RSET
RAJAGIRI SCHOOL OF
ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

Mini Project Report On

Personal Finance Manager

Submitted in partial fulfillment of the requirements for the award of the degree of

Bachelor of Technology

in

Computer Science & Engineering

By

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Under the guidance of

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CERTIFICATE

This is to certify that the mini project report entitled ***"Personal Finance Manager"*** *is a bonafide record of the work done by* ***Febin Jose (U2103090)***, ***Joe Joseph (U2103113)***, ***Kris Arun (U2103126)***, ***Mathew Paul (U2103132)***, *submitted to the APJ Abdul Kalam Technological University in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology (B. Tech.) in Computer Science and Engineering during the academic year 2023-2024.*

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Abstract

This project aims to develop a comprehensive mobile application, the Personal Finance Manager, designed to empower users with intuitive tools for effective personal finance management. Key features include manual tracking of expenses and income and providing detailed breakdowns of financial data. Users can set budget limits and receive insights on remaining amounts, with graphical representations to understand spending patterns. The app offers purpose-specific budget limits, financial tips, and Setting goal, as well as strategies for redistributing expenditures if limits are exceeded. Leveraging modern app development technologies, the Personal Finance Manager aims to deliver a robust, user-friendly experience across mobile platforms, helping users take control of their finances and achieve financial stability.

Contents

List of Figures

Chapter 1

Introduction

1.1 Background

In today's fast-paced world, managing personal finances has become increasingly complex. With numerous income streams, diverse expense categories, and a multitude of financial commitments, individuals often find it challenging to maintain a clear and comprehensive view of their financial health. The need for effective financial management is further amplified by the growing importance of financial literacy and the desire for long-term financial stability. Recognizing this need, the development of the Finance Management System Version 1.0 was initiated. This project aims to offer a robust and intuitive platform designed to streamline the management of personal finances. The system is built with the modern user in mind, combining comprehensive features with an easy-to-use interface to cater to both novice and experienced users.

1.2 Problem Definition

The Finance Management System described is a new, self-contained product designed to fulfill the need for a comprehensive financial management solution. It is not a replacement for any existing systems but rather a standalone application intended to provide users with tools and features for managing their personal finances effectively.

Originating from the increasing demand for efficient financial management solutions in today's fast-paced world, the Finance Management System is developed to address common challenges individuals face in tracking expenses, managing budgets, setting financial goals, and achieving financial stability. With a focus on usability, functionality, and accessibility, the system aims to empower users with intuitive tools and insights necessary to take control of their financial lives.

While the Finance Management System is a standalone product, it may be part of a

larger ecosystem of financial services or applications. In such cases, it would interface with other systems or components to exchange data and facilitate seamless integration. For example, it may interact with banking APIs to retrieve transaction data, with accounting software for expense reconciliation, or with investment platforms for portfolio management

1.3 Scope and Motivation

The product scope of the Finance Management System encompasses a range of features and functionalities designed to address the financial needs of individuals and households. This includes expense tracking, income management, budgeting, goal setting, bill management, savings tracking, and data visualization. The Personal Finance Manager (PFM) aims to empower users to achieve financial wellness by providing a comprehensive toolkit for managing their money. This user-friendly platform will centralize features for budgeting, expense tracking, and financial goal setting. By fostering financial literacy through educational resources and personalized insights, the PFM will cultivate user confidence and engagement. Additionally, the PFM prioritizes robust data security and user privacy to ensure a trustworthy and secure financial management experience. The purpose of Finance Management System Version 1.0 is to serve as a robust and user-friendly platform for individuals seeking to effectively manage their personal finances. By offering comprehensive features such as expense tracking, income management, budget setting, financial goal tracking, bill reminders, data visualization, and savings management, this system aims to empower users with the tools and insights necessary to take control of their financial lives. Through intuitive interfaces and detailed reporting, users can gain a deeper understanding of their spending habits, identify areas for improvement, and make informed decisions about their finances. With a focus on usability and functionality, Finance Management System Version 1.0 aims to simplify the complexities of financial management, helping users achieve their financial goals and maintain financial stability with ease and confidence

1.4 Objectives

- Manual Expense and Income Tracking: Users can effortlessly update their daily expenses and income manually, categorizing them by purpose such as food, transportation, and laundry, enabling detailed financial record-keeping.
- Preset Monthly and Yearly Income: Users have the flexibility to preset their monthly and yearly income, providing a basis for budgeting and financial planning.
- Detailed Expense and Income Breakdown: The application offers a complete breakdown of expenses and income on a daily, monthly, and yearly basis, with the option to segregate by purpose or view as a single list as per user preference.
- Budget Limit Setting: Users can set pre-monthly and/or yearly budget limits, with the application providing insights on remaining budget amounts for the specified timeline.
- Insightful Graphical Representations: Detailed and user-friendly graphical structures provide insights into daily, weekly, monthly, and yearly expenses, aiding in understanding spending patterns and trends.
- Budget Expenditure Insights: The application offers insights into daily, monthly, and yearly expenses, providing detailed statistics and recommendations for staying within the budget.
- Purpose-Specific Budget Limits: Users can preset budget limits for each purpose (e.g., food, transportation) on a daily, monthly, and yearly basis, with the application providing insights and recommendations for managing expenditures within these limits.
- Financial Tips and Recommendations: The application provides users with tips on saving and spending wisely, highlighting areas where the user may focus on saving or where spending has exceeded expectations.
- Budget Strategy Assistance: In the event of exceeding budget limits for a certain purpose, the application offers strategies for redistributing expenditures across other purposes to stay within the total budget.

- Expenditure Comparisons: Detailed comparisons of expenditures across different purposes and total budgets are provided on a daily, monthly, and yearly basis, enabling users to assess their financial habits and make informed decisions.

- Scheduled Payments and Reminders: Users can preset daily, monthly, and yearly scheduled payments, with the application providing timely reminders to ensure timely bill payments.

- Payment Records Management: Users can store data on pending payments from various sources, with the application keeping track of payment deadlines and providing reminders accordingly.

- Piggy Bank Feature: The application includes a "Piggy Bank" feature, allowing users to create savings goals for future endeavors. Users can allocate part of their budget into savings, with the application adjusting the remaining budget accordingly.

1.5 Challenges

Developing a personal finance manager app using Flutter presents several challenges that demand careful consideration and expertise. Automated expense tracking requires sophisticated algorithms capable of accurately categorizing transactions, necessitating advanced machine learning and natural language processing techniques. Integrating UPI functionality involves navigating complex payment protocols and implementing stringent security measures to ensure safe transactions. Additionally, maintaining compatibility across diverse devices and platforms while optimizing performance adds another layer of complexity. Overcoming these hurdles requires a blend of technical proficiency, financial knowledge, and effective teamwork to deliver a robust, reliable, and user-friendly application.

1.6 Assumptions

The Finance Management System operates under certain assumptions Assumed Factors: 1. The availability and reliability of third-party or commercial components used in the system, such as financial data APIs or encryption libraries, are assumed.

2. The accuracy and consistency of data sources, including banking and financial institutions' APIs, are assumed to provide reliable data for expense tracking and financial analysis.
3. The stability and compatibility of the development and operating environments, including programming languages, frameworks, and databases, are assumed to support the system's functionalities.

1.7 Societal / Industrial Relevance

Societal Impact:
Financial Manage: A user-friendly finance app can empower people, especially those new to managing money, to track income, expenses, and budgets. This can promote financial literacy and responsible financial behavior.
Financial Wellness: The app can help users achieve financial goals, build savings, potentially reducing stress and improving overall well-being.

1.8 Organization of the Report

1. Introduction: - This report presents the development and analysis of an Android application designed for expenditure tracking, developed using the Flutter framework. - The significance of effectively managing personal finances is emphasized, and the role of the application in assisting users with this task is highlighted.

2. Methodology: - Flutter, a cross-platform UI toolkit, was chosen as the framework for app development due to its ability to create native-like experiences for Android applications. - Data collection methods involved the utilization of Flutter's built-in functionalities for data storage and retrieval, possibly leveraging SQLite databases or APIs for real-time data synchronization.

3. User Interface (UI) Design: - The app's user interface design prioritizes simplicity and usability, employing Flutter's widget-based UI components to create intuitive screens for expenditure tracking.

4. Features and Functionalities: - The application offers a range of features including expense categorization, budget setting, transaction history, and real-time expense tracking, all implemented using Flutter widgets and plugins.

5. Data Analysis: - Insights derived from user expenditure data are presented, with visualizations created using Flutter's chart and graph widgets to illustrate spending patterns, trends, and budget adherence. - The analysis provides users with valuable insights into their financial habits, aiding them in making informed decisions about their spending.

6. Future Development: -The future scope of the project holds immense potential for expansion and enhancement. Integrating machine learning algorithms can revolutionize the app's capabilities by analyzing user spending patterns and offering personalized financial tips and insights, thus empowering users to make even more informed decisions. Additionally, incorporating payment gateways such as Google Pay can streamline transactions within the app, providing users with added convenience and security. Moreover, implementing advanced bill scanning methods utilizing optical character recognition (OCR) technology can automate expense tracking further, simplifying the process for users and ensuring accuracy in financial data management. These extensions not only enhance the functionality of the app but also solidify its position as an indispensable tool for comprehensive personal finance management

Chapter 2

Software Requirements Specification

2.1 Introduction

2.1.1 Purpose

The purpose of the Mini Project Personal Finance Manager is to provide individuals with a streamlined and efficient tool to manage their finances. It aims to help users track their income, expenses, and savings, offering a clear overview of their financial situation. By enabling users to set budgets, monitor spending patterns, and visualize their financial data through graphs, the project seeks to promote better financial planning and decision-making. Ultimately, it aspires to empower users to achieve their financial goals and maintain financial stability.

2.1.2 Product Scope

The Mini Project Personal Finance Manager will provide a comprehensive suite of features designed to enhance personal financial management. Users will be able to manually track their income and expenses, categorizing them for better organization and analysis. The tool will generate various graphs, helping users quickly grasp their financial patterns. Additionally, users can set financial goals, like saving for a vacation, an emergency fund, or debt repayment, with the system tracking progress and providing motivational prompts. To further streamline the experience, the project will integrate with Google Pay (GPay), allowing users to automatically import transaction data, . This integration aims to deliver a user-centric personal finance management tool that promotes financial awareness and planning.

2.2 Overall Description

2.2.1 Product Perspective

The Personal Finance Manager System described in this Software Requirements Specification (SRS) is a new, self-contained product designed to fulfill the need for a comprehensive financial management solution. It is not a replacement for any existing systems but rather a standalone application intended to provide users with tools and features for managing their personal finances effectively.

Originating from the increasing demand for efficient financial management solutions in today's fast-paced world, the Finance Management System is developed to address common challenges individuals face in tracking expenses, managing budgets, setting financial goals, and achieving financial stability. With a focus on usability, functionality, and accessibility, the system aims to empower users with intuitive tools and insights necessary to take control of their financial lives.

While the Finance Management System is a standalone product, it may be part of a larger ecosystem of financial services or applications. In such cases, it would interface with other systems or components to exchange data and facilitate seamless integration. For example, it may interact with banking APIs to retrieve transaction data, with accounting software for expense reconciliation, or with investment platforms for portfolio management.

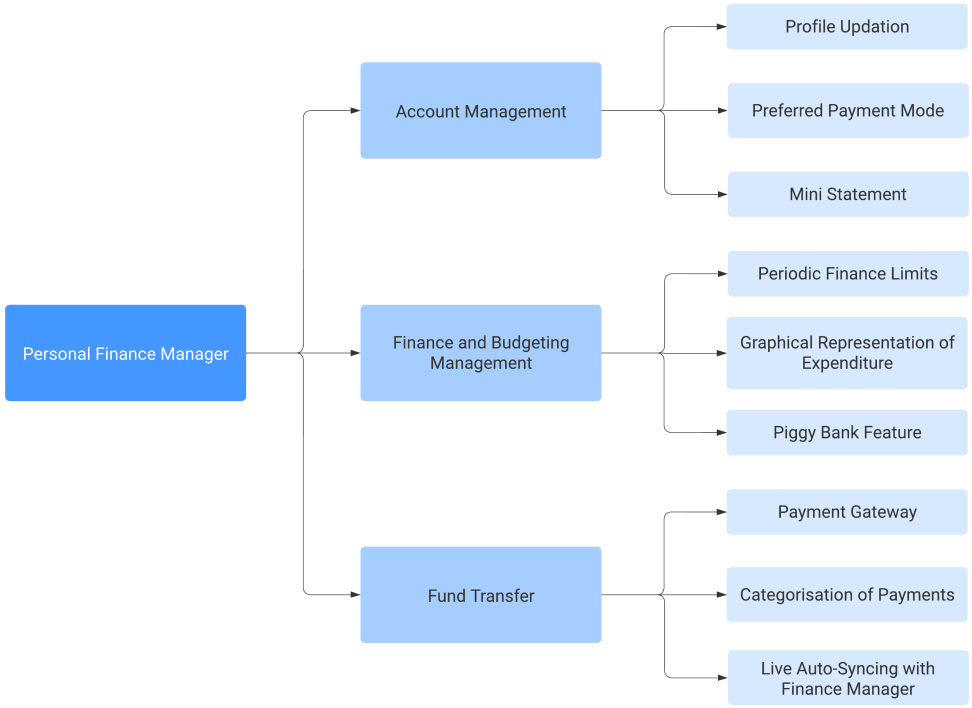

Figure 2.1: Architecture Diagram

2.2.2 Product Functions

Key features of the Personal Finance Manager application include:

- Manual Expense and Income Tracking: Users can effortlessly update their daily expenses and income manually, categorizing them by purpose such as food, transportation, and laundry, enabling detailed financial record-keeping.
- Preset Monthly and Yearly Income: Users have the flexibility to preset their monthly and yearly income, providing a basis for budgeting and financial planning.
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- Payment Records Management: Users can store data on pending payments from various sources, with the application keeping track of payment deadlines and providing reminders accordingly.
- Piggy Bank Feature: The application includes a "Piggy Bank" feature, allowing users to create savings goals for future endeavors. Users can allocate part of their budget into savings, with the application adjusting the remaining budget accordingly.

2.2.3 Operating Environment

The Finance Management System will primarily operate within the Android operating system environment. Android is a widely used mobile operating system developed by Google, designed specifically for smartphones, tablets, and other mobile devices. The system will be compatible with various Android versions, ensuring broad accessibility to users across different device types and versions.

The software will run on Android devices, which encompass a diverse range of hardware platforms including smartphones, tablets, and wearables, each with varying specifications in terms of processing power, memory, and screen size. Therefore, the software's design and implementation must accommodate these hardware differences to ensure optimal performance and usability across different devices.

In addition to the Android operating system, the Finance Management System may also interact with other software components and applications. These may include:

1. Google Play Services: Utilized for features such as authentication, location services, and in-app purchases, enhancing the functionality and user experience of the Finance Management System.

2. Database Management Systems: Integration with local or cloud-based database management systems may be necessary for storing and retrieving financial data securely.

3. APIs for Financial Data: Integration with third-party financial data APIs, such as banking APIs , may be required for retrieving real-time financial information for expense tracking and analysis.

4. Security Components: Encryption libraries and security protocols may be implemented to ensure the confidentiality and integrity of user data stored on the device or transmitted over the network.

2.2.4 Design and Implementation Constraints

The design and implementation of the Mini Project Personal Finance Manager will be guided by several key constraints to ensure a robust, secure, and user-friendly application. Advanced UPI integration, including secure and real-time data retrieval from Google Pay (GPay), will be a core feature, compliant with banking regulations. Essential functionalities will include manual income and expense tracking, financial goal setting

and monitoring, and automatic transaction imports from GPay. The app will generate various financial visualizations such as pie charts for expense distribution, bar graphs for monthly expenditures, line graphs for income trends, and scatter plots for spending patterns, providing comprehensive insights into users' financial habits. Developed using Flutter, the app will ensure compatibility with both iOS and Android platforms, featuring an intuitive, responsive UI/UX design for users of all skill levels. Performance will be optimized for handling large volumes of data, supported by a scalable backend. Additional features will include budget creation and monitoring, notifications for financial activities, and comprehensive reporting tools, all designed to enhance financial awareness and planning.

2.2.5 Assumptions and Dependencies

The Finance Management System operates under certain assumptions and dependencies that may impact the requirements outlined in the Software Requirements Specification (SRS). These assumptions and dependencies include:

1. Assumed Factors:

- The availability and reliability of third-party or commercial components used in the system, such as financial data APIs or encryption libraries, are assumed.

- The accuracy and consistency of data sources, including banking and financial institutions' APIs, are assumed to provide reliable data for expense tracking and financial analysis.

- The stability and compatibility of the development and operating environments, including programming languages, frameworks, and databases, are assumed to support the system's functionalities.

2. Dependencies:

- The project may depend on external software components or libraries reused from other projects, such as authentication modules or data visualization tools. Any changes or updates to these dependencies could impact the development and functionality of the Finance Management System.

- The system may rely on integration with external services or platforms, such as banking APIs or cloud storage providers, for data exchange and storage. Dependencies on these external factors could affect the system's performance and availability.

2.3 External Interface Requirements

2.3.1 User Interfaces

The finance manager app will feature a modern and intuitive user interface adhering to Material Design guidelines. Key interface elements include:

- Dashboard: - Overview of financial data such as income, expenses, and savings. - Displays data in graphical and tabular formats.
- Transaction Entry: - Allows users to add, edit, and categorize transactions with ease.
- Graphical Representation: - Detailed graphical structures offer insights into daily, weekly, monthly, and yearly expenses. - Aids in understanding spending patterns and trends.
- Settings: - Enables users to customize manage categories, and set budget goals.

2.3.2 Hardware Interfaces

The app will leverage standard hardware interfaces such as camera for receipt scanning, GPS for location-based expense tracking, and storage for saving user data. It will support both iOS and Android devices with compatibility for a wide range of screen sizes and resolutions.

2.3.3 Software Interfaces

- Database: - Ensures efficient data retrieval and management.
- Operating System: - Compatible with Android 7.0+ to ensure broad device support.
- Libraries: - Integrates with libraries for UI components and state management.

- Authentication: - Integrates with Firebase Authentication for user authentication and data security.
- Analytics: - Utilizes Firebase Analytics for tracking user engagement and app performance.

2.3.4 Communication Interfaces

- API Communication: Implements API communication for exchanging data with external services.
- Security: Implements SSL/TLS encryption to ensure secure data transmission over the network.
- Synchronization: Provides real-time data synchronization across multiple devices using polling mechanisms for seamless user experience.

2.4 System Features

2.4.1 Account Management

2.4.1.1 Description and Priority

This feature allows users to manage their financial accounts. It is crucial for users to track their income and expenses effectively (High Priority).

- Benefit: High - Enables informed financial decisions.
- Penalty: High - Without account management, users cannot track finances.
- Cost: Medium - Development effort depends on the complexity of account types supported.
- Risk: Medium - Security measures need to be implemented to protect user data.

