

**A**  
**Mini Project Report**  
**on**  
**SmartSpend – Comprehensive Expense Tracking and Management Tool**

Submitted in partial fulfillment of the requirements for the  
degree

**Second Year Engineering – Computer Science Engineering (Data Science)**

by

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## CERTIFICATE

This to certify that the Mini Project report on **SmartSpend** has been submitted by **Mrinmayi Badirke** (23107018), **Manas Chaudhari** (23107074), **Harshal Gaikwad** (23107052) and **Subodh Wani** (23107070) who are bonafide students of A. P. Shah Institute of Technology, Thane as a partial fulfillment of the requirement for the degree in **Computer Science Engineering (Data Science)**, during the academic year **2024-2025** in the satisfactory manner as per the curriculum laid down by University of Mumbai.

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# **Chapter 1**

## **Introduction**

Managing personal finances efficiently is a crucial aspect of financial well-being, and an expense tracker app serves as an effective tool to help users monitor their income and spending habits. With the rapid shift towards digital financial management, expense tracker apps have become an essential part of daily life, assisting individuals in budgeting, saving, and making informed financial decisions. This report explores the features, functionality, and benefits of an expense tracker app, highlighting its role in simplifying financial management.

### **1.1 Purpose**

The purpose of an expense tracker app is to provide users with an intuitive platform to monitor, analyze, and manage their financial transactions efficiently. By tracking income and expenditures, users can develop better spending habits, prevent unnecessary expenses, and work towards achieving their financial goals. The application aims to simplify personal finance management by automating expense recording, providing insightful analytics, and ensuring secure financial tracking.

### **1.2 Problem Statement**

Many individuals struggle with managing their finances due to a lack of organized expense tracking. Traditional methods, such as maintaining handwritten records or spreadsheets, are time-consuming and prone to errors. Without a systematic approach, users may overspend, fail to save adequately, or miss important financial obligations. An expense tracker app addresses these issues by offering a digital solution that automates expense recording, categorization, and budget management, thereby promoting financial discipline.

## 1.3 Objectives

The Expense Tracker Application was developed with a clear set of objectives aimed at enhancing the way users manage their personal finances. The primary goal was to create an intuitive and secure platform that allows individuals to track their income and expenses in a structured and efficient manner. To achieve this, a secure login and sign-up system was implemented using Python's Tkinter library, enabling each user to maintain a personal account with individual financial records. Once logged in, users can effortlessly add income and expense transactions, ensuring that their financial data is consistently up-to-date.

A key objective was to incorporate a categorization system where all transactions could be assigned to predefined or custom categories. This not only helps users organize their expenses better but also lays the foundation for meaningful financial insights. These categorized transactions are stored in a MySQL database, which allows for real-time updates and efficient data retrieval. The seamless integration between the front-end interface and the database ensures that all user interactions reflect immediately in the system without lag or data inconsistency.

Another crucial objective was the inclusion of budget limit functionality. The application enables users to define monthly spending limits for various categories, helping them stay within budget and develop healthier financial habits. This feature promotes financial discipline by alerting users when they approach or exceed their set limits, thereby encouraging better decision-making.

In addition to transaction logging and budget management, the application was designed to offer visual spending analysis through informative graphs. Utilizing the Matplotlib library, the app generates bar graphs and pie charts that represent the user's financial data in a clear and visually appealing format. These visual tools aid users in understanding their spending patterns, identifying areas where they can save, and making well-informed financial decisions.

Overall, these objectives not only guided the structure and features of the Expense Tracker Application but also played a significant role in strengthening the development team's understanding of user interface design, data management, and back-end integration. The result is a robust, user-friendly desktop application that empowers users to take control of their financial lives through smart tracking and analysis tools.

## 1.4 Scope

The Expense Tracker app is developed as a versatile solution to help users manage their personal finances efficiently. Its features are tailored to support various domains where tracking expenses, analyzing spending habits, and maintaining budgetary discipline are essential. The application caters to a wide range of users by offering a reliable, intuitive, and secure platform for financial management.

1. **Students and Young Adults:** The app helps students manage limited budgets, track daily expenditures like food, travel, and stationery, and build good financial habits early on.
2. **Working Professionals:** Salaried individuals can monitor monthly expenses, allocate budgets for rent, utilities, and leisure, and evaluate their spending patterns over time.
3. **Households and Families:** Families can collectively manage household expenses, maintain monthly budgets, and categorize spending across groceries, education, healthcare, and more.
4. **Freelancers and Small Business Owners:** Individuals handling irregular income streams can use the app to track earnings and expenses, enabling better financial planning and tax preparation.
5. **Educational and Training Institutions:** Institutions offering financial literacy programs can use the app as a practical tool to demonstrate real-life budgeting and expense tracking scenarios to students.
6. **NGOs and Community Groups:** Non-profits managing small-scale projects or donation-based budgets can use the app to maintain transparency and control over expenditures.

