Project report on

Fingerprint Based ATM System

By

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In the partial fulfillment of requirements for the award of degree

in

Bachelor of Computer Application

(2019-2022)

Under the Guidance of

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PROJECT COMPLETION CERTIFICATE

This is to certify that "**Subham Shrestha Pradhan**" (Registration No. **19IT102004**) & "**Sahil Pradhan**" (Registration No. **19IT102015**) of School of Information Technology, SRM University, Sikkim has worked under my supervision and guidance from 15th December 2021 to 2nd May 2022 and has successfully completed the project entitled "**Fingerprint Based ATM System**" in partial fulfillment of the requirement for the award of Bachelor of Computer Application.

17/5/22

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Assistant Professor

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DECLARATION

We hereby declare that the work recorded in this project report entitled "**Fingerprint Based ATM System**" in partial fulfillment for the requirements for the award of degree in Bachelor of Computer Application from SRM University Sikkim, is faithful and bonafide work carried out under the supervision and guidance of **Ms. HemaMalini S**, Assistant Professor, School of Information Technology, from 15th December 2021 to 2nd May 2022.

The results of this investigation reported in this project have so far not been reported for any other Degree / Diploma or other Technical forum.

The assistance and help received during the course of the investigation have been duly acknowledged.

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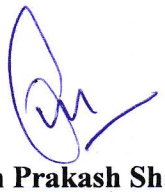
CERTIFICATE OF ACCEPTANCE

This is to certify that **Mr. Subham Shrestha Pradhan** (Registration No. **19IT102004**) & Mr. **Sahil Pradhan** (Registration No. **19IT102015**) of School of Information Technology, SRM University, Sikkim has worked on the project entitled "**Fingerprint Based ATM System**" under the supervision of **Ms. HemaMalini S**, Assistant Professor, School of Information Technology, SRM University, Sikkim. The project was carried out from 15th December 2021 & 2nd May 2022.

The project is hereby accepted by the School of Information Technology, SRM University, Sikkim, in partial fulfillment of the requirement of the award of degree Bachelor of Computer Application.



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BONAFIDE CERTIFICATE

This is to certify that this project report entitled "**Fingerprint Based ATM System**" is the bonafide work of **Mr. Subham Shrestha Pradhan** (Registration No. **19IT102004**) & **Mr. Sahil Pradhan** (Registration No. **19IT102015**) who carried out this project under my supervision.

This is to further certify that the work referred herein does not form a part of any other project or dissertation for which a degree or award has been conferred or any candidate before.

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ACKNOWLEDGEMENT

We would like to express our special thanks of gratitude to our Registrar prof. and Associate Dean for their great words of inspiration and motivation. We express our thanks and gratitude to Dr. Om Prakash Sharma, HOD school of Information Technology for their valuable support and inspiration during our research work.

We wish to record my deep sense of gratitude and profound thanks to my research supervisor Ms. Hema Malini S, Assistant Professor, School of Information Technology, SRM University, Sikkim for his interest, inspiring guidance, constant encouragement with my work during all stages, to bring this thesis into fruition.

We thank our Project Coordinator Ms. Hema Malini S, Assistant Professor for his valuable guidance throughout the span of our project. We also thank the faculty and nonteaching staff members of the IT Department, SRM University, Sikkim, for their valuable support throughout the course of my research work.

We thank our friends, and family members who have encouraged us in our research efforts and shouldered in the needy times.

ABSTRACT

Biometrics based authentication is a potential candidate to replace password-based authentication. Among all the Biometrics, fingerprint based identification is one of the most mature and proven techniques. At the time of transaction fingerprint image is acquired at the ATM terminal using a high resolution fingerprint scanner. Security measures at banks can play a critical, contributory role in preventing attacks on customers. These measures are of paramount importance when considering vulnerabilities and causation in civil litigation. Banks must meet certain standards in order to ensure a safe and secure banking environment for their customers. This paper focuses on vulnerabilities and the increasing wave of criminal activities occurring at Automated Teller Machines (ATMs) where quick cash is the prime target for criminals rather than at banks themselves. A biometric measure as a means of enhancing the security for the banking system for both customer's & bankers also. We also proposed nominees fingerprint identification process while the actual card holder was unable to do the transactions.

Key Words: Security, ATM, Biometric (Fingerprint), Verification, E-Banking.

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Chapter 1

INTRODUCTION

It is an application that allows the bank customers to carry out banking transactions like deposits, transfers, balance enquiries, mini statement, withdrawal and fast cash etc. Notwithstanding, we lived in a world where people no longer want to encounter long queues for any reason, they do not want to wait for too long time before they are attended to and this has led to the increasing services being rendered by banks to further improve the convenience of banking through the means of electronic banking.

