A
Project Report
on

Expense Management System

by

Bhavesh Sharad Yeole [72168931M]

Under the guidance of

Prof. Ms. Poonam R. Dholi

Department of Computer Engineering

Matoshri College of Engineering and Research Centre, Nashik-422105

SAVITRIBAI PHULE PUNE UNIVERSITY
2022-23

CERTIFICATE

Department of Computer Engineering
Matoshri College of Engineering and Research Centre, Nashik

This is to certify that .....
.....has successfully completed his / her project work on .....
.....at Matoshri College of Engineering and Research Centre, Nashik in partial fulfillment of the under Graduate course B. E. Computer, in academic year 2022 - 23 as prescribed by Savitribai Phule Pune University.

ProjectGuide	Dr. Varsha H. Patil Head	Dr. G. K. Kharate Principal

External Examiner Name and Sign

ABSTRACT

The purpose of the Expense Management System is to automate the existing manual system with the help of computerized equipment and full-fledged computer software, fulfilling their requirements so that their valuable data/information can be stored for a more extended period with easy access and manipulation of the same. The required software and hardware are easily available and easy to work with. An expense Management System, as described above, can lead to an error-free, secure, reliable, and fast management system. It can assist the user in concentrating on their other activities rather than concentrating on record keeping. Thus it will help the organization in better utilization of resources. The organization or individual can maintain computerized records without redundant entries. That means that one need not be distracted by information that is not relevant while being able to reach the information.

Keywords: Expense Management, Expense Manager, Expenditure Management System, Expense Tracker

ACKNOWLEDGMENT

First and the foremost I, express my deep sense of gratitude, sincere thanks and deep sense of Appreciation to project Guide **Prof. Ms. Poonam R. Dholi** and seminar coordinate **Prof. Swati Bhavsar** Department of Computer Engineering,Matoshri College of Engineering and Research Center, Nashik. Your Availability at any time throughout the Semester,valuable guidance ,view, comments,critics, encouragement and support tremendously boosted this research work.

Again load and loads of thank to head Computer Engineering Department **Dr.Varsha H. Patil** for providing me the support I ever had .Your opinion, view , Comments and thoughts have been really helped me to improve my writing.

I like to express my sincere gratitude to Dr.G.K.Kharate, Principal,Matoshri College of Engineering and Research center,Nashik for proving the great platform to complete the this within the schedule time.

I am also Thankful to all the faculty member,Computer Engineering Department, Matoshri College of Engineering and Research Center,Nashik for giving comments for the improvement of work ,encouragement and help during completion of the thesis.

Last bit not least; I should say thanks from my bottom of heart to my family and friends for their never ending love,help and support in so many ways through all this time.Thank you so much.

Finally , I am thanking to MIGHTY GOD,who given me the courage confidence to not only this Dissertation work but also in bad difficult situation.

Contents

Certificate i
Abstract ii
Acknowledgement iii
List of Figures v
List of Tables iv
Abbreviations vii

1 Introduction **1**
1.1 Overview 1
1.2 Motivation 1
1.3 Problem statement 2
1.4 Objectives 2
1.5 Organization of report 2

2 Literature Survey **4**
2.0.1 Literature Survey Table 4

3 Software Requirement Specification **7**
3.1 Software Specification 7
3.1.1 Monex Application Feature 7
3.1.2 Database Requirements 8
3.1.3 Hardware and Software Requirements 8
3.1.4 Functional Requirements 9
3.1.5 Non-Functional Requirements 9
3.1.6 Specific Requirements 9
3.1.7 Timeline Chart 10

4 Design of Expense Management System **11**
4.1 Monex System Architecture 11
4.2 Monex Data Flow Diagrams 12
4.2.1 DFD 0 Level daigram 12
4.2.2 DFD 1 Level diagram 12
4.2.3 DFD 2 Level diagram 13
4.3 UML Diagrams of Monex 15
4.3.1 Use Case Diagram of Monex 15
4.3.2 Sequence Diagram 16
4.3.3 Class Diagram 17
4.3.4 Activity Diagram 18
4.4 Modules of Monex-Expense Management System 19

4.4.1 User Module 19
4.4.2 Budget Organiser Module 20
4.4.3 Categorization Module 21
4.4.4 Financial AI Assistant Module (Chat GPT3.0 Integration . . . 22

5 Test Driven Development (TDD) 25
5.0.1 Unit Testing 25
5.0.2 Integration Testing 25
5.0.3 System Testing 25
5.0.4 Acceptance Testing 26
5.0.5 Need of Testing in Expense Management System 26
5.0.6 Benefits of Software System Testing 26
5.0.7 Test Cases for Each Module 28

6 Results and Discussion 32

7 Conclusions and Future Scope 40
7.1 Conclusions 40
7.2 Future Scope 40

List of Figures

4.1 System Architecture 11
4.2 DFD Leval 0 diagram 13
4.3 DFD Leval 1 diagram 13
4.4 DFD Leval 2 diagram 14
4.5 Sequence Diagram 16
4.6 Class Diagram 17
4.7 Activity Diagram 18
4.8 User Module Diagram 19
4.9 Budget Organiser Module 20
4.10 Categorization Module Diagram 22
4.11 Financial AI Assistant Module Diagram 23

6.1 Home page 32
6.2 Registration Page 33
6.3 Login Page 33
6.4 Profile Page 34
6.5 User Profile Subpart of user Module_1 34
6.6 User Profile Subpart of user Module_2 35
6.7 Budget organization module_1 35
6.8 Budget organization module_2 36
6.9 Financial AI assistance Implementation-Input Data 37
6.10 Financial AI assistance Implementation-Data Processing 38

List of Tables

2.1 Literature Survey Table 4
Literature Survey Table 4

Timeline Chart 10
3.1 Timeline chart 10

ABBREVIATIONS

Abbreviation	Illustration
CSS	Cascading Style Sheets
DFD	Data Flow Diagram
UML	Unified Modeling Language
HTML	HyperText Markup Language
API	Application Program Interface
UMTC	User Module Test Cases
CMTC	Categorization Module Test Cases
BOTC	Budget Organization Module Test Cases
AIASTC	Artificial Intelligence assistance Module Test Cases

Chapter 1

Introduction

1.1 Overview

The primary objective of our project is to aid the staff in recording the time and effort they spend on their respective tasks. The system produces various types of information that can assist individuals in managing their finances. Our project is designed to be scalable and has a user-friendly interface. It generates various reports based on expenses, categories, payments, etc. This functionality allows users to analyze their spending habits and make informed decisions about their finances.

The development of the "Expense Management System" aims to address the challenges encountered in the current manual system. The software intends to eliminate or reduce the difficulties faced by the existing system. Additionally, the system is customized to meet the specific requirements of the company and ensure smooth and efficient operations.

The application has been simplified to minimize errors during data entry and can detect invalid data, providing an error message. The system is designed to be user-friendly, requiring no formal training for the user. By implementing an Expense Management System, it can result in a secure, reliable, fast, and error-free management system. This can enable users to focus on other activities instead of record-keeping, thereby allowing the organization to utilize resources more efficiently.

1.2 Motivation

The primary objective behind the implementation of this system is to avoid a situation where you have no command over your money due to the absence of budgeting and spending checks. In such a scenario, your funds will control you, and you may end up in a vicious cycle of debt or perpetual insufficient funds. By using a money management application, you can distinguish between short-term and long-term expenses. If you lack financial management expertise, you may encounter difficulty while categorizing your expenses. However, keeping a record of your spending and budgeting will enable you to understand the amount you need to allocate to each expense category. In case of any shortfall, you can easily make adjustments.

Our team's motivation for this project stems from our personal experiences. As individuals, we often encounter daily challenges, particularly when it comes to managing

our finances. Money is undoubtedly a crucial aspect of our lives, and without it, we cannot survive even for a day. However, keeping a record of our financial transactions can help us overcome this issue. Unfortunately, many people struggle to keep track of their income and expenses, leading them to face financial difficulties and emotional distress. This situation inspired us to develop an Android application that can help users monitor their daily expenses effectively. Our Daily Expense Tracker app is designed to help individuals keep track of their expenses on a daily basis, leading to a stress-free life.

1.3 Problem statement

To solve the problem of management of expenses and finances in an efficient way and help utilize the use of software engineering and web development to solve a real-world problem. The Expense Management System helps user to manage all their expenses in an efficient way and track budget. This could be useful for people who frequently go on trips or to the theatre with their buddies. It will make it easier for them to disburse the bill.The usage of a daily expense tracker can aid individuals in monitoring their earnings and expenditures regularly, which can lead to a stress-free lifestyle.

1.4 Objectives

The objectives of the system are

- To increase efficiency of managing the expense.
- To track all the information of payments and the expenses individually .
- By implementing efficient expense management procedures, organizations can promptly and precisely issue reimbursements. It can be frustrating for employees to have to wait for months to receive reimbursement after covering expenses.
- By utilizing this application, users have the ability to oversee all financial data and monitor all expenses and income categorized accordingly.
- The improvement of editing, adding, and updating records leads to better resource management of expense data.

1.5 Organization of report

This topic describes general overview about the Expense management system , application,necessary and objective.

Literature Survey

This chapter describe about survey of all the literature based on many existing system have been studied which provide some drawbacks of their methods and algorithms.

Software Requirement Specification

This chapter describe problem description in detail. It contain the all solution used in the System. It gives the overall problem Statement of the project. It contains the hardware and software requirements of the project and also contain UML diagram that more elaborate the system.

Design of System

This chapter introduces architecture of the system and module of the system. It also contain the registration, verification, authentication process and functioning of the system.DFD and UML diagram are explained in this chapter.

Prototype model of project

This chapter describe prototype model of system . This chapter discuss about how the system is implemented and a general overview of system working. It contains user interface of the project ,how the project look like , algorithm and steps code for better understanding how the system is implemented.

Conclusion

This chapter concludes the project.

Summary

The process of defining software and hardware requirements plays a crucial role in ensuring that the project fulfills the needs and expectations of the stakeholders. By identifying the necessary functionalities and features, the project team can make sure that the software and hardware systems are specifically designed to meet the project's objectives and goals. This process is essential in ensuring that the final product meets the standards set by the stakeholders and that the project is considered a success.

The requirements for software and hardware serve as a guide for the development process, specifying what needs to be developed, how it should be developed, and the necessary tools and technologies required. This allows the development team to stay on track and ensure that the project is completed within the set timeline and budget.

Chapter 2

Literature Survey

This chapter discuss brief literature regarding the project. Literature survey is mainly used to identify information relevant to the project work and know impact of it within the project area. It defines as till yet how many surveys have been done knowledge of latest technology and implementation designs.

2.0.1 Literature Survey Table

Table 2.1: Literature Survey Table

Sr.No	Title	Year	Author	Details
1	Analytical Expense Management System	2017	Zeki Bozkus.	This project is to manage all the records in the secure manner. but doesn't consist smart features.
2	Expenditure Management System	2018	Dr. V. Geetha, G. Nikhitha, H. Sri Lasya	In everyone's life, money plays an important role. A person who cannot manage his expenses cannot successfully lead a household and fulfill his goals. In the current world where mobile phones and laptops have become a part of living, such an app would be handy to deal with all our expenses.
3	Finsave	2022	Sakshi Namdev Kore	Expense Administrator AI Based Expense Management System.
4	Daily Expense Tracker BSc.CSIT Project Nepal	2018	Rashna Maharjan	The primary objective of the Daily Expense Tracker (DET) application is to aid individuals in monitoring their expenses and saving money.

Customer Problems:

Suppose we are a multi-business owner, and we are unsure which business generates income and how much income each business generates. In that case, this application can assist us in segregating and storing all income sources. We can set reminders for specific dates to manage and finalize our income effectively. This will enable us to keep track of our revenue streams and make informed business decisions.

This application will aid you in monitoring the tasks you need to complete by the end of the month. Specifically, it will help you keep track of your monthly expenditures and their corresponding costs. These expenses may include food, phone bills, power charges, taxes, and other personal fees. issues that include:

- **Saving of Records and information:** As the amount of data increases each day, it becomes increasingly challenging to store and maintain all data manually.
- **The assurance of data security and privacy is not guaranteed:** In the manual recording method, data is documented on books and papers, which are susceptible to damage, resulting in data loss.
- **Absence of a database:** Due to the absence of a database to store information, there is a high potential for data loss or damage as the data is stored in physical files.
- **Critical requirements:** The difficulty in managing expenses arises from the critical requirements that each person has, which leads to a lack of standardization in expense management..

The Expense Management System

The Expense Tracker is a convenient web-based tool that enables users to monitor their expenses and generate regular reports on their expenditure and savings. The proposed application is designed to assist in managing daily or periodic income and expenses, and serves as a useful reminder in today's fast-paced world where it's easy to forget important financial obligations. It helps to keep track of what needs to be done at the end of each month, including payments that must be made. Sometimes, due to stress or conflicting priorities, we might forget important details like income sources, outstanding payments, or due dates. The Expense Tracker is a reliable solution that can help to alleviate such challenges.

The primary aim of this application is to serve as a reminder tool to aid users in keeping track of their budget. In today's fast-paced environment, students and small businesses will benefit significantly from this online application.

Due to the hurry-up and get-it-done culture that many people experience nowadays, there is a heightened demand for efficient methods of tracking expenses. In recent years, some studies on household budgets have been conducted, indicating that budget tracking is a daunting task in most situations, primarily because budget management is typically carried out verbally.

Provides

- Online Management of your expenses.
- Completely secure.
- Provide Transparency between the customers and service provider.
- Get instant payment, activity alerts via portal
- Beautiful dashboards create more interest.
- Any kind of device phone or computer can be used.
- Easy to track money and individual expense and to do payment.
- Information kept safe and locked.
- Two-way communication possible.

Summary

The purpose of conducting a literature survey in a project is to gather information about the current state of knowledge in the field or topic. It helps to identify gaps, contradictions, and limitations in the existing literature and establish a basis for defining the research problem and objectives. By conducting a literature survey, the project team can also recognize applicable theories, methodologies, and tools that can be utilized in the project. Moreover, it enables the team to assess and compare their findings and conclusions with those of other researchers, which enhances the validity and reliability of the project outcomes. Ultimately, a literature survey serves as a foundation for the project and steers its direction, guaranteeing that it contributes to the existing knowledge in the field.

Literature survey is crucial in establishing a strong foundation for the project and steering it in the right direction. It guarantees that the project contributes to the existing knowledge in the field. Additionally, it aids the team in recognizing any potential challenges and limitations in the project, allowing them to create strategies to tackle them effectively.

