FinSight AI: AI Powered Personal Finance Management Platform

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***Abstract*—Personal finance management is often hindered by fragmented tools, manual record-keeping, and limited analytical support. It introduces Fin Sight AI, an intelligent personal finance management platform that integrates expense tracking, budgeting, and AI-driven insights within a unified system. The platform enables users to allocate monthly budgets, record expenses manually, and leverage receipt scanning using Optical Character Recognition (OCR) and natural language processing to automate transaction entry and categorization. Built with a modern full-stack architecture—featuring Next.js and React for the frontend, Supa base PostgreSQL with Prisma ORM for secure data management, and cloud deployment via Vercel—the system emphasizes scalability, performance, and user experience. Key integrations include Clerk for authentication, Arc jet for security, and Ingest for background task automation. Users gain access to multi-account management, category-wise budget allocations, real-time utilization alerts, and an interactive analytics dashboard. Additionally, the system generates AI-powered monthly reports and predictive insights to guide financial decisions**

***Index Terms*—Finance Management, Expense Tracking, Artificial Intelligence, Optical Character Recognition (OCR)**

I. INTRODUCTION

Managing personal finances has become increasingly important in today's fast-paced world, where individuals deal with multiple expenses, accounts, and financial responsibilities. However, most people still rely on manual methods such as spreadsheets or use existing financial tools that are often limited, fragmented, or difficult to use. These traditional approaches require constant manual input, provide only basic tracking, and rarely deliver intelligent insights to help users improve their financial habits. As a result, individuals often struggle to stick to their budgets, track expenses accurately, and make informed financial decisions.

To address these challenges, there is a need for a modern system that not only simplifies financial tracking but also provides intelligent support through automation and analytics. Fin Sight AI is designed as a solution to this problem. It is a personal finance management platform that combines budget creation, expense tracking, receipt scanning, and AI-powered insights into one integrated application. The platform allows users to create monthly budgets, add expenses manually, and also scan receipts using Optical Character Recognition (OCR) to automatically capture and categorize transactions. This reduces manual work and improves accuracy in expense tracking.

A. Chanllenges in Exsisting System

Personal finance management tools such as Mint, YNAB, Pocket Guard, Personal Capital, and Toshl have gained popularity in helping users track expenses and manage budgets. However, these platforms still face several shortcomings that limit their overall effectiveness. A major drawback is their heavy reliance on manual data entry or direct bank integration. While this works for digital transactions, it becomes inconvenient for users who frequently deal with cash payments or wish to maintain flexibility without linking sensitive bank information. Moreover, the receipt scanning functionality in most tools is either absent or very basic, which fails to significantly reduce the effort of recording daily expenses.

Another challenge is the limited use of artificial intelligence. Existing systems typically provide static charts and reports, but they lack predictive analysis, automated categorization, and personalized

recommendations that could guide users toward better financial habits. The user experience is also a concern—some platforms, like YNAB, have steep learning curves, while others, like Mint, often overwhelm users with advertisements and cluttered dashboards. Privacy and security issues further discourage adoption, as users are hesitant to share sensitive financial data with third-party services. Additionally, recurring expenses such as rent, utility bills, and subscriptions are not efficiently automated, requiring repetitive manual input.

B. Novelty of the Project

The proposed Fin Sight AI platform introduces an integrated approach to personal finance management by combining AI-driven receipt scanning, automated categorization, and predictive insights within a single system. Unlike traditional finance tools that rely heavily on manual entry or basic analytics, Fin Sight AI leverages Optical Character Recognition (OCR) and natural language processing to minimize user effort and improve accuracy in expense tracking. The system further distinguishes itself through real-time budget utilization alerts, recurring transaction automation, and AI-generated monthly reports, offering users actionable guidance rather than static summaries. Additionally, the platform emphasizes secure multi-account management and privacy-first data handling using technologies such as Supa base with Row-Level Security and Arc jet for threat protection.

C. Objectives

- To design and develop an AI-powered personal finance management platform that simplifies budgeting and expense tracking.
- To implement OCR-based receipt scanning and NLP techniques for automated expense recording and categorization.
- To enable multi-account management with secure authentication and role-based access.
- To provide category-wise budget allocations with real-time utilization tracking and alerts.
- To support recurring transactions automation, reducing repetitive manual input for users.
- To generate AI-driven monthly financial insights and predictive recommendations for better decision making.
- To ensure data privacy and security using Supa base Row-Level Security, Arcjet protection, and encrypted storage.

