# AI Detector *by SciSpace*

C17_SE IEEE REPORT.pdf • 13 May 2025
2812 words (19808 characters)

## Completely Human 0%

The text is entirely written by humans, without any assistance from AI.

| AI weightage | Content weightage | Sentences |
|---|---|---|
| H Highly AI written | **0%** Content | 0 |
| M Moderately AI written | **0%** Content | 0 |
| L Lowly AI written | **0%** Content | 0 |

# Enhancing independence for elderly: Context-Aware Assistant for Memory Support

Ruchi Chaurasiya
*Department of computer Science and Engineering*
*Amrita School of Computing, Bengaluru*
Amrita Vishwa Vidyapeetham, India
bl.en.u4cse22278@bl.students.amrita.edu

Shakshi Yadav
*Department of Computer Science and Engineering*
*Amrita School of Computing, Bengaluru*
Amrita Vishwa Vidyapeetham, India
bl.en.u4cse22286@bl.students.amrita.edu

Swagata Malik
*Department of Computer Science and Engineering*
*Amrita School of Computing, Bengaluru*
Amrita Vishwa Vidyapeetham, India
bl.en.u4cse22252@bl.students.amrita.edu

Pooja Gowda
*Department of Computer Science and Engineering*
*Amrita School of Computing, Bengaluru*
Amrita Vishwa Vidyapeetham, India
g_pooja@blr.amrita.edu

***Abstract*—Dementia and Alzheimer's disease are neurodegenerative disorders that impair memory, cognition, and daily functioning. As the global prevalence of dementia increases, the need for practical, accessible, and non-intrusive care solutions becomes urgent. The study presents an Android-based application created to facilitate the lives of those suffering from dementia and for the special caregivers involved in medication reminders, emergency contact access viewing visual identification, customizable voice alerts for behavioral reinforcement, real-time location tracking and secure caregiver-only modules. The application developed using Android native functionalities focuses on usability, security, and accessibility. Iterative development and emulator-based testing demonstrated the results of overcoming a strong potential improvement in patient routine management and caregiver burden reduction. An extensive authentication system ensures that authorized caregivers are the only ones who can handle the relevant data. Patients, on the other hand, have an easy read-only interface. The program works offline, guaranteeing its reliability in low-connectivity areas. This shows how effective mobility health solutions can come to support people's cognition decline and thus increase the general quality of their life and autonomy.**

***Index Terms*—neurodegenerative disorder, android-emulator, behavioral reinforcement, visual identification**

## I. Introduction

Dementia, including its most common form, Alzheimer's disease is a Chronic neurodegenerative condition associated with gradual decline in cognitive ability, memory, and the ability to carry out activities of daily living is what defines dementia. The World Health Organization (WHO) states that more than 55 million people live with dementia worldwide, with nearly 10 million new cases every year. Given that the world is becoming older, this figure is poised to increase tremendously and individuals suffering from dementia generally experience loss of memory and confusion which, ultimately, tends to limit their ability to perform routine day-to-day tasks causing great strain on their caregivers and health assistants. However, an mHealth (mobile Health) solution can fill the gaps in care when well designed and implemented according to care realities and patients' cognitive abilities.

While technologies assisting patients have emerged, most are found lacking in personalization, security, or accessibility to users-averse to technology. The last few years have seen the emergence of mobile health applications (mHealth) to fill the gap, primarily due to their portability, acceptability, and multitasking capabilities. Research revealed that dementia-oriented apps can help in scheduling activities, monitoring medication, and responding to emergencies when adapted to specific cognitive disabilities.

This research addressed the need for the development of a strong, accessible, and completely dedicated application for android which aims to facilitate caregivers and patients suffering from dementia to perform daily tasks. The proposed Android application includes essential modules such as:

- Medication Management and Reminder Module
- Contact Saving with Visual Aids Module
- Live location tracking and alert generation module
- Customized Voice Alert Module
- Caregiver-only access secured by authentication

The caregiver module allows secure access to manage medications, store contacts with images and descriptions, and schedule custom voice alerts to help patients recognize routine tasks. A location-tracking module also enables caregivers to create a safe zone and receive live alerts if patients wander beyond that border. The module is completely simplified for the patient user, having easy access to those features and only available for viewing but not editing important contact information.

