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An Application of Biometric Security Identification for Automated Teller Machine

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ABSTRACT

This project is respectively about implementing an Automated Teller Machine (ATM) by using multimodal biometric identification system, which focuses to retina and fingerprint biometric identification. Instead of using an identification number (PINs) in accessing the ATM transaction performance, biometric identification system had been chosen for safety purpose. In developing this technology, Visual Basic software had been used for a combination of GUI system and implementation of Image Processing system purposes. Personal computer with several software for identification purposes, webcam and fingerprint scanner had been used. Successful identification will allow user to access the ATM transaction performances.

1.0 INTRODUCTION

This project is respectively about an application of biometric identification technology for an Automated Teller Machines system (ATM). Focuses to retina and fingerprint biometrics identification, and this system called multimodal biometric system.

An Automated Teller Machine (ATM) is a computerized telecommunications device that provides the customers of a financial institution with access to financial transactions in a public space without the need for a human clerk or bank teller (Liu, S., & Silverman, M.2001). Using an ATM, customers can access their bank accounts in order to make cash withdrawals (or credit card cash advances) and check their account balances as well as purchasing mobile cell phone prepaid credit.

The majority share of online shopping market consists of young people who go to college and are from 20 to 29 years old. There is increasing growth in online shopping among young consumers as over 70% of the age group purchased product or services online in 2013.It was found that old people had lukewarm response on online shopping as the frequency was lower as it was 41% from ages of 50 to 59 who bought products once in a while for the year 2015(Soobia Saeed et al, 2020). For this purpose ATM is preferred.

1.1 Objectives of the project

The objectives of this project as follows:

i. To combine a GUI system with an Automated Teller Machine (ATM) based on biometric technology.
ii. To implement the biometric technology into Automated Teller Machine system (ATM) in a way for increasing the security level.
iii. To implement an Image Processing system in biometric technology.

1.2 Scopes of Project

This project has following limitations:

i. To construct a GUI system for an Automated Teller Machine (ATM).
ii. To implement a biometric technology by using two biometric identification schemes, which are retina and fingerprint.
iii. To design a GUI system by using Visual Basic software.
iv. To develop this project by using several devices such as laptop, web camera and fingerprint scanner.

v. To implement the biometric technology for a stand-alone ATM system.

2.0 METHODOLOGY

This chapter explains the project development, which comprises of two main parts. There are, software and hardware implementation. In biometric system, it is required to combine the hardware and software system for biometric verification and identification. The purpose is for making the system enable for achieving or receiving the biometric samples from an enrollee or candidate, extract biometric featured from the sample, comparing the sample of the candidate with stored templates from individuals and also to indicate identification and verification upon the result of the previous comparison. Hence, the block diagram and the flow of this project will also be discussed in this chapter.

4.1 Flow Chart of Preparing the Project

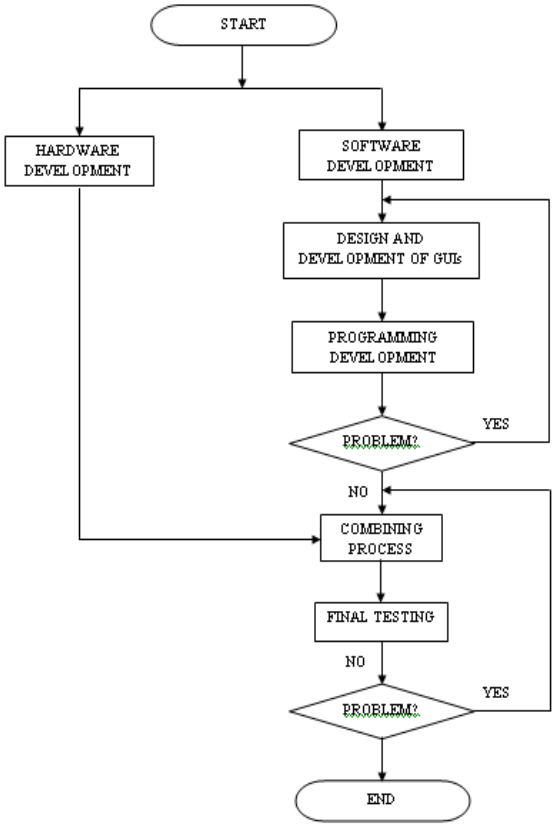

Figure 1: Flow of Project Development Process

In this early phase, this project required several activities in searching for generals and details information as well as the materials regarding to this project. It is a must and very important for searching and accumulate all related information and details in developing this project.

