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A PROPOSED MODEL FOR USERS' AUTHENTICATION OF ATTENDANCE SYSTEM TOWARDS CURTAILING FRAUD IN PUBLIC SECTOR

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Abstract

Fraud in the public sector is endemic and requires immediate attention. 'Users' Authentication (UA) remains the most viable system for fraud management globally. The conventional Users' Authentication (UA) utilizes the biometrics and authentication of an attendance system such as GPS, RFID and therefore identified with certain limitations. Therefore, this study integrated biometrics, authentication of attendance system, national identity database (NID) and or Bank Verification Number (BVN) as a framework for financial management in the public sector. A system-to-system integration approach will be adopted to reduce human interference and errors.

Verification and authentication of each users biometrics from the NID / BVN will serves as the major input parameters. The

KEYWORDS: Users' authentications, Attendance system, Fraud in public sector,

collection of daily biometric data of attendance will be passed to central payroll application which in turn forms the output of the model at the end of the month. The integration of biometric authentication of attendance system, National Identity

Database and BVN can provide a more reliable and effective framework for the management of financial leakages in public sector. The developed framework is therefore recommended for use in public sector.

INTRODUCTION

The poor attitude of public and civil servants towards punctuality to work has become a big challenge. This ugly tendency was reported (Obara, Nangih, & Agba, 2017) to have created avenue for a monumental fraud by serving as a conduit for huge financial losses in government establishments. Users' Authentication (UA) remains the most viable system for fraud management globally. The conventional UA utilizes the biometrics and authentication of an attendance system such as GPS, RFID and therefore identified with certain limitations. Effective and efficient daily authentication of employees' attendance remains viable panacea for reducing financial losses in the public sector (Nugroho & Andryzal Fajar, 2017). Conventional methodology utilizes only biometrics and authentication of an attendance system such as GPS, RFID and therefore identified with poor performance and other certain limitations. The major objective of this present study is the integration of automated employees' authentication system with the National Identity Database and or Bank Verification Number (BVN) in a single framework for managing financial leakages in the public sector.

Definition of terms

i. Attendance System

This involves capturing employees' attendance and presence at the office premises automatically using mobile phone (via dedicated app or USSD driven method) combined with his biometrics (Nagothu, Kumar, & Anitha, 2016). This method is much efficient for registering employees' presence at the office, thereby leading to real time data collection and transmission to the Integrated Payroll and Personnel Information System (IPPIS) (Obara et al., 2017). One advantage of this system is that it can locate the employees around their respective offices with the aid of geo-fencing features. This

method provides more flexibility in exchange of information related to attendance of employees among the concerned stakeholders such as the ministry, department and agencies thereby encourages collaboration. The method is cheap and can be operated with smart phones and ordinary low-end mobile phones.

ii. **Frauds in Public Sector**

Sharp practices such as, ghost workers on the payroll of ministries, department and agencies is widely reported among the African countries, most especially in Nigeria by the Federal Ministry of Finance. The prevalent of fraudulent tendencies such as embezzlements and deliberate damaging of evidences of corruptions like sensitive documents, setting registry ablaze, undue cover-ups constitute big challenges in managing the direct financial embezzlement related frauds(Obara et al., 2017). The indirect financial frauds practices resulted through punctuality of the employees to work. Others may be related to inconsistent attitudes of not stay at work and focus of official tasks. All these constitutes fraud which will eventually leads to corruption with huge amount of money being lost, through dishonest means which undermine socio-economic and political programs of the country. Billions of naira is lost in the public sector every year through this kind of dishonest punctuality practices, however, the implementation Bank Verification Number has helped in authentication of government employees, exposes the ghost workers and reduces financial wastes in government recurrent expenditures (CBN Annual Report, 2016).

