# A Personal Finance Management Web Application

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Abstract: Managing personal finances poses a challenge for people because they struggle with unorganized expense management, low or nonexistent financial literacy, and poor financial planning and controlling. Many existing financial information systems are either too complicated for users to operate or do not provide adequate and personalized user financial data. Users are further limited in their ability to make reasonable decisions concerning saving, spending, and investing money because of the absence of AI-assisted guidance. This study introduces Personal Finance Management Web Application which provides AI-powered finance assistance, categorizes expenses, and tracks budget. The system creates opportunities for improvement in financial literacy and appropriate decision-making. The located system enables users to log their expenses and income, set/track personal financial objectives, and get tips through an AI powered chatbot. The chatbot analyzes the user's spending behavior and provides timely tips on how to better their spending patterns.

The web application is done on MERN Stack (MongoDB, Express.js, React.js and Node.js) which ensures scalability as well as easy maintainability. For Ai chatbot we use Google Gemini API key. Users are able to boost their financial conditions better through data visualization techniques like interactive graphs and pie charts. User confidentiality is maintained with security protocols such as JWT authentication and data encryption. Automatically managing finances in particular, tracking expenditures, ensuring users do not overspend, and aiding in saving is expected to enhance financial literacy. Preliminary user testing has shown that personalized AI insights makes the users more active when it comes to managing their finances.

This research shows how automation with AI features can profoundly change the way people manage personal finances, making it easier for them to plan and actively engage in the goal-based approach to financial planning. Future improvements can include giving investment suggestions, watching over someone's credit score, and integration to several other platforms to enhance financial wellness.

Keywords: Personal Finance Management Web application, Financial Management, Financial Literacy, Web-based Applications, Finance Management using Ai

## 1. INTRODUCTION

Managing personal finances is becoming increasingly chal- lenging due to financial landscape complexities, lack of fi- nancial literacy, and difficulties tracking expenses or cre- ating effective budgets [4][5]. Conventional finance tools lack personalization, rely on static budgeting, and provide generic investment advice [10][1][8]. This paper proposes developing an AI-powered personal finance assistant to ad- dress these limitations. The assistant will provide a com- prehensive financial overview, personalized insights using machine learning, and educational content to enhance fi- nancial literacy. By automating expense tracking, creating adaptive budgets, offering tailored investment recommendations, and providing proactive notifications, the proposed assistant aims to transform financial management.[9][7]

## 2. LITERATURE REVIEW

Managing personal finances effectively is important for maintaining stability and pursuing long-term goals. Many finance management software programs have been created over the years to help users with budgeting, expense tracking, and making sound financial choices. But, with the introduction of Artificial Intelligence (AI), Machine Learning (ML), and Data Analytics, the FinTech sector is now inclined toward automated systems and AI powered financial advisory services. This literature review focuses on the finance management applications and AI powered advisory systems, technologies for expense tracking, and existing gaps within the literature that the proposed system intends to fill.

## 2.1 Web-Based Financial Applications

Financial processes are automated which enhances the efficiency of work done on web-based processes. Sari et al.

[10] created an online application using PHP and MySQL for a boarding house in Indonesia which allowed planning, budgeting, auditing, and billing to be done from one place. Their solution was to improve the existing problems for manual bookkeeping, usability assessments, and security. Still, there was little incremental improvement compared to other solutions. In the same light Ahmed et al. [1] developed a responsive university budget management system for Iraq with the use of HTML, PHP, JavaScript, and AJAX.

## 2.2 Personal Budgeting Research

Effective personal budgeting entails a number of financial interconnected activities that are deceptively simple. Galperti [5] analyzed the relationships perceived of budgeting with consumption-saving tendencies and self-control problems. The scope of the study pointed out the individual biases and their perceived trade-off deals and financial decisions. However, for getting for more efficiency in budgets and tracking expenses in real life requires further study.

Even with the availability of several budgeting applications, many still depend on primitive tracking techniques or do not provide AI-powered features that enable custom budget estimations and other functionalities.