After all of the general information such project's title, objectives, scopes and expected result accomplished, the details information had been examined (El-Bakry et al, 2009). This stage consists of results based on the previous development which link to the project's progress. In addition, this data and facts involved in problem occurred, requirements, advantages, opportunities and recommendation from the earlier research.

4.2 Software design

Software design is the method of describing a system's architecture, subsystems, interfaces, functionalities, and data to meet specified demands. Systems design could be seen as applying system theory to the development of products. There is a considerable similarity with the systems analysis, network management and systems engineering disciplines (Shaikh, A. 2020) .

There are several software require in a way to implement this BiOS project. And there are, Microsoft Visual Basic 6.0, VeriLook 2.0 and VeriFinger 4.2.

The Microsoft Visual Basic 6.0 or the "Visual" part refers to the method used to create the graphical user interface (GUI). There are three main steps to creating an application in Visual Basic (Jain, A. K et al, 2004):

i. Create the interface
ii. Set properties
iii. Write code

VeriFinger 4.2 Software, is a compact and reliable fingerprint identification engine which intended for system integrators who need powerful fingerprint identification algorithm for their biometric security systems. VeriFinger 4.2 can be easily integrated into a customer's security system.

VeriLook 2.0, is the system for person identification using the eye retina image which been taken by a video camera (webcam). VeriLook 2.0 software, used to implement a new eye retina recognition technology which based on the method of feature set definition. VeriLook2.0 is among the easier software which can be easily integrated into an access control or identification and verification system. (Prabhakar et al, 2003)

3.0 RESULTS AND ANALYSIS

This chapter discussed about result and analysis for this project. The analysis had been taken from software development.

A. Software: Design GUI System by using Visual Basic 6.0 for Identification Part

Figure 4 shows the graphical user interface (GUI) that will open and execute the biometric software. A registered credential user will not have a problem from being recognized by biometric software. Successful fingerprint identification using VeriFinger will open and execute the next retina identification.

