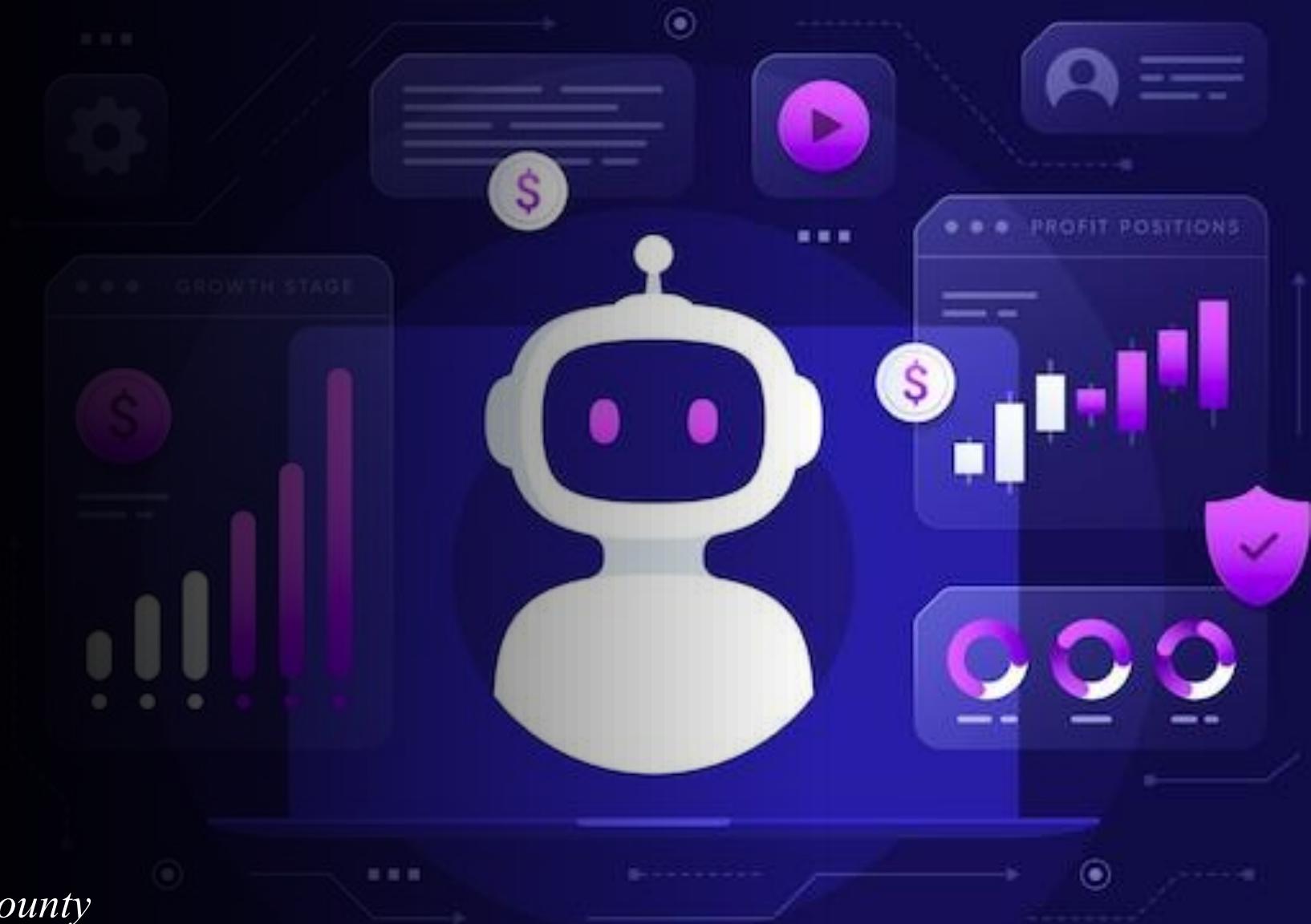# AI-Powered Personal Finance Chatbot

Tejaswini Jammi

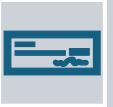*Data 606 Capstone Project*

University of Maryland, Baltimore County

Professor: Dr Chaojie (Jay) Wang

FINANCE AI

Problem Statement

Bank statements are unstructured, inconsistent, and hard to analyze
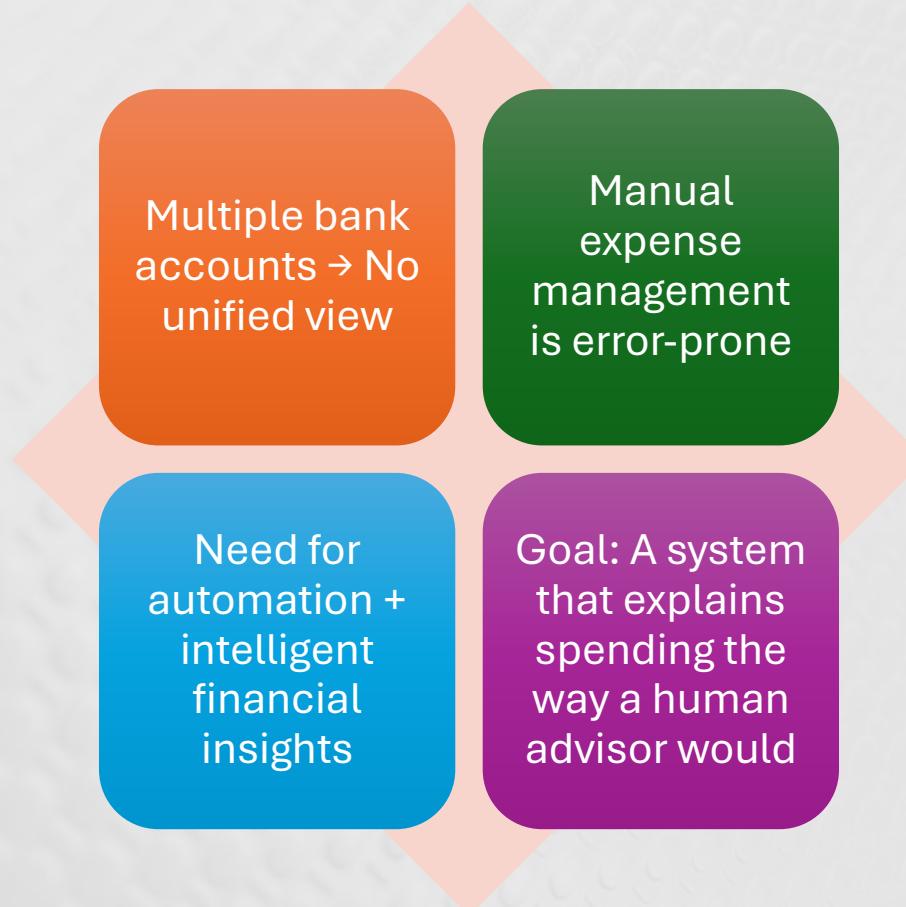
Users manually review long PDFs every month