Conducting a comprehensive literature survey showcases the project team's expertise and credibility in the field, proving that they have thoroughly reviewed the literature and are familiar with the current state of knowledge on the project topic. This can significantly boost the project's reputation and increase its potential for making an impact.

A literature survey allows the project team to pinpoint gaps and deficiencies in the current literature relating to the project topic. This can aid in defining the research problem and objectives more accurately, as well as determining the project's contribution to the existing knowledge base.

Chapter 3

Software Requirement Specification

The present section offers a synopsis of the Software Requirement Specification (SRS) and its constituents. This paper comprises the predicament statement of the project, along with the hardware and software prerequisites, operational and non-operational requirements. The SRS is formulated after the analysis phase to enhance the functions and performance prospects of the software that were assigned during system engineering. It presents a comprehensive depiction of information, detailed functional and behavioral accounts, performance requisites, design limitations, validation criteria, and other pertinent data that relates to the requirements.

3.1 Software Specification

3.1.1 Monex Application Feature

1.Secure Login System

- This application like the vast majority of the applications will have a user login screen and alternatives for enlistment. The user should enlist in this application when the person in question is using it for the first time. Nonetheless, the client who is now enlisted can login to the application utilizing their login accreditation's that are made bythe user at the hour of enrolment

2.Categorization Module

- Categorization module is responsible for identifying the type of incoming documents and sorting them into appropriate categories for further processing. The module uses machine learning algorithms to analyze the contents of the documents and identify relevant keywords and phrases that can be used to classify the documents into predefined categories. The categorization module is a critical component of the overall system, as it allows for efficient and accurate handling of large volumes of documents..

3.Budget Organization Module

- The budget organization module is responsible for organizing the expenses of the organization. It allows the user to input the expenses and categorize them

based on different categories such as salaries, equipment, supplies, rent, etc. The module also allows the user to generate reports and visualize the expenses in the form of graphs and charts, which helps in better understanding the organization's financial health.

4.Financial AI Assistance Module

- Financial AI Assistance module aims to provide users with a seamless and intuitive experience while helping them make informed financial decisions.

3.1.2 Database Requirements

- MongoDB
- Firebase

3.1.3 Hardware and Software Requirements

1. Requirements of Hardware

- Processor core i3 and above
- RAM 4GB is Minimum Criteria
- Hard Disk Drive 500GB and above

2.Software Requirements

- JavaScript, ReactJS, React Native, Hooks, ContextApi

  The open-source UI software framework React Native was developed by Meta Platforms, Inc. It allows developers to use the React framework and native platform capabilities to create applications for various platforms such as Android, Android TV, iOS, macOS, tvOS, Web, Windows, and UWP.

- HTML, CSS-Cascading Style Sheets

  CSS or Cascading Style Sheets is a language used for creating style sheets that define how a document should be presented. This document could be written in a markup language like HTML or XML. CSS is one of the core technologies used on the World Wide Web, along with HTML and JavaScript.

- Operating System: Windows 8 and above

  The operating system developed by Microsoft, Windows, is the most commonly used system for desktop and laptop computers. It is primarily designed to run on x86-based computers. Windows offers a Graphical User Interface and a desktop environment that enables applications to be displayed in re sizable and movable windows on the screen.

3.1.4 Functional Requirements

REQ-1 : The system offers searching capabilities based on different factors, including expense, type, and user registration.

REQ-2 : The Expense Management System can also facilitate online payment management for the user. It offers the convenience of customization and the addition of various features specific to the user interface.

REQ-3 : System Can be used for increase efficiency of managing the Expense, Security, confidentiality.

REQ-4 : The system is responsible for overseeing the data and operations of the user.

3.1.5 Non-Functional Requirements

REQ-1 : System user analysis.

REQ-2 : Thoughts for the day are provided.

3.1.6 Specific Requirements

- A device (computer, mobile phone, tablet, etc.) with Internet
- React Native
- HTML5
- CSS3
- JavaScript
- Bootstrap 5.0
- MongoDB
- Firebase

3.1.7 Timeline Chart

Table 3.1: Timeline chart

Sr.No	Task Name	Duration	Start	Finish
1	Preliminary Phase	9 Day	27-09-2022	6-10-2022
2	Domain Selections	6 Day	07-10-2022	12-10-2022
3	Information Gathering	5 Day	12-10-2022	17-10-2022
4	Finalizing The Topic	7 Day	18-10-2022	25-10-2022
5	Requirement Gathering	7 Day	26-10-2022	02-11-2022
6	Analyzing the results	6 Day	02-11-2022	09-11-2022
7	Problem Identification	10 Day	10-11-2022	21-11-2022
8	Literature Review	12 Day	22-11-2022	02-12-2022
9	Requirement Specification	5 Day	03-12-2022	08-12-2022
10	Finalizing the requirement	4 Day	10-12-2022	15-12-2022
11	System Analysis	4 Day	16-12-2022	20-12-2022
12	Abstract Preparation	3 Day	21-12-2022	24-12-2022
13	Synopsis preparation	3 Day	21-12-2022	24-12-2022
14	UML diagram	3 Day	22-12-2022	24-12-2022
15	Architecture Design	5 Day	25-12-2022	31-12-2022
16	Coding	35 Day	01-01-2023	05-02-2023
17	Linking of Modules	2 Day	05-02-2023	07-02-2023
18	Testing	3 Day	07-02-2023	10-02-2023

Summary

When it comes to identifying the requirements of a project, it is essential to analyze the features and functionalities of the system in detail. Functional requirements pertain to what the system must do, while non-functional requirements pertain to how the system should perform.

In project management, creating a timeline chart is a crucial step as it enables the project team to visualize the project's timeline and milestones. Through a timeline chart, the project team can establish realistic deadlines, identify dependencies and potential bottlenecks, and monitor progress. Key milestones such as project start and end dates, specific deliverable deadlines, and significant meetings and events can be included in the timeline chart to provide a comprehensive overview of the project's progress. Overall, a timeline chart serves as an essential tool in project management that facilitates effective planning, tracking, and communication among team members.

Identification of functional and non-functional requirements requires prioritization as well. By prioritizing these requirements, the project team can concentrate on the most critical features and functionalities first, guaranteeing that the system provides value to the stakeholders right from the start. Prioritization also aids in managing expectations and ensuring that the project is completed within the given timeframe and budget.

Chapter 4

Design of Expense Management System

This chapter introduces architecture of the system and module of the system. It also contain the registration, verification, authentication process and functioning of the system.DFD and UML diagram are explained in this chapter.

4.1 Monex System Architecture

Figure 4.1 .

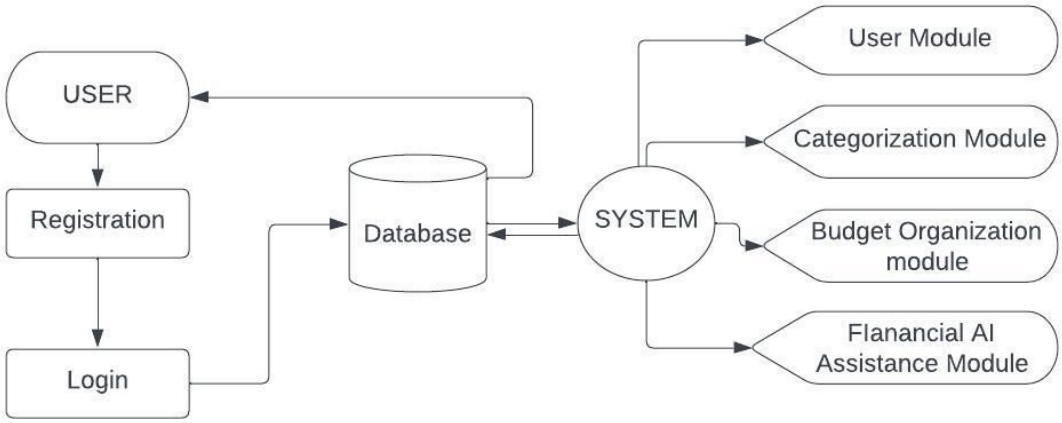


Figure 4.1: System Architecture

System architecture has this major blocks

- Registration module , Login Module, User Module
- Budget Organiser Module
- Categorization Module
- Bill Split Module

Registration module and Login Module

Also called as user Module of Monex Application, in Which The user module provides the functionality for users to sign up, log in, and log out. By signing up, users can associate the content they create with their account, and it permits various permissions to be assigned to their roles. This capability is beneficial to users as it enables them to have ownership of their content and control over their actions within the system.

Budget Organiser Module

A project budget is a detailed plan that highlights the projected revenue, expenses, and profit for your project. By tracking the project budget, you can keep a record of the expenses incurred over time, and determine the remaining amount to ensure that you stay within the budget. This allows you to adjust your direction when necessary to ensure that you are on track with your expenses.

Categorization Module

Three primary categories of financial expenses are Fixed, Variable, and Periodic. Fixed expenses are those that remain constant for extended periods, such as office rent or vehicle lease payments for you or your staff. Variable expenses fluctuate from month to month, such as utilities or meals and entertainment. Periodic expenses are those that occur at regular intervals, such as taxes or insurance premiums.

Financial AI Assistant

As a ChatGPT model trained on financial data, I can assist you with various aspects of finance management, including budgeting, investing, saving, retirement planning, tax strategies, and more. I can provide insights on financial best practices, help you create a budget based on your income and expenses.

4.2 Monex Data Flow Diagrams

A Data Flow Diagram (DFD) is a visual illustration of data movement within an information system, portraying its process-oriented features. Typically, a DFD is utilized as an initial stage to present a high-level view of the system without delving into intricate details, which can be expanded upon later.

4.2.1 DFD 0 Level daigram

At the highest level, a context diagram is a data flow diagram, also known as a "Level 0" diagram of MOnex Application. Figure 4.2 This Level 0 diagram comprises only one process node, which is "Process 0". This node serves as a generalization of the entire system's function concerning external entities.

4.2.2 DFD 1 Level diagram

In the Level 1 DFD, the system is partitioned into sub-systems (processes) that handle one or more of the data flows to or from an external agent. These sub-systems work together to deliver the system's entire functionality.Figure 4.4 shows a Level 1 diagram.

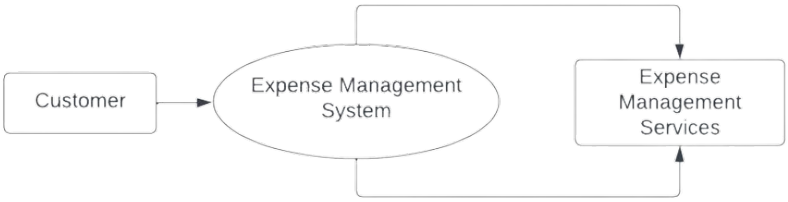


Figure 4.2: DFD Leval 0 diagram

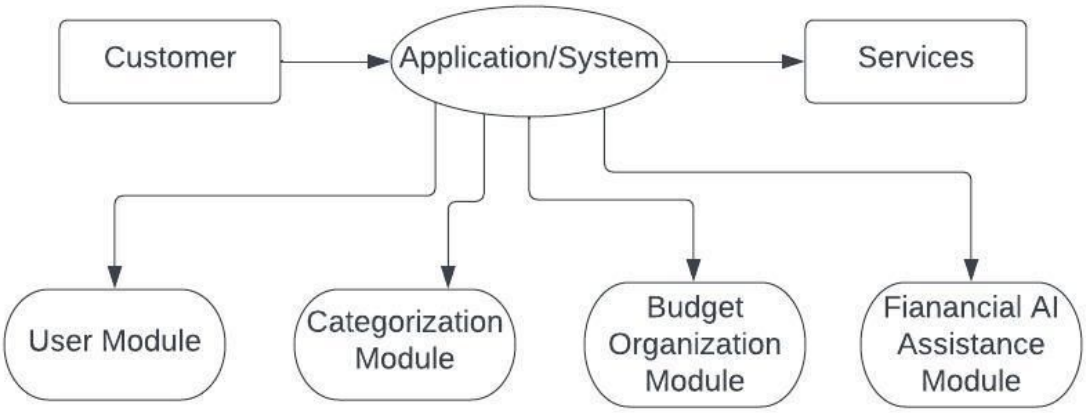


Figure 4.3: DFD Leval 1 diagram

4.2.3 DFD 2 Level diagram

DFD Level 2 is useful for understanding the detailed workings of a system and identifying areas for improvement or optimization. It can also be used to communicate system requirements to stakeholders and developers, as well as to help with system testing and validation.Figure 4.4 shows a Level 2 diagram.

In Level 2 diagrams, the processes that were identified in the Level 1 diagram are elaborated into more detailed sub-processes, and the data flows between these sub-processes are demonstrated. This diagram provides a more comprehensive and detailed representation of the system, making it useful for understanding the specific steps involved in each process. It provides a detailed view of the system, allowing for a better understanding of the interconnectivity between sub-processes.

To illustrate, assume that the Level 1 diagram includes a process named "Order Processing." The Level 2 diagram may further divide this process into smaller sub-processes like "Validate Customer Details," "Inventory Verification," "Payment Processing," and "Order Status Update." These sub-processes would portray the flow of data between them, indicating how information is transferred from one sub-process to another.Overall, a Level 2 DFD provides a more detailed and comprehensive view of the system than a Level 1 diagram, and it is useful for understanding the specific steps involved in each process.

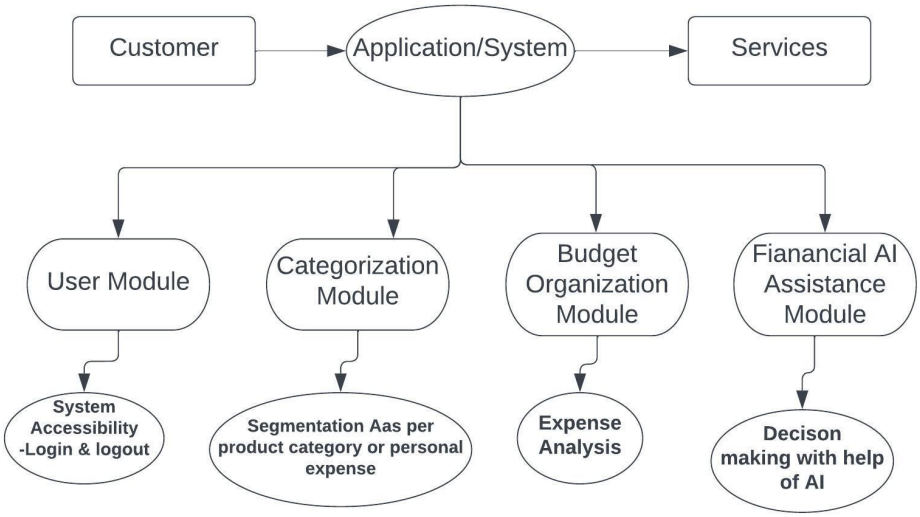


Figure 4.4: DFD Leval 2 diagram

A DFD Level 2 diagram is a more detailed version of a Level 1 diagram that shows the sub-processes and data flows within each process. It provides a more comprehensive view of the system and is useful for understanding the specific steps involved in each process. The Level 2 diagram is created by breaking down the major processes identified in the Level 1 diagram into more detailed sub-processes and showing the data flows between them. Overall, the Level 2 DFD is an important tool for understanding the flow of data through a system and how it is processed at each step.

