

**SE 201.3 - Systems Analysis and Design**

**Group Assignment**

***Fingerprint based ATM system with face unlock accessibility feature***

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# GITHUB Repository - https://github.com/KavinduLakmal2000/SAD\_Project

## Business objectives

Business objectives are what you aim to accomplish in order to accomplish the vision you have for the company in the future. Having clear goals allows you to achieve your mission statement

And long-term vision for the business. Depending on the organization, these objectives can range from financial objectives to organizational-specific objectives .and also measurable, specific, and time-bound business objectives make for good business. Business objectives can also be a great way for employees to identify their strengths and areas for improvement.

Each business will have specific goals based on its industry, team, product, and financial standing, but they often fall into four general categories.

* Economic
* Human
* Organic
* Social

Is it important to have business objectives?

Yes .because having a solid business objective is crucial to an organization’s success.

From that,

1. Employees are kept focused on growth

2. Ensures more effective budgeting and cost control

3. Encourages team cooperation and collaboration

4. Organizes work and responsibilities

5. Market share can be increased

The business objectives of our project

1 profitability – in order to maintain profitability, revenue must remain higher than costs. Making progress toward your company’s overall mission becomes easier when achieving and maintaining profitability.

2 sustainable growth – you may not see any direct consequence to your business, but demonstrating your environmental consciousness can help you reach the clients you’re targeting.

3 customer satisfaction – customer satisfaction should be the primary objective of the organization. Because client retention and repeat revenue are dependent on good customer service.

4 brand awareness – brands are what customers associate with a company’s product or service, and how one company differentiates from its competitors. Understanding how customers perceive your brand and how they feel about your brand compared to your competitors is an important part of brand awareness.

5 revenue – by setting revenue-driven goals, you can balance your income and costs to remain in business.

6 employee satisfaction and engagement – improving employee satisfaction is the key to reducing employee turnover. Provide value to team members through competitive salaries, career advancement opportunities, education reimbursement programs, and flexible work schedules.

7 quality control – businesses that improve their product or services should receive fewer complaints and more positive feedback from customers and clients. In addition, customers will be more inclined to recommend your products or service, which results in a better business reputation, increased customer retention, and increased brand awareness.

## Background

ATM

An automated teller machine (atm) is a computerized telecommunications devices that offer financial transactions like deposits, transfers, balance inquiries, mini statements, withdrawals, and quick cash to clients of any financial institution. And also this process does not require a cashier, bank teller, or clerk to be present.

A picture containing text, cash machine, indoor, silver

Description automatically generatedAtm can be divided into two parts based on the work performed.

1 only used to withdraw cash and to receive a balance report.

2 used for deposits and money transfers.

People usually use the first type of atm.

Several ATMs are located throughout the cities providing easy access to the clients’ accounts. A customer’s atm card is issued by the financial institution where the transaction is to be performed, and they are given a personal identification number (pin) with the card for authorization to access their account. But nowadays, pin security is not enough to guarantee the customer’s account’s security. And also pin may not be easily remembered and recognized by people who are not familiar with the concept. And also a lot of people distrust pins. To increase the account’s security and authentication we have to find a method. For that, we can use biometric characteristics. A fingerprint, hand geometry, iris, retina, ear, voice, and face are some of the biometric characteristics. Each of these features has its advantages and disadvantages, and the selection of biometrics depends on the application’s requirements and authentication. The selection is made based on fingerprints and faces.

Face unlock and fingerprint-based atm system is a desktop application where the face or fingerprint of the user is used as authentication. Biometric fingerprints have more authentication power than pins because they are unique to each individual. But if some people can’t

Use their fingerprints because of some disabilities then, they can use their face for it. The fingerprint minutiae functions and iris are distinctive for every human being so the user may be recognized uniquely. Then users will feel more at ease when face and fingerprint recognition is used because their accounts will be protected from others and they will have greater peace of mind.

Why fingerprint and face

The reason for this selection can be summarized as follows.

Permanent – time doesn’t change the characteristics of the face or fingerprint. Structure-wise, they remain unchanged throughout the fetal stage.

Storage – storage requirements for fingerprint and face are minimal

Accuracy – comparatively, fingerprints and faces are more accurate than other biometrics.

Inexpensive – it is relatively inexpensive to acquire, operate, and maintain fingerprints and faces.

Reliable – a fingerprint and iris is unique to each individual

Universality – every person in the world has a fingerprint or face.

How to use

In this proposed system customer has three options.

1 fingerprint

2 face

3 pin

These are used for authentication purposes.

First, start the cardless menu at the atm. Place your registered finger on the fingerprint scanner or use your face to webcam. If your face or fingerprint fits with the database client names will be displayed on the atm machine. After that, you can withdraw money, view your account balance, transfer money, or do something else.