Crime at ATMs has become a nationwide issue that faces not only customers, but also bank operators. Security measures at banks can play a critical, contributory role in preventing attacks on customers. These measures are of paramount importance when considering vulnerabilities and causation in civil litigation and banks must meet certain standards in order to ensure a safe and secure banking environment for their customers. Basically, the ATM scam involves thieves putting a thin, clear, rigid plastic sleeve into the ATM card slot. When you insert your card, the machine cannot read the strip, so it keeps asking you to re-enter your PIN number. Meanwhile, someone behind you watches as you tap in your number. Eventually you give up, thinking the machine has swallowed your card and you walk away. The thieves then remove the plastic sleeve complete with card, and empty your account. The main fact is that many of the customers have never used an ATM before and are completely unfamiliar with that concept therefore they are very unlikely to memorize and remember a PIN. Furthermore, there is a sense of mistrust with PINs. People may feel that it is unsafe because if they lose their card they worry that someone will find and somehow be able to determine their PIN and steal their money from the ATM. To keep it in mind we proposed a combined technique i.e. customers insert their card & PIN, if customers insert valid PIN then access is grant to another security approved process i.e. biometric fingerprint. Using valid PIN & biometric fingerprint costumer can access ATM transaction process i.e. deposits, transfers, balance enquiries, mini statement, Fast cash & withdrawal etc. By using fingerprint recognition customers are more comfortable with the idea of saving their money with the bank because they understand that if they lose their ATM card, no one can replicate their fingerprint and take their money.

The primary focus of this work is on developing a biometric strategy (Fingerprint) to enhance the security features of the ATM for effective banking transactions and more comfortable features i.e. we proposed another option for nominee users because in case a card holder faces an accident, then the transactions process is not possible. To keep this drawback in mind we consider nominees fingerprint sample for second user to do the transaction while actual card holder unable to do the transactions. Actually PIN code are changeable but fingerprints are not changeable, so a card holder may change his/her PIN code while maintaining one's own secrecy and may permit his/her nominee to give updated PIN code for transactions. We have considered the left & right thumb impression of an individual; it has been observed that there is no any match in these samples in any case. We have also observed that thumb impression samples have been taken in different angles & different forces.

1.1. C# (Coding Language)

C# is a general-purpose, multi-paradigm programming language. C# encompasses static typing, strong typing, lexically scoped, imperative, declarative, functional, generic, object-oriented (class-based), and component-oriented programming disciplines.

The C# programming language was designed by Anders Hejlsberg from Microsoft in 2000 and was later approved as an international standard by Ecma (ECMA-334) in 2002 and ISO (ISO/IEC 23270) in 2003. Microsoft introduced C# along with .NET Framework and Visual Studio, both of which were closed-source. At the time, Microsoft had no open-source products. Four years later, in 2004, a free and open-source project called Mono began, providing a cross-platform compiler and runtime environment for the C# programming language. A decade later, Microsoft released Visual Studio Code (code editor), Roslyn (compiler), and the unified .NET platform (software framework), all of which support C# and are free, open-source, and cross-platform. Mono also joined Microsoft but was not merged into .NET.

1.2. .NET Framework

The .NET Framework is a proprietary software framework developed by Microsoft that runs primarily on Microsoft Windows. It was the predominant implementation of the Common Language Infrastructure (CLI) until being superseded by the cross-platform .NET project. It includes a large class library called Framework Class Library (FCL) and provides language interoperability (each language can use code written in other

languages) across several programming languages. Programs written for .NET Framework execute in a software environment (in contrast to a hardware environment) named the Common Language Runtime (CLR). The CLR is an application virtual machine that provides services such as security, memory management, and exception handling. As such, computer code written using .NET Framework is called "managed code". FCL and CLR together constitute the .NET Framework.

FCL provides the user interface, data access, database connectivity, cryptography, web application development, numeric algorithms, and network communications. Programmers produce software by combining their source code with .NET Framework and other libraries. The framework is intended to be used by most new applications created for the Windows platform. Microsoft also produces an integrated development environment for .NET software called Visual Studio.

1.3. MySQL (Database)

MySQL is an open-source relational database management system (RDBMS). Its name is a combination of "My", the name of co-founder Michael Widenius's daughter, and "SQL", the abbreviation for Structured Query Language. A relational database organizes data into one or more data tables in which data may be related to each other; these relations help structure the data. SQL is a language programmers use to create, modify and extract data from the relational database, as well as control user access to the database. In addition to relational databases and SQL, an RDBMS like MySQL works with an operating system to implement a relational database in a computer's storage system, manages users, allows for network access and facilitates testing database integrity and creation of backups.