Expense tracking apps often require manual tagging

Lack of personalized insights for financial decision-making

Motivation

Multiple bank accounts → No unified view

Manual expense management is error-prone

Need for automation + intelligent financial insights

Goal: A system that explains spending the way a human advisor would
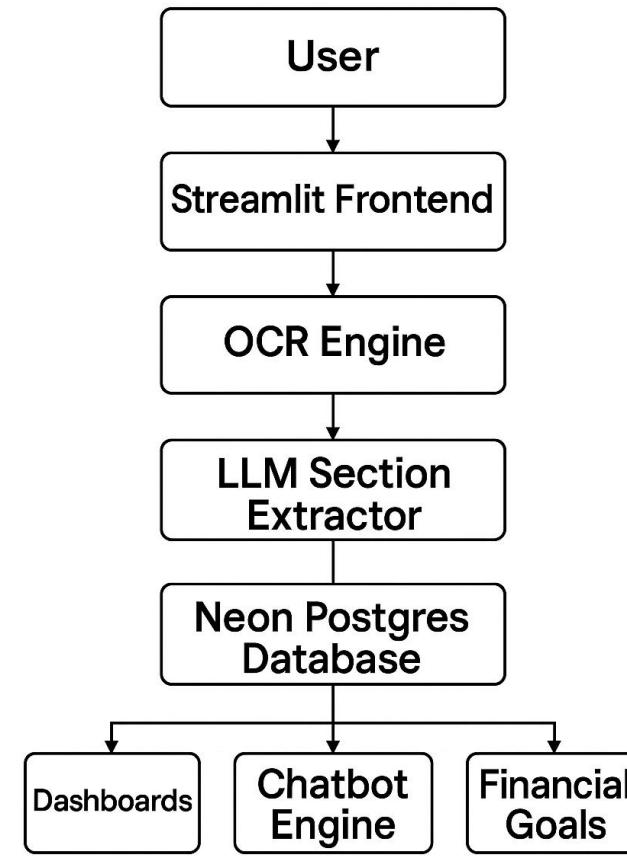
Project Objectives

