Elder Care Robots and the Smart Home
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Washington State University is in the process of testing a robot and smart home system that is both interactive and mobile. The pairing of a smart home and mobile robot that assists with everyday tasks could potentially allow those suffering from dementia to spend extended periods of times on their own. WSU conducted tests in January with college students that produced promising results and hopes to test the system with older people in the near future.

The Robot Activity Support System (RAS)

The Robot Activity Support System (RAS) consists of a mobile wheeled robot that connects wirelessly to a network of sensors pre-installed throughout a "smart" home. By accessing this network, the robot is able to determine "where its residents are, what they are doing and when they need assistance with daily activities".[1]

If the robot determines that the resident is having difficulty with a given task, it can navigate throughout the home to find the resident and provide "video instructions on how to do simple tasks and can even lead its owner to objects like their medication or a snack in the kitchen."[2]

RAS research is lead by Diane Cook, a professor of electrical engineering and computer science and director of the WSU Center for Advanced Studies in Adaptive Systems (CASAS). RAS is the first robot that CASAS researchers have tried to incorporate into a smart home environment installed at the University. They recently published a study in the journal Cognitive Systems Research that demonstrates how RAS could make life easier for older adults struggling to live independently.[3]

RAS Study

To test the robot system, CASAS researchers recruited 26 students at WSU to complete three activities with the assistance of RAS. These activities consisted of 1) getting ready to walk the dog, 2) taking medication with food and water, and 3) watering household plants.[4]

Upon completion of the activities, most of the student participants provided a favorable rating of the robot system's performance. They found the robot's tablet interface to be easy to use, and they reported that the instructional "next step" videos were the most useful of the prompts provided by RAS.

Bryan Minor, a postdoctoral researcher supporting the study, indicated that the initial results with RAS have been promising. He further noted that "[t]he next step in the research will be to test RAS'

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[1] Washington State University. "Smart home tests first elder care robot." ScienceDaily. 14 January 2019. Available at: https://www.sciencedaily.com/releases/2019/01/190114130913.htm. Accessed on May 31, 2019.
[2] *Ibid.*
[3] Garrett Wilson, Christopher Pereyda, Nisha Raghunath, Gabriel de la Cruz, Shivam Goel, Sepehr Nesaei, Bryan Minor, Maureen Schmitter-Edgecombe, Matthew E. Taylor, Diane J. Cook. Robot-enabled support of daily activities in smart home environments. Cognitive Systems Research, 2018; DOI: 10.1016/j.cogsys.2018.10.032
[4] Washington State University. *op cit.*

performance with a group of older adults to get a better idea of what prompts, video reminders and other preferences they have regarding the robot."[5]

Meeting a Need

With the number of adults over 85 expected to triple by 2050, the hope is that technologies like RAS and the WSU smart home will alleviate some of the financial strain on the healthcare system by making it easier for older adults to live alone.

Professor Cook further notes that "[u]pwards of 90 percent of older adults prefer to age in place as opposed to moving into a nursing home. We want to make it so that instead of bringing in a caregiver or sending these people to a nursing home, we can use technology to help them live independently on their own."[6]

The need extends to older adults well under the age of 85. The National Institutes of Health's National Institute on Aging suggests people prepare for the support they'll need as they age — before they need it.[7] And, the number of people over the age of 65 is expected to double from 46 million in 2016, to more than 98 million by 2060, according to Population Reference Bureau.[8]

Going Forward

To be sure, the RAS system is still at the early stages of its development. And, while it seems to show promise based on the results with 26 student participants, it is not yet clear that results would compare well with older users; especially for those with the kinds of mental and physical impairments for whom the RAS system is designed.

The RAS system seemed to be able to respond in instances where help is needed. Indeed, this would appear to be strong evidence in support of its utility. The tasks performed were few and quite specific, but the study certainly indicates promise for these kinds of systems.

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[5] *Ibid.*

[6] *Ibid.*

[7] NIH National Institute on Aging. "Aging in Place: Growing Old at Home". Content reviewed: May 1, 2017. Available at: https://www.nia.nih.gov/health/aging-place-growing-old-home. Accessed on May 31, 2019.

[8] Population Reference Bureau. "Fact Sheet: Aging in the United States". January 13, 2016. Available at: https://www.prb.org/aging-unitedstates-fact-sheet/. Accessed on May 31, 2019.