iii. **Users' Authentications**

There are various technological methods of users' authentication system available today, some of which are biometric, radio frequency identification (RFID), Near Field Communication (NFC), etc. Various types of biometrics have also been developed for application in different industries. These include fingerprint, vein, iris and facial recognition authentication methods. These technologies use pattern-recognition and artificial intelligence based on images of fingerprints, veins, irises, and faces (Sultana, Enayet, & Mouri,

2015). Fingerprint authentication is a well-adopted and widely used technology across the globe. Vein based authentication make use of three types of veins, finger vein, palm vein, and dorsal hand vein. Another authentication method is Iris authentication which uses video images of one or both irises of the eyes, which are unique and well protected against damage. The facial authentication can use a normal camera to detect a face and recognize various patterns to identify a user.

Literature review

Information technology advancements is expansively growing and penetrating all fields of human endeavors. The growth of information technology in private and public sectors, education, social sciences, medicine and other humanities is very great. A web-based attendance system for managing lecture attendance was proposed by(Nugroho & Andryzal Fajar, 2017) to manage attendance of both lecturers and students of the university. If the implementation of this system is mandatory; it means that lecturers and students as users are forced to use the system to manage attendance. However, web-based attendance system for managing lecture attendance may be abused by others marking attendance in proxy for an absentee.

Another attendance system is based on face detection, which recognizes student using a specific algorithm. It automatically detects the students when student is entering the class room, recognizes that student and mark the attendance (Pathak, Khairnar, Paratnale, Yadhav, & Wadgaonkar, 2016). Conversely, a student marking the attendance and leave the class without staying for entire lecture duration may constitute a major compromise this system.

Further to above proposed smart location based time and attendance tracking system, which is implemented on android mobile application smartphone reduced the need of additional biometric scanner device. The organizations have a specific location, which can be determined by the GPS.

Each employee's location can be determined by the GPS using smartphone (Sultana et al., 2015). However, the limitation of this system is the affordability of smartphone by all the employee of the institution.

One of the most important success factors in automated attendance system is user's authentication method. Each user must be uniquely identified with his or her identity parameters. Several research works have been carried out in this area but the authentication methods are not carefully selected. Some of them considered implementation of password, while others uses media such as RFID, NFC cards, facial recognition, GPS etc. All these methods have their own merits but deficiency in selection of one over another may be major challenge. Due to financial and risk involved, this study has carefully chosen a combination of various tools which includes biometrics, GPS and GPRS location coordinates, National Identity Database and or Bank verification Number identity system to achieve a more accurate and effective management strategy for user's authentication towards curtailing fraud in public institutions.

Related work

Several researches have been done in the past on an automated attendance management system using students, staff members, employees etc. Some of these researches focused on biometric authentication system while others combined an automated system of attendance using biometric authentications and locations services such as GPS, etc. For instance, there have been studies on the feasibility and limits of various authentication technologies such as radio frequency identification (RFID), quick response (QR) codes, and fingerprint, vein, iris, and facial recognition for manpower management and access control at construction sites (Chin, Kim, & Choi, 2017). Also, a smart location based time and attendance tracking system, which is implemented, on android mobile application on smartphone. The location of an organization which can be determine by the GPS was considered as a key feature, to determine location of each employees by the

GPS using smartphone (Sultana et al., 2015). Another study was carried out on Attendance Monitoring System Using ZigBee and RFID which was designed to collect and manage student's attendance record from RFID devices installed in an educational environment. Based on the verification of the student identification in the class, the system could generate sophisticated student attendance database for analysis purpose (Khan, Patil, Shah, & Kampli, 2015). In all, there was no study that focused and considers a model that combines an attendance system using biometric authentications, national identity database / national bank verification number system towards curtailing fraud in public sector. This research work therefore carefully looks into the issues surrounding fraud in public sectors arising from lack of a proper system that can efficiently manage an attendance system in public sector putting in considerations the authentic punctuality of an employee at work. Several parameters such as employees' arrival and closing time, numbers of days of attendance in a month, etc. will be gathered, analyzed and shared with respective departments or agencies of government in order to proffer an appropriate solution to the existing problems. The proposed model will integrate employees identities combined it with the national bank verification number database and then transmits the information to the integrated personnel payroll information system which is being centrally managed by government for preparation of the salary on a monthly basis.