4.3 UML Diagrams of Monex

4.3.1 Use Case Diagram of Monex

Actor:

A logical collection of functions that users perform while engaging with the use cases.

Use case:

Unified Modeling Language (UML) is a language utilized for visualizing, specifying, and documenting systems. It is a crucial step in the product development process after analysis. The objective is to create a model of the entities involved in the project that will be built later. The design of the entities to be included in the product being developed must be represented in UML.

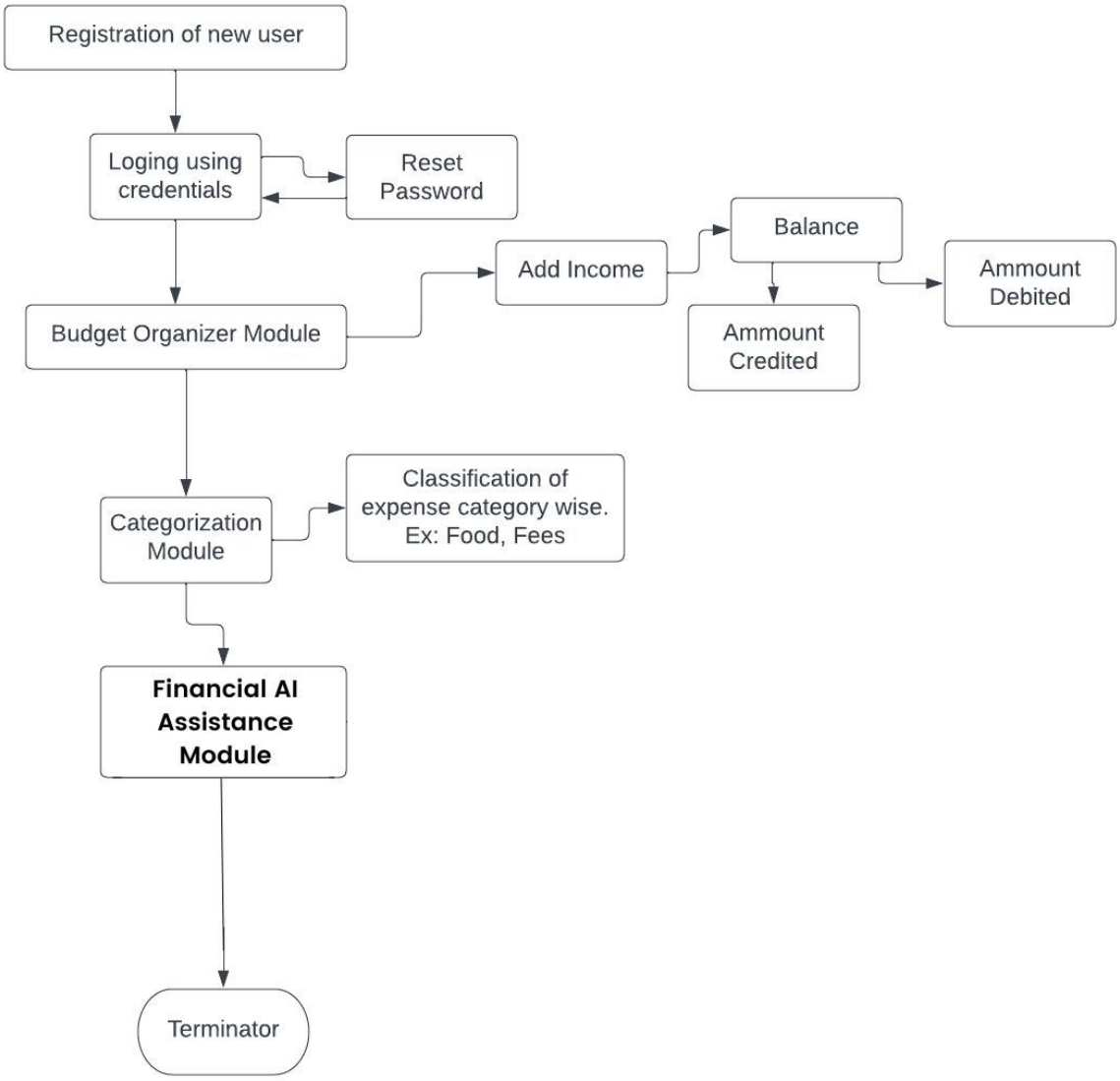


figure :Use case Diagram

4.3.2 Sequence Diagram

Sequence diagrams and collaboration diagrams are both types of interaction diagrams. These diagrams depict an interaction that includes a set of objects and their relationships, as well as the messages that may be exchanged between them.

A sequence diagram is a visual representation of the sequential interactions between objects in a system, illustrating the order in which these interactions occur. It can also be referred to as an event diagram or event scenario. The purpose of a sequence diagram is to depict the functioning of objects within a system and the sequence in which they operate. It provides an overview of how objects interact with each other and in what order. Figure 4.5 shows a Monex-Sequence Diagram.

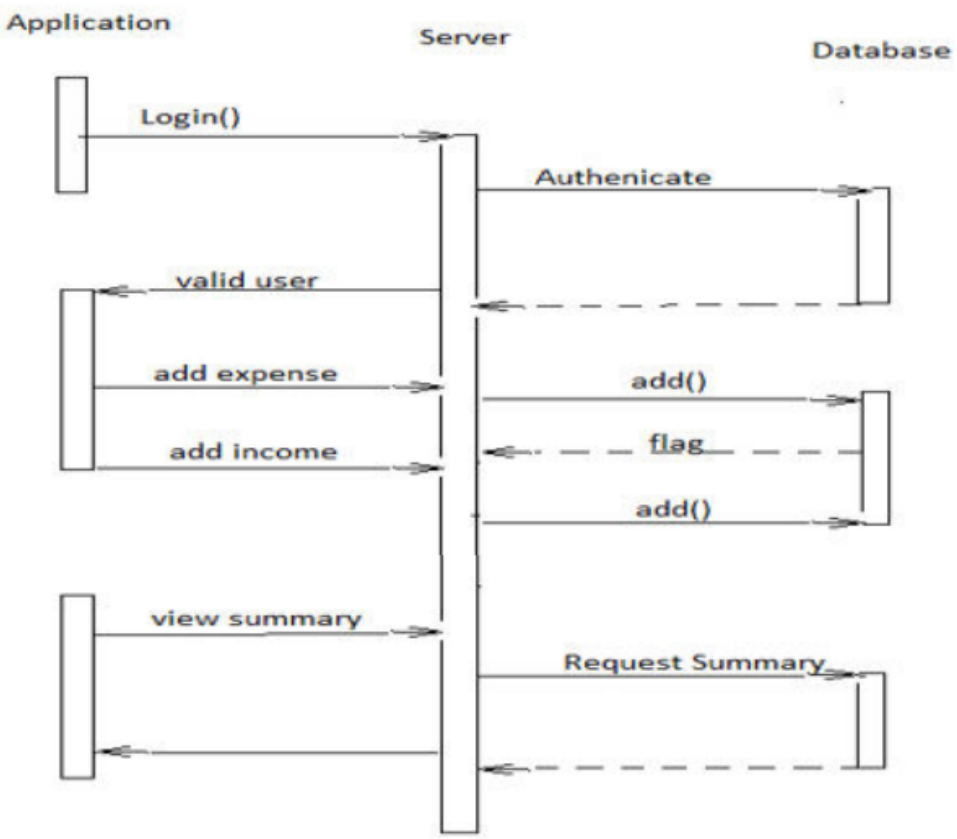


Figure 4.5: Sequence Diagram

The figure you mentioned provides a visual representation of the flow and sequence of the MONEX Application. It helps users understand the overall process of how the application works and how different components of the system are connected to each other.Overall, the flowchart seems to provide a clear and concise overview of the MONEX Application's functionality, making it easier for users to understand and use the system effectively.The flowchart shows that each action leads to the next step in the process and highlights the dependencies between different actions and It helps users understand the overall process of how the application works and how different components of the system are connected to each other.

4.3.3 Class Diagram

In the Unified Modeling Language (UML), a class diagram is a diagram type that depicts the system's structure by displaying its classes, attributes, methods, and the connections between them. This static diagram is widely used in software engineering to model the structure of object-oriented software systems.In a class diagram, each class is represented as a rectangle that contains the class's name, attributes, and methods. The attributes represent the properties of the class, while the methods represent the behaviors that the class can perform. The relationships between classes are represented using various types of lines, such as inheritance, association, aggregation, and composition.Figure 4.11 shows a class diagram.

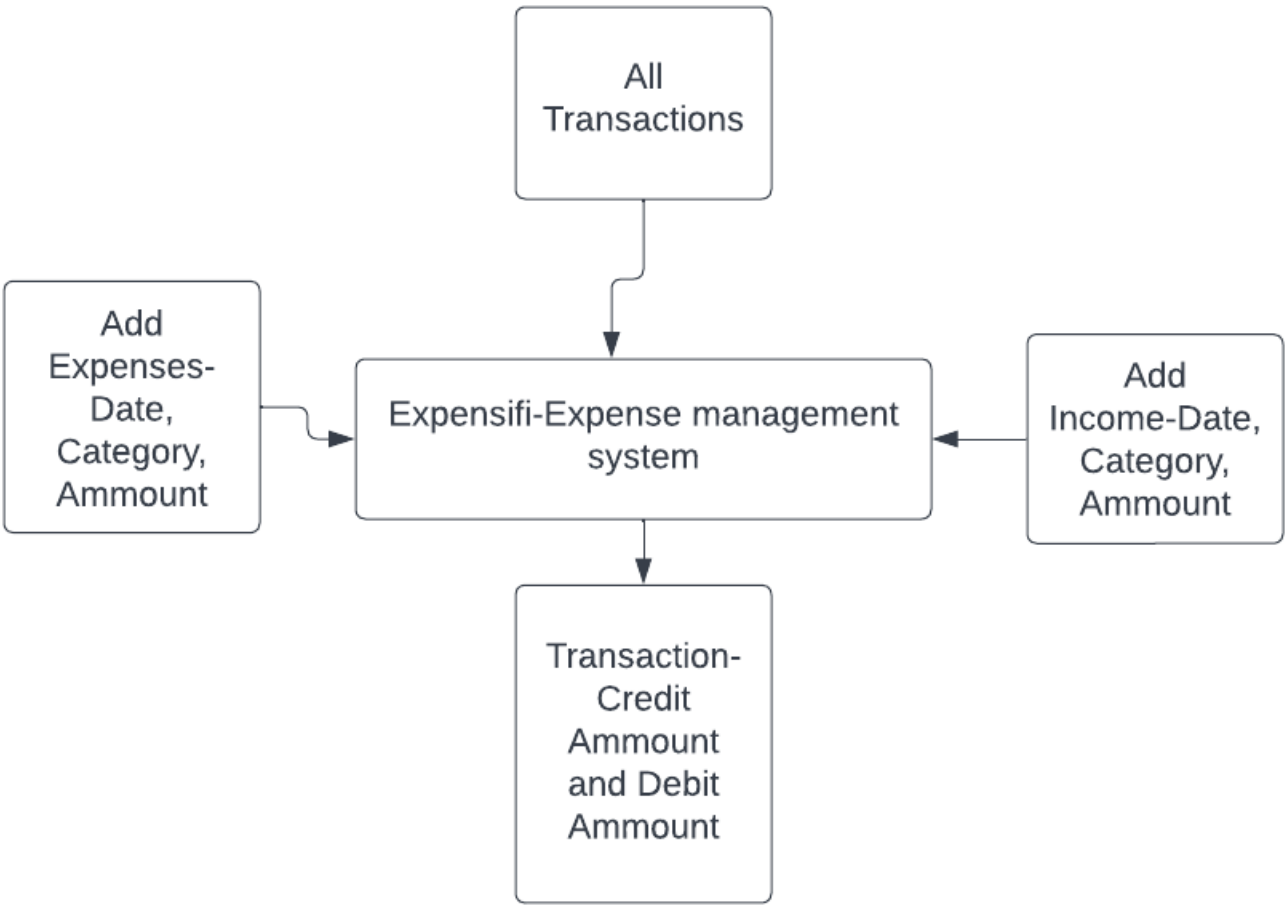


Figure 4.6: Class Diagram

Inheritance represents the relationship between a super class and its sub classes, where the sub classes inherit the properties and methods of the super class. Association represents a relationship between two classes, where one class uses the other class's objects. Aggregation represents a relationship between two classes, where one class contains objects of the other class. Composition is a stronger form of aggregation, where the objects of one class cannot exist without the objects of the other class.

4.3.4 Activity Diagram

An activity diagram is a type of diagram in the Unified Modeling Language (UML) that shows the flow of activities in a system or a process. It is a behavioral diagram that depicts the behavior of a system by modeling the activities involved in a particular business process or use case.

In an activity diagram, the activities are represented as nodes or circles, while the transitions between the activities are represented as arrows or lines. The nodes can also contain additional information, such as conditions or constraints that control the flow of activities.