## 2.3 Financial Literacy Initiatives

Informed decision-making is becoming increasingly complex. Therefore, financial systems need to be understood in depth, as noted by Molina-García et. Al. [7]. Their research on university students showed negative correlation between financial literacy and risk tolerance, which highlights the necessity for educational programs. Rath and Patra [9], for example, emphasized the contribution of financial literacy towards understanding the Indian financial system. Mireku et. Al [6] was also able to show that financial literacy is predictive of responsible financial behavior among students in Ghana. Dube and Asthana [4] studied the knowledge, skills, and behavioral dimensions of financial literacy in students in India and found that there were mesurable gaps.

Despite emphasizing the need for financial literacy program, most of these studies noted that there is a lack of applied graphic tools of financial education which are embedded in the budgeting software. This gap can be filled by AI driven assistants that can provide educational insights in real time while monitoring financial activity.

## 2.4 Financial Literacy and Investing

Having proficient skills in financial matters facilitates better investment decision making and management. Shaheen et al.

[11] analyzed factors affecting the choices of individual investors, pinpointing financial literacy as one of the most important. Nevertheless, the study's findings were constrained by a limited sample size which necessitated further qualitative research to explain investment decision-making processes.

Most current applications for managing personal finances emphasize fundamental expenditure documentation and do not provide any investment advice or risk evaluation. Our approach is to develop AI-assisted investment guidance for the targeted users which will allow novices to make better investment decisions.

## 2.5 AI Applications in Finance

The advancement of AI technology isto deeply rooted within the automated finance industry. Cao [3] classified AI methods which enable advanced analytics and autonomous financial decision making, but, AI-enabled automation systems still employ conventional finance techniques. In research by Waliszewski and Warchlewska [12], the authors studied the acceptance of AI- assisted finance applications and identified adoption and trust gaps linked to particular demographic groups.

Although AI has made command in assisting with financial decisions, none of the current applications offer an interactive AI powered chatbot that analyzes the user's financial data and provides actionable insights to user. The aim of the research is to design an AI-based personal finance management system that automatically analyzes a user's spending behavior and offers tailored advice.

## 2.6 Intelligent Finance Assistants

Preliminary efforts towards AI-finance chatbots, specific to personal finance management, have previously been proposed. Müller et al. [8] designed a Natural Language Processing (NLP) chaot that tracks expenses and which can assists with budgeting, while Balathas et al. [2] developed an AI system that captures transactions from SMS alerts and bills to construct an automated financial overview for the user. Though these systems are promising, existing AI assistants seem to lack the ability to be tailored to individual preferences in spending. Our project advances AI financial assistants by incorporating: Chatbot service for realtime financial advice, Intelligent categorization of expenses through automation and Optimized saving suggestions based on individual usage patterns

- 2.7 Gaps in Existing Research & How This Project Fills Them
- Even with the continuous development of personal finance apps, the following issues remain unresolved:
- Absence of AI-Enabled Expending Modification & Chatbot Support
- Most existing software programs have rulebased expense classification which is inflexible and non-responsive in nature.
- There are very few applications that have an AI chatbot that assists users in making real-time financial assessments.
- A proposed solution: An AI chatbot that classifies expenses in real time and gives tailored financial advice is integrated into our system.
- Unidimensional Data Visualization in Expenditure Monitoring
- Current applications are limited to providing users with static reports instead of interactive dashboards that allow the user to track varioustrends over time.
- A proposed solution: Systems are being developed to enhance financial planning by incorporating spending visuals (graphs, charts, and spending trends), which are anticipated to be more dynamic than ever.
- Ineffectiveness of financial management apps because of security & privacy issues
- Risk of exposing personal finance details makes the users uncomfortable revealing such sensitive information.
- A proposed solution: The implementation of secure authentication (JWT) with encryption methods protects the details.
- Inflexible budgets and failure to set alert notifications
- In real-time, existing options offer no alerts for set budget categories which remain static.
- A proposed solution: Budgets, saving opportunities, and AI alert notifications can be generated with the proposed application.

## 2.8 Conclusion

• AI-assisted financial advisory services and the latest personal finance apps are analyzed in this literature review. Like other existing solutions for expense tracking and budgeting, none offer automated expense classification with AI personalized recommendations and data visualization.

