ADVANCING INNOVATION FOR AGING

Welcome to PennAITech

We welcome you to our 9th newsletter of the Penn Artificial Intelligence and Technology Collaboratory for Healthy Aging (PennAITech). PennAITech, funded by the National Institute on Aging, is committed to developing, evaluating, commercializing, and disseminating innovative technology and artificial intelligence systems to support older adults and those with Alzheimer's Disease and Related Dementias. We are excited to see our Year 3 pilot awardees starting their projects; our Year 4 pilot award competition is close to completion and the call for Year 5 applicants will open on December 2.

In this newsletter we continue to showcase activities and resources within our Collaboratory. We feature PennAITech Innovation Fellows Justine Sefcik and Shu Yang. PennAITech is committed to mentoring and facilitating research and educational opportunities for our Innovation Fellows.

This fall we had the opportunity to co-sponsor a single day conference on October 10 organized by the Leonard Davis Institute and the Wharton Healthcare Analytics Lab at the University of Pennsylvania on **"Re-Writing the Future of Health Care with Generative AI."** The event provided unique insights into how large language models can improve clinical decision making and patient communication, and highlighted health system and policy strategies to reduce risks and maximize opportunities for advancing health care.

We are pleased to see various stakeholders continue to access and utilize our **PennAITech Video Library** consisting of educational modules focusing on ADRD, aging, AI tools and techniques, ethical implications of research and system design for aging and persons with dementia, and many other domains covered by our PennAITech experts.

Finally, we launched our webinar series for this academic year 2024-2025 in September; all recorded sessions are available on our **YouTube channel**. In this issue we feature Dr. Wexler. We also learn more about the VCU/Emory and etectRx pilot teams. We provide updates from the field and latest news. As always, we invite you to follow our social media platforms, including our YouTube channel and reach out with any questions or suggestions.

George Demiris

Meet the Team

Principal Investigators

George Demiris, PhD, FACMI

Jason Karlawish, MD

Jason H. Moore, PhD, FACMI

Aging Focus Pilot Core

Kathryn H. Bowles PhD, FACMI, FAAN

Pamela Z. Cacchione, PhD, CRNP, FAAN

The overarching goal of the Aging Focus Pilot Core is to promote the advancement of science using technology and artificial intelligence to optimize quality of life and healthcare management for older adults living in their homes independently, as well as those receiving skilled home and community-based services. This Core solicits, selects, and manages pilot studies that develop or test AI and technology applications to detect risks, predict needs, address disparities, improve access to care, and support decision making for chronic illness management and safe aging in place.

AD/ADRD Focus Pilot Core

Lauren Massimo PhD, CRNP

Dawn Mechanic-Hamilton, PhD

The overarching goal of the Alzheimer's Disease and Alzheimer's Disease Related Dementias (AD/ADRD) Focus Pilot Core is to promote the advancement of science and engineering for predictive analytics, clinical decision support, or the care of adults with AD/ADRD. This Core solicits, reviews, and supports pilot studies that develop or advance the use of AI and technology for AD/ADRD predictive analytics, clinical decision support, or the care of adults with AD/ADRD.

Meet the Supporting Core Team

Networking and Mentoring Core

The overarching goal of the Networking and Mentoring Core is to support activities intended to facilitate networking and mentoring for the awardees of the Aging and AD pilot projects, all of whom are invested in Artificial Intelligence (AI) approaches and technology for aging adults, including those with Alzheimer's disease or related dementias (AD/ADRD).

This Core organizes and supports consortium networking activities and communicates with the broader scientific community.

Marylyn D. Ritchie, PhD

Technology Identification and Training Core

Li Shen, PhD, FAIMBE

Ryan Urbanowicz, PhD

The overarching goal of the Technology Identification and Training Core is to use evidence from the literature, stakeholder and expert inputs to identify the technology needs of older Americans, as well as develop training activities for artificial intelligence (AI) and technology for scientists, engineers, clinicians, medical professionals, patients, policy makers, and investors.