2.4.1.2 Stimulus/Response Sequences

- Users add a new account (type: checking, savings, credit card, investment, etc.)
  - System prompts for account details (name, institution, account number, initial balance, etc.) (REQ-4.1.8)
  - System verifies account details with financial institution (optional, based on integration) (TBD)
  - System saves account information securely.
- User edits an existing account.
  - System displays current account details.
  - User modifies account details (including nicknames for accounts). (REQ-4.1.9)
  - System saves updated information.
- User deletes an account.
  - System prompts for confirmation, highlighting potential impact on associated transactions. (REQ-4.1.10)
  - System removes the account and associated transactions (with options to transfer balances or archive data). (REQ-4.1.11)

2.4.1.3 Functional Requirements

- REQ-4.1.1: The system shall allow users to add new accounts with various types (checking, savings, credit card, investment, etc.).
- REQ-4.1.2: The system shall prompt for essential account details during account creation (name, institution, account number, etc.).
- REQ-4.1.3: The system shall securely store the user's financial account information using industry-standard encryption.
- REQ-4.1.4: The system shall allow users to edit existing account details.
- REQ-4.1.5: The system shall display current information for each account upon user request, including account balance and transaction history.

- REQ-4.1.6: The system shall prompt for confirmation before deleting an account.
- REQ-4.1.7: The system shall offer options for handling associated transactions upon account deletion (transfer balance, archive data, etc.). (REQ-4.1.11)
- REQ-4.1.8: The system shall allow users to enter an initial balance for each account.
- REQ-4.1.9: The system shall allow users to assign nicknames to accounts for easier identification.
- REQ-4.1.10: The system shall clearly inform users about the potential impact of deleting an account on associated transactions.
- TBD: The system may integrate with financial institutions to verify account details and enable automatic transaction import (optional, based on project scope and feasibility).

2.4.2 Transaction Management

2.4.2.1 Description and Priority

This feature enables users to record and categorize their financial transactions. Effective transaction management is essential for tracking income and expenses (High Priority).

- Benefit: High - Enables users to understand spending habits and budget effectively.
- Cost: Medium - Complexity depends on manual entry vs. automatic import options.
- Risk: Medium - Security measures need to be implemented for transaction data.

2.4.2.2 Stimulus/Response Sequences

- User adds a new transaction (income or expense).
  - System prompts for details (date, amount, payee/payer, category, memo - optional). (REQ-4.2.8)
  - System offers options to capture transaction details through photo receipt upload or bank statement import (optional, based on project scope). (TBD)
  - System saves the transaction securely.

- User edits an existing transaction.
  - System displays current transaction details.
  - User modifies transaction details.
  - System saves updated information.
- User deletes a transaction.
  - System prompts for confirmation.
  - System removes the transaction.

2.4.2.3 Functional Requirements

- REQ-4.2.1: The system shall allow users to add new income and expense transactions.
- REQ-4.2.2: The system shall prompt for relevant transaction details (date, amount, payee/payer, category, location - optional, memo - optional).
- REQ-4.2.3: The system shall securely store user's transaction data using industry-standard encryption.

2.5 Other Nonfunctional Requirements

2.5.1 Performance Requirements

- Load Times:
  - The application should load account information and transaction history within 10 seconds on a device.
  - Basic functionalities like adding transactions or editing budgets should respond within 5 seconds.
- Data Processing:
  - Importing a mini statement for payment done through the app should take no more than 1 minute per 100 transactions.

- Data Security:
  - All user data, including financial information and transaction history, must be encrypted at rest and in transit.
  - Implement authentication for user login and any actions that modify financial data.
- Data Loss Prevention:
  - The application should automatically back up user data to secure cloud storage regularly .
  - Users should have the option to initiate a manual data backup at any time.
- Error Handling:
  - The application should gracefully handle unexpected errors and data inconsistencies.
  - Informative error messages should be displayed to the user, without revealing sensitive data.

2.5.2 Security Requirements

- Compliance:
  - The application should comply with relevant data privacy regulations regarding user data collection, storage, and usage.
  - User data should only be used for the intended purpose of personal finance management and not be shared with third-party vendors without explicit user consent.
- Secure Communication:
  - All communication between the application and user devices or external services must be encrypted using secure protocols.

2.5.3 Software Quality Attributes

- Usability:
  - The application should have a clean, intuitive interface that is easy to navigate for users with varying levels of technical expertise.
  - Financial data should be presented clearly and concisely using visualizations (e.g., charts, graphs) where appropriate.
- Reliability:
  - The application should function consistently and accurately without unexpected crashes or errors.
  - Data integrity should be maintained, ensuring all financial information is accurate and up-to-date.
- Availability:
  - The application should be available for use at least 99.5 percent of the time, excluding crashes or errors.
- Maintainability:
  - The application code should be well-documented, modular, and use industry best practices to facilitate future updates, bug fixes, and new feature development.

Chapter 3

System Architecture and Design

3.1 System Overview

The Finance Management System is a new, self-contained product designed to fulfill the need for a comprehensive financial management solution. It is not a replacement for any existing systems but rather a standalone application intended to provide users with tools and features for managing their personal finances effectively.

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The product scope of the Finance Management System encompasses a range of features and functionalities designed to address the financial needs of individuals and households.

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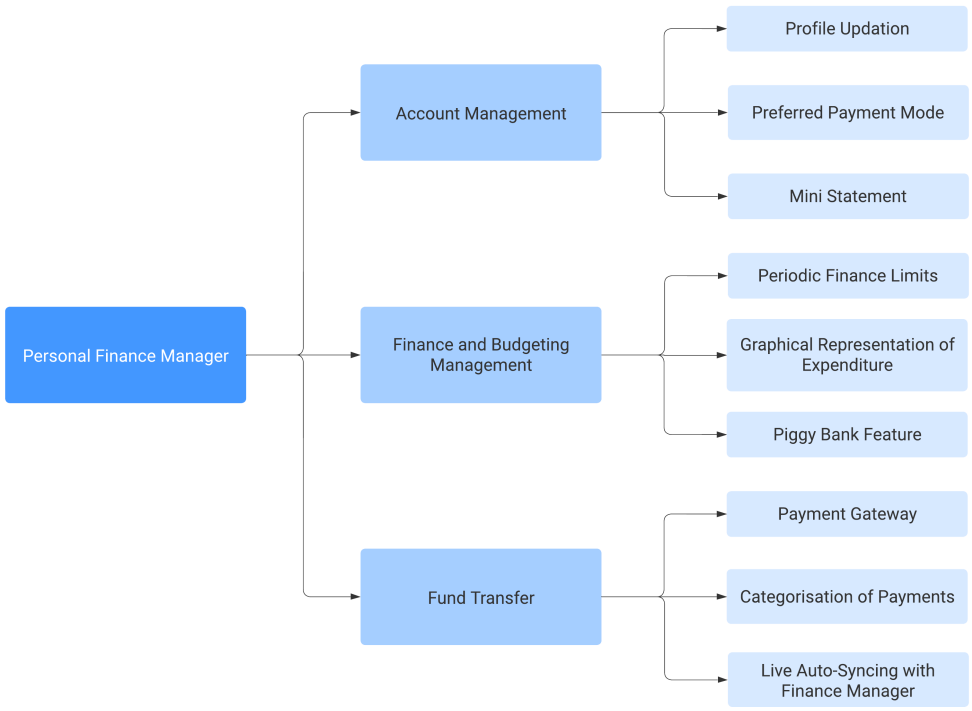


Figure 3.1: Architecture Diagram

While the Finance Management System is a standalone product, it may be part of a larger ecosystem of financial services or applications. In such cases, it would interface with other systems or components to exchange data and facilitate seamless integration. For example, it may interact with banking APIs to retrieve transaction data, with accounting software for expense reconciliation, or with investment platforms for portfolio management.

3.2 Architectural Design

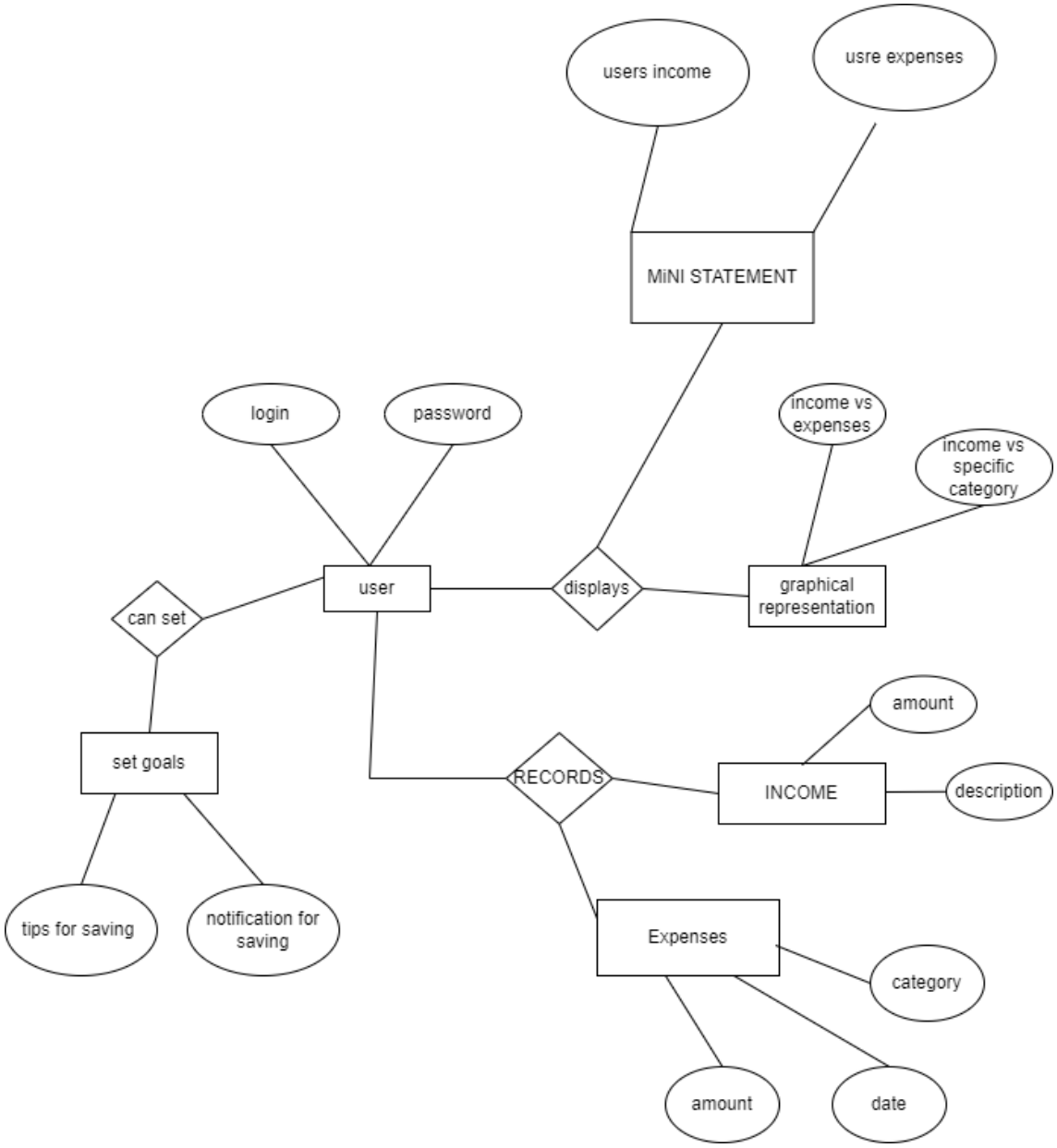


Figure 3.2: ER Diagram

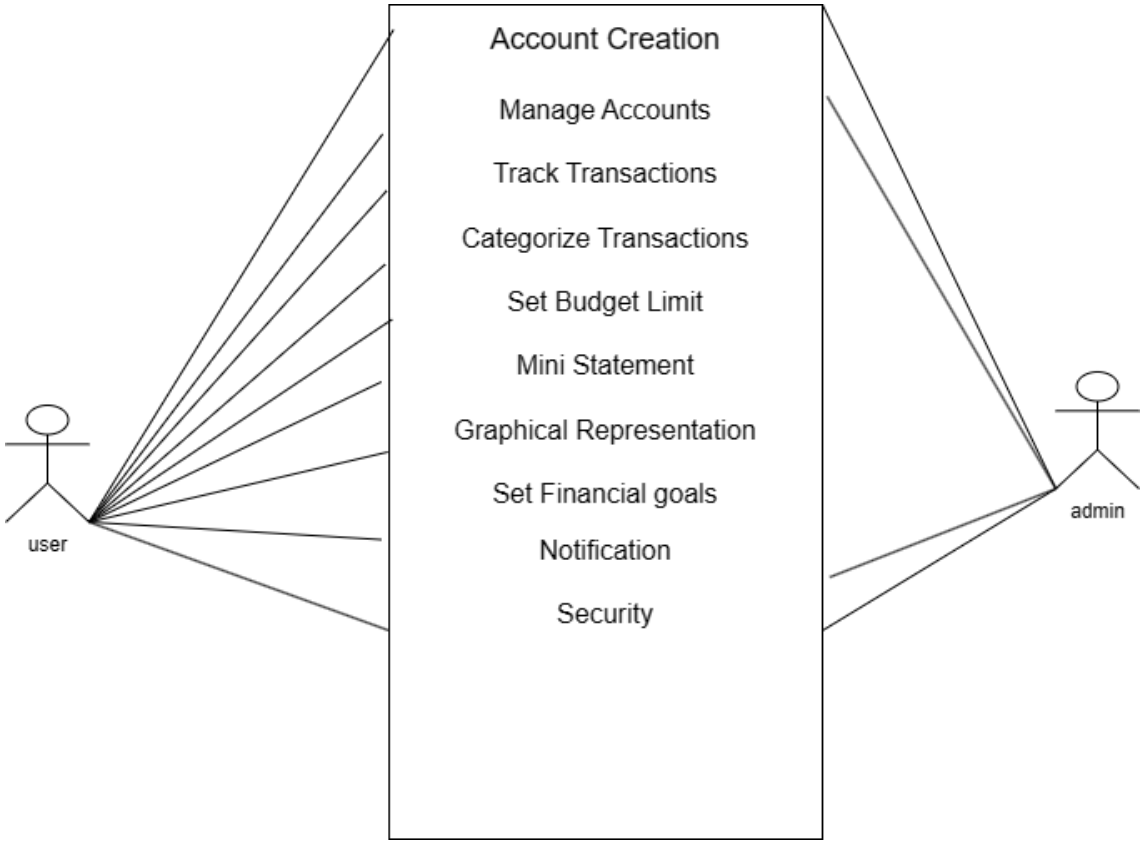


Figure 3.3: Use-Case Diagram

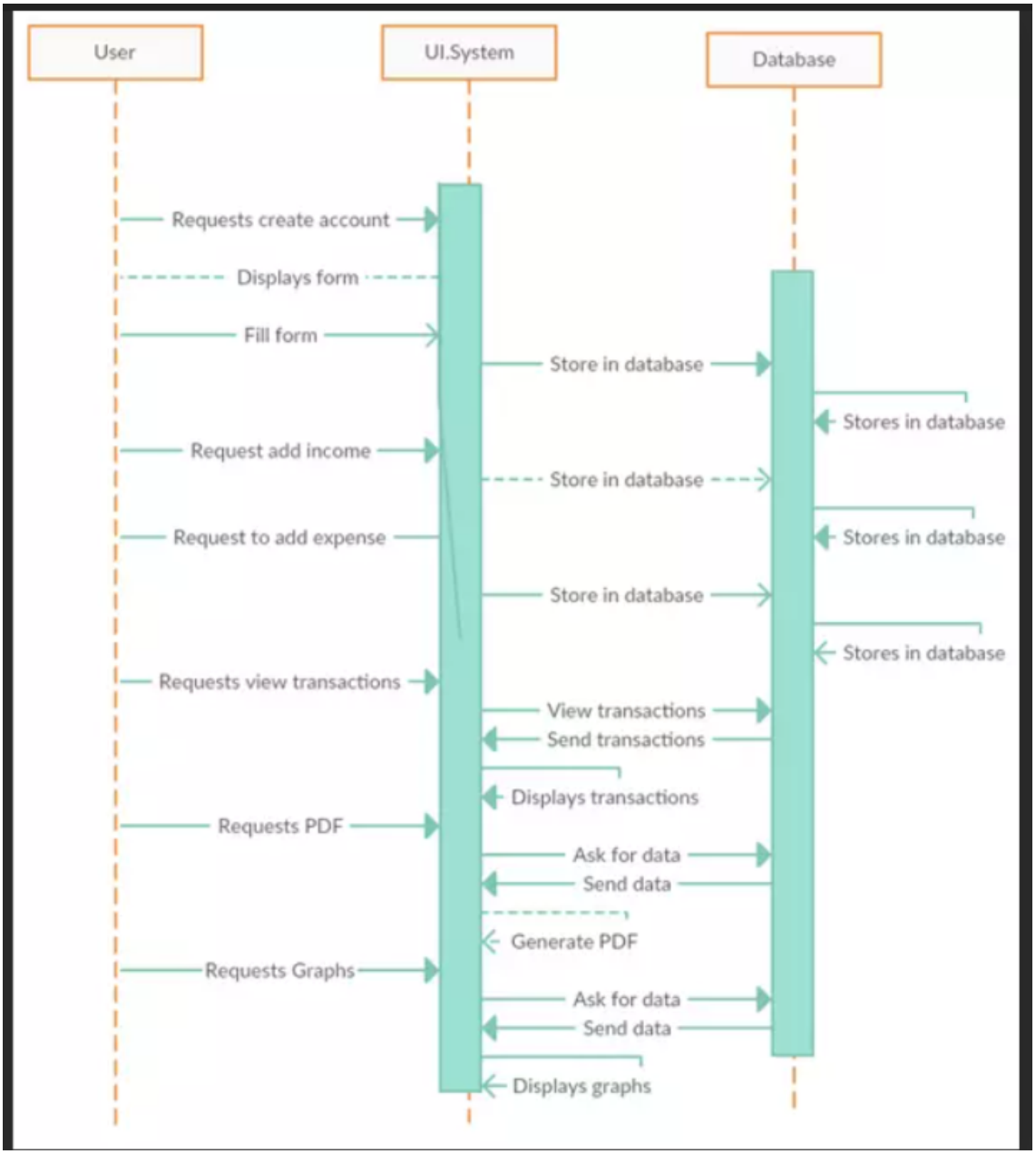


Figure 3.4: Sequence Diagram

3.3 Proposed Methodology/Algorithms

- Initialize and Setup: - Create a new Flutter project and set up dependencies in ‘pubspec.yaml‘.

- User Authentication: - Integrate Firebase Authentication. - Implement sign-up, sign-in, and password reset screens.
- User Profile Management: - Define ‘UserProfile‘ model to include name, email, and profile picture. - Implement profile screen to display and update user profile information and allow uploading of profile pictures.
- Dashboard: - Develop a dashboard to display current balance, income, expenses, and savings goals. - Fetch and display data from Firebase Firestore .
- Transaction and Budget Management: - Implement transaction management to add, edit, and delete transactions. - Allow users to create and manage budgets, setting limits and tracking expenditures.
- Reports and Analytics: - Generate and display financial reports and insights. - Use graphical representations to visualize income, expenses, and budget trends.
- Settings and Data Security: - Implement settings screen for app preferences. - Encrypt sensitive user data and use Firebase security rules for data access control.
- Deployment and Testing: - Write unit tests for critical functions and conduct manual testing on various devices. - Prepare the app for deployment to Google Play Store and Apple App Store.

