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DEVELOPMENT OF A FRAUD PREVENTION PLATFORM FOR ONLINE BANKING

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Abstract

Over the years electronic banking has improved the efficiency of banking sector. This has drastically reduced the resources and time spent in carrying out financial transaction in this sector. However, this development still comes with its own challenges that if not tackled will destroy the whole essence of the technological advancement in this sector. One of such major challenges is using this technology for fraud as a result of the use of PIN for authenticating transaction. If we must make online transaction to be fully dependable and reliable, better method of authenticating transaction must be used and encouraged. This paper provided a better platform for carrying out banking (online) transaction using fingerprint to authenticate such transaction. The platform was developed using Object Oriented Analysis and Design Methodology. Microsoft Visual Studio was used as the Integrated Development Environment (IDE) for the application interface and Microsoft SQL Server was used as the backend. Visual C#.NET programming language was used to program the application control mechanism and ASP.NET was used to develop the application interfaces. The implementation of the software and the testing shows that the platform could secure the banking system using fingerprint biometric.

Keyword: Fingerprint, Banking Transaction, Biometric, Authentication, Fraud Prevention.

Introduction:

Over the years, there has been a lot of advancement in information processing. Since computers form the major tools used in processing data and manipulating information in many sector (e.g. banking sector), there is need to have adequate security for these computers. Meanwhile Michael & Herbat (2005), define computer security as the need to secure physical location, hardware and computer software from outside threats. There exist multiple layers of computer security namely- physical security, personal security, operational security, communication security, network security and information security. All these layers of computer security have received series of researchers' attentions since the information age and a lot of improvements have been recorded on them. It is true that computer software are used to process data and store customers account details in the banking sectors. These computers need vigorous software security because any little compromise by the system, can lead to loss of large amount of money which can create problem for the banks and their customers. Banks need more intrusive security procedure in their software than many other applications (Sommerville, 2011). It is important to note that the banking sectors have been using account number, account name and customers signature for account verification and authentication. These methods of verification and authentication of bank customers has make banking operation to be very easy for the literate and highly difficult for the illiterate and have so many challenges like; poor customer data security, allowing third party transaction, and enabling transaction falsification. This is true because, people can easily copy someone account number, forge his/her signature to commit fraud on that persons account. Also many people who are not familiar with the concept of Personal Identification Number (PIN) and account number are unlikely to memorize it (Omogbhemhe & Momodu, 2015), this is mainly applicable to the illiterate customers. In the same vein, alots have been recorded about how

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many people (bankers) entrusted with the banking solutions used it to commit fraud, and the software will be unable to prevent it. (Paul 2016, Adebayo 2016). With this in mind, the banking sector have be making more efforts in introducing biometrics as a means of customers account verification and authentication. In order to improve security measures in many data-driven applications, authentication like biometric plays important roles (Rashmi, 2015). It was pointed out that "Biometrics provide very powerful tools for the problems requiring positive identification and provide enabling technology that have potential to make our society safer, reduce fraud and lead to user convenience" (Jain, Prabhakar, Hong, & Pankanti, 2000; Gunajit & Pranav (2010). Compared to other security measures, application of biometric technology provide a better method to curb online fraud, since it uses certain physical and behavioral traits that are distinctive to an individual to identify and verify the person through authentication. (Shouvik , Anamitra, Roy, Ghos & Nilanjan, 2012; Okediran, 2014). According to (Selina & Oruh, 2012), "Institutions offering Internet-based products and services to their customers should use effective methods to authenticate the identity of customers using those products and services". Coventry, DeAngeli, & Johnson, (2003); Amtul (2011) affirmed that fingerprint technology in particular, can provide a much more accurate and reliable user authentication method. It can help to reduce fraudulent practices in payment transaction in the banking sector. Biometric is the utilization of physiological characteristics to differentiate an individual. It utilizes biological characteristics or behavioral features to recognize an individual. It is a new way to verify authenticity (Rupinder & Narinder, 2014). The reason biometric is gaining more attention in the banking sectors is because, its uses encourages many (both literate and illiterate) customers in banking services.