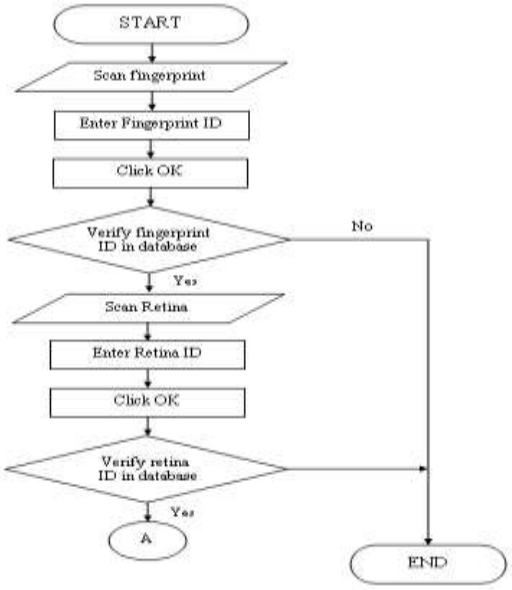

Figure 2: Flow of finger print verification

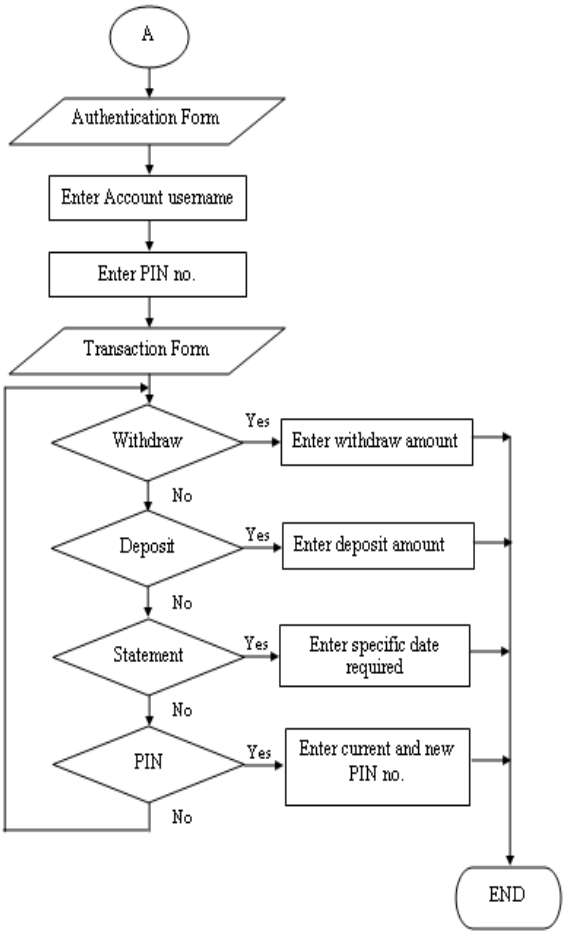

Figure 3: Flow of ATM Transaction Process

Figure 5 and Figure 6 show the successful recognition of identity using VeriFinger and VeriLook will show a record ID. After obtain the record ID that represent the user, then the users are required to insert their name into the textbox.

Figure 4: The overall windows of GUI system.

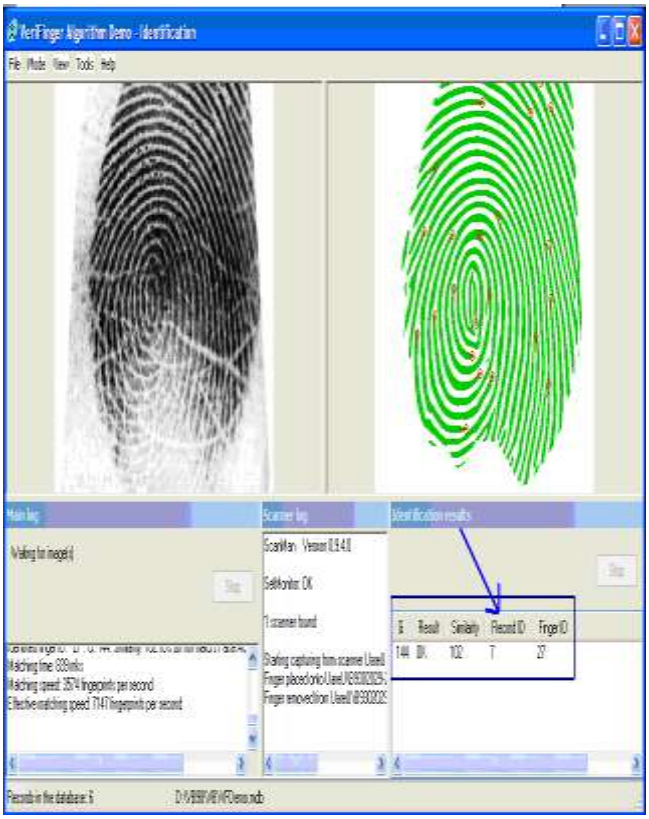

Figure 5: Fingerprint ID appeared for a successful identification.