# Chapter 2

## Proposed System

The proposed system introduces a user-friendly, efficient, and secure expense tracking platform. By leveraging advanced technology, the system automates financial management tasks, making it easier for users to record expenses and monitor their spending habits. The expense tracker app is designed to be intuitive, ensuring that users of all financial literacy levels can navigate and utilize its features effortlessly.

### 2.1 Features and Functionality

An expense tracker app is designed to provide users with a structured way to record, categorize, and analyse their financial transactions. The core functionalities of the application include:

1. **Transaction Recording:** Users can input both income and expenses manually, ensuring detailed financial tracking.
2. **Expense Categorization:** The app organizes expenses into predefined categories such as food, transportation, utilities, and entertainment, allowing users to identify spending patterns and areas of high expenditure.
3. **Budget Management:** A key feature is the ability to set financial limits for different spending categories and receive alerts when approaching or exceeding the budget threshold. This functionality is one that we aim to incorporate into our project as well.
4. **Data Visualization:** To enhance financial awareness, the application provides analytical representations such as graphs and charts, offering users a clear overview of their spending habits and financial progress.
5. **Security Measures:** Protecting users' financial data is essential. Common security features include password protection and two-step verification, ensuring that sensitive financial information remains secure.

By integrating these features, an expense tracker app becomes a **reliable financial management tool**, helping users maintain control over their spending and work toward their financial goals effectively.





Figure 2.1.: Block Diagram/Architecture of the project

## **Chapter 3**

### **Project Outcomes**

The development and deployment of the expense tracker application are anticipated to deliver substantial benefits to users by enabling structured and systematic financial management. This application will serve as a comprehensive tool for individuals seeking to monitor their income, expenses, and overall financial health in an organized manner. By providing users with an intuitive and user-friendly interface, the app will simplify the process of tracking daily expenditures and categorizing spending habits.

One of the key advantages of this application is the enhanced financial awareness it fosters among users. By gaining insights into their financial activities, individuals will be able to assess their spending patterns more effectively. This increased awareness is expected to encourage responsible financial behaviour, allowing users to set realistic budgets, control unnecessary expenditures, and allocate resources more efficiently. Over time, these habits can lead to more disciplined financial planning and better money management.

Furthermore, the app will integrate analytical tools that provide users with valuable financial insights. Features such as graphical expense breakdowns and category-wise expenditure analysis will help users understand where their money is being spent the most. With access to such data-driven insights, users can make well-informed financial decisions, ensuring that they align their spending with personal financial goals. The ability to visualize financial trends over time will also assist in long-term financial planning, helping users work towards savings, investments, or debt management more effectively.

In addition to improving financial stability, the application is expected to support users in achieving their financial goals. Whether users aim to reduce discretionary spending, save for a significant purchase, or manage monthly budgets more efficiently, the app will act as a reliable financial companion. By offering personalized insights and structured budgeting tools, the expense tracker will empower users to take control of their finances with greater confidence and precision.

Ultimately, the implementation of this project will provide a structured and well-organized approach to personal finance management. By combining accessibility, usability, and data-driven decision-making, the application is poised to enhance users' financial discipline, foster better budgeting habits, and contribute to overall financial well-being. The effectiveness of the application will be further refined based on user feedback and testing outcomes to ensure optimal functionality and user satisfaction.

# Chapter 4

## Software Requirements

The development of the Expense Tracker app requires a combination of core software tools and libraries that ensure smooth functionality, a user-friendly interface, and reliable data handling. The primary components used are:

**Programming Language:** Python – The core language used to develop the application due to its simplicity and extensive library support.

**Database:** MySQL – Used to store and manage all user data and financial records securely.

**GUI Frameworks:** Tkinter – Python’s in-built library for building the graphical user interface; Matplotlib – for rendering bar graphs and pie charts within the app.

**Development Environment:** Visual Studio Code – The IDE used for coding and debugging the project.

### Python Libraries Used:

1. **os:** Provides functions for interacting with the operating system.
2. **io:** Helps manage I/O operations in memory.
3. **platform:** Used to access underlying system information.
4. **tkinter / ttk:** For creating GUI elements like windows, buttons, labels, and more.
5. **messagebox, filedialog, colorchooser:** Modules under tkinter used for dialogs and color selections.
6. **mysql.connector:** To establish connection and interact with the MySQL database.
7. **datetime:** Used to handle and format dates for transaction records.
8. **matplotlib.pyplot & FigureCanvasTkAgg:** For generating and displaying data visualizations such as graphs and charts.
9. **reportlab:** Used to generate PDF documents, including tables and styled text.
10. **pandas:** Helps in organizing and processing tabular data before export or visualization.
11. **pdf\_export:** A custom module used for handling the export of data into PDF format.

