

## Assignment -1

### Projects in Machine Learning

INFO8665

MemoriAI

Group 3

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#### Item 1: Project Strategy, Purpose, Vision, Mission, and Tactics

**Introduction:** Alzheimer's disease makes daily life difficult for patients and stressful for caregivers. Families and caregivers often struggle with many different apps, none of which fully meet the daily needs of Alzheimer's care. MemoriAI closes this gap by offering one AI-powered companion that supports memory, safety, and caregiver needs in a single platform.

**Strategy:** We aim to improve the daily lives of people with Alzheimer's and their caregivers by providing an AI-powered companion that integrates memory support, safety monitoring, and caregiver tools into one accessible system.

**Purpose:** Alzheimer's patients face challenges with memory, communication, and routine tasks, while caregivers experience high stress balancing safety and support. The purpose of MemoriAI is to offer a unified, personalized companion that promotes patient independence and reduces caregiver burden.

**Vision:** Our vision is to help people with Alzheimer's live with dignity, safety, and a sense of independence, while easing the challenges faced by their caregivers.

**Mission:** We are committed to developing an integrated platform that combines cognitive games, word and identity support, smart reminders, safety monitoring, and a caregiver dashboard with alerts and resources.

**Tactics:**

Build AI-powered modules for memory reinforcement and identity support.

Integrate smart reminders, safety alerts.

Provide caregivers with real-time dashboards and educational tools.

Test functionality through simulated patient-caregiver scenarios.

#### Item 2: Relevance and Use Cases

##### Relevance of the Project

This project is most relevant to people, as it directly improves the daily lives of Alzheimer's patients and reduces caregiver stress. By combining memory support, safety features, and caregiver tools in one system, MemoriAI provides meaningful, human-centered impact.

##### Use Case 1: Cognitive & Identity Support

Alzheimer's patients often lose confidence when memory gaps cause confusion. This use case helps by keeping the mind active while offering simple identity support.

Memory games, puzzles, and quizzes to strengthen recall and attention.

Personalized activities drawn from daily life (e.g., recalling a daughter, a pet, or a familiar place).

Prompts that confirm identity or identify familiar people when confusion arises.

Reduces stress and worry, helping patients stay calm and confident.

#### Use Case 2: Daily Memory & Safety Support

Patients need help maintaining safe and reliable daily routines. This use case ensures important tasks are not forgotten.

Smart reminders for medication, meals, and appointments.

Caregiver notifications if reminders are ignored or missed.

AI adapts to patient patterns (e.g., frequent snoozing, skipped tasks, false completions).

Provides smarter assistance, reduces risks, and strengthens independence.

#### Use Case 3: Caregiver Dashboard & Awareness Hub

Caregivers often struggle with stress and lack of reliable information. This use case empowers them with knowledge and tools.

Dashboard with real-time updates on patient activities and reminders.

Alerts, personalized strategies, and educational resources for better care.

Predictive insights to anticipate patient needs and improve planning.

Reduces caregiver stress and improves overall quality of care.

#### Item 3: Literature Review (Supporting Use Cases)

To validate the proposed use cases, this section reviews existing literature to provide supporting evidence and identify gaps. Each use case is grounded in prior research while highlighting what remains unaddressed, making the project's contributions clear and compelling.

##### Use Case 1: Cognitive & Identity Support

Cognitive training through games and puzzles has been widely recognized as an effective way to slow decline in dementia patients. Abd-Alrazaq et al. (2023) found that serious games significantly improved attention among elderly individuals with cognitive impairment. Similarly, Saragih et al. (2022) concluded that serious games reduce depression and support cognitive health in people with dementia. Prinz et al. (2025) demonstrated that dementia patients who engaged in serious games for 10 weeks showed improved engagement and memory performance.

Beyond gaming, assistive technologies also provide identity prompts. Pappadà et al. (2021) reviewed dementia-care technologies and reported that many systems include features to help patients recall names and relationships. Ghorbani et al. (2023) further proposed augmented systems that combine serious games with life-scene recognition to contextualize memory prompts.