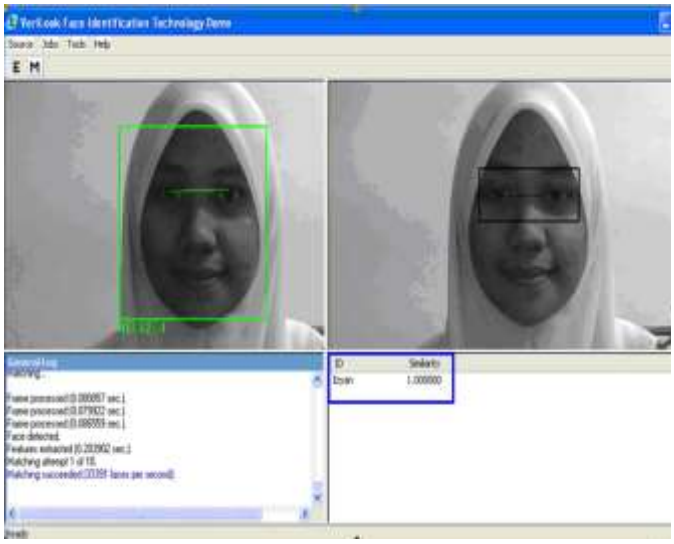

Figure 6: Retina ID appeared for a successful identification

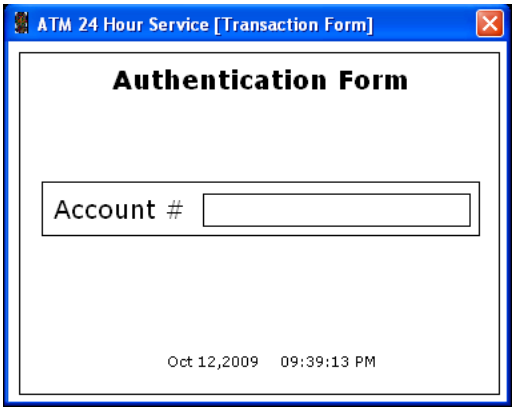

Figure 7 : ATM Transaction Part; Authentication Form

(User Insert Account No.)

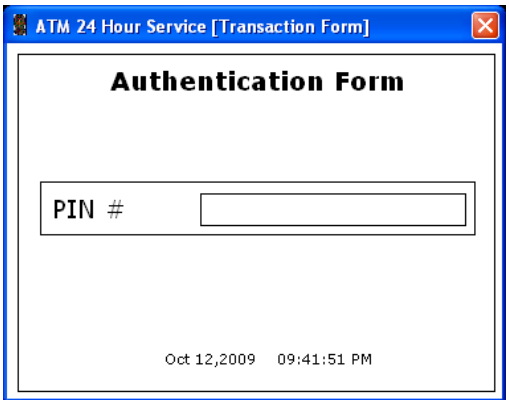

Figure8: ATM Transaction Part; Authentication Form

(User Insert PIN No.)

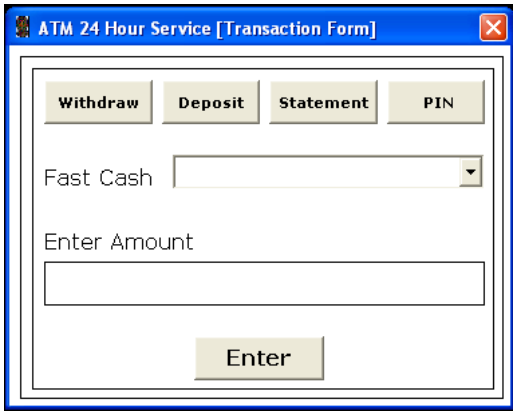

Figure 9 : ATM Transaction Form

(User Choose Transaction)

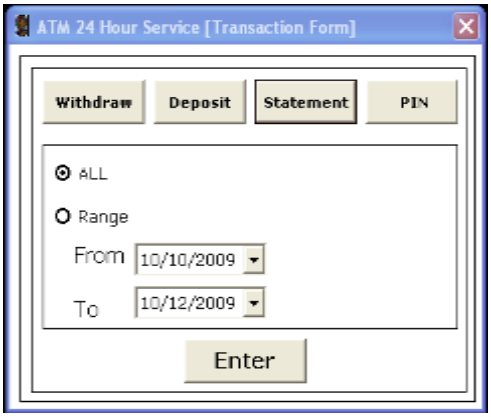

Figure 10: ATM Transaction Form

(User Choose Statement)

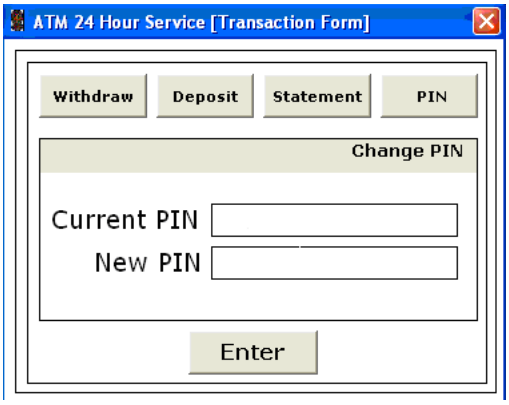

Figure 11: ATM Transaction Form

(User Choose Change PIN)

