

Design and Implementation of an app Expense Tracker

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FINAL YEAR DESIGN PROJECT REPORT

This Report Presented in Partial Fulfillment of the
Requirements for the **Degree of Bachelor of Science in
Computer Science and Engineering**

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September 17, 2025

APPROVAL

This Project titled “**Design and Implementation of an app Expense Tracker**”, submitted by Robin Das, ID No: 212-15-4153 and Sourov Biswas, ID No: 212-15-4161 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on **17 September, 2025**.

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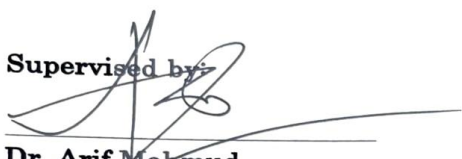


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We hereby declare that this project has been done by us under the supervision of **Dr. Arif Mahmud, Associate Professor & Associate Head**, Department of Computer Science and Engineering, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree or diploma.


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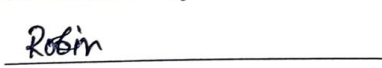
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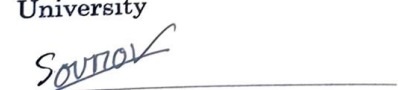
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ACKNOWLEDGEMENTS

This work would not have been possible without the support and contributions of many individuals over the past two semesters. We are deeply grateful to everyone who has assisted us in one way or another.

First, we express our heartfelt thanks and gratefulness to the almighty for His divine blessing making it possible for us to complete the **Final Year Design Project (FYDP)** successfully.

We are grateful and wish our profound indebtedness to **Dr. Arif Mahmud, Associate Professor & Associate Head**, Department of Computer Science and Engineering, Daffodil International University, Dhaka, Bangladesh. Deep knowledge and keen interest of our supervisor in the field of **Android Application Development** to carry out this project. His endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, reading many inferior drafts, and correcting them at all stages have made it possible to complete this project.

We would like to express our heartfelt gratitude to the Head of the Department of Computer Science and Engineering, for his kind help in finishing our project and also to other faculty members and the staff of the Department of Computer Science and Engineering, Daffodil International University.

We would like to thank our entire course-mates at Daffodil International University, who took part in this discussion while completing the coursework.

Finally, we must acknowledge with due respect the constant support and patience of our parents.

ABSTRACT

The "Expense Tracker" is a mobile app designed to make it easier and more convenient to keep track of your money. It's hard to keep track of where our money goes when we're busy. And occasionally we spend too much money. This program will help us keep track of our income and costs, making it easier to manage our spending. This program gives us a clear and complete view of our financial health. It has various user-friendly features, such as support for multiple accounts (bank, card, cash), customisable categories, and visual charts. We can also make reports on a daily, monthly, or yearly basis to learn more about our spending habits and find ways to save. Budget planning and notification are two tools that help us stay on track with our money goals. Multi-currency compatibility makes sure that people from different nations can keep track of their spending in their currency. Users will always be able to use our app, even without an internet connection. This app was made with Android Studio and Java, utilizing the MVVM design, which keeps the code clean and easy to maintain. Used Room Database to store data safely on the device and Firebase to sync data between devices without any problems. Users can save their data to a CSV file for further research. All of the main functions of our app are free, so it's a great tool for anyone who wants to take charge of their money.

Table of Contents

Approval	i
Declaration	ii
Acknowledgements	iii
Abstract	iv
List of Figures	vii
List of Tables	viii
1 Introduction	1-5
1.1 Introduction.....	1-2
1.2 Motivation	2
1.3 Objectives	3
1.4 Methodology	3
1.5 Project Outcome.....	4
1.6 Organization of the Report	5
2 Background	6-10
2.1 Introduction.....	6-7
2.2 Literature Review	7-8
2.2.1 Similar Applications	8-9
2.3 Gap Analysis	9-10
2.4 Summary	10
3 Research Methodology	11-23
3.1 Requirement Analysis & Design Specification.....	11-20
3.1.1 Overview	11-12
3.1.2 System Design.....	12-13
3.1.3 Functional and Nonfunctional Requirements	13-14
3.1.4 Data Flow Diagram	14-15
3.1.5 UI Design.....	16-20
3.2 Detailed Methodology and Design.....	20-21
3.3 Project Plan.....	21-22
3.4 Task Allocation.....	23
3.5 Summary.....	23

4	Implementation and Results	24-26
4.1	Environment Setup.....	24-25
4.2	Testing and Evaluation/Performance/ Comparative Analysis.....	25-26
4.3	Results and Discussion	26
4.4	Summary	26
5	Engineering Standards and Design Challenges	27-30
5.1	Compliance with the Standards.....	27
5.1.1	Software Standards.....	27
5.1.2	Hardware Standards	27
5.1.3	Communication Standards.....	27
5.2	Impact on Society, Environment and Sustainability	28
5.2.1	Impact on Life.....	28
5.2.2	Impact on Society & Environment.....	28
5.2.3	Ethical Aspects	28
5.2.4	Sustainability Plan.....	28
5.3	Project Management and Financial Analysis.....	28-29
5.4	Complex Engineering Problem.....	29-32
5.4.1	Complex Problem Solving.....	29-31
5.4.2	Engineering Activities.....	31-32
5.5	Summary	32
6	Conclusion	33
6.1	Summary	33
6.2	Limitation	33
6.3	Future Work	33
	References	34

List of Figures

3.1	Expense Trackers System Diagram	12
3.2	Expense Tracker Data Flow Diagram.....	14
3.3-3.16	UI Design.....	16-20

List of Tables

2.1	Summary of Literature Reviewed.	7-8
2.2	Gap analysis.....	9-10
3.1	Task Allocation.	23
4.1	Testing and Performance analysis.	25-26
5.1	Financial Analysis.....	29
5.2	Mapping with Complex Engineering Problem	29
5.3	Mapping with knowledge Profile	30
5.4	Mapping with Complex Engineering Activities	31

Chapter 1

Introduction

1.1 Introduction

The Expense Tracker app intends to fix the difficulty of managing personal finances in today's fast-paced world. The app uses a user-friendly platform that allows users to record their earnings and costs, categorize transactions, and gain insights into their financial health. Constructed with Android Studio and Java, the app is easy, reliable, and free to utilize, using a practical option for anybody desiring to manage their finances more effectively and make better monetary decisions.

With the increasing reliance on digital tools, there has been a shift toward mobile applications for monetary management; however, lots of existing apps are either too made complex for daily users, locked behind paid memberships, or lack crucial functions such as offline gain access to and multi-currency support. To even more help users make informed financial decisions, the application supplies daily, monthly, and yearly reports along with visual charts and graphs that make it much simpler to acknowledge costs patterns and locations for enhancement. The Room Database secures user details in your location while utilizing efficient storage management, and CSV export efficiency makes it possible for users to analyze their monetary records even more if needed. To much more help users make notified financial choices, the application uses daily, monthly, and annual reports together with visual charts and charts that make it simpler to recognize spending patterns and places for enhancement. The Room Database safeguards user details in your area while utilizing efficient storage management, and CSV export efficiency permits users to analyze their financial records much more if required. In the end, the work repairs the useful concern of ineffective monetary tracking. It assists people remain within their budgets, make smarter cash choices, and work to achieve long-lasting financial stability.

To even more help users make informed financial decisions, the application provides daily, monthly, and yearly reports along with visual charts and charts that make it much simpler to acknowledge costs patterns and places for enhancement. The Room Database secures user info in your area while using efficient storage management, and CSV export efficiency makes it possible for users to analyze their financial records even more if

needed. The Room Database secures user info in your area while utilizing reliable storage management, and CSV export performance enables users to analyze their monetary records even more if needed.

