The Alan Turing Institute

Robotics and AI for health and social care

Abstracts

Yoshio Matsumoto, AIST Japan

Robotics for care: Japan experience

Due to the rapid progress of aging society in Japan, it is urgently expected to develop assistive robots to realize reduction of the burden on nursing care, and to promote the independence of the elderly people. Japanese government started a project to promote the development and introduction of robotic devices for elderly care in 2013.

In this project, METI (the Ministry of Economy, Trade and Industry) and MHLW (the Ministry of Health, Labor and Welfare) determined the "prioritized areas in elderly care" in which robotic technologies should be applied as follows: Transfer Assistance (Wearable Type / Non-Wearable Type), Mobility Support (Outdoor / Indoor), Excretion / Bathing Support and Monitoring Support (Institution / Home). In this talk, the robotic devices being developed in the project and commercialized are introduced. In addition, key factors and issues in the development and introduction are addressed, some of which are related with Big Data, Artificial Intelligence, and IoT.

Sanja Dogramadzi, Bristol Robotics Lab

Safe Physical HRI for Assistive Robotics

In the context of human-robot interaction, close physical-proximity brings issues of safety and adaptation that are essential in achieving collaborative tasks efficiently. For safety, the robot must be able to avoid or adapt to dynamic environment obstacles or unexpected human movements. Investigation of human/robot movement in different physical human-robot collaboration has been performed in two assistive robotics projects – CHIRON and I-DRESS. Both projects focused on elderly, frail users in need of this type of assistance which brings the complexity of the interaction to the next level compared to collaborative robots in other application domains. Designing effective, safe and long-term supportive mobility assistance requires input from multidisciplinary teams and extensive testing in relevant environment.

Farshid Amirabdollahian, University of Hertfordshire

Accompany project, reflections using technical, ethical and user acceptability views

Accompany project focused on developing a home-companion setup using existing technology including Care-O-Bot 3, to allow for assessing different aspects of design and development in robot companion technology. While some aspects like moving from user requirement to technical and system requirements are repeated by subsequent projects such as GrowMeUp, Acanto, and RAMCIP, other aspects such as acceptability and ethical norms surrounding this technology remain novel and unique to the Accompany project. The talk focuses on challenges overcome by the project and reflects on findings from both technical, ethical and acceptability perspectives. The talk also highlights the need for a multi-faceted assessment and evaluation framework for such complex interventions and offers points for further discussions during the day.

Alessandro Di Nuovo, Sheffield Robotics

Programming robots that care for humans

Socially assistive robotics proposes realistic options for the long-term care of ageing populations. Elderly users may benefit from services provided by robots operating in different environments, such as providing assistance inside apartments, serving in shared facilities of buildings or guiding people outdoors. The talk will present the experimental results of several possible robotic services for supporting the elderly to live independently at home, with a particular focus on the acceptability of the human-robot interaction and usability of the software interfaces.

Amelia DeFalco, University of Leeds

Imagining Robot Care

This presentation explores the emergence of social robots and how such machine entities might transform the meanings and practices of care. In particular, it considers the role fictional speculations can play in shaping public perceptions and interpretations of caregiving machines. It argues that imaginary robot relations depicted in speculative fiction, such as the television programme Real Humans (Äkta Människor), can assist us in analysing the political and ethical implications of existing robots designed for care.

Heather Draper, University of Warwick

Ethics, robotics and technology

This presentation will start by outlining the goals of rehabilitation and then explore how these might be in tension with respect for individual/patient autonomy. It will be suggested that there may be scope for 'forceful' rehabilitation, which falls short of forced rehabilitation, where this rehabilitation is human to human. It will look at how 'forceful' rehabilitation may be justified where a patient's/individual's own goals are under-ambitious. It will suggest that if forceful rehabilitation is justified in the case of under-ambitious goals, consistency dictates that it might also be applied where the individual's/patient's goals are considered (by professionals) to be over-ambitious. The final part of the paper will look at whether similar arguments can be employed in human-machine rehabilitation interactions. It will be argued that machines such as robots should not be programmed to be forceful in the face of under-ambitious patient/individual goals, even where they are standing in for human rehabilitation specialists. This may prove to be a limitation on their use in rehabilitation. On the other hand, they could be programmed to be forceful with respect to over-ambitious patient/individual goals. This may, however, mean revising (or at least carefully interpreting) Asimov's first rule.

Erica Palmerini, Scuola Superiore Sant'Anna Pisa

Social care robots and the issue of legal personhood

This talk focuses on the hypothesis to recognize legal personhood to robots, and especially to robots involved in health and social care. Regulatory proposal and doctrinal suggestions in this direction will be examined and discussed with regard to their underlying rationale, the conceptual significance of such an acknowledgment and its potential practical consequences.

Praminda Caleb-Solly, Bristol Robotics Lab

Socially and physically assistive robots to support independent living

Assistive robots that are can support older adults in maintaining their activities of daily living need to be able to recognise and adapt to changing ageing-related conditions over time. Considering modular designs, adaptable interfaces and integrating robots with smart home sensing solutions can provide the dynamic contextual intelligence that is required. Based on some of her recent projects, CHIRON, FLOURISH and CASA, Prof Caleb-Solly will discuss the challenges and approaches for working towards safe and robust assistive robotic solutions in noisy real-world environments.

Luc de Witte, CATCH

Are robots ready to assist us in everyday life?

Over the past 10-15 years the expectations of robots entering our lives and playing a role in health and social care have gradually increased. Many research and innovation projects are taking place and the number of publications is rapidly increasing. Looking at the role robots are playing in industry, the logistic sector and other economic sectors, it seems realistic to think that robots will also enter to field of health and social care. But how realistic is that? Currently there only very few examples of robotic applications in this field that are being implemented at a substantial scale. Far most projects in this field remain in the laboratories of universities and companies. In this presentation I will reflect on the current status of robots in health and social care. I will discuss some of the barriers for the uptake of robots in health and social care and propose possible ways forward to enhance the use of robots.

Ray Jones, University of Plymouth

Developing care robotics in Cornwall

Cornwall is a rural area with an older population. Over the last three years, with ERDF funding, the eHealth Productivity and Innovation in Cornwall (EPIC) project has developed both demand for and SME expertise in eHealth including socially assistive robotics. We ran numerous public roadshows and workshops demonstrating and getting views on Pepper, Paro, Miro, Pleo, Padbot and cheaper robot animals. We have carried out studies focussed on Paro and other companion animal robots particularly examining the needs of, and benefit to, older people living in care homes. We have helped the formation of start-up SMEs and pilots and evaluation studies (including Genie and Stevie). We have installed Echo Spots (Alexa devices with small screen) in over 110 care homes (60% of all Cornish care homes) so developing a large user-base for SME's working in voice or multi-modal applications for assistive care. With these older demographics and well-established ecosystem, Cornwall is now an excellent location for implementation studies in assistive robots and technologies.

Bill Huang, CloudMinds

Industry-Academia collaboration in robotics research

In this talk we present an industry-led approach to the development of assistive robot technologies for care. CloudMinds' vision is to build a family nanny robots by the year 2025. We achieve this by placing robots' brain in the cloud. Essentially this is to turn the robotics problem into the communications problem.

Inside the Cloud Brain, the first layer is multimedia switching system, the second layer is AI algorithms, language, vision, and motion control all together into a multi-modal environment. The third layer is gamification using digital twin technology that creates extreme reality between virtual and physical robots and the environments they live in. We achieve this by leveraging game engine and MMO technology