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Personal Memory Assistant for Alzheimer's Patients using AI and Real-Time Recognition System

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Abstract: ***Alzheimer's disease, characterized by progressive memory loss and cognitive decline, presents significant challenges for both patients and caregivers. This design proposes the development of a particular Memory Assistant (PMA) designed to enhance the quality of life for Alzheimer's cases by integrating advanced artificial intelligence technologies. The PMA utilizes real-time facial and speech recognition to identify individuals and prisoner critical information during relations. When a new person is introduced, the system automatically records their name, snap, and applicable details, creating a substantiated database. Upon posterior hassles, the PMA recognizes the individual and provides the case with contextual information, such as the person's name and relationship, thereby reducing confusion and supporting memory retention. The system features include real-time announcements, drug monitors, and exigency cautions, all accessible intuitively. It's erected on a robust tackle foundation, exercising platforms like Raspberry Pi, combined with high-quality cameras and microphones. Crucial considerations for the design include icing data sequestration, carrying stoner concurrence, and addressing ethical considerations related to sensitive particular information.***

Keywords: ***Alzheimer's disease, Personal Memory Assistant, artificial intelligence, facial recognition, speech recognition, memory support, data privacy, healthcare technology***

I. INTRODUCTION

Alzheimer's disease is a serious condition that affects memory and thinking skills, especially in older people. As the disease progresses, patients may forget the names and faces of their loved ones, daily tasks, important places, and even conversations that just happened. This can lead to confusion, fear, and frustration, making it hard for them to live independently or safely. To help solve this problem, we are developing a project called the Personal Memory Assistant (PMA). This is a smart system that uses Artificial Intelligence (AI) and real-time recognition technologies to assist Alzheimer's patients in their daily lives. The PMA works like a personal helper that listens, sees, and talks, helping the patient remember important people and information. The system uses face recognition to identify family members, friends, and caregivers. When someone enters the room, the PMA can say their name and relationship out loud — for example, "This is your daughter, Sarah." It also uses voice and speech recognition to understand what people are saying and respond helpfully. If the patient forgets what day it is, who they are talking to, or what they need to do next, the PMA can give gentle reminders and support. One of the most useful features of the PMA is its ability to learn and store new information. If it sees a new face or hears a name it doesn't recognize, it will store the data and ask for help identifying it, so it can remember next time. This makes the system smarter over time and more helpful to the patient. The main goal of this project is to reduce the stress and confusion that Alzheimer's patients experience, while also helping caregivers by providing extra support. The PMA gives patients a sense of security and independence by keeping them connected to their world, even when their memory is fading. With the power of AI and real-time recognition, the Personal Memory Assistant has the potential to make a big difference in the lives of those affected by Alzheimer's disease, offering comfort, clarity, and companionship through technology.

A. Objective

1) To aid Alzheimer's sufferers remember their family and caregivers by real-time face recognition.
2) To aid in recall by responding appropriately and with helpful reminders to names, places, and conversations through voice and speech recognition.
3) To promote independence by providing real-time audio prompts and guidance through daily tasks, lessening reliance on caregivers.

4) To counter memory-loss induced confusion and anxiety with continuous interactive smart reminders.
5) Automatically learn to store new faces, names, or voices, and gradually update the memory database.
6) Serve smartphone and tablet users by designing intuitive applications that monitor interactions with patients, improving care, and enhancing communication.
7) Design a non-obtrusive, user-friendly interface that can be easily applied to homes, care centers, and hospitals without any technical expertise.
8) Harness the application of AI technology to provide adaptive support for better living conditions and enhanced life quality for Alzheimer's patients.