- Fill these gaps with the design of an AI-assisted Personal Finance Management Web Application that implements:
- Financial recommendations from an AI chatbot always available to assist users.
- Automated, user-defined expense classification.
- Financial insight interactive dashboards.
- Enhanced data protection.
- The intention is to increase users' financial literacy, personal finance management, and decision-making skills through AI and web-based technologies.

## 3. METHODOLOGY

## 3.1 Tech Stack

For our project, we selected React.js, Node.js, Express.js, MongoDB, and the Google Gemini API for chatbot implementation. These technologies were chosen with budgeting management applications in mind to maximize their potential and enable efficient, scalable interaction.

- Frontend: React.js aids in building modern user interfaces through a dynamic, interactive frontend. Which implements a component-based architecture and which helps in maintainability and responsiveness [8].
- Backend: Node.js and Express.js provide Node's lightweight extensibility for server-side scripting and which offer scalable options for developing RESTful APIs, allowing seamless integration with AI-based services [8].
- Database: Flexible data storage in NoSQL MongoDB gives programmers the ability to work with semi-structured financial records, rough transaction histories, and budget categories without the use of rigid schemas [9].
- AI Chatbot: Google Gemini API or an in-house developed NLP model assists in providing personalized recommendations and insights for better financial decision making with advanced insight analysis [12].
- Authentication: Secure user access and data privacy from JWT authentication allows for mitigating unauthorized access risk [1].

# 3.2 Architecture

A microservices architecture is maintained on the backend for scalability, while modular components are maintained on the frontend for improving maintainability. The database consists of schema structures for Users, Transactions, Budget Categories, and AI Chatbot engagement.

Key Features:

- User authentication & Profile settings\* Managing secured access with JWT authentication [1].\*
- Expense Tracking & Categorization\* Using AI-based classification methods to identify spending behavior [2].\*
- Budget Management with Custom Limits\* Users are allowed to set custom budgets with AIassisted optimization for better budgetary management [5].\*
- AI Chatbot for Financial Advice\* Provides financial advice by analyzing transaction data through intent recognition and NLP models [12].\*
- Data Visualization\* Implemented using Chart.js/Recharts to graphically present data on spending patterns and budget appropriation over time[6].\*
- Automated Alerts & Notifications\* Push and email notifications for expenditures and budgeting breaches in real-time [7].\*

# 3.4 AI Chatbot Workflow

The chatbot combines the processes of intent recognition, response generation, and retrieves relevant insights from the database.

- Intent Recognition Analyzes user questions using natural language processing (NLP) and groups them into specific slices which include budgeting, savings, and expense tracking [12].
- Response Generation Retrieves relevant insights from the user's previous transactions and presents them along with custom recommendations [6].
- Integration With Financial APIs Permits users to link their financial accounts and obtain live banking information [9].

3.5 Security and Privacy Measures

To keep data safe and adhere to financial limitations:

- Sensitive financial information is safeguarded against cyber risks through the implementation of end-to-end encryption. [4]
- User's privacy is respected through OAuth2 for third- party API integrations which allows secure connections with external financial services. [3]

• Unauthorized changes to data are mitigated through role-based access control (RBAC) which provides restricted permissions based on user roles. [11]

Our system comprehensively fulfills user's needs while ensuring their security by integrating sophisticated technology with AI-powered insights, thus bridging the current gap in financial management solutions.



Figure 1: Flowchart of our Personal Finance Management Web Application

## 4. IMPLEMENTATION AND RESULTS

## 4.1 Implementation Process

A streamlined software development process from project inception to completion was supplemented with well- organized code structure, API setup and frontend-backend integration to execute the personal finance management web application.

## 4.1.1 Code Structure

The application was developed on a MERN stack with a modular monolithic design to ease maintainability and scalability. The major components are as follows:

- Frontend (React.js): Developed with a use-case driven component-based approach where UI elements for dashboard, budget tracking and chatbot interaction are reused.
- Backend (Node.js & Express.js): Built as RESTful API with automated user authentication, budget management, and chatbot answer services.
- Database (MongoDB): Contains user information, monetary transactions, and chatbot conversation records
- AI Chatbot: Financial analysis queries from users are processed through the Google Gemini API connection under a chatbot framework.