## Chapter 5

### Project Design

The design of the expense tracker application prioritizes simplicity, efficiency, and usability, ensuring a seamless experience for users. The graphical user interface (GUI), built using Tkinter, is structured to provide a clear and intuitive layout, allowing users to navigate effortlessly. The main dashboard serves as the central hub, offering a structured view of financial insights, categorized expenses, and budget limits. Users can input their daily transactions through well-defined fields, ensuring easy data entry and organization.

To enhance usability, the application features customizable budget categories, enabling users to set spending limits and track expenses accordingly. Visual indicators and summaries will help users monitor their financial health, encouraging better financial management. Additionally, the design ensures a logical workflow, where users can seamlessly transition between viewing reports, adding expenses, and modifying budgets without unnecessary complexity.

The backend design supports efficient data handling, ensuring smooth interaction between the UI and the MySQL database. The database structure is designed to store financial records securely and retrieve them efficiently, minimizing delays and ensuring real-time updates. This structured approach ensures that users always have access to their latest financial data, enhancing the overall functionality of the system.

Field	Type	Null	Key	Default	Extra
id	int	NO	PRI	NULL	auto_increment
username	varchar (50)	NO	UNI	NULL	
email	varchar (100)	NO	UNI	NULL	
password	varchar (100)	NO		NULL	
auth_code	varchar (6)	NO		NULL	
currency	varchar (3)	YES		USD	

security_question	varchar (100)	NO		NULL	
security_answer	varchar (100)	NO		NULL	

Table 5.1.: Users table from MySQL database

Field	Type	Null	Key	Default	Extra
id	int	NO	PRI	NULL	auto_increment
user_id	int	NO	MUL	NULL	
amount	decimal (10, 2)	NO		NULL	
type	enum ('Income', 'Expense')	NO		NULL	
category_id	int	NO	MUL	NULL	
description	text	YES		NULL	
date	date	NO		NULL	

Table 5.2.: Transactions table

Field	Type	Null	Key	Default	Extra
id	int	NO	PRI	NULL	auto_increment
user_id	int	NO	MUL	NULL	
name	varchar (50)	NO		NULL	
color	decimal (10, 2)	NO		NULL	

Table 5.3.: Categories table

Field	Type	Null	Key	Default	Extra
id	int	NO	PRI	NULL	auto_increment
user_id	int	NO	MUL	NULL	
category_id	int	NO	MUL	NULL	
month_year	varchar (7)	NO		NULL	
limit_amount	decimal (10, 2)	NO		NULL	