D. Motivation for the Project

Managing personal finances is often difficult when expenses are spread across multiple accounts and recurring bills. Existing tools depend heavily on manual entry, lack intelligent receipt scanning, and provide only basic analytics, leaving users with incomplete financial awareness. With the rise of digital transactions and lifestyle expenses, there is a growing need for a smarter and more adaptive solution.

This project is motivated by the goal of creating a secure, AI-powered platform that reduces manual effort through OCR-based receipt scanning, improves accuracy with automated categorization, and delivers real-time insights and budget alerts. By integrating automation and analytics, Fin Sight AI empowers individuals to take better control of their finances and make informed decisions.

E. Proposed Solution

The proposed solution introduces Fin Sight AI, an integrated platform that combines expense tracking, budgeting, and AI-driven insights into a single system. It leverages Optical Character Recognition (OCR) and natural language processing to extract and categorize data from receipts, thereby reducing manual entry and improving accuracy. Users can create monthly budgets, manage multiple accounts, and track real-time spending with category-wise allocation and utilization alerts.

The system is built on a modern full-stack architecture using Next.js and React for the frontend, Supa base PostgreSQL with Prisma ORM for secure data management, and Vercel for deployment. Advanced integrations such as Clerk for authentication, Arc jet for security, and Inngest for recurring task automation ensure reliability and scalability. Additionally, the platform generates AI-powered monthly reports and predictive insights, helping users identify spending patterns and improve financial decision-making.

II. LITERATURE RIVEW

A. Overview of Existing Literature

The development of personal finance management systems requires the integration of modern web technologies, usability considerations, and advanced

analytics. Recent studies highlight the importance of scalable frontend frameworks such as Next.js and React in building responsive and high-performance applications. Johnson and Smith [1] emphasized that these technologies provide flexibility, scalability, and faster rendering, making them suitable for platforms that demand real-time updates and seamless user experiences The need for effective personal finance tools has been widely discussed in academic and industry research. Peterson et al [2] conducted a comparative study of popular finance management applications and identified gaps such as limited AI integration, poor automation, and inconsistent user experiences. Similarly, Williams [3] reviewed digital budgeting software and concluded that most tools focus on basic tracking but fail to provide advanced insights or predictive features. Davis and Thompson [4] extended this analysis to investment platforms, noting that while such systems support asset tracking, they often lack features that address day-to-day financial management. From a design perspective, Garcia [5] stressed the role of mobile-friendly interfaces and user engagement strategies in financial applications, underlining that accessibility and simplicity significantly influence adoption. Anderson et a. [6] further recommended best practices in application development, such as modular design, technology integration, and security-first approaches for building reliable finance systems. The integration of artificial intelligence is considered a key enabler for the next generation of personal finance platforms. Brown [7] highlighted that AI enables features such as automated expense categorization, predictive budgeting, and personalized financial recommendations, positioning it as a transformative element in this domain. At the same time, ensuring security and compliance remains critical. Lee and Wang [8] explored rate limiting and protection strategies in financial applications, emphasizing the need for robust security frameworks against threats such as DDoS attacks and unauthorized access. User interface and accessibility principles have also been recognized as essential factors. Taylor [9] discussed responsive design, clear visualization, and inclusive accessibility practices as central to improving user trust and adoption. Finally, efficient and scalable database design forms the backbone of financial systems. Miller et al [10] argued that optimized database architectures significantly improve performance, scalability, and security in applications dealing with high transaction volumes.

B. Gaps Identified in Existing System

- Limited AI Integration for Expense Management: Most personal finance applications focus on manual transaction entry or basic bank integration, lacking advanced AI features such as automatic receipt scanning, intelligent expense categorization, and predictive recommendations Brown, [7], Peterson et al [2].
- Inadequate Automation of Recurring Transactions: Existing tools require users to repeatedly input recurring expenses (e.g., rent, subscriptions) every month. This increases user effort and reduces convenience, with very few systems offering true automation of such tasks. Anderson et al [6].
- Poor User Experience and Accessibility: Several platforms suffer from cluttered interfaces, steep learning curves, and lack of responsive designs. This prevents effective engagement, especially for less tech-savvy users or those relying on mobile devices. Taylor [9], Garcia [5].
- Weak Security and Privacy Measures: Existing systems often raise privacy concerns due to direct bank integrations or insufficient protection against threats such as unauthorized data access and rate-limit abuse. Lee & Wang, [8]. Most lack robust role-based access control and fine-grained data encryption.
- Lack of Real-Time Insights and Predictive Analytics: Current solutions provide only static reports or basic analytics dashboards without actionable, real-time insights or AI-powered recommendations to help users plan better and avoid overspending. Williams, [3], Davis & Thompson [4].