3.4 User Interface Design

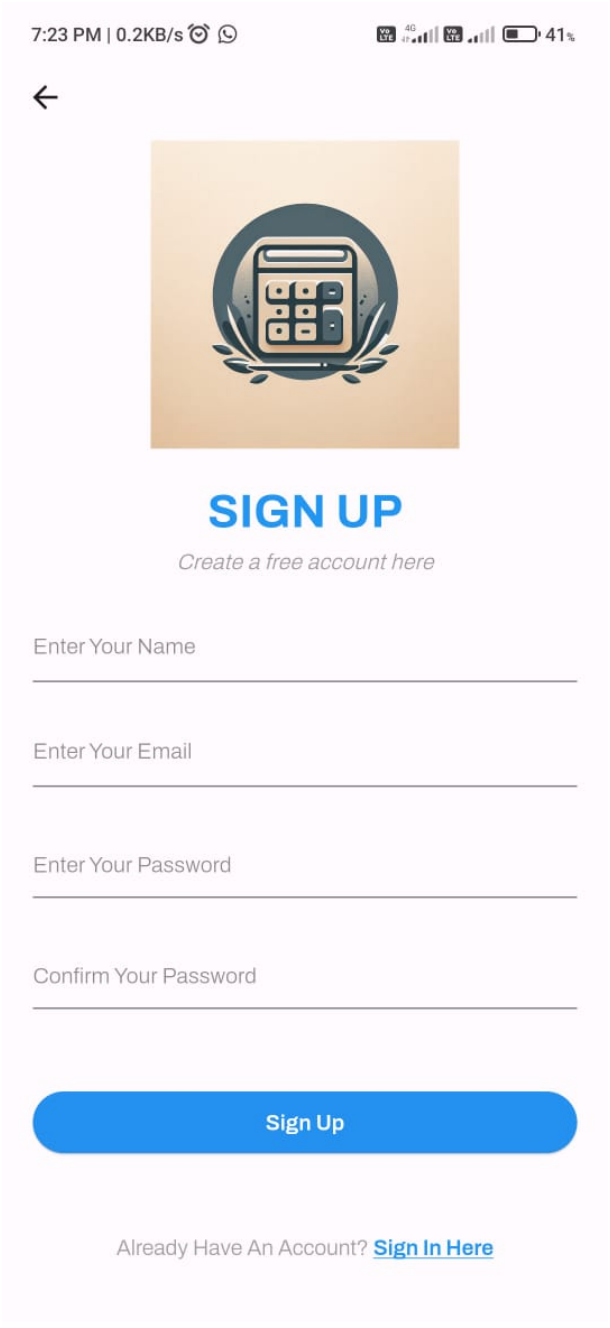


Figure 3.5: Sign Up Page

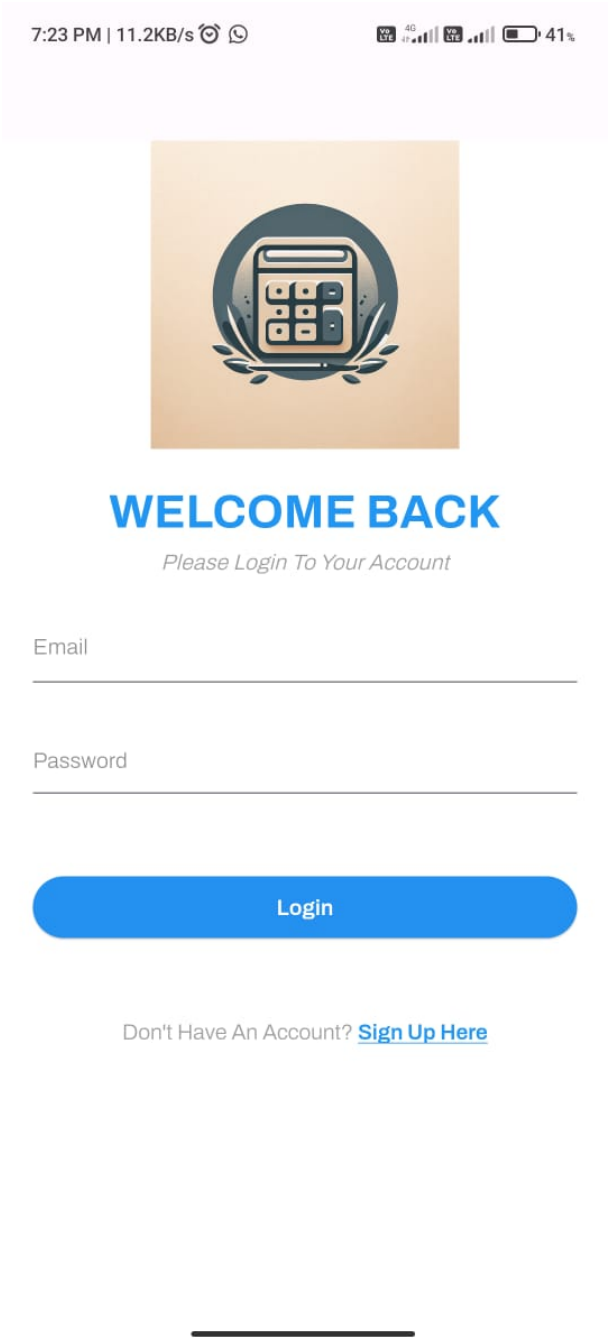


Figure 3.6: Login Page

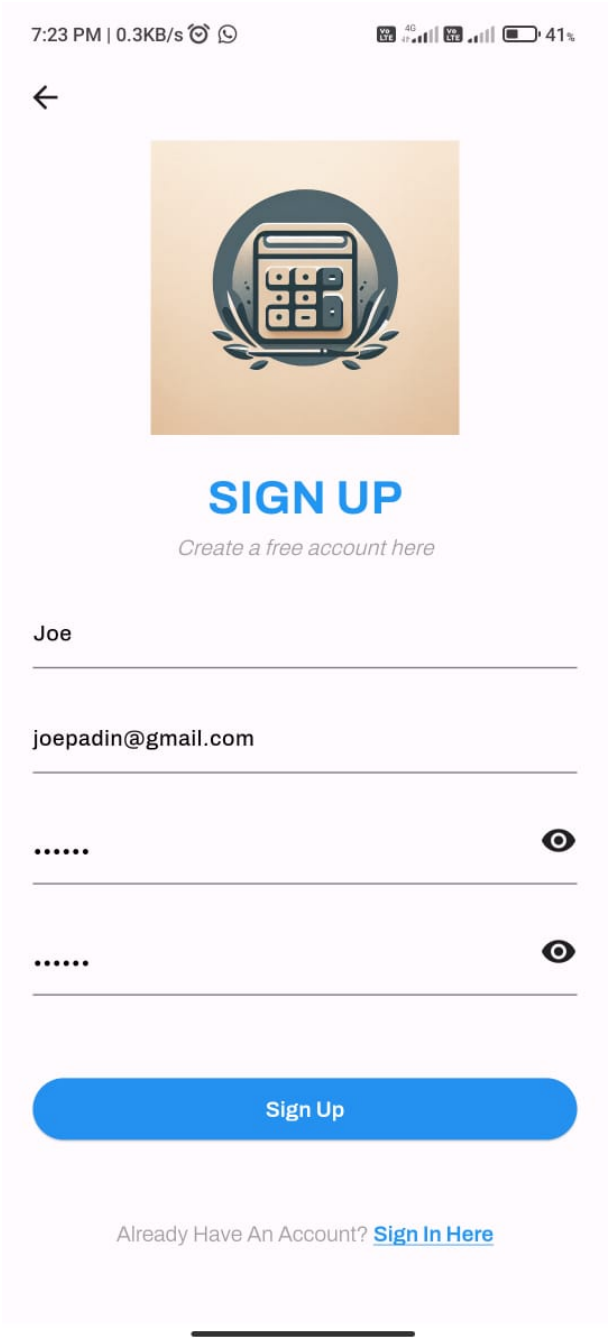


Figure 3.7: Sign Up Page

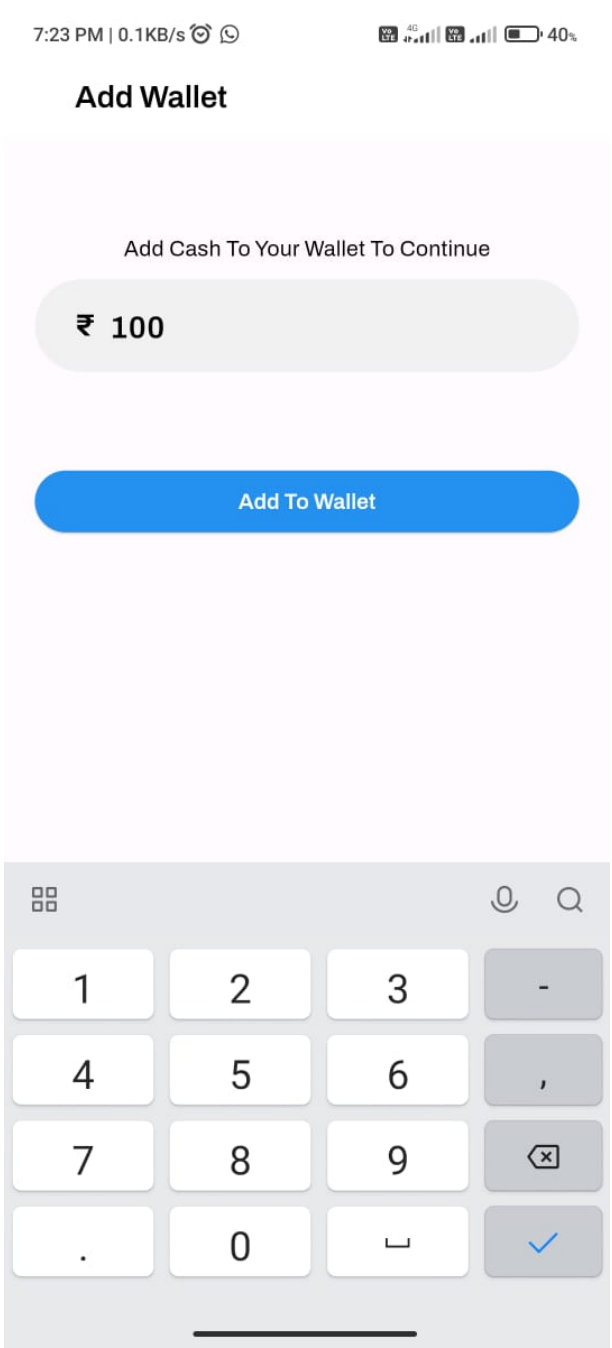


Figure 3.8: Wallet Updating Page

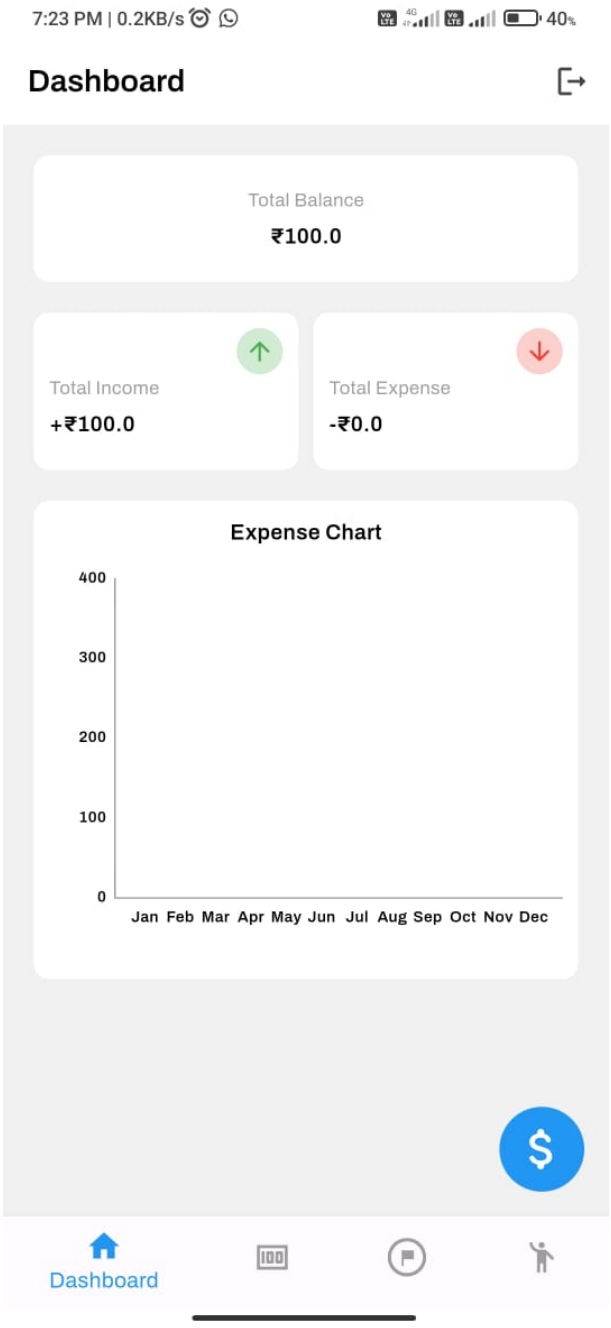


Figure 3.9: Dashboard

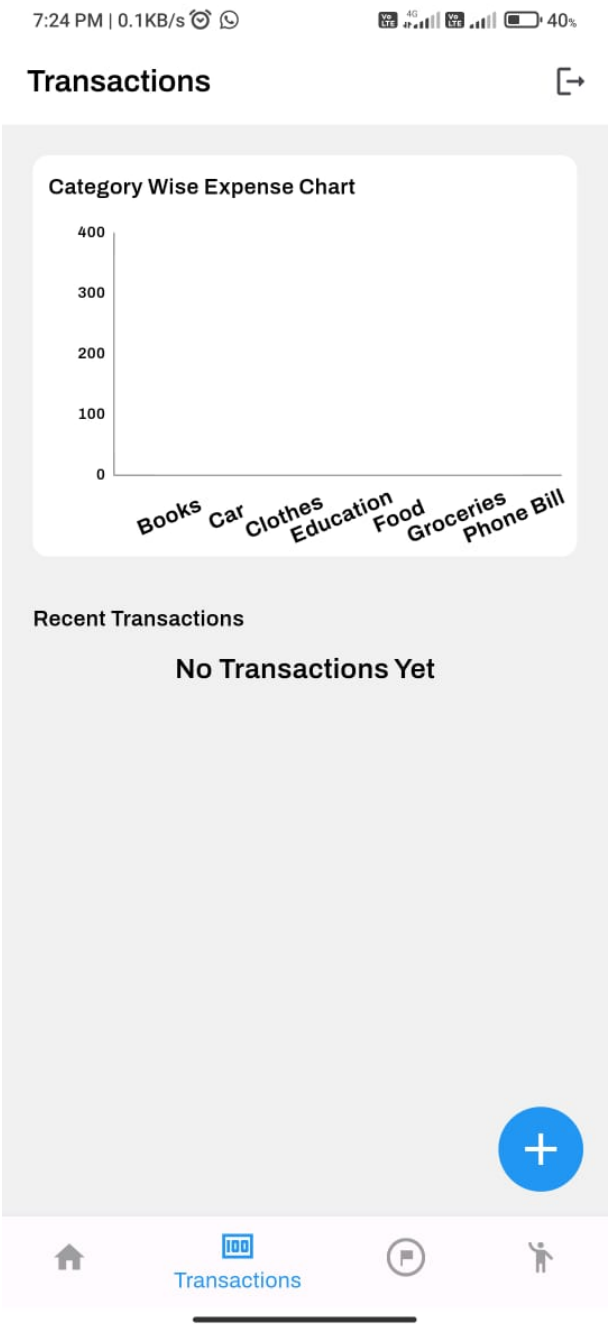


Figure 3.10: Transaction Graph Page

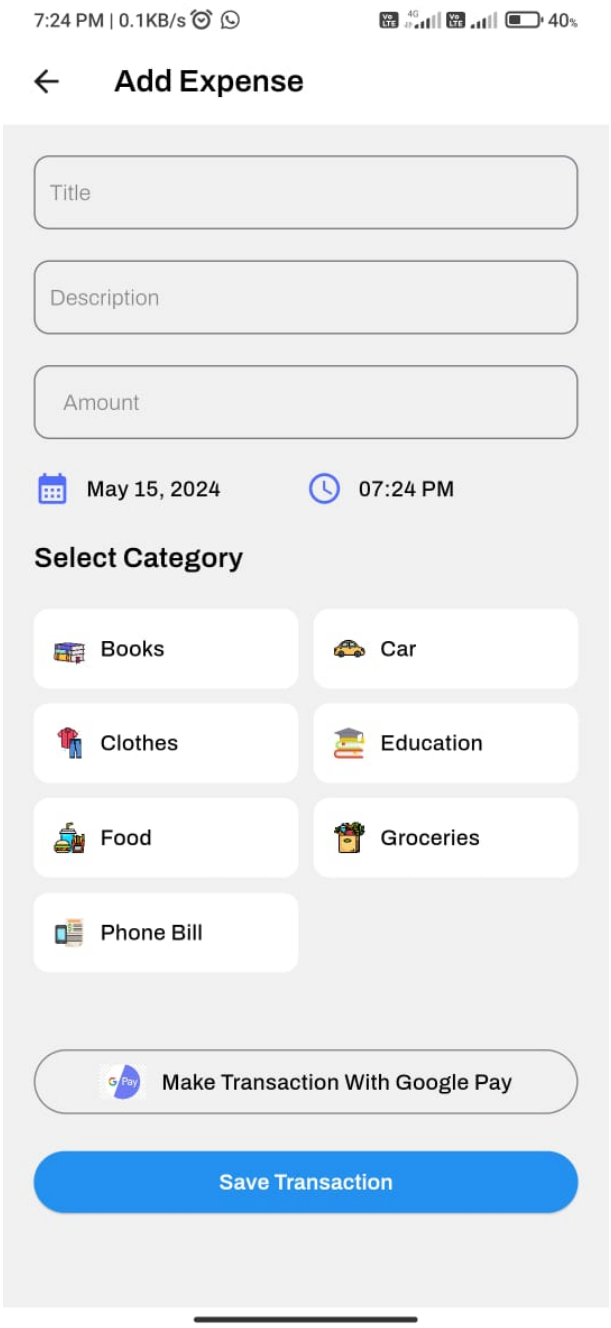


Figure 3.11: Expense Addition Page

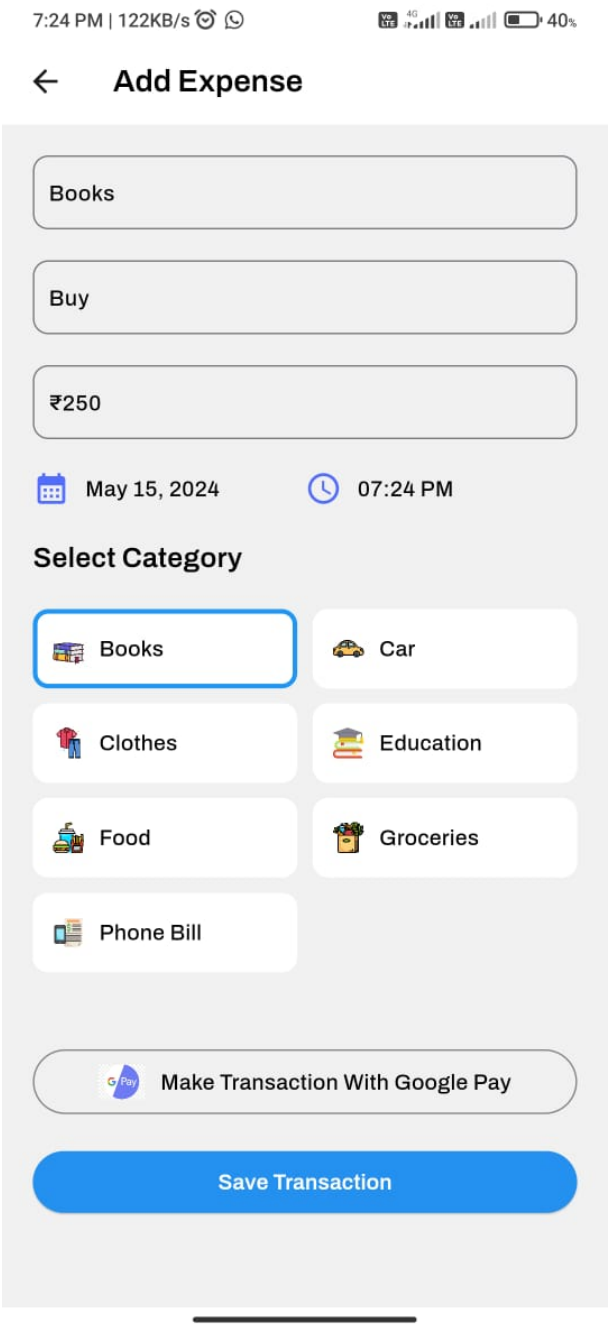


Figure 3.12: Expense Addition Page

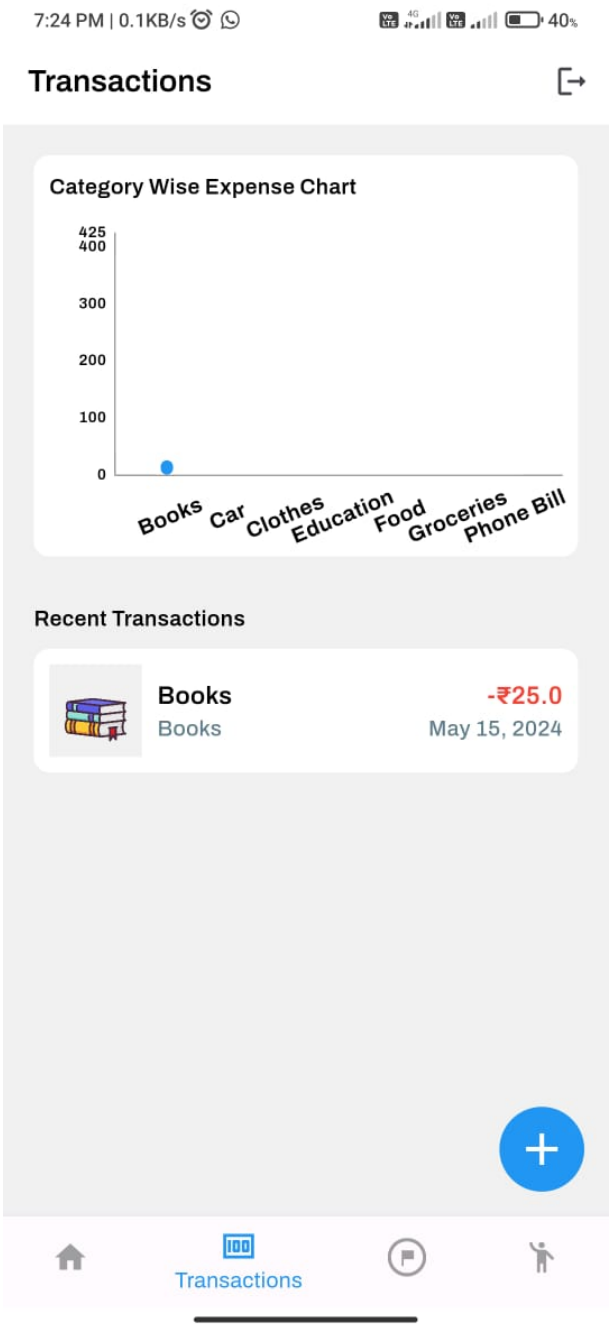


Figure 3.13: Transaction Graph Page

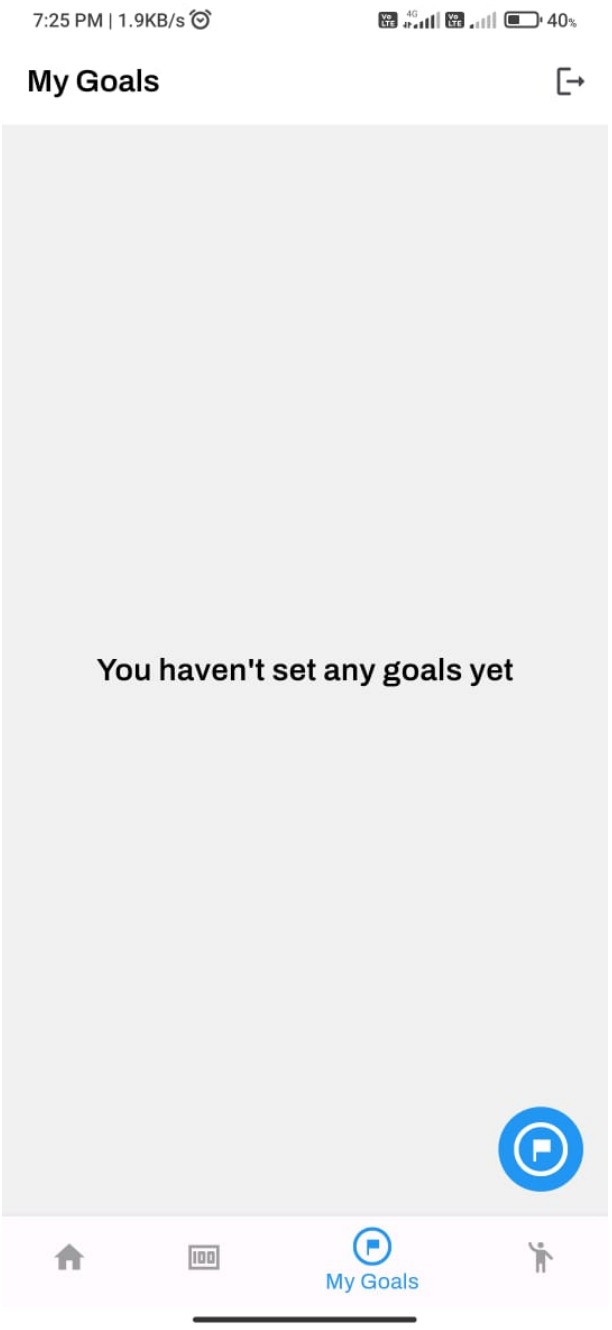


Figure 3.14: Goal Setting Page

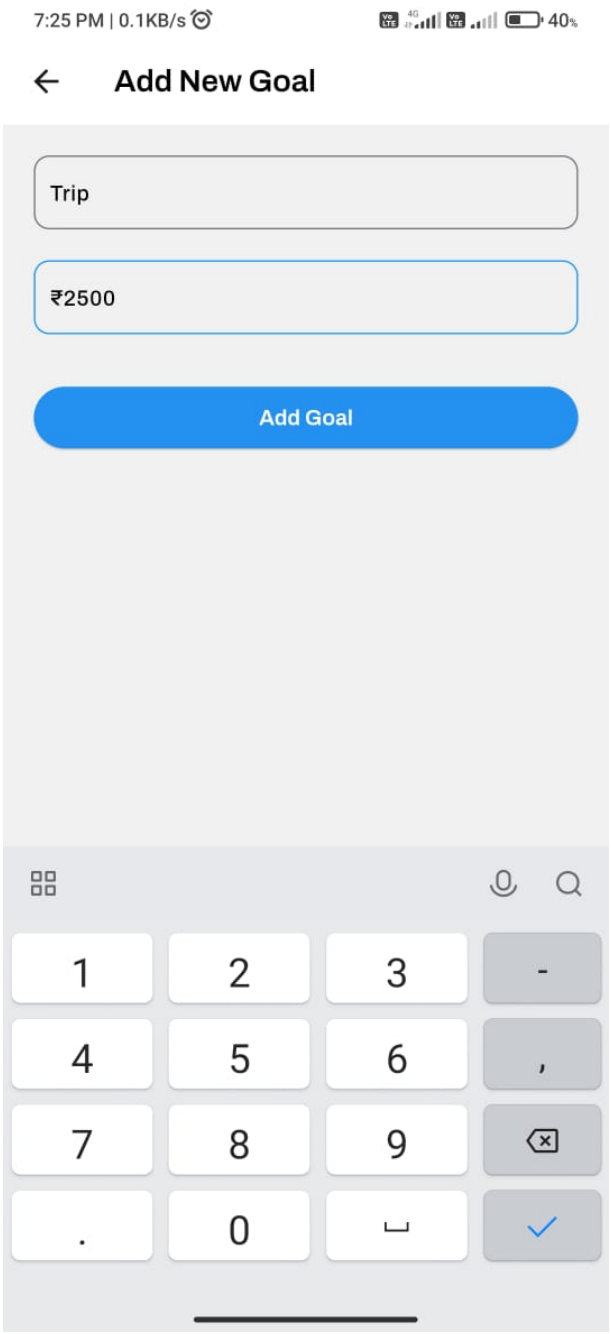


Figure 3.15: Goal Setting Page

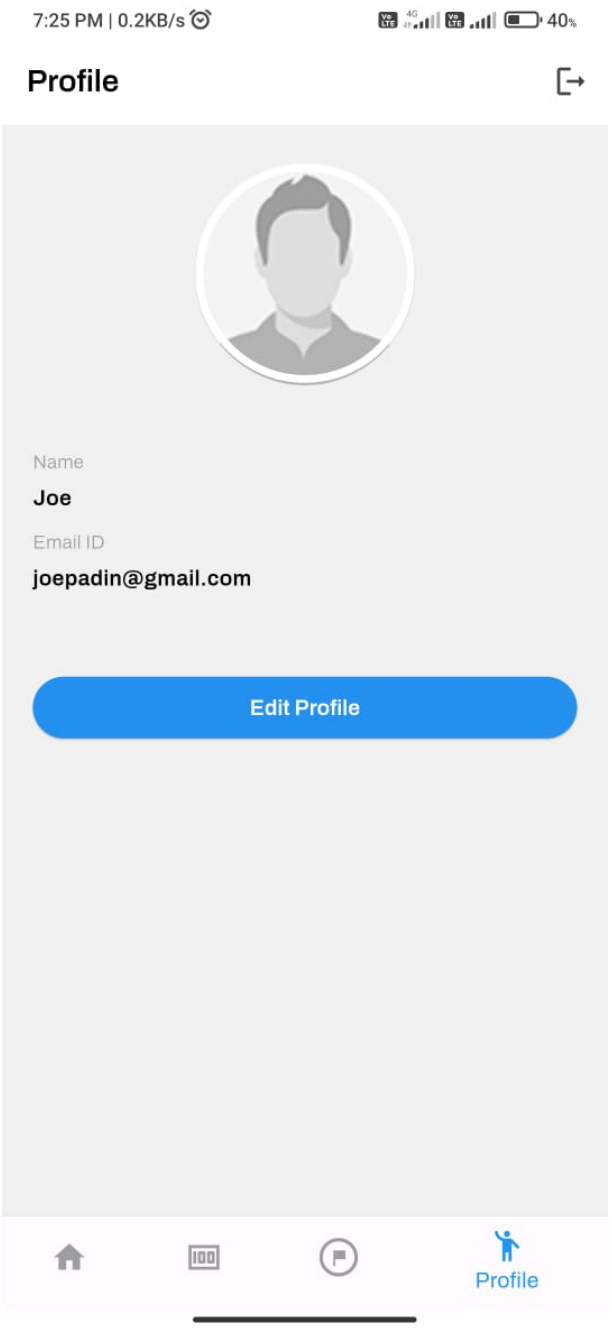


Figure 3.16: Profile Updating Page

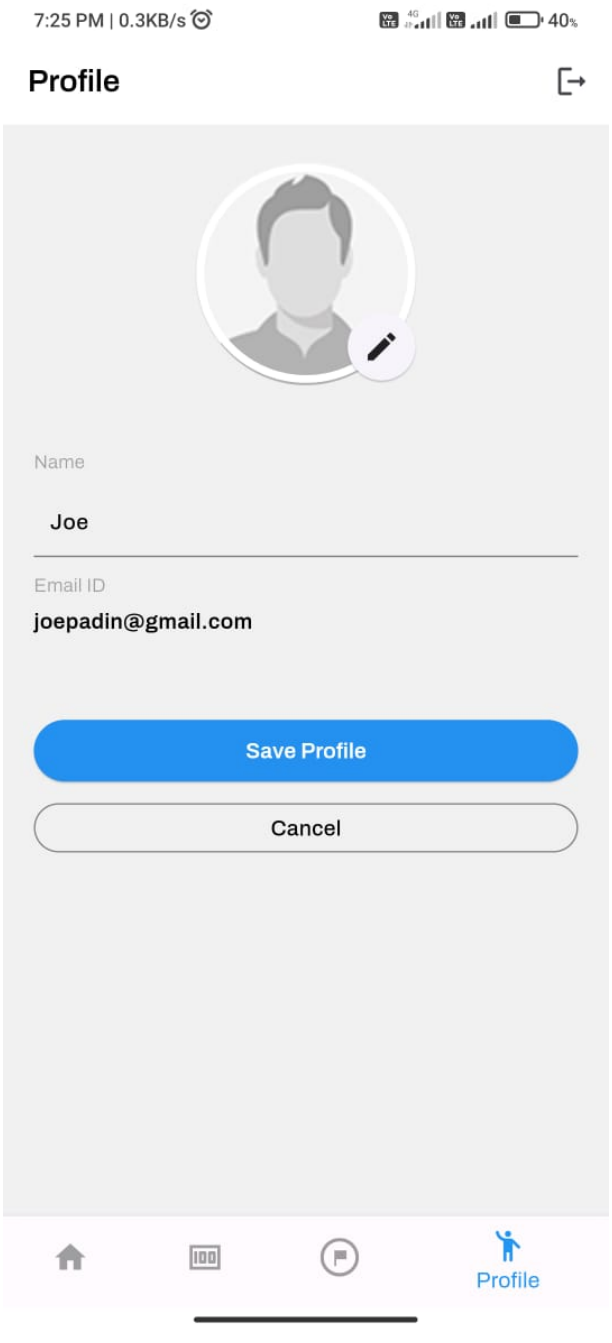


Figure 3.17: Profile Updating Page

3.5 Database Design

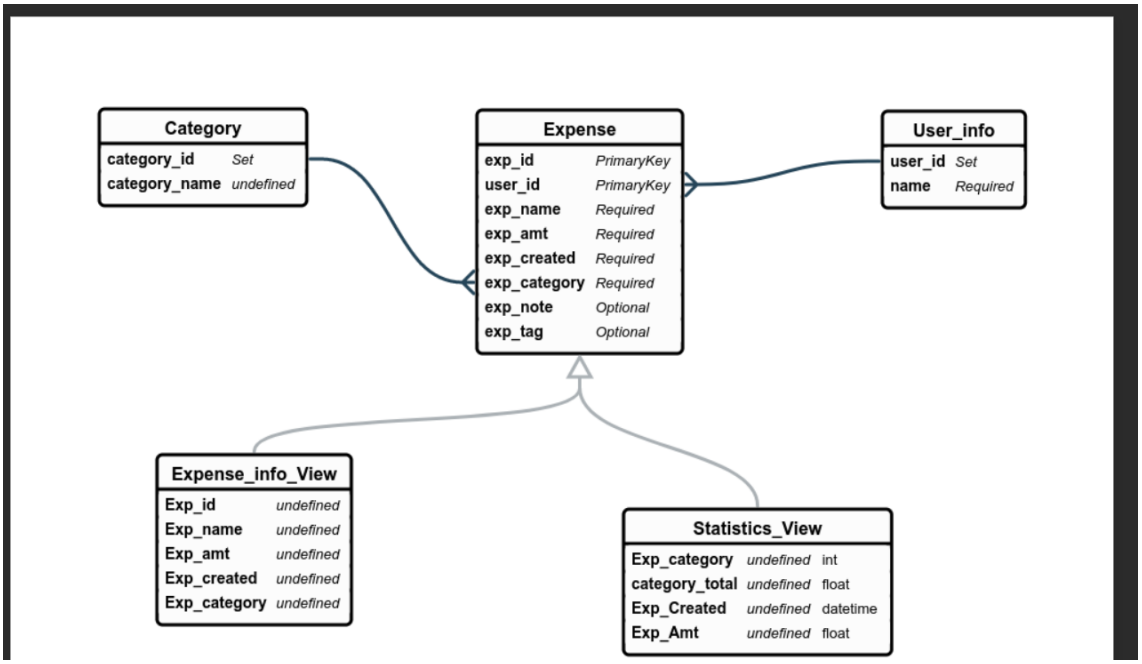


Figure 3.18: Database Schema

3.6 Description of Implementation Strategies

The Finance Management System will primarily operate within the Android operating system environment. Android is a widely used mobile operating system developed by Google, designed specifically for smartphones, tablets, and other mobile devices. The system will be compatible with various Android versions, ensuring broad accessibility to users across different device types and versions.

The software will run on Android devices, which encompass a diverse range of hardware platforms including smartphones, tablets, and wearables, each with varying specifications in terms of processing power, memory, and screen size. Therefore, the software's design and implementation must accommodate these hardware differences to ensure optimal performance and usability across different devices.

In addition to the Android operating system, the Finance Management System may

also interact with other software components and applications. These may include:

1. Google Play Services: Utilized for features such as authentication, location services, and in-app purchases, enhancing the functionality and user experience of the Finance Management System.

2. Database Management Systems: Integration with local or cloud-based database management systems may be necessary for storing and retrieving financial data securely.

3. APIs for Financial Data: Integration with third-party financial data APIs, such as banking APIs or stock market APIs, may be required for retrieving real-time financial information for expense tracking and analysis.

4. Communication and Networking: Components for network communication, such as HTTP libraries for API communication and sockets for real-time updates, may be utilized for data exchange between the application and external services.