Gap: While existing research supports cognitive games and identity prompts individually, few integrate them into one unified system with both personalized quizzes and identity support.

##### Use Case 2: Daily Memory & Safety Support

Reminder systems are essential for Alzheimer's patients to manage medication, meals, and appointments. Mettouris et al. (2023) introduced eSticky, a digital reminder platform that replaces

sticky notes with scheduled alerts, improving adherence and independence. However, many reminder tools remain rigid. Pappadà et al. (2021) noted that most existing systems are static and lack adaptive intelligence.

Shaik et al. (2025) highlighted that integrating context-aware data into reminders can strengthen daily safety monitoring for Alzheimer's patients. Additionally, Lai et al. (2025) explored AI-driven task verification, showing how generative models can detect incomplete or falsely completed tasks in dementia care.

Gap: Existing reminder systems do not adapt to patient patterns such as frequent snoozing, skipping tasks, or false completions. Adaptive AI-driven reminders remain underexplored and are critical for safety.

### Use Case 3: Caregiver Dashboard & Awareness Hub

Caregivers face significant stress managing the daily needs of Alzheimer's patients. Zmora et al. (2021) documented how caregivers benefit from remote monitoring tools that reduce uncertainty and improve oversight. Hasan et al. (2024) presented ADQueryAid, a conversational AI tool that empowers caregivers with retrieval-augmented answers and educational support. Pottipogu et al. (2025) described Smartcare Connect, a voice-assisted dashboard providing remote monitoring and caregiver-patient interaction.

In addition, systematic reviews show that educational interventions for caregivers reduce stress and improve outcomes (Piersol et al., 2017).

Gap: Current caregiver tools are fragmented, forcing families to rely on multiple apps. A unified dashboard integrating alerts, patient activity, and educational support has not been widely implemented.

### References

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#### Item 4: Justification of Use Cases

The selected use cases are the most compelling candidates because they directly address the core challenges faced by Alzheimer's patients and caregivers, while filling gaps identified in existing literature.

**Use Case 1: Cognitive & Identity Support** Maintaining cognitive engagement is critical for slowing decline and preserving identity in Alzheimer's patients. Games, puzzles, and memory prompts have proven benefits in research, but current tools remain fragmented. By integrating brain exercises with personalized life-scene quizzes and identity prompts, this use case provides a unified and supportive environment that reduces stress, increases confidence, and improves daily interactions. It goes beyond entertainment by targeting dignity, independence, and emotional reassurance.

**Use Case 2: Daily Memory & Safety Support** Medication adherence, meal scheduling, and task completion are daily pain points. Existing reminder systems are helpful but often static. An adaptive AI model that learns patient patterns (e.g., snoozing, skipped tasks, false completions) ensures higher reliability and personalized intervention. This proactive approach reduces health risks, strengthens patient independence, and provides timely caregiver alerts making it far superior to generic reminders.

**Use Case 3: Caregiver Dashboard & Awareness Hub** Caregivers experience high levels of burden, stress, and lack of accessible information. A centralized dashboard with alerts, activity summaries, and educational resources empowers them with knowledge and foresight. Unlike fragmented apps, this integrated hub reduces caregiver stress, improves care coordination, and enhances patient outcomes. It directly aligns with the literature showing that educational and integrative tools improve caregiver well-being and efficacy.

**Overall Justification** Together, these use cases form a holistic solution that benefits both patients (independence, cognitive stimulation, identity support) and caregivers (reduced burden, informed decision-making). Each use case is backed by literature, addresses unmet gaps, and ensures practical, real-world impact—making them the strongest candidates for this project.

#### Conclusion

This project presents a clear strategy supported by relevant use cases, validated through literature and justified with strong arguments. By addressing patient independence, cognitive support, and caregiver empowerment, it offers an integrated solution that stands out as both impactful and feasible.