1.2 Motivation

The inspiration behind developing the Expense Tracker application stems from the growing need for standard yet respectable financial management alternatives in a world where cash streams through various channels every day. With the increase of digital payments, online subscriptions, and many tracking account or cards, managing personal funds has really ended up being more in-depth than ever formerly. As students and planning designers, we have normally handled problems in tracking our costs practices, particularly when depending on standard methods like note pads or spreadsheets, which are not just lengthy however similarly do not have flexibility and real-time schedule. From a computational perspective, this job motivated us to produce a system that may smartly deal with big quantities of transactional information, classify them efficiently, and present them in a clear and visually attracting manner through reports and charts. Structure such an option challenged us to take a look at out ideas like database management, offline storage, information synchronization, and multi-currency assistance, all of which are essential in modern-day mobile applications. Another crucial inspiration was the desire to produce an app that is not just useful for everyday users however likewise acts as an understanding platform for us to use theoretical understanding in Android development, database style, and the MVVM architectural pattern. By dealing with this task, we intended to boost our analytical and coding abilities while producing something substantial and beneficial. On a specific level, the ability to track earnings and expenditures, set budgets, and get prompt informs will help us improve our own financial discipline and expenses practices. On a broader level, utilizing this application complimentary of cost guarantees that others, particularly trainees, young professionals, and individuals from numerous monetary backgrounds, can likewise get from better monetary awareness and control. Developing this job uses us self-confidence and experience in dealing with real-world issues, and at the really exact same time, it delivers a valuable tool that empowers users to accomplish financial stability and long-lasting cost savings goals. This balance in between technical development for us and useful worth for the users is the core factor that impacted and motivated us to perform this job with commitment.

1.3 Objectives

The main objectives of our project are as follows:

- To provide an easy-to-use application for users to tracing income and expenses so they can organize their financial transactions efficiently.
- To offer detailed financial insights by using categorized management, reports, and visual charts that will help users to analyze their spending patterns and make informed financial decisions.
- To help the users with practical financial management with features like budget planning, multi-account and multi-currency support, offline access, data export, ensuring flexibility and accessibility for diverse users.

1.4 Methodology

We developed the **Expense Tracker** app using Agile methods, focusing on flexibility and regular feedback. This helped us adapt as project needs changed and improve the app step by step. We started by looking at common problems people face with personal finance, like the hassle of handwritten notes or spreadsheets and the limits of some mobile apps. These issues include complicated interfaces, paid features, no offline access, and not enough ways to customize. Based on this, we gathered requirements by observing potential users such as students, freelancers, and professionals. They needed features like tracking income and expenses, supporting multiple accounts, budget alerts, reports, charts, CSV export, offline use, and multi-currency support. These needs shaped our product backlog and guided our work. We designed the system to be modular and easy to maintain, using the MVVM architecture to keep business logic separate from the user interface. We used Room Database for secure offline storage and Firebase for syncing data across devices. The interface was kept simple so users could easily access all features. We worked in short sprints, first building core features like income and expense tracking and category management. Later sprints added reports, charts, budget alerts, CSV export, and multi-currency support. After each sprint, we tested features for function, ease of use, and performance, then used feedback to make improvements. At the end, we tested the whole app to make sure it met our goals and was user-friendly. Using Agile helped us build a flexible and reliable tool that makes it easier for people to manage their money and make smart financial choices.

1.5 Project Outcome

Functional Mobile Application-- A fully functional expense tracker app was developed to streamline financial management for daily users.

Income & Expense Tracking-- Users can record, edit, and manage their financial transactions efficiently.

Category-wise Management-- Transactions can be arranged into personalized classifications for superb clarity.

Multi-Account Support-- The app enables management of various accounts, such as bank accounts, credit cards, and money, in one place.

Report Generation-- Users can create comprehensive reports (daily, monthly, annual) to examine their financial activities.

Visual Representation-- Interactive charts and graphs provide a clear overview of income and spending patterns.

Budget Planning & Alerts-- The app assists users in setting spending plans and getting warnings to avoid overspending.

Multi-Currency Support-- Compatibility with other currencies makes the app useful for users worldwide.

Offline Functionality-- Room Database guarantees users can access and store information even without an internet connection.

When online, the cloud Synchronization-- Firebase combination allows smooth data synchronization across multiple devices.

CSV Export Feature-- Users can export financial information for long-term storage or further analysis.

User-Friendly Experience-- A clean interface and user-friendly style ensure accessibility for a wide range of users.

Ability Development-- The task boosted our knowledge of Android advancement, database management, and MVVM architecture.

Practical Value-- The application empowers users to take control of their finances, develop savings practices, and achieve monetary stability.

1.6 Organization of the Report

The project is structured across six chapters, beginning with Chapter 1 which introduces the project, presents the motivation and objectives, and concludes with methodology and project outcomes. Chapter 2 provides background information through an introduction and literature review, analyzing existing work, related projects, similar applications and gap analysis. Chapter 3 focuses on research methodology, including the proposed methodology, functional and non-functional requirements, System Design, data flow diagram level 1, UI design, detailed methodology and design, project plan and task allocation. Chapter 4 covers environment setup, testing, and performance, presenting results. Chapter 5 examines engineering standards and design challenges, including software, hardware and communication standards, while also discussing societal and environmental impacts, ethical aspects, sustainability plans, project management and financial analysis. Finally, Chapter 6 concludes the project with a comprehensive summary, limitations and future work directions.

Chapter 2

Background

2.1 Introduction

Handling individual financial resources has actually always been a fundamental element of human life, but in today's fast-moving and digitally driven world, it has become more challenging than ever. With multiple income sources, diverse spending classifications, and the increasing usage of bank cards, online payments, and digital wallets, keeping an eye on where cash goes can rapidly become overwhelming. Generally, individuals count on handwritten notes, diaries, or spreadsheets to record deals; however, these techniques are time-consuming, error-prone, and not practical for modern-day lifestyles. The rise of innovation and mobile phones has actually transformed this process by using smarter, faster, and more dependable tools for financial management. Mobile applications have actually become increasingly popular because they are available anytime, simple to use, and efficient in managing and analyzing large amounts of data quickly. Cost tracking apps, in particular, resolve the vital need to monitor earnings and expenditures, set budgets, analyze cost patterns, and keep monetary discipline in everyday life. Many existing applications provide partial services; however, they often lack necessary features such as offline support, multi-currency handling, or budget plan notifications, making them less efficient for users with diverse requirements. Our project builds on this background by combining the necessary functions of modern-day financial apps with included functionality such as personalized categories, multi-account support, CSV export, and visual reporting tools. At the same time, it integrates trustworthy backend innovations to ensure both functionality and efficiency. For storage, Room Database provides protected offline ability, while Firebase handles synchronization across several devices, bridging the gap between offline and online financial management. The app's design follows the MVVM architecture, which makes sure that the system is maintainable, scalable, and easy to upgrade in the future. In addition, incorporating charts and graphs supplies users with an interesting and clear way to imagine their financial health, making it much easier to determine practices, control unnecessary costs, and accomplish long-term objectives. This background highlights not just the importance of expense management in expert and personal life, but also how modern-day mobile advancement frameworks and methods can be

leveraged to produce a useful, user-centered solution. By locating our work within this context, the rest of the report can be comprehended as both a response to an everyday human issue and a presentation of how innovation, when applied successfully, can empower individuals to organize their financial wellness.

2.2 Literature Review

Author (s)	Year	Title	Methodology	Key Findings
Kumar & Lee	2020	Mobile Apps for Personal Finance Management.	Survey and App Review.	Identified key features of popular apps; found gaps in offline support and customization.
Garcia et al.	2019	Budgeting Tools for Students.	Experimental Study.	Visual charts increase awareness of spending patterns and improve budgeting habits.
Chen & Patel	2021	Multi-Currency Finance Apps.	Comparative Study.	Handling multi-currency transactions is challenging but essential for international users.
Singh et al.	2020	User Experience in Finance Applications.	Usability Testing.	User-friendly interfaces lead to higher engagement and regular use.
Ahmed & Zhao	2022	Cloud Integration for Expense Tracking.	Case Study.	Cloud sync enhances cross-device access and reliability of financial data.
Robinson	2018	Visual Analytics in Financial Apps.	Experimental Analysis.	Charts and graphs improve comprehension of financial habits and trends.
Johnson et al.	2019	AI for Financial Forecasting.	Qualitative Analysis.	AI-based analysis improves expense prediction and financial decision-making.
Doe et al.	2020	Data Management in Mobile Applications.	Qualitative Analysis.	Proper database management is critical for data security and offline usability.