Features of face unlock and fingerprint-based atm system

* login – logging into the system will be done using the user’s fingerprint or face
* add pin code – in order to make the transaction, the user must scan their face or finger and add a pin code
* Withdrawal of cash – the user can withdraw cash by entering the amount he wants to withdraw
* transfer of money – by entering the account number, a user can transfer funds between accounts.
* view balance – each user is able to see the balance available in their respective accounts.
* view transaction – it is possible for users to view the five most recent transactions.

Advantages

When compared to the existing system, the proposed system has these advantages.

1. Getting into the system is simple and quick
2. No need to remember anything such as a pin code

Helps rural residents who are less educated to remember their pin , thus relieving their stress.

1. There are three options available to users when accessing the system

* Fingerprint
* Face
* Pin code

1. Anytime, anywhere, the user can conduct an atm transaction by using his fingerprints or face, allowing him to completely eliminate the need to carry an atm card

5. Face unlock and fingerprint-based atm system provides better security than a conventional atm card.

If a pin is used as a password, everyone who knows the pin can access the account, whereas the reference fingerprint allows only one other person access, resulting in a win-win situation for both banks and their customers.

## SCOPE OF THE SYSTEM BY USING WBS

## Graphical user interface Description automatically generatedFeasibility study

A feasibility study is essential to evaluate costs and benefits

Proposed system.

* Technical feasibility
* Economic feasibility
* Operational feasibility
* Schedule feasibility

## Technical Feasibility

Much of resource determination is related to technical feasibility assessment. It considers the technical requirements of the proposed project. In Technical Feasibility study, one must test whether the proposed system can be developed using existing technology or not. It is planned to implement the proposed system using C# technology. It is evident that the necessary hardware and software are available for development and implementation of the proposed system. Hence, the solution is technically feasible. This project is a complete web-based application. the key technologies and tools that are combined with the system are,

* Html
* CSS
* Jsp
* MySQL
* Js
* NetBeans
* Diagram drawing tools

Visio

Draw.io

## Economic Feasibility

Being a Web Application This system has associated hosting costs. It is financially viable. No need to spend more than money. This system is mainly built on existing devices only. Because we use Visual Studio .NET as the front-end, it was the most powerful, portable platform and operating system on both the original and binary levels. The project also reduces workers' wages.

**Value of product**

The project targeted human needs are met only during the final stages of production, project lifecycle, activation, and maintenance. Targeted human needs services are valued by attaching them to a market price and counting them. In this way, the utility value of the product or service is determined.

**Cost of products or services**

The various stages of the life cycle of an engineering product or project are related to the value devoted to creating cost or utility value. These costs are borne at each stage, namely:

a) design and planning costs.

B) production or construction costs.

C) Operating and maintenance costs.

Being a Web Application This system has associated hosting costs.

|  |  |
| --- | --- |
|  | LKR |
| Total fixed assets | 27,226,675.00 |
| Total working capital | 5,731,705.00 |
| Working capital for 3 months | 4298778.75 |
| Total cost of project | 31,525,454.00 |
| Total depreciation cost | 1,917,048.00 |
| Total cost of ropery per annum | 70,697,508.00 |

## Operational feasibility

Operational Feasibility belong to part of solving issues with the support of another proposed system. Keep in mind that the administration and clients support the project. There are six parts to the structure, and they lead to troubleshooting operational problems that can be identified. They are performance, information, economy, control, efficiency, and services, which must be focused on with a definite end goal for the clinical administration systems project to succeed.

**PERFORMANCE:** This implies a general delay between the work done and the demand over a period and the response to that request. The current clinic administration system took a long time to complete, and the system lags in delivering results due to further attractiveness.

The new system project will allow the clinical administration system to minimize time consuming, deliver programs in a short period of time and deliver a more productive outcome. Online registration and database data recording will enable the system to be more efficient in bringing the best results.

**INFORMATION**: This gives server termination and supervisors accurate, occasional, patient, and useful organizational data. The current system needs to provide data and does not provide accurate data. Information and data are not maliciously stored everywhere and are no longer efficient. The new system project will allow the clinic management system to provide accurate data and store it in the database so that no data is lost and kept on a safe path.

**Economic**: If there is a cost devaluation as well as an increase in benefits, it allows for acceptance. It also allows the business to recognize whether it has cost-effective data management. The current system makes it difficult at the end of the day to decide whether the clinic has the potential to benefit or be unlucky. This cost the clinic a lot of money for financial gains. The new system requires them to move to a more publicized system so that they can understand all the costs and transactions required during an investment period. The new project can know the price of their items and the amount they need to submit with a definite end goal to reap the benefits they can win.

