AI Family Financial Analyst

Akash S[1], R. RajiniGanth[2], Akshaya R[1], Dharaneesh R[1], Gugan G[1]
[1]Department of Computer Science and Engineering, SNS College of Engineering, Coimbatore, India
[2]Assistant Professor, CSE Department, SNS College of Engineering, Coimbatore, India

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Abstract - Managing family finances often involves tracking income, expenses, savings, debts, and financial transactions across separate records, creating difficulties in understanding spending patterns and planning budgets. AI Family Financial Analyst is an AI-powered family financial management system designed to organize these activities within a centralized platform. The proposed system combines income and expense tracking, document-based financial data extraction, expense categorization, spending pattern analysis, future expense prediction, and personalized budget and savings recommendations. The platform uses data analytics to identify spending behaviour, monitor financial activities, and help families make better financial decisions. The system also includes a centralized financial dashboard, transaction management, budget planning, savings analysis, and consolidated financial reports. This paper describes the system scope, workflow, architecture, prototype screens, and responsible-use considerations. The proposed system aims to simplify household financial management by providing clear financial insights and AI-assisted recommendations. The accuracy of predictions, security-test results, system performance, and end-to-end testing require further validation. Accordingly, the reported outcomes should be considered design- and prototype-level observations rather than claims of measured production performance. A validation plan is outlined for assessing accuracy, reliability, security, usability, and recommendation quality before deployment.

Key Words: AI-powered financial management, family finance, expense tracking, budget planning, savings analysis, financial dashboard

I. INTRODUCTION

Artificial intelligence (AI) and data-driven applications are changing how families manage their financial activities. Families regularly handle income, expenses, savings, debts, and financial transactions, and they need to monitor these activities to maintain better financial control. When financial information is recorded across separate documents, spreadsheets, or applications, it can become difficult to track spending, understand financial patterns, plan budgets, and identify opportunities to save money. As a result, families may spend additional time managing records rather than making informed financial decisions.

AI Family Financial Analyst is proposed as a centralized family financial management system that connects income records, expense details, savings information, financial transactions, budget plans, and financial reports. Its purpose is not to make financial decisions without user involvement; rather, it is to organize financial information and provide assistance through data analysis. Expense categorization and AI-generated financial insights are intended to support users in understanding their spending patterns. Family members retain responsibility for their final financial decisions.

The workflow contains four major stages: financial data collection, data preprocessing, AI-based financial analysis, and budget and savings recommendations. The system collects family income, expenses, savings, and transaction details to understand financial activities. The collected information is processed and categorized to identify spending patterns and estimate future expenses. Based on the analysis, the system provides budget suggestions and savings recommendations. These outputs represent the project's proposed functionality.

This paper makes three design-level contributions. First, it organizes family financial activities into a single financial management platform. Second, it describes how data collection, expense categorization, financial analysis, and budget recommendations can be integrated into a modular architecture. Third, it identifies implementation and evaluation requirements needed to avoid unsupported claims about AI accuracy, security, or production readiness. The work is presented as a system-design case study supported by project documentation and illustrative interface prototypes. Because reproducible runtime measurements were not supplied, the paper distinguishes specified features and prototype outputs from verified operational results.

II. LITERATURE REVIEW

Research on AI-enabled financial management describes opportunities to improve household budgeting, understand spending patterns, and reduce repetitive manual record-keeping, while highlighting that successful adoption depends on accurate financial data, suitable analytical methods, and responsible usage [1], [2]. Automated tools can help organize financial information, categorize expenses, and support budget planning, but their outputs depend on the quality and completeness of the available data. .

Research on AI-based financial management has documented concerns about data privacy, accuracy, transparency, and the reliability of automated financial recommendations [3]. Studies on digital financial

decision-making further show that automated analysis can produce misleading results when financial data, prediction methods, or evaluation criteria are unsuitable [4]. These findings are especially relevant when an analytical result influences a family's budgeting or savings decisions. A financial management platform should therefore retain accurate financial records, explain its recommendations, and support correction of data-entry errors. Performance should be evaluated across different financial situations and household spending patterns rather than summarized by one overall accuracy score alone. .

Ethics-focused research on AI-enabled financial management emphasizes transparency, accountability, data privacy, and meaningful user control [5]. These principles affect both the interface and the underlying workflow. Family members should understand what financial information is collected and processed; users should know how an insight or recommendation was generated; and authorized users should be able to correct errors or modify recommendations based on their financial needs. For budget planning, clear categories and consistent evaluation criteria can improve comparisons between income and expenses, provided the analysis reflects actual household financial activities [6].