Ethics and Policy Core

Emily Largent, JD, PhD, RN

Anna Wexler, PhD

The overarching goal of the Ethics and Policy Core is to shift the current ethics and policy paradigm by focusing on issues that arise at the intersection of aging and of AI methods and technologies for healthy aging. The Core will work in close collaboration with the other PennAITech Collaboratory Cores to address four key issues: (1) promoting the autonomy of older adults by balancing considerations of usefulness and intrusiveness; (2) protecting older adults in light of vulnerability due to cognitive and functional decline; (3) mitigating bias and addressing health disparities, such as racial disparities and urban-rural disparities; and (4) safeguarding the data privacy of older adults.

Clinical Translation and Validation Core

The goal of the Clinical Translation and Validation Core is to use the science and practice of geriatrics and gerontology to assess the feasibility and clinical utility of artificial intelligence (AI) methods for clinical decision support and of new technology for monitoring aging adults in their home. This Core provides an expert panel to assess the feasibility and clinical value of new artificial intelligence models for predictive analytics and clinical decision support and of new technologies designed to monitor aging adults and those with AD/ADRD. It provides a testbed for new technologies designed to monitor aging adults and those with AD/ADRD with an emphasis on underserved and rural populations.

Jason Karlawish, MD

Rebecca T. Brown, MD, MPH

Stakeholder Engagement Core

The overarching goal of the Stakeholder Engagement Core (SEC) is to ensure that technology solutions and AI approaches proposed and developed by the PennAITech Collaboratory are maximally adoptable by and accessible to their end users by soliciting ongoing stakeholder input and involving all key parties throughout all phases of the development and testing processes. The Core maintains a technology consortium (consisting of technology companies, startups, venture capital firms, and angel investors) that provide guidance and collaboration opportunities for pilot projects and a platform for potential dissemination and commercialization of innovative tools.

George Demiris, PhD, FACMI

Lisa M. Walke, MD, MSHA
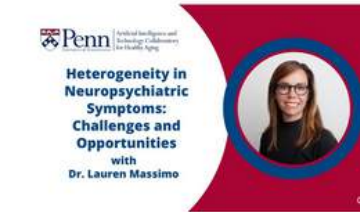
Internal Advisory Board (IAB)

John Holmes, PhD, FACE, FACMI

The Internal Advisory Board (IAB) plays an important role in providing perspective and detailed advice and recommendations to the leadership team and the core directors. The IAB is chaired by Dr. John Holmes who is a Professor of Informatics and Epidemiology with significant experience in artificial intelligence and clinical decision support. We have assembled a team of local Penn experts representing three key areas of expertise. The first area, Biomedical Informatics and Artificial Intelligence, includes Drs. John Holmes (Professor of Informatics, AI expert), Ross Koppel (Professor of Sociology, EHR expert), Konrad Kording (Professor of Computer Science and Neuroscience, AI expert), Insup Lee (Professor of Computer Science and Engineering) and Danielle Mowery (Chief Research Information Officer). The second area, Geriatrics and Medicine, includes Drs. Mark Neuman (Anesthesiologist specializing in older adults), Matt Press (Medical Director of Primary Care), and Ramy Sedhom (Palliative Care, Geriatric Oncology, Penn Medicine Princeton Health). The third area, Home Care, includes Danielle Flynn (Director, Penn Medicine Home Health), Nancy Hodgson (Professor of Nursing), Bruce Kinosian (Division of Geriatrics), and Brian Litt (Director, Penn Center for Health, Devices, and Technology).

We are excited to feature our PennAITech Video Library consisting of educational videos covering a broad range of topics from an introduction to Alzheimer's Disease and Related Dementias to Basics of Artificial Intelligence, Machine Learning and Natural Language Processing. The library addresses clinical, technical and ethical implications of designing and deploying AI and other technologies for aging and persons with dementia and their families. The topics include:

PennAITech Video Library

Introduction to PennAITech

AD/ ADRD: Definitions

Heterogeneity in Neuropsychiatric Symptoms: Challenges and Opportunities

Understanding Functional Status Among Older Adults

Generative AI and Aging

AI and Machine Learning for ADRD

Automated Machine Learning and Best Practices in Data Science

Interprofessional Robotics Research

Ethical Considerations in Human Subjects Research

Ethical Considerations for Wearable Devices and AI applications

Engaging older adults and geriatric specialists in the design of new technologies

Translating AI to the bedside

Big Data and ADRD

Digital Technology Use in Cognitive Assessment: Is it feasible and does it add value?

