

TechSage News

Fall 2023



Rehabilitation Engineering Research Center on
Technologies to Support Aging among
People with Long-Term Disabilities



Project Director: Laura A. Rice

Leadership Team: Jon A. Sanford, Wendy A. Rogers, Tracy L. Mitzner, & Elena T. Remillard

University of Illinois Urbana-Champaign, Georgia Institute of Technology
& Georgia State University



In this issue of TechSage News, we look back at the past year to highlight achievements and updates from the Center. Learn more about our featured projects and staff, and catch up on the latest events, publications, and study opportunities.

TECHSAGE AWARDED 5 YEAR GRANT



TechSage 3 Team



TechSage 3 team members including researchers and consultants.

We are pleased to announce that we have been awarded a \$4.6 million grant by the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR) to support another five years of TechSage. This grant will enable us to continue making a profound difference in the lives of those aging with long-term disabilities through technology research, development, and training.

Our journey began a decade ago at Georgia Tech with Co-Directors Jon Sanford, Wendy Rogers, and Tracy Mitzner. In the years since, TechSage has evolved into a multi-site collaboration that includes the University of Illinois Urbana-Champaign, where Rogers is now Professor of Health and Kinesiology, and Georgia State University, where Sanford is now Research Professor of Occupational Therapy.

The RERC will be based at Illinois with Laura Rice, Associate Professor of Health and Kinesiology, as Project Director. The leadership team includes continued collaboration from Sanford, Rogers, and Mitzner, now Principal Research Scientist at Person in Design, alongside long-time Project Coordinator, Elena Remillard, Senior Research Scientist at the Center for Inclusive Design and Innovation at Georgia Tech. We have established four cores (Clinical, Industry, Community Outreach, Dissemination), each led by a member of the leadership team, which will work to foster engagement with external groups, translate knowledge, and provide resources to research teams.



TechSage Project Director Laura Rice

The third 5-year cycle of TechSage, which began in September, aims to “meet the needs of people with long-term disabilities where they live, work, and play by conducting advanced engineering research and development of innovative technologies.” The center features further development and exploration of several projects, which now are moving towards

transferring knowledge, interventions, and technologies to the community. Ongoing projects include: the SmartBathroom Laboratory, led by Co-PIs Brian Jones, Principal Research Scientist at the Interactive Media Technology Center at Georgia Tech, and Jon Sanford; Telewellness Technologies, led by Co-PIs Mitzner and Remillard; a Falls Detection System for People Who Use Wheelchairs, led by Rice; and User Needs Research, led by Co-PIs Rogers, Remillard, and Lyndsie Koon, Assistant Professor at the University of Kansas Life Span Institute. We are also pursuing new directions with novel work in the areas of soft and assistive robots, mobile applications, and a greater emphasis on industry and clinical collaborations.

The TechSAGE footprint at Illinois has continued to grow with new investigators and projects. Katie Driggs-Campbell, Assistant Professor of Electric and Computer Engineering, is leading the development of a wayfinding robot to support people aging with vision impairment. There is new R&D work designing self-care technologies for people aging with mobility disabilities, including a soft robotic shower head, led by Girish Krishnan (Assistant Professor of Industrial and Systems Engineering) and Ian Rice (Teaching Associate Professor of Health and Kinesiology). For Training, Deana McDonagh, Professor of Industrial Design and Director of the (dis)Ability Design Studio is developing an empathic design training program for researchers and Harshal Mahajan, Assistant Research Director of the McKechnie Family LIFE Home, is leading a robotic student design competition. McDonagh and Mahajan will serve as co-leads for the community outreach and industry cores, respectively.