Security frameworks provide additional guidance for systems that process personal information and control access to sensitive records. The NIST AI Risk Management Framework emphasizes managing AI-related risks across design, development, deployment, and use [7]. The OWASP Application Security Verification Standard provides a reference for examining application security controls [8]. For Aegis Recruit, these perspectives support a design that separates AI assistance from authoritative business rules, protects candidate documents, records important state changes, and requires testing before operational claims are made.

The design gap addressed here is integration. Income tracking, expense management, savings analysis, budget planning, and financial reporting can exist as separate functions. AI Family Financial Analyst proposes to connect these functions through a shared financial record and a structured analysis workflow. Its intended contribution is improved financial organization and traceability, not a claim that the proposed system or prototype outperforms existing financial management applications. Such a comparative claim would require a controlled evaluation with equivalent financial tasks, datasets, and performance criteria.

III. METHODOLOGY

A. Study Scope and Design Approach

The work is organized as a design-oriented case study of a family financial management system. The source materials used for this manuscript describe the problem context, functional workflow, architecture, interface prototypes, limitations, and future validation needs. The analysis maps those artifacts into a common system model: users and modules are defined first, the financial management workflow is then specified, and the architecture identifies where application rules, AI-assisted analysis services, persistent financial records, and external integrations belong. This is not a controlled experiment. No new financial test dataset, household study, or measured performance benchmark is claimed

The design objective is to provide family members with one organized view of their financial activities while keeping important financial decisions under user control. The primary users are family members, account holders, and authorized users who manage financial records. Their access should be controlled according to their roles and permissions. A user should be able to access their authorized financial information but not other users' private records; authorized users should be able to manage permitted income and expense details; and financial recommendations should be based on verified records rather than manually changed dashboard values.

B. Functional Model and Candidate Data

The functional model contains several connected modules. Job management stores the position description, required skills, and assessment policy. Candidate management stores applicant details and links the candidate to a job or hiring campaign. Resume ingestion validates a supported file, stores it in a protected location, and invokes parsing to identify available education, experience, projects, skills, and certifications. Extracted fields are presented for human review because document structure, scanned pages, and incomplete information can produce errors. The original resume should remain available to authorized reviewers so that extracted values can be checked against the source.

Job and financial goal comparison relates the recorded financial information to family budget requirements. A useful result should identify spending patterns, savings opportunities, and relevant financial gaps, not provide only an unexplained score. Financial management records income, expenses, savings, budget limits, and transaction details. The analysis module examines spending patterns and estimates future expenses based on available data. Budget management records planned amounts, spending limits, and savings goals. The recommendation module provides budget suggestions and savings insights based on the analysis. Reporting consolidates financial information and current budget status, while transaction records help users track important changes to income, expenses, savings, and financial plans.



Fig. 1. Analysing Financial Statements with AI

The workflow begins when a user registers family financial details and enters income, expenses, savings, and transaction records. Financial data analysis supports the initial understanding of household spending, but it does not itself make final financial decisions. Users can manage their financial activities through the following stages in the specified order:

- Stage 1 – Income and Expense Tracking: Users enter their family income and expense details. The system records transaction amounts, categories, dates, and financial details. This information helps users understand their spending patterns and track their household expenses.
- Stage 2 – Financial Data Analysis: The system analyses the collected financial records to identify spending patterns and expense categories. It examines income, expenses, and savings details to understand financial behaviour. The analysis helps users identify areas where expenses can be controlled.
- Stage 3 – AI-Assisted Financial Analysis: The platform analyses financial activities and provides insights into spending behaviour and future expenses. AI-assisted recommendations help users understand their financial situation. Any generated insights are supporting information and should be reviewed by users before making financial decisions.
- Stage 4 – Budget Planning and Savings Recommendations: Users review their financial dashboard, budget suggestions, savings insights, and expense reports. The system provides recommendations based on the available financial information. Users make the final decisions about their budgets, savings plans, and financial goals.

The financial analysis and recommendation process is based on system rules, not just dashboard labels. The backend should calculate or verify financial results using stored income, expense, and transaction data, apply the configured budget rules consistently, and store the resulting financial status. Incomplete records, invalid transactions, or unavailable analysis services should not silently generate final recommendations. The application should use explicit states for data collection, processing, analysis completed, recommendation available, and review required, with retry and recovery procedures defined according to the system requirements.



Fig. 2. AI Financial Transaction Analysis Model

D. System Architecture and Data Flow

The proposed architecture separates the presentation layer, application workflow, AI-assisted processing, persistent data, financial document management, and external services. The presentation layer provides family member and account management experiences. The application layer validates requests, checks permissions, manages financial records, processes income and expense details, calculates financial summaries, applies budget rules, and generates reports. These responsibilities should remain authoritative on the server so that users cannot modify financial results simply by changing client-side values.