Passive Sensing and Smart Homes for Aging

Treating Sepsis

Click Here for Full Playlist

TEAM MEMBER SPOTLIGHT:

Anna Wexler, PhD

Assistant Professor of Medical Ethics and Health Policy, University of Pennsylvania Perelman School of Medicine

Tell us about your research interests. Describe some of your research projects.

I research the ethical, legal, and social implications of emerging technology, particularly in the fields of digital health, wearables, neurotechnology, and direct-to-consumer products. I'm interested in how these new technologies challenge traditional paradigms of scientific and medical research. My research spans the gamut but much of it involves empirical research, such as using interviews, surveys, or case studies to better how various stakeholders—patients, clinicians, and research participants—utilize new forms of technology to manage their own health or to conduct research.

What is your role within PennAITech?

My colleague Emily Largent and I co-lead the Ethics and Policy Core. We provide guidance to pilot grant awardees and help answer questions from potential applicants. We also publish resources to help guide those developing AI technology to consider ethical issues. For example, our paper in Nature Communications offered ethical considerations for those developing and testing minimal-risk wearable devices, and we have a forthcoming piece in BMC Digital Health about ethical and regulatory considerations across the digital health product-development lifecycle. Our goal for the work we do as part of PennAITech is to be practical – to try and speak the language of developers and engineers and provide real-world guidance, rather than just staying at a theoretical or philosophical level.

What do you see as the role of artificial intelligence and technology in biomedicine and health care in the next few years?

AI is already playing a significant role in healthcare and we're going to see this role continue to evolve in the coming years. Right now, there's a lot of hype surrounding what AI may be able to do, as well as a lack of public understanding regarding the strengths and weakness of different types of AI applications. For example, AI is unlikely to replace physicians entirely in the near future. Instead, various applications of AI will serve to enhance healthcare providers' capabilities, likely automating routine tasks and augmenting clinical decision-making. Hopefully this will lead to improved efficiency and patient outcomes—but a lot depends on the types of the applications that will be developed and how they are integrated into the existing healthcare system.

What advice do you have for innovators and entrepreneurs who are embarking on works harnessing the potential of AI or other technologies for aging?

Well, I am an ethicist, so I'd say, don't forget about ethics! There's an active conversation going on about AI ethics, and much of the discourse has centered on the ethical use of AI in healthcare applications. While there is no one agreed-upon set of ethical guidelines in AI, there are ethical issues that tend to emerge repeatedly–for example, related to bias, transparency, and fairness—that are important to consider. And in the aging space in particular, it's critical to keep in mind that many individuals may be vulnerable or may not have the capacity to consent to research. So if you're conducting human subjects research, there may be extra steps you need to take, from an ethical perspective, when working with this population.

INNOVATION FELLOW SPOTLIGHT:

Justine Sefcik, PhD, RN

**Assistant Professor, Drexel University,
College of Nursing and Health Professions**

**Adjunct Assistant Professor,
University of Pennsylvania, School of Nursing**

Tell us about your research interests. Describe some of your research projects.

I am the recipient of a K23 Mentored Patient-Oriented Research Career Development Award from the National Institutes of Health National Institute of Nursing Research. My project is titled, "A Person-Centered Environmental and Sensory Intervention for Nursing Home Residents with Dementia who Exhibit Persistent Vocalizations". This project aims to test the acceptability and feasibility of using a person-centered nature-based intervention in the nursing home setting.

How do you envision the role of AI and technologies in supporting aging?

I envision the role of AI and technologies in supporting aging as multifaceted, focusing on enhancing the quality of life for older adults. AI and technology could play a role in health monitoring, social interaction, memory aids, and safety. I would like to see AI and technology as tools to empower older adults to live more independently and with greater dignity while supporting caregivers and healthcare providers.