Activity Diagram

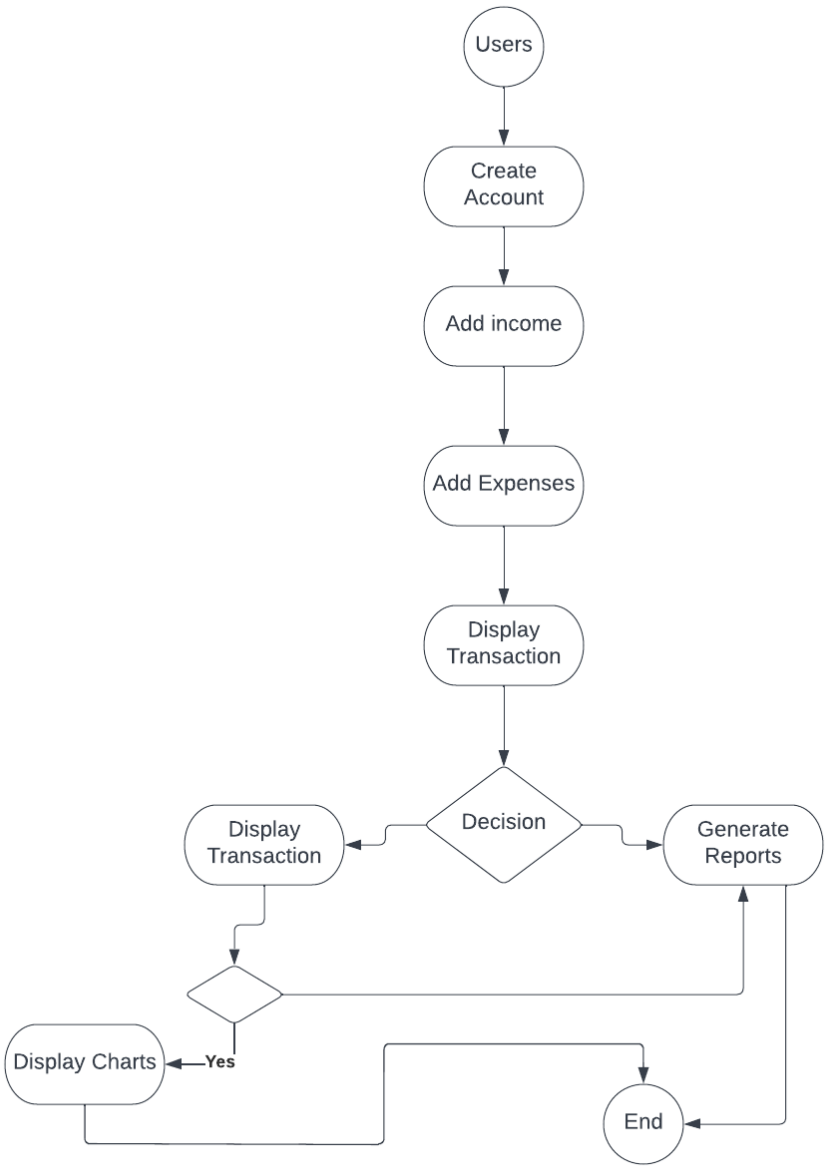


Figure 4.7: Activity Diagram

4.4 Modules of Monex-Expense Management System

4.4.1 User Module

The user module is an essential component of any modern web application, providing crucial functionality for user management. With the user module, users can not only register and log in, but also update their profile information, reset their passwords, and manage their account settings.One of the key advantages of the user module is that it enables users to create an account and associate their content with it. This allows for a personalized experience, as users can view their own content, track their activity, and easily manage their contributions. It also helps in maintaining data integrity and accountability, as content created by users can be easily attributed to their respective accounts.

Function Of Module:

The user module also plays a crucial role in enhancing the security of the application. It allows for features such as password hashing and encryption, account verification, and two-factor authentication, which help in safeguarding user data and preventing unauthorized access.

- User Registration
- User Login
- User Logout

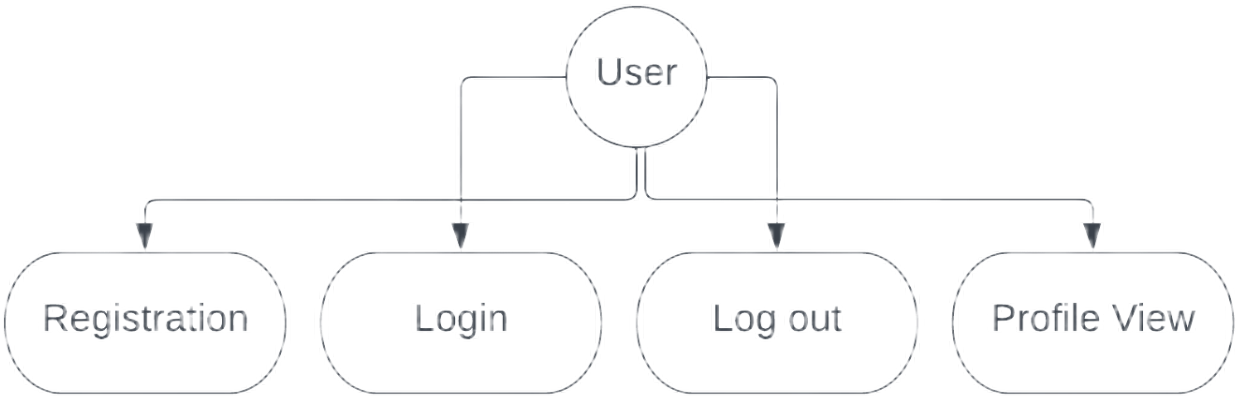


Figure 4.8: User Module Diagram

Input

User registration information such as username, email, and password.

Process

Registered user account with associated profile and permissions.

Output

Validate input data, store user information securely in a database, generate unique user ID, and provide confirmation or error message to the user.

Working

The user module in a web application allows users to register an account with inputting their registration information, such as username, email, and password. The module validates and securely stores the user data in a database, generates a unique user ID, and provides functionalities like login, logout, profile management, and access control to enhance the overall user experience and security of the application.

4.4.2 Budget Organiser Module

A project budget serves as a financial road map for a project, detailing the projected income, expenses, and expected profit. Project budget tracking allows for monitoring of expenditure over time, determining the remaining budget, and making adjustments as needed. Data visualization techniques can be employed to visually represent the budget data, making it easier to analyze and interpret the financial status of the project.

Function Of Module:

Budget tracking module in a project management system provides functionalities for planning, tracking, analyzing, and reporting on project budget data, allowing for effective financial management, course correction, and data visualization to support decision-making.

- Budget Planning
- Expense Tracking
- Income Tracking
- Budget Analysis and Reporting

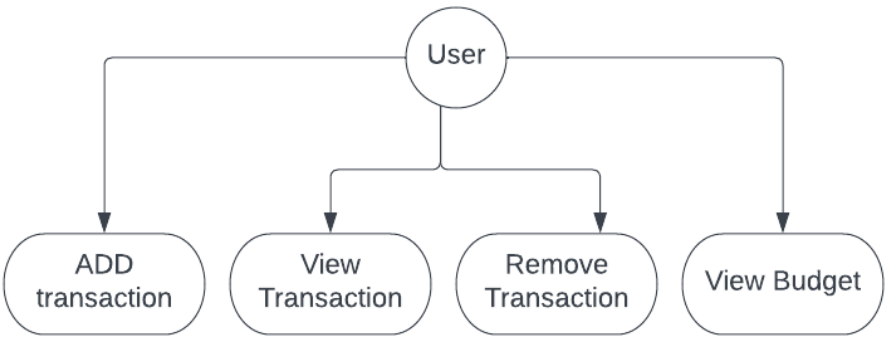


Figure 4.9: Budget Organiser Module

Input

Project budget plan and actual income/expense data

Process

Comparison, analysis, and data visualization

Output

Budget analysis, reports, and data for decision-making

Working

The project budget tracking module receives input in the form of a budget plan and actual income/expense data, performs comparison, analysis, and data visualization processes, and generates output in the form of budget analysis, reports, and data for decision-making, enabling effective financial management and decision-making in the project.

4.4.3 Categorization Module

Proper categorization of expenses can help individuals and businesses gain a better understanding of their spending patterns, identify areas where cost savings can be made, and make informed financial decisions. By accurately categorizing expenses, it becomes easier to track and analyze spending, create realistic budgets, and manage overall financial health effectively.

Function Of Module:

The module enables efficient expense management by providing a structured framework for organizing and reviewing expenses. It helps in monitoring and controlling expenses, identifying potential discrepancies or inaccuracies, and ensuring that expenses are properly accounted for.The categorization module facilitates financial analysis by providing insights into spending patterns and trends. It helps in identifying spending habits, areas of high or low expenses, and areas where cost savings can be made. This information can be used to make informed financial decisions and optimize overall financial health.

- Budgeting and planning
- Financial analysis
- Expense management
- Reporting and compliance

Input

Raw financial data including various expenses incurred by an individual or business.

Process

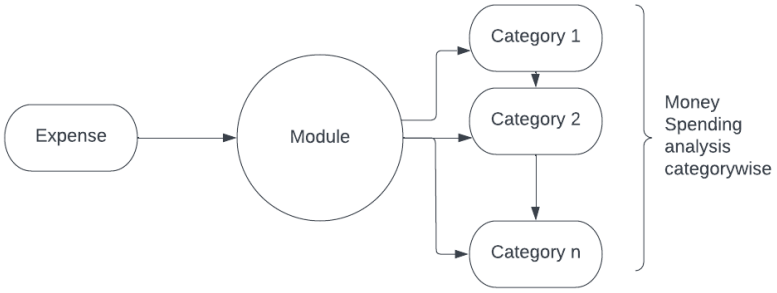


Figure 4.10: Categorization Module Diagram

Categorization module classifies the expenses into fixed, variable, or periodic categories based on their characteristics.

Output

Categorized expenses that provide a clear overview of spending patterns, aid in budgeting and planning, and facilitate financial analysis and reporting.

Working

When a user spends money on specific categories such as food, medical expenses, household items, clothing, transportation, entertainment, and more, the app's advanced algorithms automatically categorize the expenses for easy tracking and budget management. This feature simplifies the process of managing finances by providing a clear overview of where the money is being spent. Users can quickly identify spending patterns, make adjustments to their budget, and make informed financial decisions.

4.4.4 Financial AI Assistant Module (Chat GPT3.0 Integration

To integrate ChatGPT into project or system, we can follow these general steps:

Sign up for an OpenAI account and obtain an API key. Choose the appropriate API endpoint, such as the "davinci-codex" model. Make API requests using your API key and preferred programming language. Format input and output as messages with roles ("system", "user", or "assistant") and content. Parse API responses to extract generated text. Handle API rate limits to avoid rate limit errors. Test and iterate to fine-tune conversation flow and input format. Review and follow OpenAI's usage policies and guidelines for ethical AI practices. By following these steps, you can integrate ChatGPT into your project and leverage its capabilities for conversational interactions with users or other applications.

Function Of Module:

- Decision Making
- Budget management
- User assistance
- Financial planning

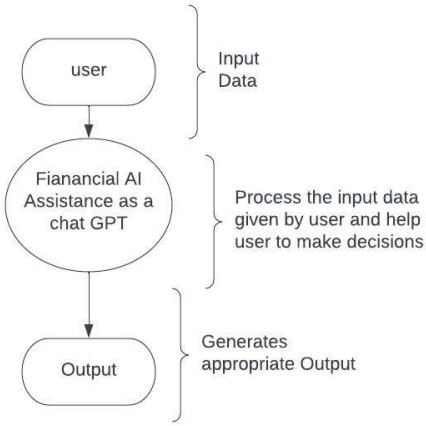


Figure 4.11: Financial AI Assistant Module Diagram

Input

User provides information about their financial situation, goals, and preferences.

Process

The ChatGPT API allows for interactive back-and-forth conversations with the user, allowing the user to ask follow-up questions, seek clarification, or request additional information. The AI model can continue to provide responses based on the user's input, helping to address their financial management needs in a conversational manner.

Output

The AI model produces appropriate replies by taking into account the input provided by the user.

Working

The AI model uses its trained knowledge of financial concepts, rules, and best practices to analyze the user's input and generate relevant responses. It may use natural language processing (NLP) techniques to understand the user's intent and extract relevant information, such as income, goals, risk tolerance, and preferences. The model then applies its financial knowledge to provide appropriate recommendations, tips, and strategies for managing finances effectively.

Summary

The financial management system we have developed consists of four modules: User Module,categorization, budget organization, and AI assistance. The categorization module helps users to classify their transactions into different categories, making it easier to keep track of their expenses. The budget organization module allows users to set budgets for each category and monitor their spending to ensure they stay within their limits. The AI assistance module offers a chatbot interface and recommendation system, powered by machine learning, to provide users with personalized financial advice.

The categorization module works by automatically identifying and categorizing transactions based on their description and amount. Users can manually adjust the category if the system misclassifies it. The budget organization module allows users to set budgets for each category, and the system will send notifications if they exceed the limits. The AI assistance module provides users with personalized financial advice by analyzing their spending patterns and offering suggestions on how to save money or optimize their budget

Overall, our financial management system offers users a comprehensive solution to manage their finances effectively. The system's modules work together seamlessly, providing users with a holistic view of their financial situation and empowering them to make informed decisions about their money.

Chapter 5

Test Driven Development (TDD)

One of the most critical phases in the development of an expense management system is testing. Testing ensures that the system functions as intended and meets the requirements of its users. It helps identify defects, errors, and other issues that can impact the system's functionality, performance, and security. In this chapter, we will discuss the various testing methods used in the development of an expense management system.

5.0.1 Unit Testing

Unit testing is a testing method that concentrates on examining individual units or components of the system. It consists of scrutinizing each module, function, or class in isolation to confirm that it operates as expected. The primary objective of unit testing is to detect faults at an early stage in the development process and guarantee that every element of the system operates accurately. Developers usually conduct unit testing using frameworks such as JUnit, NUnit, or pytest.

5.0.2 Integration Testing

The primary objective of Integration testing is to examine the interaction between different modules or components of the system. It verifies that the system's various parts work together smoothly and that data flows correctly between them. The main aim of integration testing is to detect interface errors, communication issues, and data inconsistencies that can arise when various components are integrated. Developers usually conduct Integration testing using tools such as Selenium, Appium, or TestNG.

5.0.3 System Testing

System testing is a form of testing that concentrates on the entire system. This includes testing all of the system's components to guarantee that it meets the user's requirements. The purpose of system testing is to uncover defects, errors, and other problems that may affect the system's functionality, performance, and security. Independent testers usually perform system testing using tools like JMeter, LoadRunner, or Apache Bench.

5.0.4 Acceptance Testing

Acceptance testing is a form of testing that concentrates on verifying whether the system fulfills the users' needs and requirements. It encompasses testing the system against user-defined use cases, scenarios, and requirements. The primary objective of acceptance testing is to ensure that the system performs as expected and meets the users' expectations. End-users or product owners usually conduct acceptance testing using various tools, including Cucumber, FitNesse, or SpecFlow.

5.0.5 Need of Testing in Expense Management System

The process of software testing is crucial as it guarantees the dependability and excellence of software systems. This procedure involves the confirmation and validation that the system complies with its requirements and specifications and operates as planned. Testing is beneficial in detecting flaws, mistakes, and susceptibilities in the software, enabling their rectification before the system is made available to end-users.

To guarantee that the system is working correctly, satisfies the user's requirements, and is safe to use, testing is indispensable. It instills certainty that the system is dependable, stable, and performs in accordance with the specifications. Testing assists in verifying that the software is user-friendly, satisfies the business requirements, and is simple to manage and update.