The AI service layer may support financial document processing, expense categorization, spending pattern analysis, future expense prediction, and budget recommendation generation. A replaceable provider interface can isolate the financial analysis workflow from a specific AI service provider. Before being stored or displayed, AI-generated output should be checked for the expected format and reviewed for financial relevance. Where practical, the system should retain enough context—such as financial records and analysis parameters—to help an authorized user understand the generated result. A prototype response or sample value must not be represented as a live AI-generated result.

The data layer holds structured records such as users, family profiles, income details, expenses, transactions, savings, budget configurations, financial analysis results, recommendations, and report records. Financial documents and authorized uploaded files should be stored in protected file storage, with file metadata linked to database records. The server should check authorization before providing financial documents or reports. Long-running tasks such as document processing and financial report generation may use background jobs with progress reporting, bounded retries, and clear failure states. External AI services, if integrated, should be isolated from the main application and handled with appropriate access controls, timeouts, and data-protection measures.

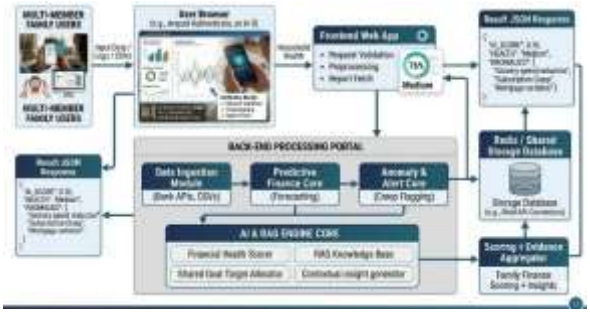


Fig. 3. Proposed system architecture

E. Security, Privacy, and Responsible AI

Financial records include personal details, family income, expenses, savings information, transaction records, and financial documents. Access should be restricted by user permissions, connections should use secure transport, and stored financial files should not be publicly accessible by default. Input validation is needed for financial forms, document uploads, transaction entries, and API calls. Audit events should record important financial updates and changes with timestamps and authorized-user information. Retention and deletion rules should be defined for uploaded documents, transaction records, and financial reports. These requirements should be validated against the selected application-security controls [8].

Users should receive clear information about how their financial data is collected and processed, including what information is used, why it is used, how long it is retained, and who can access it. Appropriate alternatives should be considered where automated document processing creates difficulties. AI-generated financial insights and budget recommendations should be advisory, based on available financial evidence, and correctable by users. Automated predictions should not be treated as guaranteed financial outcomes. The platform should be evaluated for errors and unreliable recommendations, and its AI-related risks should be managed throughout the system lifecycle rather than only after deployment [5], [7].

IV. RESULTS

A. Prototype and Design Outcomes

The available project artifacts define the main workflow across family financial management functions. The user-facing prototype includes financial dashboards, income and expense management, transaction records, budget planning, savings analysis, financial recommendations, reports, and settings. User activities are represented as a sequence of financial data entry, expense categorization, financial analysis, and budget recommendation generation. These screens communicate the intended module boundaries and the financial information users are expected to review; they are illustrative interface prototypes rather than evidence that all backend integrations are operational.



Fig. 4. dashboard prototype.

The financial dashboard illustrates how analysed financial information can be presented alongside income, expenses, savings, and budget indicators. In a live system, each financial value should be traceable to its original transaction or financial record, and users should be able to correct data-entry errors. The percentages and predictions shown in a prototype interface must not be treated as experimentally validated financial results. Personal financial details displayed in prototype images should be protected to maintain user privacy.

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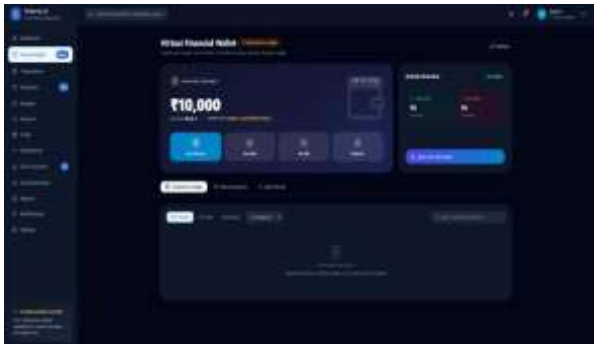


Fig. 5. Solvent Virtual Financial Wallet

The financial evaluation dashboard brings income, expense, savings, and budget indicators into one view. This design is intended to help users review their financial activities alongside spending patterns and savings information before making financial decisions. Displayed amounts, percentages, and financial insights are illustrative placeholders; they are not results from a verified household study or evidence of AI prediction accuracy. The final financial decisions remain with the users.