We have also expanded our work with the Department of Occupational Therapy at Georgia State University. The 'Innovation Incubator', led by Jon Sanford, supports rapid turnaround, 1-2 year proof-of-concept studies on technologies to support aging with long-term disability. Slated projects include innovative work from GSU OT and PT faculty: a music-based intervention to improve hand function after stroke led by Yi-An Chen, Assistant Professor in OT, a fall risk app for people aging with multiple sclerosis led by Katherine Hsieh, Assistant Professor in PT, a home-based rehab system for people with hand impairments led by Sutanuka Bhattacharjya, Assistant Professor in OT, and a parametric modeling software that would enable AT providers to design and fabricate customized 3D printing adaptations for clients led by Susan Lee, Assistant Professor in OT. Lee will also serve as co-PI at GSU and serve as co-lead on the Clinical core. OT faculty will continue to be engaged on the SmartBathroom project contributing their expertise on toilet and bathing transfers.

According to the [2021 U.S. Census Bureau's American Community Survey](#), an estimated 32.5% of older Americans (ages 65+) are living with a disability. Our focus remains on expanding the growing, but limited knowledge base about people who are aging with long-term disabilities and developing advanced engineering solutions that empower them to thrive in all the activities they need and want to do. We are excited for the next chapter of TechSAGE and look forward to sharing our progress with you.

Read the press releases on the new grant from [Illinois](#) and [Georgia Tech](#).

PROJECT SPOTLIGHT

Telewellness Technologies

Many older adults with mobility disabilities experience barriers to participating in physical activity, such as limited transportation, and inaccessible classes and facilities. This population is also at high risk of social isolation and loneliness, which put them at increased risk of heart disease, depression, cognitive decline, and mortality. Group exercise classes help promote exercise participation and adherence and can decrease loneliness and increase social connectedness. For the past 10 years, researchers on the TechSAGE 'Telewellness' Technologies project, led by PI Tracy Mitzner, have

been exploring how tele-technology (e.g., video conferencing software) that facilitates remote participation can expand access to the physical and mental health benefits of group exercise classes for people aging with mobility disabilities.



Screenshot of a simulated Tele Tai Chi class. Small groups of participants exercise together to tai chi lessons broadcasted via Zoom video conferencing

The team's initial user-centered research found that people aging with mobility disabilities are generally positive and open about using technology to engage in exercise from home, but they had some concerns about safety, technology support, and privacy. Building upon this knowledge, the team translated an in-person, evidence-based tai chi program to an online, social experience that is accessible and appropriate for those aging with mobility disabilities. "We designed this class to be as supportive as possible", Mitzner shared. "The class is delivered to them in the convenience of their home. All exercises can be modified or visualized. We give them technology training and help along the way... We hope someone

might think, 'I can actually exercise now, because this has been designed to meet my needs.'

The 'Tele Tai Chi' clinical trial (NCT04696887), which wrapped up this Fall, included 60 older adults with long-term mobility disabilities. Small-group classes (6-8 people) convened twice weekly on Zoom to participate in the 8-week seated Tai Chi for Arthritis program (Tai Chi for Health Institute). A key element of the Tele Tai Chi program is the evidence-based program Tai Chi for Arthritis, from the [Tai Chi for Health Institute](#). The seated version used in this study was designed to accommodate older adults with a range of disabilities and health conditions and has a number of benefits including: improved balance, increased strength, falls reduction, and decreased pain. The organization's founder, Dr. Paul Lam, is a world leader in the field of tai chi for health improvement and has been an enthusiastic partner for this research which shares his goal of making tai chi accessible to all. In advance of the study, the research team had the opportunity to [host Dr. Lam for a visit at Georgia Tech](#) to discuss their work and practice tai chi together.

While data analyses are in progress, feedback from participant interviews suggests that many enjoyed and perceived benefits from the program. "Participants discussed how the peer-to-peer connection was a really valuable part of the program", said Investigator, Elena Remillard. "They shared how much they enjoyed the opportunity to connect with other people who are also managing mobility challenges and to do something productive together."

