Service Oriented Biometric Model Suitable for Securing ATM System

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Abstract— There have been a lot of increased transaction frauds on Automatic Teller Machine (ATM) in the globe in general and Nigeria in particular. This is due to the fact that the traditional security mechanism currently used by these systems (ATM), can be compromised. As a result, many bank customers have lost a lot of money to financial frauds perpetuated by fraudsters. These have posed serious challenges to the smooth operations of banks and their service delivery in Nigeria. This paper presents a service oriented model of securing ATM in Nigeria using the Bank Verification Number (BVN). It is a known fact that biometric is an important security mechanism that has recorded a lot of success in securing system/application used in different sectors of the economy. Hence, this mechanism is used in this paper to present the service oriented model that will help to guarantee adequate security in ATM operations in Nigeria. The service oriented model presented in this paper has an end-transaction Biometric-PIN otherwise called the B-PIN to validate every transaction. The Model was integrated with biometric application that establishes a state relationship with the BVN emulator. The end transaction B-PIN act as the validator for any transaction to be done by the ATM. This thereby guaranteed better, secure and accurate transaction within the banking services through the use of ATM.

Index Terms— Biometric, Service Oriented, Automatic Teller Machine, Bank Verification Number

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1 INTRODUCTION

Biometric is the use of human physiological features such as fingerprint in identifying human or person for a particular operation. Implementing biometric techniques as a means of authenticating any transaction shows that the authentic owner of such transaction must be present at the time of the transaction [1]. Biometric is one of the sure way employ in identifying people by a system equipped with such capabilities. [2] noted that, biometric is a new way to verify authenticity in many transactions. This gave birth to the establishment of biometric industry in early 1990s. [3] further raised the hope of using and deploying this mechanism in securing transaction in different sector of the economy. In order to enhance system and transaction security, biometric system is needed. Meanwhile the traditional method of securing sensitive or transaction information is the use of personal identification number (PIN), password and usernames. Since the invention and use of ATM, these traditional security system has been adopted on its card but has been violated by identity theft leading to loss of money by authentic owner of account data. The fraud within ATM transaction is a global threat and its growth is exponential in nature. [4] noted that security needs is a great concern if banking services and ATM services must attain its full potentials. It was noted by [5] that the traditional security methods such as PIN are no longer reliable to satisfy the security requirements of electronic transactions

The implementation of biometric mechanism on ATM provides a better enhancement on its security over the currently used traditional method. Meanwhile, as a result of lack of centralized database to manage citizen data within Nigeria, the banking industry establish a mechanism called "know your customer" (KYC) to identify their customers. In the light of the above, a centralized biometric identification system was launched by central bank of Nigeria to enable the banking sectors, collate customers' biometric data for optimal identification of bank's customers. To implement this system, a Nigerian Company and German Company established a technical agreement/partnership in order to develop a BVN single control database that resides at the Nigeria Interbank Settlement System (NIBSS). This kind of system carries out biometric (fingerprint and facial) data capturing and processing of bank customers to uniquely identify them during any bank transaction. With the successful completion of the BVN project and its use in Nigerian banks, it is obvious that it can easily be used in securing the ATM, since most transaction carry out today are done through the ATM. [6] maintained that fingerprint implementation is easier in ATM and therefore serve a better alternative in securing the system from advance security challenges. Hence, the service oriented model present in this paper, adopts an end-transaction B-PIN to validate services of the ATM. Consequently, the debate on the best and appropriate biometric to adopt in securing system has been witnessed within the researches of numerous researcher. Hence, [7] suggested a multimodal biometric system. [3] investigated all possible biometric techniques suitable for securing system in the laboratory and shows that the approaches follows a similar steps of processes for all biometric technologies. Since fingerprint is widely used and a lot of success has been recorded from its uses in different sectors, it is obvious that it has some preferential advantages over other bi-

ometric features like Iris, face and vain [11]. A comparative analysis of the use and successes of different biometric mechanism in securing system was carried out and shown by [6]

Material and Method

In developing any software, we began by selecting an appropriate software development methodology (SDM). There exists a lot of software development methodology in practice but anyone can be suitable for a particular development based on the features of the software to be developed. Here, the Agile Software development approach is most appropriate for implementing the model for ATM security as given in Figure 1. The software development tools used were basically software and hardware tools. These tools and their roles are highlighted below.