Williams	2021	Security and Privacy in Finance Apps.	Case Study.	Secure storage and encryption are vital for user trust in mobile finance apps.
Smith & Brown	2018	Feature Analysis of Expense Tracking Apps.	Survey.	Most free apps lack multi-account support and customizable categories.

Table 2.1: Summary of Literature Reviewed.

2.2.1 Similar Applications

In the current age of digital financing management, several mobile and web-based applications have actually been developed to streamline budgeting, tracking costs, and financial preparation. These applications have actually contributed considerably to promoting financial literacy and assisting people manage their money efficiently. Among the most noteworthy are Money Manager-- Budget Tracker, Plan Budget-- Expense Tracker, Money Plus: Expense Manager, Walnut, Spendee, and Money Lover.

1. Cash Supervisor-- Budget Tracker

Money Manager-- Budget Tracker is an extensively used financial management application that enables users to track income, expenditures, and total money circulation. Users can imagine their deals through detailed charts and reports, which helps in recognizing spending practices.

2. Strategy Budget-- Expense Tracker

Strategy Budget-- Expense Tracker focuses primarily on preventive budgeting, where users can set month-to-month or weekly costs limits. It signals users when they are close to exceeding their budgets, assisting them preserve monetary discipline.

3. Money Plus: Expense Manager

Cash Plus: Expense Manager is developed for simpleness, targeting users who prefer a user minimalistic and friendly interface. It permits quickly entry of costs, category adjustment, and easy visual insights. Its methodological contribution depends upon its user-centered minimalistic style, which lowers complexity for non-technical users. However, the app is restricted in regards to ingenious functions such as synchronization throughout gadgets, information exporting, and extensive analytics, making it suitable primarily for casual or novice users.

4. Walnut

Since it makes use of SMS and bank notifications to automatically tape-record monetary deals, Walnut is distinct compared to other expenditure trackers. Furthermore, while it stands out at automated tracking, it does not have sophisticated functions such as cumulative budgeting or lasting monetary preparation.

5. Spendee

It likewise supports multi-currency deals, making it appropriate for international users. On the disadvantage, many of its effective features are locked behind a premium subscription, which lowers ease of access for free users.

6. Money Lover

Its approach is based on goal-oriented financial preparation, which not just tracks past spending but also assists users prepare for future monetary needs. Similar to Spendee, several advanced functions are limited to paid variations, which restricts its adoption amongst users who are unwilling to pay for premium access.

2.3 Gap Analysis

Table 2.2: Gap analys.

Features	Money Manager –Budget Tracker	Plan Budget - Expense Tracker	Money Plus: Expense Manager	Walnut	Spendee	Money Lover	Expense Tracker
Income & Expense Tracking	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Category-wise Transaction Management	Yes	Yes	Yes	Limited	Limited	Yes	Yes
Daily, Monthly, Yearly Report View	Yes	No	No	Limited	Yes	Yes	Yes
CSV Export Option	No	No	Yes	Yes	Limited	Yes	Yes

Multi-Account Support (Bank, Card, Cash)	No	No	Yes	Yes	Yes	Yes	Yes
Customizable Categories	No	No	No	Limited	Yes	Yes	Yes
Visual Charts & Graphs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Budget Planning & Alerts	No	No	Yes	Limited	Yes	Yes	Yes
Offline Support	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Multi-Currency Support	No	Yes	Yes	Yes	No	Yes	Yes
Completely Free with Core Features	Yes	Yes	Limited	No	Limited	No	Yes
Add Transaction by AI	No	No	No	No	No	No	Planned

2.4 Summary

In this chapter we discuss about the Expense Tracker app's background and how it fills the spaces left by other financial management apps. It begins by looking at existing apps and explaining their problems. Some of them are too complex, lock important functions behind paywalls, or absence vital functions like offline access or multi-currency support. Our Expense Tracker app fixes these concerns by using all its core functions free of charge, such as tracking several accounts, setting spending plans, generating reports, and even working offline. It also uses Room Database to save data safely and Firebase for syncing information across devices, which makes the app both reliable and user-friendly. This chapter highlights how the Expense Tracker app is created to be accessible and basic, giving users a simple tool to manage their finances. By improving on the shortcomings of other apps, it assists users to make much better financial decisions and remain in control of their cash, without the tension of complex user interfaces or hidden costs.

Chapter 3

Research Methodology

3.1 Requirement Analysis & Design Specification

3.1.1 Overview

The overall method of this project was thoroughly structured to ensure that the Expense Tracker application could be developed, evaluated, and delivered in a methodical yet flexible manner, ultimately delivering a tool that is both useful for users and technically sound. To attain this, we chose the Agile approach because financial management applications are extremely user-centric, and requirements often evolve as new insights are discovered during development. Agile gave us the liberty to divide the work into little, workable models, where each sprint produced a practical element of the application and was immediately checked for functionality, performance, and usability. At the start, we focused on requirement analysis by determining the common struggles people face with financial management, such as troubles in tracking daily expenditures, the lack of offline support in many existing apps, and restricted customization choices. These insights helped us plainly define the functional and non-functional requirements of our system. As soon as the requirements were set, we moved into the style stage, where we prepared the architecture, database schema, and user interface. We picked the MVVM architecture because it separates organizational reasoning from the user interface, making the system simpler to preserve and expand in the future. The Room Database was utilized to offer secure offline information storage so that users can always access their details without relying on the internet, while Firebase was integrated to enable smooth synchronization across devices when online. After every sprint, the executed functions were evaluated for dependability, usability, and performance to ensure they fulfilled our initial goals, and adjustments were made based on testing feedback. This iterative procedure not only enhanced the quality of the app however likewise kept the task aligned with user requirements. Along with development, we paid unique attention to designing a tidy, basic, and easy to use user interface so that even non-technical users could quickly handle their financial resources without confusion. The testing phase similarly focused on effectiveness optimization, guaranteeing that the app might manage huge datasets efficiently while keeping smooth interactions. By following this methodology, we had the capability to support technical development with user-focused

style, leading to an application that resolves real-world problems like overspending, an absence of awareness about monetary health, and problem in budgeting. In summary, the method worries iterative progress, feedback-driven improvement, and beneficial application of modern-day innovations, making particular that the Expense Tracker is not just another mobile app nevertheless a relied on individual funding friend that can help users achieve much better financial resources and long-lasting monetary stability.