The Tele Tai Chi study was launched during the pandemic at a time where people around the world were attempting to figure how to deliver health and wellness programs virtually. Building on what they learned, the research team developed the [TechSAge Tool: Guidelines for delivering telewellness programs to older adults with disabilities](#). The tool provides a blueprint to others with step-by-step guidance on key considerations for

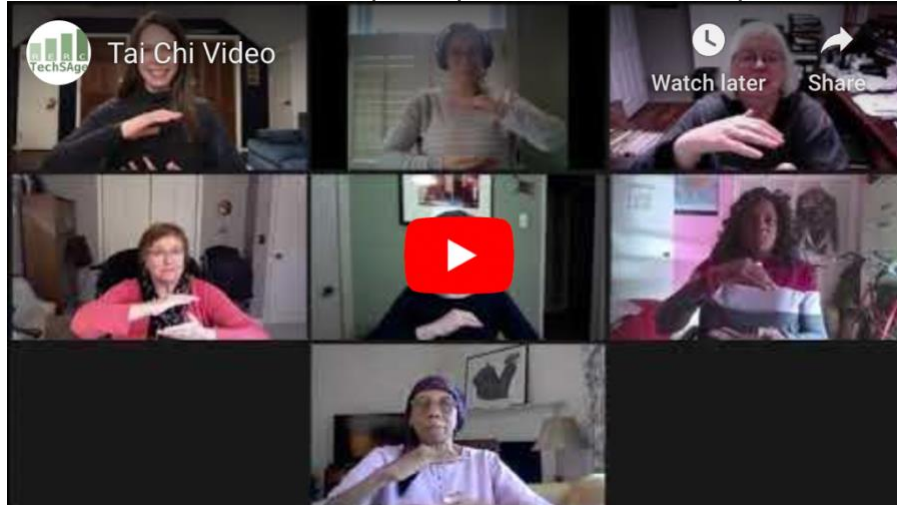


Team members Elena Remillard, Tracy Mitzner, Kara Mumma, and Jordan Chen strike a tai chi pose along with Dr. Paul Lam and Jocelyn Simpson of the Tai Chi for Health Institute

telewellness classes (e.g., software selection, safety, class organization and logistics, social time structure, and technical support).

By combining the ancient practice of tai chi with the convenience of remote participation, this project has created a unique platform to foster physical and social well-being for older adults with long-term mobility disabilities. Looking ahead to the new TechSAGE grant, the Telewellness project will focus on implementing the Tele Tai Chi program in a real world setting through partnerships with community-based organizations.

Click the video below to hear from participants about their experience in the class.



Story by Sujana Vangala & Elena Remillard

FEATURED ARTICLE

Fall detection from a manual wheelchair: Preliminary findings based on accelerometers using machine learning techniques



A student does a controlled, forward fall from a wheelchair in the laboratory setting to measure acceleration patterns of different types of falls among wheelchair users.

Existing automated fall detection devices are lacking in their ability to detect falls among wheelchair users. A new TechSAGE article in [Assistive Technology](#) highlights the development of a fall detection algorithm, developed in a laboratory setting using machine learning techniques, that can accurately differentiate between wheelchair-related falls and wheelchair mobility activities. Researchers conducted a pilot study wherein 30 young, healthy, and ambulatory adults simulated 258 wheelchair falls and 220 wheelchair mobility activities in a lab with fall data retrieved from accelerometers worn

on participants' wrist, chest, and head. Findings indicate that the algorithm should be integrated into wrist-worn devices and further tested among wheelchair users to evaluate their ability to minimize consequences from falls. [Email us](#) to request the full article by Libak Abou, Alexander Fliflet, Peter Presti, Jacob Sosnoff, Harshal Mahajan, Mikaela Frechette, and Laura Rice.

STRETCH ROBOT PITCH COMPETITION



TechSage presents:

STRETCH ROBOT PITCH COMPETITION
in collaboration with Hello Robot
and AI CARING

Seeking creative solutions to support people aging with disabilities

Open to all majors (undergrad & grad) at Georgia Tech

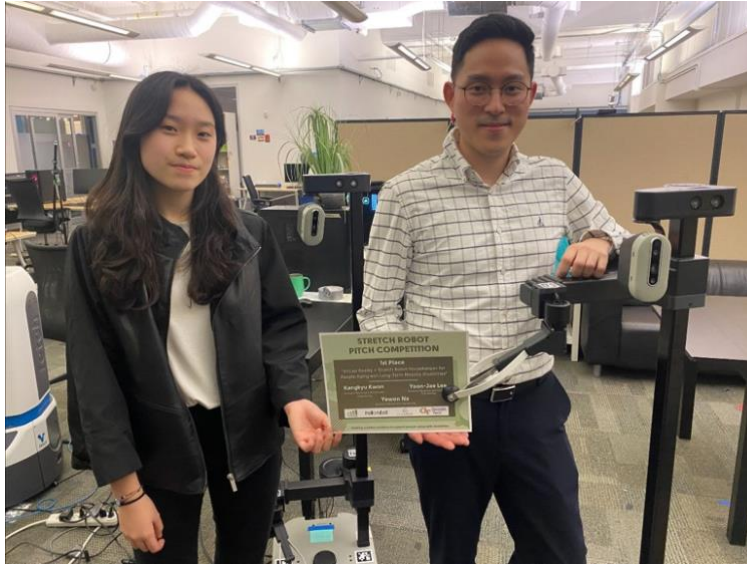
WIN CASH PRIZES!

Georgia Tech

The 2022 Stretch Robot Pitch Competition, sponsored by [TechSage RERC](#) in collaboration with [Hello Robot](#) and [AI-CARING](#), was hosted at the Georgia Institute of Technology. This competition sought innovative hardware or software solutions to support individuals aging with disabilities at home using the Stretch™ robot. Developed by Hello Robot, Stretch is an open-source mobile manipulator with reaching, grasping, and sensing capabilities to support people with a wide range of tasks. AI-CARING is a collaborative research institute, which includes Georgia Tech, that is focused on developing the next generation of personalized, collaborative Artificial Intelligence (AI) systems to support older adults and their network of care partners. Students submitted a brief proposal and pitch video that detailed their concept for Stretch and how it addressed a need for individuals aging with disabilities. Undergraduate and graduate Georgia Tech students, representing a wide range of disciplines, submitted novel ideas for Stretch to support this population. An interdisciplinary panel of judges that included representatives from TechSage, Hello Robot, and AI-CARING evaluated the submissions. Read the [news story](#).

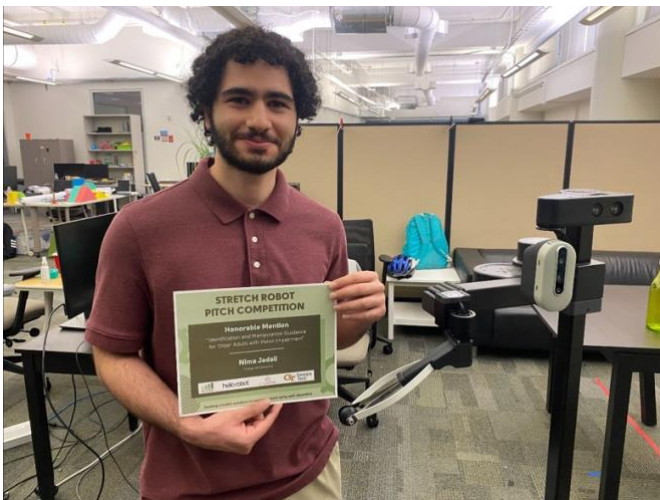
First place was awarded to Kangkyu Kwon, Yoon-Jae Lee, and Yweon Na, whose proposed project integrated VR with Stretch to support individuals with disabilities with tasks that may require assistance, such as getting up to grab an item, or opening a drawer. Two honorable mentions were awarded. Learn more about the winning submission and honorable mentions [here](#). Read the full news story from AI Caring [here](#).

Winners



Yewon Na (left) & Yoon-Jae Lee (right) pose with Stretch Robot handing them their 1st place award certificate. Kangkyu Kwon not pictured.

Honorable Mentions



Nima Jadali poses with Stretch Robot handing him an honorable mention certificate. He proposed using Stretch's camera and audio systems to aid users with audio cues to alleviate the process of correctly locating and identifying objects, such as grabbing the correct prescription bottle and then taking the right dosage of medication.