- Hardware tools: The tools under this category are the computers and peripherals. Specifically, HP notebook with 180GB hard disk, 2.0GB RAM was used to develop the system prototype. It also serves as the host computer for the software tools used.
- Software tools: The software tools used are
  a. Operating System: Microsoft Window XP Professional Version 2002 Service Pack 2 which works excellently with other software tools used in this development. This system enables the application and other software tools used to interact with the machine and derive its computation power.
  b. Development platform: Microisoft.NET Platform was used as the development Platform for this system. The choice of this platform is because as it stands today, this platform remains the most dominant application development platform for enterprise application ([8]) [9] [10])
  c. Language: In the implementation, the visual C# programming language was used to code the logic of the application. The structured query language (SQL) was adopted to interact with the database. The unified modeling language was sued for the system design.
  d. Integrated Development Environment (IDE): There are a lot of IDEs that support different programming language. However, for this project, visual studio compiler was used on the ground of familiarity, though it

is not in any way powerful than other existing platform. Normally, IDE enable programming and system development to be easy and interesting in achieving set objectives
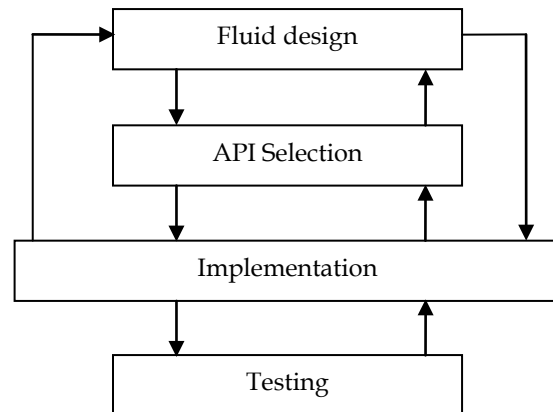

Figure 1 Agile Implementation Model

Similarly, Fig 2 presents the Use Case diagram of the service equivalent of the ATM system. This enables us to get the general services of the ATM
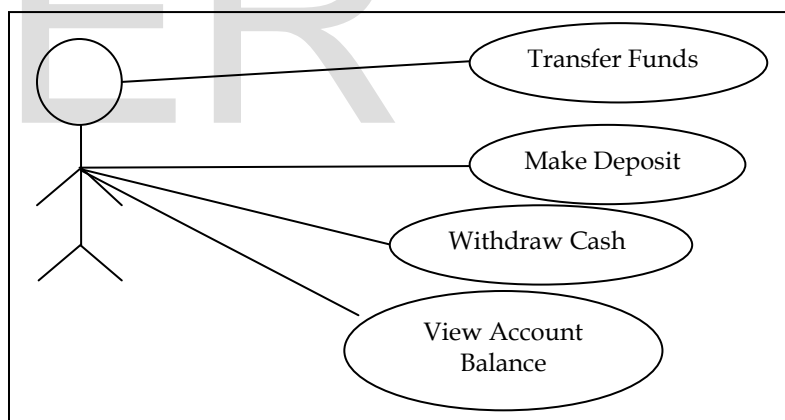