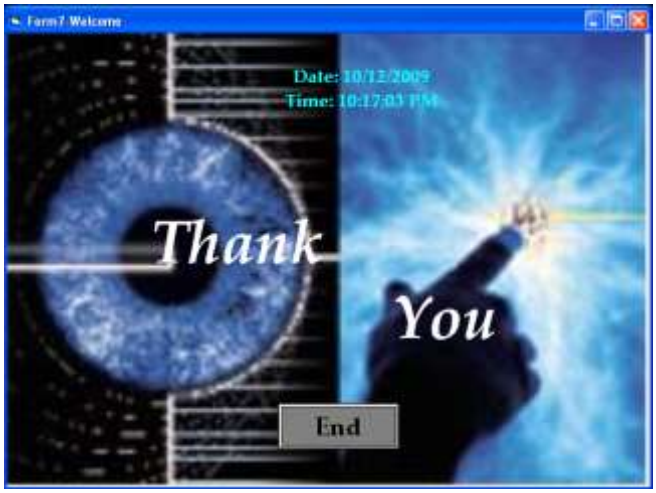

Figure 12 : Form 7 Ending Menu for Exit the BiOS Bank

B. Software: Design GUI System by using Visual Basic 6.0 for ATM Transaction Part

For the starts, by referring to the Figure 8 and below, it shows the ATM Transaction Process. Where from the Authentication Form, users required to insert their Account No. and PIN No. as shown at Figure 8 and Figure 9. After inserting required ID, system will move on to the next form which is the Transaction Form as shown in Figure 10. There are several transactions choices such as Withdraw, Deposit, Statement for printing receipt and PIN for PIN Changed as shown in Figure 11. If user wants to end the transaction, form as shown at Figure 13 will appear.

C. Analysis for Identification Part

By referring to the interface developed, it can be divided into two main parts. The first part is the Biometric Identification while second part is the ATM Transaction. By referring to the first part, it is more on identification process. To run this part successfully, user's biometrics identification ID should successfully be stored in the database where the database for Visual Basic 6.0 software is Microsoft Access 2003.

During the fingerprint enrollment task, sometimes the BOCS fingerprint scanner could not detect the fingerprint image. Therefore, it required user to repeat the enrollment task again. Where user need to place their finger back to the BOCS until the image appear to the VeriFinger Algorithm Demo page.

For retina identification task also have certain problem during the enrollment. There are specific distances between users to the camera. User should focus directly to the camera and stand still until the green box appears to the face image area.

By using two types of biometrics identifications, it needs to be emphasized that an emerging technology such a biometrics is typically confronted with unrealistic performance expectations and not fairly compared with existing alternatives (e.g., passwords) that have resigned to tolerate.

Any system assuring reliable person identification must necessarily involve a biometric component. Because of the unique person identification potential provided by biometrics, they have and will continue to provide useful value by deterring crime, identifying criminals, and eliminating fraud.

For both identifications, when system looking for the match in the database, it is possible to find exactly the same image as in database. Therefore the system had been set to detect about 0.01% similarity image from the original image that stored in the database. This part called threshold.

D. Analysis for ATM Transaction Part

By referring to the second part, the ATM transaction part consists of several transactions such as withdraw, deposit, statement and PIN. Each transaction requires mathematical VB coding. Admin should enroll and authorized the ATM system. Only one person with the password is able to do all the registrations process. All user's account data been stored in the database where Microsoft Access 2003 is used as the database. If user inserts wrong ID either Account ID or PIN no. the system will appear Error Notice. For withdraw transaction, user cannot exceed more than RM 1000000 per day.

4.0 CONCLUSION AND RECOMMENDATION

After implementing this project, all the objectives are fully achieved. ATM system using biometric security (BiOS) are the latest solution of increasing the security level which to avoid ATM scams to work easily until nobody will saw their coming. Instead of using single biometric, a combination of two biometrics such fingerprint and retina identifications or also known as multimodal biometrics had been chosen based on the efficiency performances, strong authentication, accurate and most important thing is more secured.

4.1 Recommendations and Scope for Further Research

Based on this project a modification is suggested in a way of making this project more efficient and effective globally. For the future development, a multifunction of ATM transaction should been implemented since *BiOS* only run a basic ATM transaction in a way of the consistencies through the future and modern technology.

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