

**MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY.**

**SCHOOL OF COMPUTING AND INFORMATICS**

**DEPARTMENT OF COMPUTER SCIENCE**

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**A Research Project Proposal Submitted in partial fulfillment of the requirements for a Bachelor in Computer Science.**

FINGERPRINT-BASED ATM

NAME: TONNY OCHIENG' LANG'O

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# Declaration

I Tonny Lang'o hereby declare that this documentation of my third year project is authentic and is my true work and that it has not been presented in this or other university for presentation.

Name: ...........................................................................................

Sign: ...........................................................................................

Date: .............................................................................................

Supervisor: .......................................................................................

Sign: ...............................................................................................

Date: ..................................................................................................

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# Abstract.

The main purpose of this system is to make online transaction more secure and user-friendly. Now days Biometric technology is increasing rapidly. Biometric is used for personal identification. Here we are using Fingerprint scanning biometric to provide access to ATM machine. Data of a fingerprint is stored in database using the enrollment process through the Bank. Bank provide authentication to the customer that can be access while performing transaction process. If fingerprint match is found in data base then transaction take place. After verification if fingerprint does not match transaction will be canceled. Using fingerprint based ATM system user can make secure transaction.

# INTRODUCTION

Biometric can be used to identify physical and behavioral characteristics of user fingerprints. There are many biometric devices like iris detection, face recognition, fingerprint. In my Project, we are using fingerprint biometrics. Users fingerprint are scanned using biometric trait and stored in database. All fingerprints have unique characteristics and patterns. A normal fingerprint pattern is made up of lines and spaces. These lines are called ridges while the spaces between the ridges are called valleys. Fingerprint biometrics are easy to use, cheap and most suitable for everyone. Characteristics of fingerprint vary from person to person. Fingerprint are unique identity of user.

## Background information

Banks are important institutions that provide us the service of storing our cash and withdrawing them when needed. They also enable employers to pay their employees through the employees account conveniently. Through the use of ATMs, people can withdraw the money from their account at anyplace, anytime where there is an ATM installed. All a customer requires is an ATM card and the correct PIN. The ATM use the ATM card and PIN to verify a customer before allowing him/her to access an account.

## Problem Statement

The invention of ATM has brought lots of benefits to bank users as it has provided easy access to money from their accounts. By using the ATM card provided by the bank, one is able to access his/her account 24/7.  Customers are typically identified by inserting a plastic [ATM card](https://en.wikipedia.org/wiki/ATM_card" \o "ATM card) (or some other acceptable payment card) into the ATM, with authentication being by the customer entering a [personal identification number](https://en.wikipedia.org/wiki/Personal_identification_number" \o "Personal identification number) (PIN), which must match the PIN stored in the chip on the card (if the card is so equipped), or in the issuing financial institution's database.

Use of the ATM card has experience lots of security threats and caused lose of customers’ money through card fraud. Cards are easily lost or stolen from the card holders. An attacker can use the lost card and a guessed PIN to access a customer’s account. A later variant of this approach is to trap the card inside of the ATM's card reader with a device often referred to as a [Lebanese loop](https://en.wikipedia.org/wiki/Lebanese_loop" \o "Lebanese loop). When the customer gets frustrated by not getting the card back and walks away from the machine, the criminal is able to remove the card and withdraw cash from the customer's account, using the card and its PIN.Another simple form of fraud involves attempting to get the customer's bank to issue a new card and its PIN and stealing them from their mail.By contrast, a newer high-tech method of operating, sometimes called card skimming or card cloning, involves the installation of a magnetic card reader over the real ATM's card slot and the use of a wireless surveillance camera or a modified digital camera or a false PIN keypad to observe the user's PIN. Card data is then cloned into a duplicate card and the criminal attempts a standard cash withdrawal. The availability of low-cost commodity wireless cameras, keypads, card readers, and card writers has made it a relatively simple form of fraud, with comparatively low risk to the fraudsters.

This project intends to come up with a solution to this huddles through the use of a customers fingerprint. The use of fingerprints to identify a customer will replace the existing mechanism of using a magnetic card.

## Main Aim of the Project.

The main aim of this project is to develop a system that will replace the existing means of identifying bank customers from ATM card to a fingerprint-based system.

## Objectives

### General objectives.

To design and implement a program that will use fingerprint to authorize identity and to design a more secure ATM system.

### Specific objectives.

1. To design a system that will use fingerprints to authorize customers.
2. To implement a system that will use fingerprints to identify customers.
3. To design a database to customers records.