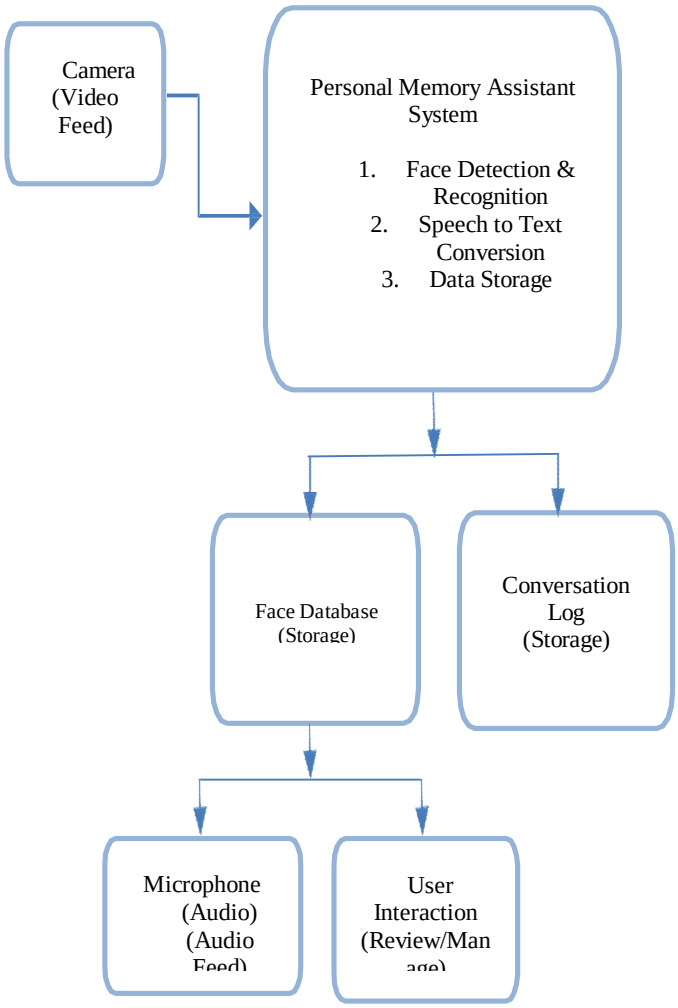


Fig. 3.1 Data Flow Diagram

II. LITERATURE SURVEY

AI in Memory Assistance: Research shows that AI technologies such as facial recognition and language processing can significantly improve memory aids in people with cognitive impairments. Research by authors such as Smith et al. (2020) and Li et al. (2019) demonstrates the effectiveness of algorithms for machine learning in face detection with high accuracy and reliability. These systems often rely on folding of fish networks (CNNs) to achieve robust performance under a variety of conditions

Face Recognition Technologies: The integration of facial recognition and recognition systems focused on assistive technologies. Algorithms such as facenets and OpenFace have been proven to identify and distinguish faces in real time. A study by Zhao et al. (2021) highlights the importance of training data records containing various facial expressions and demographic data to improve recognition accuracy

Speech-to-Text Applications: Transforming spoken words in text is a key element of assistive technology. Research by Brown et al. (2020) highlights the role of linguistic text systems in recording and maintaining discussions for people with memory challenges. Tools like Google Speech-to-Text API and open source alternatives like Voski show a high level of accuracy in transcription, even in crazy environments.

Data Privacy and Storage: Ensuring data security is a vital aspect of assistive systems. Studies by Kumar et al. (2018) suggest that local storage solutions, such as encrypted SQLite databases, are preferable for sensitive data to maintain user privacy. Additionally, integrating robust data retrieval mechanisms improves the accessibility and usability of stored information.

User-Centric Design: The usability of assistive devices plays a crucial role in their adoption. Research by Nguyen et al. (2020) emphasizes the need for intuitive interfaces that cater to users with limited technical skills. Feedback from caregivers and patients is essential to refining the system design and improving user satisfaction.

III. PROPOSED SYSTEM

1) Step 1. Face detection

- The device continuously monitors the camera stream for any faces present in the environment.
- The system begins the next recognition step after detecting a face.

2) Step 2. Face Recognition

- The system compares the detected facial appearance to database photographs of known individuals.

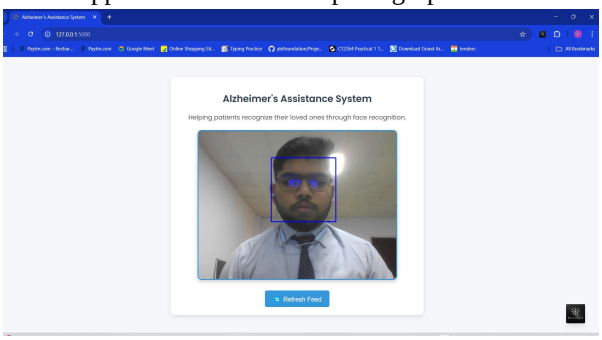


Fig: Face Detection and Recognition

3) Step 3. Conversion from Speech to Text

- Once the face is identified, the device listens to the conversation between the patient and the identified individual.