In addition to ensuring quality, testing can also contribute to lowering the cost and time required for software development. By identifying and addressing defects early in the development process, the expenses associated with resolving them are considerably mitigated. Testing can also prevent system failures and expensive rework, which can lead to lost revenue and harm the organization's reputation.

In the summary, testing is critical in software development and ensures that the software system is of high quality, reliable, and meets the user's needs. It helps to reduce the cost and time involved in the development process and ensures that the software is safe, user-friendly, and easy to maintain.

5.0.6 Benefits of Software System Testing

The early identification of defects: Testing plays a crucial role in identifying defects and issues in software at an early stage, even before it is released to end-users. This approach helps in minimizing the cost and effort needed to fix defects in later stages of the software development life cycle.

Improving the user experience: Testing plays a crucial role in improving the user experience. It ensures that the software meets the user's expectations and requirements by testing it from their perspective. Testers can identify areas for improvement and implement changes to enhance the user experience.

The quality of the software is enhanced: Through testing, defects, errors, and bugs in the code are detected and resolved, resulting in software that is not only more reliable but also efficient and user-friendly.

Save Time and Money: The process of testing can lead to significant time and cost savings by identifying defects early in the software development process. This early identification of defects reduces the time and effort required to fix them in later stages, ultimately reducing the cost of rework and ensuring timely and budget-friendly software delivery.

Reduces Risks: The act of testing can aid in minimizing the risks that come with software development, which includes compatibility risks, security risks, and performance risks. Testers can recognize and mitigate potential risks by conducting thorough software testing, which ensures that the software is secure, reliable, and safe to use.

Provides Confidence: The process of testing instills confidence in developers, testers, and end-users that the software is of superior quality and satisfies their demands. It also guarantees that the software conforms to industry standards and regulations.

Facilitates continuous improvement: The process of testing plays a vital role in promoting continuous improvement by providing valuable feedback and insights into the software development process. This allows for the identification of areas that require improvement and enables necessary changes to be made to ensure that the software attains optimal quality.

In general, these subjects offer a comprehensive comprehension of software development, encompassing software systems, modeling, and testing. They highlight the significance of guaranteeing software quality, enhancing user experience, and accomplishing continuous improvement.

5.0.7 Test Cases for Each Module

User Module Test Cases

Test Case ID	Test Case Description	Expected Result	Actual Result
UMTC001	Verify that a new user is able to register for the system by providing their email, username, and password.	User enters valid email, username, and password, and clicks on the "Register" button. The system creates a new user account and redirects the user to the login page.	Passed
UMTC002	The objective is to confirm that a current user can successfully log in to the system utilizing their designated username and password.	When the user inputs their username and password and clicks the "Login" button, the system will verify the user's credentials, and subsequently, the user will be redirected to their dashboard..	Passed
UMTC003	Verify that the system displays an error message when an incorrect username or password is entered during login.	User enters an incorrect username or password, and clicks on the "Login" button. The system displays an error message indicating that the username or password is incorrect.	Passed
UMTC004	Verify that the system allows users to reset their password by providing their email address.	The "Forgot Password" link prompts the user to enter their email address and submit it. An email is then sent to the user's email address with a link to reset their password. The user can then click on the link, enter a new password, and the system will update their password in the database.	Passed

Categorization Module Test Cases

The Categorization Module is a critical component of the Expense Management System, as it allows users to classify their expenses into different categories. To ensure its effectiveness, thorough testing of this module is necessary. The test cases for this module will focus on verifying that the module correctly identifies and categorizes expenses according to user-defined criteria. Additionally, it will test whether the module can accurately match similar transactions to pre-existing categories, reducing the burden on users to manually categorize every expense.

Test Case ID	Test Case Description	Expected Result	Pass/Fail
CM-001	Add new category	Add a new category and verify that it appears in the list of categories.	Pass
CM-002	Edit existing category name	Edit the name of an existing category and verify that the new name is displayed correctly in the list of categories.	Pass
CM-003	Delete existing category	Delete an existing category and verify that it is no longer visible in the list of categories.	Pass
CM-004	Assign a category to an expense	Assign a category to an expense and verify that the expense is categorized correctly.	Pass
CM-005	View expenses by category	Select a category and verify that all expenses in that category are displayed.	Pass
CM-006	View all categories	View all existing categories and verify that they are displayed correctly.	Pass
CM-007	View total expenses by category	View the total expenses in each category and verify that the amounts are displayed correctly.	Pass
CM-008	Assign a sub-category to a category	Assign a sub-category to a category and verify that it is assigned correctly.	Pass

Budget Organization Module Test Cases

The test cases for this module ensure that the budget calculations are accurate and the system generates proper alerts and notifications when the user is close to exceeding the budget. It also checks if the reports generated by the module are correct and show accurate information about the user's expenses and budget allocation.

The Budget Organization module is responsible for managing the user's budget by providing features such as setting monthly or weekly budgets, monitoring expenses, and generating reports. The module ensures that the user stays within the allocated budget and provides suggestions for reducing expenses.

Test case ID	**Test case description**	**Expected result**	**Result**
BO-TC-01	Add a new budget with valid details	New budget is added successfully	Passed
BO-TC-02	Add a new budget with invalid details	Error message is displayed and budget is not added	Passed
BO-TC-03	Edit an existing budget with valid details	Budget details are updated successfully	Passed
BO-TC-04	Edit an existing budget with invalid details	Error message is displayed and budget details are not updated	Passed
BO-TC-05	Delete an existing budget	Budget is deleted successfully	Passed
BO-TC-06	View budget report for a specific time period	Budget report is generated successfully for the selected time period	Passed
BO-TC-07	View budget report for a specific category	Budget report is generated successfully for the selected category	Passed
BO-TC-08	View budget report for all categories	Budget report is generated successfully for all categories	Passed

AI Assistance Module Test Cases

The test cases for this module ensure the actual test cases and their expected results will depend on the specific features and functionality of the module, as well as the requirements of the system as a whole.

ID	Test Case Description	Expected Result	Actual Result
AIAS-TC-01	Test the AI model for accuracy by providing it with a set of questions and comparing the answers with the correct ones.	The AI model should provide correct answers for all the questions.	All questions were answered correctly by the AI model.
AIAS-TC-02	Test the chatbot functionality by providing it with a set of queries related to the organization's services and checking if it can provide relevant and accurate responses.	The chatbot should provide relevant and accurate responses to all the queries.	The chatbot provided relevant and accurate responses to all the queries.
AIAS-TC-03	Test the recommendation system by providing it with a set of inputs related to the user's preferences and checking if it can provide relevant recommendations.	The suggestion system must offer appropriate suggestions based on the user's inputs.	The suggestion system offered pertinent suggestions based on the user's inputs.

Summary

To ensure that the system is operating correctly and generating precise results, test cases have been developed for all modules. For the Categorization module, a group of articles was provided to the system to test its ability to classify them correctly.

During the testing phase of the Budget Organization module, a set of budget data was provided to the system to verify its capability to sort the data accurately. The AI Assistance module, on the other hand, underwent testing to ensure that the AI model, chatbot functionality, recommendation system, and voice recognition system were all functioning correctly. The test cases were designed meticulously to cover various aspects of the system and guarantee that it is performing as intended.

Chapter 6

Results and Discussion

This chapter introduce about the results obtained after the successful implementation of the project.As the system has been designed and tested with various test cases, the expected result is that it will provide accurate and reliable assistance to users in managing their financial activities. The system will help users categorize their expenses, manage their budget, and provide personalized recommendations based on their spending patterns. The chatbot feature will allow users to interact with the system and get quick responses to their queries. The voice recognition feature will provide an additional level of convenience by allowing users to perform tasks hands-free. Overall, the system is expected to provide users with a streamlined and efficient approach to managing their finances.

Figure 6.1: Home page

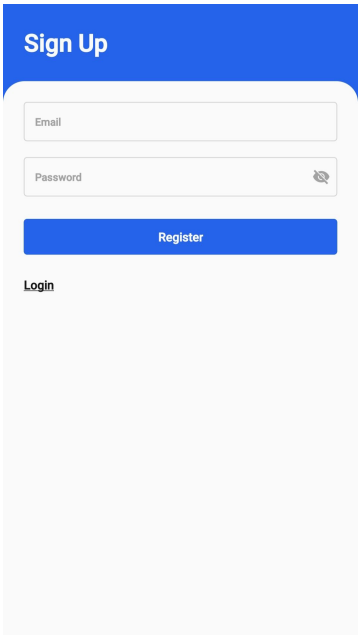


Figure 6.2: Registration Page

The depicted module in Figure 6.2 necessitates that the user provides all the essential credentials required for the primary registration process. Once the registration is successful, the user's data is saved in the application database, enabling them to access the application with ease by logging in.

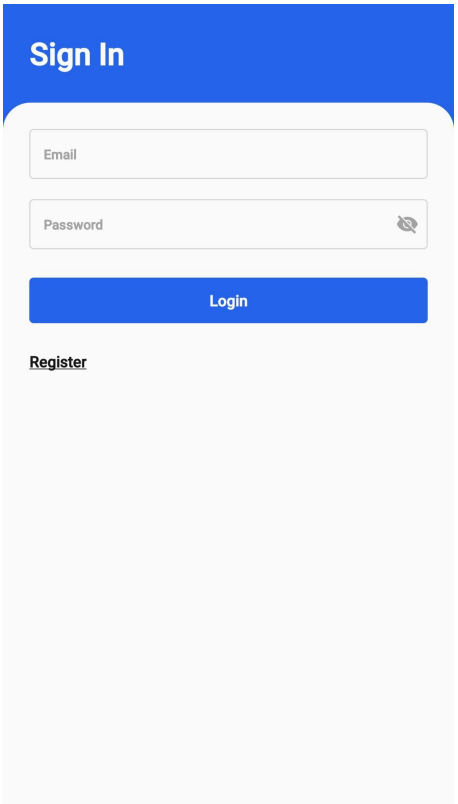


Figure 6.3: Login Page

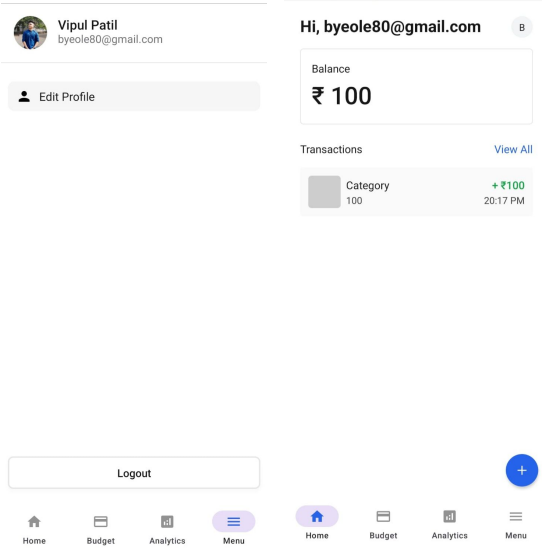


Figure 6.4: Profile Page

Upon successful login, the user will be directed to the module depicted in Figure 6.4, which displays all the application features. The user can navigate and engage with the contents of the other tabs available on this page.

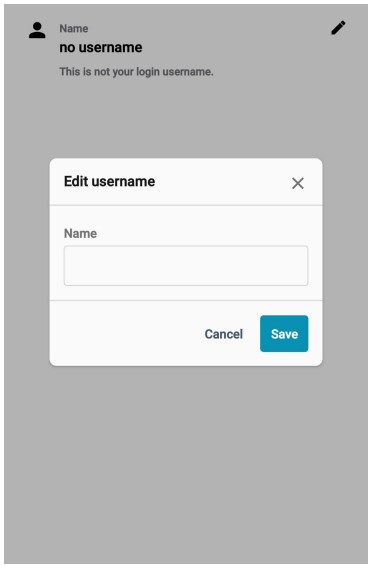


Figure 6.5: User Profile Subpart of user Module [1]

The settings feature in the user module serves as a subpart that offers users a variety of customization options. One of these options is the ability to add a profile picture to their account. Users can choose to upload a profile picture from their photo gallery or select an image from the gallery of images stored on their device. This allows users to personalize their profile and showcase their unique identity within the application.

Furthermore, the settings section also provides users with the convenience of switching accounts. This can be accomplished by changing their email ID associated with the account. For instance, if a user has multiple accounts on the same application, they can easily switch between them by updating their email ID in the settings. This enables users to manage their different accounts efficiently and seamlessly within the application, without having to log in and out repeatedly.

Additionally, the settings feature allows users to update their email ID. This feature is particularly useful when users want to change their email address due to reasons such as moving to a new email provider or updating their contact information. By providing the option to update their email ID, the application ensures that users can keep their account information accurate and relevant, facilitating smooth communication and account management.

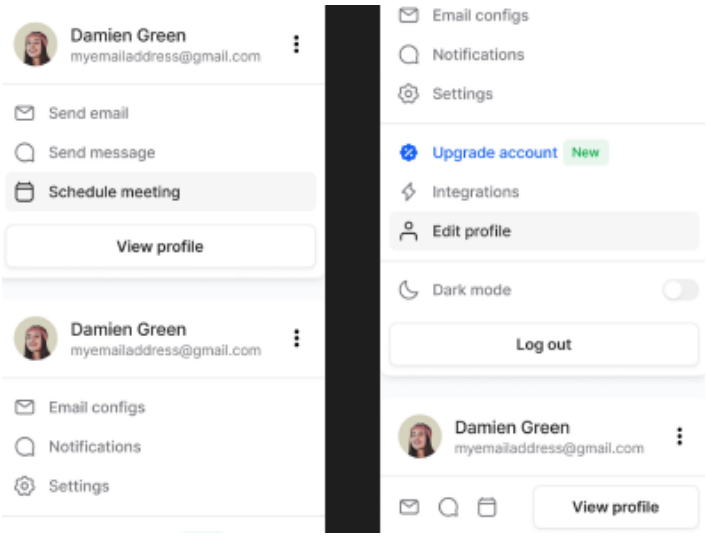


Figure 6.6: User Profile Subpart of user Module$_2$

Communication Features The user settings module may include integrated communication features that allow users to send both emails and messages directly from the application. Users can send messages or emails to other users or support staff for inquiries, clarifications, updates, or any other communication related to their financial activities.