What do you see as some of the greater opportunities and challenges for the future?

I believe that AI and technology in terms of aging research and care of older adults presents both significant opportunities and challenges. From my perspective, the opportunities include enhanced quality of life, cognitive support, and preventative health care. In terms of challenges for the future, I think there are three major ones to consider. The first is privacy and security. The second is technological adaptation which could be challenging for older adults and their caregivers. The third is the ethical deployment of AI.

INNOVATION FELLOW SPOTLIGHT:

Shu Yang, PhD

Postdoctoral Researcher at Li Shen lab, Department of Biostatistics, Epidemiology and Informatics

Tell us about your research interests.

Describe some of your research projects.

As a computer science PhD by training, my research interests lie at the intersection between artificial intelligence and bio/medical informatics, with a current focus on developing novel methods to leverage multimodal data for Alzheimer Disease (AD) research. For example, understanding the relationship between genetic backgrounds and brain imaging phenotypes for AD offers promising opportunities for risk prediction and subtyping at the individual level. With the recent availability of numerous genetic variants from genotyping and whole genome sequencing data for AD/control cohorts, I am working with my mentor and colleagues on efficient model parameterization techniques for deep neural networks to handle high-dimensional genetics data with small samples and make connections to brain imaging phenotypes. In addition, as large language models (LLMs) demonstrate promising performances across various applications, we also examine their potential in AD, and we have developed a novel framework where LLM and AD-specific knowledge graph (KG) mutually enhance each other. We first leverage LLM to construct an evolving KG based on scientific literatures/text modality of AD, and then we implement a knowledge retrieval approach to select appropriate knowledge from the KG to augment LLM's inference capabilities in AD-related tasks such as question answering or drug repurposing.

How do you envision the role of AI and technologies in supporting aging?

AI and technologies have transformed many aspects of aging support over the past decade, we have witnessed the success of deep neural networks in diverse aging-related tasks such as smart home assistance, clinical biomarkers detection, disease progression prediction etc., and I believe they will continue to play the leading role to revolutionize the field in the coming decade likely at an even faster pace. At this moment, pre-trained large language models (LLMs) have showed us unprecedented capabilities and drastically changed the best practice in various language-related tasks. This also indicates potential paradigm shift in aging-related applications such as personalized medicine, virtual chatbot or cognitive function monitoring, EHR analysis and management etc. For instance, I study Alzheimer Disease (AD) and in my field, researchers are exploring using LLM agents for AD early detection: we can allocate a set of LLMs each specialize in one area of AD like radiology, neurology, genetics etc. to give AD diagnosis based on their own specialties, and then we can have them discuss or debate with each other to reach a consensus diagnosis, much like expert panel consultation in reality.

What do you see as some of the greater opportunities and challenges for the future?

On the research side, with the rise of powerful large language models (LLMs) like GPT4, the gap between the pre-trained models and the downstream tasks has become narrower than ever before. This will lead to a research paradigm shift in the near future, which opens up great opportunities but also brings new challenges. Taking my area of Alzheimer Disease as an example, pre-trained language models were mainly used to extract high-level text features or initialize model weights for downstream tasks like EHR analysis etc. in the past. But now the models become much more powerful and take on more responsibilities: we may just prompt GPT4 to make disease predictions without even needing to fine-tune the model weights to get good performances. However, since the most powerful models like GPT are not open-sourced and maintained by monopolies, there are data privacy issues and ethical challenges. Even if they became open-sourced, the enormous resources (data, high-end GPUs, electricity) required to train such models also make it impossible for individuals or even typical academic institutions to do it.