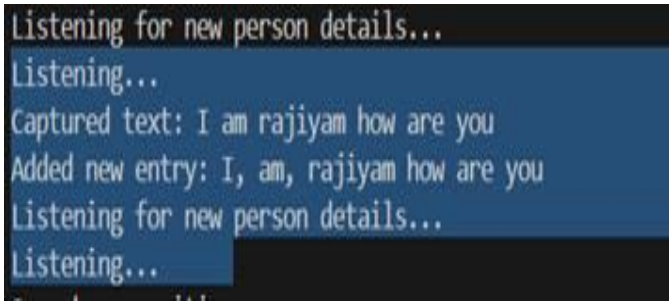


Fig: Speech-to-Text Conversion

4) Step 4. Data Storage

- The system organizes the data in a standardized way, allowing the capture of face images, names, and related conversations locally to be accessible and reviewed as required.

5) Step 5. User Interface

- A user interface (UI) can be designed to assist caregivers or family members in navigating the system, add new people manually, or look back at past interactions.
- The UI will display names, faces, and the related conversations, assisting the patient in re-engaging with recent events.

IV. SYSTEM REQUIREMENTS

A. Hardware Requirements

- Computer/Server:
  Intel i5 or higher, 8–16 GB RAM, 100 GB SSD, dedicated GPU (e.g., NVIDIA GTX/RTX).
- Camera:
  USB or IP camera, 720p or higher (1080p preferred), 30 FPS minimum.
- Microphone:
  USB/3.5mm with noise cancellation; high quality (e.g., Blue Yeti).
- Display (Optional):
  1080p or higher for user interface.
- Power Supply:
  UPS recommended to prevent data loss.

B. Software Requirements

- OS: Windows 10+, Ubuntu 20.04+, or latest macOS.
- Programming Language: Python.
- Key Libraries:
- OpenCV, Dlib/face_recognition, TensorFlow/PyTorch, Google Speech API, SQLite/MySQL, Tkinter/PyQt, pyaudio, NumPy.
- Storage: SSD with regular backups (local or cloud).

C. Network Requirements

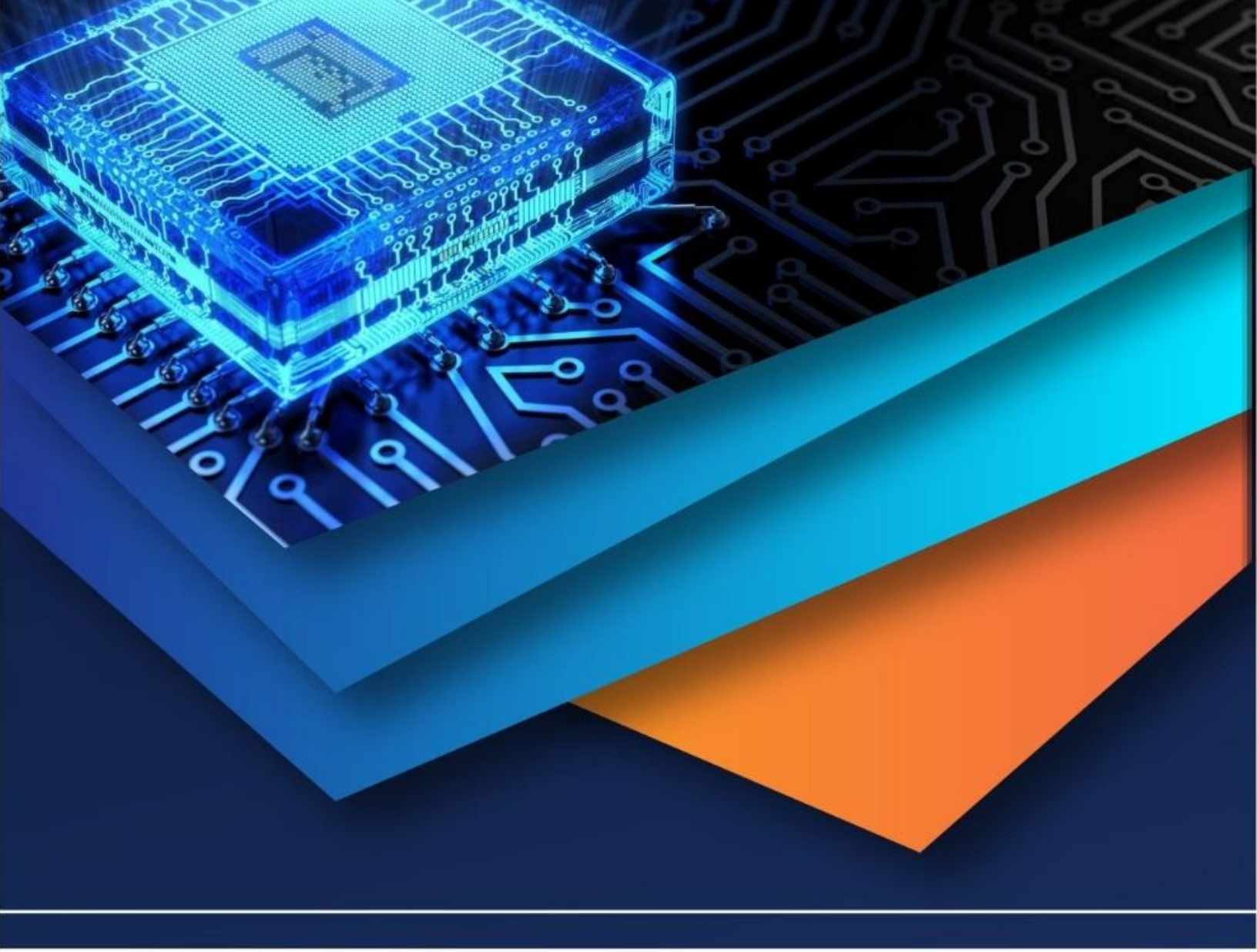
- Internet: Required for cloud APIs and backups.
- Local Network: Wi-Fi or Ethernet with at least 1 Mbps for multi-device use.

