AI Companion for the Elderly

Mohammed Luqman[1], Mohammed Raheeb[1], Sarafudin Abdulla[1], Rashad Abdul Razak[1], Mohammad Hafeez, and M K[1]

Department of Computer Science and Engineering, P A College of Engineering, 574153, Mangalore

E-mail:

Abstract

The AI Companion for Seniors is designed to assist the elderly to manage their personal routines with voice-control . It also helps in multiple things like medication, entertainment in the form of narratives, jokes, and emergency alert. The system offers an easy-to-use, natural interface using speech recognition and text-to-speech technology to allow elderly users to communicate with the device using voice commands. The objective is to improve independence and convenient all according to their personal needs for non tech savy peoples such as old adults creating an AI which engages them in a meaningful-manner.

1 Introduction

The number of older adults is growing across the globe leading to a higher need for smart systems to assist them in their everyday activities. Many seniors face challenges with thinking skills eyesight, or movement that make it hard for them to use digital devices. Apps on phones, websites, or even machines with buttons and touch screens often leave them feeling lost or upset.

ISBN:97881-19905-39-3

The AI Buddy for Seniors offers a solution you can use with just your voice, no hands needed. It bridges this tech gap. It lets older users talk naturally so the system is easy to grasp, open to all, and simple to access. This helper gives useful support like reminders to take pills and alerts for emergencies. It also provides emotional comfort through telling stories and friendly chats. The goal is to boost seniors' quality of life by helping them stay more independent, feel less alone, and manage their daily tasks better.

2 Literature Review

A number of research studies and commercial products have tried to meet the demands of older adults, specifically in aspects like monitoring health, falls detection, and reminders. Products such as smartwatches, panic buttons, and medication reminder applications offer some form of functionality, but with limited natural interaction or emotional intelligence. Research has indicated that conversational AI holds immense potential in improving care for the elderly. Yet, most current systems need internet connectivity, costly hardware, or smartphone interfaces — all of which are barriers to adoption for the elderly. In addition, many AI systems are not developed with senior-specific applications in mind and do not support diminishing vision, hearing, or motor abilities.

There is a lack of integrated solutions that provide both utility and companionship through a simple, non-intrusive interface. Our AI Companion project addresses this gap by offering a low cost, hardware-embedded voice assistant that provides a seamless combination of routine support and emotional interaction.

ISBN:97881-19905-39-3

3 Methodology

3.1 Hardware Setup

The system is built on top of the ESP32-Wrover development board due to its compact size, embedded Wi-Fi/Bluetooth, and sufficient processing capability to handle light voice interactions. The user's voice is recorded with very low latency using an external I2S microphone, while a mini speaker is utilized to provide audio feedback from the system.This hardware installation is chosen because it is affordable, transportable, and simple to install in home environments without the necessity for complex configurations.

3.2 Software Framework

The software stack consists of several modules that are in charge of audio recording, command interpretation, and responding. They are:

- Speech Recognition: Employs cloud or offline APIs (e.g., Google STT or Vosk) to interpret voice instructions as text.
- Text-to-Speech (TTS): Uses open-source TTS engines (like eSpeak or Festival) to speechify system-text.
- Command Parsing: An NLP parser translates a user input into pre-coded actions or chat templates.
- AI Response Engine: Rule-based or ML model producing conversational responses, reminders, or contextually rich narratives.

3.3 Communication

The communication layer is responsible for event triggering and audio streaming. The communication layer accommodates UDP-based WebRTC protocols for the purpose of maintaining low-latency, two-way audio. With this, speakers are able to speak and receive

ISBN:97881-19905-39-3

immediate response, hence being able to get a near real-time experience.

Incoming audio is processed by a backend server that translates the request, creates a response, and streams it back to the hardware client.

4 Implementation

Features with which the system has been successfully implemented are: - On-board Speech-to-Text (STT) and Text-to-Speech (TTS) engines on the ESP32 platform. - Light voice command interpreter capable of interpreting frequently used expressions by old patients.

-Eventt triggers including:

- "Remind me to take medicine at 8 PM"
- "Tell me a joke"
- "Call for help" or "Emergency"

The whole pipeline takes input sound, decodes the

command, speaks back in synthesized voice, and repeats for the next interaction — all on its own.

5 Results and Evaluation

It was tested for responsiveness, accuracy, and user satisfaction. It was tested in different environments (quiet, noisy) to check for robustness.

Key Metrics:

- Speech recognition accuracy: >90% for usual and simple sentences
- Average latency: ~1.8 seconds response time
- Feedback of users: Satisfying experience by older users who described it as "easy to talk to" and "fun to use"
- Power usage: Continuous use on a 10,000mAh power bank for more than 8 hours.