Biometric fingerprint are unique to every human. They are generations of numerous ridges and valleys on the surface of human figure. A fingerprint is the flows of ridges patterns in tip of the human finger. Among all biometric traits, fingerprint has one of the highest levels of reliability (Conventry *et.al* 2003, Keerthi *et.al* 2014). In the rapid growth of information security, fingerprints are highly used to secure information system and are highly reliable. These make many researchers to be agitating for the full use of this technology in securing information in different sectors. Fingerprint has so many application like banking security, Automated Teller Machine (ATM) security, card transaction, physical access control, voting, identification of criminals as recorded by (Vidya & Aswathy, 2014). Similarly, Adeoye (2014) shows how a fingerprint can be used to control examination screening. The possibilities of using fingerprint to perform verification and authentication is determined by the pattern of ridges and furrows as well as the minutes points. Catalin, Vasile-Gheorghiţa, & Valeriu, (2015) maintained that the idea of using biometric for bank user authentication is a new idea that needed more attention. With the success of fingerprint biometric system in many fields, many researchers are of the opinion of using this kind of technology in our banking services in Nigeria. This paper has presented a platform that can be use to secure our online banking transactions using fingerprint.

Methodology

System methodologies are procedural steps embarked upon to design a system. This paper adopted the Object Oriented Methodology. This helps in gathering adequate information on the requirements for the development of this software. Cascading Style Sheet (CSS) was used to style the application frontend and C# was used as the control mechanism of the frontend. The administrators and back end was developed with ASP.NET while SQL Server provided the database. The server-side scripting was executed using Ado.Net in a framework provided by Visual Studio- a friendly environment for Object Oriented Programming. The SQL database was used as the relational database management system for managing the banking customer's records including the fingerprint. Figure 1 shows the proposed system architecture and figure 2 shows its use-case diagram.

In this proposed system, when a customer wants to perform a transaction (withdrawal) in his/her account, he/she will fill all the necessary information like the bank name, account number and amount. Immediately the customer click on pay, the platform will trigger the fingerprint biometric module to perform authentication of such transaction. When

the fingerprint captured during the transaction agrees with the account holder fingerprint, the system will perform the transaction; otherwise the transaction will be declined. With this mechanism, nobody can use PIN for any transaction, so it is safer and better.

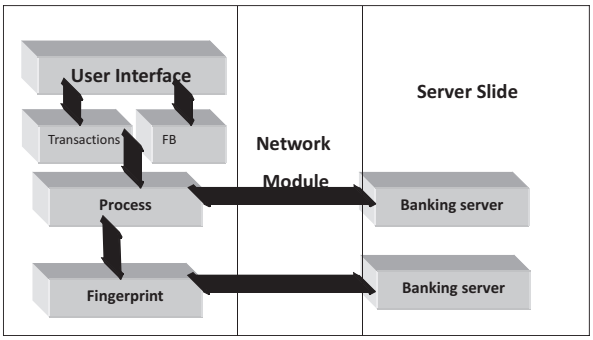


Figure 1: System Architecture

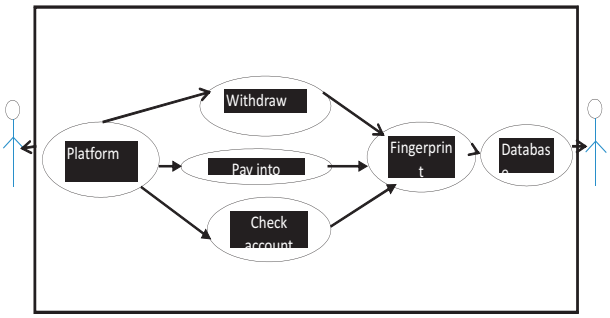


Figure 2: System Use-Case Diagram

Software Development Tools

The following tools were used for the development of the application.

i Microsoft Visual Studio: Visual Studio Compiler is one of the most important tools needed for the development of this application. It is the client interface development tool that enables us to develop applications (web, windows, console etc.) by using C# programming language and other related tools. It serves as the interface development environment (IDE) for the application frontend. It is used in developing the application interfaces and the codes that work within them. It has some built-in graphical user interface needed to develop a full application.

ii. SQL Server: In developing the application in this research, SQL SERVER is needed to be installed in the designing machine. This system allows the creation of the application database and tables. The system serves as the backend (database) of the application. It uses structure query language (SQL) syntax for scripting database queries. It is commonly used for any data driven application

Database Design

The tables below show the design layout of the database tables that exist in this application.

