. I. Kalu, D. Nwogbaga, & F. Nnaji. The philosophy and politics of national identity management in Nigeria: A case for nation-building. *African Journal of Politics and Administrative Studies*, 11(1), 2018.
- [12] H. Kaur, & P. Agganwal. A Hybrid Algorithm for Fingerprint Recognition. *International Journal of Advanced Engineering Research and Science (IJAERS)*, Vol 1, Issue -4, 2014.
- [13] J. McDowell. Something You Are: Biometrics versus Privacy. *Sans Institute USA*, 6-10, 2002.
- [14] M. A. McKenna. *Deficiencies in Electoral Security: Outcomes of the 2007 and 2013 Kenyan Elections*. Cambridge, MA, USA, 2020: Dash.harvard.edu.
- [15] NIMC, D.-G. *National Identity Management Commissio (NIMC), April 2021*. Retrieved from NMIC Press Release: <https://nimc.gov.ng/>
- [16] O. S. Olorunsola, F. N. Ogwueleka, & A. Evviekpaefe. Assessment of privacy and security perception of biometric technology case study of Kaduna state tertiary academic institutions. *Security and Privacy*, 3(5), e124. 2020. Retrieved from <https://onlinelibrary.wiley.com/doi/abs/10.1002/spy2.124>

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<https://afrcict.net>

[17] B. Secur. *Five Takeaways from the Latest Biometric Research*. July 2015 Retrieved from b-secur.com: <http://www.b-secur.com>

[18] K. Sulovská. Biometric Systems in the Czech Republic: Friends or foes? *EEE Consumer Electronics Magazine*, 3(3), 62-69, 2014.

[19] A. Thiel. Biometric identification technologies and the Ghanaian ‘data revolution. *The Journal of Modern African Studies*, 58(1), 115-136, 2020.