PROJECT GENOVA

1. Problem Statement

Can You Build an AI Assistant That Helps People With Dementia Recall Things?

People with dementia, particularly the elderly, have problems with memory loss, confusion and disorientation, to the extent they are unable to remember names, faces, events or even what they did earlier that day. This leads to overdependence, emotional dysfunction and confusion in everyday interaction. Most families and caregivers are puzzled with constant questioning, confusion fits and reassurance. Current digital support for memory aid is not personalized, emotionally aware or privacy aware. Thus, there is a strong market demand for an AI-based, elderly-friendly memory aid to bridge the memory damages through voice input, visual instructions, personal knowledge — and privacy-respecting learning — serving as a memory companion, making everyday recollection effortless and human.

2. Target Audience & Context

Dementia affects more than 55 million people around the world, with 10 million new cases each year. In India, there are expected to be 7.6 million cases by 2030. The most common affected age group is that of the 65+, up to 40% is that of the 85+.

Most common users are old people in mild to moderate stage that can still operate some basic voice/touch interaction. Caregivers and family members who help and observe are secondary users. Created for multilingual and culturally sensitive households (particularly in India), the app is designed to help users remember, feel safe and connected, all while ensuring your most personal data stays private through federated learning methods.

3. Use of Gen-AI

Our dementia assistant leverages Generative AI for personalized cognitive support:

Memory Reconstruction: Summarizes photos, calls, and locations into personal stories.

Emotion-Sensitive Chat: Uses sentiment analysis to generate calming, empathetic responses.

Confusion Disruptor: Detects confusion triggers and delivers reassuring dialogue.

AI-Filled Memory Gaps: Completes incomplete thoughts using contextual understanding.

Voice Familiarizer: Clones loved ones' voices for emotional reminders.

Smart Object Reminder: Combines object detection with GenAI captions to locate misplaced items.

Daily Summarizer: Recaps daily activities using GenAI-based summarization.

Mood-Based Features: Suggests music, creates memory games, and simulates chats via persona-trained models.

Journal Intelligence: Analyzes voice/video journals to extract and categorize useful information for other features.

All features are powered by **federated learning**, enabling secure, on-device personalization without compromising privacy.

4. Solution Framework

Our core idea is to develop an AI-powered dementia assistant that combines memory recall, emotional support, privacy, and physical safety in one unified experience. Designed as a Flutter-based mobile app, the system supports voice queries, personalized reminders, emotional conversations, and safety features like real-time tracking and geo-fencing.

The approach integrates Generative AI with user-specific data (photos, call logs, journals) to reconstruct events and provide emotionally intelligent responses. **Federated learning** is used to personalize the assistant locally on the user's device, enabling safer model improvement without centralizing sensitive personal data. **A geo-fencing module is embedded to share the patient's live location with family members if they move beyond a 5km radius from their home, adding a layer of safety and peace of mind.**

Workflow: A user asks a query ("Where did I go yesterday?") via voice or touch. The request is routed to the n8n middleware, which identifies the intent, fetches context, and processes it through Gen-AI models like T5 (summarization), DistilGPT2 (gap completion), or GPT2 personas (memory flashbacks). The response is then displayed or read aloud.

High-Level Architecture:

- **Frontend (Flutter)**: Voice/chat UI, reminders, games, media playback.
- **Middleware (n8n)**: Orchestration engine for AI tasks and routing.
- **AI Services**: T5, DistilGPT2, YOLOv5, Mimic3, GPT2 via APIs.
- **Geo-Fencing**: Location alerts if 5km boundary is crossed.
- **Federated Learning Engine**: On-device model adaptation using user interaction.
- **Backend**: Firebase (auth, real-time DB), PostgreSQL, cloud storage.