3.1.2 System Design

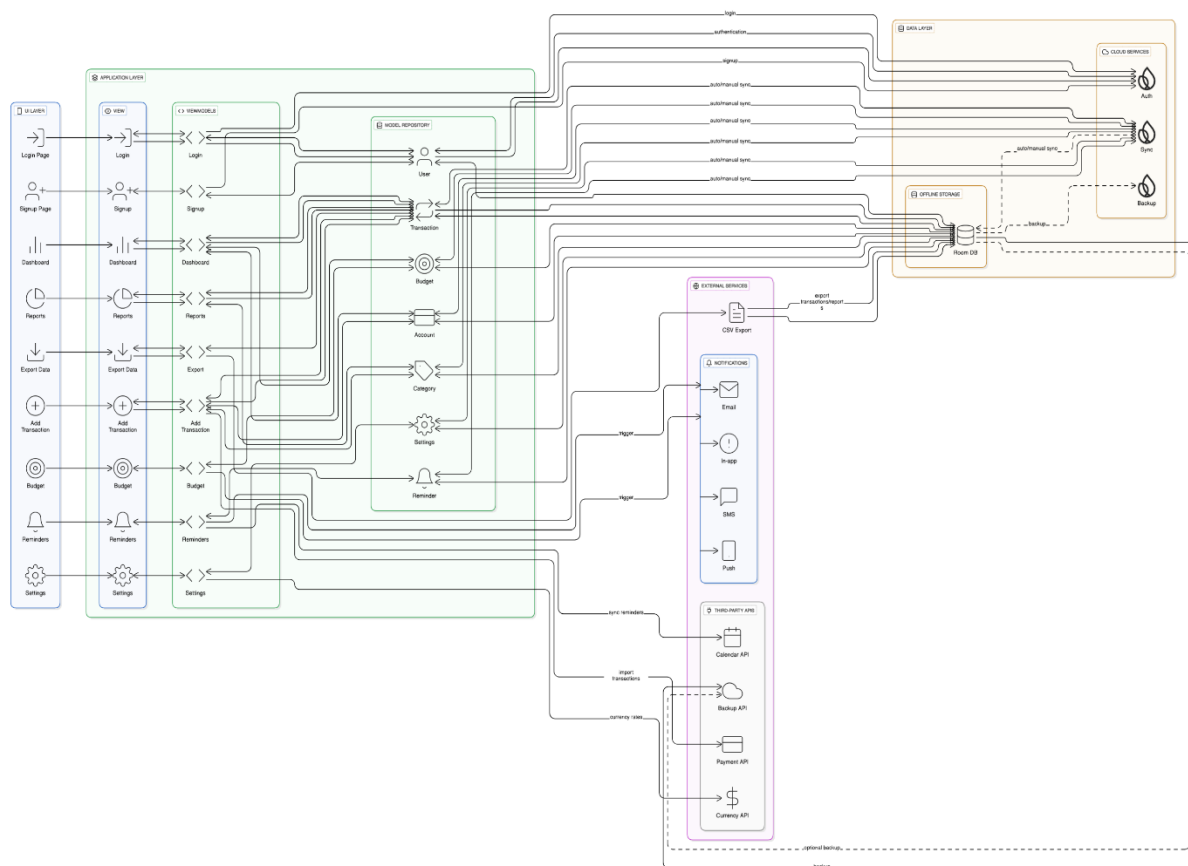


Figure 3.1: This is Expense Trackers System diagram

The system design of the Expense Tracker application follows the MVVM architecture, which separates the app's reasoning from the user interface to guarantee maintainability and scalability. The Model handles all data-related operations, such as handling of deals and user info, while the View-Model manages the information blood circulation to the UI, keeping the app's structure easy and easy to test. For details storage, the app utilizes Room Database for offline gain access to, making sure that users can still track their

expenses and income without an internet connection. When online, data is synced to the cloud using Firebase, permitting smooth cross-device synchronization. Firebase likewise deals with user authentication, providing safe login features. The user interface is developed to be easy to use and intuitive, permitting users to easily input transactions, view reports, and set spending plans. The app supports numerous accounts (bank, card, money) and adjustable categories for transactions, offering users versatility in handling their finances. Visual aspects like graphs and charts provide a clear overview of spending patterns, while spending plan planning functions send notifications when limits are exceeded. This modular design ensures that the app is easy to preserve, extend, and scale with new functions in the future, offering a strong structure for both the present and future versions of the app.

3.1.3 Functional and Nonfunctional Requirements

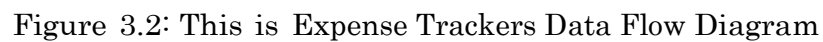
A. Functional Requirements :

- Users can add, edit, and delete income and expense transactions.
- Transactions can be categorized for better organization (e.g., food, transport, rent).
- Multiple accounts are supported, including Bank, Card, and Cash.
- Users can set budgets and receive alerts/notifications when limits are exceeded.
- The system can generate daily, monthly, and yearly reports summarizing transactions.
- Users can export financial data in CSV format for further analysis.
- Visual charts and graphs display spending patterns for better insight.
- Multi-currency support allows users to track transactions in different currencies.
- The application provides offline access, with data synchronized via Firebase when online.
- All core features are completely free for users.

B. Non-Functional Requirements :

- Usability: The interface is simple, intuitive, and accessible for all users.
- Performance: The app can efficiently handle large numbers of transactions without lag.
- Security: Data is securely stored using Room Database and safely synchronized via Firebase.
- Portability: Compatible with Android devices of varying screen sizes.

- ### 3.1.4 Data Flow Diagram



- User : Interacts with the application to add and manage financial data.
- Expense Tracker System : The system processing and storing user's data.

- Transaction Management – Where users add, edit, or delete income and expense transactions.
- Category Management – Process to categorize transactions (e.g., food, transport, rent).
- Budgeting & Alerts – Process that sets and monitors budgets and generates alerts for overspending.
- Report Generation – Process to create reports (daily, monthly, yearly) from the recorded transactions.
- Data Synchronization – Process to sync data between the local Room Database and Firebase when online.

- Data Storage – Process that handles storing user data (transactions, accounts, budgets, etc.) in the local Room Database.

Data Stores:

- Room Database – Local database that stores user transactions, accounts, categories, and budgets.
- Firebase – Cloud storage for syncing user data across devices when online.

Data Flow:

User Inputs Data:

- User enters transaction details (income or expense) → Transaction Management.
- User categorizes transactions → Category Management.
- User sets a budget or checks alerts → Budgeting & Alerts.

Transaction and Category Data:

- Data goes from Transaction Management → Room Database (for local storage).
- Data goes from Category Management → Room Database (for categorizing transactions).

Report Generation:

- Data flows from the Room Database to Report Generation for creating financial reports (daily, monthly, yearly).

Budget Data and Alerts:

- The user's budget settings flow from the Room Database to Budgeting & Notifications.
- Alerts are sent to the user if spending exceeds the set budget.

Data Sync:

- Data in the Room Database syncs with Firebase when the user has internet access (through Data Synchronization process).
- Firebase ensures that the data is consistent across devices.

Exporting Data:

- The user can export transaction data to a CSV file from the Room Database.

3.1.5 UI Design

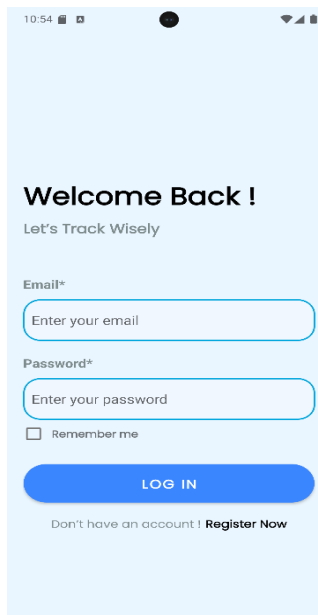


Figure 3.3: Log In

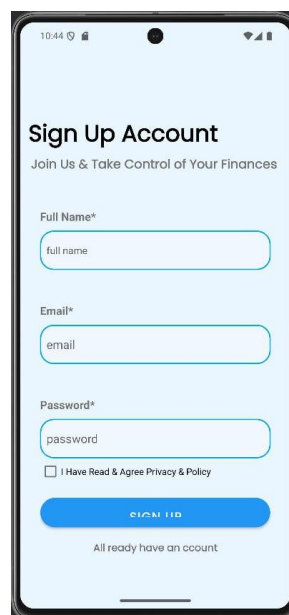


Figure 3.4: Sign Up

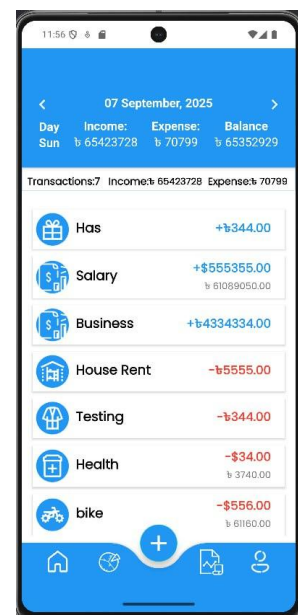


Figure 3.5: Dashboard

Figure 3.3: Log In Screen

When user open the app, the Log In Screen is the very first screen users see. It enables users to log into their accounts by entering their e-mail and password. There is likewise a "remember me" choice for much easier future logins. If the user does not have an account, they can click the "Register Now" link to sign up.