MySQL is free and open-source software under the terms of the GNU General Public License, and is also available under a variety of proprietary licenses. MySQL was owned and sponsored by the Swedish company MySQL AB, which was bought by Sun Microsystems (now Oracle Corporation). In 2010, when Oracle acquired Sun, Widenius forked the open-source MySQL project to create MariaDB.

1.4. Bitmap

Bitmap, method by which a display space (such as a graphics image file) is defined, including the colour of each of its pixels (or bits). In effect, a bitmap is an array of binary data representing the values of pixels in an image or display. A GIF is an example of a graphics image file that has a bitmap. When the GIF is displayed on a

computer monitor, the computer reads the bitmap to determine which colours to use to "paint" the screen. In a bitmapped font, each character is defined as a pattern of dots in a bitmap.

1.5. FingerSpot FlexCode SDK

FlexCode SDK is simple and easy to use in accordance with the demands of your application needs. FlexCode SDK provides more advanced solution, suitable for those who need more freedom in creative. The functions in FlexCode SDK are not too basic, the functions concept are instant, you simply call the functions required for registering and verify fingerprints then FlexCode SDK will do registration process and verification process without you need to be directly involved in it. The registration process will produce a fingerprint template in a text format that is easy to be stored and distributed. When you want to identify a finger, the templates are used to compare the fingerprints scanned. You will get the results of the verification whether the same finger or not. FlexCode SDK greatly save your time to integrate fingerprint technology into any application required.

Chapter 2

LITERATURE REVIEW

This part of study literature review includes available research related to consumer to consumer online Second–Hand markets.

2.1 ATM Security Using Fingerprint Biometric Identifier: An Investigative Study

Methodology:

Crime at ATMs has become a nationwide issue that faces not only customers, but also bank operators and this financial crime case rises repeatedly in recent years. A lot of criminals tamper with the ATM terminal and steal customers' card details by illegal means. Once users' bank card is lost and the password is stolen, the users' account is vulnerable to attack. Traditional ATM systems.

By: -Moses Okechukwu Onyesolu & Ignatius Majesty Ezeani

PUBLISHED ON: 2012

The result shows that Fingerprints have a wide variation since no two people have identical prints. b. There is a high degree of consistency in fingerprints. A person's fingerprints may change in scale but not in relative appearance, which is not the case in other biometrics.

2.2 Fingerprint Verification of ATM Security System by Using Biometric and Hybridization

Methodology:

To create a fingerprint by assuming that a set of feature extractors can identify significant features in the image. Fingerprint is the pattern of ridges and valleys on the tip of a finger and is used for personal verification of people. The minutiae-based method requires accurate detection of the minutiae from a fingerprint image.

By: Pramila D. Kamble & Dr.Bharti W. Gawali

Published on: November 2012

The result shows that, it is essential to first understand the basics of a biometric based security system. The implementation of an ATM security system by using biometric methods is a very important method. As well as very challenging and difficult. But for security purposes or to control the criminal records it is very important to produce this method. I think for future work it will also implement various technologies such as unique cards or any other method.

2.3 Fingerprint Based Biometric ATM Authentication System

Methodology:

An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main devices used in embedded products are microprocessors and microcontrollers. In this paper a fingerprint based ATM cash box accessing system using PIC microcontroller is implemented. Microcontroller forms the controlling module and it is the heart of the device.

By: Dhiraj Sunehra

Published On: June 2014

The result shows that the fingerprint based ATM authentication system is designed such that the door access can be controlled using fingerprint authentication. The status of the door access is displayed on the LCD.

2.4 The Evolvement of ATM Using Fingerprint

Methodology:

It is most important that when the person enters the bank to open his/ her account using an ATM then it's necessary to give his/her thumb impression for security purposes.

By: V. Ajantha Devi & A. Priyanka

Published On: March & April 2017

The result shows that Fingerprints have intrinsic features that they do not change for their whole life and are personally different. And they are easy to use, cheap and the most suitable miniaturization.

Chapter 3

PROBLEM STATEMENT & OBJECTIVES

3.1 Problem Statement

In the present scenario, a traditional ATM system accepts only the PIN CODE security system, enabling the other person rather than the owner to access the account very easily. This ensures that the traditional ATM system is not fully secured. .

3.2 Objectives

The Main objective of this project is:

1. The objective of our project is to provide biometric security through fingerprint authentication in ATM applications.
2. The underlying principle is the phenomenon of biometrics “AUTHENTICATION", in this project we propose a method for fingerprint matching based on matching algorithms.

Chapter 4

METHODOLOGY

The security feature for enhancing the Indian banking ATM was designed using the client/server architecture. There will be a connection between the customer‟s identification information, customer‟s accounts and records in the bank (server). The network is designed to support a large number of users and uses a dedicated server to accomplish this. The reason for choosing the Client/Server model for this application is because it provides adequate security for the resources required for a critical application such as a banking system. Similarly, a descriptive conceptual approach which includes Unified Modelling language (UML) tools such as Use case models, activity diagrams & sequence diagrams etc is adapted. The work is implemented using Visual Basic 6.0 software tool, used to design the user interfaces and/or cardholder interaction with the ATM Machine to be extracted from the templates at the central server directly.