Charles Hong (left) and Akber Shaikh (right) pose after Stretch Robot handed them their honorable mention award certificates. Hong and Shaikh proposed a device to allow individuals with motor impairments to manipulate Stretch's dextrous wrist attachment remotely to promote autonomy and self-sufficiency with everyday tasks, like picking up around the house.

GRADUATES

Fall 2022



Four students on the TechSAge team at Illinois received their Ph.D. last Fall: Kenneth Blocker, Maurita Harris, Madina Khamzina, & Tina Nie are pictured here at the doctoral hooding ceremony along with their advisor, Wendy Rogers.

Spring 2023



Ritika Sadalge, B.S.
Biology

Chandler Pearson, B.S.
International Affairs

Ivy Rubio-Ramirez, B.S.
Architecture

Georgia Institute of Technology

Congratulations, TechSAge
GRADUATES

Class of 2023



University of Illinois Urbana-Champaign



Husna Hussaini, B.S.
Sociology

Ki Lim, B.S.
Molecular and
Cellular Biology

Malaak Yehya, M.S.
Public Health

"I truly enjoyed learning about the populations aging with disability and how to conduct research that can amplify their voices to ensure equitable solutions are created. "

- Maurita Harris

"I enjoyed learning how to communicate highly technical information to a variety of audiences, a skill that has served me well in my post-graduate career."

- Chandler Pearson

AWARDS AND RECOGNITIONS



Tracy Mitzner is now Principal Research Scientist with Person in Design (www.personindesign.com), a consulting business she founded 7 years ago. In this capacity, she will continue her work guiding technology development to support healthy and active aging. She worked 22 years at Georgia Tech.



Elena Remillard was promoted to Senior Research Scientist at the Center for Inclusive Design and Innovation and celebrated her 10-year work anniversary at Georgia Tech. With the new TechSage grant, she'll serve as the site PI for Georgia Tech.



Lelah Cochran is one of TechSage's longest tenured students having worked on the Telewellness project for over 4 years since she beginning as a work-study student her freshman year. She has played an integral role supporting the development and execution of the Tele Tai Chi trial, including serving as the lead tech moderator for the Zoom-based tai chi classes.



Maya Dye is a senior at Illinois who has been engaged with the ACCESS study since her freshman year, recruiting and interviewing late-deafened older adults about their everyday challenges and technology support needs. Maya also helps manage and maintain the Participant Registry. She plans to pursue a graduate program in speech and hearing science.

STAFF SPOTLIGHTS



Brian Jones is a Principal Research Engineer at Georgia Tech's [Institute for People and Technology \(IPaT\)](#) and Director of the [Aware Home Research Initiative](#). With over 25+ years at Georgia Tech, much of Brian's career has focused on the design and development of applications and connected home technologies to support health, wellness, and independence. Brian is a PI of the TechSAge [SmartBathroom project](#), developing a highly-sensed bathroom environment with adjustable features to study bathroom transfer performance and develop predictive algorithms. He is also PI of a patented [gait speed measurement system](#) designed to assess short-distance walking speed in the clinic setting. When he can get away, Brian loves to join his fellow scouters, his now college-aged kids, or his dog, to adventure in the outdoors.



Tooba Umar is pursuing a Master of Science in Community Health at Illinois and is a Graduate Research Assistant at the [Human Factors and Aging Laboratory](#). She is actively involved in the TechSAge User Needs project, ACCESS, interviewing older adults with long-term vision impairments about their lived experience of activity challenges and strategies they employ to overcome those challenges. She is particularly intrigued by the idea of transforming the ACCESS dataset into a multitude of innovative resources to benefit populations of people aging with disability. Tooba is a dedicated mother of three and enjoys spending time with her family, going on nature walks, and participating in Girls Scout activities with her daughter.

PRESENTATIONS AND EVENTS

Discover recent TechSAge conference presentations.