Figure 5.4.: Category\_limits table

## Workflow:

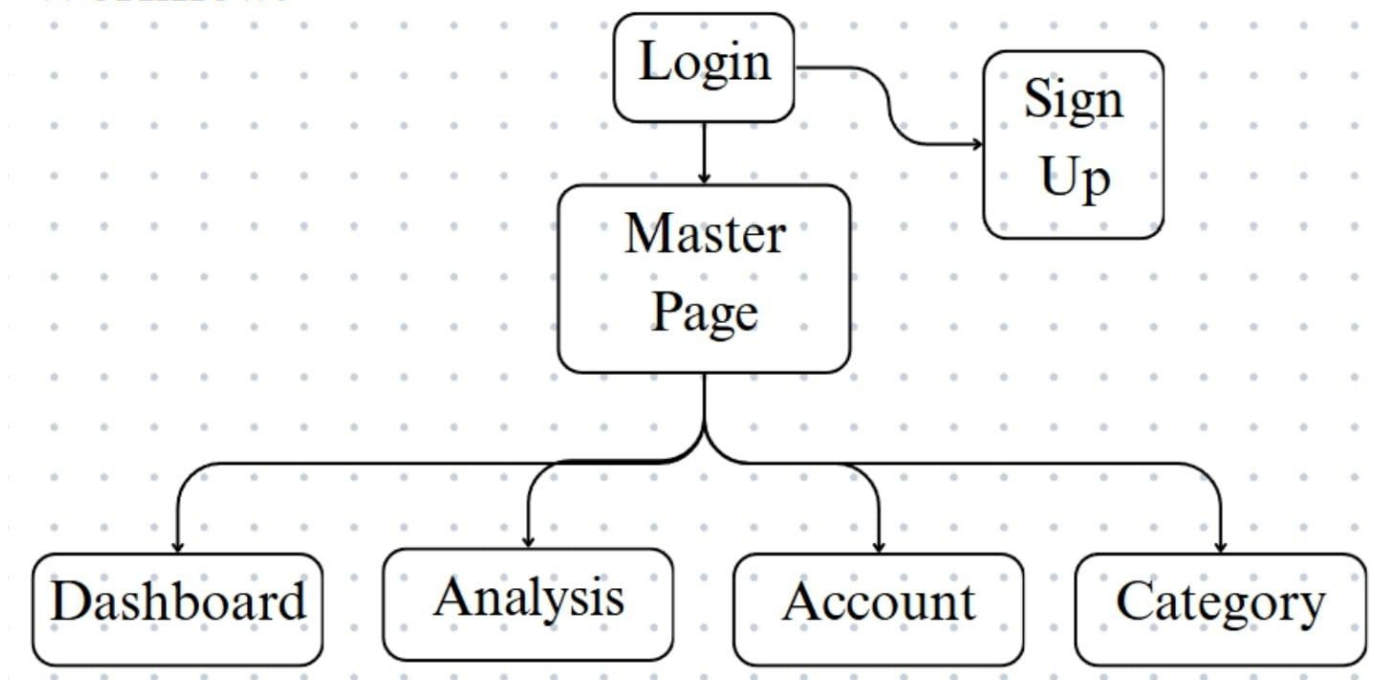


Figure 5.1.: Workflow of the project

Overall, the project design emphasizes clarity, efficiency, and structured financial management, ensuring users can track expenses effortlessly while maintaining a well-organized and visually clear interface.

# Project Scheduling

The development of the expense tracker application followed a structured timeline, progressing through key phases such as requirement finalization, interface design, backend development, database integration, module testing, and documentation. To track progress efficiently, a logbook is maintained, documenting daily activities, challenges faced, and key milestones achieved during the development process. A schedule outlining planned start and finish dates, durations, and allocated resources for each task ensured that tasks were completed on time, contributing to overall efficiency and successful project execution.

## GANTT CHART

[illegible]

Figure 6.1: Gantt Chart Representing Project Timeline and Task Allocation

During the project timeline, the group members undertook various tasks to ensure the successful completion of the Mini Project. In the first week of January, Subodh Wani, Harshal Gaikwad, Mrinmayi Badirke, and Manas Chaudhari focused on group formation and topic finalization, identifying the project's scope and objectives. Following this, in mid-January, Subodh Wani, Harshal Gaikwad, and Mrinmayi Badirke identified the key functionalities required for the Mini Project.

From the last week of January to the first week of February, a collaborative effort involving Subodh Wani, Harshal Gaikwad, Mrinmayi Badirke, and Manas Chaudhari was made to discuss the project topic, utilizing a paper prototype to visualize ideas. Concurrently, Harshal Gaikwad and Mrinmayi Badirke worked on designing the Graphical User Interface (GUI), focusing on creating a user-friendly layout.

In the second week of February, the team — including Subodh Wani, Harshal Gaikwad, Mrinmayi Badirke, and Manas Chaudhari — prepared for Presentation I. Then, from mid-February to the first week of March, Subodh Wani and Harshal Gaikwad concentrated on database design, which was crucial for the project's functionality.

By the first week of March, they moved on to establishing database connectivity for all modules. In the second and third weeks of March, Harshal Gaikwad and Manas Chaudhari worked together on integrating all modules and began the report writing. Finally, in the last week of March to the beginning of April, the team prepared for Presentation II, marking the culmination of their structured and collaborative development process.



# Chapter 7

## Results

The Expense Tracker Application has been successfully developed and tested to meet its intended objectives of allowing users to record, categorize, and manage their daily expenses. Below is a detailed summary of the outcomes observed during the final phase of the project.

### 7.1 Functionality and Performance

#### Data Handling:

The application accurately records and retrieves user expenses through a structured database system. Core functions such as adding new entries, deleting records, filtering by category or date, and viewing summaries operate reliably. An additional feature allows users to **export their expense data into a well-formatted PDF file**, making it easier to store or share records offline.

#### Responsiveness:

The system performs consistently across different actions, including adding expenses, switching between monthly summaries, and generating charts. Even with a larger dataset, the response time remains smooth, ensuring a positive user experience.

### 7.2 Testing and Evaluation

#### Functional Testing:

The application was subjected to detailed functional testing covering:

- Adding multiple expenses under different categories and amounts
- Deleting selected records and verifying that summaries update instantly
- Generating accurate monthly and category-wise breakdowns
- Exporting the full dataset as a PDF and verifying formatting integrity

All tested modules functioned correctly, with no data inconsistencies or crashes observed during test runs.

### **Usability Testing:**

Feedback from users during trials highlighted the app's simplicity and ease of use. Clear navigation, prominent action buttons, and minimal clutter contributed to an intuitive user interface. The export-to-PDF feature was especially appreciated for enabling offline access and backup.

## **7.3 Challenges and Resolutions**

### **Database Connectivity:**

Initial versions faced occasional lags in storing or retrieving data. This was resolved by optimizing query execution and streamlining the backend interaction logic.

### **Date Handling:**

Handling various date formats posed a challenge, particularly when filtering entries. Standardized formats and validation checks were integrated to prevent errors and ensure consistency.

