Adoptability of in-home AI healthcare monitoring systems for the elderly in Orlando

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Objective

While the development of Artificial Intelligence (AI) technology related to in-home healthcare monitoring systems is rapidly advancing and becoming increasingly viable for daily application, a significant practical question remains largely unanswered: will the target demographic—the elderly population—actually consider adopting it? The promise of these technologies to enhance independent living and improve health outcomes is substantial, but their success depends entirely on user acceptance. This project will be a study of the prospective for adoptability by the local elderly in the city of Orlando which would allow developers to better understand user needs.

Background

The global population is aging rapidly, placing significant demands on existing healthcare systems. Florida, in particular, has one of the highest proportions of residents aged 65 and older in the United States, with over 21% of its population in this demographic. This demographic shift is particularly evident in regions like Orlando and the broader Central Florida area, which have experienced notable growth in their elderly populations. This aging demographic often requires substantial medical support, as more than 90% of older adults live with at least one chronic condition, and nearly 80% have two or more, such as hypertension, diabetes, and heart disease. [Population Reference Bureau (PRB)]

Current healthcare infrastructure in Central Florida faces significant challenges in meeting the increasing demand for elderly care services. These challenges include persistent healthcare worker shortages, rising care costs, and the desire of most seniors to "age in place"—remaining in their homes for as long as possible. This situation often results in a strain on family caregivers and potential gaps in continuous care, highlighting the need for innovative solutions that complement traditional care models.

Artificial Intelligence (AI) healthcare monitoring systems offer a promising avenue to address these issues. These in-home technologies can provide personalized, continuous monitoring of vital signs, physical activity, and behavior patterns, enable early detection of potential health issues and reduce hospital readmissions. Orlando Health, for instance, has already begun launching AI-driven hospital-at-home services, indicating a local interest in these technologies. Existing systems in the region offer features like fall detection, location tracking, and real-time vital sign tracking via wearable devices, often supported by 24/7 call centers.

Despite the potential benefits, the adoption of these AI systems is not without barriers. Previous research indicates concerns among older adults and healthcare providers regarding technical complexity, privacy and data security, potential loss of autonomy, and the preservation of human connection in care. Acceptability can be mixed, particularly for certain types of devices like

wearable sensors, which may be perceived as uncomfortable or intrusive. To ensure these technologies genuinely enhance quality of life and health outcomes for the elderly in the Orlando area, it is crucial to understand the specific factors influencing their acceptance and use within this local context.

This research proposal aims to investigate the factors that influence the adoptability of in-home AI healthcare monitoring systems for elderly people in Orlando and to identify potential technology features to mitigate existing barriers to implementation.

Research Methods

A mixed-methods approach will be developed, combining both qualitive and quantitative research methods, ideal for comprehensive studying the issue of AI healthcare monitoring technology adoption in Orlando, FL by the elderly. This approach will allow for the identification of key factors and deep understanding of personal experiences and perceptions.

Quantitative Method(Surveys)

Quantitative methods will be used to gather measurable data to identify general trends, assess the prevalence of specific attitudes, and validate findings across a larger sample.

A cross-sectional survey will be designed and conducted using validated scales.

Community-dwelling older adults in the Orlando area with varying degrees of health conditions and prior technology exposure will be targeted.

Goal-directed sampling through local community centers, senior living facilities, and healthcare provider networks in Orlando.

A structured questionnaire will be developed using established theoretical frameworks like the Technology Acceptance Model and the Diffusion of Innovation theory to assess:

- Perceived usefulness
- Perceived ease of use
- Privacy and security concerns
- Demographics and tech literacy

Data analysis will be conducted using descriptive statistics and inferential statistics and exploration of relationships between demographic characteristics, technology perceptions, and willingness to adopt AI systems.

Qualitative Methods (Interviews)

Qualitative methods will provide rich, in-depth insights into subjective experiences, emotional responses, and specific cultural contexts influencing adoptability in Orlando.