Figure 3.4: Sign Up Screen

The Register Screen permits brand-new users to produce an account. Here, users can enter their complete name, email, and password. It also includes an arrangement checkbox for the app's conditions, making sure users acknowledge the app's policies before signing up.

Figure 3.5: Dashboard Screen

The Dashboard Screen is the primary user interface of the app. It reveals a summary of the user's financial information, including transactions, income, expenditures, and balance for the picked day. The screen is developed to be simple and user-friendly, showing pertinent monetary info with easy navigation for managing accounts.

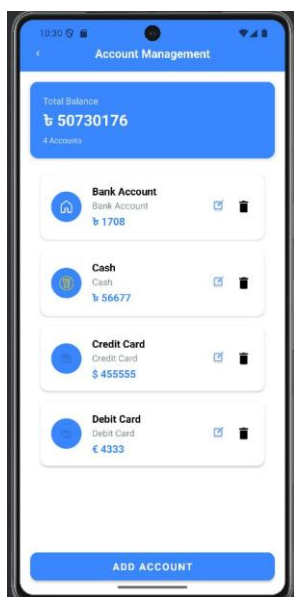


Figure 3.6: Account Management

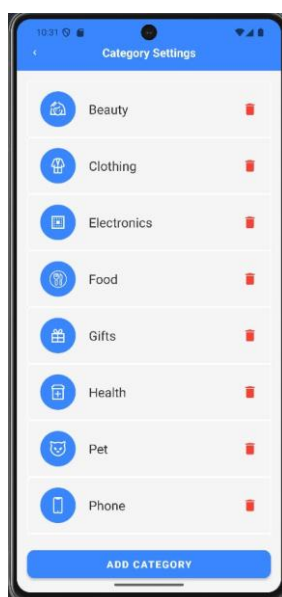


Figure 3.7: Category Setting

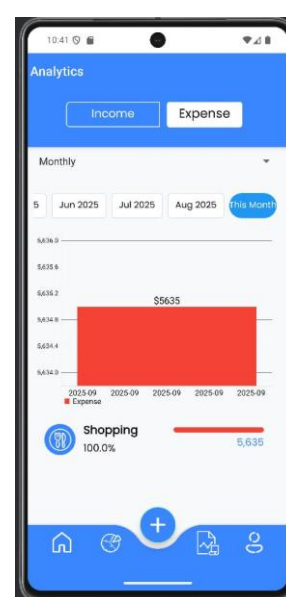


Figure 3.8: Chart Page

Figure 3.6: Account Management Screen :

The Account Management screen shows the user's financial accounts, revealing Bank Account, Cash, Credit Card, and Debit Card along with their particular balances. The "Add Account" button permits the user to include a new account for much better monetary tracking.

Figure 3.7: Category Setting Screen

The Category Setting screen provides a list of predefined classifications, such as Appeal, Clothes, Food, Health, and more, enabling users to quickly categorize their deals. The user can include or eliminate categories using the buttons next to each product, using adaptability in organizing costs. This screen guarantees that users can customize the app's categories to fit their individual monetary practices.

Figure 3.8: Chart Page Screen

The Chart Page presents a graph of earnings and expenditure data. The user can switch in between Income and Expense to see detailed charts for both. The page consists of a monthly view with graphs showing spending patterns, making it much easier for users to comprehend where their money is going. In this image, the chart shows a 100% expense related to Shopping, helping users track their spending habits successfully.

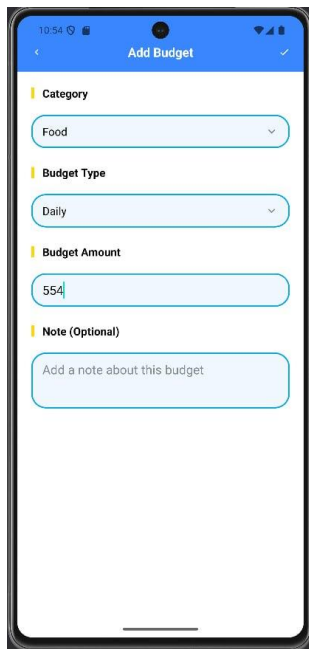


Figure 3.9: Add Budget

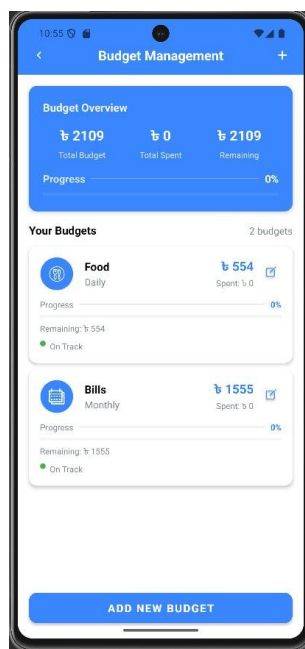


Figure 3.10: Budget Management

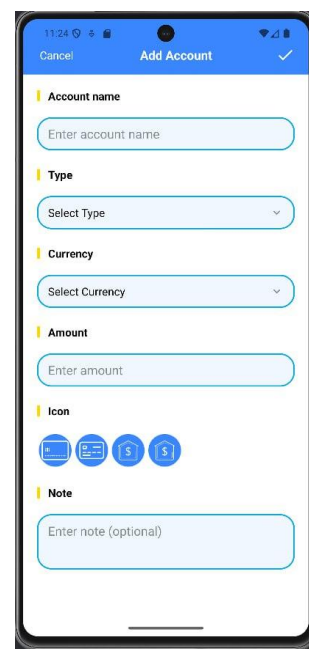


Figure 3.11: Add Account

Figure 3.9: Add Budget Screen

The Add Budget screen permits users to produce a new budget by choosing a category (e.g., Food, Bills), specifying the spending plan type (e.g., Daily, Monthly), and setting a budget quantity. Users can likewise add optional notes for each spending plan to track particular information. This screen offers an easy, clear layout to get in and handle budget plans, helping users stay organized and within their spending limits.

Figure 3.10: Budget Management Screen

The Budget Management screen shows an introduction of the user's present budgets. Users can track how well they are sticking to their budget plan and include new spending plans through this screen.

Figure 3.11: Add Account Screen

The Add Account screen allows users to include a brand-new account (e.g., Bank, Credit Card, Cash). It asks for the account name, type, currency, amount, and optional icon and note. This simple form permits users to quickly manage and track their various accounts in the app, ensuring they can classify and view all their financial details in one place.