## Limitations.

Some of the problems that may hinder the project from performing according to specification include:

1. Dust on the scanners will prevent correct capture of fingerprint details.
2. Using fingerprint scanner does not take into consideration when a person physically changes. A person’s finger changes sizes or form/pattern over time and the fingerprint scanner does not take this into consideration. When this changes occur, an individual can have difficulty identifying themselves and gaining access. The fingerprint scanner can have problems in capturing an accurate fingerprint image as well. E.g In the manual labour industry since employees are usually working with their hands, their fingers may get rough or scratched which could lead to a miss-reading.
3. Using the fingerprint scanner can lead to false rejections.A biometric device does not always read an individuals fingerprint accurately, and could therefore refuse access to a user. In certain cases, a user may have not placed their fingerprint in the right spot or placed the left finger instead of the right and visa versa. When this happens the software will falsely rejects the user’s fingerprint. If a user does not place their correct finger in the right spot the fingerprint scanner may not read the employee's identification properly and the software will reject him/her.

## Scope.

The project suggests to design and develop a system that will register bank users by scanning their fingerprints and the use the data to authorize one when accessing the account to withdraw cash.A bank employee will be able to register a customer into the bank’s database. Among the data captured will be the customer’s fingerprint data and will be stored into the banks database. The customer will be able to register for one or more accounts using the same fingerprint data. The authorized bank employee will also be able to view customer’s details for verification purposes only. The employee will not be able to edit a customer’s data.

The project also involve designing and implementing an interface to enable the customer to access his/her account to check balance and withdraw money. The interface will allow a customer to use the ATM machine by first placing his finger at Biometric scanner which will scan his fingerprint feature and compare that extracted feature with stored feature from the database, if feature matches then the person is allowed for transaction otherwise it not process. The customer will have to provide a PIN for verification purposes. The system will the match if the password is correct.

## Benefits of the project.

1. Reliable: The system will be reliable in that no two people will be matched to the same fingerprint. Using of fingerprint makes it to be able to be used at anytime. One will always transact by being able to use his/her fingerprint without the fear of losing it.
2. Easy to use: The system is easy to use for people from every class of the society. It involves only placing a finger to be scanned and inserting a correct PIN.
3. Secure: The system eliminates cloning of card by using fingerprint of which no current technology can clone. This provide a unique feature of identifying customers.

## The beneficiaries of this project.

1. Bank customers: There will no losing or forgetting the authorization requirements since one will always be in position of his/her fingerprint.
2. Banking institutions: The confidence of customers with the bank will increase as cases of card fraud will be no more.

## Project Justification.

The purpose of this project is to implement a system that can use fingerprint biometric technology to identify customers of a bank. While the use of fingerprint as a biometric identification of people has been widely used in other areas that make use of biometric technology, it is rarely used in the ATM. The ATM use a plastic card which is affected by card fraud leading to lose of money.

Biometric authentication using fingerprint identification is seen by many as the solution to most of the theft and fraud cases being reported in the use of ATM systems and ATM cards. Biometrics-based authentication offers several advantages over other authentication methods, as there has been a significant surge in the use of biometrics for user authentication in recent years (S. Oko and J. Oruh, 2012). Majority of peoples chose fingerprint identification as the preferred biometric identification solution to ATM card theft and fraud (Onyesolu and Ezeani 2012). In this proposed biometric-based ATM authentication system biometric authentication on ATM systems is implemented to prove that it is practicable and could be implemented in production environments. The need of using a card is therefore eliminated and replaced by use of fingerprint which solves the problem of smart-card loss, card theft, card cloning and card clocking by Lebanese loop.

# LITERATURE REVIEW

## Introduction.

This chapter aimed to be a review of the literature relevant to this subject of study focusing on the use of biometric on ATM to authorize customers. The biometric that we focus on is fingerprint to see how it has been suggested by other people or already been utilized. Existing cases of attempts to achieve this kind of implementation are analyzed with reference to work that has already been published. In this chapter, the achievements of existing similar systems were discussed together with the challenges those systems face, the similarities there had to the proposed system and the advantages the proposed system had over them hence that’s why it should be the system of choice

## Review

This project aims at implementing an ATM that will have biometric authentication techniques to verify the owner of ATM card at the time of transaction. To provide such type of facility we have studied different research papers and found some vital information.

For the system we use fingerprint bio-metrics scanner that capture the fingerprint and then follow certain algorithm for fingerprint matching. Most finger-scan technologies are based on minutiae. 80 percent of finger-scan technologies are based on minutiae matching but that pattern matching is a leading alternative (Samir Nanavati, Michael Thieme, and Raj Nanavati, 2002). This technology bases its feature extraction and template generation on a series of ridges, as opposed to discrete points. The use of multiple ridges reduces dependence on minutiae points, which tend to be affected by wear and tear (Julian Ashbourn, 2002). The downside of pattern matching is that it is more sensitive to the placement of the finger during verification and the created template is several times larger in byte size.