A small, diverse subset of older adults from the quantitative phase, as well as their caregivers and healthcare providers in the Orlando area, such as geriatric nurses and physicians.

Goal-directed sampling to ensure a variety of perspectives are captured, such as individuals who are resistant to technology, early adopters, isolated elderly (no familial support) and those with chronic conditions.

Data collection will be through in-depth interviews to explore personal experiences, values and specific scenarios in detail.

Thematic analysis will be used to identify recurring themes, patterns, barriers, and facilitators of AI adoption.

An interview guide will be developed using frameworks like the Theoretical Domains Framework to ensure comprehensive coverage of behavioral determinants, focusing on impressions of AI, expected difficulties, and maintaining the "human touch" in care.

Expected Project Timeline

Months	**May**	**June**	**July**
Finalize research plan, submit project to IRB, develop survey instruments and interview guides.			
Recruit participants from the Orlando area, administer surveys, conduct interviews.			
Transcribe qualitative data after collection, prepare quantitative data and perform statistical and thematic analysis.			
Formulate findings, draft final research report, prepare final deliverable.			

Expected Outcome

Upon completion of this summer research project, several key deliverables will be produced and disseminated to various stakeholders to ensure maximum impact and knowledge transfer.

<u>Deliverables and Dissemination</u>

- Scholarly Journal Article: This academic deliverable will be a manuscript drafted for submission to a peer-reviewed journal. This article will detail our mixed-methods approach, findings on local adoption factors, and theoretical contributions.
- Poster Presentation: A professional research poster will be developed and presented at a UCF undergraduate research conference (SURE) to share our findings within the university community.

Dissemination will be conducted through academic channels and community outreach such as sharing the report with local senior living facilities, area Hospitals, and any other Orlando senior representatives.

This project will yield new knowledge for both the field of AI technology and the local UCF community. By focusing on the area of Orlando, this research provides context-specific data that moves beyond generalized national studies. It will highlight the factors that influence technology adoption in a key metropolitan retirement hub. The mixed-method approach will bridge the gap between what technology seniors might use and why they choose to use or reject it, offering a more robust understanding of user acceptance. This project may promote further research and development of features that would improve the adoption of these technologies in Orlando and therefore, improve elderly care throughout the city.

This project will promote collaboration between the UCF Colleges of Health Professions and Sciences and Computer Science. It provides invaluable data to the UCF academic health center at Lake Nona, helping them tailor future AI healthcare initiatives to the local population's needs. Furthermore, the project serves as a model for interdisciplinary student research focused on solving real-world, local community challenges relevant to the city of Orlando. Finally, throughout this research, a better understanding of the current technological infrastructure and digital literacy levels within the city healthcare organizations will be gained.

Literature Review

Chung, J., Lee, H., & Ku, B. (2020). Healthcare technology acceptance in older adults: A social cognitive theory perspective. Journal of Medical Internet Research, 22(4), e15714.

This article uses Social Cognitive Theory to explore the factors affecting the acceptance of healthcare technology among older adults. It specifically addresses how personal factors (like self-efficacy) and environmental influences (like social support) impact technology adoption, which is vital for understanding community dynamics in Orlando.

Friedrich, Björn. *Empowering Independent Living using the ICF: An Unobtrusive Home Monitoring Sensor System for Older Adults*. Springer Vieweg, 2024. Empowering Independent Living using the ICF: An Unobtrusive Home Monitoring Sensor System for Older Adults | SpringerLink

The book specifies the capabilities of the ICF (International Classification of Functioning, Disability and Health) home monitoring system. The ICF home monitoring system is wearable monitoring system. The book demonstrates the system’s operation and capabilities through text and images. The book provides samples of experiments and data collected. The book also states limitations and potential resolutions. I will utilize this material in understanding AI remote healthcare monitoring system that requires wearables.