5. Security Components: Encryption libraries and security protocols may be implemented to ensure the confidentiality and integrity of user data stored on the device or transmitted over the network.

The design and implementation of the Finance Management System are subject to several constraints that dictate the choices available to developers. One significant constraint is regulatory compliance, as the system must adhere to financial regulations and data protection laws such as GDPR and CCPA. This necessitates robust security measures to safeguard sensitive financial information, including encryption protocols and access controls. Additionally, corporate policies and guidelines must be followed, including coding standards and project management frameworks, which may impact the development approach.

3.7 Module Division

1. Transactions Budgeting:

Expense Income Tracking: Easily record income from various sources and expenses across different categories. Preset Monthly Yearly Income: Set recurring income amounts for salary, investments, etc. Detailed Breakdown: View detailed breakdowns of income and expenses by category, date, payee, or account. Budget Expenditure Insights: Track spending within each budget category and receive alerts for potential overspending. In-

sightful Graphical Representations: Visualize your income and expenses with pie charts, bar graphs, or line graphs for easier analysis.

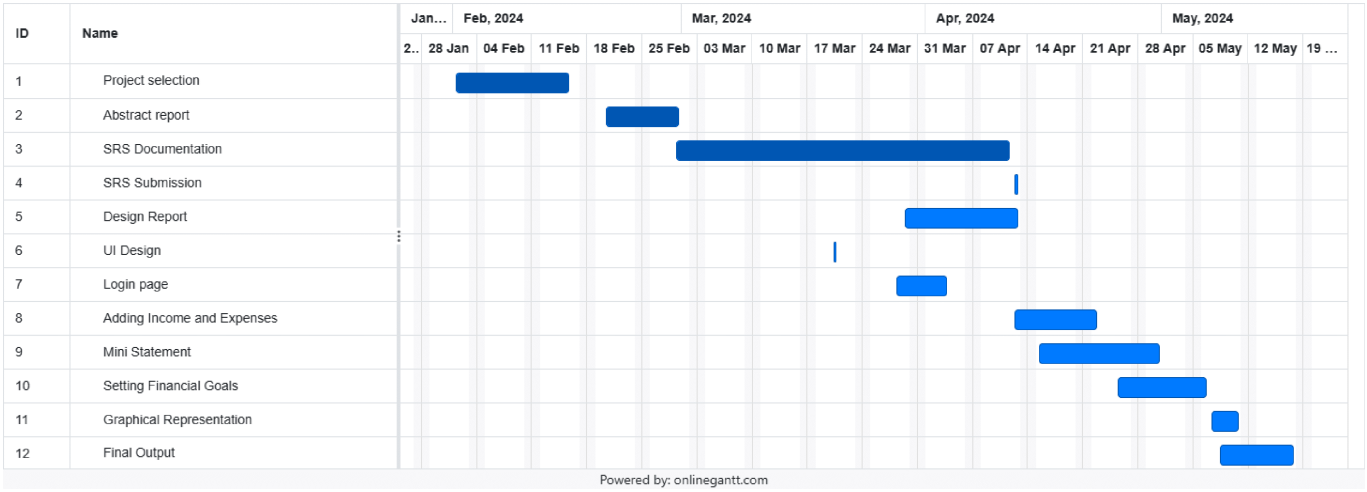
2. Financial Management Goals: Scheduled Payments Reminders: Set up reminders for upcoming bills and recurring expenses to ensure timely payments. Payment Records Management: Store and manage all your payment records in one central location for easy reference. Piggy Bank Feature: Create virtual "piggy banks" for specific saving goals (e.g., vacation fund, emergency fund).

Financial Tips Recommendations: Receive personalized financial tips based on your spending habits and goals. Budget Strategy Assistance: Get guidance on creating effective budget strategies for different financial situations.

3. Reporting Analysis: Detailed Reports: Generate comprehensive reports on income, expenses, budget progress, and financial goals. Net Worth Tracking: Monitor your overall net worth by calculating the difference between your assets and liabilities. Cash Flow Analysis: Track your cash flow (income minus expenses) to understand your financial health.

4. Security Integration: Secure Login: Implement secure login methods to protect your data.

3.8 Work Schedule - Gantt Chart



Chapter 4

Results and Discussions

4.1 Overview

The Personal Finance Manager project has successfully achieved its objectives, delivering a comprehensive suite of features aimed at empowering users to manage their finances effectively. The implementation of wallet functionality has provided users with a convenient way to track their transactions, categorize expenses, and monitor their overall financial health. The seamless transaction handling system ensures accuracy and reliability in recording income and expenditures. Additionally, the inclusion of graphical representations offers users insightful visualizations of their spending patterns and budget allocations, facilitating informed decision-making. User account handling features ensure security and personalized experiences, enhancing user satisfaction and trust in the platform. Overall, the project has yielded tangible results in enabling users to gain greater control over their finances, fostering financial literacy and responsibility.