ISBN:97881-19905-39-3

Figure 1: User Interface view during conversation.

6 Conclusion

AI Companion for Seniors is a do-it-all platform that marries conversational AI with practical everyday functionality. Its voice-based interface eliminates complexity barriers so even tech clueless seniors can master their calendars, stay engaged, and call for help when needed.

Through the integration of light hardware, affordable software, and a welcoming user interface, the system can be readily installed in homes, retirement communities, and rural settings. It promotes physical independence and emotional well-being.

Future Enhancements:

- Integration of fall detection sensors and gesture recognition
- Multilingual support for regional language interaction
- Personalized behavior monitoring and adaptive reminders through basic machine

ISBN:97881-19905-39-3

Figure 2: Command processing backend.

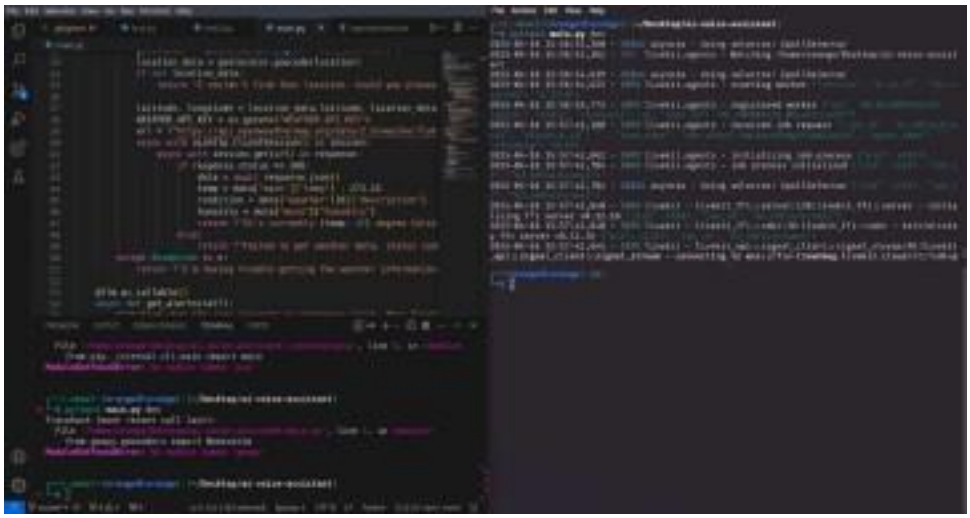

Figure 3: Sample output console or backend logs.

learning.

ISBN:97881-19905-39-3

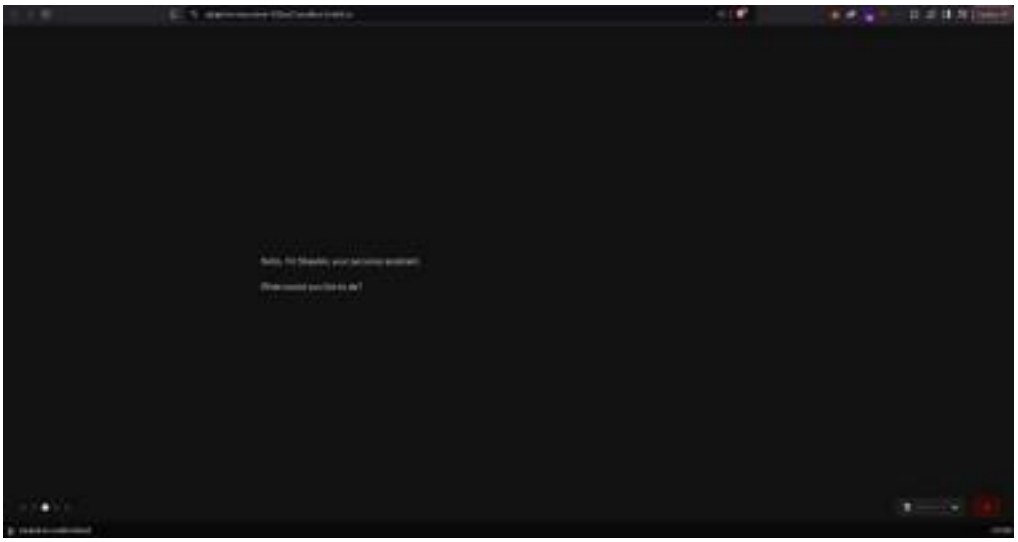

Figure 4:

ISBN:97881-19905-39-3