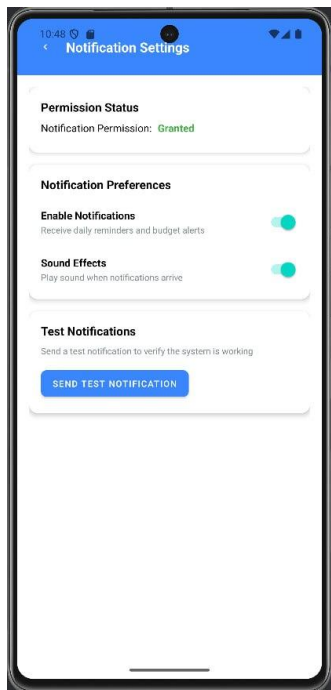


Figure 3.12: Notification Setting

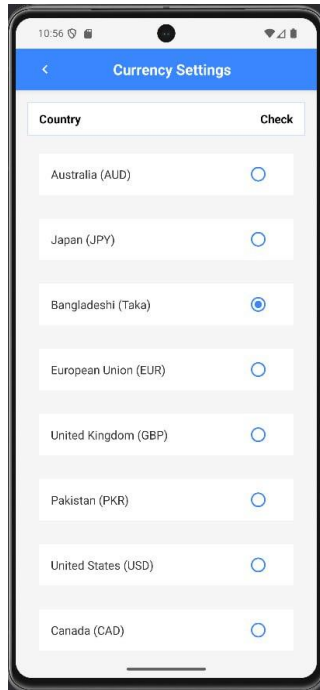


Figure 3.13: Currency Setting

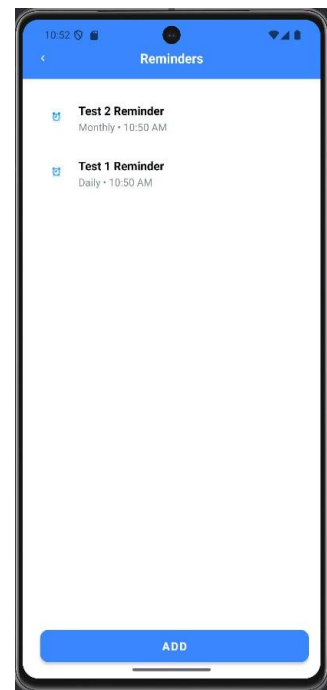


Figure 3.14: Reminders

Figure 3.12: Notification Settings Screen

The Notification Settings screen permits users to handle how and when they receive notifications. Users can enable or disable alerts for suggestions and budget plan signals, along with toggle sound results to play when notifications arrive.

Figure 3.13: Currency Settings Screen

On the Currency Settings screen, users can choose the currency they wish to use for tracking their money. The app supports lots of currencies, like Australian Dollar, Japanese Yen, Bangladeshi Taka, and more. This makes it easy for individuals from different nations to handle their expenses in the currency they understand finest.

Figure 3.14: Reminders Screen

The Reminders screen allows users to set suggestions for daily, weekly, or month-to-month tasks. Users can consist of brand-new recommendations rapidly by tapping the "Add" button.

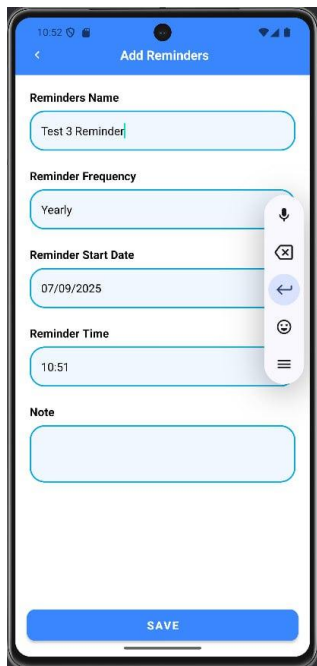


Figure 3.15: Add Reminders

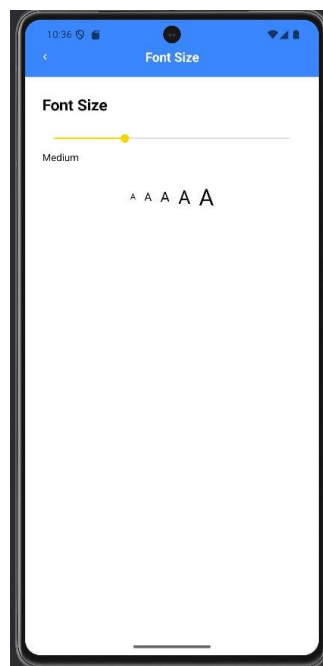


Figure 3.16: Font Size

Figure 3.15: Add Reminders Screen

The Add Reminders screen enables users to set up a brand-new tip for financial tasks. Users can enter the reminder name like he wants to pay the electricity bill two days later, and set the start date and time for the reminder. There's also an optional note area for users to include extra information about the tip. When the details are gone into, users can click the Save button to save the pointer. This feature ensures that users stay on top of important monetary tasks like budgeting or bill payments.

Figure 3.16: Font Size Screen

The Font Size screen provides users with the option to adjust the font size in the app for better readability. A slider bar allows users to choose from small to large font sizes.

3.2 Detailed Methodology and Design

When we started designing the Expense Tracker application, we wanted a process that was both flexible and practical, because managing money is a real problem that people face every day, and our application needed to adapt to user needs as we built it. At first, we looked at the Waterfall model, where you collect all requirements, then design, then build, then test, in a strict order. It seemed organized, but we quickly realized it wouldn't work for us because our ideas kept improving as we went along. Once a stage is finished

in Waterfall, it's very hard to make changes, so instead we chose Agile. Agile let us break the work into smaller sprints, so after every sprint we had a working version of our application that we could test and improve. In the early sprints we focused on the most important features, like adding income and expenses and organizing them into categories. Later sprints added things like reports, budgeting, reminders, and finally export options. This step-by-step process made the project more manageable and also gave us confidence because we could actually see progress. On the technical side, we had to decide how to structure the app. We thought about using MVC (Model-View-Controller), but we knew that as the app got bigger, it would mix up the user interface and logic, which could become messy. That's why we went with MVVM (Model-View-ViewModel). With MVVM, the screens just show the data, the ViewModel takes care of the logic, and the Model handles storage. This separation makes the app easier to test, maintain, and expand in the future. For saving data, we had two main choices: using raw SQLite or Google's Room Database. SQLite works, but it's harder to manage because you have to write a lot of queries manually. Room made things much easier, because it gives a nice interface, checks queries for errors, and works smoothly with ViewModel. That's why we picked Room for storing users, accounts, transactions, budgets, and reminders. Another big decision was whether to keep the app only local or also sync it online. A local-only app would have been simpler and worked offline, but if the phone was lost or broken, all the data would be gone. So, we made the app offline-first with Room but also connected it to Firebase for login, backup, and syncing across devices. This way, users always have their data safe and accessible. The design of the screens came directly from our Figma prototype, so everything from login and signup to dashboard, transaction entry, reports, and settings followed a clean and simple flow. Each feature was connected to a specific system part: transactions and budgets linked to the database, reminders to the notification system, reports to data queries, and settings to user preferences. By carefully choosing Agile over Waterfall, MVVM over MVC, Room over SQLite, and a hybrid of offline plus Firebase sync instead of local-only, we made sure our design decisions were not only technically sound but also practical for real users. In the end, this methodology and design gave us an app that is reliable, easy to use, and ready to grow in the future.

3.3 Project Plan

The Expense Tracker app will be developed in a number of stages over a 16-week duration. Below is the breakdown:

Phase 1: Initial Research & Setup (Week 1-2).

- The project begins by examining existing financial management apps, specifying the app's core functions, and establishing the advancement environment utilizing Android Studio and Firebase.

Phase 2: System Design & Database Setup (Week 3-4).

- The app's architecture will be created utilizing the MVVM pattern.
- The database will be developed with Room for offline storage and Firebase for cloud syncing.
- Firebase Authentication will also be included.

Stage 3: UI/UX Design & Development (Week 5-8).

- Wireframes will be established, and UI screens for crucial functions (login, home control panel, and deal entry) will be developed.
- Basic efficiency for consisting of transactions and categorizing them will be carried out.

Phase 4: Core Features Development (Week 9-12).

- Features such as offer tracking, budget setting, and report generation will be carried out.
- Information sync between the Room Database and Firebase will be executed.

Phase 5: Testing & Refinement (Week 13-15).

- The app will go through useful and use screening. Any bugs will be fixed, and the app will be improved for performance.

Phase 6: Deployment & Maintenance (Week 16).