The application is designed to cater for the needs of users even offline by building an offline-first architecture and adopts role-based access control for securing sensitive data. Allowing users a clear understanding of how to operate the application

would increase patients' independence and improve their caregivers' stress levels. If health understanding can be merged with mobile technology, then this research can provide an invaluable contribution to the digital health ecosystem.

## II. Literature Survey

Zeinullin and Hersh [1] introduced the Tactile Audio Responsive Intelligent System to enhance user independence by using tactile and auditory feedback, supporting multi-sensory interaction for individuals with disabilities.

Zhu et al. [2] developed an application aimed at training working memory in older adults. By adapting task difficulty based on physiological and psychological feedback, the system promotes cognitive engagement. This aligns with Gross et al. [3], who found that structured memory training significantly improves cognitive performance.

Hong and Barense [4] explored digital tools, such as AI-driven reminders and note-taking apps, showing they serve as external cognitive aids to support memory retention.

Leung et al. [5] and Wilson et al. [6] examined the use of mobile apps, VR, and assistive technologies for elderly cognitive care. Both emphasized the need for personalized and accessible user interfaces.

Kalaiselvi et al. [7] created the GHJINI mobile app, integrating facial recognition, voice prompts, and alerts to assist dementia patients in daily tasks. Similarly, Karamchandani et al. [8] used Raspberry Pi and YOLOv5 for real-time object and face recognition to support dementia care.

Joshi et al. [9] proposed DementAid, a web platform offering cognitive training and caregiver interaction tools to improve care quality and engagement.

Haque et al. [10] demonstrated the use of eye-tracking and deep CNNs for early detection of cognitive impairments, enabling earlier diagnosis and intervention.

Maresova et al. [11] reviewed various AI-based technologies—including wearables and smart home tools—highlighting their role in enhancing independence and cognitive support for Alzheimer's patients.

Paul et al. [12] and Mehala and Gripsy [13] developed intelligent medication reminder systems using real-time alerts and voice prompts to improve adherence. Zhou et al. [14] emphasized usability in caregiver systems post-pandemic, while Lee and Liao [15] proposed an AI-based drug interaction reminder system to reduce polypharmacy risks.

Lazarou et al. [16], Ye et al. [17], and Hackett et al. [18] examined mHealth apps supporting cognitive training and location tracking in dementia care. Scullin et al. [19] confirmed the role of mobile-based memory aids in improving daily functioning.

Şanal et al. [20] launched a GPS-enabled reminder app, while Mettouris et al. [21] introduced a digital sticky note for early-stage dementia. Liu et al. [22] reviewed usability features like high-contrast UIs and voice controls for older users.

Minhunlee et al. [23] built a motion-sensor-based monitoring system using ML to detect abnormal activity. Schneider-Kamp et al. [24] promoted smart home tech for independent living.

Coghlan et al. [25] and Vozna et al. [26] inquired about the ethical, legal, and societal concerns regarding the implementation of AI-reliant social robots for the welfare of the elderly; as a result, the discussions flagged some red flags in relation to privacy, security of data, and ethical considerations in AI decision-making. Abdollahi et al. [27]. Importance of participatory design in aligning robots with the specific needs and expectations of the elderly is reiterated by Irfan et al. [28] to ensure such technologies would be accepted and appreciated by their users.

Calatrava-Nicolás et al. [29] introduced RobWell-a robotic system combined with AI and smart home technologies to monitor and improve the individual's well-being. Cantone et al. [30] and Burzagli et al. [31] also stressed the need for intelligent environments in the improvement of human welfare, proposing a Design for All approach that guarantees accessibility, usability, and independent living for older adults. Barber et al. [32] talked about a multi-robot system to assist older people with some of their daily activities, such as small robots and big robots in a smart home environment, which increasingly reflects the involvement of robotics in elderly care.

Sumit Kumar et al. [33] defined an AI-based health system for mood tracking, which identifies mental health states like loneliness and depression. The integrated system, with tailored machine learning models for assessing one's emotional condition, provides virtual companionship and support groups against social isolation-the same general move for improvement in elderly care through AI-driven solutions.

## III. Methodology

This section describes the approach, tools, and processes used to create and assess the Android-based application designed for dementia care. The development process focused on iterative design, security, and usability to meet the practical needs of patients and caregivers.