- Convert PDF statements into structured data

- Use LLMs to extract and classify statement sections

- Store normalized data in Postgres

- Build a chatbot to answer financial questions using SQL

- Provide dashboards for spending and income trends

- Enable a Goals page to set savings targets (e.g., emergency fund/trip) and track progress over time

Data

- Personal Bank Statements (Either Credit or Debit)

System Architecture (High Level)

User
↓
Streamlit Frontend
↓
OCR Engine
↓
LLM Section Extractor
↓
Neon Postgres Database
↓
- Dashboards
- Chatbot Engine
- Financial Goals

Workflow / Data Pipeline

User uaploads bank statement PDF through the Streamlit interface

OCR engine converts PDF statements into raw text

Large Language Model (LLM) extracts and normalizes statement sections

Cleaned and structured data is stored in a PostgreSQL database

Chatbot engine queries database views to answer user financial questions

Dashboards retrieve aggregated data to visualize spending and income trends

Goals module leverages stored transaction data to track user-defined financial goals and progress
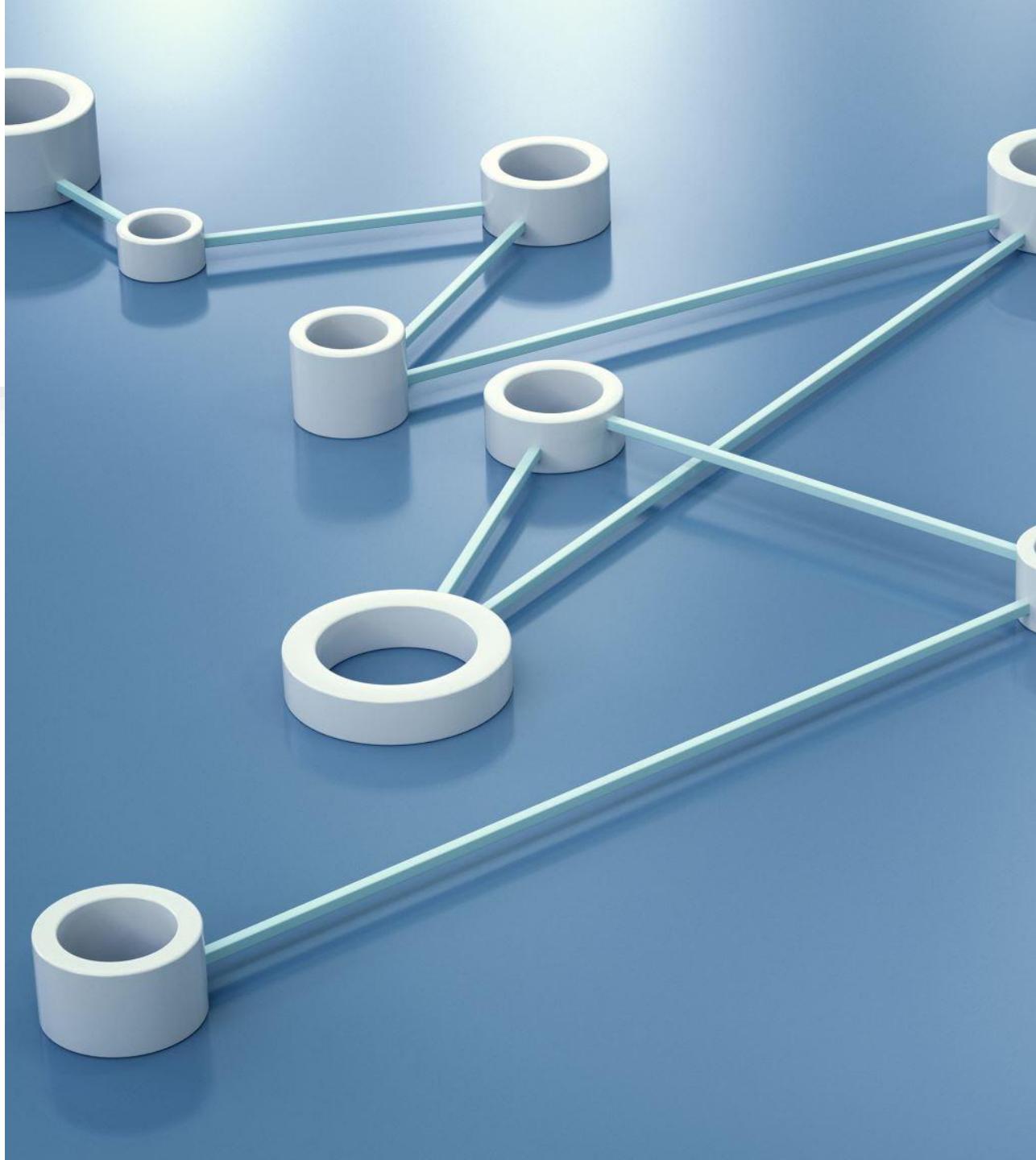
Key Challenges Addressed