[International Society for Gerontechnology \(ISG\) 2022](#)

- Development of an Automated Fall Detection Device Specific to Wheelchair Users (Laura Rice)
- The Role of Centers in Advancing Gerontechnology (Neil Charness, Sara Czaja, Walter Boot, Wendy Rogers, & Jon Sanford)



[Rehabilitation Engineering Society of North America \(RESNA\) 2023](#)

- Assessing the Potential of Voice-Activated Digital Home Assistants for Older Adults with Mobility Disability (Emma Lachs)
- SmartBathroom Testbed: Study of Transfer Performance (Jon Sanford)
- Developing a Fall Detection System to Monitor and Manage Falls (Laura Rice)
- TechSAGE Telewellness Tool: Delivering Inclusive Wellness Classes Via Videoconferencing (Kara Mumma)



[American Congress of Rehabilitation Medicine \(ACRM\) 2023](#)

Technology Solutions to Support People Aging with Mobility Disabilities (moderated by Jon Sanford)

- Parametric Modeling to Customize Assistive Technologies to Meet Needs of Individuals with Hand Impairments (Susan Lee)
- Digital Hand Rehabilitation System for People with Hand Impairments (Sutanuka Bhattacharjya)
- Technology-Based In-Home Music Interventions for People with Stroke (Yi-An Chen)
- Mobile Health for Fall Risk Screening for Individuals with Ambulatory Impairments (Katherine Hsieh)
- Falls Detection System for Wheelchair Users (Harshal Mahajan)



Tampa, FL • November 8-12

[Gerontological Society of America \(GSA\) Annual Meeting 2023](#)

Technology as a Catalyst for Supporting Aging with Disability

- Methods and Baseline Characteristics for the TechSAGE Tele Tai Chi Clinical Trial (Tracy Mitzner)

- Understanding Everyday Needs of Older Adults With Macular Degeneration or Glaucoma (Kara Mumma)
 - Exploring Wisdom in Persons Aging with Disability (Hye Soo Lee)
- Improving Rehabilitation Outcomes for People Aging with Long-term Hand Impairments (Jon Sanford)

PARTICIPANT SPOTLIGHT



Veronica Daniels-Lewis

Veronica Daniels-Lewis has been participating in research studies since she was 4 years old. From asthma medication trials as a child, to multiple sclerosis (MS) treatment studies as an adult, Veronica embraces the opportunity to share her perspective in research and champions others to do so. Since her diagnosis in 1996, Veronica has been actively involved in the MS community. She leads a self-help group for the National MS Society in Texas, that provides it's over 200 members with the opportunity to connect with peers and educate themselves about treatments, services, and research. She is regularly engaged with legislators in Washington D.C., fighting for disability rights and support for those with chronic illnesses.

Veronica recently participated in the TechSAGE Tele Tai Chi study and shared that the program helped her overcome some exercise challenges and engage with other people aging with mobility limitations. She shared, "I was feeling disconnected. I felt like my upper body was moving like normal, but my lower body...I felt like they were not listening to each other. Doing Tai Chi was so exciting because I felt the movements. I felt like it was helping me connect the pieces together. I'm still doing it." Lewis also emphasized the value of the small-group dynamic, saying, "I loved the connection—we held each other accountable."

Veronica is eager to share new TechSAGE research opportunities, as well as findings, with her network. She is excited that the new TechSAGE grant includes user needs research specifically focused on African American, Latino, and Native American populations. Veronica serves on the RIDE (Research, Inclusion, Diversity and Equity) council of [iConquerMS](#), which is aimed at engaging people from minority groups in research. On designing technology, Veronica reiterated the importance of diverse inputs and experiences. "Everybody has different problems and different environments. A lot of people don't have access or experience with technology." She recognizes how research that intentionally engages older adults, and especially those from underrepresented groups, can help bridge the technology divide and promote inclusivity.

Veronica lives in Sugar Land, Texas, just outside Houston with her family. She is a mother of three and has one granddaughter. Her career included 20 years in marketing, mortgage banking, and sales for Fortune 500 companies, as well as early childhood education.

Veronica's story underscores the importance of engaging diverse perspectives in research. Join the TechSAGE Participant Registry today to get involved with research on technology, aging, and disability. Your unique perspective can shape the future of technology innovation. Click [here](#) to join the participant registry.