1. Customer Account Registration Table Design Layout

Field Name	Data Type	Size	Description
ID	INT		Database table unique ID
AccountNo	char	10	Account Number
Customer Name	varchar	20	Customer surname
Sex	varchar	6	Customer sex
Phone	char	26	Customer phone number
Home Address	varchar	70	Customers Address
Email	char	25	Customer's Email
Date of birth	Datetime		None
Amount	char	15	Account opening amount
AccountType	varchar	20	Type of Account
OfficeAddress	char	60	Customer Office Address
FingerPrint	Image	null	Customer Fingerprint Image

2. Withdrawal Table Design Layout

Field Name	DataType	Size	Description
PIN	INT		Database table unique ID
AccountNo	char	10	Customer Account
CurrentBalance	char	15	Current account balance
Account Name	char	50	Account Name
Date	datetime	none	Date
AmountWithdrawn	char	15	Amount
TransactionRefCode	char	25	Transactionreference code
FingerPrint	Image	null	Customer Fingerprint

3. General Ledger database

Field Name	DataType	Size	Description
PIN	INT		Database table unique ID
Credit	char	10	The credit
Balance	char	10	The balance
Debit	char	10	The debit
Date	datetime	none	Date
Account No	char	10	accountNo
Transaction Date	Datetime	None	Date
ValueDate	Datetime	None	Date
PostDate	Datetime	None	Date
FingerPrint	Image	null	Customer Fingerprint

4. Customer Address Table

Field Name	DataType	Size	Description
PIN	INT		Database table unique ID
Date	datetime	none	Date
Account No	char	10	accountNo
Customer Address	char	100	Customers Address
FingerPrint	Image	null	Customer Fingerprint

Application Algorithm (Pseudocodes)

Algorithm is the sequence of steps that must be taken in order to solve a particular problem that is already defined. Algorithms create flexibility in solving a problem already well defined by the existing manual system; the algorithm for the system is implemented using pseudocodes as shown below:

```
/* Pseudocode to register customer*/
INPUT: F: Fingerprint
        N: Name
        CF: Face
       ACC: Account
       ACCT: Account Type
       AD: Address
       AM: Amount
       DB: Date
       EM: Email
       SX: Sex
        NF: Number of Fields
For (int Ninput=1; Ninput<NF;
Ninput=Ninput+1)
{
Get Entry()
}
IF      Exist (Report)

ELSE
       {
       Create ACC
       }
OUTPUT: ACC
          : F
          : CF
          : N
END

/* Withdrawal Update Pseudocodes*/

INPUT: N: Name
          F: Fingerprint
       ACC: Account
       ACCT: Account Type
       AM: Amount
       DB: Date
       NF: Number of Fields
For (int Ninput=1; Ninput<NF;
Ninput=Ninput+1)
{
Get Update()
}
IF (Corresponded with FingerPrint)
       {
       Successful Update
       }
ELSE
       {
       Report Error
       }
OUTPUT: Successful
          : Not Successful
       END
```

Programming Languages Used

The programming languages used for the implementation of this application are as follows:

i. **C-Sharp (C#) Programming Language: -** This is a programming language suitable for all forms of computer applications numerical, graphical, scientific, database, and commercial programming. It was released by Microsoft in about twelve years ago. It is an object oriented programming language. It is quite flexible and effective in database manipulation, accessing and retrieval of information. It is an event driven language, program developed with it are highly interactive in nature as they respond to event like button clicks.

ii. **SQL: -** SQL is an acronym for structure query language. It is a database language which helps to manipulate database data. It can also be used to write database script that will generate database tables and their relations.

iii. **ADO.NET:-** This is the language used to connect the application interface to the corresponding database.

iv. **CSS:-** This is used to generate the application colours and a place holders for all the controls. It is also used to style the application.

System Requirements

For effective implementation of computer application, certain requirements are to be fulfilled. The system requirements are considered on both the hardware and software basis, therefore, the consideration is given to both the hardware and the software requirements of the developed application. Web browsers such as Internet explorer, Safari, Google Chrome, Firefox, Opera are needed for the smooth execution of this system. The system (mobile device) to be used in executing this software must have an inbuilt fingerprint scanner with a defined SDK. Visual Studio must be deployed in the server side of the system for seamless execution. Internet Information Services (IIS) must also be used for this application.

Results/Discussions

After the successful development of this application, the application was tested by registering account information (fingerprint) of customers with amount in the account and we updated this amount in the accounts using the software to ascertain the

extent of the software meeting its Fingerprint authentication security objective. The generated results were promising as we can see in the figures below.