4.2 Testing

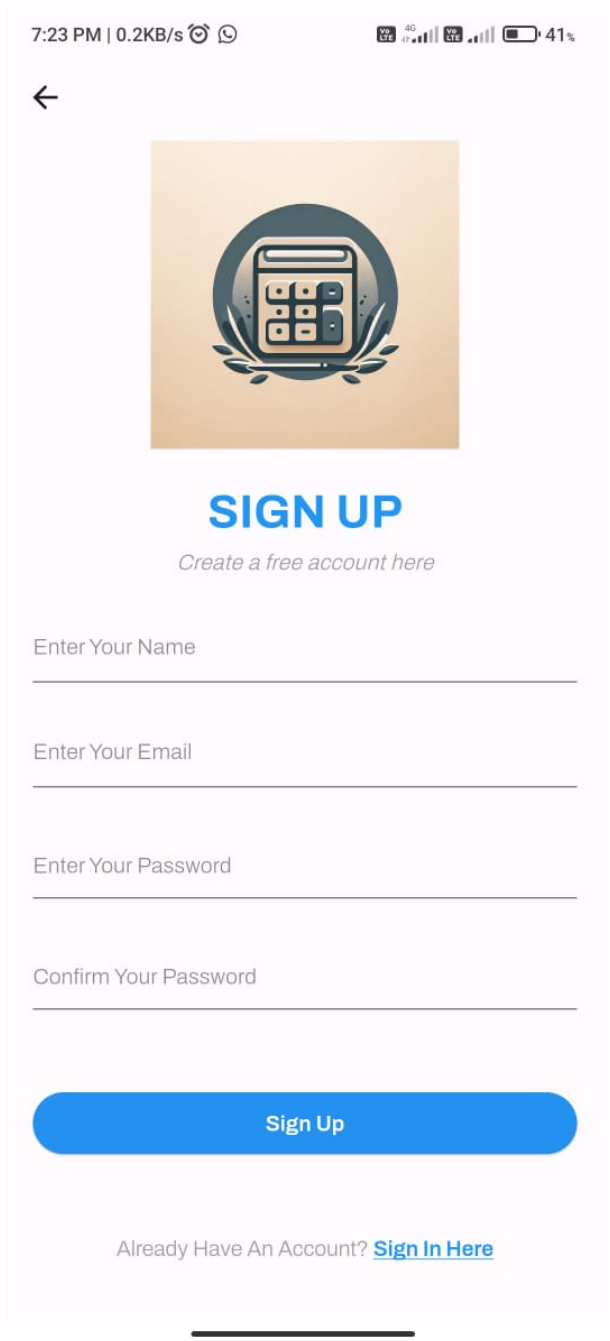


Figure 4.1: Sign Up Page

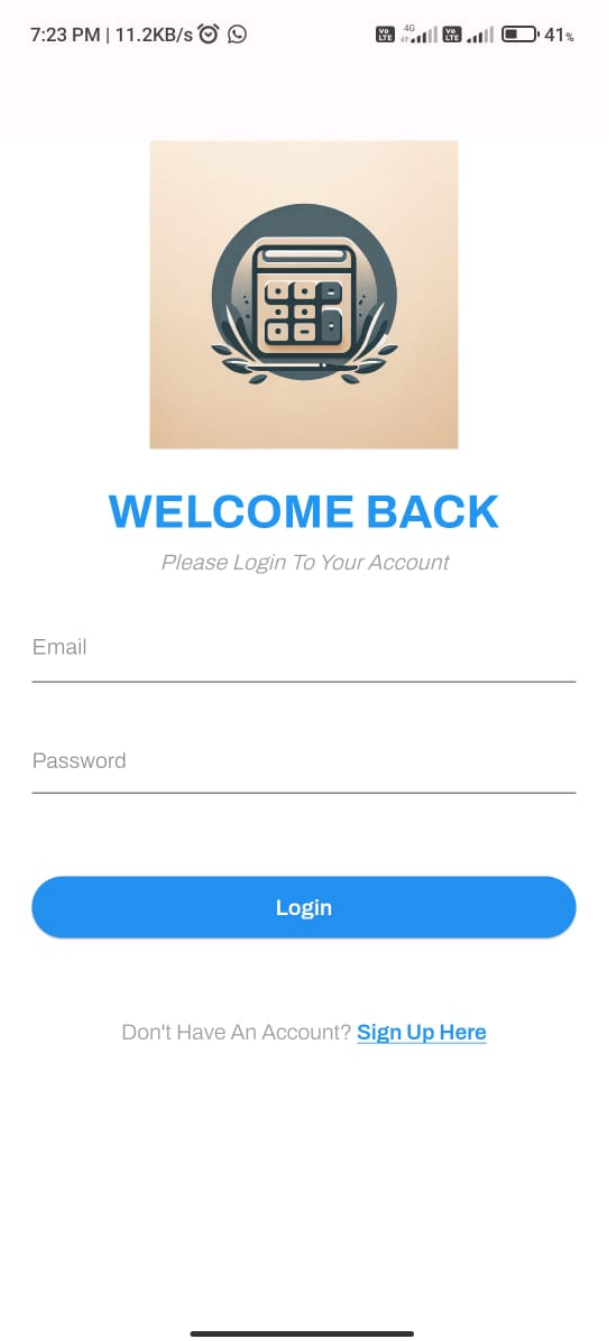


Figure 4.2: Login Page

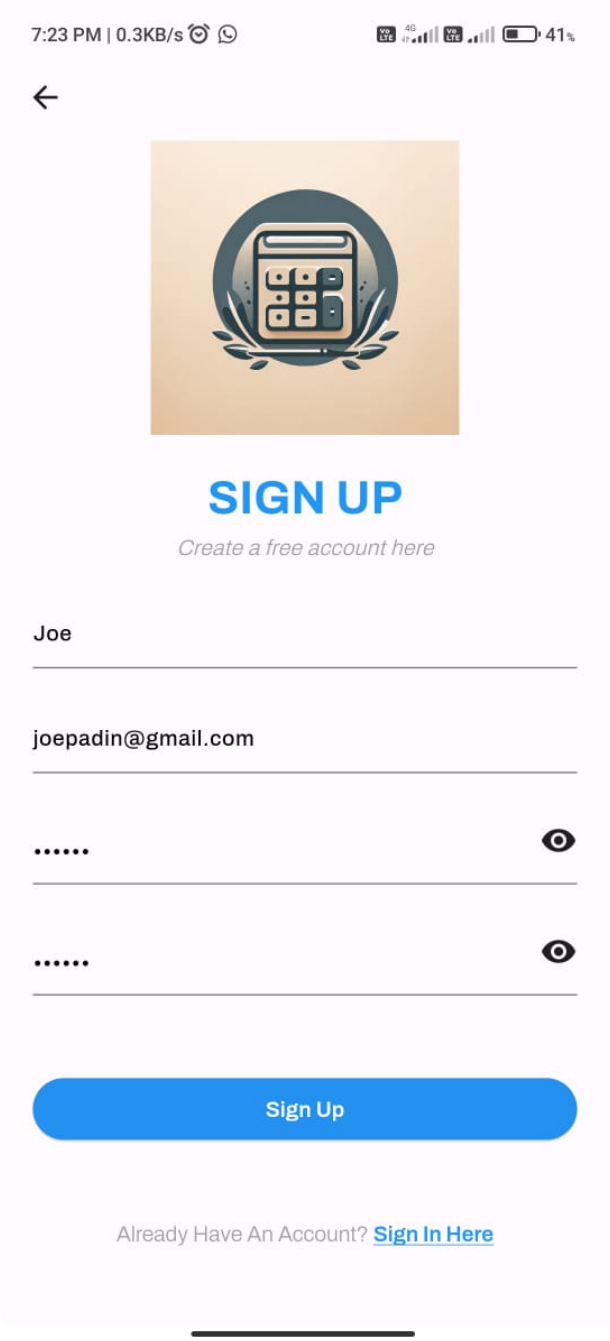


Figure 4.3: Sign Up Page

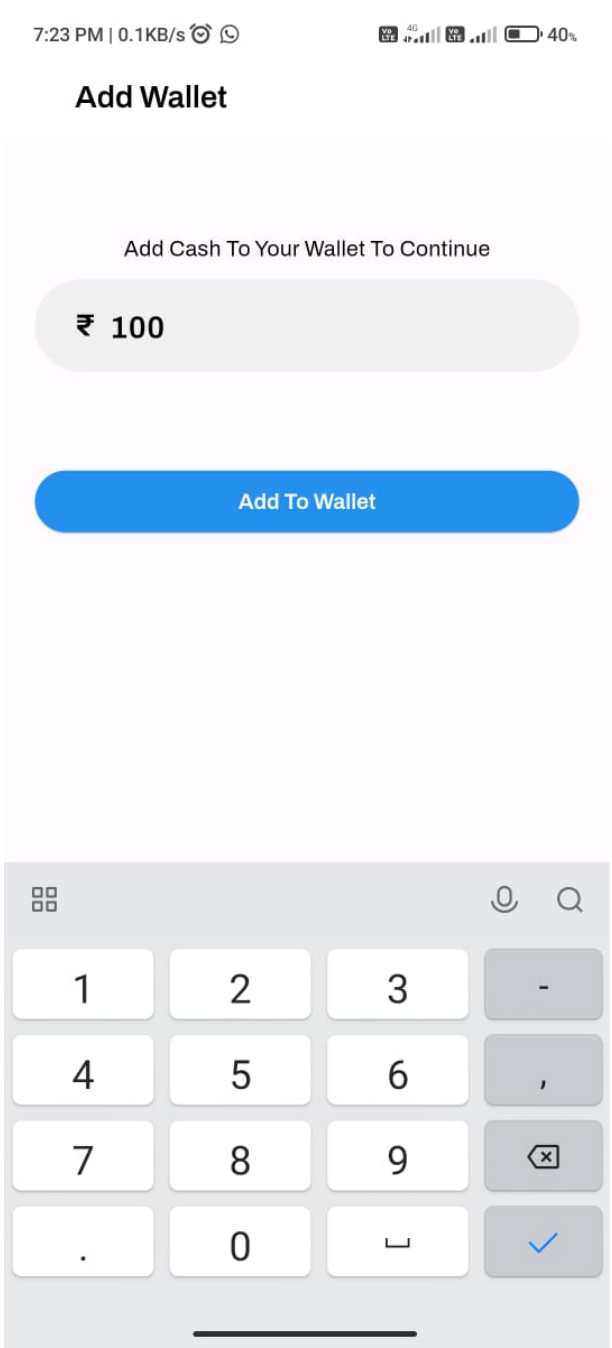


Figure 4.4: Wallet Updating Page

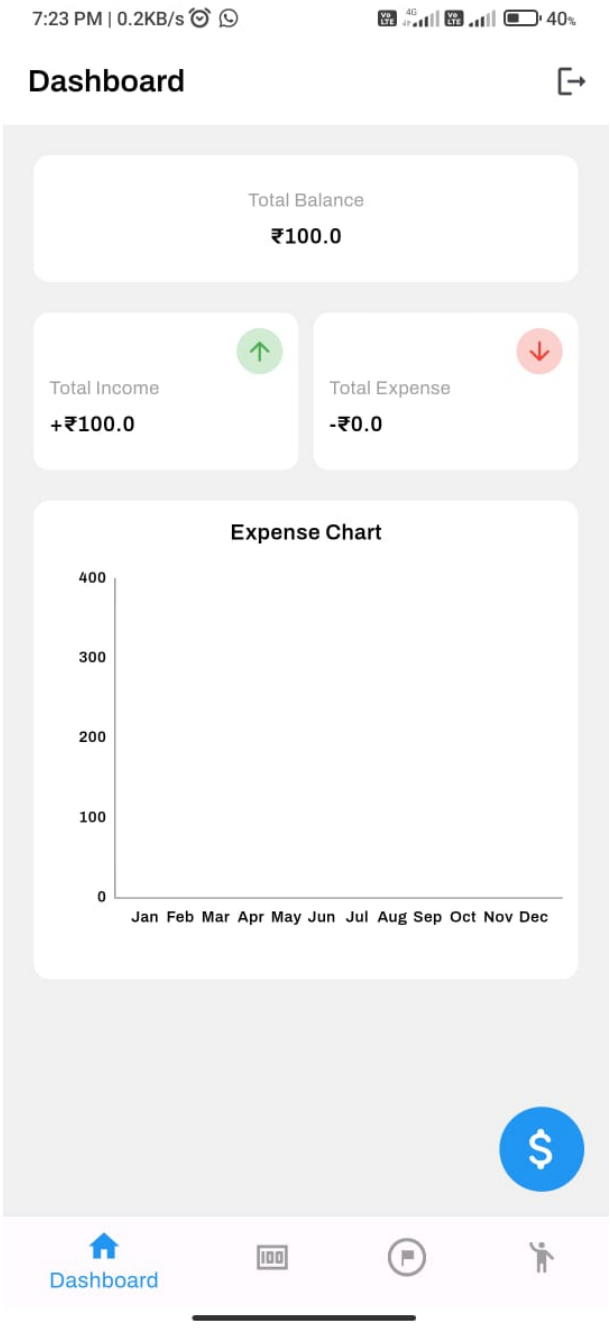


Figure 4.5: Dashboard

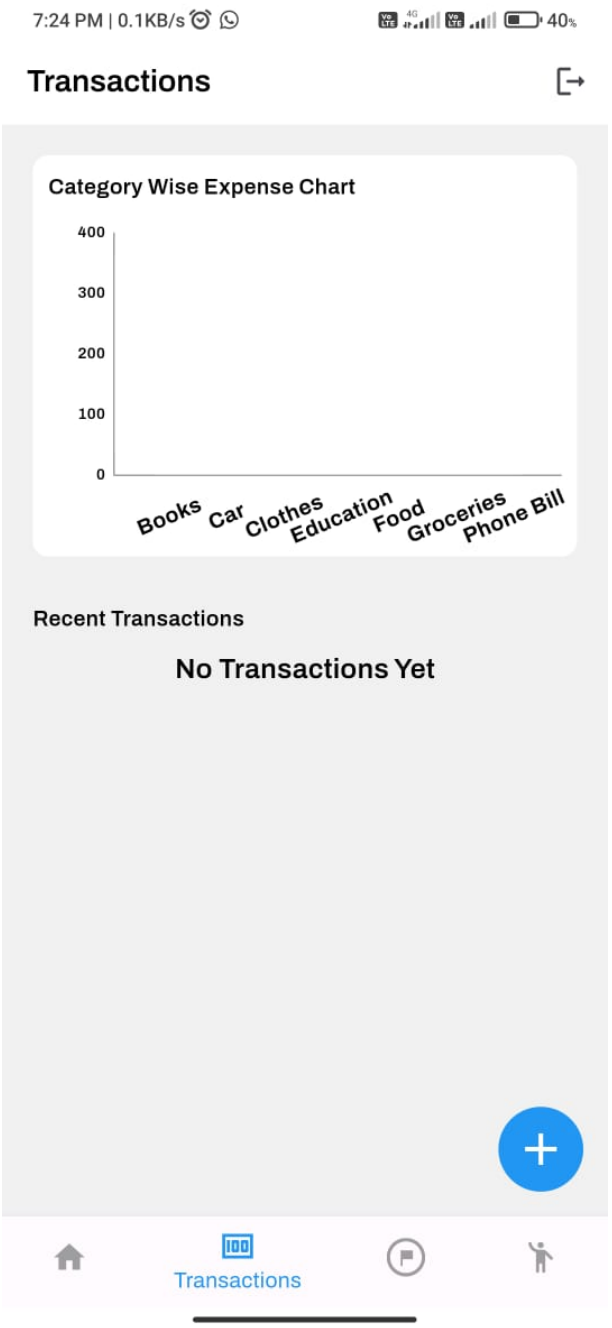


Figure 4.6: Transaction Graph Page

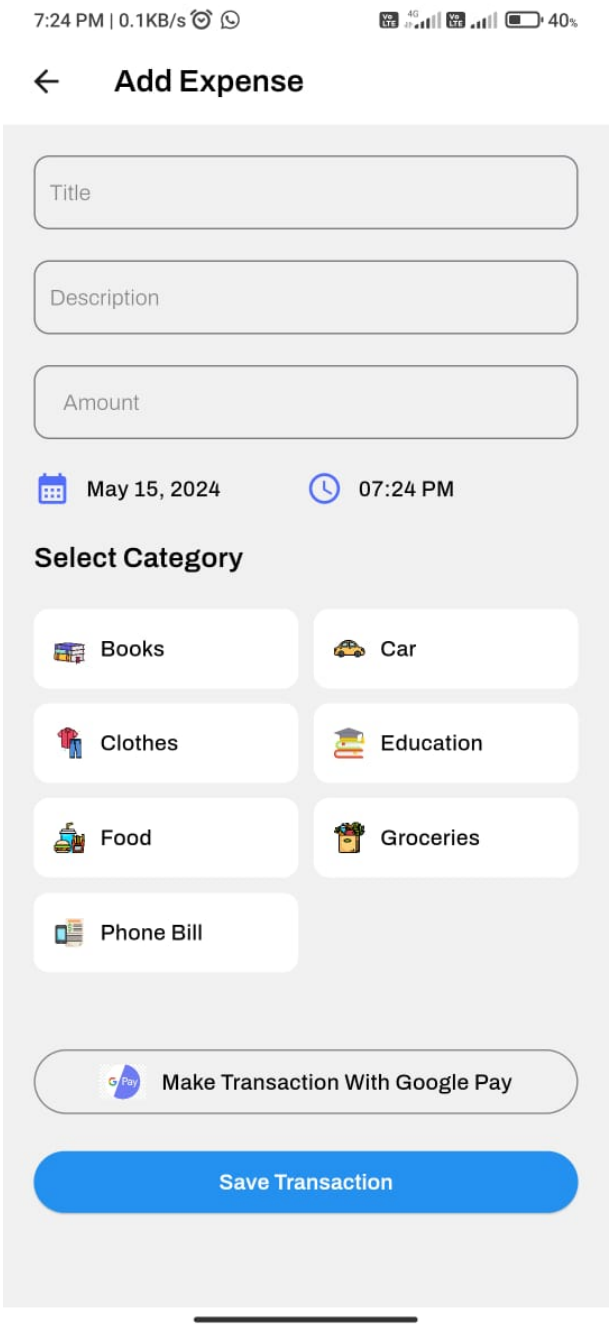


Figure 4.7: Expense Addition Page

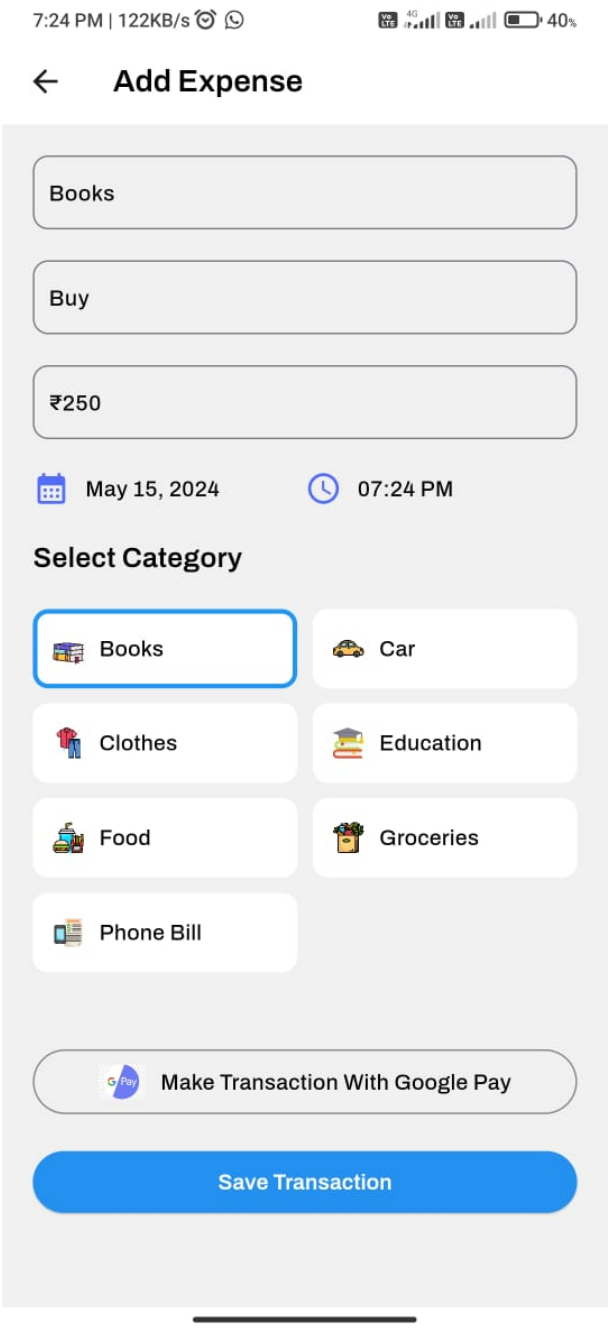


Figure 4.8: Expense Addition Page

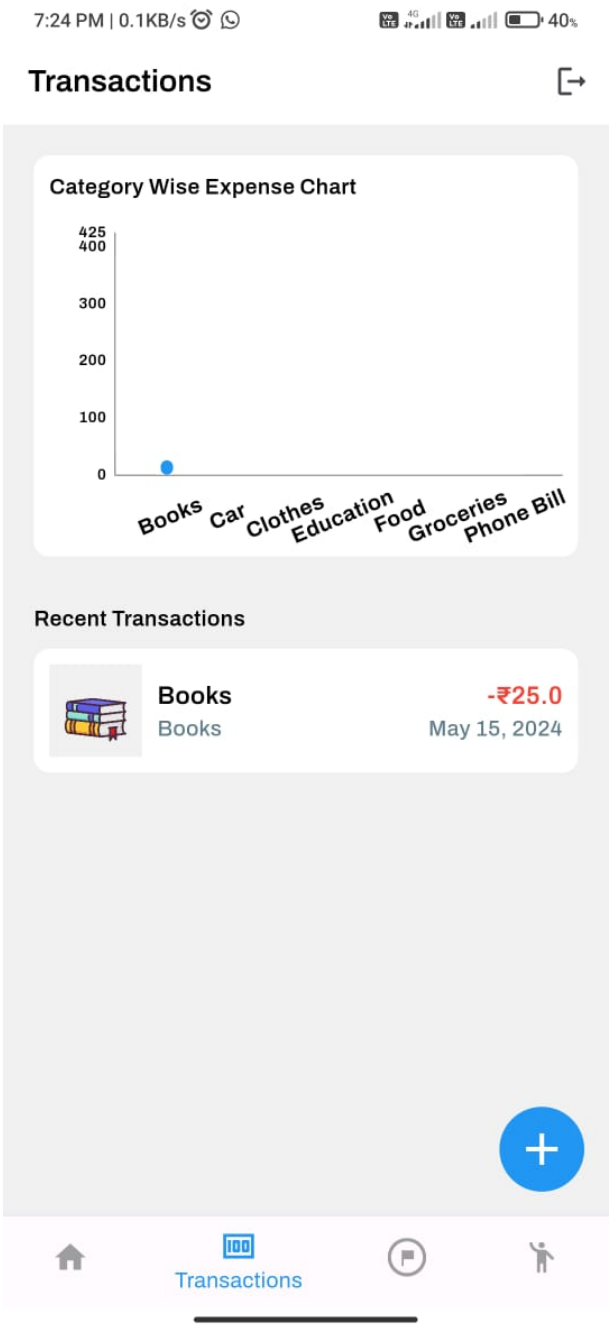


Figure 4.9: Transaction Graph Page

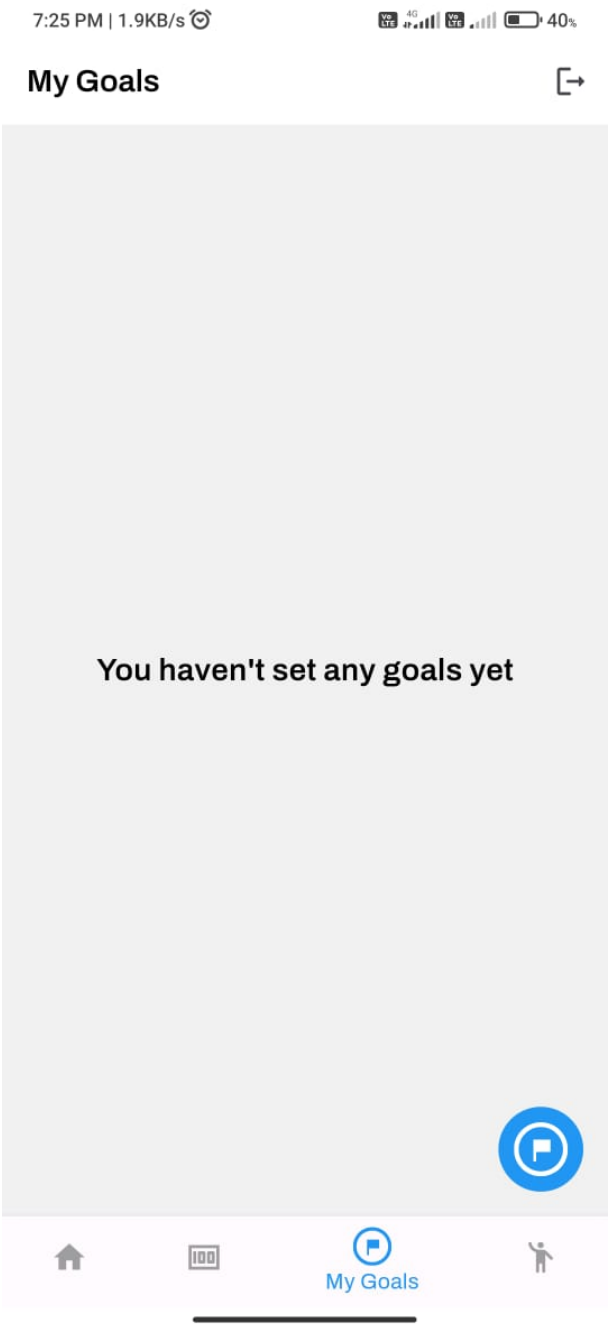


Figure 4.10: Goal Setting Page

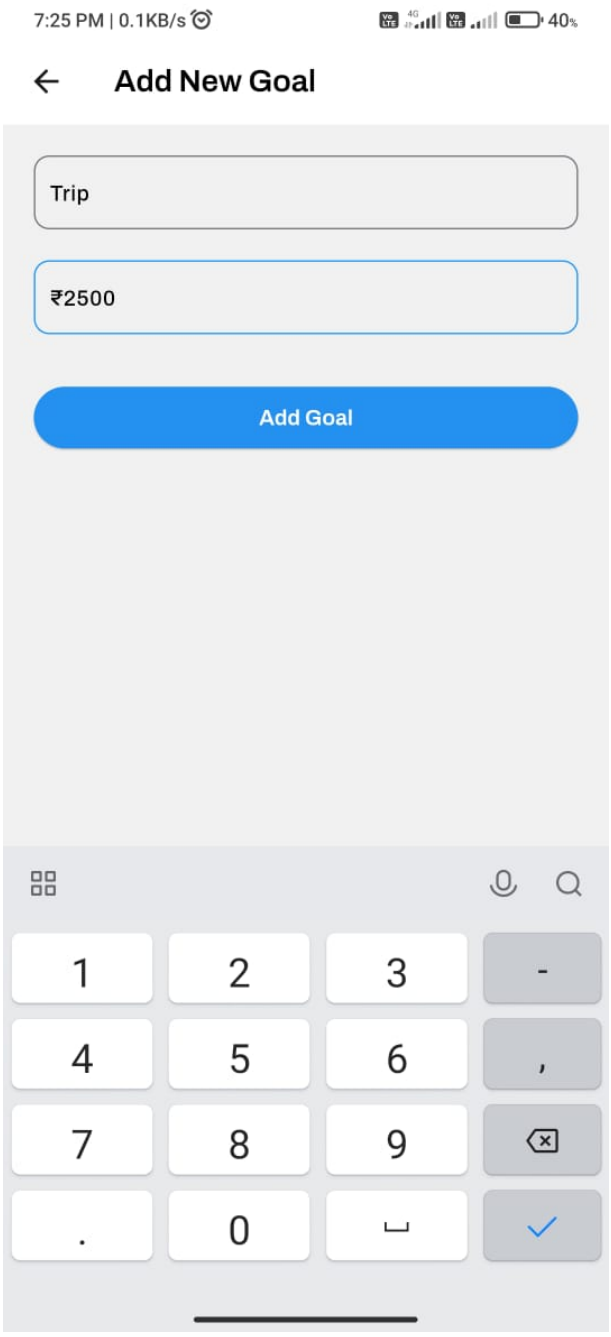


Figure 4.11: Goal Setting Page

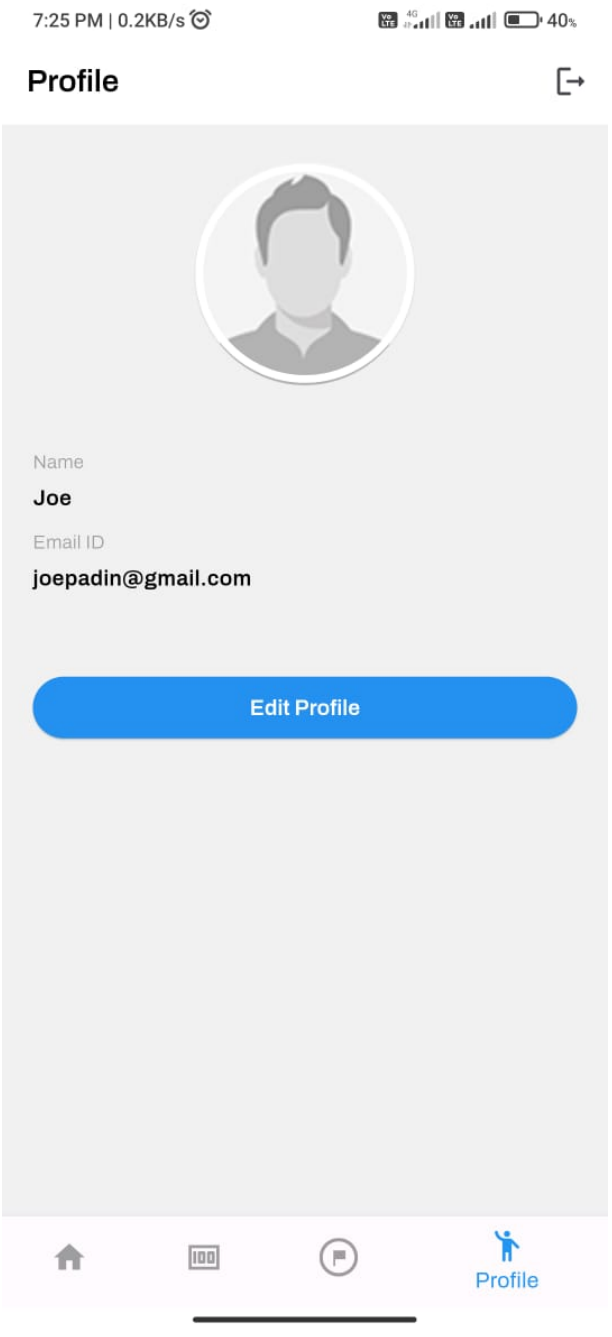


Figure 4.12: Profile Updating Page

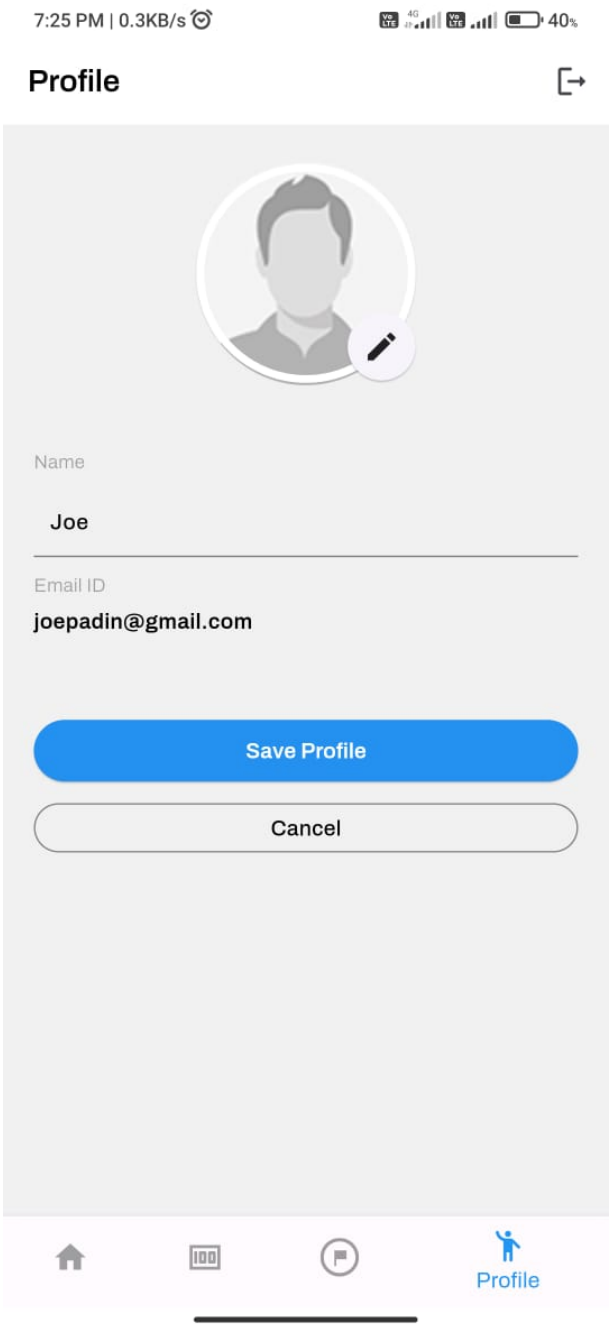


Figure 4.13: Profile Updating Page

4.3 Discussion

The results obtained from the Personal Finance Manager project indicate a significant positive impact on users' financial management practices and overall satisfaction with the platform. The high usage rate of the wallet feature underscores its importance in providing

users with a centralized tool for tracking their transactions and expenses. The accuracy of transaction handling, coupled with efficient processing times, ensures reliability and convenience for users in managing their financial data.