### **Dynamic Summaries:**

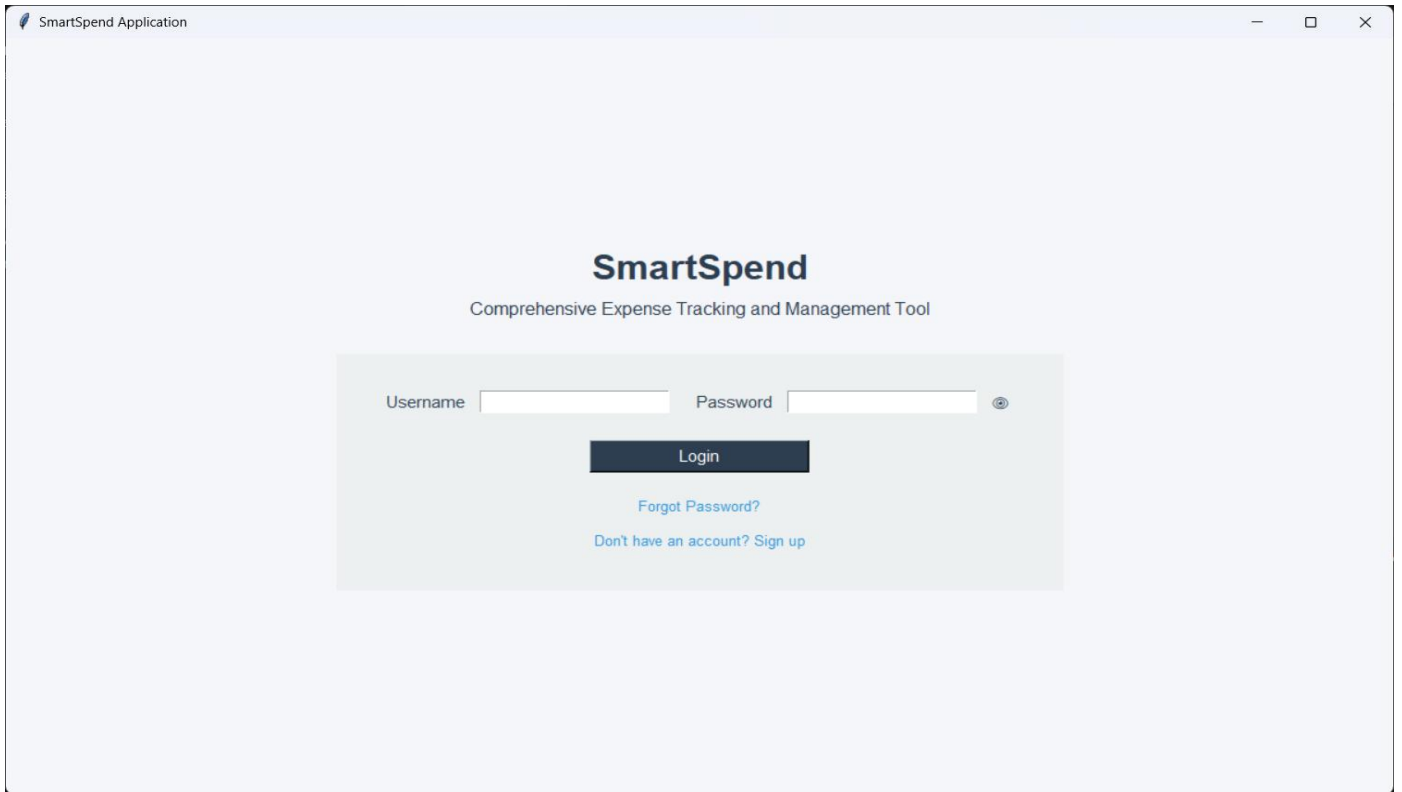
Ensuring that changes like record deletions immediately reflected in the summary and charts required implementing real-time updates. This was managed by keeping the app's internal data updated with every user action.

## **7.4 User Interface Overview**

The user interface of the expense tracker is built using **Tkinter**, providing a clean and intuitive layout that simplifies the process of recording and reviewing expenses. Key features like amount input, category selection, and date entry are clearly positioned for ease of use. Visualizations, such as **bar graphs and pie charts**, are generated using **Matplotlib**, helping users gain quick insights into their spending patterns.

A convenient "**Export to PDF**" feature allows users to generate printable reports of their expense data, offering a compact summary of their financial activities.

Screenshots of the actual project implementation are included ahead for reference.



The image shows a web browser window titled "SmartSpend Application". The page has a light blue background. In the center, there is a white box containing the login form. The form has the title "SmartSpend" in bold, followed by the subtitle "Comprehensive Expense Tracking and Management Tool". Below this, there are two input fields: "Username" and "Password". The "Password" field has a small eye icon to its right. Below the input fields is a dark blue "Login" button. Under the button, there are two links: "Forgot Password?" and "Don't have an account? Sign up".