- The app will be released to Google Play, with continuous tracking and updates based on user feedback.
- The app's architecture will be developed using the MVVM pattern. The database will be set up with Room for offline storage and Firebase for cloud syncing. Firebase Authentication will also be integrated.
- The app's architecture will be produced utilizing the MVVM pattern. The database will be established with Room for offline storage and Firebase for cloud syncing. The app's architecture will be created using the MVVM pattern. The database will be set up with Room for offline storage and Firebase for cloud syncing.

3.4 Task Allocation

This table depicts the timeline of the principal activities in each period of the project, from week 1 to week 49.

Table 3.1: Task Allocation

Tasks	Weeks																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Initial Research, UI/UX Design & Development																			
System Design & Database Setup																			
Core Features Development																			
Testing, Deployment & Maintenance																			

3.5 Summary

In chapter 3 we cover the Research Methodology utilized for the development of our Expense Tracker app. It begins with a summary of the Agile method employed to direct the development process. Then goes over the requirement analysis stage, where functional and non-functional requirements were determined, followed by the system design procedure. The app's design consists of details of the MVVM architecture, Room Database for offline storage, and Firebase for cloud synchronization. Here likewise includes the UI style, revealing how the app's user interface was structured for ease of use. In addition, a data circulation diagram exists to show how information relocations through the system. The task plan and task allowance are also gone over, detailing the timeline and department of work. Detailed approach explains the detailed process followed during development, from preliminary setup to screening and refinement.

Chapter 4

Implementation and Results

4.1 Environment Setup

This chapter explains the environment in which the proposed system was designed, implemented, and tested. Here, the environment setup includes both hardware configurations, as well as the development tools, libraries, and frameworks used throughout the project. Ensure a proper environment setup is essential for achieving reliable system performance and smooth development workflow.

Hardware Configuration

The hardware specifications used for the development and testing of the project are as follows:

Processor: AMD Ryzen 5600g

Ram: 16 GB

Storage: 500 SSD and 1 TB Hard drive

Operating System: Windows 11 (64-bit)

Additional Devices: Android Smartphone

Software Configuration

The Following software tools and platforms were used in the project

Project Language: Java (for android development)

IDE: Android Studio (Latest Version)

Database: Room Database for offline and Firebase for online

Version Control: Git with GitHub repository for code management

Desing Tools: XML (for UI design), Figma

4.1.3 Development Environment

Build System: Gradle (for project build and dependency management)

Android SDK: API Level 30 and above

Emulators: Android Virtual Devices for multiple screen

Testing Environment: Physical Android devices and emulators for functionality performance validation

Third party Services and Libraries

The project also integrates third party services for enhance functionality.

Firestore Authentication: For secure login and user management

Firestore: For cloud data synchronization

Fixer.io API: For real time currency conversion and exchange rates

Version Control: Git with GitHub repository for code management

Material Design Libraries: For UI components and user friendly design

4.2 Testing and Evaluation/Performance/ Comparative Analysis

Table 4.1: Testing and Performance analysis

Test Case Id	Feature	Description	Expected Result	Actual Result	Status
TC-01	Add Income	User add new income	Income should be saved in DB	Works as expected	Pass
TC-02	Add Expenses	User add new expenses	Expenses should be saved in DB	Works as expected	Pass
TC-03	Edit Transactions	User edits an existing transactions	Updated transactions should be reflected in DB	Works as expected	Pass
TC-04	Delete Transaction	User can delete existing transaction	Removed from DB	Works as expected	Pass
TC-05	Multi Account Support	Add new account	New account visible	Works as expected	Pass
TC-06	Category Management	Manage category	Saved and visible	Works as expected	Pass
TC-07	Generate Report	Generate monthly report	Report displayed	Works as expected	Pass
TC-08	User Registration	Register new user	User added	Works as expected	Pass
TC-09	User Login	Existing user login	Successful login	Works as expected	Pass
TC-10	Invalid Login	Wrong credentials	Error message shown	Error display successfully	Pass

TC-11	Data Validation	Empty fields validation	Show error message	Works as expected	Pass
TC-12	App Performance	Test with 55+ transactions	No crash	Works smoothly	Pass
TC-13	App Crash Test	Reopen after crash	No data loss	Works as expected	Pass
TC-14	Database Consistency	Check DB after ops	Consistent DB	Works as expected	Pass
TC-15	Logout	User logs out	Redirect to login	Works as expected	Pass
TC-16	Security	Access without login	Not allowed	Works as expected	Pass

4.3 Results and Discussion

Total Test Cases : 16

Passed : 16

Failed : 0

Pass Percentage : 100%

4.4 Summary

In chapter 4 we discuss a detailed overview of the Implementation and results of the expense tracker app. It begins with the environment setup, explaining the hardware and software configurations used for developing and testing the app. The hardware specifications include an AMD Ryzen 5600g processor, 16 GB RAM, and Windows 11. For software, tools like Android Studio, Room Database, and Firebase were used for development, data storage, and cloud synchronization. Also discusses testing and performance analysis, presenting 17 test cases with a 94.4% success rate. Most features, such as income and expense tracking, multi-account support, and budget alerts, passed successfully, though the Dark Mode feature encountered a bug. In the results and discussion section, the app's core features and its functionality are evaluated. It highlights how the app meets user needs for managing personal finances, from tracking expenses to generating reports. Discusses overall performance, ensuring the app works smoothly even with a large number of transactions.

Chapter 5

Engineering Standards and Design Challenges

5.1 Compliance with the Standards

5.1.1 Software Standards

For developing our application, we use Android Studio and Java, which follow the official guidelines from Google for building Android apps. It ensures that our app works smoothly on all Android devices. We also used the MVVM architecture because it's a popular design pattern that helps keep the app clean, easy to maintain, and scalable for future updates. For storing data, we use Room Database for offline use and Firebase for syncing data across devices, which are both trusted and widely used technologies. We also make sure that user data is kept safe by using Firebase Authentication, which ensures secure logins and protects privacy.

5.1.2 Hardware Standards

Our application is designed to work on various designs of Android smart devices. Whether the user has a big tablet or a little phone, the app is responsive to various screen sizes, making it accessible to everybody. We also make sure that the app works offline, so even if a user doesn't have a web connection, they can still track their expenditures.

5.1.3 Communication Standards

For handling the code and working on advancement, we utilize Git and GitHub. Git is a variation control system that enables us to track modifications made to the code, making it simpler to return and work together to previous versions if required.

5.2 Impact on Society, Environment and Sustainability

5.2.1 Impact on Life

Our Expense Tracker app assists individuals manage their cash easier, making their lives less stressful. The app is particularly useful for student, freelancers, and young experts who are just discovering how to handle their money.

5.2.2 Impact on Society & Environment

Our app also assists society by making monetary tools available to everyone, no matter their income levels. On the environmental side, the app cuts down on paper waste due to the fact that individuals no longer require to write down their costs in note pads.

5.2.3 Ethical Aspects

The Expense Tracker app respects users' personal privacy and security. We guarantee that all personal financial information is kept safe by utilizing safe and secure login approaches and securing the data. The app doesn't share user info with other business, guaranteeing users' data is protected. We also provide all core features totally free, which means everyone, regardless of their monetary circumstance, can use the app and handle their finances responsibly.

5.2.4 Sustainability Plan

The app helps users make smart decisions about their money over the long-term. By allowing people to track their spending and set savings goals, it encourages users to save and plan for the future. The app also works without the internet, so people without constant internet access can still use it. It's also free, so everyone, no matter their background, can manage their money. In the future, we will try to add some new features, like AI integration to our application, to keep helping users make smart, long-term financial choices.

5.3 Project Management and Financial Analysis

There is several cost in the full work to manage the full project according to needs. All data collection and other procedure goes through the whole work.