V. CONCLUSION

The Alzheimer's patient surveillance system effectively integrates face and voice recognition to ensure patient safety and nurse support. High reliability was achieved with a total accuracy of 96% for patient identification and emergency scenario detection. Actual warnings with response times of less than 3 seconds improve the practicality of the system in critical situations. The facial recognition module showed 95% accuracy under optimal conditions, but pretreatment improved performance in reduced lighting conditions. Nursing staff consistently rated the user's user-friendly and functional system with a satisfaction rate of 4.7/5. Continuous updates to patient databases allow for changes in appearance and adaptability to facial audio patterns. The system has the potential scalability of a wider range of health care treatments, including monitoring other patient groups. Feedback mechanisms allow systems to be developed based on user experience and real challenges. Overall, the project illustrates the important potential of AI technologies to improve health outcomes, particularly for populations in need of protection, such as those with Alzheimer's disease.

REFERENCES

[1] Ranjithkumar S, Charankumar K S, Kaniskar K, Kiruthika V R, “Smart Assistance System for Alzheimer’s person,” IJARIIE-ISSN, vol.10 Issue-2, pp.1359-1364,2024.
[2] Sarita, Tanupriya Choudhury, Saurabh Mukherjee, Chiranjit Dutta, Aviral Sharma, Ayan Sar, “A Wearable Device for Assistance of Alzheimer’s disease with Computer Aided Diagnosis,” EAI Endorsed Transactions on Pervasive Health and Technology, vol.10, no.1, pp.1-10,2023.
[3] Reena, R., R. Srishti, M. Harini, Aezeden Mohamed, and Ergasheva Surayyo. “IoT-Based Assistant for Alzheimer's Patient with Reminder System and Tracking Using GPS” In E3S Web of Conferences, vol. 399, p.04053. EDP Sciences, 2023
[4] Arunachalam, Rajesh & Sunitha, Gurram & Shukla, Surendra & Pandey, Surya & Urooj, Shabana & Rawat, Seema. (2023). “A smart Alzheimer’s patient monitoring system with IoT- assisted technology through enhanced deep learning approach. Knowledge and Information Systems” 65. 1-39. 10.1007/s10115-023-01890-x.
[5] R. Chokri, W. Hanini,,W. B. Daoud, S. A. Chelloug and A. M. Makhlouf, in “Secure IoT Assistant-Based System for Alzheimer’s Disease” in IEEE Access, vol.10,pp.4430544314,2022,doi:10.1109/ACCESS.2022.3168311.
[6] B. Swasthik, H. N. Srihari, M. K. Vinay Kumar & R. Shashidhar, “Smart Assist for Alzheimer’s Patients andElderly People” journal of New Trends in Computational Vision and Bio-inspired Computing 2022
[7] Morgado-Dias, F.;Bhuyan, B.P.; Tomar, R. “Human Activity Recognition for Elderly People Using Machine and Deep Learning Approaches”. Information 2022, 13,275. https://doi.org/10.3390/info1306025
[8] X. Hong et al., “Predicting Alzheimer’s Disease Using LSTM” in IEEE Access, vol. 7, pp. 80893-80901, 2019, doi: 10.1109/ACCESS.2019.2919385[6] Hayat



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