Addressing these gaps, this study aims to develop a robust AI-based finance tracker that integrates multiple parameters, ensuring smooth management of finance.

III. METHODOLOGY

The methodology of the Fin Sight AI platform focuses on automating personal finance management by integrating AI technologies with a modern web application architecture. The system is designed to

minimize manual effort, enhance accuracy, and provide actionable insights for better financial decision-making.

The system architecture of the solution is as below

Fig. 1. System Architecture

- User Authentication and Account Management: The platform uses Clerk Authentication to handle secure user registration, login, and session management. Each user can create and manage multiple financial accounts independently, with role-based access controls ensuring that sensitive data remains private and isolated. Strong password-less authentication options and Multi-Factor Authentication (MFA) enhance security.
- Budget Creation and Expense Tracking: Users can set up a monthly budget by defining a total spending limit and allocating amounts to different categories such as Food, Travel, Utilities, and Entertainment. This structured allocation helps in better expense control. Users can manually input transactions by providing details such as date, amount, category, and description, making the system flexible for different user preferences.
- Receipt Scanning and Automated Data Extraction: The system integrates the Gemini OCR API to scan receipt images uploaded by the user. The OCR module extracts key information such as merchant name, date of purchase, transaction amount, and expense category from the receipt image using advanced image processing and natural language techniques. Each extracted field is assigned a confidence score, and users can review and edit the information before confirming the transaction. This significantly reduces manual effort while improving data accuracy.
- Automated Categorization and Real-Time Updates: Once the receipt data is extracted, it is processed by a categorization module that uses predefined rules combined with AI inference to automatically assign the expense to the correct budget category. The system updates the user's dashboard in real time, reflecting remaining budget per category and triggering alerts when the usage approaches predefined thresholds (e.g., 75% or 90% of allocated budget).
- AI-Generated Insights and Reports: At the end of each month, the system generates a comprehensive AI-powered financial report using the Gemini model. The report includes spending summaries, category-wise breakdowns, detected spending patterns, and personalized recommendations such as suggestions to reduce discretionary spending or optimize recurring expenses. These insights help the user improve future financial decisions and promote responsible budgeting habits.
- Data Persistence and Security: All user data—including budgets, transactions, receipts, and insights—is stored securely in Supa base PostgreSQL. The system enforces Row-Level Security (RLS) to ensure that users can only access their own data. Prisma ORM is used for efficient, type-safe database interactions. Sensitive fields such as merchant names or receipt images are encrypted at rest to ensure privacy.
- Task Automation: The system leverages Inngest cron jobs to automate periodic tasks, such as adding recurring expenses (e.g., monthly rent) and sending email alerts when budget thresholds are crossed. These background tasks run reliably in the cloud, removing the need for user intervention and improving system reliability.

A. AI Integration

Our solution is able to automate expense tracking by integrating Gemini OCR (Optical Character Recognition) and natural language processing (NLP) technologies. This enables the system to extract structured data from unstructured receipt images, minimizing manual effort and improving accuracy.

When a user uploads an image of a physical receipt through the frontend interface, the image is sent to the OCR Processing Module within the backend. The following steps take place:

- Image Preprocessing:

The uploaded receipt image undergoes preprocessing to enhance clarity, reduce noise, and correct distortions. This improves the accuracy of text extraction during the OCR phase.

- Gemini OCR API Call:

The pre-processed image is passed to the Gemini OCR API, which performs text recognition on the receipt. Gemini's advanced algorithms are used to detect text blocks and extract relevant textual content such as merchant name, date of transaction, and total amount.

- Field Extraction and Confidence Scoring:

Once raw text is extracted, the system applies natural language processing techniques to identify and extract key fields:

- Merchant Name
- Transaction Date
- Transaction Amount
- Expense Category

Each extracted field is assigned a confidence score by the Gemini model to indicate the likelihood of accuracy.

