

Robotics Innovation for the Elderly

By Yi Guo 

As I write this editorial, it is the beginning of 2023. I would like to wish you and your loved ones a happy and healthy new year. We hope that 2023 will be a better year. Year 2022 was difficult for those in the war zone and those who struggled with policies on the COVID-19 pandemic. While the pandemic is at the back of most people's minds in many countries, as China abruptly abandoned its zero-COVID policy, hospitals in China became overcrowded very quickly, and the health-care system has faced a major stress test since December 2022. Sadly, among the most vulnerable populations, older adults were hit badly and could not get needed help in time, which led to many deaths. We need to take care of the elderly and work on robotics innovations to assist them.

All around the world older adults make up the vast majority of people who have died from COVID. It was reported that nearly half of all deaths from COVID-19 happened in care and nursing homes across the developed world [1]. When we examine the reasons, we find that not only did the living arrangements cause the virus to spread more easily, but also the care

facilities and nursing homes were often understaffed, and the turnover rate of staff at these facilities was usually higher than in other sectors. Experts said that COVID added a crisis on top of a long-lasting crisis at nursing homes, and a better system

would make it easier for most people to age at home; one hopes with help from technology [1].

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While most people will need care as they age, many older adults value autonomy and independence most of all and would like to remain in their home for as long as possible. There has been continuous research effort on monitoring sensors and supporting devices (e.g., medication dispensers and smart wheelchairs) that help improve the physical and mental health of the elderly. This

effort has been supported by funding agencies around the world.

Funded by the Smart and Connected Health program at U.S. National Science Foundation, during the past few years, my colleagues and I have been working on an integrated robot and wearable sensor system to support aging in place for older adults. Within the scope of our project, we tested our system at



a senior center in New York City, where adults aged 65 or older attended activities and exercise classes. In addition to validating our algorithms, we evaluated participant attitude toward technology [2]. In contrast to the prominent stereotype of the perceived

incompetence of older adults to engage with various forms of technology, the participants in our test showed a positive attitude toward technology and would generally welcome a robot at home or a robot to help them exercise. They tolerated the mechanical look of our lab robot and waited patiently when the robot and sensors were being charged or occasionally malfunctioned. In addition to validating our integrated system and algorithms, through participant questionnaires, we found that technophilia (the love of technology) emerged as a significant predictor of positive self-perception of aging. My first-hand research experience made me aware of the many technical challenges involved in delivering a capable and reliable robotic system in real-world environments. I also became aware of the expectations of the elderly and felt the urgent need of technology innovations to improve care for them.

This issue is a special issue (SI) on homecare robots. We assembled seven featured articles that present innovative robotics solutions to improve homecare. *IEEE Robotics and Automation Magazine (RAM)* Associate Editor Weihua

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an e-mail to Lei Yang, the contact of CRTIC, at hhhheee1@163.com, or Yifei Hu, the contact of CRGR, at frederick1207@163.com to request to be added to the list of participants.

P3177: FRAMEWORK OF MODULARITY FOR ROBOTICALLY ASSISTED SURGICAL SYSTEM WORKING GROUP

The purpose of the Framework of Modularity for Robotically Assisted Surgical System standard (RASS) is to define a modular framework for a RASS. This framework includes interconnected modules and focuses on the

connection between modules. This standard will propose the interface and interaction requirements between modules to allow modules to be flexibly combined and replaced to meet the requirements of different surgical operations. The standard also helps enterprises, especially small/medium-sized enterprises and start-ups, which develop robot-assisted surgical equipment to provide more universal modules and submodules to meet market needs.

There are currently 17 voting members from government, industry, hospitals, and academia; 23.5% of the members are from the medical industry,

11.7% are from government, and 64.8% are from academia.

Membership in the working group is available for anyone who is interested in robotically assisted surgical systems. If the reader would like to join, please send an e-mail to Lihai Zhang, chair (zhanglihai74@qq.com), or Peng Zhang, secretary (starzhly@163.com) to request to be added to the list of participants.

Apart from the new working groups, requests about the other IEEE RAS standards efforts can be directed to Craig Schlenoff, RAS standards chair, at craig.schlenoff@nist.gov.



FROM THE EDITOR'S DESK (continued from page 4)

Sheng led the SI effort and managed the peer review process together with Guest Editors Hesheng Wang, Yingzi Lin, Yasuhisa Hirata, and Stefano Mazzoleni. I'd like to thank them for their dedicated service. The first article of the special issue is open access, and it summarizes the research findings of a project funded by the government of Japan. We hope this special issue increases the awareness and visibility of robotics research on homecare.

As usual, in this first issue of the year, I would like to welcome the new Associate Editors, Chao Jiang, Cunjia Liu, Maria Pozzi, Alberto Pretto, and Chen Wang, to join the editorial board. I would also like to express my gratitude and appreciation to the retiring RAM AE, Yue Wang, for her dedicated service to RAM.

THE MAGAZINE REDESIGN

You may have noticed that your print issue of *RAM* has a new look. This is a result of a comprehensive redesign to enhance the presentation and make the magazine more visually appealing. The IEEE Publication team, led by Janet

Dudar and Peter Tuohy, has worked diligently on the new design for more than six months. Some of the thought behind the redesign is to update the magazine to a more contemporary look. There are a lot of details to get right, and establishing a new look that is clean looking begins with the cover and ends with the last page of editorial content. Fonts were carefully chosen based on readability. The front of the magazine shows a new table of contents format, indicating the type of different features and giving more descriptive information on the subject matter of each article. The columns and departments sport a refresh as well, with the use of rules and new fonts. The overall design shows elements that carry through the entire magazine, making it a cohesive brand.

In addition, *RAM* will have a new digital edition with a website to be launched soon. The digital edition provides a deeply engaging reading experience and is mobile friendly. We hope to make good use of the media and increase visibility of your research results. Prepare your robotics videos with good quality, and we will feature them on the website.

The redesign was supported by the IEEE Robotics and Automation Society (RAS) leadership and the Publication Activities Board. I would like to thank Frank Park, RAS president, for inspiring us with redesign ideas. The redesign is a team effort, and I'd like to thank the committee members, Todd Murphey (vice president of publication activities), Bram Vanderborcht (vice president of media services), Jindong Tan (*RAM* editor), and the supporting RAS staff, Amy Reeder and Paul Goldberg, who have spent many hours meeting with the redesign team and providing feedback on the mockups and the website.

We hope you enjoy this new look while reading the magazine.

REFERENCES

[1] "The pandemic shows the urgency of reforming care for the elderly: Most people should be helped at home as they age", *Economist*, Jul. 2020. [Online]. Available: <https://www.economist.com/international/2020/07/25/the-pandemic-shows-the-urgency-of-reforming-care-for-the-elderly>

[2] Q. Zhao et al., "Gait monitoring for older adults during guided walking: An integrated assistive robot and wearable sensor approach," *Wearable Technol.*, vol. 3, Oct. 2022, Art. no. e28, doi: 10.1017/wtc.2022.23.

