Design: Proposed Project Idea and Minimum Viable Product (MVP)

Wasan Yotchai

Maryville University

SWDV 691: Software Development Capstone 1W 25/SP2

Professor Joseph Gradecki

March 16, 2025

AI-Powered Personal Finance Manager Proposal

Author: Wasan Yotchai

Date: March 16, 2025

Project Overview

Managing personal finances is challenging for many individuals due to inconsistent tracking, lack of real-time insights, and difficulties in budgeting effectively. The **AI-Powered Personal Finance Manager (Budget App)** aims to solve these issues by offering users an intelligent platform to track their expenses, receive personalized budgeting recommendations, and gain insights into their financial health.

Unlike traditional budgeting apps, this system will l**everage AI for automated categorization, financial forecasting, anomaly detection, and smart recommendations**, ensuring users have actionable insights to improve their financial habits.

Goals

1 Provide an intuitive and accessible way for users to track expenses, set budgets, and manage financial goals.

2 Offer insights and analytics on spending habits through data visualization.

3 Enable users to store and manage financial records securely.

3 Include additional features such as income tracking, reminders for bill payments, and savings plans.

Business Logic & User Interactions

This application will go beyond simple CRUD operations by incorporating **AI-driven decision-making** and **data analytics** to enhance user interaction.

- **Automated Transaction Categorization:** AI will classify transactions such as rent, groceries, entertainment, etc.
- **Expense & Budget Predictions:** Users receive **real-time forecasts** of their monthly expenses based on previous spending patterns.
- **Smart Budgeting Assistant:** The AI suggests dynamic budget adjustments based on user behavior.
- **Anomaly Detection & Alerts:** Users are notified of unusual spending spikes or fraudulent transactions.
- **AI-Powered Financial Chatbot:** Users can ask financial questions like "How much can I save this month?" and receive data-driven responses.

Problems Solved by the Application

- **Lack of visibility into financial health** → AI provides a **visual breakdown** and predictions.
- **Time-consuming manual tracking** → **Automated categorization** and transaction syncing.
- **Overspending issues** → Real-time notifications and smart budgeting recommendations.
- **Lack of financial literacy** → AI chatbot educates users on better financial habits.

User Personas & Value Proposition

User Persona	Pain Points	How the App Helps
College Students	Struggle to manage limited budgets.	AI helps them track expenses & suggest savings strategies.
Working Professionals	Have income but lack financial planning discipline.	Provides real-time financial insights and smart budgeting.
Small Business Owners	Need to separate personal & business finances.	Categorization & anomaly detection help maintain financial control.

Example Personas:

Persona 1: James Miller – Budget-Conscious Young Professional

- **Age**: 28
- **Occupation**: Software Developer
- **Tech Proficiency**: High
- **Financial Goals**: Wants to track expenses, set budget limits, and save for retirement
- **Pain Points**: Struggles with tracking daily expenses and staying within budget
- **How He Uses the App**: Uses mobile and desktop versions to check expenses, review budget reports, and get spending alerts

Persona 2: Sarah Lee – Busy Small Business Owner

- **Age**: 40
- **Occupation**: Owner of a local bakery
- **Tech Proficiency**: Moderate
- **Financial Goals**: Wants to separate personal and business expenses, track cash flow, and simplify tax preparation
- **Pain Points**: Managing finances manually is time-consuming
- **How She Uses the App**: Uses the app's automated categorization and reporting features to track expenses and income efficiently.

Justifying the Cost of Development

The AI-powered personal finance manager **saves users time and money** by offering intelligent budgeting, fraud detection, and forecasting. Unlike budgeting tools that rely on manual entry or basic automation, this app provides **smart, personalized financial insights** using AI, making it a worthwhile investment.

Value

Building this personal finance manager web application requires time and resources, but the benefits justify the cost in several ways:

- **Financial Awareness & Stability**: Users will gain better control over their income and expenses, improving financial decision-making and long-term stability.
- **Time Savings**: Instead of manually tracking expenses, the application automates the process, reducing errors and saving time.
- **Data-Driven Decision-Making**: Users can access visualizations and insights into their spending habits, helping them make informed financial choices.
- **Security & Convenience**: A secure and accessible platform will give users a centralized place to manage their finances from any device.
- **Scalability & Potential Revenue**: If successful, the application could expand to include premium features like AI-driven budgeting recommendations, investment tracking, or financial education, potentially generating revenue through subscriptions or partnerships.