![Penn - University of Pennsylvania. Artificial Intelligence and Technology Collaboratory for Healthy Aging]

INTRODUCING OUR 2024-2025 PILOT AWARDEES

Xina Quan
Improved algorithms for wearable, passive, noninvasive BP monitoring for seniors
PyrAmes

Soheyla Amirian
AI-powered Web Application to Analyze Knee Joint Space for Aging Population
Pace University

Rui Zhang
Task-Oriented Multimodal Conversational AI for Assisting Seniors with Daily Tasks
Penn State University

Emily Moin
Determinants of access to and outcomes following specialized palliative care for patients with ADRD
University of Pennsylvania

Chun Lim
Mobile technology as a cognitive biomarker of Alzheimer's disease
Beth Israel Deaconess Medical Center (BIDMC)

Mohammad H. Mahoor
Building Deep Digital Twins for Prediction of AD/ADR/MCI in Older Adults
DreamFace Technologies, LLC

Ab Brody
Aliviado Dementia Care Machine Learning Algorithm Development for Caregiving
New York University

Nicholas Kalaitzandonakes
AI/ML Analyses of Mobility Changes Among Elderly Using Continuous Gait Data
Foresite Healthcare

Daniel Press
Developing a Home Cognitive Vital Sign to Detect Cognitive Changes AD
Beth Israel Deaconess Medical Center (BIDMC)

Trent M. Guess
Motor function assessment for mild cognitive impairment, frailty, and fall risk
University of Missouri

Hualou Liang
Detecting Cognitive Impairment using Large Language Models from Speech
Drexel University

Xiaopeng Zhao
MUSICARE-VR: Music Intervention with Virtual Reality for Alzheimer's Care
University of Tennessee, Knoxville

![Penn University of Pennsylvania — Artificial Intelligence and Technology Collaboratory for Healthy Aging]

Gary Weissman
Advancing Diagnostic Excellence for Older Adults through Collective Intelligence and Imitation Learning
University of Pennsylvania

Maria Valero
GlucoCheck: A Non-invasive & AI-assisted Blood Glucose Monitoring Device for Older Adults

Kennesaw State University

Tony C Carnes
Real-time remote monitoring of confirmed medication adherence

etectRx

Maryam Zolnoori
A speech-processing algorithm for automatic screening of African American patients with mild cognitive impairment and early dementia in home health settings
Columbia University Medical Center and VNS Health

Jane Chung
A Device Free WiFi Sensing System to Assess Daily Activities and Mobility in Low-Income Older Adults with and without Cognitive Impairment
Virginia Commonwealth University

Xinyu Zhang
Non-Intrusive, Fine-Grained In-Home Daily Activity Transcription for Alzheimer's Monitoring
University of California San Diego

Aidong Zhang
Fairness and Robust Interpretability of Prediction Approaches for Aging and Alzheimer's Disease

University of Virginia

Clara Berridge
Talking tech with dementia care dyads: Improving a self-administered tool to support informed decision
University of Washington

Sandeep Patil

Prevention of Patch Poisoning in Elderly Alzheimer's Patients
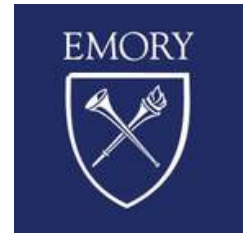
Vaaji LLC

Julie Faieta
Health App Review Tool: Connecting those Affected by Alzheimer's to Needed Technology Support
University of Pittsburgh

PILOT IN THE SPOTLIGHT:

A Device Free WiFi Sensing System to Assess Daily Activities and Mobility in Low-Income Older Adults with and without Cognitive Impairment

TELL US ABOUT YOUR PROJECT AND WHAT YOU HAVE DONE THIS YEAR.

Cognitive impairment affects the ability to perform and manage daily activities and mobility behaviors. Detecting the changes in these abilities early is crucial but often challenging in low-income older adults due to limited resources. Our goal is to meet the unmet needs of low-income older adults by creating a low-cost, cutting-edge system that uses WiFi signals to recognize different patterns of in-home activities and mobility. As a first step, we developed a device-free WiFi sensing system using machine learning classification to categorize and quantify daily activities. We deployed the sensor system in residences of low-income senior housing to collect WiFi signal data for up to 7 days. We tested the system's accuracy and examined daily number and duration of each activity performed. Also, we explored low-income older adults' perceptions of using novel sensing technology for functional monitoring.

