Short- and Long-Term Personalisation in Social HRI

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I. Aims and Scope

The success of personal robots is related to their ability to autonomously tailor their behaviour according to the individual's culture [1], preferences [2], and cognitive and physical abilities [3], [4], among others. Robots are requested to adapt their behaviour in both short- and long-term interactions. In the short-term, as the interactions are very often limited in time, robots need to learn from scratch the user's preferences and adapt quickly to them [5]. In the long-term, users' needs may change and robots need to continuously adapt in a way that keeps them engaged [6] and interested over time [7]–[9]. Personalisation can greatly improve short- and long-term interactions in various real-world scenarios by increasing engagement through tailored content, building trust and rapport, improving adherence to the interaction, and enhancing task performance [10]–[12]. Nonetheless, building robots capable of doing so requires the robot to be endowed with specific perceptual and reasoning capabilities [13].

Robots must be able to deal with the high uncertainty of the environments as well as with the unpredictability of the human behaviours that is influenced by their motivations, attitude and interactions, which can change over time [14]. Additionally, robots must be able to model and predict human intentions and beliefs (Theory of Mind) [15] in order to anticipate human actions and provide the most appropriate behaviour [16].

Apart from being able to tailor their behaviour autonomously, robots must also be easy for non-experts to personalise [17]. This involves developing approaches that allow non-experts to set up and teach new behaviours to the robot, such as through demonstration [18], [19]. Enabling non-experts to initialise the robot can also help to avoid the "cold start" problem and speed up the process of achieving reasonable behaviour [20].

Finally, personalisation also has ethical implications, particularly when it is used with vulnerable populations. For example, incorrect personalisation in healthcare settings [21] can lead to inadequate care and decrease trust, acceptance, and use of robots by healthcare professionals [22]. Privacy is another concern, as personalisation often involves collecting personal information. Additionally, the use of machine learning to personalise behaviour carries the risk of perpetuating existing biases [23].

The special session is well-suited within the conference theme of "Designing New Bridges for H-R-I" as it aims to increase the [H]umans' [H]appiness and [H]ealth, by designing [R]obots capable of personalized [I]nteractions. Personalised robots have the potential to facilitate the [R]ecovery and [R]econnection of individuals with disabilities or impairments, by adapting to their specific needs and abilities.

The session will focus on the impact of robot personalisation and behavioural adaptation on both short- and long-term interactions with humans. In particular, this special session aims at bringing together a multidisciplinary group of researchers from areas including, but not limited to, psychology, neuroscience, computer science, robotics, and sociology, to share and discuss current approaches to empowering social assistive robots with adaptive and learning capabilities in order to foster research and development of robotic solutions specifically designed for meeting the individual's unique needs. Topics include, but are not limited to, the following:

- Personalisation in short and long-term HRI
- User modelling in HRI
- Robot's personality
- Context and situation awareness for robots
- Engagement evaluation and re-engagement strategies
- Personalised dialogue with robots
- Personalised non-verbal behaviour with robots
- Adaptive human-aware task planning
- Theory of Mind for adaptive interaction
- Machine Learning for robotic personalisation
- Lifelong (continual) learning for adaptation
- Adaptation in multimodal interaction
- Affective and emotion-adapted HRI
- Persuasion in HRI
- Culture-aware robots
- Evaluation metrics for adaptive robotic behaviour
- Ethical implications of personalisation
- Robot customization and teaching

II. Tentative Speakers

- Cynthia Breazeal, MIT Media Lab, USA
- Maja Mataric, University of Southern California, USA
- Wafa Johal, University of Melbourne, Australia

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- Barbara Bruno, Swiss Federal Institute of Technology in Lausanne, Switzerland
- Minsu Jang, University of Science and Technology, South Korea
- Goldia Nejat, University of Toronto, Canada
- Mary-Anne Williams, University of New South Wales, Australia
- Silvia Rossi, University of Naples, Federico II, Italy
- Katie Winkle, Uppsala University, Sweden
- Nikhil Churamani, University of Cambridge, UK
- Séverin Lemaignan, PAL Robotics, Spain
- Alyssa Kubota, University of California San Diego, USA
- Goldie Nejat, University of Toronto, Canada

III. Keynote Speaker

Prof. **Silvia Rossi**, University of Naples Federico II.