Abedi, Hajar, et al. "AI-Powered Noncontact In-Home Gait Monitoring and Activity Recognition System Based on mm-Wave FMCW Radar and Cloud Computing." *IEEE Internet of Things Journal*, 2023. arXiv, AI-Powered Noncontact In-Home Gait Monitoring and Activity Recognition System Based on mm-Wave FMCW Radar and Cloud Computing | IEEE Journals & Magazine | IEEE Xplore

The article first establishes the need for in-home AI monitoring systems before thoroughly describing current technology available currently. The article then introduces the AI-GM&AR system which is designed to improve currently available systems by utilizing better monitoring techniques. The system is also non-contact necessary, allowing the individuals from needing to wear any equipment. Experiment results are presented to support improved algorithms and monitoring techniques. Finally, the article suggests findings support feasibility of continuous passive monitoring of activity within a home and the potential for improvement of clinical practice in the home for individuals. I will utilize this article in understanding AI remote healthcare monitoring wireless system with non-contact capabilities.

Wrede, Christian, Annemarie Braakman-Jansen, and Lisette van Gemert-Pijnen. "Voices of Caregivers: Key Demands Towards AI-driven Home Monitoring in Community-based Dementia Care." *Innovation in Aging*, vol. 5, no. Supplement_1, Dec. 2021, pp. 660-61. Voices of Caregivers: Key Demands Towards AI-driven Home Monitoring in Community-based Dementia Care | Innovation in Aging | Oxford Academic

This article focuses on the growth of AI-driven home monitoring, especially in regard to dementia patients and the need for improved privacy and care for patients. The author used interviews with informal caregivers and home care professionals to formulate an analysis of concerns. The results were that the patients felt that their privacy was at stake as well as feeling like having machines instead of people monitoring them dehumanized them. This article should provide me with background information on previous interviews on the subject. This should help me understand how to approach my interviews with potential adopters and/or critics. My research will be similar to the one in this article, mostly interviewing.

Malviya, Rishabha, and Priyanshi Goyal. *Remote Patient Monitoring: A Computational Perspective in Healthcare*. River Publishers, 2023. e-Reader | Remote Patient Monitoring: A Computational Perspective in H

This book is a comprehensive outline of AI home monitoring systems for healthcare. It provides information on general AI healthcare systems, future and present. The book also explores obstacles and difficulties with this type of technology and discusses the

potential scope of the applicability of such technologies. It is a good introduction to AI in healthcare, especially remote monitoring. I will utilize this for foundational understanding of AI remote monitoring systems in general.

Preliminary Work and Experience

I have thoroughly researched Artificial Intelligence methods for elderly care monitoring at home for my own personal needs. I have elderly in-laws who both suffer from illnesses that require daily monitoring. Even though they do not need assistance around the clock, they have suffered falls that have landed them in the hospital. My spouse and I live and care for her parents. It would be very helpful if someone didn't have to be consistently in the home in order to monitor emergencies. Such a system would give elderly adults much more independence.

Unfortunately, they do not trust technology that would require the installation of cameras inside of their home for monitoring. This has led me to this research project's proposal. Finally, although many young people are open to such technology, many elderly people I interact with don't feel the same way. As a caretaker of elderly people, I am inspired to figure out why and how this can be overcome if possible.

IRB statement

IRB approval will be required since interviews and surveys will be conducted which will involve several organizations.

Budget

The approximate budget requested for this project is $1,230 as specified below:

Category	**Item**	**Cost**
Participant Incentives	Gift cards are provided to all elderly participants for their time and contribution to surveys and interviews. ($20 for 50 participants)	$ 1,000.00
Data Transcription Services	Professional transcription of recorded interviews. Needed for accurate qualitative analysis. (About 8 hours of audio at $25 an hour)	$ 200.00
Research Supplies/Printing	Printing costs for surveys, consent forms, recruitment flyers and final poster presentation materials.	$ 30.00
Total:		$ 1,230.00