### *A. Requirement Analysis*

The initial phase involved gathering requirements through literature review and consultations with caregivers and healthcare professionals. Key features identified included medication alerts, location tracking, visual ID support, voice reminders, emergency contacts, and caregiver-only access modules.

### *B. Design and Development*

The app uses a layered architecture to enhance scalability and maintainability. Each layer serves a distinct purpose:

**Presentation Layer:** Handles the user interface and interactions for key features like reminders, tracking, and contact access.

**Application Layer:** Manages core logic, processes user actions, and links the interface with backend data.

**Data Layer:**Stores patient data, medication schedules, and location logs securely.

**Security Layer:** Ensures only verified caregivers can access sensitive information through robust authentication.

The following architecture diagram visualizes the layers and their interactions:

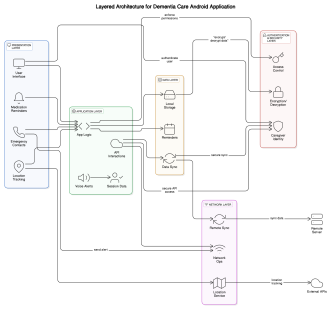


Fig. 1. Layered Architecture for Dementia Care Android Application

### C. User Interface (UI) Design

The UI was designed for simplicity and accessibility, featuring large buttons, high-contrast colors, and clear text to aid dementia patients. Key functions like medication reminders and emergency access were placed on the home screen with minimal navigation. Caregivers accessed a separate secure interface to manage settings and data. Android's built-in accessibility tools, such as screen readers and magnification, were integrated for enhanced usability.

### D. Data Management and Security

To protect sensitive patient information, data was encrypted both in transit and at rest. Patient records were stored locally using SQLite to support offline access. Caregivers authenticated via Firebase with two-factor authentication. Role-based access control (RBAC) ensured users only accessed data relevant to their role, restricting patient access to read-only content.

### E. Testing and Evaluation

Testing involved both emulator and physical device trials.

**Usability:** Interface testing confirmed ease of navigation for both user types, with feedback guiding improvements.

**Performance:** The app was tested for speed and stability, especially with active voice alerts and GPS tracking on lower-end devices.

**Offline Mode:** Critical features, including medication alerts and emergency contacts, were confirmed to function without internet access.

**Security:** Penetration tests verified that encryption and authentication systems effectively protected data against unauthorized access.

### F. Security and Privacy Considerations

The app enforced strong privacy protections through encryption, Firebase Authentication, and RBAC. Personally identifiable information (PII) was minimized and stored only as needed. Audit logs tracked user activity to detect any security concerns, ensuring adherence to privacy standards and safe data handling.

## IV. Implementation

The Dementia Care App has been implemented using a modular architecture designed to support offline functionality, role-based access control, and data isolation. Each component of the system corresponds to a dedicated module responsible for a distinct set of features. The following subsections detail the implementation of each module in accordance with the system architecture.

### A. Medication Management Module

This module lets caregivers schedule, edit, and remove medication reminders. Patients receive timely alerts, with an option to confirm intake through a prompt.

**User Story:** As a caregiver, I need to manage medicine schedules to ensure timely intake.

**Functional Requirements:**

- Require login for medication tasks.
- Create, modify, and delete reminders.
- Trigger local alerts with confirmation options.
- Show all scheduled medicines in a list view.

**Non-Functional Requirements:**

- Store data locally on the device.
- Ensure prompt notification delivery.
- Protect caregiver credentials.
- Allow multiple reminders per patient.

**Implementation:** Medication data is stored using SQLite with Android Room. Alerts are managed by `AlarmManager`, with visual and audio cues. Caregiver logins are secured using Jetpack Security encryption. Each entry uses a unique UUID, and authentication is required for edits or deletions.

### B. Contact Management Module

This module allows caregivers to store and manage emergency contacts with offline support.

**User Story:** As a caregiver, I want to save and display emergency contacts with photos for easy patient recognition.

**Functional Requirements:**

- Secure access for adding, editing, and deleting contacts.
- Validate input fields before saving.
- Display contact photo, name, number, and notes.

**Non-Functional Requirements:**

- Local data storage.
- Stable and responsive UI.
- Efficient image handling.

