

Proposal for a Special Session at IEEE RO-MAN 2023

Human-Agent/Robot Interaction in Healthcare and Medicine

Aim and Scope of the Special Session

The exponential growths of research efforts in robotics and human-robot interaction / human-agent interaction have unveiled increasing number of collaborative fields. One of the highly impactful areas that has shown steep increase of interests and collaboration is the healthcare and medical domain, which has welcomed the technological advancement in robotics and artificial intelligence and shown huge potentials for further growths in the near future. Surgical robots are being used to assist surgeons in surgery, and research on diagnostic imaging powered by artificial intelligence is also being actively conducted. However, due to the cross-disciplinary nature of the research domain and complex factors related to human health, regulations, privacy issues, medical/ clinical expertise and practices, and longitudinal nature of the study time, many research outcomes have faced challenges in sharing their findings and outcomes in a timely manner to a wide audience of researchers and related professionals.

With the robotic agent being the core element in these highly multi-disciplinary and newly emerging research field, we would like to propose a Special Session on Human-Robot/Agent Interaction in Healthcare and Medicine at the IEEE Ro-Man 2023 Conference. It is very promising that this special session will be able to draw large number of audiences and professionals not just in engineering but also in medicine, healthcare, nursing, and even industry and public sectors. Focus areas and subtopics of this special session will include but not limited to the followings:

- Healthcare / Surgical Robotics
- Assistive Robotics
- Rehabilitation Robotics
- Robots for Emotional and Mental Health
- Social Robots with Clinical Applications
- Clinical Measures for Healthcare Robotics
- Intelligent Agents in Healthcare and Hospital Environments
- Telemedicine, Digital Hospital, and Digital Patients
- Robots for Nursing and Personal Care
- Interaction between AI agent, Patients, and Healthcare Providers
- Diagnostic / Medical Imaging AI with Human-System Interaction
- Interactive Medical AI

Organizers

Chung Hyuk Park, Ph.D., Associate Professor

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Short Bio: Dr. Park directs the Assistive Robotics and Tele-Medicine (ART-Med) Lab., and his current research interests are: 1) Multimodal human-robot interaction and robotic assistance for individuals with disabilities or special needs, 2) Robotic learning and humanized intelligence, 3) Tele-medical robotic assistance, and 4) AI-based reasoning for medical perception and decision-making. He is a recipient of an NSF CAREER grant and carried out a National Robotics Initiative (NRI) NIH R01 project as the lead-PI. He received his PhD degree in Electrical and Computer Engineering from the Georgia Institute of Technology (2012, Dr. Howard) and MS degree in Electrical Engineering and Computer Science and BS degree in Electrical and Computer Engineering from Seoul National University (2002; 2000).

Juyoun Park, Ph.D., Senior Researcher

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Short Bio: Juyoun Park is a Senior Researcher in the Artificial Intelligence and Robot Institute at KIST, Seoul, Republic of Korea. She received her B.S. and Ph.D. degrees in Electrical Engineering from KAIST, Daejeon, Republic of Korea, in 2015 and 2019, respectively. She was a Post-doctoral Researcher in the Information & Electronics Research Institute at KAIST in 2019. In 2020, she was with the Department of Biomedical

Engineering, School of Engineering and Applied Science (SEAS) at the George Washington University, Washington, DC, United States, where she was a Post-doctoral Scientist and Instructor. Her research interests include but are not limited to the areas of artificial intelligence (AI) for autonomous agents, including robots, in particular, developing novel machine learning or deep learning methods to allow robots to autonomously recognize and understand the environments. It is also one of her research fields to develop a framework for human-robot interaction (HRI).

Zackory Erickson, Ph.D., Assistant Professor

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Short Bio: Zackory Erickson is an Assistant Professor in The Robotics Institute at Carnegie Mellon University, where he leads the Robotic Caregiving and Human Interaction (RCHI) Lab. His research focuses on developing new computational, control, and sensing methods for intelligent physical human-robot interaction and healthcare robots. Zackory's work spans physical human-robot interaction, healthcare robotics, robot learning, physics simulation, multimodal perception, and mobile manipulation. Prior to joining CMU, Zackory received his PhD in Robotics from Georgia Tech with Prof. Charlie Kemp. He also received an M.S. in Computer Science from Georgia Tech and B.S. in Computer Science at the University of Wisconsin–La Crosse. His work has won the Best Student Paper Award at ICORR 2019 and a Best Paper in Service Robotics finalist at ICRA 2019.

Dan Ding, Ph.D., Associate Professor

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Short Bio: Dan Ding is an associate professor in the Department of Rehabilitation Science and Technology at the University of Pittsburgh and a research biomedical engineer within the United States Veteran Affairs Pittsburgh Healthcare System. She directs a Rehabilitation Engineering Research Center on Wireless Technologies for People with Disabilities. Her research primarily focuses on the interaction of sensors, machine learning, and human-computer interaction, with a specific emphasis on the development and implementation of assistive technology for individuals with disabilities. Specifically, her work has been investigating the use of smart technology, such as wearables, IoT devices, and assistive robotics, to enhance health, autonomy, and social engagement for this population.

Daehyung Park, Ph.D., Assistant Professor

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Short Bio: Daehyung Park is an assistant professor at the School of Computing, KAIST, leading the Robust Intelligence and Robotics Laboratory. His research lies at the intersection of mobile manipulation, artificial intelligence, and human-robot interaction to advance collaborative robot technologies. Prior to joining KAIST, he had been a postdoctoral associate in Computer Science and Artificial Intelligence Laboratory at MIT. He received a Ph.D. at Georgia Institute of Technology, an M.S. from the University of Southern California, and a B.S. from Osaka University. He has received the Google Research Scholar Award 2022 and won the Best Student Paper Award at RiTA 2022 and an Outstanding Navigation Award Finalist at ICRA 2022.

Tentative Speakers

1. "Exploring AI-based deep generative priors for enhancing the quality of medical images," Kang Hyun Ryu, Korea Institute of Science and Technology.
2. "Building Caregiving Robots," Tapomayukh Bhattacharjee et al, Cornell University.
3. "Robotic Helper: How to assist human tasks?," Daehyung Park et al., KAIST.
4. "A feasibility study of social robot-assisted sleep intervention for older adults," Chien-Ming Huang et al., Johns Hopkins University.
5. "Enabling robotic pets to autonomously adapt their own behaviors to enhance therapeutic effects: A data-driven approach," Casey C. Bennett et al., Hanyang University.