4.1 Use Case Diagram

It is a methodology used in system analysis to identify, clarify, and organize system requirements. Use case define between external and the system to attain particular goals. The subject (of the use case) is the system under design on consideration to which a set of use case apply. Anything that interacts with the system, like human user, internal or external application will be named as actors.

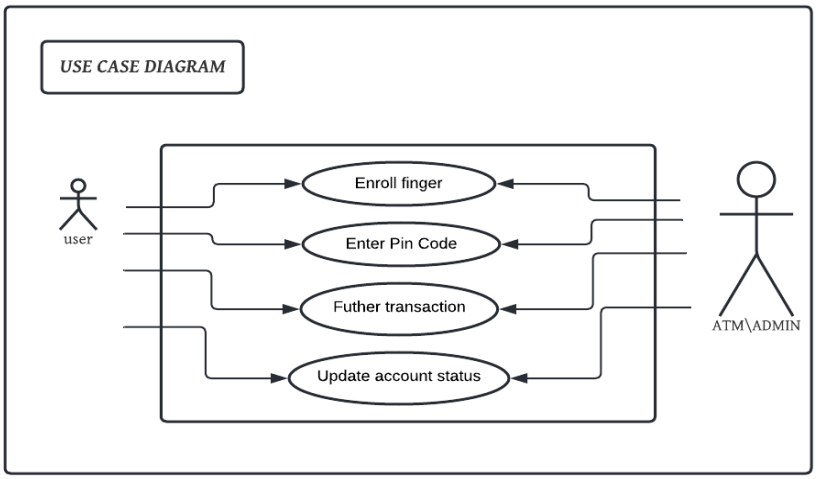

Figure 1: Use Case Diagram

4.2 ENTITY RELATIONSHIP DIAGRAM

An entity relationship model, also called an entity-relationship (ER) diagram, is a graphical representation of entities and their relationship to each other, typically used in computing in regard to the organization of data within database or information systems. An entity is a piece of data-an object or concept about which data is stored. There are three types of relationship between entities which are as follow: -

- One-to-One
- One-to-Many
- Many-to-Many

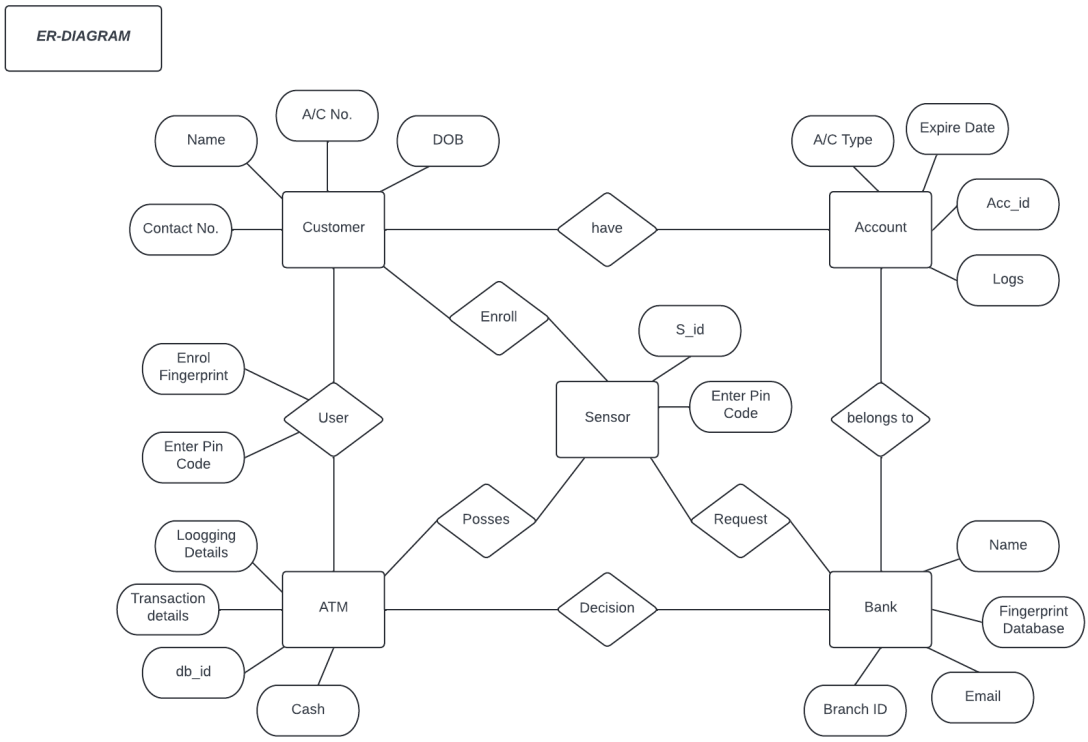

FIGURE 2: ENTITY RELATION DIAGRAM

4.3 Sequence Diagram

Sequence Diagrams are interaction diagrams that detail how operations are carried out. They capture the interaction between objects in the context of a collaboration. Sequence Diagrams are time focus and they show the order of the interaction visually by using the vertical axis of the diagram to represent time what messages are sent and when.