**Implementation:** Contact info is saved via Android Room. Images are stored using URI paths. Entries are shown in a scrollable `RecyclerView`. Only caregivers can modify data through a secure interface.

### C. Custom Voice and Buzzer Alerts Module

This module lets caregivers record or choose audio alerts for task reminders.

**User Story:** As a caregiver, I want to play custom voice prompts to help patients recognize tasks.

**Functional Requirements:**

- Record, store, and play voice messages.
- Avoid simultaneous alert playback.
- View and manage voice alert list.

**Non-Functional Requirements:**

- Full offline support.
- Adjustable volume settings.
- Easy-to-use setup interface.

**Implementation:** Voice alerts are handled using `MediaRecorder` and scheduled with `WorkManager`. Each entry stores metadata for management. Only one alert plays at a time, and access is restricted to caregivers.

### *D. Location Tracking and Safety Alerts Module*

This module monitors patient location and alerts caregivers when a geofence is crossed.

**User Story:** As a caregiver, I want to be notified if the patient leaves a defined safe area.

**Functional Requirements:**

- Set home location and radius.
- Track patient location continuously.
- Alert caregiver on boundary breach.

**Non-Functional Requirements:**

- Background tracking.
- Power-efficient operation.
- Real-time notifications.

**Implementation:** Using `FusedLocationProviderClient`, the system checks the patient's location against a defined radius. Exits trigger a notification with live map links. Location is managed in a foreground service.

### *E. Patient Contact Viewer Module*

This module shows patients their emergency contacts in a simple, read-only view.

**User Story:** As a patient, I want to view important contacts in an easy-to-read format.

**Functional Requirements:**

- Display contact list in view-only mode.
- Restrict editing based on user role.

**Non-Functional Requirements:**

- Cognitive-friendly UI.
- Offline access.
- Quick loading interface.

**Implementation:** The module reads from the shared Room database. The UI features large fonts and high contrast. Only viewing is allowed for patients; no editing permissions are granted.

### *F. Memory Boosting Game Suite*

The *Play Games* module offers cognitive exercises like **Sound Match** and a **Daily Memory Quiz** to aid memory retention in dementia patients.

**User Story:** As a patient, I want to play simple memory games to stay mentally active and improve recall.

**Functional Requirements:**

- List and launch games (Sound Match, Daily Memory Quiz).
- Store scores and completion logs for caregiver review.
- Provide visual and sound feedback.
- Enable replay of games.

**Non-Functional Requirements:**

- Full offline support.
- Simple, high-contrast UI with large buttons.
- Low system resource usage.
- Intuitive, step-by-step interactions.

**Implementation:** Games are developed as separate activities using Android's native UI. Room Database stores local scores. Sound Match uses audio pairing; the quiz pulls rotating questions. Feedback and navigation are tailored for users with cognitive challenges.

## V. Results

### *A. Result Analysis: Caregiver Dashboard*

The caregiver dashboard provides a simple and user-friendly interface with four main modules: Medications, Contacts, Buzzer Alarm, and Voice Assist. Each module is color-coded with large icons to support quick recognition and ease of use, especially for caregivers managing multiple tasks.

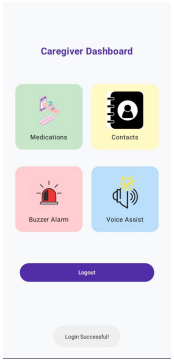


Fig. 2. Caregiver Dashboard with main control modules.

This dashboard effectively meets usability goals and supports efficient caregiving for dementia patients.The proposed Dementia Care Android application integrates five key functional modules designed to assist both patients and caregivers in daily management. The following subsections illustrate the interface outputs generated for each module, validating the app's usability and purpose.

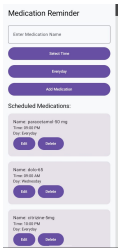


Fig. 3. Medication scheduling interfac

*1) Medication Management Module:* Fig.3 demonstrates the medication scheduling interface, where users can input the name of medicines, specify dosage details, and assign specific times for reminders. This module helps reduce the likelihood of missed doses and enhances treatment adherence through timely alerts.