## 4.1.2 API Endpoints

The backend exposes multiple endpoints for managing personal finances:

Endpoint	Method	Description
/api/auth/register	POST	User registration
/api/auth/login	POST	User authentication (JWT-based)
/api/expenses	GET	Fetch user's expense data
/api/expenses/add	POST	Add a new expense record
/api/budget/set	POST	Set budget limits
/api/chatbot/query	POST	Fetch AI chatbot response

# 4.2 Screenshots of Key Features

To demonstrate the working of the application, the following key UI components are implemented:



Figure 2: An overview of the user's financial status.



Figure 3: Users can set budget limits and categorize expenses.

irst Name	Dote	Туре	Category	Amount	Description	tion
ai	2024-05-28	income	Rent Deposit	300.00	For internship placement	8
nondo	2024-05-01	income	Medicine	90.00	The scent of wildflowers filled the air, signaling the arrival of spring.	8
	2024-04-29	income	85H	250.00	He gazed out the window, lost in thought as raindrops pattered against the glass.	
	2024-04-28	income	Rent	290.00	2-month rent payment	
					1	

Figure 4: Includes budget allocation, expenses, and financial insights

BookFiesta 🖉 🕯		Cafe / 8		
Amount RM 45.75	Remaining RM 3.43	Amount RM 250.00	Remaining RM 8	
Start: 2024-05-03 End: 2024-06-03		Start: 2024-02-08 End: 2024-02-08		

Figure 5: User can set the budget.

Desktop 🖉 🗟 👁 Target: RM1,500.00	Re	nt Deposit / get: RM700.00	<b>8</b> •	
Current RM1,100.00 R	maining M400.00 RM7	ent 00.00	Romaining RM0.00	
Deadline: 04-06-2024	Dec	dline: 27-06-2024		

Figure 6: User can add the goals .

onthly	Expe	ense Repor	n				
at Month:	May	- Select Year:	2024 - Geno	ate Report			
	-	Call Transport I	George Barrier Colo	cafeone and Food	Category	Amount (RM)	Percentage (%)
					Cate	242.00	4739
					Transport	66.00	13.26
					Oroceries	67.00	13.07
					BookFlesta	42.32	825
					Food	36.00	7.02
					Rent	30.00	5.85
					Books	15.00	2.93
					Others	12.50	2.44
					Total Spent	5/2.82	100.00

Figure 7: Visualization of expenses.

	Paisabuddy	
		Aj: Hi there
	Paisabuddy is typing	
Hi there		Send

Figure 8: Chatbot Working.

5. CONCLUSION

## 5.1 Summary of Key Findings

This study focuses on the creation and deployment of an AI-based personal finance management web application developed on the MERN stack with the aim of achieving a highly interactive user experience with having a proper security for users . The application features budgeting, expense tracking and categorization, AI chatbot , and data visualization, which addresses financial management in an efficient manner. The results from usability testing revealed that the users were able to effectively "self- monitor" their spending habits, set financial targets, and obtain AI-assisted recommendations.

- Most important insights of this study are:
- More financial awareness due to active expense tracking and budgeting.
- Support of AI-driven decision making capability for easier financial decisions.
- Better user data utilizing NoSQL (MongoDB) due to its ease of scaling and flexibility.
- High user engagement and satisfaction from the system evidenced through usability testing comments.

5.2 How this Project Helps Individuals Manage Finances Better

It assists the user in tracking their spending, setting budgetary limits, receiving alerts for overspending, as well as using the AI chat bot to get tailored tips and strategies based on spending patterns. The application uses a AI driven and easy to navigate approach to personal finance management which allows users to:

Analyze spending trends through interactive charting.

By solving common financial issues, this project enables users, greater financial discipline and make more informed decisions.

## 5.3 Future Research Directions

Even though the current implementation is effective, there is future for improvement. Further research might consider respectively:

- Utilizing predictive financial analytics with machine learning for more accurate budgeting suggests based on the past performance.
- Utilizing deep learning models to enhance chatbot capabilities for personalized financial management.
- Implementing blockchain technology for improved security and transparency in financial transactions.

- Facilitating userable investment decision by integrating real-time financial market data.
- Making the project more accessible by creating a mobile application for wider reach.

This project is the basis for further development's innovations on AI-powered personal finance management to aid the ever-growing integration of finance and technology. This will enable users to attain better financial stability and improve their decision-making.

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