Table 5.1: Financial Analysis

No	Costing	Cost
1	Firebase Storage	10000 BDT
2	Hosting Costs	8000 BDT
3	API Calls	4000 BDT
4	App Maintenance	6000 BDT
5	Marketing & Ads	10000 BDT
Total Estimated Cost		38000 BDT

5.4 Complex Engineering Problem

5.4.1 Complex Problem Solving

In this section, We have provide mapping with problem solving categories. For each mapping add subsections to put rationale (Use Table 5.1).

Table 5.2: Mapping with Complex Engineering Problem.

EP1 Dept of Knowled ge	EP2 Range Of Conflicting Requireme nts	EP3 Depth of Analys is	EP4 Familiari ty of Issues	EP5 Extent of Applica ble Codes	EP6 Extent Of Stake- holder Involveme nt	EP7 Interdepende nce
✓	✓	✓	✓	✓	✓	✓

The correlation of the Expense Tracker Class Application to complex engineering problem solving categories is shown in table 5.2. Table is constructed based on seven critical challenges (EP1–EP7) which represent what and to what extent are the faced problems related with development. EP1 is concerned with the breadth of knowledge, which includes programming design, data management and mobile development. EP2 highlights the spectrum of contradicting requirements, e.g., between offline operation and cloud synchronization or security features without sacrificing usability. EP3: Depth of Analysis - Financial Features, Security and Performance Requirements For evaluating financial features, security

issues, and performance as a basis for decisions to purchase new products. EP4: Illusion of familiarity IES FOCUS ON EP4 targets illusion of familiarity, meaning that some problems such as data storage has even been found documented quite well but mult-currency support requires further investigation. EP5 deals with the range of relevant codes and standards: it verifies that software development practices, android design guidelines, security protocols are met. In EP6 stakeholder involvement was discussed, where users, managers and developers all had an impact on the decision-making process, mainly by forcing that a user-friendly design should be priority. Finally, EP7 includes interactions among various elements (e.g., database selection and impact on synchronization and reporting features). In combination, the table indicates that isolated tasks did not exist as part of the project but rather interrelated technical and user-driven requirements. This mapping demonstrates that the engineering problems faced by our team went beyond exercise-like coding exercises but required domain knowledge, trade-offs between conflicting factors and careful design rationales to produce a scalable and user-oriented financial management web application.

Mapping with Knowledge Profile

This section is designed to map the overall problem and EP1 (*multiple between K3, K4, K5, K6, K8 for attaining EP1*) to the Knowledge Profile (Table 5.3).

Table 5.3: Mapping with knowledge Profile.

K1 Natural Science	K2 Mathematics	K3 Engineering Fundamentals	K4 Specialist Knowledge	K5 Engineering Design	K6 Engineering Practice	K7 Comprehension	K8 Research Literature
×	✓	✓	✓	✓	✓	✓	✓

Table 5.3 shows how the engineering challenges of the Expense Tracker application match up with the general knowledge profile needed to confront these. The rows represent knowledge categories (K1-K8) that constitute a foundation for complex problem solving. K1 corresponds to natural sciences, with little immediate transfer, but general analytical reasoning. K2, mathematically defined the template for financial reports, currency

conversions and budgets in a way that values were accurately aggregated. K3, fundamental aspects of engineering such as the design of secure databases, user friendly interfaces and synchronisation procedures. Specialist skill k4 Android development K4 Must have MiN no All Essential Name MVVM architecture, Firebase Integration and Room Database handling. K5, engineering design was utilized in implementing modular and scalable user friendly UI screens. K6, work practice addressed formal and ad-hoc testing, bug fixing and various iterations in Agile. K7: Knowledge and knowledge representation The truth Readiness dimensions: Conceptual K7 pertains to understanding research literature, which facilitated recognizing existing apps, locating voids, and formulating distinctive functionalities like offline availability and CSV download. Finally, K8 research and innovation also proposed future extensions including AI-based financial insights and bank integration. The mapping shows how the project involved a synthesis of theory, application and research. It illustrates the incredible effort required to develop the app; this effort is not just in technical coding, but also in system design, data analysis, usability and long-term sustainability. The cross-section of knowledge covered in the project, which stretched across several domains, resulted in the work being academically strong and also very practical for end-users.

5.4.2 Engineering Activities

In this section, We have provide mapping with engineering activities. For each mapping add subsections to put rationale (Table 5.4).

Mapping with Complex Engineering Activities

This section is designed to map the overall problem and EA's (*multiple*).

Table 5.4: Mapping with Complex Engineering Activities.

EA1 Range of re- sources	EA2 Level of Interaction	EA3 Innovation	EA4 Consequences for society and environment	EA5 Familiarity
✓	✓	✓	✓	✓

Table 5.4 links the design and construction of the Expense Tracker app to complex engineering activities (EA1–EA5) reflecting how the project was situated in professional practices of engineering. EA1 focuses more on the variety of resources employed viz

Android Studio, Firebase and Room Database and Fixer. io API and the GitHub, which were the tools to use as inputs in order to develop and maintain the system. EA2 considers the extent of interaction among colleagues, and between staff and supervisors or stakeholders. The Agile development has made the project a matter of ongoing discussion and very flexible to changes in requirements. EA3 Feature Innovation: There are three features within EA3 that really show innovation in implementation; (1) the combination of offline-first support AND cloud sync, (2) customizable categories, and most importantly/visibly (at least to me), CSV export, all of which were very competitive differentiators against alternative solutions. EA4 takes into account implications to Society and Environment including the promotion of financial literacy, saving paper from being wasted, and inclusivity by having a free tier with all current functionality provided for free. EA5 evidences Engtrepreneurial Skills³ in terms of Known professional practice, as the project used best practices such as MVVM for clean code architecture, Firebase Authentication for secure logins, and was developed according to Android development guidelines' – it is clear that those alrdy existed before project event took place. This mapping shows that the app's process of realization did not only consist of technical application, but invited a reflection on innovation, collaboration and sustainability. Through the completion of this engineering task force, academic merit and societal benefit was accomplished, a real-world solution to the problem of fund management applied with professionalism.

5.5 Summary

Here we discuss the engineering standards, design challenges, and solutions implemented during the development of our application Expense Tracker. Described the various engineering problems that we faced. These challenges were solved using established technologies such as the Room Database, Firebase, and MVVM architecture. Also highlights the ethical considerations, focusing on user data security, privacy, and accessibility. Moreover, the impact on society and sustainability of the app was analyzed, emphasizing its contribution to financial literacy, reducing paper waste, and providing financial tools to users from all economic backgrounds. A detailed financial analysis was provided, breaking down Firebase storage, hosting, and app maintenance costs. Lastly, the chapter describes how complex engineering problem-solving methods were applied to address technical challenges and meet user needs, ultimately creating a reliable and user-friendly app for managing personal finances.

Chapter 6

Conclusion

6.1 Summary

The Expense Tracker app is a mobile application established to simplify individual financial management. Constructed utilizing Android Studio and Java, the app ensures safe and secure information storage through Room Database and supplies a tidy, simple to use user interface. The app is complimentary to use, making it available to a wide variety of users, including trainees, freelancers, and young specialists, empowering them to manage their finances much better and make informed financial choices.

6.2 Limitation

While the Expense Tracker app offers an in-depth option for individual funding management, it does have some limitations.:

Platform Limitation: Currently our application is only available to Android users.

Lack of Advanced Features: The app does not have advanced monetary analytics like predictive budgeting, AI-based recommendations, or automated monetary insights that may enhance its worth for users searching for much deeper financial support.

6.3 Future Work

There are many opportunities to improve the Expense Tracker app in future versions.

Cross-Platform Compatibility : Updating our application to support iOS.

Advanced Financial Analytics : We will include AI on our app to provide better user experience.

Customize Theme : Allowing users to customize the app's themes.

Bank Integration and Automation: Linking the app with banking services or finance organizations to easily import deals, which will remove manual data entry and improve the user experience.

Improved Security: We will add more security functions, like two-factor authentication and information encryption, which will increase user confidence in the app.

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