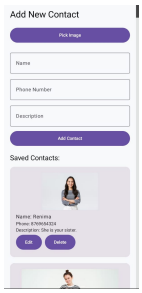


Fig. 4. Essential contact viewer

*2) Contact Management Module:* As shown in Fig.4 the contact management screen provides quick access to critical contacts such as family members and healthcare professionals. The design supports direct calling features and displays key identifiers, enabling patients or caregivers to communicate effectively during urgent situations.

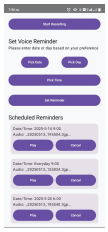


Fig. 5. Voice and buzzer reminder setting

*3) Custom Voice and Buzzer Alert Module:* Fig.5 displays the module that handles personalized voice messages and buzzer notifications. These auditory cues can be configured to alert the patient using familiar voices or distinct sounds, thereby assisting in memory recall and habit formation.

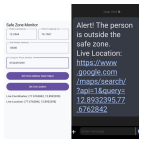


Fig. 6. Real-time location monitoring

*4) Location Tracking and Safety Alerts Module:* The real-time tracking feature, illustrated in Fig:6 utilizes GPS technology to monitor the patient's location continuously. This functionality is essential for safety management, especially in cases where the patient may wander or move into unfamiliar areas. The app is also capable of sending alerts when safe zones are breached.

### *B. Result Analysis: Patient Dashboard*

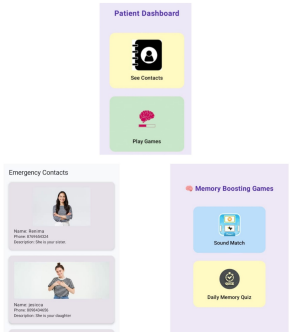


Fig. 7. Patient Dashboard with modules

Fig.7 shows This module offers a simplified dashboard for dementia patients, allowing them to view emergency contacts and engage in basic cognitive activities. As shown in Fig.7, the dashboard includes options to access saved contacts with photos and relationship descriptions, helping patients recognize familiar faces. Additionally, the "Memory Boosting Games" section provides interactive activities such as Sound Match and a Daily Memory Quiz. These features are designed to support memory retention in a user-friendly, offline-accessible interface.

## VI. Conclusion

The Dementia Care App was developed to assist both dementia patients and their caregivers by offering a simple, secure, and offline-capable mobile platform. It includes key features such as medication reminders, voice alerts, emergency contact access, and memory-enhancing games, all designed with the cognitive needs of users in mind. The caregiver module allows secure data management, while the patient interface emphasizes ease of use through minimal design and clear visuals. Testing confirmed that the application is user-friendly and accessible, with offline support and role-based access enhancing its practicality and security.

In future iterations, the Dementia Care App can be expanded to include cloud backup for data synchronization across devices, ensuring better accessibility for caregivers. Incorporating AI-driven behavior analysis may help track patient habits and detect unusual patterns early. Additionally, integrating multilingual support, voice command features, and real-time emergency alerts can further enhance the app's usability and responsiveness. These improvements aim to make the application more inclusive, intelligent, and scalable for wider adoption in dementia care.

## References

[1] M. Zeinullin and M. Hersh, "Tactile audio responsive intelligent system," *Ieee Access*, vol. 10, pp. 122 074–122 091, 2022.

[2] D. Zhu, Y. Jing, R. Huang, Y. Gao, Y. Liu, Z. Zou, and W. Liu, "Designing a mobile application for working memory training through understanding the psychological and physiological characteristics of older adults," *Sustainability*, vol. 14, no. 21, p. 14152, 2022.

[3] A. L. Gross, J. M. Parisi, A. P. Spira, A. M. Kueider, J. Y. Ko, J. S. Saczynski, Q. M. Samus, and G. W. Rebok, "Memory training interventions for older adults: A meta-analysis," *Aging & mental health*, vol. 16, no. 6, pp. 722–734, 2012.

[4] B. Hong and M. D. Barense, "Memory loss and aging: How can we use smartphones to better remember?"

[5] C. Leung, K. C. Wong, W. W. So, Z. C. Tse, D. Li, Y. Cao, and D. H. Shum, "The application of technology to improve cognition in older adults: A review and suggestions for future directions," *PsyCh Journal*, vol. 11, no. 4, pp. 583–599, 2022.