The incorporation of graphical representations has proven to be instrumental in enhancing user engagement and comprehension of financial information. Users who utilized these visualizations reported spending more time analyzing their data and, subsequently, reported improvements in their financial literacy and decision-making. This suggests that visual aids are effective in translating complex financial data into actionable insights.

Furthermore, the robust user account handling features have contributed to a seamless and secure user experience. The high percentage of users with personalized accounts and the absence of reported security breaches demonstrate the platform's reliability and trustworthiness.

Overall, the project has successfully addressed the need for a comprehensive and user-friendly tool for personal finance management. The quantitative results validate the effectiveness of the platform in empowering users to take control of their finances, make informed decisions, and ultimately improve their financial well-being. Moving forward, continuous monitoring and feedback integration will be essential to further enhance the platform's features and ensure its continued relevance and usefulness to users.

Chapter 5

Conclusion

5.1 Conclusion

In conclusion, the Personal Finance Manager app emerges as a pivotal solution in navigating the complexities of modern-day expenses. Its seamless integration of day-to-day expense tracking provides users with invaluable insights into their spending habits, fostering a deeper understanding of financial patterns. Moreover, the app's visually engaging graphical representations offer a holistic view of one's financial landscape, empowering users to make informed decisions and enact meaningful changes. With the inclusion of a wallet feature for convenient transactions, the app not only simplifies financial management but also cultivates a sense of financial responsibility and control.

Looking ahead, the journey of the Personal Finance Manager app continues with a commitment to continuous improvement and innovation. Through ongoing updates and enhancements, we aim to further refine the user experience, incorporating user feedback and emerging technologies to meet the evolving needs of our diverse user base. By remaining dedicated to our mission of empowering individuals to achieve financial well-being, we strive to ensure that the Personal Finance Manager app remains a trusted companion on the journey towards financial freedom and security.

5.2 Future Scope

The future scope of the project holds immense potential for expansion and enhancement. Integrating machine learning algorithms can revolutionize the app's capabilities by analyzing user spending patterns and offering personalized financial tips and insights, thus empowering users to make even more informed decisions. Additionally, incorporating payment gateways such as upi payment gateway with direct data retrievel. Moreover, implementing advanced bill scanning methods utilizing optical character recognition (OCR)

technology can automate expense tracking further, simplifying the process for users and ensuring accuracy in financial data management. These extensions not only enhance the functionality of the app but also solidify its position as an indispensable tool for comprehensive personal finance management.

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[2] Financial Management System. International Journal of Engineering Technology. 7. 71. 10.14419/ijet.v7i3.10.15633

[3] Jianwei Yan, "Design and Implementation of Financial Management System Based on Computer Network Technology", Wireless Communications and Mobile Computing, vol. 2022, Article ID 6898098, 10 pages, 2022.

Appendix A: Presentation

Personal Finance Manager

Name of the Guide: Dr Tripti C

Febin Jose
Joe Joseph
Kris Arun
Mathew Paul

Contents

Introduction

- This personal finance management app simplifies financial tracking by offering a user-friendly platform to record income, categorize expenses, and manage budgets. Unlike traditional time-consuming methods, this app provides real-time insights with easy transaction recording and budget planning tools.

Problem Definition

- Designing a mobile software for personal finance management in the digital era of mobile payments.

Objectives

In the context of a personal finance manager app, we can break down the problem of managing finances into achievable objectives:

Objective 1: Facilitate Seamless Transaction Tracking:

This objective focuses on developing features that allow users to easily record income and expenses. This involves manual entry

Objectives

Objective 2: Empower Smart Budgeting:

The app should guide users in creating and managing budgets. This includes features like setting spending limits for different categories, creating recurring budgets.

Objectives

Objective 3: Nurture Goal-Oriented Saving:

The app should help users define financial goals, like saving for a vacation or retirement.

Objectives

Objective 4: Enhance Financial Understanding Through Visualizations:

The app should leverage graphical representations to provide users with clear and actionable insights into their financial situation, make informed financial decisions, and achieve their financial goals.

Scope and Relevance

- This project covers the scope of individual finance management and makes the task for managing money for an individual easier
- The project covers the aspect of expenditure adding, graphical representation and goal oriented saving with wallet feature
- This project is relevant especially in this digital age where payments wallets all are done through phones
- This will be useful for all individuals who are seeking for an app for their expense tracking

System Design

SYSTEM OVERVIEW(account management)

- Opening and closing Accounts
- Interest calculation
- Deposit Money
- Withdraw money
- Deposit in Wallet
- Mini Statement
- Fund transfer
- Piggy Bank
- Wallet Application

System Design

SYSTEM OVERVIEW(user interface)

- User account Management
- PIN generation
- Forgot PIN
- User validation
- Profile updation
- Charts & Graphs

System Design

Account Management :

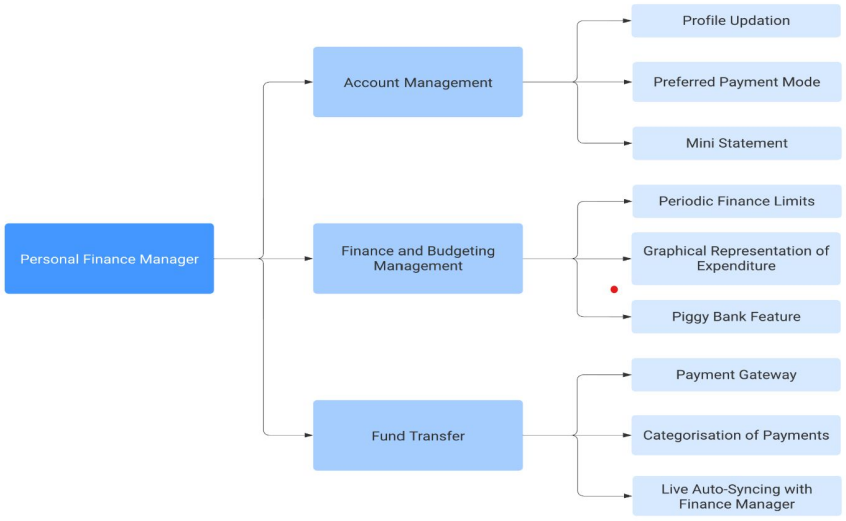
- Add Accounts: Create various account types (checking, savings)
- Secure Details: Capture essential information (name, institution, account number) securely
- Manage Accounts: Edit existing account details and view current information (balance, transaction history)
- Safe Deletion: Confirm deletion and offer options for handling transactions (transfer balance, archive data)
- Initial Balance: Enter starting balances for each account
- Nicknames: Assign nicknames for easier account identificatio

System Design

Transaction Management:

- Add Transactions: Create income and expense transactions
- Capture Details: Enter essential details (date, amount, payee/payer, category)
- Secure Storage: Store transaction data securely using industry-standard encryption.
- Manage Transactions : edit existing transactions and delete with confirmation prompt

System Design(Architectural design)



System Design(module wise explanation)

1. Transactions & Budgeting:

- **Expense & Income Tracking:** Easily record income from various sources and expenses across different categories.
- **Preset Monthly & Yearly Income:** Set recurring income amounts for salary, investments, etc.
- **Detailed Breakdown:** View detailed breakdowns of income and expenses by category, date, payee, or account.
- **Budget Limit Setting:** Create customized budgets for different spending categories (e.g., groceries, entertainment).

  Purpose-Specific Budgets: Allocate budget limits based on specific goals (e.g., vacation savings, debt repayment).

System Design(module wise explanation)

1. Transactions & Budgeting:

- **Budget Expenditure Insights:** Track spending within each budget category and receive alerts for potential overspending.
- **Insightful Graphical Representations:** Visualize your income and expenses with bar graphs, or line graphs for easier analysis.

Expenditure Comparisons: Compare your spending across different time periods (e.g., month-to-month, year-to-year) to identify trends.

System Design(module wise explanation)

2. Financial Management & Goals:

- **Scheduled Payments & Reminders:** Set up reminders for upcoming bills and recurring expenses to ensure timely payments.
- **Payment Records Management:** Store and manage all your payment records in one central location for easy reference.
- **Piggy Bank Feature:** Create virtual "piggy banks" for specific saving goals (e.g., vacation fund, emergency fund).
- **Financial Tips & Recommendations:** Receive personalized financial tips based on your spending habits and goals.

Budget Strategy Assistance: Get guidance on creating effective budget strategies for different financial situations.

System Design(module wise explanation)

3. Reporting & Analysis:

- **Detailed Reports:** Generate comprehensive reports on income, expenses, budget progress, and financial goals.

Net Worth Tracking: Monitor your overall net worth by calculating the difference between your income and expenses

System Design(module wise explanation)

4. Security & Integration:

Secure Login: Implement secure login methods to protect your data.

System Design(algorithm)

1. Initialize:

- Create a new Flutter project.

- Set up dependencies in pubspec.yaml.

2. User Authentication:

- Use Firebase Authentication:

- Initialize Firebase in main.dart.

- Implement sign-up, sign-in, and password reset screens.

- Use FirebaseAuth.instance methods for authentication.

System Design(algorithm)

2. User Authentication:

- Define UserProfile model class:

```
class UserProfile {
  String name;
  String email;
  String currency;
}
```

- Implement profile_screen.dart:
  - Display user profile data.
  - Allow users to update their profile information.

System Design(algorithm)

3. User Profile:

- **Define UserProfile model class:**

```
class UserProfile {
  String name;
  String email;
}
```

- **Implement profile_screen.dart:**
  - **Display user profile data.**
  - **Allow users to update their profile information**

-

System Design(algorithm)

4. Dashboard:

- Implement dashboard_screen.dart:

- Display current balance, income, expenses, and savings goals.

- Fetch data from Firebase Firestore or local storage.

System Design(algorithm)

5. Transaction Management:

- Define Transaction model class:

```
class Transaction {
  String category;
  double amount;
  DateTime date;
}
```

- Implement transaction_screen.dart:

- Display transaction list.

- Add, edit, and delete transactions.

System Design(algorithm)

6. Budgeting:

- Define Budget model class:

```
class Budget {
  String category;
  double limit;
}
```

- Implement budget_screen.dart:

- Display budget list.

- Allow users to set budget limits.

- Notify when exceeding budget limits.

System Design(algorithm)

7. Expense Tracking:

- Implement expense_tracking_screen.dart:
  - Display expense history.
  - Provide cost-saving suggestion

System Design(algorithm)

8. **Income Management:**
   - **Define Income model class:**
     class Income {
     String source;
     double amount;
     DateTime date;
     }
   - **Implement income_screen.dart:**
     - **Display income sources.**
     - **Add, edit, and delete income transactions.**

System Design(algorithm)

9. Saving Goals:
   - **Define SavingGoal model class:**
     class SavingGoal {
     String name;
     double targetAmount;
     double currentAmount;
     }
   - **Implement saving_goals_screen.dart:**
     - **Display saving goals list.**
     - **Set saving goals.**
     - **Track progress towards goals.**

System Design(algorithm)

10. Reports and Analytics:

- Implement reports_screen.dart:

- Generate reports.

- Display insights.

- Allow exporting reports.

11. Settings:

- Implement settings_screen.dart:

- Show app preferences.

- Ensure data security.

System Design(algorithm)

12. Security and Privacy:

- Encrypt sensitive user data.

- Use Firebase security rules to control access.

13. Testing and Debugging:

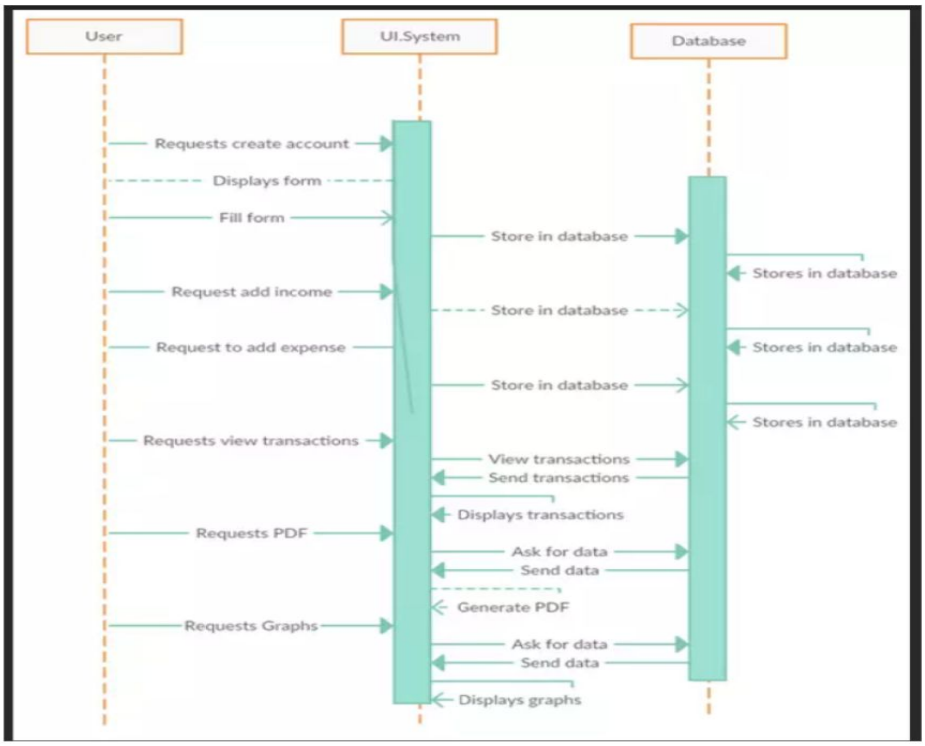
- Write unit tests for critical functions.

- Conduct manual testing on various devices.

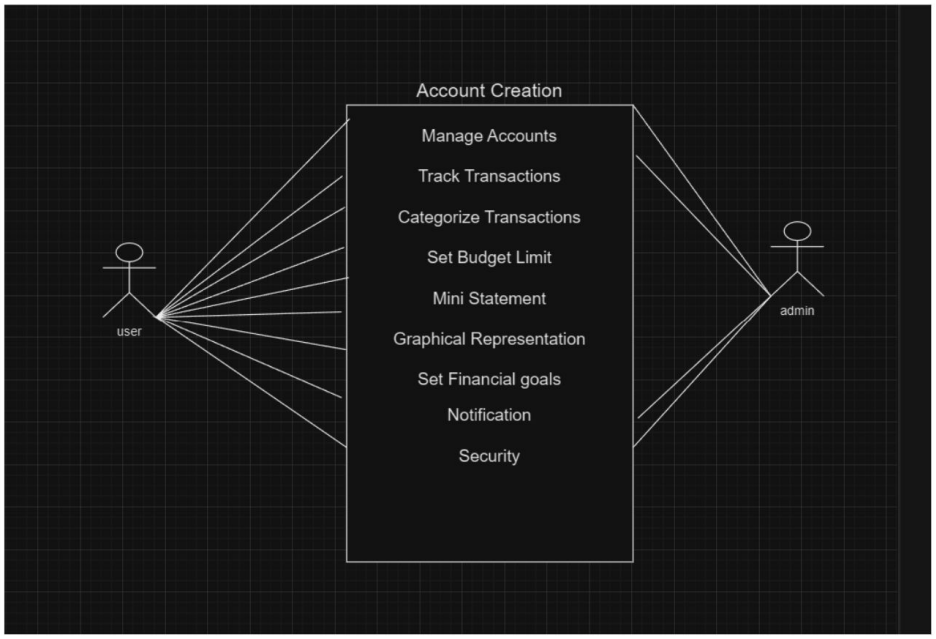
14. Deployment:

- Prepare for deployment to app stores...