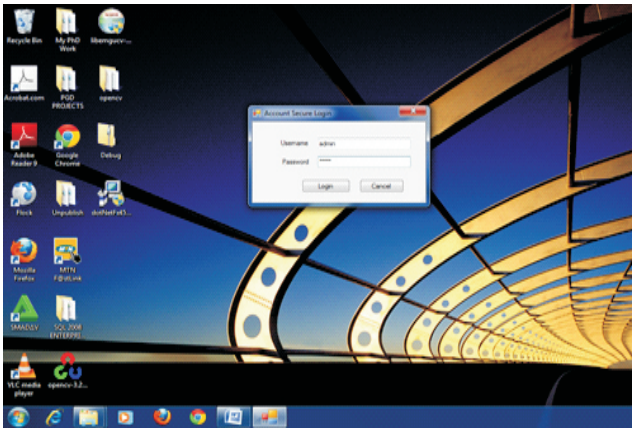


Figure 3: Login Screen

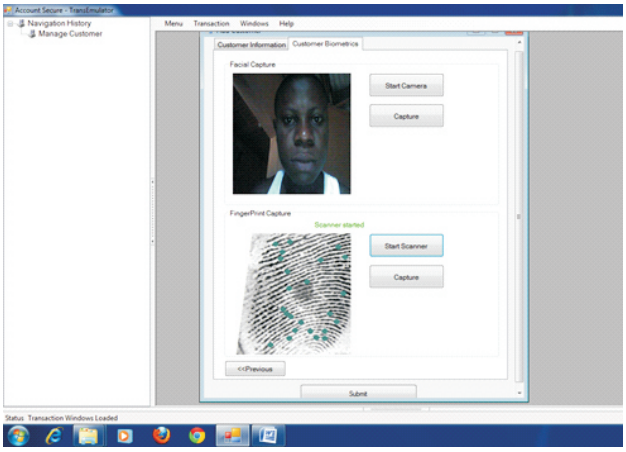


Figure 4: Register Fingerprint and matching passport

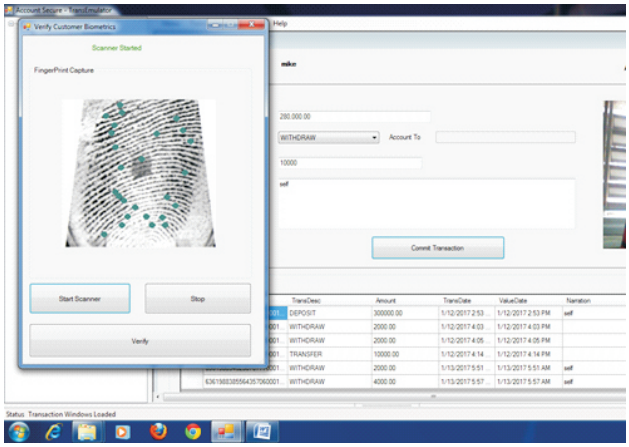


Figure 5: Customer Authentication/Validation of Transaction using Fingerprint

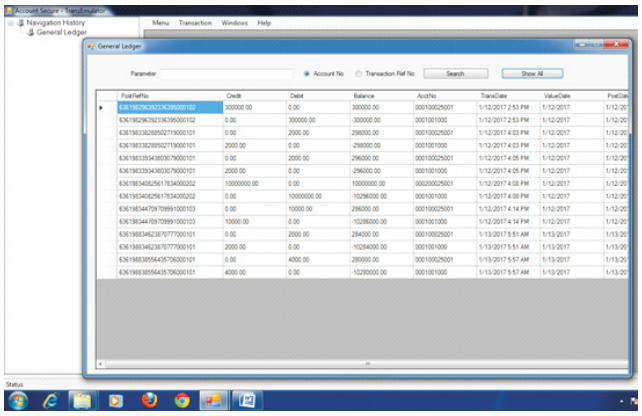


Figure 6: Customer Successful Transaction Database Screen

Conclusion

Solutions to the current insecure transaction platform facing banking industries today may not be achieved, if the solution are not software based solution for preventing bank fraud rather than human security solution currently in place in this sector and existing banking software security model provided by so many researchers that is geared towards fraud detection and not fraud prevention. In this paper a fraud prevention platform is developed for online banking transactions. This paper provided a fingerprint biometric platform that is suitable for achieving software based security solutions in the banking sector that is geared towards fraud prevention. The platform provided in this paper used fingerprint in securing banking transaction. In this platform, before any transaction is carried out, it must be validated with the customer fingerprint instead of the PIN that is currently in used in most banking transaction platforms. The fingerprint is used to authenticate any withdraw or transfer update that is to be performed in the customer's account. The platform provided in this paper will guarantee high data security in banking transaction in a large scale.

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