Finger-scan technology is proven and capable of high levels of accuracy. There is a long history of fingerprint identification, classification and analysis. This along with the distinctive features of fingerprints has set the finger-scan apart from other biometric technologies. There are physiological characteristics more distinctive than the fingerprint (the iris and retina, for example) but automated identification technology capable of leveraging these characteristics have been developed only over the past few years. The technology has grown smaller, more capable and with many solutions available. Devices slightly thicker than a coin and an inch square in size are able to capture and process images. Additionally, some may see the large number of finger-scan solutions available today as a disadvantage; many see it as an advantage by ensuring marketplace competition which has resulted in a number of robust solutions for desktop, laptop, physical access, and point-of-sale environments. Biometric data are separate and distinct from personal information. Biometric templates cannot be reverse-engineered to recreate personal information and they cannot be stolen and used to access personal information (Edmund Spinella, 2003).

**ATM Card Fraud**

Crime at ATM has become a notion wide issue that faces not only customer but also bank operators and the financial crime case rises repeatedly.

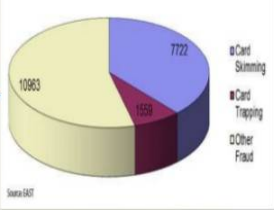


Figure 1: Pie chart of ATM card frauds

|  |  |  |  |
| --- | --- | --- | --- |
| ATM Fraud’s | Card Skimming | Card Trapping | Other Fraud |
| Fraud ration | 7722 | 1559 | 10963 |
| Overall fraud ratio | 20244 | 20244 | 20244 |

Table 1: Sample table to estimate card fraud ratio

Criminal steal customers card, after stealing the card criminal use detail of card by illegal means. The fraud include like card Skimming and card Trapping and many more way included in ATM fraud. Above table and Pie chart gives the approximate Ratio of ATM card related Fraud. We can Say that card Skimming is most common type of Fraud. Card skimming involves the installation of a magnetic card reader over the real ATM's card slot and the use of a wireless surveillance camera or a modified digital camera or a false PIN keypad to observe the user's PIN. Card data is then cloned into a duplicate card and the criminal attempts a standard cash withdrawal. The availability of low-cost commodity wireless cameras, keypads, card readers, and card writers has made it a relatively simple form of fraud, with comparatively low risk to the fraudsters(snopes.com 2016).

Once a customer card is lost and the password is stolen, the user's account is able to hack. When customer's credit card get stolen there may be a chance that unauthorized user can often come with the correct personal code to choose easily guessed pins and password that can be birthdays, phone number and social security numbers.

A later variant of the above approach is to trap the card inside of the ATM's card reader with a device often referred to as a [Lebanese loop](https://en.wikipedia.org/wiki/Lebanese_loop" \o "Lebanese loop). When the customer gets frustrated by not getting the card back and walks away from the machine, the criminal is able to remove the card and withdraw cash from the customer's account, using the card and its PIN. This type of fraud has spread globally. Although somewhat replaced in terms of volume by skimming incidents, a re-emergence of card trapping has been noticed in regions such as Europe, where EMV chip and PIN cards have increased in circulation(Atmsecurity.com, 2009).

Another simple form of fraud involves attempting to get the customer's bank to issue a new card and its PIN and stealing them from their mail(the original, 2008).

**Comparison**

|  |  |  |
| --- | --- | --- |
| Factor | Fingerprint -based ATM | Card-based ATM |
| Risk | Hands can become disfigured over time. Though this happens slowly and the fingerprint data can be stored afresh. | Card can be lost or even stolen. Stolen cards can be used to commit fraud. Cloning of the card is also possible. |
| Remembering | Use of fingerprint save one from having to remember to carry any authentication material to an ATM. | One has to remember to carry the ATM because one won’t be able to access the ATM without it. |
| Cost | Requires the acquisition of one fingerprint scanner for every ATM. | Requires the bank institution to provide a card to every customer who need to use the ATM. Lost ATM cards also cost to replace is mostly discouraged |
| Reliable | Its reliable since one is expected to always have his/hand when trying to access the ATM | One may not have his/her ATM card when he/she want to access an ATM. |

# METHODOLOGY.

## Introduction.

This chapter provides a general description of the methods that were used to collect data from the field, the tools that were used to analyze and the tools that were used to implement the proposed solution. This chapter will focused on data collection, data analysis and processing, sampling procedure, tools for implementation, time plan and budget allocation.