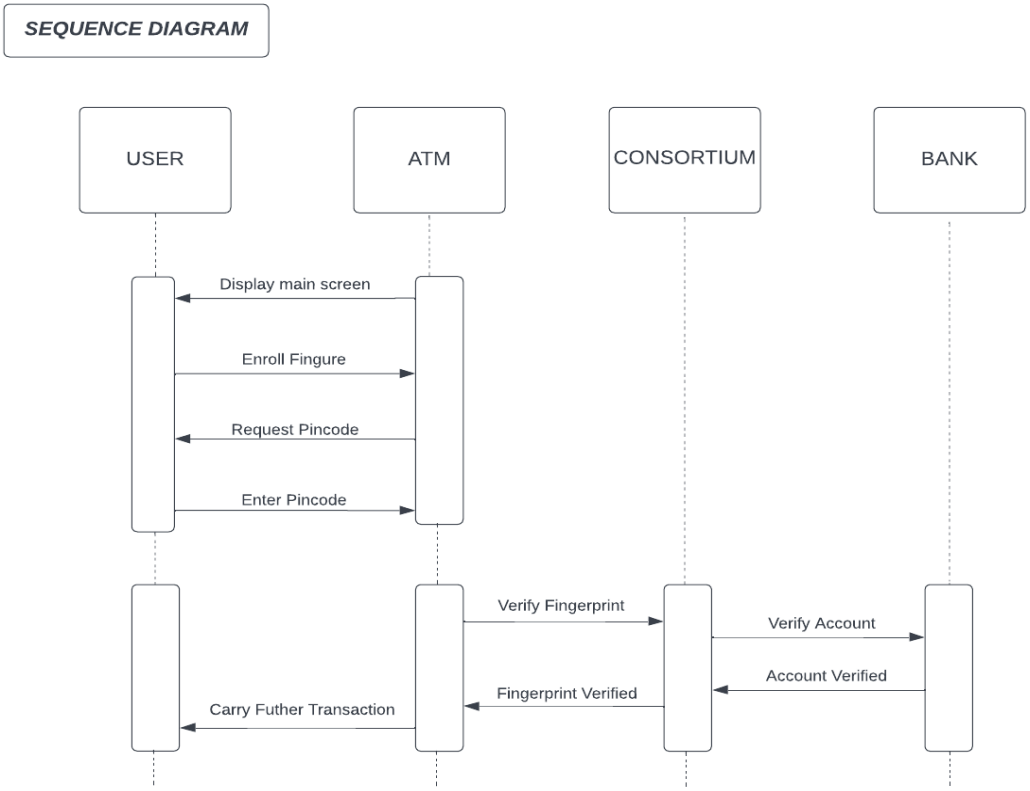

Figure 3: Sequence Diagram

4.4 Gantt Chart

A Gantt chart is a commonly used graphical depiction of a project schedule. It's a type of bar chart showing the start and finish dates of a project's elements such as resources, planning and dependencies.

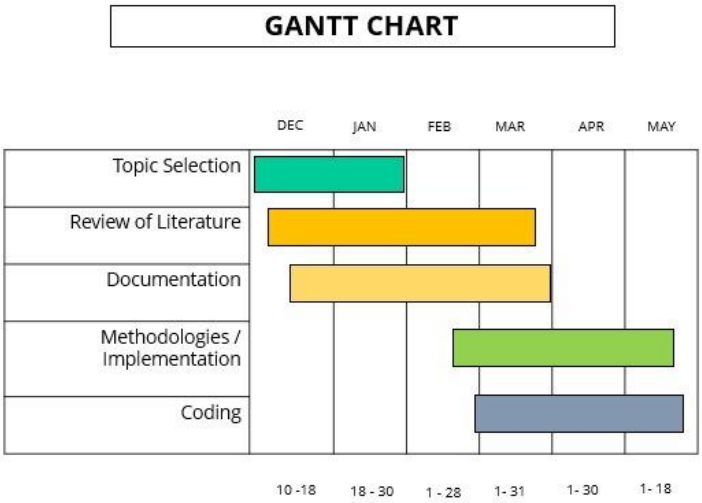

Figure 4: Gantt Chart

4.5 Flow Chart

A flowchart is a picture of the separate steps of a process in sequential order. It is a generic tool that can be adapted for a wide variety of purposes, and can be used to describe various processes, such as a manufacturing process, an administrative or service process, or a project plan.