Device-Free Wi-Fi Sensing Technology to Assess Daily Activities and Mobility in Low-Income Older Adults

Jane Chung, PhD, RN*; Eyuphan Bulut, PhD; Md Touhiduzzaman, BS; John Karlsen, AS; Megan Vain, BS; Ingrid Pretzer-Aboff, PhD, RN
Virginia Commonwealth University, Richmond VA
PennAITech AD/ADRD Focus Pilot Core

BACKGROUND

- **Low-income, minority older adults** are at an increased **risk of cognitive impairment** and dementia.
- Cognitive impairment affects *the ability to perform and manage daily activities and mobility behaviors.*
- **Assessing the ability to perform daily activities and detecting the changes in these abilities early is crucial,** but often **difficult** in this population due to **limited resources.**
- Traditional activity and mobility assessment tools are primarily self-report, subjective, and episodic.
- Existing smart home sensors show **limited ability to detect different types of human behaviors** (e.g., eating, preparing meals).
- Sensing devices are not readily available to older adults with health disparities due to cost and information barriers.
- There is a need to develop **new sensing technology that can characterize and quantify daily activities** while also *being discreet, affordable, and requiring minimal user engagement.*
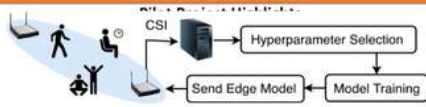
PROJECT GOAL

To develop a Channel State Information (CSI)-based device-free Wi-Fi sensing system using ML classification to localize and recognize different in-home daily activities and mobility. *Our ultimate goal is to create an affordable cutting-edge system that uses Wi-Fi signals for assessing physical function in low-income older adults.*
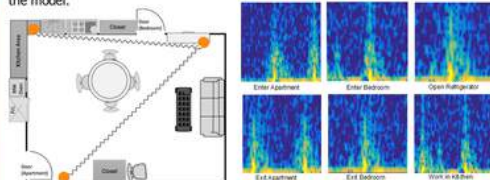
PILOT PROJECT HIGHLIGHTS

Figure 1. Overview of the typical WiFi sensing system

Technology Description: We leverage existing Wi-Fi infrastructure or use low-cost devices to transmit Wi-Fi signals in the home environment. The CSI of Wi-Fi signals in all subcarriers are used for communication between Transmitter and Receiver devices. We employ ML algorithms to process the CSI data and extract different activity features, such as sitting, meal preparation, kitchen sink use, watching TV, phone use, and entering/exiting home.

Participants: Individuals living in low-income senior housing (aged 60 and older) with and without mild cognitive impairment.

Preliminary Results: Seven participants have enrolled in the study. The following images show a participant's floor map with our setup and the spectrogram images obtained from 6 different activities of the participant. We are developing a Convolutional Neural Networks (CNN) model to establish the accuracy of activity detection based on the preprocessed raw data. Our CNN model based on a single participant was 68.8% accuracy. We will use data with more variations to fine tune the model.

CONCLUSIONS & IMPLICATIONS

- **The ability to identify and differentiate human activities** will be improved when algorithms to disambiguate the data are fully available.
- This initiative aims to empower low-income older adults by harnessing the power of Wi-Fi sensing technology and ML to detect functional decline early that signals cognitive impairment. **By providing an accessible and cost-effective solution, we can improve the lives of older adults with health disparities and enhance their brain health.**
- Wi-Fi sensing system facilitates passive monitoring, which does **not require user involvement.** Our target population has **limited digital technology experience and low IT literacy.** This technology may provide a more effective sensing solution to older adults with cognitive decline, functional impairment (e.g., visual or hearing impairment), limited technology experience, low literacy, and/or lack of technology support, potentially **achieving digital health equity.**

ACKNOWLEDGEMENT

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School of Nursing

WHAT ARE THE LONG TERM GOALS FOR YOUR RESEARCH?