## Software Development Process

The software development process used to design and implement this project is the agile software development. Under this software development process, iterative and incremental methodologies were used. Iterative development enabled the feature code to be designed, developed and tested in repeated cycles. With each iteration, additional features were designed, developed and tested until there was a fully functional software application that could be deployed. Using incremental development, the software development was split into smaller segments that build upon each other. Working iteratively allowed going through a cycle to evaluate with each iteration, and determine what changes are needed to produce a satisfactory end product.

## Methodologies used

### Documents and Records reviews.

Documents and Records reviews involved going through existing book record written by a dedicated member about his/her family members. Doing this enabled us to know what information about family needed to be preserved.

Advantages

1. This was an inexpensive way to gather data.
2. It provided spontaneous data.
3. We also got detailed information.

Disadvantages.

1. It was time consuming.
2. It requires informed consent.
3. It provides subjective data.
4. Data could be biased.

### Interview

Interviewing involved meeting with people and asking them questions. It was realized that though people may not be in contact with their relative, they still wanted to know about how they were doing. Some people’s extended families were so large and they could not keep track of the members.

Advantages.

1. It allowed first hand data collection about people’s problem.
2. Useful to obtain detailed information about person’s feelings, perception and opinion.
3. It allowed more detailed questions to be asked.
4. It achieved a high response rate.
5. Ambiguities could be clarified and incomplete answers followed up.
6. Interview was not influenced by others in the group.

Disadvantages.

1. It was costly to travel to conduct the interview.
2. Very time-consuming: setting up, interviewing, transcribing, analyzing, feedback reporting.
3. Different interviewers may understand and transcribe interview in different ways.

## System requirements

The following segment describe both hardware and software requirements that will be used in the project.

* Hardware requirements

1. A fully functioning computer.

* Software Requirements.

1. An operating system.
2. 2. A Java IDE.
3. 3. MySQL server.

# BUDGET AND SCHEDULE

## Budget

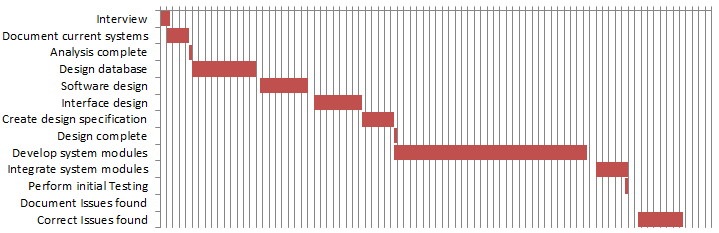
|  |  |
| --- | --- |
| Item | Cost |
| Computer | 20,000 |
| Java IDE | 0 |
| MySQL Server | 0 |
| OS | 0 |

## Schedule

Table 2: schedule table

|  |  |  |  |
| --- | --- | --- | --- |
| Interview | 10/7/2018 | 5 | 10/11/2018 |
| Document current systems | 10/11/2018 | 7 | 10/17/2018 |
| Analysis complete | 10/18/2018 | 1 | 10/12/2018 |
| Design database | 10/19/2018 | 20 | 10/13/2018 |
| Software design | 11/9/2018 | 15 | 10/14/2018 |
| Interface design | 11/26/2018 | 15 | 10/15/2018 |
| Create design specification | 12/11/2018 | 10 | 10/16/2018 |
| Design complete | 12/21/2018 | 1 | 10/17/2018 |
| Develop system modules | 12/21/2018 | 60 | 10/18/2018 |
| Integrate system modules | 2/22/2019 | 10 | 10/19/2018 |
| Perform initial Testing | 3/3/2019 | 1 | 10/20/2018 |
| Document Issues found | 3/3/2018 | 5 | 10/21/2018 |
| Correct Issues found | 3/7/2019 | 14 | 10/22/2018 |

Figure 2: schedule Gantt diagram



# SUMMARY, RECOMMENDATIONS AND CONCLUSIONS.

## Summary.

To summarize, the project allows a person to record information about his/her family. Other members of the family who join later may add more information about this family. One can also view and learn about his/her relations with other members. A member can describe another member and allow other to know about him/her. Members of the family can also advice each other member on the way of life. Information about the family hierarchy will be easily available.

## Recommendations.

Any person who wants to record his/her family genealogy is advised to use this application. It will make it easy for other people to access the information. The information will also be easy to update.

## Conclusions

Family is important and should always be close and be readily accessed. Bringing family together is so important and information about each other can make each member to appreciate each other.

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