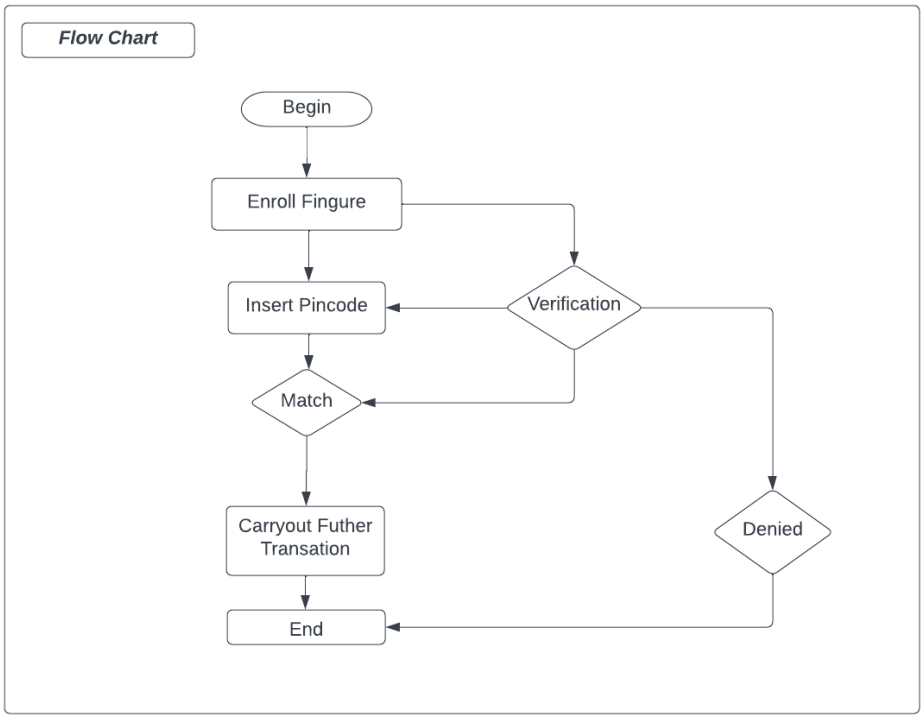

Figure 5: Flow Chart

4.6 Activity Diagram

Sequence Diagrams are interaction diagrams that detail how operations are carried out. They capture the interaction between objects in the context of a collaboration. Sequence Diagrams are time focus and they show the order of the interaction visually by using the vertical axis of the diagram to represent time what messages are sent and when.

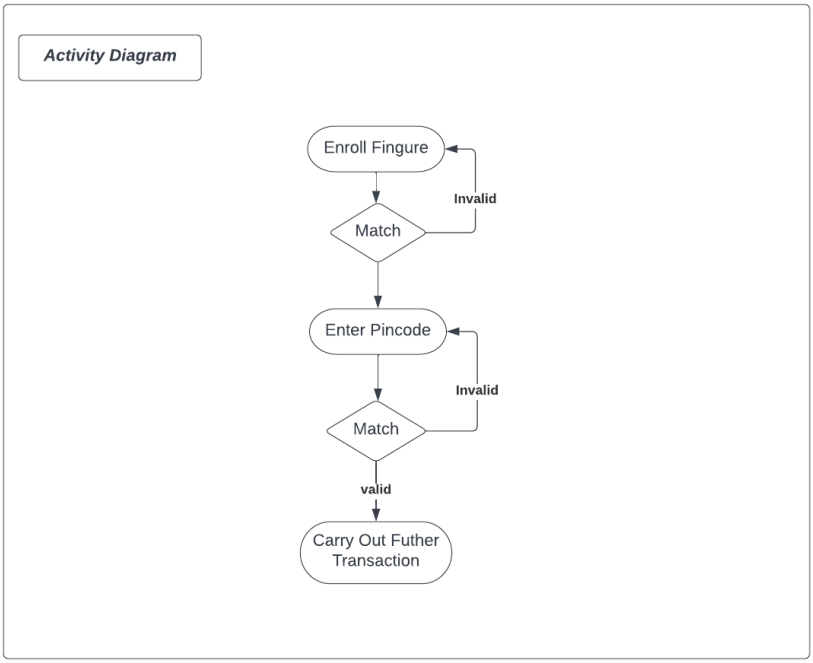

Figure 6: Activity Diagram

Chapter 5

RESULT

5.1 Result

In this project, we gained a deep knowledge about the development of windows application, and we learned a lot of programming languages to apply in this project to make it more functional and dynamic. We used C#.NET, Sql Query and we used XAMPP as a local server for database storage.