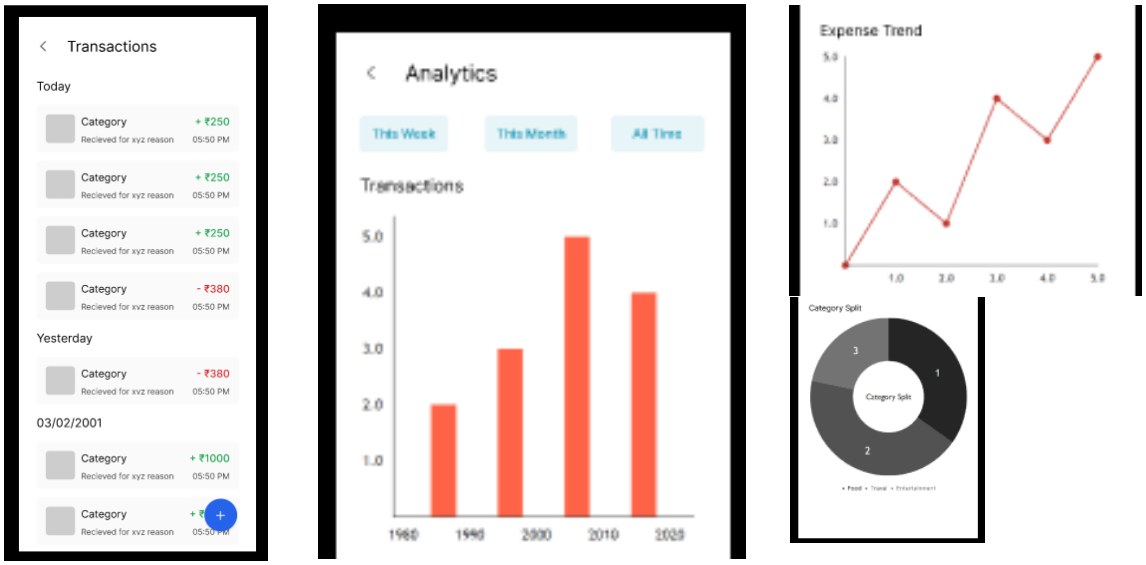


Figure 6.7: Budget organization module$_1$

The budget organization module is designed to assist users in managing their transactions effectively, providing them with a comprehensive view of their financial activities. This is achieved through the integration of analytical tools that offer valuable insights and visualizations, enabling users to make informed decisions regarding their budget.

One of the key functionalities of the budget organization module is transaction tracking. Users can input and categorize their transactions, such as income, expenses, savings, and investments, into the system. The module then utilizes analytical tools to process and analyze this data, generating graphical representations and summaries for easy visualization.

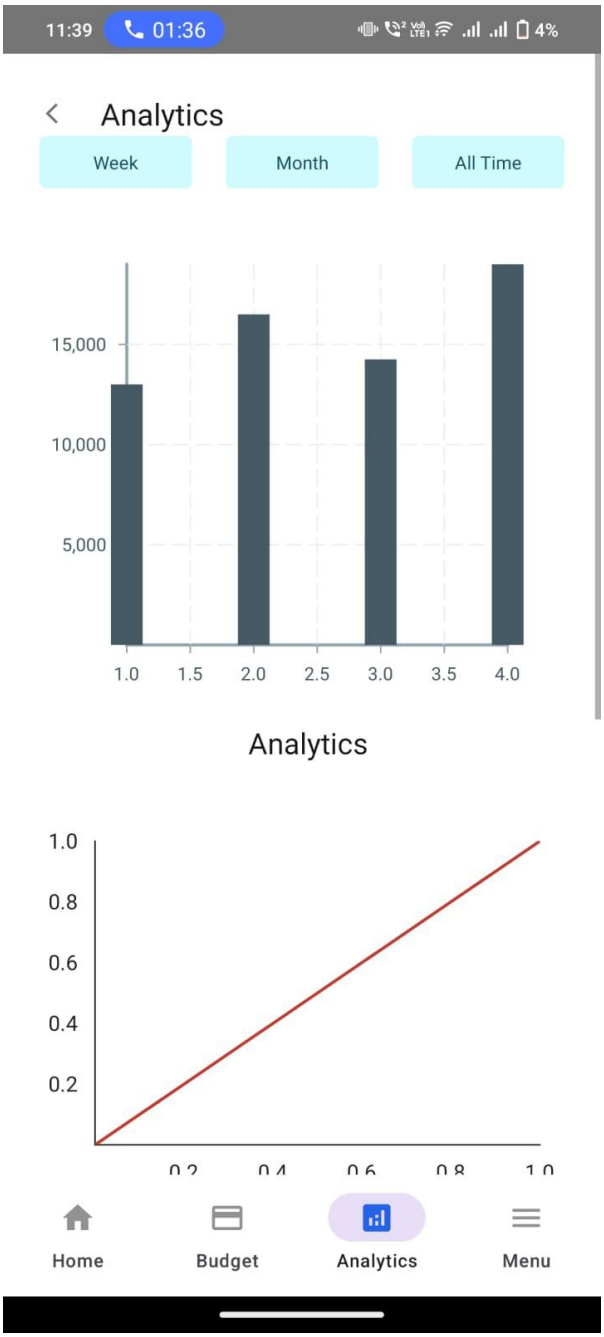


Figure 6.8: Budget organization module [2]

A financial AI assistance system can offer various functions such as financial planning, investment management, budgeting and expense tracking, tax planning, financial education, risk assessment and management, personalized recommendations, alerts and notifications, interactive conversations, and data security and privacy. These functions can help users with managing their finances, making informed financial decisions, and achieving their financial goals. However, it's important to carefully evaluate the features and capabilities of any AI-powered financial management system and seek professional financial advice when needed.

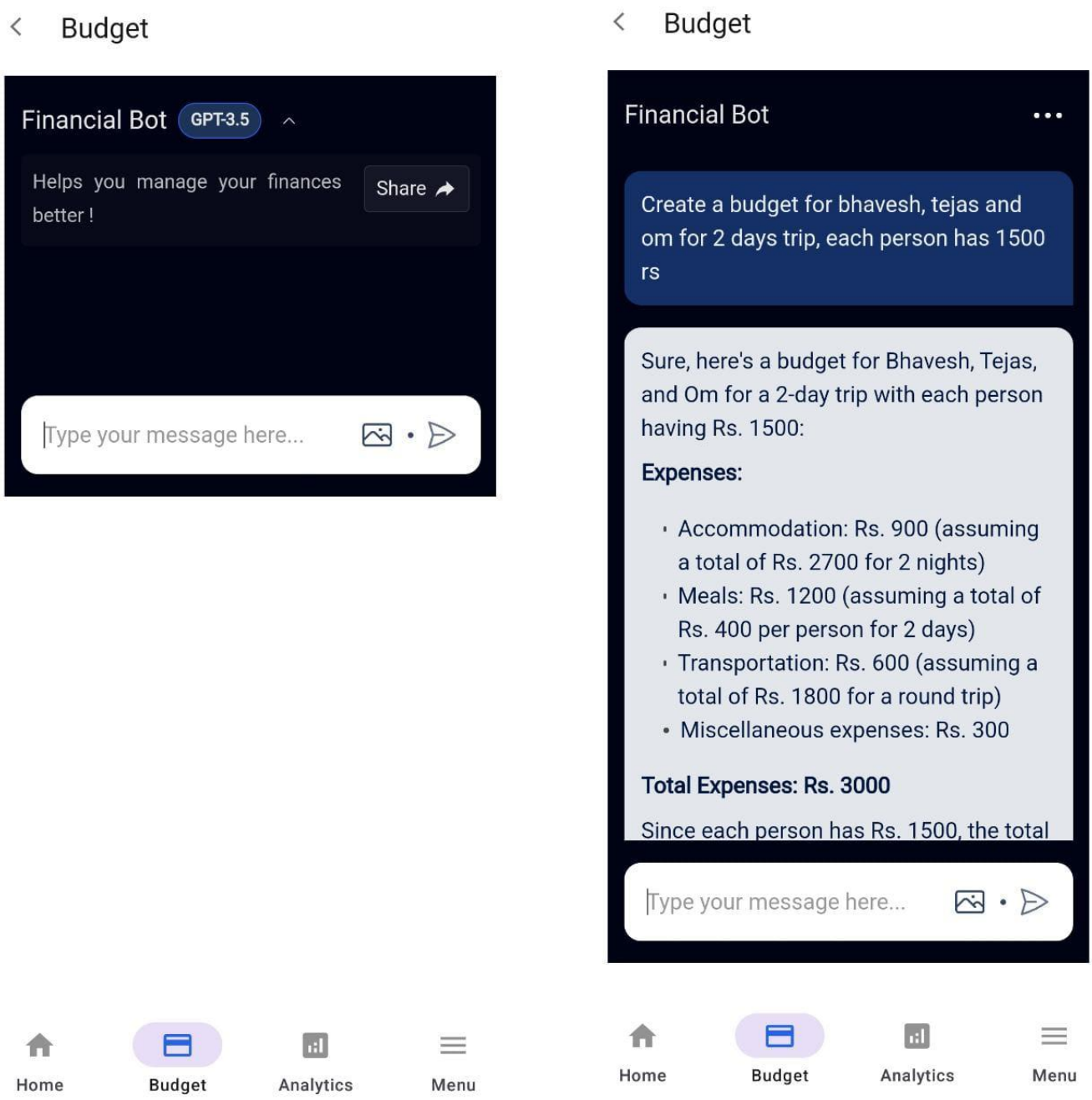


Figure 6.9: Financial AI assistance Implementation-Input Data

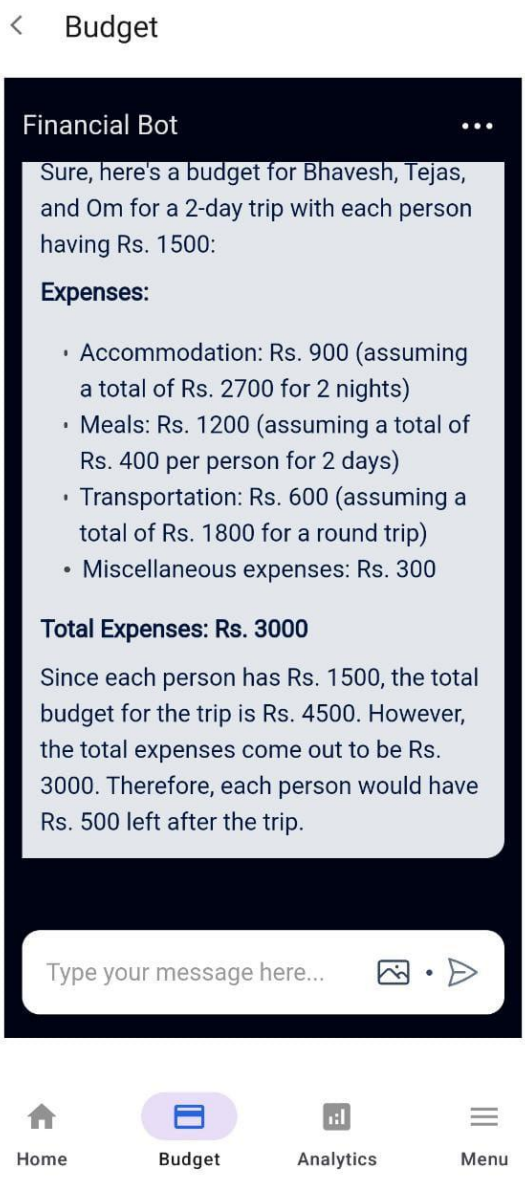


Figure 6.10: Financial AI assistance Implementation-Data Processing

The AI Assistance module in an expense management system is a potential future scope that involves the use of artificial intelligence to provide personalized recommendations and insights to users. This module can use machine learning algorithms to learn from users' behavior and provide customized advice on spending, budgeting, and financial planning. The AI Assistance module can also automate repetitive tasks, such as categorizing expenses and creating reports, saving users time and effort. Overall, the AI Assistance module has the potential to make the expense management system more efficient, user-friendly, and personalized.

The AI Assistance module can also provide users with real-time alerts and notifications, such as overspending alerts, payment due date reminders, and budget goal tracking. This feature can help users stay on top of their finances and make informed decisions in real-time.

Summary

The user module in an expense management system can provide users with the ability to create and manage budgets, track expenses, and set financial goals. It can also include features such as user authentication, user profiles, and account management. The categorization module can use machine learning algorithms to automatically categorize expenses, saving users time and effort. It can also provide users with the ability to customize expense categories and create rules for automatic categorization. The budget organization module can provide users with the ability to create and manage budgets, set spending limits, and track progress towards financial goals. It can also provide users with real-time alerts and notifications when they are approaching their spending limits or are at risk of overspending. Finally, the AI Assistance module can use artificial intelligence to provide personalized recommendations and insights to users, automate repetitive tasks, and provide users with real-time alerts and notifications. Together, these practical implementations can help users better manage their finances, save time and effort, and achieve their financial goals.

Overall, these practical implementations can help users better manage their finances, save time and effort, and achieve their financial goals.

Chapter 7

Conclusions and Future Scope

7.1 Conclusions

In conclusion, an expense management system that includes modules such as the user module, categorization module, budget organization module, and AI Assistance module can provide users with an effective and efficient way to manage their expenses. By automating repetitive tasks, providing personalized insights and recommendations, and offering real-time alerts and notifications, the system can help users better understand their spending patterns and make informed decisions about their finances. Additionally, features such as integration with financial institutions, mobile-first design, advanced reporting capabilities, and gamification can further enhance the user experience and increase user engagement. Ultimately, the practical implementations of each module can help users achieve their financial goals, save time and effort, and improve their overall financial well-being.

Once this application is developed, we guarantee that it will assist users in managing their daily expenses effectively. It will provide guidance and awareness about their daily expenditures. This will prove beneficial for individuals who are struggling with budget management and feeling frustrated with the amount of expenses. The application will help them manage their money and maintain a record of their daily costs, which can be useful in modifying their spending habits. Ultimately, this application will aid its users in reducing the wastage of money and achieving better financial stability.

7.2 Future Scope

Daily expenditure monitoring has the potential to not only aid in money-saving, but also in establishing financial goals for the future. By having a clear picture of your monthly expenses, you can rapidly identify areas where you can cut back and find a balance. Our team has developed a system that is more effective than other tools for tracking income and expenses.

This project eliminates the need for manual calculations when estimating monthly income and expenses. Furthermore, the modules have been designed to be both efficient and visually appealing. Moving forward, some potential future enhancements for this system include: integrating machine learning algorithms to provide personalized budgeting recommendations, incorporating data visualization tools to help users

better understand their spending patterns, and implementing a mobile app version for improved accessibility.

Integration with third-party financial institutions: One possibility is to allow users to connect their accounts with banks and other financial institutions. This could provide real-time updates on expenses, income, and budgeting. It could also allow for automated categorization and analysis of spending habits.