This modular, privacy-conscious system provides cognitive support and compassionate care powered by GenAI and federated learning.
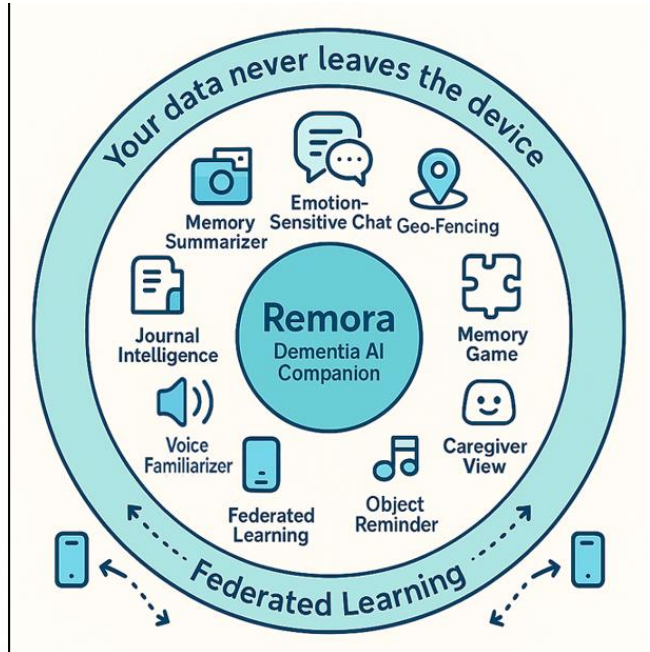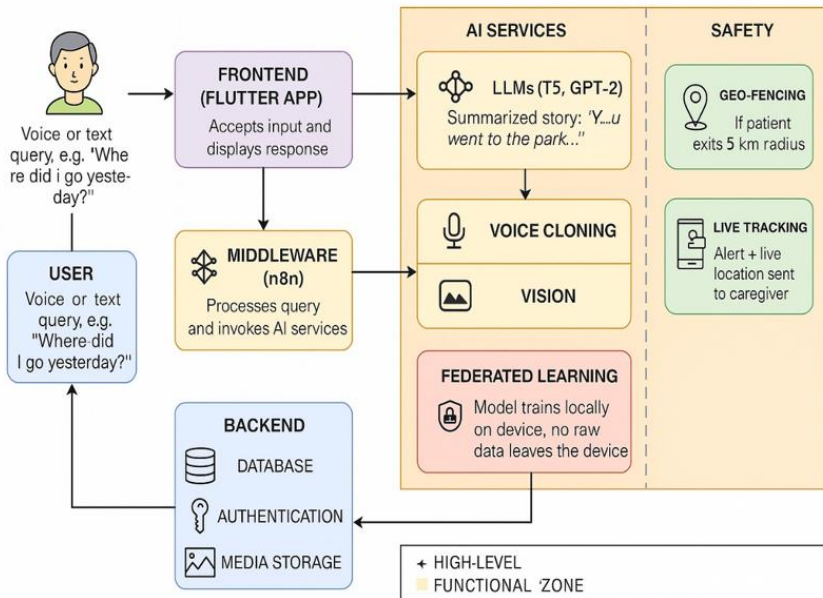
5. Feasibility & Execution

The solution can be practically implemented using open-source tools, mobile-first technologies, and low-code automation. The app will be developed in Flutter, with n8n for backend orchestration. GenAI models like T5 and DistilGPT2 will run via Hugging Face APIs or lightweight local servers. Federated learning frameworks like **TensorFlow Federated or PySyft** will allow models to learn from user behavior on-device without compromising data privacy. Geo-fencing will use Google Maps SDK or Mapbox. Firebase will handle user auth, real-time updates, and cloud functions. Data such as photos, messages, and calendar entries will be processed securely with consent.

6. Scalability & Impact

With over 55 million people worldwide living with dementia and nearly 10 million new cases annually (WHO), the need for scalable cognitive support is critical. Our solution uses lightweight, open-source GenAI models that can run on smartphones and tablets, enabling access across urban and rural areas. **Federated learning** further ensures it scales securely by continuously adapting locally across devices without needing centralized data. Its multilingual design supports regional and cultural customization. If widely adopted, it could revolutionize dementia care by improving recall, emotional well-being, and confidence, particularly in regions with limited neurological and caregiving infrastructure.

7. Conclusion & MLP

Remora is a compassionate AI memory companion designed for dementia care. It combines voice-enabled recall, emotional support, and privacy-first personalization using **federated learning** to ensure dignity and safety.

Our Minimum Lovable Product (MLP) includes a freemium mobile app with core features like memory recall, geo-alerts, and emotional chat. We also offer a **caregiver SaaS dashboard** and partner integrations with NGOs, pharmacies, and elder care networks—making it a scalable, community-driven health-tech solution rooted in empathy and real-world impact.

8. Sources

Sources include reports from the **World Health Organization** and **Alzheimer's Association**, along with Indian insights from **ARDSI**. Global prevalence data is based on the **Lancet Public Health (2022)** analysis from the Global Burden of Disease Study.