Problem Solution and Interaction:

How Would Your Anticipated Users Solve Their Problem with Your Web Application?

Users typically struggle with tracking their income, expenses, and savings across multiple accounts. Currently, they might rely on:

- **Spreadsheets or Manual Tracking**: Time-consuming and prone to errors.
- **Bank Apps**: Limited to a single institution and lack comprehensive financial planning tools.
- **Third-Party Budgeting Apps**: These may require expensive subscriptions or share data with advertisers.

Our web application provides a **centralized** and **user-friendly** solution by allowing users to:

- Input transactions manually or sync with bank accounts.
- Categorize expenses automatically using AI-driven categorization.
- Set financial goals and track progress.
- Generate reports and visualizations for insights into spending habits.
- Receive reminders for bill payments and budgeting adjustments.

How Do You Imagine They Would Interact with Your Application?

Users will interact with the application in the following ways:

- **Dashboard**: Upon logging in, users will see an overview of their financial health, including recent transactions, budget progress, and key insights.
- **Transaction Management**: Users can add, edit, or delete income and expenses. The system may also allow automatic imports from bank accounts.
- **Budgeting & Goal Setting**: Users can set monthly spending limits for different categories (e.g., food and entertainment) and track progress toward savings goals.
- **Reports & Insights**: A section where users can generate charts and reports to visualize spending trends over time.
- **Notifications & Reminders**: Users receive alerts for bill due dates, low balances, or unusual spending patterns.
- **Settings & Customization**: Users can personalize their experience, such as choosing themes, adjusting budget categories, or setting financial goals.

Minimum Viable Product (MVP)

Overview:

The **Personal Finance Manager** is a web application designed to help users track their income, expenses, and financial goals in a structured and intuitive way. The application will provide users with a simple yet effective tool to manage their finances, offering key features such as budget tracking, expense categorization, financial goal setting, and real-time spending insights.

The MVP will focus on core functionalities that deliver immediate user value while ensuring scalability for future enhancements. It will include a **user-friendly dashboard**, basic **CRUD operations** for income and expenses, **visual financial insights** through charts, and a **secure authentication system**. Users can set budget limits, receive alerts when nearing spending thresholds, and generate reports to analyze their financial habits.

This application aims to give individuals better control over their finances, promoting smarter financial decisions and improved money management. By addressing the common problem of disorganized financial tracking, the **Personal Finance Manager** will offer a practical solution that justifies its development cost through improved financial awareness and user budgeting efficiency.

Core Features & User Flow

To ensure a **workable MVP**, the application will include the following **minimum set of features**:

1. **User Registration & Authentication**
    - A secure login system (OAuth, JWT) is needed.
    - Multi-factor authentication (MFA) for security.
2. **Transaction Management**
    - Users can manually enter transactions or sync with their bank via **Plaid API**.
    - AI-powered **automatic transaction categorization**.
3. **Budgeting & Smart Insights**
    - AI recommends **monthly budgets** based on income and past spending.
    - Users receive **overspending alerts** in real-time.
4. **AI-Powered Predictions & Alerts**
    - Forecasts **next month's expenses** based on historical data.
    - Anomaly detection to notify users of **unusual transactions**.
5. **Dashboard & Reports**
    - Interactive charts showing income, expenses, and savings trends.
    - Customizable reports (monthly, yearly, by category).
    -

User Flow

1. **Sign Up/Login → Connect Bank → View Dashboard**
2. AI categorizes transactions **automatically**
3. Users receive **budget suggestions and financial insights**
4. AI chatbot provides **real-time spending advice**
5. Users get **alerts for unusual transactions**

High-Level Architecture

Architecture Overview:

1. **Frontend** (React.js, Next.js)
    - Displays **dashboard, charts, alerts, chatbot**
    - Interactive UI with real-time updates
2. **Backend** (Node.js, Express.js, Python for AI models)
    - Handles **user authentication, transactions, budgeting logic**
    - AI services for **categorization, predictions, fraud detection**
3. **Database** (PostgreSQL / MongoDB)
    - Stores **user transactions, budgets, financial history**
4. **AI & Analytics Engine** (Python, TensorFlow, scikit-learn)
    - Machine learning models for **categorization, anomaly detection, predictions**

5. **Bank API Integration** (Plaid API)

    - Syncs bank transactions securely

Data Management

Data Entity	Fields	Relationships
User	user_id, name, email, password_hash	Owns transactions & budgets
Transactions	transaction_id, user_id, amount, category, timestamp	Linked to Users
Budgets	budget_id, user_id, category, limit, period	Linked to Users
Al Predictions	prediction_id, user_id, type, value, timestamp	Generated from Transactions

Data Format / Structure

1. User Object

Each user has a unique profile, allowing them to manage their personal finances securely.

```
{
  "_id": {"$oid": "string (auto-generated by MongoDB)"},
  "fullName": "string",
  "email": "string",
  "passwordHash": "string (hashed password)",
```

"createdAt": "string (ISO date format)",

"updatedAt": "string (ISO date format)"

}

2. Income Object

Tracks different sources of income with details such as category and date.

{

"_id": {"$oid": "string (auto-generated by MongoDB)"},

"userId": "string (reference to User ID)",

"source": "string (e.g., Salary, Freelance, Investments)",

"amount": "decimal",

"category": "string",

"date": "string (ISO date format)",

"notes": "string (optional)"

}

3. Expense Object

Logs expenses with categories, helping users track their spending.

{

"_id": {"$oid": "string (auto-generated by MongoDB)"},

"userId": "string (reference to User ID)",

"description": "string",

"amount": "decimal",

"category": "string (e.g., Rent, Groceries, Entertainment)",

"date": "string (ISO date format)",

"paymentMethod": "string (e.g., Credit Card, Cash, PayPal)",

"notes": "string (optional)"

}

4. Budget Object

Allows users to set spending limits per category.

{

"_id": {"$oid": "string (auto-generated by MongoDB)"},

"userId": "string (reference to User ID)",

"category": "string",

"amountLimit": "decimal",

"startDate": "string (ISO date format)",

"endDate": "string (ISO date format)",

"status": "string (Active, Expired)"

```
}
```

5. Financial Goal Object

Tracks long-term savings or investment goals.

```
{
  "_id": {"$oid": "string (auto-generated by MongoDB)"},
  "userId": "string (reference to User ID)",
  "goalName": "string",
  "targetAmount": "decimal",
  "currentAmount": "decimal",
  "deadline": "string (ISO date format)",
  "status": "string (In Progress, Completed)"
}
```

6. Transaction Log Object

Maintains a history of user transactions (income and expenses) for reporting and analysis.

```
{
  "_id": {"$oid": "string (auto-generated by MongoDB)"},
  "userId": "string (reference to User ID)",
  "transactionType": "string (Income or Expense)",
```

"amount": "decimal",

"category": "string",

"date": "string (ISO date format)"

}

7. Report Object

Stores generated financial reports and summaries.

{

"_id": {"$oid": "string (auto-generated by MongoDB)"},

"userId": "string (reference to User ID)",

"reportType": "string (Monthly Summary, Yearly Overview, etc.)",

"generatedOn": "string (ISO date format)",

"data": "object (summary of transactions, expenses, and insights)"

}

Data Relationships

At the MVP stage, your collections are mostly independent, with a **userId** field linking user-related data such as **income, expenses, budgets, goals, and reports**. If you expand your project, you can normalize data further or introduce **references between collections** where necessary.

Conclusion

This proposal outlines an **AI-powered budgeting tool** that offers more than simple CRUD functionality. By integrating **machine learning for categorization, predictions, and alerts**, this project delivers **real-time financial intelligence** to users.

By focusing on the MVP **core functionalities** first, we can ensure the app is **usable, scalable, and impactful** while maintaining a manageable scope for development.