Figure 2: Use Case Diagram of ATM System

Figure 3 below shows the service oriented end-transaction biometric model use in securing ATM transaction. It presents better security approach to ATM system. Similarly, figure 4 shows the system activity diagram for better understanding and implementation of the system.
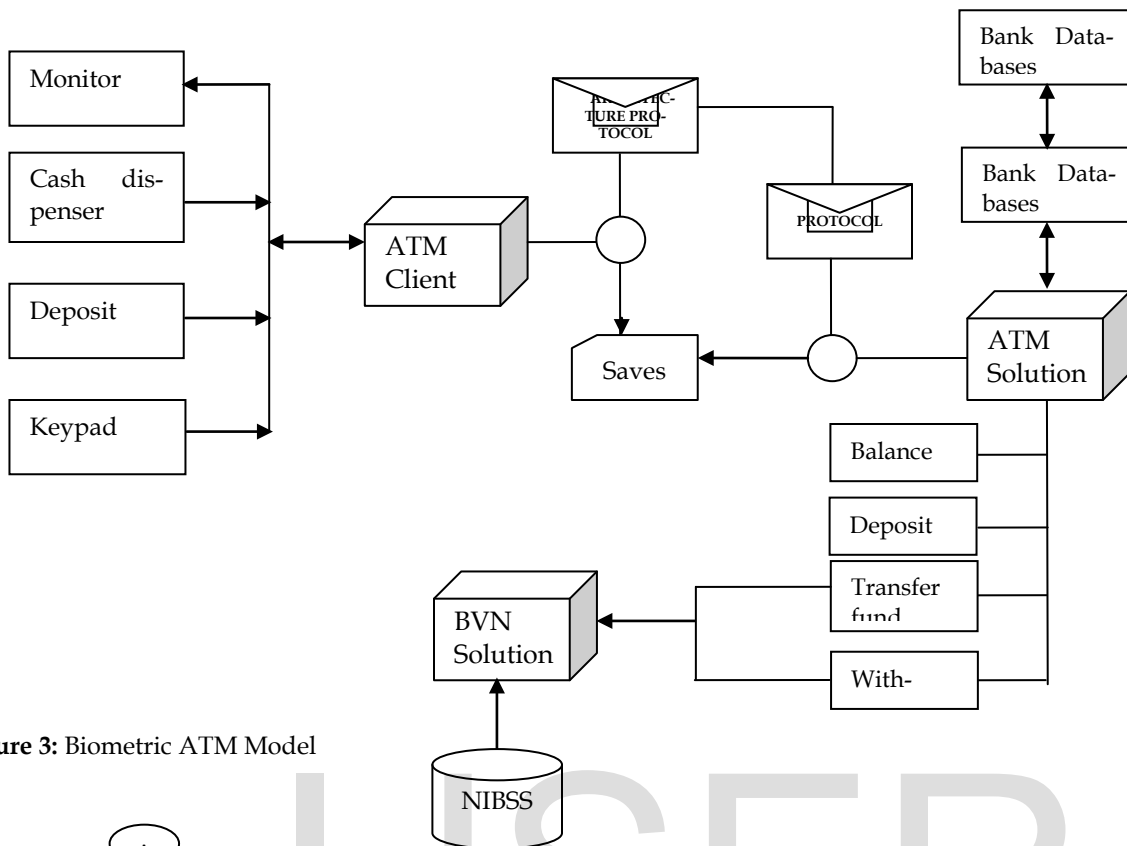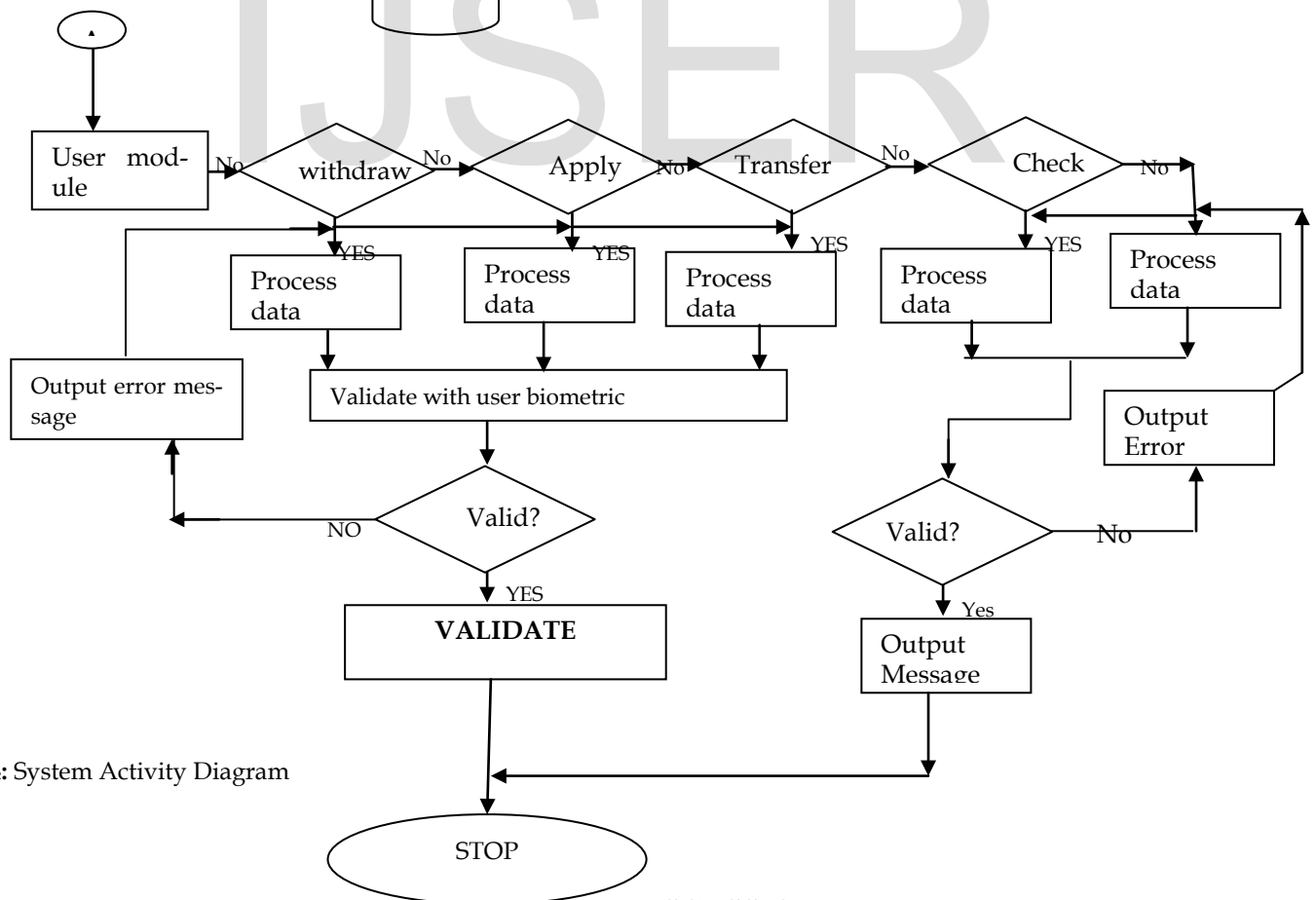
Figure 3: Biometric ATM Model

Figure 4: System Activity Diagram

DISCUSSION

The models presented above will guarantee better security of the ATM services when fully deployed. The models perform their transactions by authenticating and validating every task at the end of the transaction using the biometric mechanism. The uniqueness of this model is by using the biometric mechanism as the end-transaction security tool (B-PIN) for each service performed. All the transactions within this model cannot be completed without validating with the biometric mechanism. The validation is done at the end of each service within the model.

CONCLUSION

Guaranteed solutions to the current transaction security challenges facing ATM services in Nigeria and other countries in general can be made possible with the full implementation and deployment of the kind of software models presented in this paper in real life situation. With this development, there is a renewed hope that fraud within the operation/processes of ATM services can be ameliorated. Curbing the fraud will enhance the reliability of the use of ATM by the bank customers. Biometric is a highly secured mechanism for validation of transaction, hence, its adoption in ATM will guarantee fraud-free end-transaction within the bank sectors.

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