

Generative-AI Solutions for Connecting Seniors and Healthcare Providers

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Abstract—As the aging population grows, effective healthcare communication becomes increasingly critical, particularly for older adults managing multimorbidity (multiple chronic conditions). Traditional methods often fail to engage this demographic, leading to misunderstandings, inefficient care coordination, and increased provider workload. This paper presents a generative AI-driven solution integrating a multimodal chatbot and an AI-enhanced provider dashboard to bridge this gap. The chatbot employs a hybrid architecture combining intent-driven logic with large language model (LLM)-powered natural language understanding (NLU) for safe, context-aware interactions, while the dashboard synthesizes patient-chatbot dialogues, extracting key insights like sentiment trends, discussion topics, and tone analysis to aid clinical decision-making. Additionally, an LLM-assisted virtual meeting room enables real-time transcription, patient history summarization, and interactive querying of past interactions, streamlining consultations. By leveraging conversational AI, real-time analytics, and AI-assisted care coordination, this scalable solution enhances accessibility, promotes independent living, and improves provider efficiency, offering a transformative approach to patient-centered healthcare for aging populations.

Index Terms—Older Adults Healthcare, Patient-provider communication, Large-language-model

I. INTRODUCTION

The aging population and the increasing prevalence of multiple chronic conditions (MCC) are placing significant strain on healthcare systems worldwide. Older adults face complex health challenges that require continuous monitoring and personalized care. At the same time, healthcare professionals are burdened with heavy workloads, limiting their capacity to provide timely and effective patient support [1]. A critical issue in this landscape is communication between older adults and healthcare providers. Many patients feel disconnected, leading to misunderstandings about treatment plans and self-care [2]. Limited health literacy, difficulties in symptom reporting, and inefficient follow-up methods further exacerbate these challenges. Traditional approaches, such as manual phone calls or outdated digital platforms, often fail to effectively reach patients, increasing their sense of isolation and reducing the overall quality of care [3].

Home-based healthcare services have emerged as a promising solution to improve accessibility and alleviate provider

workload [4]. Additionally, recent advancements in large language models (LLMs) present new opportunities to enhance patient-provider communication. Conversational agents (CAs) powered by LLMs can facilitate natural interactions, extract insights from conversations, and summarize key information [5]. However, deploying LLM-based CAs in healthcare settings poses several risks, including the generation of irrelevant or inaccurate responses [6]. These challenges are particularly pronounced for older adults, who may misinterpret AI-generated guidance, struggle with understanding nuanced information, or experience inconsistencies due to the limited memory of conversational models [7]. Further concerns regarding AI reliability, biased prioritization of health issues, and inaccurate severity assessments also remain unaddressed [8].

While existing research has explored various CAs—such as chatbots, embodied agents, and virtual assistants—for health information delivery and mental health support, many of these solutions suffer from usability limitations, cultural mismatches, a lack of explainability, and are often tailored to deal with a specific task, limiting their adaptability and broader applicability [9].

To address these gaps, this paper presents a generative AI-driven system designed to enhance communication in home-based healthcare. The main contributions of this research are as follows:

- *Multimodal Conversational Agent for Older Adults:* We introduce a chatbot that processes both text and voice, integrating intent-driven logic with LLM-powered natural language understanding (NLU). This hybrid approach ensures safe, context-aware interactions tailored to older adults' needs.
- *LLM-Augmented Clinical Dashboard:* Our dashboard synthesizes patient interactions, extracting sentiment trends, discussion topics, and tonal nuances. It also includes an LLM-powered assistant for real-time transcription, patient history summaries, and quick retrieval of past conversations, enhancing informed and efficient care. It streamlines decision-making, keeping providers informed without adding to their workload.
- *AI Safety and Reliability in Healthcare:* Our proposed system tries to balance LLM-generated responses with structured decision-support and human supervision, miti-