Machine learning for improved accuracy and insights: An AI assistance module could be further enhanced by incorporating machine learning algorithms to provide better predictions, insights, and recommendations to users. This could be particularly useful for identifying patterns in spending, and for providing personalized budgeting advice.

Advanced reporting capabilities: Another potential scope is to integrate the system with accounting and tax software. This could streamline the financial management process for users, making it easier to manage expenses, track income, and prepare tax returns.

Expense tracking for small businesses: The expense management system could be extended to support small businesses as well, providing features such as invoice management, expense approvals, and reimbursement tracking. This could help businesses keep track of their expenses more efficiently, reduce fraud, and streamline their accounting processes.

Gamification: Gamification could be used to make the expense management system more engaging and motivating for users. For example, users could earn points or badges for achieving their financial goals or for sticking to their budget.

Integration with Indian Payment Gateway: Integrating a payment gateway into an expense management system can boost the user experience by enabling users to make payments directly through the system. To ensure the integration is secure, authentication and authorization mechanisms must be in place to protect user data and financial transactions.

Adhering to relevant regulations and standards, such as the Payment Card Industry Data Security Standard (PCI DSS), is critical for the integration's success. Selecting a payment gateway that aligns with the system's technology stack and provides features like fraud detection, chargeback management, and reporting is crucial for a seamless integration.

The payment gateway can also be utilized to automatically classify expenses, which can save users time and effort. Overall, integrating a payment gateway into an expense management system can enhance the user experience, as well as enhance the system's overall functionality.Before integrating a payment gateway into a project, it is advisable to conduct comprehensive research and choose a payment gateway that meets the project's specific requirements. After selecting the appropriate payment gateway, obtain the necessary API credentials and use the payment gateway's API documentation to integrate it successfully into your project. It is crucial to test the integration thoroughly, handle payment errors gracefully, and ensure the security and compliance of the payment processing to prevent any potential issues.

Summary

An expense management system has many potential future scopes that can make it more useful and effective for users. For example, one possible scope is integration with third-party financial institutions to provide real-time updates on expenses, income, and budgeting. This would give users a more comprehensive view of their financial situation and help them make more informed decisions about their spending.

Future scopes for an expense management system include integration with financial institutions for real-time updates, machine learning for personalized insights, mobile-first design for accessibility, advanced reporting capabilities, integration with accounting and tax software, expense tracking for small businesses, expense analysis and optimization, personalized financial coaching, gamification for user engagement, integration with digital assistants, and addition of a payment gateway for seamless payments.

References

1.https://http://www.journaleca.com/
2.https://en.wikipedia.org/wiki/Reacat -Native)
3.https://marketplace.zoom.us/docs/api-reference/zoom-api
4.https://https://www.jetir.org/papers/JETIR1811850.pdf
5.https://www.brainyquote.com
6.https://sendgrid.com/blog/what-is-an-smtp-server
7.https://www.w3schools.com
8.Analytical Expense Management System-2019, Zeki Bozkus.
9.Expenditure Management System-2020, Dr. V.Geetha,G.Nikhitha,H. Sri Lasya.
10.Finsave-Expense Administrator AI Based Expense Management System, 2018, Sakshi Namdev Kore.
11.Daily Expense Tracker BSc.CSIT Project Nepal 2018 Rashna Maharjan.

DOI: 10.55041/IJSREM19862

ISSN: 2582-3930

Impact Factor: 8.176

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING & MANAGEMENT

An Open Access Scholarly Journal || Index in major Databases & Metadata

CERTIFICATE OF PUBLICATION

International Journal of Scientific Research in Engineering & Management is hereby awarding this certificate to

Bhavesh Yeole

in recognizaton to the publication of paper titled

Monex - Expense Management System Application

published in IJSREM Journal on Volume 07 Issue 04 April, 2023

Editor-in-Chief
IJSREM Journal

www.ijsrem.com

ijsremjournal@gmail.com

International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 04 | April - 2023 Impact Factor: 8.176 ISSN: 2582-3930

Monex - Expense Management System Application

Bhavesh Yeole, Tejas Nitnavare, Om Bhadane

Computer Engineering, Matoshri College of Engineering & Research Centre, Eklahare, Nashik

----------***----------

Abstract - The objective of implementing an Expense Management System is to streamline and automate the manual system through the use of computerized equipment and comprehensive software. This will enable efficient data/information storage for extended periods, with easy accessibility and manipulation. The required software and hardware are readily available and user-friendly.

By employing an Expense Management System, organizations can achieve an error-free, secure, reliable, and efficient management system. This system allows users to focus on other activities instead of spending time on record keeping. Consequently, the organization can optimize resource utilization, maintain accurate computerized records without redundant entries, and access relevant information without distraction.

Key Words: Expense Management, Expense Manager, Expenditure Management System, Expense Tracker

1.INTRODUCTION

Our project is designed to support staff in capturing their effort spent on respective areas, while generating valuable information for effective money management. The system will be expandable, with a user-friendly interface that facilitates easy usage. The project will also generate comprehensive reports on expenses, categories, payments, and more, providing valuable insights for efficient financial management.

People do not have track on their monthly expenses and receivables, and they do not have any control over what they spend. Developing an application which will be able to keep track on expenses and receivables can solve this problem.

To manage our monthly expenses, we designed a mobile application. Whatever we spend monthly or daily will be recorded in this application. And it is used to manage our monthly expenses.

Users can enter their limited budget of the entire month in this mobile application where when the user exceeds their given budget in the respective month will be notified through Expenses Management System Application. And also some mathematical calculations are
done to calculate the expenditure on what items users spend a lot and users will be notified that they are spending a lot of amounts on the respective item so that they can reduce their expenditure on that item in future and Chatbot is also included Called as Financial AI Assistance

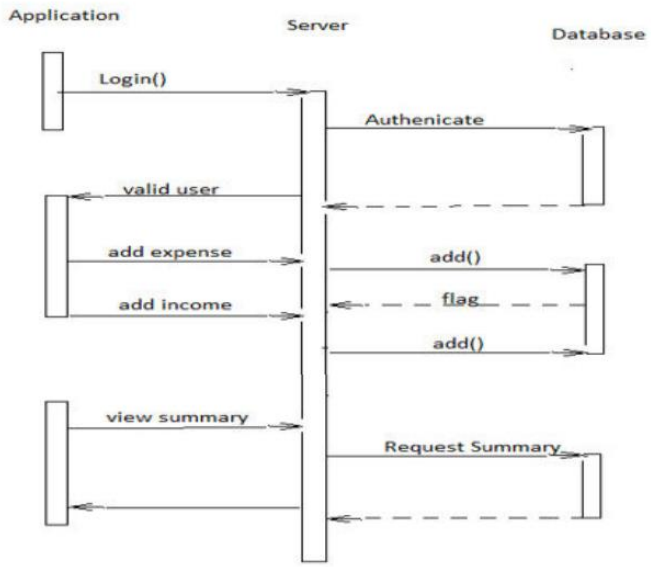


Fig -1: Sequence Diagram

2.MODULE DESCRIPTION

2.1 User Registration/Creation

New User Onboarding And Splash Screen Android Splash Screen is the first screen visible to the user when the operation's launched. Splash screen is a Special Issue Published in Int. Jnl. Of Advanced Networking & operations(IJANA) one of the most vital defenses in the operation since it's the user's first experience with the application. Call it when you want- to know the fresh features of the app new user onboarding is enforced. The user module also plays a pivotal part in enhancing the security of the operation.

It allows for features such as password hashing and encryption, account verification, and two-factor authentication, which help in safeguarding user data and preventing unauthorized access. The user module in a web application allows users to register an account by inputting their registration information, such as username, email, and password. The module validates and securely stores the user data in a database, generates a unique user ID, and provides functionalities like login, logout, profile

management, and access control to enhance the overall user experience and security of the application.

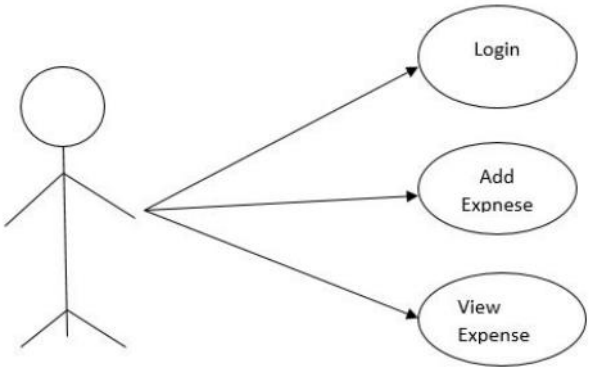


Fig -2.1: User Module

2.2 Budget Organiser Module

Budget tracking module in a project management system provides functionalities for planning, tracking, analyzing, and reporting on project budget data, allowing for effective financial management, course correction, and data visualization to support decision-making.

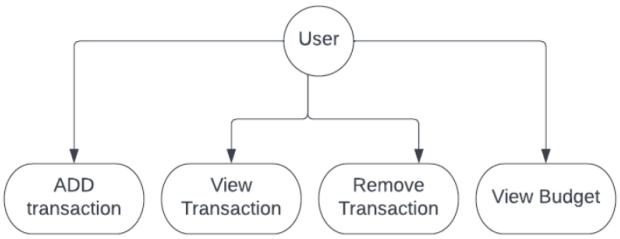


Fig -2.2: Budget Organiser Module

2.3 Categorization Module

Proper categorization of expenses can help individuals and businesses gain a better understanding of their spending patterns, identify areas where cost savings can be made, and make informed financial decisions. By accurately categorizing expenses, it becomes easier to track and analyze spending, create realistic budgets, and manage overall financial health effectively.

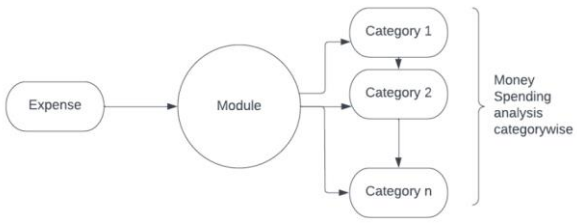


Fig -2.3: Categorization Module

2.4 Fianancial AI Assistance Module

To integrate ChatGPT into project or system, we can follow these general steps: Sign up for an OpenAI account and obtain an API key. Choose the appropriate API endpoint, such as the ”davinci-codex” model. Make API requests using your API key and preferred programming language. Format input and output as messages with roles (”system”, ”user”, or ”assistant”) and content. Parse API responses to extract generated text. Handle API rate limits to avoid rate limit errors. Test and iterate to fine-tune conversation flow and input format. Review and follow OpenAI’s usage policies and guidelines for ethical AI practices. By following these steps, you can integrate ChatGPT into your project and leverage its capabilities for conversational interactions with users or other applications.

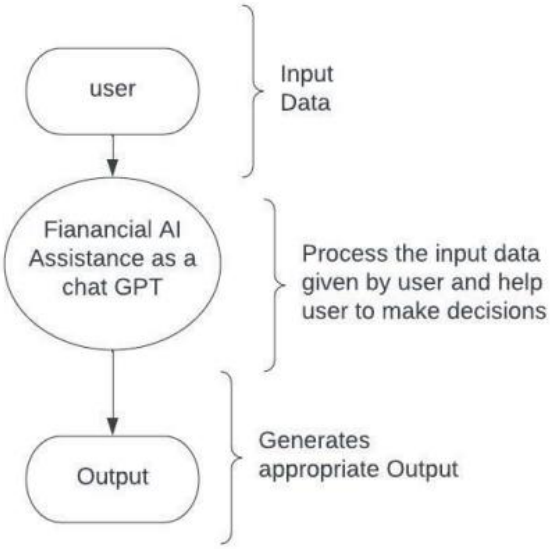


Fig -2.4: Financial AI Assistance Module

3. CONCLUSIONS

Our project involves the development of a mobile application that enables users to track their personal expenses, personal contributions towards expenses, and monthly incomes. The application provides information on "who owes who and by how much," eliminating the need for sticky notes, spreadsheets, and ledgers that often result in confusion and data inconsistency. With our application, users can effectively manage their expenses. We have also considered adding additional features to make the application more user-friendly, such as allowing users to register using their existing email or social network accounts and synchronizing their profile information with the application.

ACKNOWLEDGEMENT

First and the foremost I, express my deep sense of gratitude, sincere thanks and deep sense of Appreciation to project Guide Prof. Ms. Poonam R. Dholi and seminar coordinate Prof. Swati Bhavsar Department of Computer Engineering, Matoshri College of Engineering and

Research Center, Nashik. Your Availability at any time throughout the Semester, valuable guidance, view, comments, critics, encouragement and support tremendously boosted this research work. Again loads of thanks to head Computer Engineering Department Dr. Varsha H. Patil for providing me the support I ever had. Your opinion, view, Comments and thoughts have been really helped me to improve my writing. I would like to express my sincere gratitude to Dr. G.K. Kharate, Principal, Matoshri College of Engineering and Research center, Nashik for providing the great platform to complete this within the scheduled time.

I am also Thankful to all the faculty member, Computer Engineering Department, Matoshri College of Engineering and Research Center, Nashik for giving comments for the improvement of work, encouragement and help during completion of the thesis. Last but not least; I should say thanks from the bottom of my heart to my family and friends for their never-ending love, help and support in so many ways through all this time. Thank you so much. Finally, I am thanking to MIGHTY GOD, who given me the courage confidence to not only this Dissertation work but also in bad difficult situation.

REFERENCES

1. Analytical Expense Management System-Zeki Bozkus, Christophe Bissoon(2018)
2. Expenditure Management System- Dr. V. Geetha, G. Nikhitha, H.Sri Lasya (2019)
3. Expense Management: from efficiency to effective procurement-Keith Rodgers(2020)
4. Liliana Enciso, Jose Guarnizo, Edisson Torres and Pablo Alejandro Quezada-Sarmiento ; “Smart Office: Development of a Mobile Application for Android with Firebase Services Oriented to GroupMe Messaging” ; ISBN: 978-989-758-324-7 Copyright © 2018 by SCITEPRESS – Science and Technology Publications, Lda.
5. Fundamentals of Database systems – book by Elmasri and Navathe Developer.android.com
6. Akriti Sood, Madhurima Hooda, Saru Dhir and Madhulika Bhatia; “An Initiative to Identify Depression using Sentiment Analysis: A Machine Learning Approach”;Vol 11(4), DOI: 10.17485/ijst/2018/v11i4/119594, January 2018; ISSN : 0974-6846 .
7. AndroMoney (Expense Track) - Apps on Google Play",[online]Available: https://play.google.com/store/apps/details?id=com.kpmoney.android.
8. https://reactnative.dev/docs/accessibilityinfo
9. https://firebase.google.com/docs
10. https://www.mongodb.com/docs/

International Journal of Research Publication and Reviews

(Open Access, Peer Reviewed, International Journal)

(A+ Grade, Impact Factor 5.536)

ISSN 2582-7421

Sr. No: IJRPR 24127

Certificate of Acceptance & Publication

This certificate is awarded to Bhavesh Yeole, and certifies the acceptance for publication of research paper entitled "Monex-Expense Management System Application" in "International Journal of Research Publication and Reviews", Volume 4, Issue 4, 2023.