Story by Sujana Vangala & Elena Remillard

PARTICIPANT REGISTRY

We maintain a registry of names of people who are interested in being contacted about research studies. Opportunities include: surveys, focus groups, interviews, and technology evaluations. Depending on the study, you may be able to participate on the phone, online, on campus, at your home, or in other locations. Compensation varies by study.

Interested in joining? We need to ask you a few questions about yourself to see which studies you might be eligible for and match your interests with our researchers. This information is for screening purposes only and will not be shared with anyone outside of our research team. Click below to complete the brief survey.

[Join the Participant Registry](#)



OTHER NEWS

Media Features

- Illinois STORIED article, "[Home Is Where the Robot Is](#)" features Wendy Rogers' work on assistive robots.
- Illinois Beckman Institute article, "[Beckman, DRES collaboration launches \(dis\)Ability Design Studio](#)," highlights Deana McDonagh.
- Illinois College of Applied Health article, "[Clinic Helps Wheelchair Users Adjust Their Ride](#)," discusses the Illini Wheelchair and Scooter Clinic, developed by Laura Rice.

SELECT PUBLICATIONS

- Kadylak, T., Blocker, K. A., Kovac, C. E., & Rogers, W. A. (2022). Understanding the Potential of Digital Home Assistant Devices for Older Adults through their Initial Perceptions and Attitudes. *Gerontechnology*, 21(1), 1-10. <https://doi.org/10.4017/gt.2022.21.1.486.06>
- Ramadhani, W., & Rogers, W. A. (2022). Understanding home activity challenges of older adults aging with long-term mobility disabilities: Recommendations for home environment design. *Journal of Aging and Environment*. <https://doi.org/10.1080/26892618.2022.2092929>
- Mitzner, T.L., Remillard, E.T.; Mumma, K.T. (2022). Research-Driven Guidelines for Delivering Group Exercise Programs via Videoconferencing to Older Adults. *Int. J. Environ. Res. Public Health*, 19, 7562. <https://doi.org/10.3390/ijerph19137562>
- Nie, Q., & Rogers, W. A. (2022). Understanding Health Self-Management Challenges and Needs for Older Adults with and without Mobility and Sensory Disabilities. *Proceedings of the International Symposium on Human Factors and Ergonomics in Health Care*, 11(1), 32–37. <https://doi.org/10.1177/2327857922111006>

All publications available upon [request](#).

STUDY OPPORTUNITIES

Research Study on Music Therapy and Piano to Improve Hand Function After Stroke

We are conducting a study to understand the impacts of piano therapy on hand function for those affected by stroke. Participants will be provided with an iPad (with the music app) and piano to use for a 4-week period. Participation involves: using the app and piano over the span of 4 weeks (1 hour/day encouraged); 2 home visits from a researcher (before and after the study).

Participants must:

- Be over the age of 18
- Community dwelling
- Live in the metro-Atlanta area
- NO prior piano experience needed!

\$60 compensation

[Click here for study flyer](#)

FaMe: A Detection System to Monitor and Manage Falls among Wheelchair Users

We are conducting a research study to examine the effectiveness of a wearable fall detection device designed for wheelchair and scooter users. Participation involves: wearing a fall detection device for 12 weeks, performing normal activities of daily living, completing surveys, and participating in an interview.

Participants must:

- Be over the age of 18
- Use a wheelchair (power or manual) or scooter for at least 75% of their mobility for at least 1 year
- Have had at least 1 fall in the past 3 years
- Be able to communicate with research staff through video conferencing software or telephone

Open to participants nationwide. \$60 compensation

[Click here for study flyer](#)

UPCOMING EVENTS

[Assistive Technology Industry Association \(ATIA\) 2024](#)

- January 25 - 27, 2024 in Orlando, FL
- Wendy Rogers co-leader of [Aging & AT](#) strand

FOLLOW US



For more information on TechSage, visit our website: www.TechSageRERC.org

Rehabilitation Engineering Research Center on Technologies to Support Aging among People with Long-Term Disabilities (RERC TechSage). TechSage is funded by grants (#90REGE0021 and #90REGE0006-01-00) from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR), a Center in the Administration for Community Living (ACL), Department of Health and Human Services (HHS).