Project: Personal AI Memory (PAM)

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Project Description

This project aims to design and develop a prototype **AI Conversational Memory Companion** that helps older adults capture, retrieve, and act on personally relevant information through natural conversation.

Rather than functioning simply as a calendar or reminder application, the system will serve as an interactive **external memory aid**. A user could tell the companion something naturally—for example:

"I have an appointment with Dr. Smith next Tuesday at 10."

or

"I met a woman named Susan at the community center today. She teaches yoga."

The system will extract important information from the conversation, organize and store it, and later help the user retrieve the information or remind the user when appropriate.

The application will integrate three interconnected functions:

1. Remember for Me — Capture and Store

The user can ask the AI companion to remember information using ordinary conversational language.

The system should identify and store relevant information such as:

- appointments and schedules;
- people, names, and relationships;
- recent or upcoming events;
- intentions and tasks;
- locations;
- personally meaningful information.

For example:

User: "Remember that my granddaughter Emma is visiting me this Saturday afternoon."

AI: "Sure. I'll remember that Emma, your granddaughter, is visiting you Saturday afternoon."

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The system should confirm important information with the user before saving it when information is uncertain or incomplete.

2. Help Me Remember — Support Memory Retrieval

When users cannot remember something, they should be able to ask the companion conversationally rather than searching through menus or records.

For example:

User: “What was the name of the woman I met at the community center?”

Instead of immediately providing the answer, the application can optionally support the user's own memory by providing **progressively stronger retrieval cues**.

For example:

AI: “You met her at the community center earlier this week. Would you like another hint?”

If the user still cannot remember:

AI: “She teaches the yoga class you were interested in.”

If another cue is needed:

AI: “Her name starts with S.”

Finally:

AI: “Her name is Susan.”

This feature introduces an important design challenge: the system should determine when to provide a cue, when to provide a stronger cue, and when simply to give the answer. Users should also always be able to request the answer directly.

3. Remind Me — Proactive Support

The companion should also be able to proactively remind users about information they previously asked it to remember.

For example:

User: “Remind me to bring my medication list to my doctor's appointment tomorrow.”

The application might later generate:

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AI: "Your appointment with Dr. Smith is at 10:00 AM today. You wanted me to remind you to bring your medication list."

Reminders may initially be **time-based**, which is appropriate for an undergraduate prototype. More advanced versions could explore contextual reminders based on location, activity, or other information.

How the Three Functions Work Together

The central design concept is that **Remember for Me, Help Me Remember, and Remind Me share the same personal memory store**.

For example, a user might say:

"I'm having lunch with my friend Susan at Legal Sea Foods next Friday at noon. I want to bring her the book I borrowed."

The application could create linked memory information representing:

Person: Susan — friend
Event: Lunch with Susan — Friday at noon
Place: Legal Sea Foods
Intention: Return Susan's book

That information can subsequently support all three functions.

Remember for me: The system stores the lunch, Susan, the restaurant, and the intention to return the book.

Help me remember: If the user asks, "Where am I meeting Susan?", the system can retrieve the restaurant information or provide a cue.

Remind me: Before the lunch, the application can remind the user, "You are meeting Susan for lunch today. You wanted to bring the book you borrowed from her."

Thus, the project should treat memory as **connected information rather than independent reminder entries**.

Core Technical Components

Students will design and implement a functional prototype containing several components:

Conversational interface: A simple text-based chat interface where users can communicate with the companion using natural language. Voice input/output may be added as an optional enhancement.

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Natural-language processing / AI: An AI or large language model can interpret conversational input and identify information such as people, events, dates, places, relationships, and intentions.

Structured memory storage: Relevant information should be converted into structured data and stored locally or in a database. Each memory might contain fields such as memory ID, memory type, description, people involved, date/time, location, importance, reminder information, and date created.

Memory retrieval: The application should search stored memories in response to natural-language questions. Retrieval may use keywords, metadata, semantic similarity, or a combination of approaches.

Cue-generation mechanism: The system should generate progressively informative retrieval cues without immediately revealing the stored answer.

Reminder engine: The system should monitor stored intentions and events and generate notifications at appropriate scheduled times.

Minimum Viable Prototype

By the end of the project, the prototype should demonstrate one complete workflow across all three functions.

For example, a user should be able to tell the application:

“Remember that I have lunch with my daughter Amy at noon on Friday, and I need to bring her birthday card.”

The application should successfully:

1. Interpret and store the information.
2. Show the user what information has been saved.
3. Answer a later question such as, “Who am I having lunch with Friday?”
4. Provide progressively stronger cues if the user asks for help remembering.
5. Generate a scheduled reminder about the lunch and/or birthday card.
6. Allow the user to review, correct, or delete the stored information.

Optional Advanced Features

Depending on student experience and available development time, teams may extend the prototype with voice interaction, speech-to-text and text-to-speech, semantic/vector-based memory retrieval, location-aware reminders, personalized cue preferences, recurring routines, photographs associated with people or events, or a simple visualization showing relationships among people, events, places, and intentions.

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A particularly interesting extension would be to allow the conversational agent to recognize references to previously stored information. For example:

User: “I’m seeing Susan again next week.”

AI: “Do you mean Susan from your community center yoga class?”

This would allow the system to gradually build a connected personal memory system through repeated conversations.

Expected Deliverable

The final deliverable will be a working prototype of an **AI Conversational Memory Companion** demonstrating the integrated cycle:

Remember for Me → Help Me Remember → Remind Me

The prototype should demonstrate how conversational AI can transform everyday information into a persistent, searchable, and actionable personal memory resource while maintaining a simple interface appropriate for older adults with MCI.

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