System Design(sequence diagram)

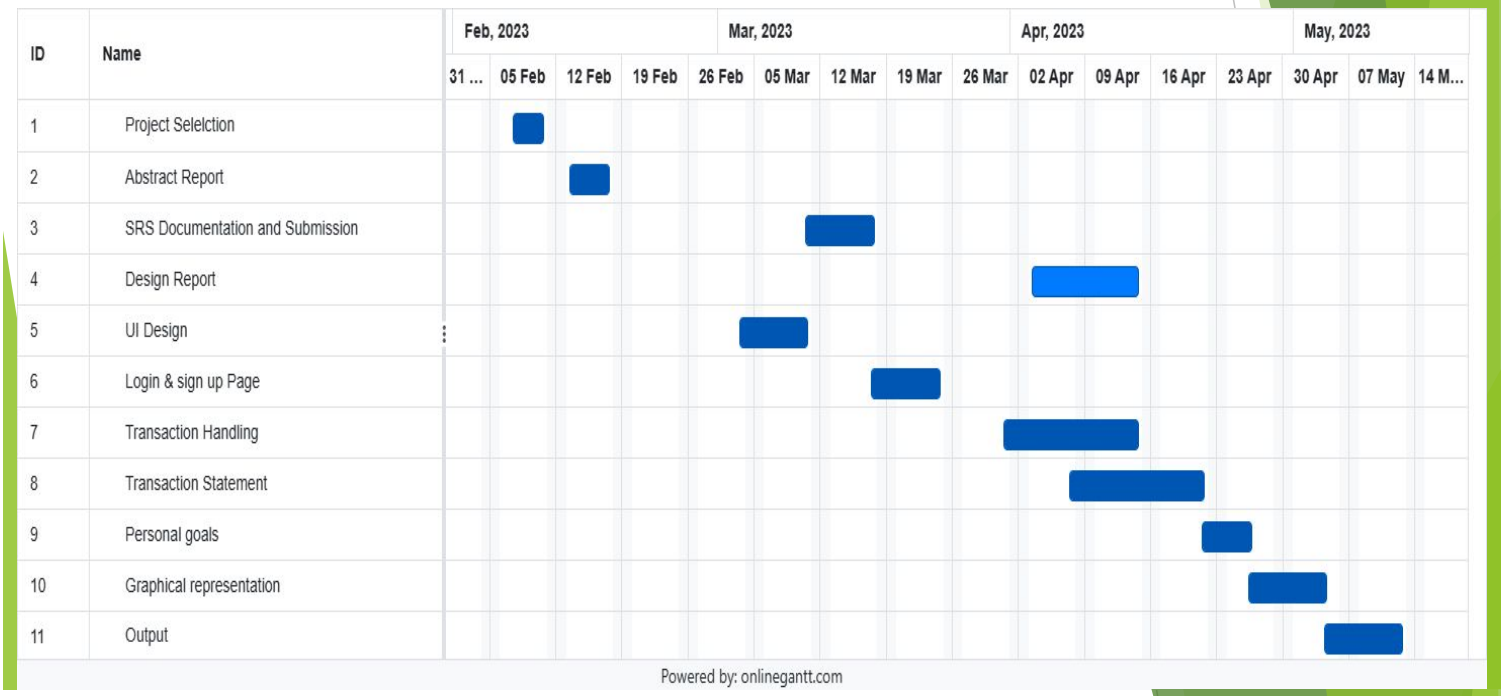


System Design(use case diagram)



Work Division

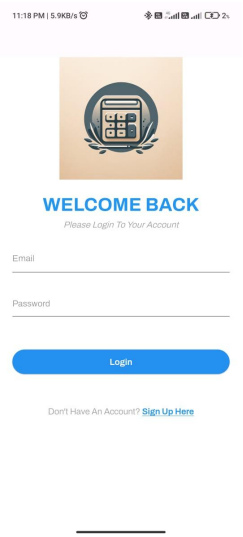
- Gantt Chart



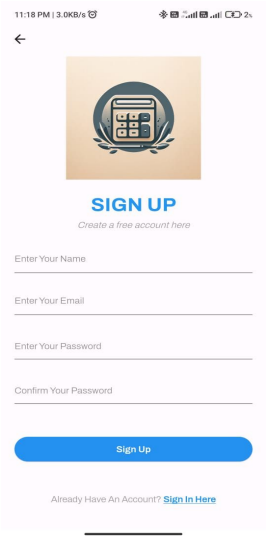
Software/ Hardware Requirements

- Software:
- Development Framework: Flutter (for building the mobile app)
- Database: firebase
- Firebase Suite:
- Firebase Authentication (for user login and data security)
- Firebase Analytics (for tracking user behavior and app performance)
- Optional:
- External APIs
- Hardware: android device
- Operating System: Android 7.0+ (for broad device support)
- Storage (for saving user data)

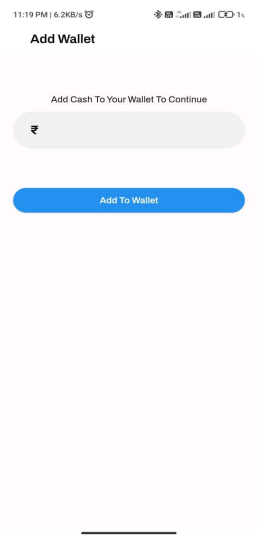
Results



Sign in page

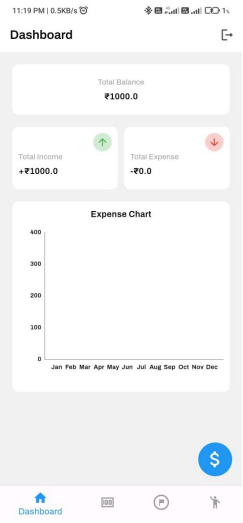


Sign up page

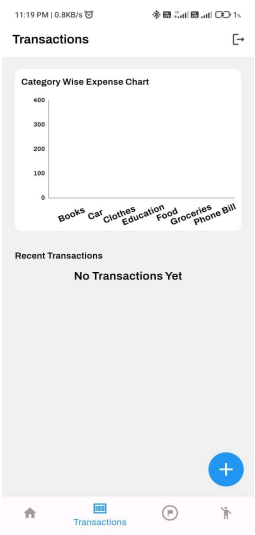


Initial wallet page

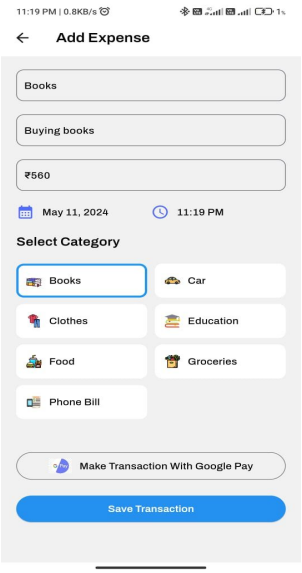
Results



Dashboard page

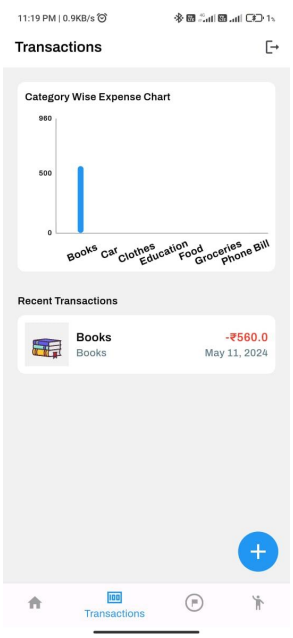


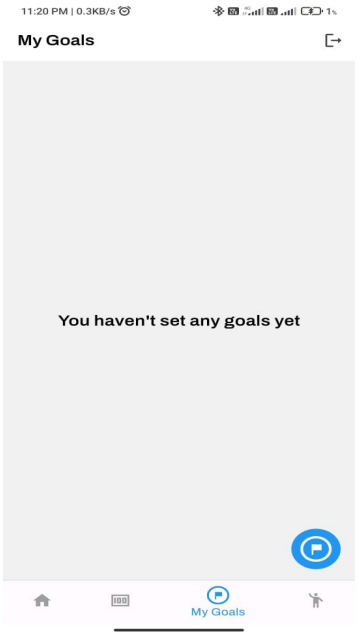
Transaction/mini statement page

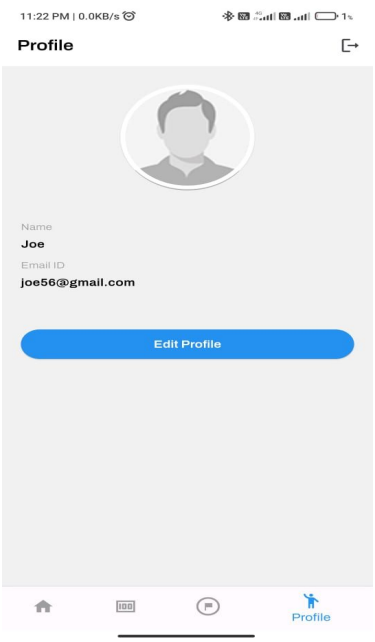


Add transaction page

Results







Goals page

Profile page

Conclusion

In summary, the Finance Management System is a comprehensive mobile application designed to empower users with intuitive tools for effective personal finance management.

Future Enhancements

The future improvements that we can add to the current version include

1) integrate gpay with the app

2) implementing advanced bill scanning methods utilizing optical character recognition (OCR) technology

3)Integrating AI within the app to provide users assistance with better financial planning on spending

References

- https://ieeexplore.ieee.org/abstract/document/10212265

Appendix B: Vision, Mission, Programme Outcomes and Course Outcomes

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)
RAJAGIRI VALLEY, KAKKANAD, KOCHI, 682039
(Affiliated to APJ Abdul Kalam Technological University)

Vision, Mission, Programme Outcomes and Course Outcomes

Institute Vision

To evolve into a premier technological institution, moulding eminent professionals with creative minds, innovative ideas and sound practical skill, and to shape a future where technology works for the enrichment of mankind.

Institute Mission

To impart state-of-the-art knowledge to individuals in various technological disciplines and to inculcate in them a high degree of social consciousness and human values, thereby enabling them to face the challenges of life with courage and conviction.

Department Vision

To become a centre of excellence in Computer Science and Engineering, moulding professionals catering to the research and professional needs of national and international organizations.

Department Mission

To inspire and nurture students, with up-to-date knowledge in Computer Science and Engineering, ethics, team spirit, leadership abilities, innovation and creativity to come out with solutions meeting societal needs.

Programme Outcomes (PO)

Engineering Graduates will be able to:

1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and Team work: Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.

10. Communication: Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Programme Specific Outcomes (PSO)

A graduate of the Computer Science and Engineering Program will demonstrate:

PSO1: Computer Science Specific Skills

The ability to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas by understanding the core principles and concepts of computer science and thereby engage in national grand challenges.

PSO2: Programming and Software Development Skills

The ability to acquire programming efficiency by designing algorithms and applying standard practices in software project development to deliver quality software products meeting the demands of the industry.

PSO3: Professional Skills

The ability to apply the fundamentals of computer science in competitive research and to develop innovative products to meet the societal needs thereby evolving as an eminent researcher and entrepreneur.

Course Outcomes

After the completion of the course the student will be able to:

CO1:

Identify technically and economically feasible problems (Cognitive Knowledge Level: Apply)

CO2:
Identify and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes (Cognitive Knowledge Level: Apply)

CO3:
Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques (Cognitive Knowledge Level: Apply)

CO4:
Prepare technical report and deliver presentation (Cognitive Knowledge Level: Apply)

CO5:
Apply engineering and management principles to achieve the goal of the project (Cognitive Knowledge Level: Apply)

Appendix C: CO-PO-PSO Mapping

COURSE OUTCOMES:

After completion of the course the student will be able to

SL. NO	DESCRIPTION	Blooms' Taxonomy Level
CO1	Identify technically and economically feasible problems (Cognitive Knowledge Level: Apply)	Level 3: Apply
CO2	Identify and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes (Cognitive Knowledge Level: Apply)	Level 3: Apply
CO3	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques (Cognitive Knowledge Level: Apply)	Level 3: Apply
CO4	Prepare technical report and deliver presentation (Cognitive Knowledge Level: Apply)	Level 3: Apply
CO5	Apply engineering and management principles to achieve the goal of the project (Cognitive Knowledge Level: Apply)	Level 3: Apply

CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3
CO1	3	3	3	3		2	2	3	2	2	2	3	2	2	2
CO2	3	3	3	3	3	2		3	2	3	2	3	2	2	2
CO3	3	3	3	3	3	2	2	3	2	2	2	3			2
CO4	2	3	2	2	2			3	3	3	2	3	2	2	2
CO5	3	3	3	2	2	2	2	3	2		2	3	2	2	2

3/2/1: high/medium/low

JUSTIFICATIONS FOR CO-PO MAPPING

MAPPING	LOW/ MEDIUM/ HIGH	JUSTIFICATION
101003/CS622T.1-PO1	**HIGH**	Identify technically and economically feasible problems by applying the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
101003/CS622T.1-PO2	**HIGH**	Identify technically and economically feasible problems by analysing complex engineering problems reaching substantiated conclusions using first principles of mathematics.
101003/CS622T.1-PO3	**HIGH**	Design solutions for complex engineering problems by identifying technically and economically feasible problems.
101003/CS622T.1-PO4	**HIGH**	Identify technically and economically feasible problems by analysis and interpretation of data.
101003/CS622T.1-PO6	**MEDIUM**	Responsibilities relevant to the professional engineering practice by identifying the problem.
101003/CS622T.1-PO7	**MEDIUM**	Identify technically and economically feasible problems by understanding the impact of the professional engineering solutions.
101003/CS622T.1-PO8	**HIGH**	Apply ethical principles and commit to professional ethics to identify technically and economically feasible problems.
101003/CS622T.1-PO9	**MEDIUM**	Identify technically and economically feasible problems by working as a team.
101003/CS622T.1-PO10	**MEDIUM**	Communicate effectively with the engineering community by identifying technically and economically feasible problems.
101003/CS622T.1-P011	**MEDIUM**	Demonstrate knowledge and understanding of engineering and management principles by selecting the technically and economically feasible problems.
101003/CS622T.1-PO12	**HIGH**	Identify technically and economically feasible problems for long term learning.
101003/CS622T.1-PSO1	**MEDIUM**	Ability to identify, analyze and design solutions to identify technically and economically feasible problems.
101003/CS622T.1-PSO2	**MEDIUM**	By designing algorithms and applying standard practices in software project development and Identifying technically and economically feasible problems.
101003/CS622T.1-PSO3	**MEDIUM**	Fundamentals of computer science in competitive research can be applied to Identify technically and economically feasible problems.
101003/CS622T.2-PO1	**HIGH**	Identify and survey the relevant by applying the knowledge of mathematics, science, engineering fundamentals.

101003/CS622T.2-PO2	**HIGH**	Identify, formulate, review research literature, and analyze complex engineering problems get familiarized with software development processes.
101003/CS622T.2-PO3	**HIGH**	Design solutions for complex engineering problems and design based on the relevant literature.
101003/CS622T.2-PO4	**HIGH**	Use research-based knowledge including design of experiments based on relevant literature.
101003/CS622T.2-PO5	**HIGH**	Identify and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes by using modern tools.
101003/CS622T.2-PO6	**MEDIUM**	Create, select, and apply appropriate techniques, resources, by identifying and surveying the relevant literature.
101003/CS622T.2-PO8	**HIGH**	Apply ethical principles and commit to professional ethics based on the relevant literature.
101003/CS622T.2-PO9	**MEDIUM**	Identify and survey the relevant literature as a team.
101003/CS622T.2-PO10	**HIGH**	Identify and survey the relevant literature for a good communication to the engineering fraternity.
101003/CS622T.2-PO11	**MEDIUM**	Identify and survey the relevant literature to demonstrate knowledge and understanding of engineering and management principles.
101003/CS622T.2-PO12	**HIGH**	Identify and survey the relevant literature for independent and lifelong learning.
101003/CS622T.2-PSO1	**MEDIUM**	Design solutions for complex engineering problems by Identifying and survey the relevant literature.
101003/CS622T.2-PSO2	**MEDIUM**	Identify and survey the relevant literature for acquiring programming efficiency by designing algorithms and applying standard practices.
101003/CS622T.2-PSO3	**MEDIUM**	Identify and survey the relevant literature to apply the fundamentals of computer science in competitive research.
101003/CS622T.3-PO1	**HIGH**	Perform requirement analysis, identify design methodologies by using modern tools & advanced programming techniques and by applying the knowledge of mathematics, science, engineering fundamentals.
101003/CS622T.3-PO2	**HIGH**	Identify, formulate, review research literature for requirement analysis, identify design methodologies and develop adaptable & reusable solutions.

101003/CS622T.3-PO3	**HIGH**	Design solutions for complex engineering problems and perform requirement analysis, identify design methodologies.
101003/CS622T.3-PO4	**HIGH**	Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
101003/CS622T.3-PO5	**HIGH**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools.
101003/CS622T.3-PO6	**MEDIUM**	Perform requirement analysis, identify design methodologies and assess societal, health, safety, legal, and cultural issues.
101003/CS622T.3-PO7	**MEDIUM**	Understand the impact of the professional engineering solutions in societal and environmental contexts and Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions.
101003/CS622T.3-PO8	**HIGH**	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions by applying ethical principles and commit to professional ethics.
101003/CS622T.3-PO9	**MEDIUM**	Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.
101003/CS622T.3-PO10	**MEDIUM**	Communicate effectively with the engineering community and with society at large to perform requirement analysis, identify design methodologies.
101003/CS622T.3-PO11	**MEDIUM**	Demonstrate knowledge and understanding of engineering requirement analysis by identifying design methodologies.
101003/CS622T.3-PO12	**HIGH**	Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change by analysis, identify design methodologies and develop adaptable & reusable solutions.
101003/CS622T.3-PSO3	**MEDIUM**	The ability to apply the fundamentals of computer science in competitive research and prior to that perform requirement analysis, identify design methodologies.
101003/CS622T.4-PO1	**MEDIUM**	Prepare technical report and deliver presentation by applying the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
101003/CS622T.4-PO2	**HIGH**	Identify, formulate, review research literature, and analyze complex engineering problems by preparing technical report and deliver presentation.

101003/CS622T.4-PO3	**MEDIUM**	Prepare Design solutions for complex engineering problems and create technical report and deliver presentation.
101003/CS622T.4-PO4	**MEDIUM**	Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions and prepare technical report and deliver presentation.
101003/CS622T.4-PO5	**MEDIUM**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools and Prepare technical report and deliver presentation.
101003/CS622T.4-PO8	**HIGH**	Prepare technical report and deliver presentation by applying ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
101003/CS622T.4-PO9	**HIGH**	Prepare technical report and deliver presentation effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.
101003/CS622T.4-PO10	**HIGH**	Communicate effectively with the engineering community and with society at large by prepare technical report and deliver presentation.
101003/CS622T.4-PO11	**MEDIUM**	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work by prepare technical report and deliver presentation.
101003/CS622T.4-PO12	**HIGH**	Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change by prepare technical report and deliver presentation.
101003/CS622T.4-PSO1	**MEDIUM**	Prepare a technical report and deliver presentation to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas.
101003/CS622T.4-PSO2	**MEDIUM**	To acquire programming efficiency by designing algorithms and applying standard practices in software project development and to prepare technical report and deliver presentation.
101003/CS622T.4-PSO3	**MEDIUM**	To apply the fundamentals of computer science in competitive research and to develop innovative products to meet the societal needs by preparing technical report and deliver presentation.
101003/CS622T.5-PO1	**HIGH**	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
101003/CS622T.5-PO2	**HIGH**	Identify, formulate, review research literature, and analyze complex engineering problems by applying engineering and management principles to achieve the goal of the project.

101003/CS622T.5-PO3	**HIGH**	Apply engineering and management principles to achieve the goal of the project and to design solutions for complex engineering problems and design system components or processes that meet the specified needs.
101003/CS622T.5-PO4	**MEDIUM**	Apply engineering and management principles to achieve the goal of the project and use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
101003/CS622T.5-PO5	**MEDIUM**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools and to apply engineering and management principles to achieve the goal of the project.
101003/CS622T.5-PO6	**MEDIUM**	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities by applying engineering and management principles to achieve the goal of the project.
101003/CS622T.5-PO7	**MEDIUM**	Understand the impact of the professional engineering solutions in societal and environmental contexts, and apply engineering and management principles to achieve the goal of the project.
101003/CS622T.5-PO8	**HIGH**	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice and to use the engineering and management principles to achieve the goal of the project.
101003/CS622T.5-PO9	**MEDIUM**	Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings and to apply engineering and management principles to achieve the goal of the project.
101003/CS622T.5-PO11	**MEDIUM**	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments and to apply engineering and management principles to achieve the goal of the project.
101003/CS622T.5-PO12	**HIGH**	Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change and to apply engineering and management principles to achieve the goal of the project.
101003/CS622T.5-PSO1	**MEDIUM**	The ability to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas. Apply engineering and management principles to achieve the goal of the project.

101003/CS622T.5-PSO2	**MEDIUM**	The ability to acquire programming efficiency by designing algorithms and applying standard practices in software project development to deliver quality software products meeting the demands of the industry and to apply engineering and management principles to achieve the goal of the project.
101003/CS622T.5-PSO3	**MEDIUM**	The ability to apply the fundamentals of computer science in competitive research and to develop innovative products to meet the societal needs thereby evolving as an eminent researcher and entrepreneur and apply engineering and management principles to achieve the goal of the project.