[6] S. A. Wilson, P. Byrne, S. E. Rodgers, and M. Maden, "A systematic review of smartphone and tablet use by older adults with and without cognitive impairment," *Innovation in Aging*, vol. 6, no. 2, p. igac002, 2022.

[7] V. Kalaiselvi, D. P. Rani, V. Dharini, P. P. N. KM *et al.*, "Ghajini-an application for dementia patients," in *2022 International Conference on Communication, Computing and Internet of Things (IC3IoT)*. IEEE, 2022, pp. 1–4.

[8] H. Karamchandani, V. K. Sinha, S. K. Shelake, and A. Singh, "Developing an assistive system for dementia patients using raspberry pi and yolov5: A step towards improved quality of life," in *2024 First International Conference on Software, Systems and Information Technology (SSITCON)*. IEEE, 2024, pp. 1–7.

[9] D. Joshi, A. Abhyankar, C. Sawakare, S. Khandare, S. Shevate, N. Agarwal, and P. Parakh, "Dementaid: A comprehensive web application for dementia's support and memory enhancement," in *2023 5th International Conference on Inventive Research in Computing Applications (ICIRCA)*. IEEE, 2023, pp. 1858–1865.

[10] R. U. Haque, A. L. Pongos, C. M. Manzanares, J. J. Lah, A. I. Levey, and G. D. Clifford, "Deep convolutional neural networks and transfer learning for measuring cognitive impairment using eye-tracking in a distributed tablet-based environment," *IEEE Transactions on Biomedical Engineering*, vol. 68, no. 1, pp. 11–18, 2020.

[11] P. Maresova, S. Tomsone, P. Lameski, J. Madureira, A. Mendes, E. Zdravevski, I. Chorbev, V. Trajkovik, M. Ellen, and K. Rodile, "Technological solutions for older people with alzheimer's disease," *Current Alzheimer Research*, vol. 15, no. 10, pp. 975–983, 2018.

[12] L. C. Paul, S. S. Ahmed, T. Rani, M. A. Haque, T. K. Roy, M. N. Hossain, and M. A. Hossain, "A smart medicine reminder kit with mobile phone calls and some health monitoring features for senior citizens," *Heliyon*, vol. 10, no. 4, 2024.

[13] M. Mehala and J. V. Gripsy, "Voice based medicine reminder alert application for elder people," *International Journal of Recent Technology and Engineering (IJRTE)*, vol. 8, no. 6, pp. 2284–2289, 2020.

[14] C. Zhou, J. Guo, Y. Zhang, T. Huang, and J. Kaner, "A home health management app designed in the post-epidemic era using empirical evidence based on the demand collection of elderly users," *Humanities and Social Sciences Communications*, vol. 11, no. 1, pp. 1–13, 2024.

[15] H.-F. Lee and P.-H. Liao, "The development and impact of an app for a smart drug interaction reminder system," *Technology and Health Care*, vol. 32, no. 3, pp. 1595–1608, 2024.

[16] I. Lazarou, T. G. Stavropoulos, L. Mpaltadoros, S. Nikolopoulos, G. Koumanakos, M. Tsolaki, and I. Kompatsiaris, "Human factors and requirements of people with cognitive impairment, their caregivers, and healthcare professionals for mhealth apps including reminders, games, and geolocation tracking: a survey-questionnaire study," *Journal of Alzheimer's Disease Reports*, vol. 5, no. 1, pp. 497–513, 2021.

[17] B. Ye, C. H. Chu, S. Bayat, J. Babineau, T.-V. How, and A. Mihailidis, "Researched apps used in dementia care for people living with dementia and their informal caregivers: systematic review on app features, security, and usability," *Journal of Medical Internet Research*, vol. 25, p. e46188, 2023.

[18] K. Hackett, S. Lehman, R. Divers, M. Ambrogi, L. Gomes, C. C. Tan, and T. Giovannetti, "Remind me to remember: A pilot study of a novel smartphone reminder application for older adults with dementia and mild cognitive impairment," *Neuropsychological Rehabilitation*, vol. 32, no. 1, pp. 22–50, 2022.

[19] M. K. Scullin, W. E. Jones, R. Phenis, S. Beevers, S. Rosen, K. Dinh, A. Kiselica, F. J. Keefe, and J. F. Benge, "Using smartphone technology to improve prospective memory functioning: A randomized controlled trial," *Journal of the American Geriatrics Society*, vol. 70, no. 2, pp. 459–469, 2022.