SmartSpend Application

## SmartSpend

Comprehensive Expense Tracking and Management Tool

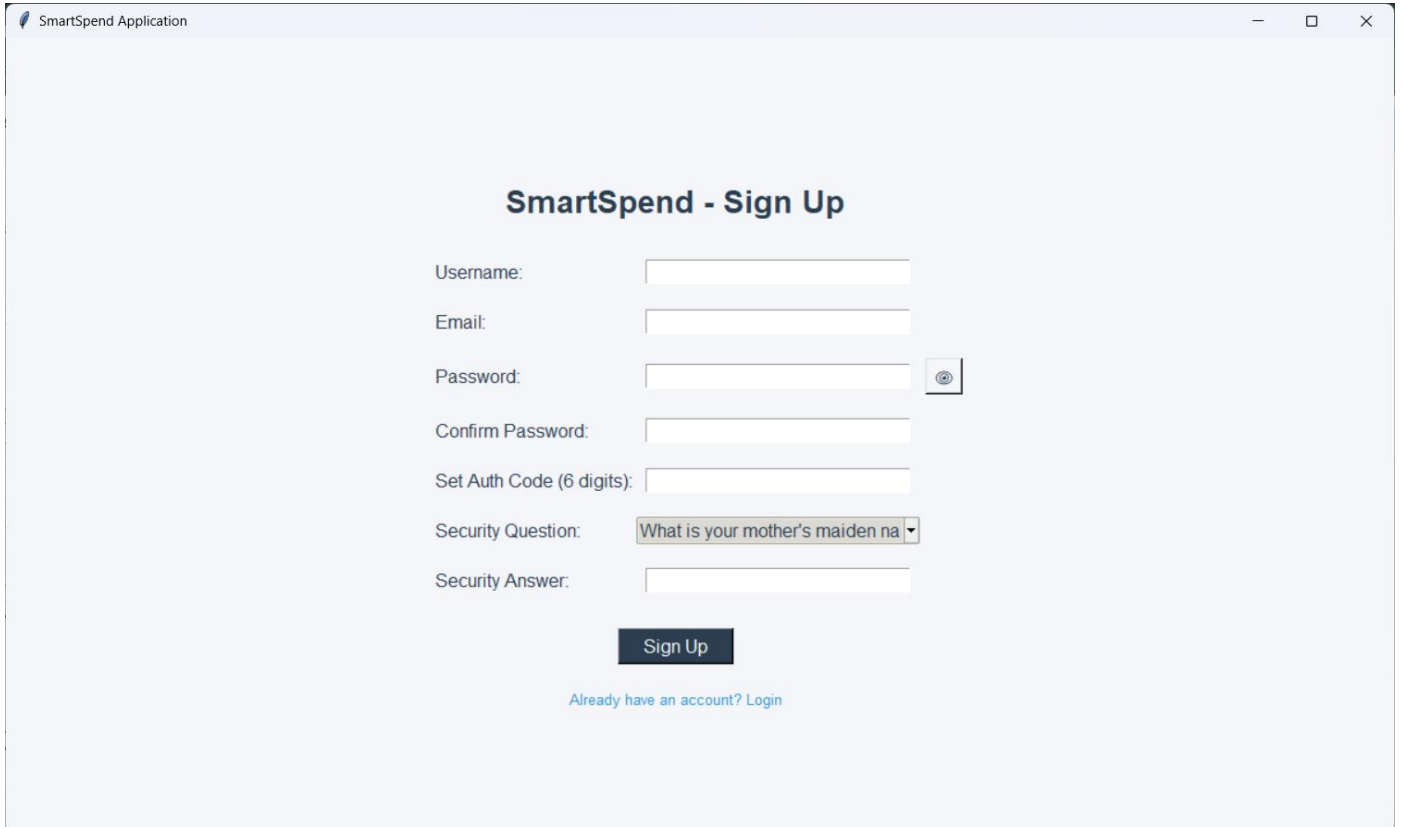
Username  Password

Login

[Forgot Password?](#)

[Don't have an account? Sign up](#)

Figure 7.1.: Login page - To take in preregistered users



The image shows a web browser window titled "SmartSpend Application". The page has a light blue background. In the center, there is a white box containing the sign up form. The form has the title "SmartSpend - Sign Up". Below this, there are several input fields: "Username:", "Email:", "Password:", "Confirm Password:", "Set Auth Code (6 digits):", "Security Question:", and "Security Answer:". The "Password" field has a small eye icon to its right. The "Security Question:" field is a dropdown menu with the text "What is your mother's maiden na". Below the input fields is a dark blue "Sign Up" button. Under the button, there is a link: "Already have an account? Login".

