Smart Financial Coach

Design Documentation & Technical Architecture

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Repository: github.com/kayladoann/smart-financial-coach

Video Link: paloatlo.MOV

Presentation Slides: Smart Financial Coach – AI-Powered Money Habits

Executive Summary

Smart Financial Coach is an AI-powered web application that transforms raw transaction data into personalized, actionable financial insights. The application addresses the common problem of financial opacity by providing users with intelligent spending analysis, goal tracking, and subscription management, powered by modern AI technology.

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1. Problem Statement

The Challenge

Many individuals struggle with personal finance due to:

- Lack of visibility into spending patterns
- Overwhelming data from multiple accounts
- Generic advice that doesn't address individual circumstances
- Manual tracking that's time-consuming and error-prone
- Hidden subscriptions that drain budgets silently

Target Audience

- Young adults and students building financial habits
- Freelancers with variable income
- Anyone seeking clarity and control over their finances

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2. Solution Overview

Smart Financial Coach provides four core capabilities:

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2.1 Intelligent Dashboard

- Real-time spending analytics with visual charts
- Category-based spending breakdown
- Top merchant identification
- Most recent monthly transaction summaries
- Filtering

2.2 AI-Powered Insights

- Natural language financial coaching
- Personalized spending alerts
- Savings opportunities identification
- Anomaly detection for unusual charges

2.3 Goal Tracking & Forecasting

- Custom financial goal creation
- Predictive analytics for goal achievement
- On/off-track status with recommendations
- Progress visualization

2.4 Subscription Detection

- Automatic recurring charge identification
- Monthly cost aggregation

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3. Technical Architecture

3.1 Architecture Pattern

Layered Architecture with MVC Pattern

Presentation Layer (Client)
HTML5 | CSS3 | Vanilla JavaScript
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API Gateway (Express.js)
REST API | JWT Authentication

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Business Logic Layer
Controllers → Services → Models

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Data Access Layer
SQLite | Knex.js ORM

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External Integrations
Claude API | Plaid API (Future)

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4. Technology Stack

4.1 Frontend Technologies

Technology	Version	Purpose
HTML5	-	Semantic markup for accessibility
CSS3	-	Modern styling with Flexbox/Grid
JavaScript (ES6+)	-	Client-side interactivity
Chart.js	Latest	Data visualization
Fetch API	Native	HTTP requests

Why Vanilla JavaScript?

- Zero framework overhead
- Fast load times
- Easy debugging
- No build process complexity
- Perfect for hackathon speed

4.2 Backend Technologies

Technology	Version	Purpose
Node.js	20.12.2	JavaScript runtime
Express.js	4.18.2	Web framework
SQLite	3.43.2	Development database
Knex.js	3.0.1	SQL query builder
JWT	9.0.2	Authentication tokens
bcrypt	5.1.1	Password hashing
Winston	3.11.0	Logging framework

4.3 AI/ML Technologies

Technology	Version	Purpose
Claude API	Sonnet 4	Natural language insights
Custom Algorithms	-	Anomaly detection
Pattern Matching	-	Subscription detection
Time Series Analysis	-	Goal forecasting

4.4 Integration & APIs

Service	Purpose	Status
Plaid API	Bank account connectivity	Configured
Anthropic Claude	AI-powered insights	Active
SendGrid	Email notifications	Optional

5. Future Enhancements

5.1 Short-term

1. **Filtering Feature**
   - Transactions filtered by dates, category, and price
   - Allow users to slice and dice their transaction history using flexible filters so they can quickly answer questions like “How much did I spend on food this month?” or “What were my large purchases last quarter?”
2. **Investment Tracking**
   - Account connections (Plaid / CSV import)
   - Performance analytics
   - Tax-loss harvesting alerts
3. **Social Features**
   - Anonymous spending comparisons
   - Community challenges
   - Achievement badges

5.2 Long-term Vision

1. **Voice Interface**
   - "Hey Coach, how am I doing?"
   - Voice-activated insights
   - Conversational Q&A
2. **Financial Planning**
   - Retirement calculators
   - College savings plans
   - Estate planning tools
3. **Business Features**
   - Expense tracking for freelancers
   - Tax deduction identification
   - Invoice management

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6. Conclusion

Smart Financial Coach demonstrates how modern AI can make personal finance accessible and actionable. By combining intuitive UX, robust backend architecture, and cutting-edge AI, we've created a tool that genuinely helps users take control of their financial lives.

Key Achievements:

- Fully functional web application

- AI-powered personalized insights
- User-friendly interface

Technical Highlights:

- Layered architecture for maintainability
- Modern JavaScript throughout
- Claude AI for natural language insights
- Comprehensive error handling
- Security-first design

This project serves as both a practical financial tool and a showcase of full-stack development capabilities, demonstrating proficiency in frontend design, backend architecture, database management, API integration, and AI implementation.

Appendix

A. Code Repository

GitHub: github.com/kayladoann/smart-financial-coach

B. Demo Credentials

- Email: demo@example.com
- Password: password123

C. Tech Stack Summary

- **Frontend:** HTML5, CSS3, JavaScript, Chart.js
- **Backend:** Node.js, Express.js, SQLite, Knex.js
- **AI/ML:** Claude API (Anthropic), Custom algorithms
- **Security:** JWT, bcrypt, AES-256
- **DevOps:** Git, npm, nodemon