- Bank statements are unstructured and inconsistent
- Debit and credit statements follow different formats
- Transaction descriptions span multiple lines
- Vendors and categories are not standardized
- Users cannot query PDFs using natural language

System Design Approach

- Modular pipeline separating extraction, storage, and analytics

- Combination of OCR, LLMs, and rule-based validation

- Normalized database schema to support both chat and dashboards

- SQL views designed specifically for reliable question answering

Chatbot Intelligence Flow

- User asks a natural language financial question
- LLM translates the question into a SQL query
- Query runs on curated database views
- Results converted into a concise, human-readable response

Analytics & Dashboards

- Monthly income vs expense trends
- Category-wise and vendor-wise spending analysis
- Interactive dashboards for financial exploration
- Consistent data source shared with chatbot

Financial Goals Module

- Users define savings or spending goals
- Goals linked to historical transaction data
- Progress tracked over time
- Encourages data-driven financial planning

End-to-End
User Experience

- Upload statements
- Ask financial questions
- Explore dashboards
- Track financial goals
- All within a single application

Modules of the Chatbot

What time period of transactions do you have for me?

Summarize my spending for the latest month you have.

Show my spending by month over all the data you have.

Show my largest transactions over the whole period.

Show my recurring transactions or subscriptions.

What time period of transactions do you have for me?

Here are the results I found for your question.

Raw results:

	start_date	end_date
0	2024-10-18	2025-10-16

Type or ask me something…

🏛 Personal Finance Chatbot

📊 Financial Dashboard

Refresh now

🔴 Auto-refresh

Filters 🔗

Transactions Date Range

Oct 18, 2024   Dec 24, 2025

🔴————————————🔴

Showing: **Oct 18, 2024 → Dec 24, 2025**

Account type

All ⌄

Transaction type

All ⌄

Category (optional)

All ⌄

Vendor (optional)

All ⌄

Income	**Spent**
$1,802.22	$2,474.83
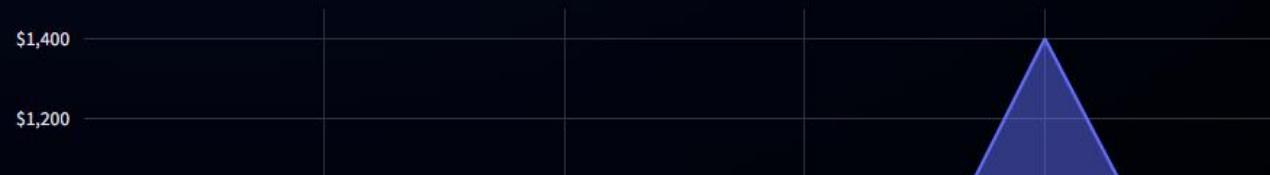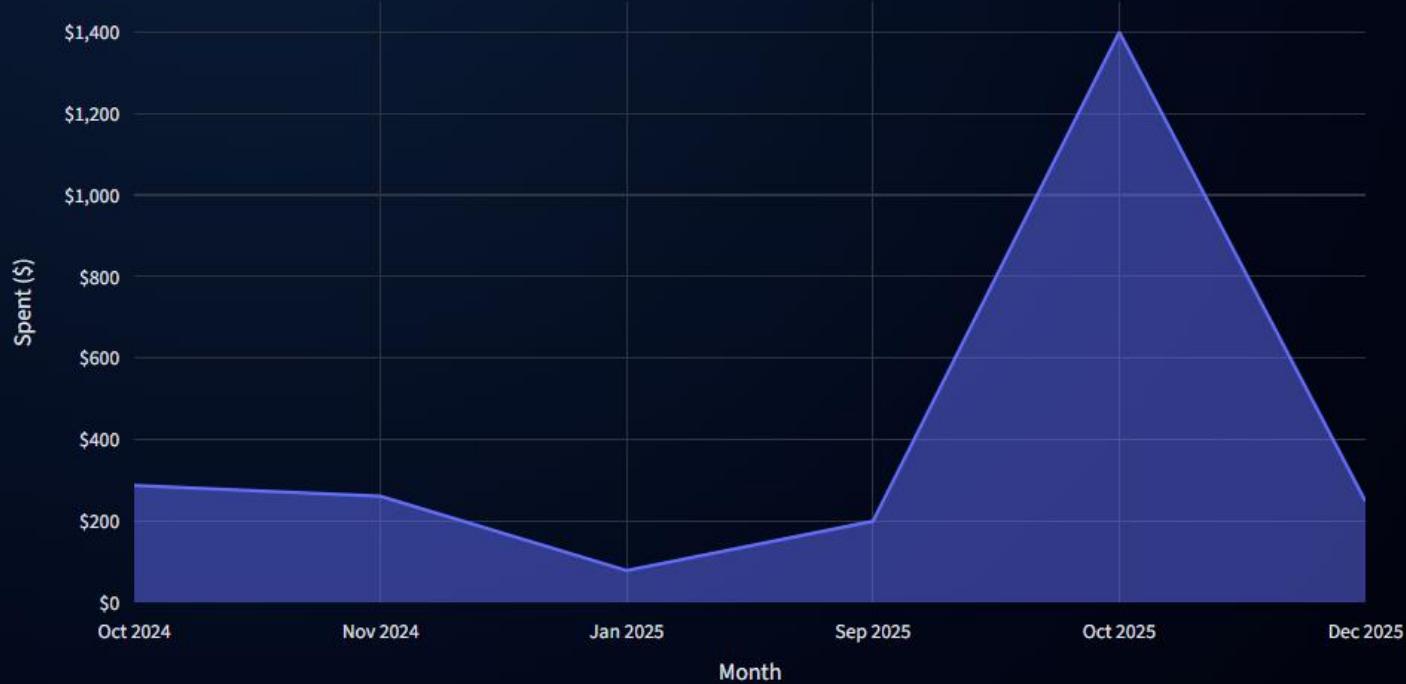
Left (Income - Spent)	**Savings rate**
$-672.61	-37.3%