Propose Model

System Design

In order to achieve the desired result, the system has been designed to adopt a multi-agency and multiple devices integrated together in a scalable manner. The employees' authentication of attendance system combines a tracking system with biometric authentication using national identity / bank verification number databases. These databases will be referenced by the agencies requesting authentication of each employees using a client-server

approach and follow a specified hardware / software design. System-to-system integration approach is considered here to reduce human error as possible. Integrating these technologies together may be a challenge if the design is not professionally implemented.

We have therefore categorized the design as hardware and software as follows. Figure 1 below represents the proposed model.

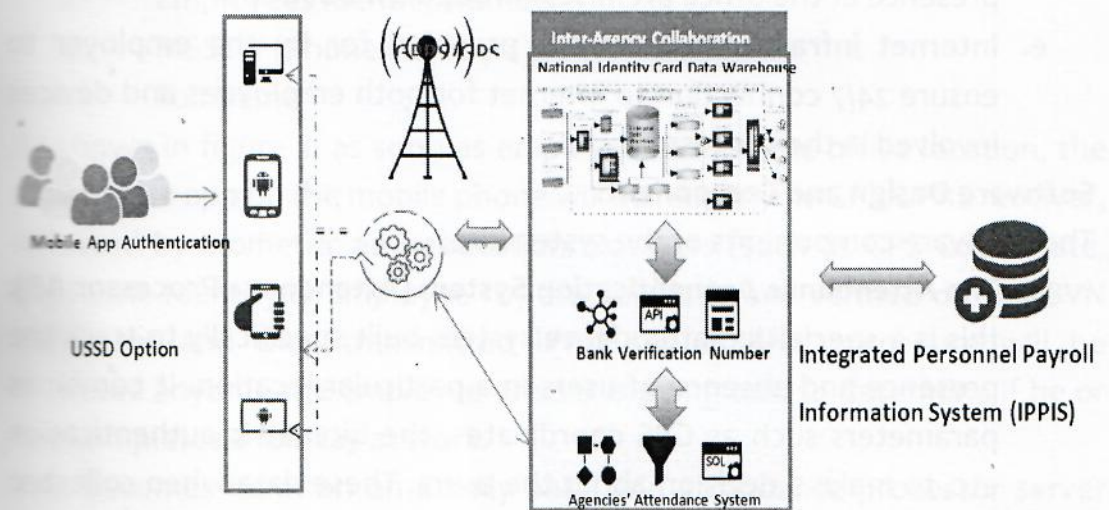


Figure 1. Inter Agency Collaboration and Exchange of Data

Hardware Design and Component

The hardware component of the system are;

- a. **The local server at the ministries' office location (Attendance Processor):** this server houses the application for authentication of Employees' attendance system. With the help of GPS/GPRS devices, it captures the identity of the users as soon as they enter the designated office area using their Biometric features, geo-location of the offices (which will be initially geo-fenced).
- b. **The GPRS/GPS Receiver System:** this hardware is positioned at offices premises. It is pre-configured to geo-fence premises of the office thereby making it easy to capture each users via their device as soon as they enter the location.

- c. **Biometric identity authentication system:** this is a biometric reader that authenticate the users biometric feature, send to National Identity Database / Bank Verification Number for confirmation via an API or web-services
- d. **Uses' Mobile Phones:** each users are expected to have their respective mobile phone which can be used to authenticate their presence at the office premises through a mobile app.
- e. **Internet infrastructure:** this is provided for by the employer to ensure 24/7 connection to internet for both employees and devices involved in the process.