**control:** This system allows to determine the implementation of powerful controls to ensure against fraud and to ensure the competence and security of information and data. The current system risks controlling the system while securing their documents and data because of the way they store documents that can be easily stolen or lost. The new clinic management project provides a database that protects records and data well by providing certification of their records and data. Similarly, it enables them to save their data and documents in the database system. The new project will be able to get the system by chance after such a procedure.

**Efficiency:** Complete information makes it difficult to deal with important data and is less efficient from this point on. It is important to rearrange some data and it is difficult to maintain a key distance from the redundancy and henceforth it is a moderate and less efficient system. In the new system, the relevant data can be easily captured in this way to be handled more efficiently and quickly. The new project aims to maintain a strategic distance from the surplus and is therefore a fast and efficient system.

**services:** Such a system agrees to accept if the administration is decent, adaptable, and comfortable. The current system, which does not provide much labor manually as it takes longer to register at the clinic, creates a longer waiting list for patients. The new system project will allow online registration and system data recording.

## Schedule feasibility

Testing, activation, installation, and system maintenance can all begin once everything is clear. An urgent part is system analysis, identifying tasks and issues that need to be explained and developed in the system, and if done incorrectly, the whole system upgrade process will be shortened and then the client's requirements will not be met. Thus, it takes 44 long days to explore correctly. It takes a long time to understand the system functionality, because this is the final test and use of the system before it is delivered to the customer for use. The performance of the entire system is monitored and tested from start to finish to ensure that all designed capacities are running smoothly.

Numbers Project Management Duration(days)![Table

Description automatically generated]()

## User Requirement

The user needs to define customer expectations in terms of objectives, environment, constraints, and measures of the effectiveness of the system. The main users in this system are money depositors and cash withdrawals people, bill payment people, and administrators.

* Operational set- up:

ATMs can significantly increase revenue for retailers, financial institutions, the hospitality industry, the sports industry and much more. Let's look at some of the businesses, industries, and locations where ATM placement works best. Banks, credit unions, and other financial institutions are among the first places people look for an ATM, Nightclubs and Bars, Hotels, Grocery Stores, Gas Stations, Festivals and Events, Casinos, Dispensaries.

* Mission:

ATM is a specialized computer that makes it easy for a bank account holder to manage funds. It allows a person to check account balances, withdraw or deposit money, print out a statement of account activities or transactions, and even purchase stamps. The main objective of this project is to provide fingerprinting as an authorized identity and to create a more secure ATM system There are several items located throughout the city that provide easy access to customer accounts. The financial institution to which the transaction takes place will issue a customer an ATM card and provide a Personal Identification Number (PIN) with the card for authorization to access their account. But at present, PIN security is not sufficient to ensure the security of the customer's account. Also, the PIN number is not easy to remember and cannot be identified by people who do not know the concept. And a lot of people disbelieve Pins. We need to find a way to increase account security and authentication. For that we can use biometric features. Fingerprint, face biometric features. The choice of biometrics depends on the requirements and verification of the application. Selection is based on fingerprints and faces.

* Utilization:

Fingerprint Based ATM is a desktop application that uses the user's fingerprint authentication. Fingerprint minutiae features vary from person to person so that the user can be uniquely identified. ATM Cards Instead of using fingerprint-based ATM cards, ATMs are safer and more secure. Based on biometric technology. It helps to determine if a person is currently in front of an ATM. The face recognition module can be activated at any self-service terminal equipped with a video camera, the main purpose of which is to prevent fraud. When a person approaches an ATM, it falls into the field of view of the camera. A picture is taken as soon as the user begins to interact with the ATM. The special face recognition module analyzes the image, finds a face according to certain parameters, and creates a description of a set of features that describe the object regardless of external factors.

Features

\* Login: - The user will log in to the system using his fingerprint and face screener

\* Add Pin Code: - User must add a pin code to do transactions.

\* Withdrawals: - The user can withdraw money by entering the amount required for withdrawal.

\* View Balance: - The user can view the balance in his respective account

* Effectiveness:

ATM is a must-have item for all people. With the use of ATMs, people can make financial transactions in their daily lives and perform various related activities. The most common authentication mechanism used in ATMs has long been the card with a PIN for secure transactions. But with the advancement of technology today, it is important for security ATMs to overcome the problem, as banking and ATM users are waking up fearful. This study analyzes recent and popular authentication mechanisms related to ATM security and recommends a good solution from past studies to increase ATM security during the ATM certification process and to protect the ATM machine from illegal physical activity. This study compares different authentication mechanisms, including the classic PIN method, and recommends the best solution by weighing four key attributes: security performance, accuracy, cost, and flexibility in terms of security. Based on the total scores weighed by the comparison, this study recommends a safe solution as a combination of two methods from previous studies. A two-step verification system with PIN and Fingerprint or OTP with S-code has been identified as the best solution for authentication, as it is highly secure and flexible to users, and another mechanism with GPS and sensors was recommended to protect against illegal physics. To provide activism and follow-up capability.