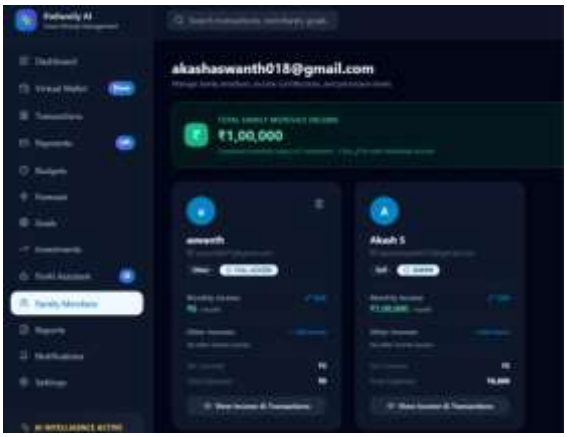


Fig. 6. Family Member Dashboard

At the workflow level, the reported design outcomes are the integrated family financial management process, the organization of income and expense records, the separation of application and AI-assisted analysis responsibilities, and the intention to consolidate financial information in a centralized dashboard and report. The documents do not provide verified automated-test reports, financial analysis logs, load-test outputs, or validated expense-prediction metrics. Consequently, no test pass rate, categorization accuracy, prediction accuracy, error rate, latency, throughput, uptime, or security assurance is reported as an observed result.

V. DISCUSSION

A. Design Implications

The principal design benefit is continuity across family financial activities. A centralized financial record can reduce repeated entry of information and make the current financial status easier to identify, provided that income, expenses, savings, transactions, and budget details remain linked to persistent records. Consistent expense categories can improve the comparison of spending patterns, while a consolidated dashboard and report can make it easier for users to understand the financial information behind a recommendation. These benefits are plausible design goals; their magnitude has not yet been measured in the available materials.

The distinction between AI assistance and user decision-making is equally important. Financial data processing can fail when records are incomplete or incorrectly entered, while an expense categorization system may place transactions in unsuitable categories that do not accurately reflect household spending. Generated predictions may also be inaccurate when financial information is limited or inconsistent. AI Family Financial Analyst should therefore display the source financial information, allow users to correct errors, and preserve the criteria used to generate financial recommendations. Budget rules must be applied consistently and reviewed to ensure that the recommendations are appropriate for the family's financial situation. No single automated prediction should replace the review of financial records or the final decisions made by users.

The security model is not an optional addition to the financial management workflow. A platform that collects family income, expenses, savings, transactions, and financial documents needs authorization checks at the data-access layer, not only protected navigation in the interface. User-level data isolation is essential when multiple family members manage financial information. Uploaded financial documents must be treated as sensitive data and processed only through suitably protected services. Financial records and reports need appropriate privacy controls, purpose limitation, retention policies, and access records. The project should document which of these security and privacy controls are implemented and which remain planned.

B. Limitations and Validation Plan

The main limitation is the absence of verified empirical evidence. Prototype images do not demonstrate that authentication, financial data collection, expense categorization, AI-based analysis, budget calculation, document processing, reporting, or recommendations work end to end. Likewise, diagrams of external services do not establish that those services are configured, secured, or available. The current paper therefore reports system design and prototype coverage, not production readiness or comparative superiority.

A reproducible evaluation should begin with unit tests for financial calculations, expense categorization, budget limits, and permitted data updates. API integration tests should verify that income, expense, and transaction records are persisted correctly and that invalid financial data cannot produce incorrect recommendations. User-based access tests should cover family financial records, uploaded documents, dashboards, and reports. File-handling tests should examine supported formats, size limits, malformed uploads, and unauthorized downloads. The financial analysis service should be tested for missing values, incorrect records, processing failures, and recovery behaviour.

Financial data extraction should be evaluated against a manually verified dataset with appropriate user consent; suitable measures may include field-level accuracy, precision, recall, and error rate. Expense categorization should be reviewed against predefined financial categories, with classification accuracy and agreement reported where appropriate. Reliability tests should specify workload and measure latency, throughput, failure rate, and recovery behaviour. Usability evaluation should involve users performing realistic financial management tasks through accessible interaction paths. Privacy and security reviews should examine data access, storage, document handling, and protection of personal financial information. Reports should disclose the test setup, sample size, metrics, failures, and unresolved limitations rather than presenting only favourable outcomes.

VI. CONCLUSION AND FUTURE WORK

AI Family Financial Analyst proposes an integrated family financial management system that connects income and expense tracking, financial data collection, expense categorization, AI-assisted financial analysis, budget planning, and savings recommendations. Its core design contribution is a centralized and organized workflow that brings family financial records and analytical insights together. The accompanying prototypes illustrate how users could review financial information, spending patterns, budget status, and recommendations within a single platform.

The available artifacts establish the intended workflow and interface direction but do not establish verified runtime accuracy, security, scalability, or end-to-end reliability.

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