SmartSpend Application

## SmartSpend - Sign Up

Username:

Email:

Password:

Confirm Password:

Set Auth Code (6 digits):

Security Question:

Security Answer:

Sign Up

[Already have an account? Login](#)

Figure 7.2.: Sign up page - To allow new users to register

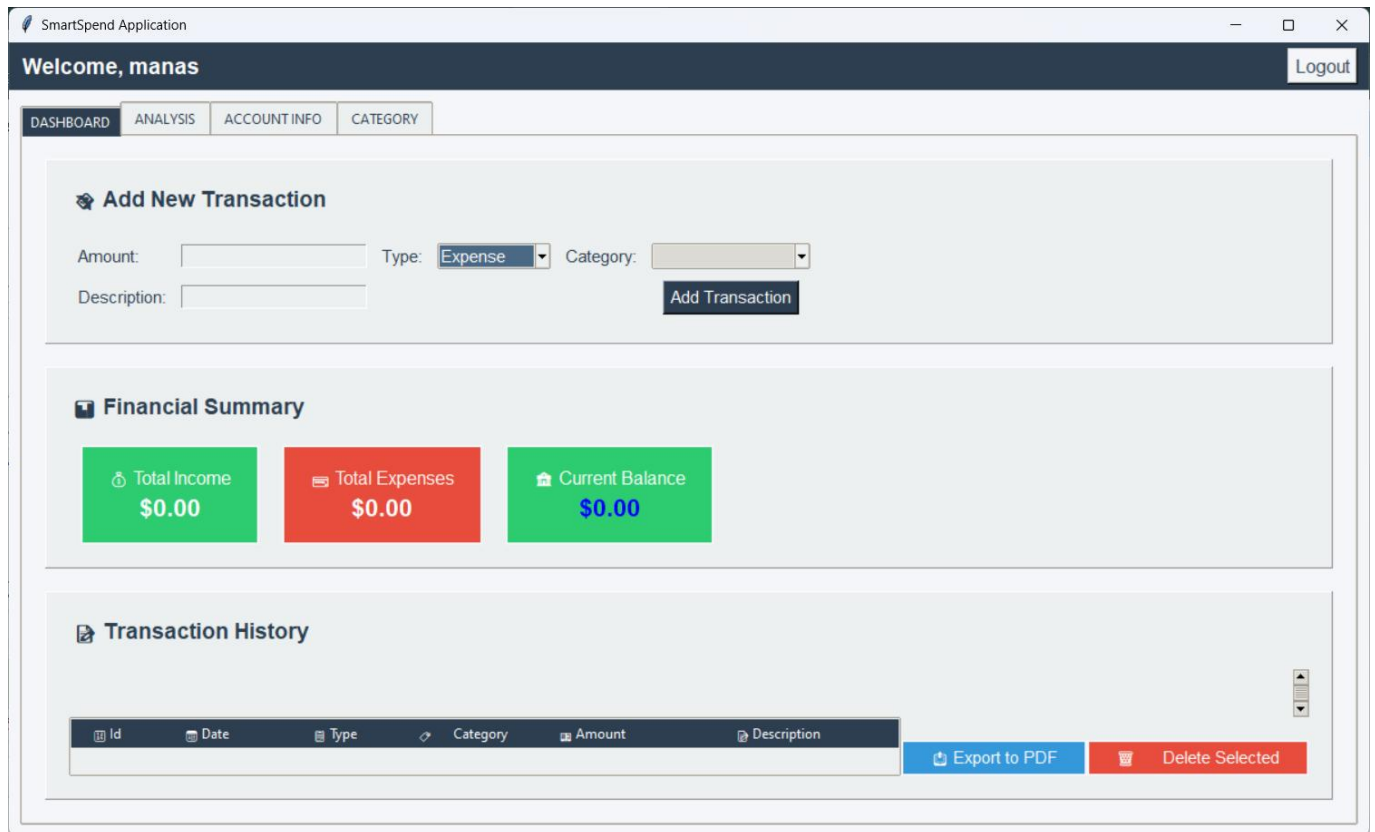


Figure 7.3.: Dashboard page - Interface for Adding, Viewing, and Deleting Expenses