Software Design and Components

The software components of the system are;

- a. **The Attendance Authentication System (Attendance Processor AP):** this is a specialized attendance system built specifically to track the presence and absence of users in a particular location. It combines parameters such as GPS coordinates, the biometric authentication etc. to make a decision about the users. These data when collected are transmitted to other applications for effective decision-making.
- b. **Mobile App and USSD Code for attendance system:** this is an app installed on the smart phone for the purpose of registering at attendance of users at the office premises
- c. **Integrated Personnel Payroll Information System Application (IPPIS):** this is an existing ERP application system, which centrally manages and processes salaries of the employees at the end of every month. Attendance parameters are transmitted to this application for accurate wages and salary calculation.
- d. **National Identity Database Server:** this is an existing infrastructure where the national identities of employees / citizens are stored.
- e. **Bank Verification Number (BVN):** this facility is being managed by the Central Bank of Nigeria, for the purpose of tracking all transactions to and fro each account numbers.

System Functionalities

The figure 2 below specifies the system functionalities base on the above explanations of the components.

Initial Enrolment

There will be confirmation of enrolment from the BVN servers using attendance processor. Some key parameters are used for such confirmation are;

- i. The Bank Verification Number
- ii. Employees Identity Number
- iii. MSSDN (Phone Numbers)
- iv. Full Name

As shown in figure 2, as soon as employees enters the office location, the attendance app on the mobile phone will be read by the GPS/GPRS receiver, followed by biometric authentication. Datasets (such as GPS Coordinate, Biometric Identity & Employee ID) are collected and verified on the BVN databases and then transmitted IPPIS server. This procedure will be repeated anytime the employee or user is going out, to determine if he or she completes a full day at work.

This becomes iteration on a daily basis and attendance processor server keeps these records till month ending. At the end of the month, all the records are shared with the IPPIS Server to compute appropriate remuneration of each of the employees.

The flow in figure 3 represents the mode of operation and further explains details of how information is being collected, processed and shared before transmission for further salary processing.

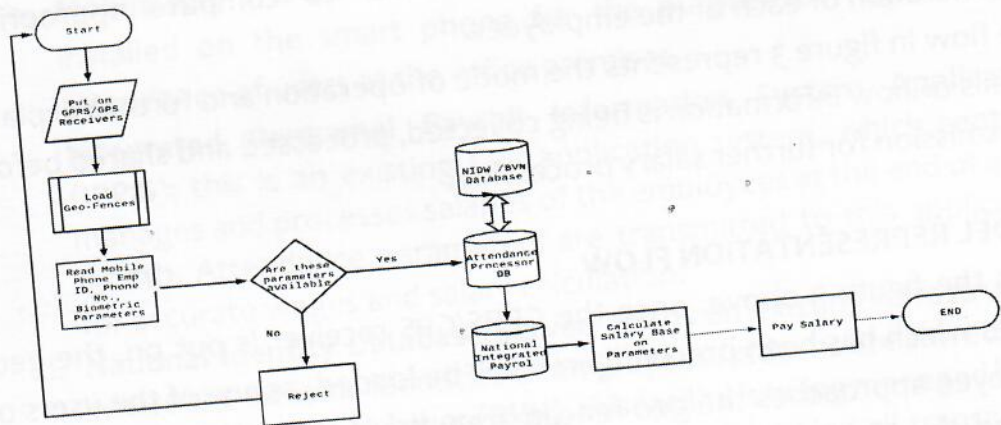
MODEL REPRESENTATION FLOW

From the figure 3 above, once the GPRS/GPS receiver is put on, the geo-fences which has been preconfigured will be loaded, as any of the users or employee approaches the geo-fenced area, the mobile phone identity will be read, the GPS coordinate will be captured and the user then move to the biometric finger print device for scanning. Biometric parameters to will also be captured here, the coordinate earlier captured will thus be combined and push to attendance processor system. The attendance processor will push these parameters to national identity data warehouse and national bank verification database for further verification and confirmation. Once it is

confirmed, the parameters will be passed to the national integrated payroll application for further processing of the salary based on the attendance parameter received. But if the parameters captured are not in existence, the system will reject it and returned to start again.