📌 Overview   ☑ Changes   🪙 Income vs Expense   📋 Tables

Is my spending getting worse or better?

$1,400 —

$1,200 —
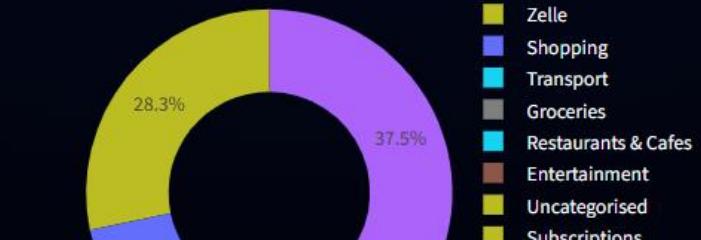
Is my spending getting worse or better?

Where is my money going?

- Other
- Zelle
- Shopping
- Transport
- Groceries
- Restaurants & Cafes
- Entertainment
- Uncategorised
- Subscriptions

37.5%
28.3%

Who am I spending the most with?

- Amrutha Akka
- CRD
- Remitly
- Michael Kors

🏦 Personal Finance Chatbot

🎯 Goals & Savings Planner

📌 Your Goals Snapshot

Total goal target

$1,000

Total saved so far

$400

40% of active goals funded

On track: 0 • Slightly behind: 1 • Off track: 0

Over the last 6 months, you've been overspending by roughly $112 per month on average.

Your active goals together need about $120 per month. Compare that with your typical savings figure above to see if your plan feels realistic.

> ➕ Add a new goal

⭐ Smart Suggestions for You

• **Review your goals**
Check which goals matter most right now and make sure each one has a monthly amount and a realistic target date.

📃 Your goals

Florida Trip
Type: fun • Priority: medium • Status: active

Your active goals together need about $120 per month. Compare that
with your typical savings figure above to see if your plan feels realistic.

> ➕ Add a new goal

📃 Your goals

Florida Trip
Type: fun • Priority: medium • Status: active

400/1,000

Target date: May 31, 2026   Slightly behind • Needs about $120/month over ~5   Planned monthly: $100
                                         months

Current saved ($)		Monthly plan ($)		Status		
400.00	− +	100.00	− +	active	⌄	Save

Results & Impact

- Converts unstructured PDFs into queryable data
- Enables financial insights without SQL knowledge
- Integrates chat, dashboards, and goal tracking
- Scalable to multiple statements and users

Limitations

- OCR accuracy depends on statement quality
- Currently supports limited bank formats
- No real-time transaction ingestion

Conclusion & Future Work

- Demonstrated an end-to-end AI-powered finance assistant
- Combines OCR, LLMs, and databases effectively
- Future work:

  - Investment insights

  - Budget recommendations

  - Multi-bank support

Thank You