This WiFi sensing system has the potential to enable early detection of physical decline in community-dwelling older adults at risk of cognitive impairment and dementia. Our long-term goal is to empower low-income older adults by leveraging WiFi sensing technology and machine learning to timely detect cognitive decline. Building on the results of this project, we aim to develop a sensing infrastructure for assessing physical function and predicting dementia risks. This system will be designed to be user-friendly, accessible, and affordable for low-resourced older adult populations. Our vision is to create a more effective sensing solution for older adults with cognitive decline, functional impairments, limited technology experience, low literacy, or lack of technology support, ultimately advancing digital health equity.

HOW DO YOU ENVISION THE ROLE OF AI AND TECHNOLOGIES IN SUPPORTING AGING?

I envision AI and technology playing a crucial role in supporting healthy aging by providing personalized and accessible solutions that address the unique challenges faced by older adults. AI can enable early detection of functional decline, monitor social well-being, and offer timely interventions to enhance the quality of life for aging individuals.

By leveraging digital biomarkers, smart devices, and machine learning, we can develop systems that monitor health in real-time, identifying risks such as cognitive impairment, physical decline, or social isolation before they lead to adverse outcomes. These technologies can be designed to be user-friendly, non-intrusive, and tailored to diverse older populations, including those with limited technology experience.

AI and technology can empower older adults to maintain independence, improve their well-being, and ensure they receive the care they need. This vision promotes equitable access to resources, fostering a society where aging individuals can thrive and enjoy the fullest potential of their health.

PILOT IN THE SPOTLIGHT: etectRx™

Real-time remote monitoring of confirmed medication adherence

Tony Christopher Carnes, PhD
Senior Vice President, Operations
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Pamela Alpert, CCRC
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Real-Time Remote Monitoring of Confirmed Medication Adherence

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PennAITech Aging Focus Pilot Core

University of Colorado
Denver | Anshutz Medical Campus

PennAITech

Abstract

The FDA-Cleared ID-Cap™ System is a seamless, end-to-end solution for remotely monitoring, tracking and improving medication adherence in real time. Using the world's first and only off-body ingestion event monitor, along with Alexa integration, enables real-time medication adherence monitoring and encouragement to assist with aging in place.

Emily, it's time to take your medication.

Milestones

✓ Design gathering and acceptability study completed
✓ Several software solutions with design informed by the completed study are in the verification phase
✓ Reader design completed with UCD also enables real-time incontinence monitoring at home and in assisted living facilities

Pilot Project Highlights

Key Participant Metrics

Participants Enrolled	Patients Enrolled	Care Provider Enrolled	Male Participants	Female Participants	Mean Participant Age
15	14	1	7	8	76.6

Identified Themes

- **93%** Have smartphones, predominantly iOS
- **80%** Can download apps by themselves from app stores
- **2-15** Meds per day. **93%** take all meds at one time
- **87%** Take meds each day at the same time
- **93%** Have heard of Alexa and **20%** are actively using Alexa
- **33%** Actively use some type of voice assistant
- **73%** Use pill boxes to help with medication management and believe it helps, but are concerned about effectiveness in the future
- **93%** State they are independently managing their meds
- **87%** Have Wi-Fi at home

Key Design Takeaways

- **93%** Think reminders would be helpful
- **33%** Would also like reminders on their phone
- **60%** Think secondary reminders would also be helpful
- **60%** Would allow caregiver to help with setup
- **33%** Stated they would setup device
- **67%** Believe a visual display of ingestion history would be helpful
- **53%** Would like device to identify you before making reminder announcement

Conclusions

20% Of subjects expressed concern about devices "listening" and security of devices like the Echo – Maybe consider speaker instead?

100% Believed that they would need help eventually with medication management beyond that which is provided by a pill box

- The vast majority believed a home reminder system would be helpful but would need help making adjustments to the device
- Strong consensus that caregiver should receive notification regarding medication non-compliance
- Verbiage consensus from reminder <Name>, <Medication>, time to take or some variant. (John, please take your XXX at 8am)

Acknowledgements

TELL US ABOUT YOUR PROJECT AND WHAT YOU HAVE DONE THIS YEAR.

The FDA-cleared ID-Cap® System offers a seamless, comprehensive solution for remotely monitoring, tracking, and enhancing real-time medication adherence. By leveraging the world's first and only off-body ingestion event monitor and integrating with Alexa, this system enables real-time monitoring of medication adherence and encourages aging in place.