Signed Aashish Agarwal

Date ***28/04/2023***

Editor-in-Chief
International Journal of Research Publication and Reviews

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Monex-Expense Management System Application

Bhavesh Yeole[1], Tejas Nitnavare[2], Om Bhadane[3]

[1]BE Computer, Nashik 422006, India
[2]BE Computer, Nashik 422007, Inida
[3]BE Computer, Nashik 422009, India

A B S T R A C T

The objective of implementing an Expense Management System is to streamline and automate the manual system through the use of computerized equipment and comprehensive software. This will enable efficient data/information storage for extended periods, with easy accessibility and manipulation. The required software and hardware are readily available and user-friendly. By employing an Expense Management System, organizations can achieve an error-free, secure, reliable, and efficient management system. This system allows users to focus on other activities instead of spending time on record keeping. Consequently, the organization can optimize resource utilization, maintain accurate computerized records without redundant entries, and access relevant information without distraction.

Keywords: Expense Management, Expense Manager, Expenditure Management System, Expense Tracker, Firebase, Finance, AI Assistance

1. Introduction

Our project is designed to support staff in capturing their effort spent on respective areas, while generating valuable information for effective money management. The system will be expandable, with a user-friendly interface that facilitates easy usage. The project will also generate comprehensive reports on expenses, categories, payments, and more, providing valuable insights for efficient financial management. People do not have track on their monthly expenses and receivables, and they do not have any control over what they spend.

Developing an application which will be able to keep track of expenses and receivables can solve this problem. To manage our monthly expenses, we designed a mobile application. Whatever we spend monthly or daily will be recorded in this application. And it is used to manage our monthly expenses. Users can enter their limited budget of the entire month in this mobile application where when the user exceeds their given budget in the respective month will be notified through Expenses Management System Application. And also, some mathematical calculations are done to calculate the expenditure on what items users spend a lot and users will be notified that they are spending a lot of amounts on the respective item so that they can reduce their expenditure on that item in future and Chabot is also included Called as Financial AI Assistance

1.1 User Module

New User Onboarding and Splash Screen Android Splash Screen is the first screen visible to the user when the application's launched. Splash screen is a Special Issue Published in Int. Jnl. Advanced Networking & Applications (IJANA) is one of the most vital screens in the application since it's the user's first experience with the application. Call it when you want-to know the additional features of the app new user onboarding is implemented.

The user module also plays a crucial role in enhancing the security of the application. It allows for features such as password hashing and encryption, account verification, and two-factor authentication, which help in safeguarding user data and preventing unauthorized access.First point for the preprints and the Proceedings. Leave a line clear between paragraphs. All the required style templates are provided in the file "MS Word Template" with the appropriate name supplied, e.g. choose 1. Els1st-order-head for your first order heading text, els-abstract-text for the abstract text etc.

1.2 Budget Organiser Module

Budget tracking module in a project management system provides functionalities for planning, tracking, analyzing, and reporting on project budget data, allowing for effective financial management, course correction, and data visualization to support decision-making.

1.3 Categorization Module

Proper categorization of expenses can help individuals and businesses gain a better understanding of their spending patterns, identify areas where cost savings can be made, and make informed financial decisions. By accurately categorizing expenses, it becomes easier to track and analyze spending, create realistic budgets, and manage overall financial health effectively.

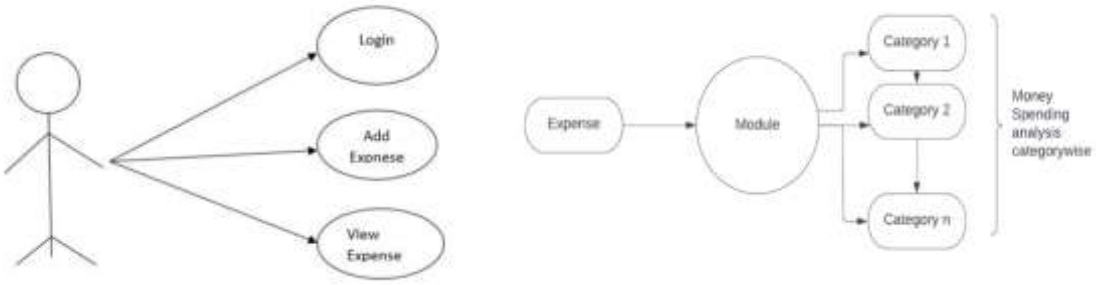
1.4 Financial AI Assistance Module

To integrate ChatGPT into a project or system, we can follow these general steps: Sign up for an OpenAI account and obtain an API key. Choose the appropriate API endpoint, such as the ”davinci-codex” model. Make API requests using your API key and preferred programming language. Format input and output as messages with roles (”system”, ”user”, or ”assistant”) and content. Parse API responses to extract generated text. Handle API rate limits to avoid rate limit errors. Test and iterate to fine-tune conversation flow and input format. Review and follow OpenAI’s usage policies and guidelines for ethical AI practices. By following these steps, you can integrate ChatGPT into your project and leverage its capabilities for conversational interactions with users or other applications..

2. Illustrations

The diagram below illustrates a software system consisting of four modules: the user module, the budget organizer module, the categorization module, and the financial AI module. The user module is responsible for handling user authentication and user-specific functionality. The budget organizer module is designed to help users manage their finances by creating budgets, tracking expenses, and generating reports. The categorization module provides automated categorization of expenses based on the type of transaction, making it easier for users to analyze their spending patterns. Finally, the financial AI module uses machine learning algorithms to provide personalized financial advice based on the user's spending habits, income, and financial goals.

Each module is labeled for easy identification, with the user module labeled as "a," the budget organizer module labeled as "b," the categorization module labeled as "c," and the financial AI module labeled as "d." This diagram helps to visualize how these different modules work together to provide a comprehensive financial management solution for users.



a) b)

Fig. 1 - (a) User Module Diagram; (b) Budget *organizer* module.

c) d)

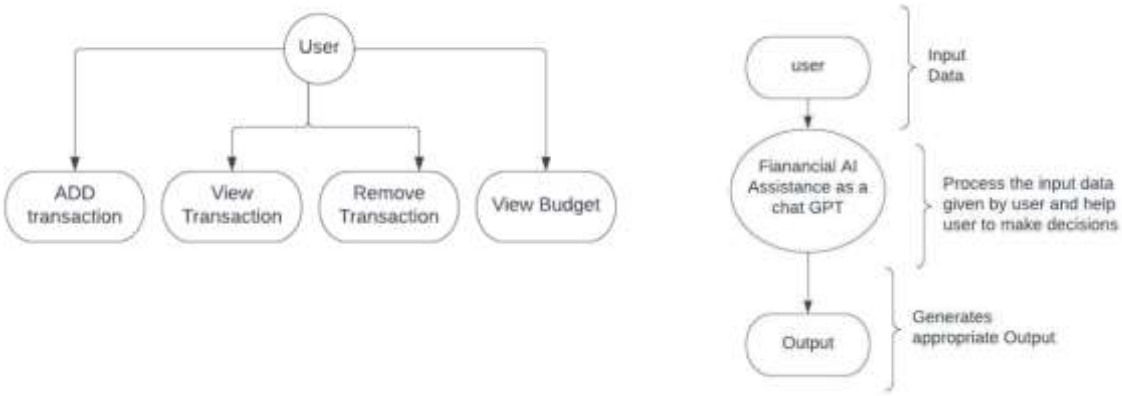


Fig. 2 - (a) Categorization module; (b) Financial AI Assistance module

Acknowledgements

First and the foremost I, express my deep sense of gratitude, sincere thanks and deep sense of Appreciation to project Guide Prof. Ms. Poonam R. Dholi and seminar coordinate Prof. Swati Bhavsar Department of Computer Engineering, Matoshri College of Engineering and Research Center, Nashik. Your Availability at any time throughout the Semester, valuable guidance, view, comments, critics, encouragement and support tremendously boosted this research work. Again, load and loads of thank to head Computer Engineering Department Dr. Varsha H. Patil for providing me the support I ever had. Your opinion, view, Comments and thoughts have been really helped me to improve my writing. I like to express my sincere gratitude to Dr. G.K.

Kharate, Principal, Matoshri College of Engineering and Research Center, Nashik for proving the great platform to complete the this within the schedule time. I am also Thankful to all the faculty member, Computer Engineering Department, Matoshri College of Engineering and Research Center, Nashik for giving comments for the improvement of work, encouragement and help during completion of the thesis. Last bit not least; I should say thanks from my bottom of heart to my family and friends for their never-ending love, help and support in so many ways through all this time. Thank you so much. Finally, I am thanking to MIGHTY GOD, who given me the courage confidence to not only this Dissertation work but also in bad difficult situation.

References

Liliana Enciso , Jose Guarnizo , Edisson Torres and Pablo Alejandro Quezada-Sarmiento ; “Smart Office: Development of a Mobile Application for Android with Firebase Services Oriented to GroupMe Messaging” ; ISBN: 978-989-758-324-7 Copyright © 2018 by SCITEPRESS – Science and Technology

Akriti Sood , Madhurima Hooda , Saru Dhir and Madhulika Bhatia; “An Initiative to Identify Depression using Sentiment Analysis: A Machine Learning Approach”;Vol 11(4), DOI: 10.17485/ijst/2018/v11i4/119594, January 2018; ISSN : 0974-6846 .Fachinger, J. (2006).

Expenditure Management System- Dr. V. Geetha, G. Nikhitha, H.Sri Lasya (2019).

PUNE VIDYARTHI GRIHA'S

College Of Engineering & S. S. Dhamankar Institute of Management, Nashik

ZenITh Association

Accredited by NAAC, approved by AICTE, New Delhi. Recognized by DTE Maharashtra. Affiliated by Savitribai Phule Pune University.

CERTIFICATE

IDEATHON

This is to certify that

Mr./~~Ms.~~ BHAVESH SHARAD YEOLE

From Matoshri College of Engi. has **participated and secured** ~~First~~/ ~~Second~~ **Position in** _____ competition during **"IDEATHON"** an Inter-College Tech event organized by the Department of Information Technology in Association with ZenITh on 9th May 2023.

Mr.Pavan.B.Ahire	Prof. S. K. Thakare	Prof. P.A. Lahare	Prof. S.N. Bhadane	Dr.M.V. Bhalerao	Dr. C.M. Sedani
Zenith President	Event Co-Ordinator	Zenith Co-Ordinator	HOD IT	Vice Principal	Principal

EXPENSE MANAGEMENT SYSTEM

ORIGINALITY REPORT

9%	5%	2%	7%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to NCC Education Student Paper	1%
2	Submitted to Savitribai Phule Pune University Student Paper	1%
3	Submitted to Higher Education Commission Pakistan Student Paper	<1%
4	www.freshbooks.com Internet Source	<1%
5	Submitted to University of West London Student Paper	<1%
6	Submitted to Visvesvaraya Technological University Student Paper	<1%
7	digitalcommons.acu.edu Internet Source	<1%
8	Submitted to West Herts College Student Paper	<1%
9	pdfcookie.com	

	Internet Source	<1 %
10	www.ijert.org Internet Source	<1 %
11	Submitted to University of Northampton Student Paper	<1 %
12	Submitted to University of Plymouth Student Paper	<1 %
13	Submitted to Harare Institute of Technology Student Paper	<1 %
14	Submitted to University of Wales Institute, Cardiff Student Paper	<1 %
15	Submitted to Nottingham Trent University Student Paper	<1 %
16	Submitted to PSB Academy (ACP eSolutions) Student Paper	<1 %
17	Submitted to University of Reading Student Paper	<1 %
18	Submitted to Harrisburg University of Science and Technology Student Paper	<1 %
19	www.slideshare.net Internet Source	<1 %

20	Bryan G. Victor, Sheryl Kubiak, Beth Angell, Brian E. Perron. "Time to Move Beyond the ASWB Licensing Exams: Can Generative Artificial Intelligence Offer a Way Forward for Social Work?", Research on Social Work Practice, 2023 Publication	<1 %
21	Submitted to King's Own Institute Student Paper	<1 %
22	Submitted to St. Patrick's College Student Paper	<1 %
23	Submitted to The University of the West of Scotland Student Paper	<1 %
24	assets.researchsquare.com Internet Source	<1 %
25	Submitted to CTI Education Group Student Paper	<1 %
26	Submitted to Government College of Engineering Aurangabad, Maharashtra State, India Student Paper	<1 %
27	Submitted to Middlesex University Student Paper	<1 %
28	securityboulevard.com Internet Source	<1 %

29	Submitted to University of Bradford Student Paper	<1 %
30	library.gunadarma.ac.id Internet Source	<1 %
31	Submitted to Arab Open University Student Paper	<1 %
32	Submitted to Cavendish University Zambia Student Paper	<1 %
33	Submitted to University of Greenwich Student Paper	<1 %
34	Submitted to University of Salford Student Paper	<1 %
35	developer.hostraddevsite.com Internet Source	<1 %
36	Submitted to Asia Pacific University College of Technology and Innovation (UCTI) Student Paper	<1 %
37	Submitted to Charotar University of Science And Technology Student Paper	<1 %
38	Submitted to Dr. Pillai Global Academy Student Paper	<1 %
39	Submitted to Texas A & M University, Kingville Student Paper	<1 %

40	Submitted to University of Bolton Student Paper	<1 %
41	www.proceedings.com Internet Source	<1 %
42	www.jcisd.org Internet Source	<1 %
43	ijias.issr-journals.org Internet Source	<1 %
44	dev.to Internet Source	<1 %
45	dl.lib.uom.lk Internet Source	<1 %
46	ijesc.org Internet Source	<1 %
47	selectsmart.com Internet Source	<1 %
48	Amir H. Behzadan, Brian W. Timm, Vineet R. Kamat. "General-purpose modular hardware and software framework for mobile outdoor augmented reality applications in engineering", Advanced Engineering Informatics, 2008 Publication	<1 %
49	dspace.vsb.cz Internet Source	<1 %

50	www.hbni.ac.in Internet Source	<1 %
51	www.lirmm.fr Internet Source	<1 %
52	www.olink.com Internet Source	<1 %

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	On		