IV. Organisers and Biographies

Antonio Andriella is Research Scientist at Pal Robotics awarded with a Marie Skłodowska-Curie cofound fellowship in the H2020 project PRO-CARED which aims at designing social robots with proactive personalised behaviour during long-lasting interactions. He received his PhD with a thesis entitled "Personalising robot assistance for cognitive training therapy" from the Institut de Robòtica i Informàtica Industrial (IRII, CSIC-UPC). His work focuses on designing, developing, and evaluating interactive social systems that can be personalised and adapted to their users over short-term and long-term interactions, based on individuals' unique needs and goals. He organised workshops on topics related to trust, ai, ethics and personalisation at HRI, RO-MAN and ICSR conferences. He served as guest editor of several special issues of journals such as the International Journal of Social Robotics, Paladyn Journal of Behaviour and Interaction Studies and as associate editor at IROS 2021-22 and ROMAN 2022.

Wing-Yue Geoffrey Louie is an Assistant Professor at Oakland University (USA) and Director of the Intelligent Robotics Laboratory where he is now the principal investigator for the National Science Foundation project on developing approaches to enable healthcare professionals to teach robots communication strategies for effective intervention delivery and University of Michigan's Automotive Research Centre project on studying human-robot interactions in video game engines. The core theme of his research is on the development of robot technology that can be easily customised by non-experts and personalised according to their needs. His research has been integrated in social and service robots for applications including therapy for autism spectrum disorder, older adult care, physiotherapy, early childhood education, search and rescue, and autonomous driving.

Barbara Bruno is a post-doc researcher at the École Polytechnique Fédérale de Lausanne (EPFL), in Lausanne, Switzerland, deputy head of the CHILI lab, with research interest in Socially Assistive Robotics and Human-Robot Interaction. She is co-founder of the start-up company Teseo, Italy, focusing on assistive technologies for older adults. Barbara received the M.Sc. and the Ph.D. in Robotics from the University of Genoa. She is part of the Swiss nationwide NCCR Robotics organisation and was involved in various international projects on socially assistive robotics. In 2017-2019 she was Technical Manager of the H2020 project CARESSES, which developed a culturally-competent care robot for older adults. She is currently serving as Associate Editor for the IEEE Robotics & Automation Letters journal and has contributed as organiser, invited speaker or panellist to a number of workshops and conferences on assistive robotics, personalised robotics and child-robot interaction. She has published more than 50 articles in international journals and peer-reviewed international conferences.

Alessandro di Nuovo is Professor of Machine Intelligence at Sheffield Hallam University and the leader of Technological and Digital Innovation for promoting independent lives at the Advanced Wellbeing Research Centre. He is also the leader of the Smart Interactive Technologies research laboratory of the Department of Computing. He has published over 120 articles in computational intelligence and its application to cognitive modelling, human-robot interaction, computer-aided assessment of intellectual disabilities, and embedded computer systems. Currently, Prof. Di Nuovo is editor-in-chief (topics AI in Robotics; Human Robot/Machine Interaction) of the International Journal of Advanced Robotic Systems (SAGE). He is serving as Associate Editor for Robotics and Applied Sciences (MDPI) journals. He has led several special issues in journals, such as IEEE Cognitive and Developmental Systems, Adaptive Behaviour, International Journal of Social Robotics.

Minsu Jang is a Principal Researcher at Electronics and Telecommunications Research Institute and an Associate Professor at University of Science and Technology (South Korea). He is currently a principal investigator for projects on developing 1) cloud-robot intelligence that can make robots effectively adapt to diverse environments and personalise services for different customers by domain adaptation and collaborative learning via cloud platforms, and 2) LBA(Learning-By-Asking) agents that can self-improve intelligence by detecting uncertainties and expand knowledge via active question answering sessions in the real-world. The main goal of his research is to build service robots not only working well but also *learning well* in the real-world. He is a member of the directors of Korea Robotics Society and has served as an organiser for workshops, special sessions and conferences at RO-MAN, HRI and ICSR, and as a guest editor for special issues in journals including International Journal of Social Robotics, Frontiers in Robotics and Artificial Intelligence and Intelligent Service Robotics.

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