- User Review and Validation: To ensure high accuracy, the system presents the extracted fields to the user for review. The user can confirm or edit the data before final submission. This human-in-the-loop approach improves model learning over time.
- Auto Categorization and Storage:

After user validation, the system applies predefined rules combined with AI inference to automatically categorize the expense into predefined categories (e.g., Food, Travel, Utilities). The structured data is then stored in the Supa base PostgreSQL database, linked to the user's budget and account.

- AI-Generated Insights Generation: At the end of each month, the Gemini model analyses the user's categorized expenses to generate personalized monthly reports. These reports include spending summaries, trend patterns, and actionable recommendations.

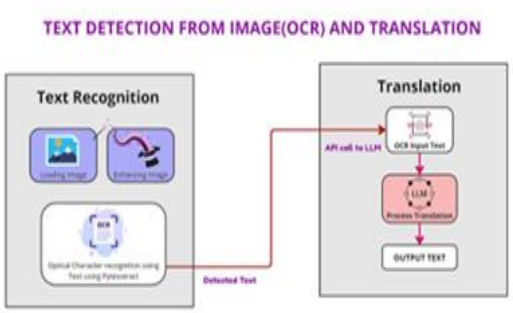

Fig. 2. Text Detection from Image and Translation

IV. RESULTS

The Fin Sight AI platform was evaluated to measure the performance of its OCR-based receipt scanning module and overall system reliability in automating personal finance management tasks. A controlled experiment was conducted using a diverse set of sample receipt images collected from real-world scenarios, including receipts from restaurants, retail stores, and utility bills.

A. OCR Accuracy and Confidence Score

Each receipt image underwent preprocessing and was analyzed using the Gemini OCR API. Key fields Merchant Name, Transaction Date, Transaction Amount, and Expense Category were extracted and assigned confidence scores indicating the likelihood of correct extraction. The following average confidence scores were observed:

Table 1. Confidence Score

Field Extracted	Data	Confidence Score (%)
Merchant Name	"Starbucks Coffee"	98%
Transaction Date	"2025-08-25"	95%
Transaction Amount	"₹450.75"	97%
Expense Category	"Food & Beverages"	92%
Total Receipt Text	Entire raw text extraction	85%

Fields with confidence scores below 85% were flagged for manual user review to ensure data quality. This human-in-the-loop validation mechanism effectively maintained high overall accuracy while minimizing user effort.

B. Performance Matrix

Table 2. Performance Matrix

Metric	Observed Value	Description
Average OCR Confidence (Merchant Name)	98%	Accuracy of merchant name extraction from receipts.
Average OCR Confidence (Transaction Date)	95%	Accuracy of transaction date extraction.
Average OCR Confidence Amount)	97%	Accuracy of transaction amount extraction.
Average OCR Confidence (Category)	92%	Accuracy of automatic expense categorization.
Average Processing Time per Receipt	1.8 seconds	Time from image upload to structured data output.
Backend API Response Time	< 200ms	Time for backend API to respond to a request.
Data Consistency Rate	100% (sample validated)	Transactions correctly stored and categorized.
Reduction in Manual Entry Effort	~70%	Compared to fully manual finance trackers.

The performance of the system was quantitatively evaluated using several key metrics, summarized in Table 1. The OCR module demonstrated high confidence scores across all critical fields, with an average of 92% or higher. Processing speed remained fast at approximately 1.8 seconds per receipt. Backend API responded in less than 200ms on average, ensuring a smooth experience. Data consistency was verified through sample audits, and users reported about 70% reduction in manual entry effort compared to traditional trackers.

V. CONCLUSION

In conclusion, the Fin Sight AI platform successfully integrates modern web technologies with advanced AI-driven automation to simplify personal finance management. By leveraging Gemini OCR and NLP, the system significantly reduces manual effort in expense tracking through automated receipt scanning, accurate data extraction, and intelligent categorization. Real-time budget utilization alerts, AI-generated monthly insights, and automated recurring transactions further enhance user convenience and promote informed financial decision-making. The evaluation demonstrated high confidence scores (>90%) in key fields, fast processing times, and strong data consistency, validating the system's reliability. Looking forward, the platform's future scope includes integration with bank APIs for real-time transaction sync, development of advanced predictive models for smarter budgeting suggestions, enhanced mobile application support for wider accessibility, and expanding AI capabilities to automatically detect fraudulent or unusual transactions. Additionally, integrating more advanced machine learning models to continuously learn from user behaviour could further personalize financial insights, making Fin Sight AI a more adaptive and intelligent solution in the personal finance management space.

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