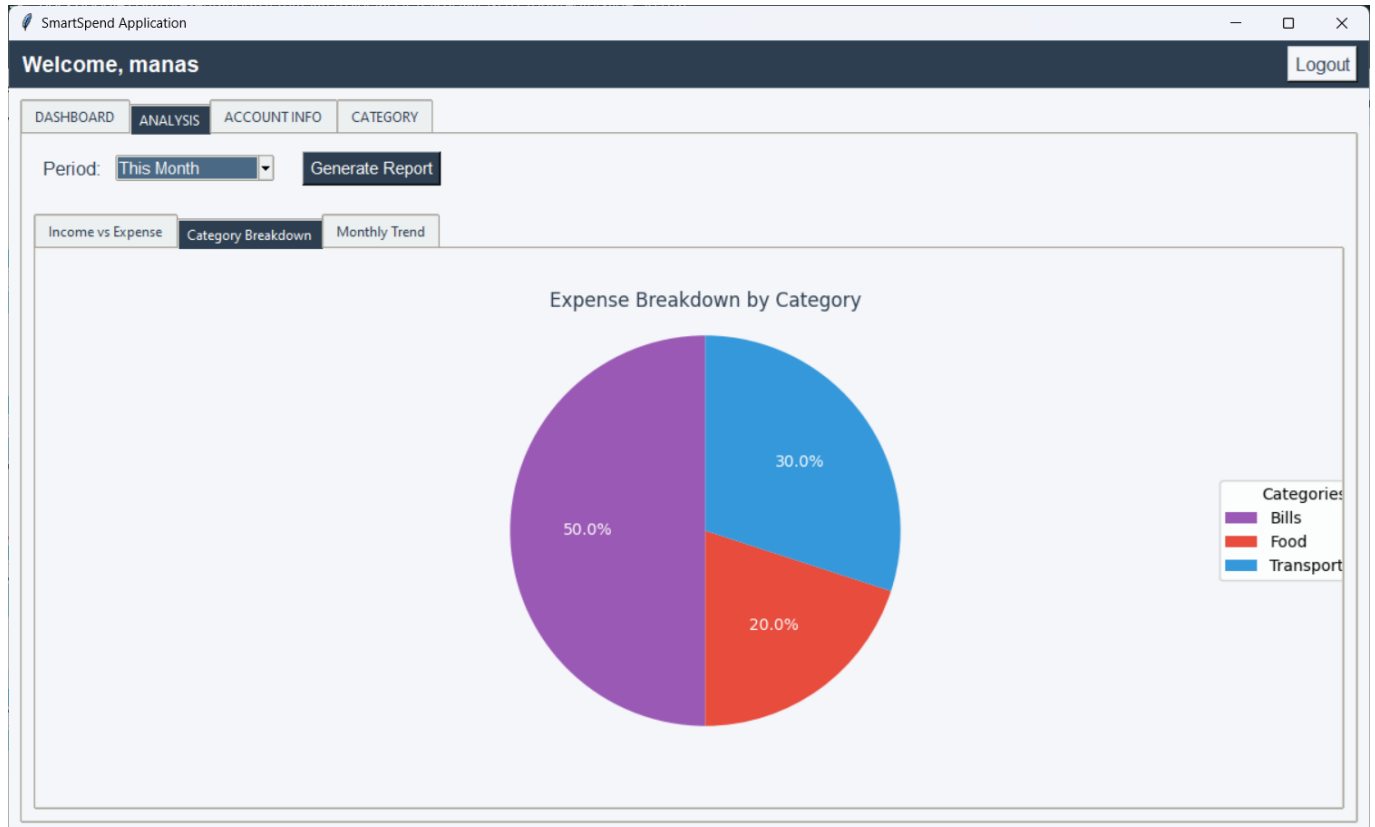


Figure 7.4.: Analysis Page – Visual Representation of Expense Data Using Charts

SmartSpend Application

Welcome, manas Logout

DASHBOARD ANALYSIS **ACCOUNT INFO** CATEGORY

### Account Information

Username: manas

Email:

Currency:

Auth Code:

Figure 7.5.: Accounts page - Update Currency, Auth Code, and User info

SmartSpend Application

Welcome, manas Logout

DASHBOARD ANALYSIS ACCOUNT INFO **CATEGORY**

### Add New Category

Category Name:

Category Color:

### Your Categories

ID	Category Name	Color	Monthly Limit	Spent This Month	Remaining
1	Food	#e74c3c	No Limit	\$10000.00	N/A
2	Transportation	#3498db	No Limit	\$15000.00	N/A
3	Entertainment	#2ecc71	No Limit	\$0.00	N/A
4	Shopping	#f39c12	No Limit	\$0.00	N/A
5	Bills	#9b59b6	No Limit	\$25000.00	N/A
6	Salary	#1abc9c	No Limit	\$0.00	N/A

Figure 7.6.: Category Setup Page – Define Expense Categories and Set Spending Limits

# **Chapter 8**

## **Conclusion**

SmartSpend serves as a practical and efficient financial tool designed to help users take control of their spending and savings. By providing features such as expense categorization and analytical insights, the application aids in better financial planning and informed decision-making. Its intuitive interface and structured data management ensure ease of use, making it a reliable solution for individuals seeking to enhance their financial management.

As technology continues to advance, expense tracker applications will evolve to incorporate more sophisticated features, offering personalized financial guidance and an improved user experience. The development of SmartSpend has provided valuable insights into software design, database management, and user-centric development, contributing to our technical and analytical skills.

By integrating an expense tracker into daily financial habits, users can achieve greater financial stability and work towards long-term financial goals, making budgeting and financial planning more accessible and effective.

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