BENEFITS OF THE MODEL

- i. Employees with multiple account numbers in government agencies could be easily identified and isolated for queries;
- ii. If perchance a double payment is authorized to employee's account, it can be easily traced and located;
- iii. Multiple payment fraud and identity forgeries will be totally controlled, owing to the inability to use multiple accounts for salary purposes;
- iv. It will strengthen the ability of law enforcement agencies in the investigation of financial fraud and identity crimes;
- v. It will enabled government agencies to authenticate staff against payrolls, thereby exposing ghost workers, with consequential savings in staff costs;



Conclusion

Curtailing the fraud in both public and private establishments become pertinent. A lot of data supposed to be captured by the department in charge of salary preparation which should be compared with their

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registered biometric with NID and BVN databases. This research proposes a holistic model and a flowchart that are big data oriented and would help to correct the abnormalities in both private and public establishment. The research will in future focus on the development and validation of the proposed model.

References

- Chin, S., Kim, I., & Choi, C. H. (2017). What Authentication Technology Should Be Chosen for Construction Manpower Management? *Procedia Engineering*, 196(June), 309–314. <https://doi.org/10.1016/j.proeng.2017.07.204>
- Khan, A., Patil, A., Shah, V., & Kambli, M. (2015). Attendance Monitoring System Using ZigBee and RFID, (2), 22–25.
- Nagothu, S. K., Kumar, O. P., & Anitha, G. (2016). GPS Aided Autonomous Monitoring and Attendance System. *Procedia Computer Science*, 87, 99–104. <https://doi.org/10.1016/j.procs.2016.05.133>
- Nugroho, M. A., & Andryzal Fajar, M. (2017). Effects of Technology Readiness Towards Acceptance of Mandatory Web-Based Attendance System. *Procedia Computer Science*, 124, 319–328. <https://doi.org/10.1016/j.procs.2017.12.161>
- Obara, L. C., Nangih, E., & Agba, J. N. (2017). Accounting Systems and Payroll Fraud in the Public Sector: A Survey of Selected Ministries and Parastatals in Rivers State, Nigeria. *Journal of Accounting and Financial Management*, 3(2), 10–24. Retrieved from [https://www.iiardpub.org/get/JAFM/VOL. 3 NO. 2 2017/ACCOUNTING SYSTEMS.pdf](https://www.iiardpub.org/get/JAFM/VOL.3%20NO.2%202017/ACCOUNTING%20SYSTEMS.pdf)
- Pathak, P., Khairnar, D. ., Paratnale, M. ., Yadhav, P. ., & Wadgaonkar, P. . (2016). Student Attendance Monitoring System Via Face Detection and Recognition System. *International Journal of Science Technology & Engineering*, 2(11), 625–630.
- Report, F. S. (2016). Financial Stability, (June).
- Sultana, S., Enayet, A., & Mouri, I. J. (2015). A Smart, Location Based Time and Attendance Tracking System using Android Application.