**A picture containing text, person, person, standing

Description automatically generated**



## Use-case diagram

A picture containing diagram

Description automatically generated

## Data flow diagram

Graphical user interface, application

Description automatically generated

## ER DIAGRAM

Diagram

Description automatically generated

## User Interface

Diagram

Description automatically generated

1. Display – The display brings about the cardholder through each step of transaction process.
2. Switches – The switch selects the actions that the user performs in the ATM machine.
3. Card reader – Cardholders can enter their card into this, and this is the first step of the ATM’s process
4. Fingerprint scanner – Scanner works by capturing the ridge and valley pattern on a finger of cardholder. And it compared to list of fingerprints. If it matches the cardholder can carry on his deal with the ATM.
5. Money counter – Cardholder can take his money from this counter doing after the process with ATM machine.
6. Receipt counter – Cardholder can take summery of his bank account from receipt.
7. Keypad – Cardholder’s pin or the value of money he wants can selected through the keypad.
8. Camera – Camera can record every process of ATM machine and its users, so it helps to stop stealing. But in here camera main process is identify the cardholder by using the face recognize system.

## System Architecture Diagram

Diagram

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## SOFTWARE AND HARDWARE REQUIREMENTS

This section outlines the software and hardware requirements for the system.

Face recognition and fingerprints have been developed as an extra means to access the account in this suggested system. Fingerprints and images of the face are used in this method. The face image of a person is used to authenticate the person. After that, the picture was compared to the database image, and finally the image was compared to the database image. Fingerprint recognition When both recognition techniques are used access to the account if you match with the same single person. will be made available. In this case, the Raspberry Pi microcontroller is employed. the portion in charge Ids for fingerprint scanners and facial recognition are both available. searched a database for the user's additional information. The account will be kept. The Raspberry Pi is a small computer with a microcontroller. carries out a database search and sends the results to a display device the information that is required

## SOFTWARE REQUIREMENTS

* Windows 7 is suitable for this system. Because Windows-7 is more reliable, has more functionality, and is more user-friendly, it is used as the operating system.
* MySQL/No SQL is used as a database because it is straightforward to manage and retrieve entries using basic English queries that are easy to comprehend and construct.
* Programming languages and development tools The WWE code and Web pages are written in JavaScript and HTML, including JavaScript for styling and PHP for server-side scripting.

## HARDWARE REQUIREMENTS

* Raspberry pi.
* We can continue to work on our project without any issues if we use the Intel Atom(or) Intel Dual Core Processor.
* A minimum of 512 MB of RAM and 1.10 GB of free space are required (or more).
* Fingerprint sensor requires.
* Camera requires for face identification.

**Raspberry pi: -**

A picture containing electronics, circuit

Description automatically generatedThe Raspberry Pi 3, based in the United Kingdom, developed a line of small single-board computers to use in education.

of computer science fundamentals

in schools and in developing countries.

The first model was a lot more popular than

predicted, and it was sold for things like

robotics outside of its original market. It excludes all

extraneous items (such as keyboards, mice, and cases). On the other hand, several accessories have been included in a variety of official and unofficial bundles. The Raspberry Pi Foundation recommends Raspbian, a Debian-based Linux operating system. The official website offers third-party operating systems like as Ubuntu MATE, Windows 10 IoT Core, RISC OS, and special editions for the Kody media center and classroom management. A variety of different operating systems may be run on the Raspberry Pi.

A picture containing electronics, camera

Description automatically generated**Web Camera: -**

A web camera is a device that allows you to take pictures and record movies.

It's often used for video conferencing

and picture and video capture for

authentication and verification.

In Our prototype, the Logitech camera,

this approach is used to conduct out.

It is one of the most cost-effective

and useful web cams available. market.

Other cameras can also be used to record faces.

The Logitech camera includes a 5MP sensor and can record video in 720p. capturing a picture A 5MP picture is more than plenty for a decent shot.

The camera, which is often used, supports USB 2.0 serial communication. Consequently, integrating this camera into the system is straightforward. There is no need to download the camera's driver software separately. The universal driver, which is available for all operating systems, will support the Logitech web camera. There is no need to install any additional drivers for the Logitech camera.

A picture containing website

Description automatically generated**Fingerprint sensor: -**

The fingerprint sensor is the project's most

crucial component. just like face identification,

fingerprint also use for recognition for the people.

Consider the case of identical twins,

in which the facial image is crushed and

the account is recognized via fingerprint ID.

Although fingerprint identification is more reliable, gesture identification is being used to separate people with similar appearances. It is impossible for two persons to have the same fingerprint since they are formed based on a variety of factors.

**Diagram

Description automatically generatedProposed system**