The ID-Cap® System features a small, ingestible sensor housed within a gelatin pill capsule containing the patient's medication. Once the ID-Capsule is swallowed, the sensor activates upon contact with gastric fluid, transmitting a digital message to a wearable reader worn on the patient's neck or wrist. This reader promptly relays the ingestion event to a patient app and clinician dashboard in real-time, confirming successful medication intake.

To enhance support for seniors aging in place, we have embarked on exploring anew iteration of the previously worn reader—a room-based reader. This advancement offers an integrated home solution that eliminates the need to remember to wear the reader to detect ingestion events.

WHAT ARE THE LONG TERM GOALS FOR YOUR RESEARCH?

The objective of this design progression is to enable seniors to prolong their stay at home with personalized medication reminders and real-time ingestion verification.

To create a solution that not only achieves this objective but is also well-received by users, we conducted a survey involving a total of 15 participants to assess the acceptance of the room reader's evolution.

Our research revealed that all participants expressed a belief in the eventual need for assistance with medication management beyond what a traditional pill box can offer. The majority also expressed a favorable view toward a home reminder system, although they anticipated requiring assistance with device adjustments.

The final design and functionalities of the room reader must instill confidence and provide support for both the senior user and their designated caregiver who oversees their medication adherence.

HOW DO YOU ENVISION THE ROLE OF AI AND TECHNOLOGIES IN SUPPORTING AGING?

AI enables the utilization of technology in unprecedented ways, leading to notable enhancements in the lives of seniors. Despite a common belief that the elderly struggle to engage with new technology, our research indicates that with suitable guidance and assistance, they can successfully adapt. The room-based reader presents a valuable opportunity for seniors to prolong their independence at home, reducing their dependence on memory and incorporating our integrated medication adherence system for support.

NEWS FROM THE FIELD

WHAT'S HAPPENING IN AI?

Zoom plans new genAI capabilities for healthcare providers

The Zoom telehealth platform will leverage the Suki artificial intelligence system to create clinical notes, aiming to alleviate the documentation workload. Zoom will incorporate Suki's AI-powered Suki Platform to generate clinical notes and integrate additional automation features to enhance both the provider's experience and patient care. Suki's technology will support ambient clinical documentation for both Zoom-based telehealth sessions and in-person consultations. For more information visit:

https://www.healthcareitnews.com/news/zoom-plans-new-genai-capabilities-healthcare-providers

Cleveland Clinic and Amazon to launch coordinated care

The Cleveland Clinic health system announced that its collaboration with Amazon One Medical will introduce new primary care offices in the Cleveland area, aiming to enhance the patient experience across all interactions. This partnership with Amazon One Medical, which provides a blend of virtual and in-person primary care services, seeks to broaden access to coordinated, high-quality care in Northeast Ohio.

https://newsroom.clevelandclinic.org/2024/10/21/cleveland-clinic-and-amazon-one-medical-announce-collaboration-to-expand-access-to-high-quality-coordinated-care-in-the-cleveland-area

In the UK AI to help doctors spot broken bones on X-rays

According to the National Institute for Health and Care Excellence (NICE), artificial intelligence (AI) has the potential to reduce the number of undetected fractures when doctors review X-rays. Research indicates that the technology is safe and could accelerate diagnosis, easing the burden on healthcare professionals and lowering the need for some follow-up appointments. Four AI tools are expected to be recommended for use in urgent care settings in England, while further evidence on their benefits is gathered.

https://www.bbc.com/news/articles/c2060gy9zy1o

Chatbots for scheduling health visits

According to the Talkdesk U.S. Consumer Healthcare Survey, conducted in August 2024 via the Pollfish online platform, nearly 66% of U.S. patients with sensitive health concerns feel more at ease scheduling appointments with chatbots than with human staff. The survey gathered responses from 1,000 adults aged 18 and older. Additionally, 62% of respondents indicated that the support provided by their healthcare organizations has either declined or stayed the same over the past year.

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