[20] A. Şanal, H. C. Alkan, and D. Özdemir, "Mobile application for alzheimer patients (remind me if i forget)," *Journal of Scientific Reports-C*, no. 008, pp. 1–10, 2024.

[21] C. Mettouris, A. Yeratziotis, L. Fixl, S. Parker, J. Starosta-Sztuczka, V. Clarke, G. Rosenauer, W. Daxberger, S. Koumou, M. Panayides *et al.*, "esticky: An advanced remote reminder system for people with early dementia," *Sn Computer Science*, vol. 4, no. 4, p. 334, 2023.

[22] N. Liu, J. Yin, S. S.-L. Tan, K. Y. Ngiam, and H. H. Teo, "Mobile health applications for older adults: a systematic review of interface and persuasive feature design," *Journal of the American Medical Informatics Association*, vol. 28, no. 11, pp. 2483–2501, 2021.

[23] M. H. Lee, D. P. Siewiorek, and A. Bernardino, "Investigating an intelligent system to monitor & explain abnormal activity patterns of older adults," 2025. [Online]. Available: https://arxiv.org/abs/2501.18108

[24] A. Schneider-Kamp and S. Askegaard, "Reassembling the elderly consumption ensemble: retaining independence through smart assisted living technologies," *Journal of Marketing Management*, vol. 38, no. 17-18, pp. 2011–2034, 2022. [Online]. Available: https://doi.org/10.1080/0267257X.2022.2078862

[25] S. Coghlan, J. Waycott, A. Lazar, and B. Barbosa Neves, "Dignity, autonomy, and style of company: dimensions older adults consider for robot companions," *Proceedings of the ACM on human-computer interaction*, vol. 5, no. CSCW1, pp. 1–25, 2021.

[26] A. Vozna and S. Costantini, "Ethical, legal, and societal dimensions of ai-driven social robots in elderly healthcare," *Intelligenza Artificiale*, p. 17248035241310192, 2025.

[27] H. Abdollahi, M. H. Mahoor, R. Zandie, J. Siewierski, and S. H. Qualls, "Artificial emotional intelligence in socially assistive robots for older adults: a pilot study," *IEEE Transactions on Affective Computing*, vol. 14, no. 3, pp. 2020–2032, 2022.

[28] B. Irfan, S. Kuoppamäki, and G. Skantze, "Recommendations for designing conversational companion robots with older adults through foundation models," *Frontiers in Robotics and AI*, vol. 11, p. 1363713, 2024.

[29] F. M. Calatrava-Nicolás, E. Gutiérrez-Maestro, D. Bautista-Salinas, F. J. Ortiz, J. R. González, J. A. Vera-Repullo, M. Jiménez-Buendía, I. Méndez, C. Ruiz-Esteban, and O. M. Mozos, "Robotic-based well-being monitoring and coaching system for the elderly in their daily activities," *Sensors*, vol. 21, no. 20, p. 6865, 2021.

[30] A. A. Cantone, M. Esposito, F. P. Perillo, M. Romano, M. Sebillo, and G. Vitiello, "Enhancing elderly health monitoring: Achieving autonomous and secure living through the integration of artificial intelligence, autonomous robots, and sensors," *Electronics*, vol. 12, no. 18, p. 3918, 2023.

[31] L. Burzagli, P. L. Emiliani, M. Antona, and C. Stephanidis, "Intelligent environments for all: a path towards technology-enhanced human well-being," *Universal Access in the Information Society*, pp. 1–20, 2022.

[32] R. Barber, F. J. Ortiz, S. Garrido, F. M. Calatrava-Nicolás, A. Mora, A. Prados, J. A. Vera-Repullo, J. Roca-González, I. Méndez, and Ó. M. Mozos, "A multirobot system in an assisted home environment to support the elderly in their daily lives," *Sensors*, vol. 22, no. 20, p. 7983, 2022.

[33] S. Kumar, P. Sharma, and M. Karnwal, "Ai-based health management system for elderly people," in *2024 2nd International Conference on Disruptive Technologies (ICDT)*. IEEE, 2024, pp. 1673–1678.