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References

- Chin, S., Kim, I., & Choi, C. H. (2017). What Authentication Technology Should Be Chosen for Construction Manpower Management? *Procedia Engineering*, 196(June), 309–314. <https://doi.org/10.1016/j.proeng.2017.07.204>
- Khan, A., Patil, A., Shah, V., & Kambli, M. (2015). Attendance Monitoring System Using ZigBee and RFID, (2), 22–25.
- Nagothu, S. K., Kumar, O. P., & Anitha, G. (2016). GPS Aided Autonomous Monitoring and Attendance System. *Procedia Computer Science*, 87, 99–104. <https://doi.org/10.1016/j.procs.2016.05.133>
- Nugroho, M. A., & Andryzal Fajar, M. (2017). Effects of Technology Readiness Towards Acceptance of Mandatory Web-Based Attendance System. *Procedia Computer Science*, 124, 319–328. <https://doi.org/10.1016/j.procs.2017.12.161>
- Obara, L. C., Nangih, E., & Agba, J. N. (2017). Accounting Systems and Payroll Fraud in the Public Sector: A Survey of Selected Ministries and Parastatals in Rivers State, Nigeria. *Journal of Accounting and Financial Management*, 3(2), 10–24. Retrieved from [https://www.iiardpub.org/get/JAFM/VOL. 3 NO. 2 2017/ACCOUNTING SYSTEMS.pdf](https://www.iiardpub.org/get/JAFM/VOL.3%20NO.2%202017/ACCOUNTING%20SYSTEMS.pdf)
- Pathak, P., Khairnar, D. ., Paratnale, M. ., Yadhav, P. ., & Wadgaonkar, P. . (2016). Student Attendance Monitoring System Via Face Detection and Recognition System. *International Journal of Science Technology & Engineering*, 2(11), 625–630.
- Report, F. S. (2016). Financial Stability, (June).
- Sultana, S., Enayet, A., & Mouri, I. J.-(2015). A Smart, Location Based Time and Attendance Tracking System using Android Application.

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Technology*, 5(1), 01–05. <https://doi.org/10.5121/ijcseit.2015.5101>
Central Bank of Nigeria Annual Report—2016

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Abstract: This paper discusses the impact of information technology on the banking industry in Nigeria. It examines the challenges and opportunities faced by banks in adopting digital technologies and the role of the Central Bank of Nigeria in regulating the industry. The paper also discusses the impact of the Central Bank of Nigeria's annual report on the industry and the role of the industry in the economy.

Keywords: Information Technology, Banking Industry, Central Bank of Nigeria, Digital Transformation, Regulatory Framework.

1. Introduction

The banking industry in Nigeria has experienced significant changes in recent years due to the rapid adoption of information technology. This has led to the emergence of digital banks and the transformation of traditional banks into digital-first institutions. The Central Bank of Nigeria (CBN) has played a crucial role in regulating the industry and ensuring the stability of the financial system. This paper discusses the impact of information technology on the banking industry in Nigeria and the role of the CBN in regulating the industry.

2. Challenges and Opportunities

The banking industry in Nigeria faces several challenges in adopting digital technologies, including a lack of infrastructure, a low level of digital literacy, and a regulatory framework that is not conducive to digital innovation. However, there are also significant opportunities for the industry to improve its efficiency and reduce costs by adopting digital technologies. The CBN has identified these challenges and opportunities and has implemented a regulatory framework that is designed to support digital innovation while ensuring the stability of the financial system.

3. The Role of the Central Bank of Nigeria

The CBN has played a crucial role in regulating the banking industry in Nigeria. It has implemented a regulatory framework that is designed to support digital innovation while ensuring the stability of the financial system. The CBN has also implemented a number of measures to promote digital innovation, including the establishment of a digital innovation hub and the implementation of a regulatory sandbox. These measures have helped to create a more conducive environment for digital innovation in the banking industry.

4. Impact of the Central Bank of Nigeria's Annual Report

The CBN's annual report provides a comprehensive overview of the industry and the role of the CBN in regulating the industry. It also provides a number of key findings and recommendations that are designed to improve the industry and the role of the CBN. The annual report is an important document for the industry and the public alike.

5. Conclusion

The banking industry in Nigeria is undergoing a significant transformation due to the rapid adoption of information technology. The CBN has played a crucial role in regulating the industry and ensuring the stability of the financial system. The industry has a number of challenges and opportunities in adopting digital technologies, and the CBN has implemented a regulatory framework that is designed to support digital innovation while ensuring the stability of the financial system. The annual report is an important document for the industry and the public alike.

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