We established a platform for users to Log-in into our ATM System. Authentication and Verification is done before logging into the application. The functions and interface is as similar to normal ATM. User can implant the fingerprint into the application and verify it.

Chapter 6

CONCLUSION & FUTURE SCOPE

6.1 Conclusion

A smartcard based ATM fingerprint authentication scheme has been proposed. The possession (smartcard) together with the claimed user's Biometrics (fingerprint) is required in a transaction. The smartcard is used for the first layer of mutual authentication when a user requests transaction. Biometric authentication is the second layer. The fingerprint image is encrypted via 3D map as soon as it is captured, and then is transmitted to the central server via symmetric algorithm. The encryption keys are extracted from the random pixels distribution in a raw image of fingerprints. The stable features of the fingerprint image need not to be transmitted, it can be extracted from the templates at the central server directly.

6.2 Future Scope

In a nutshell, it can be summarized that the future scope of the project circles around maintaining information regarding.

- OTP Verification: Secondary authentication using OTP verification using GSM.
- Eye Biometric: Eye recognition verification for Log In.

APPENDIX

It includes the following activity:

A.1 Log-In Page

A.2 Biometric Reading and Verifying

A.3 Verification Failed Page

A.4 Verification Success Page

A.5 Home Page

A.6 Balance Enquiry Page

A.7 Withdrawal Page

A.8 Withdrawal Successful Page

A.1 Log-In Page

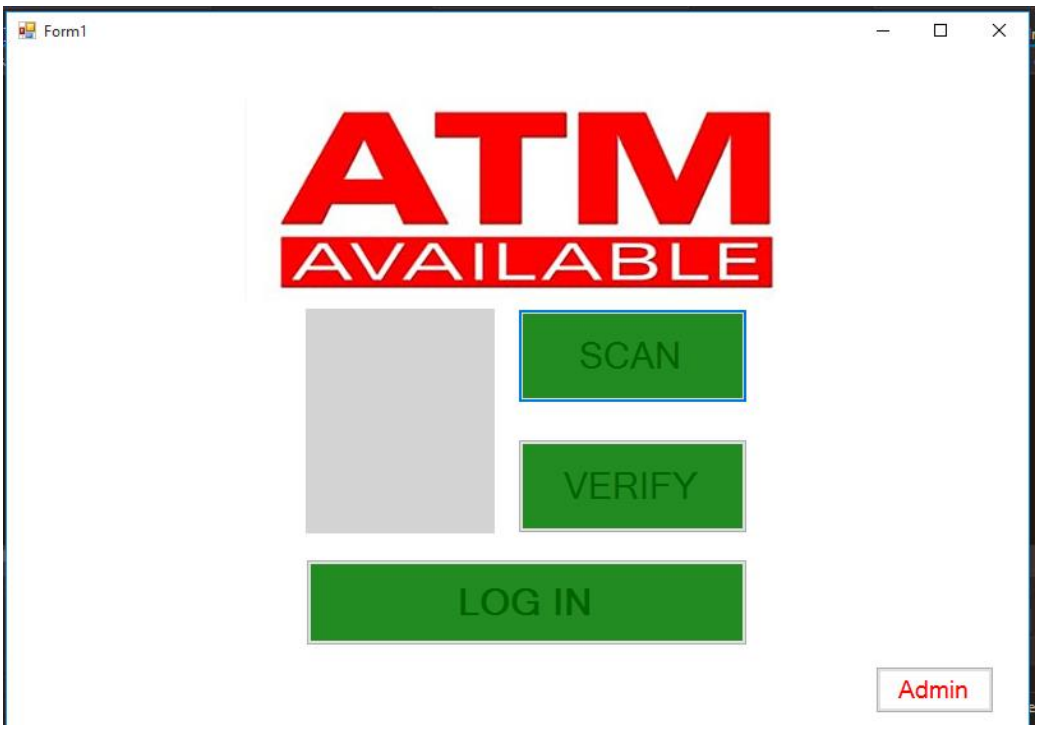

Figure 7: Log-In Page

A.2 Biometric Reading and Verifying

Figure 8: Biometric Reading and Verifying

A.3 Verification Failed Page

Figure 9: Verification Failed Page

A.4 Verification Success Page

Figure 10: Verification Success Page

A.5 Home Page

Figure 11: Home Page

A.6 Balance Enquiry Page

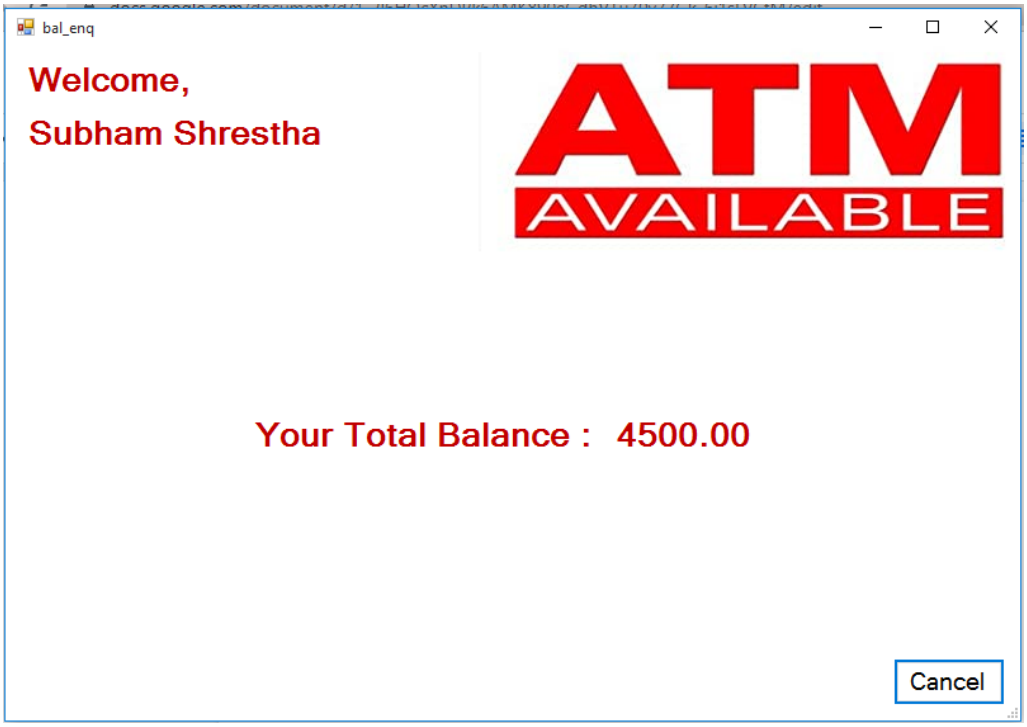

Figure 12: Balance Enquiry Page

A.7 Withdrawal Page

Figure 13: Home Page

A.8 Withdrawal Successful Page

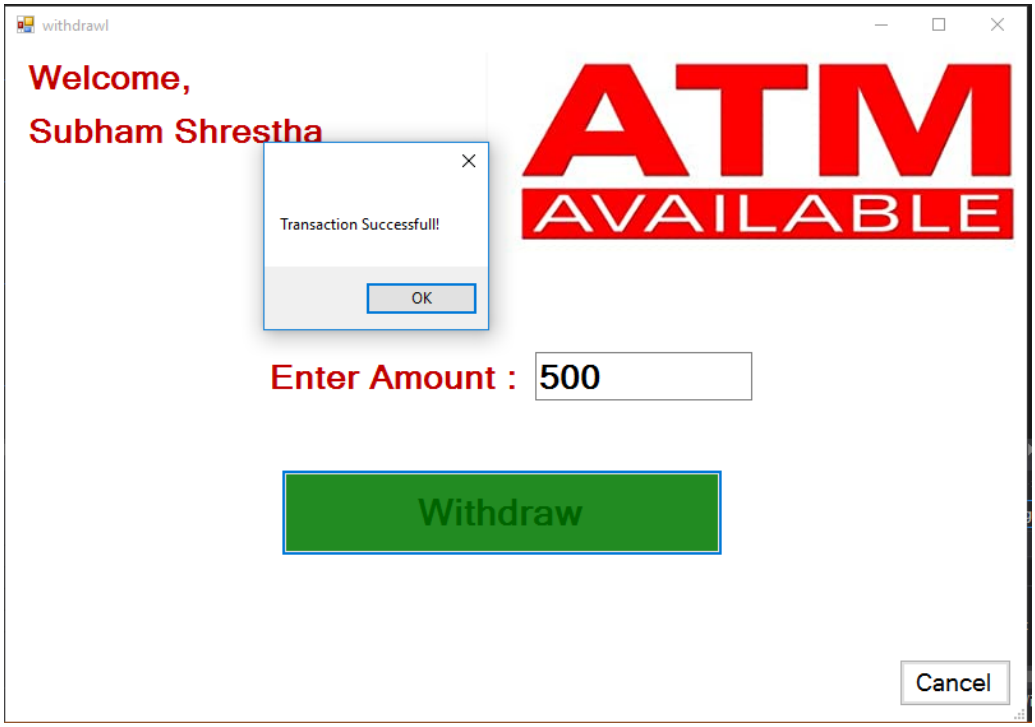

Figure 14: Home Page

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