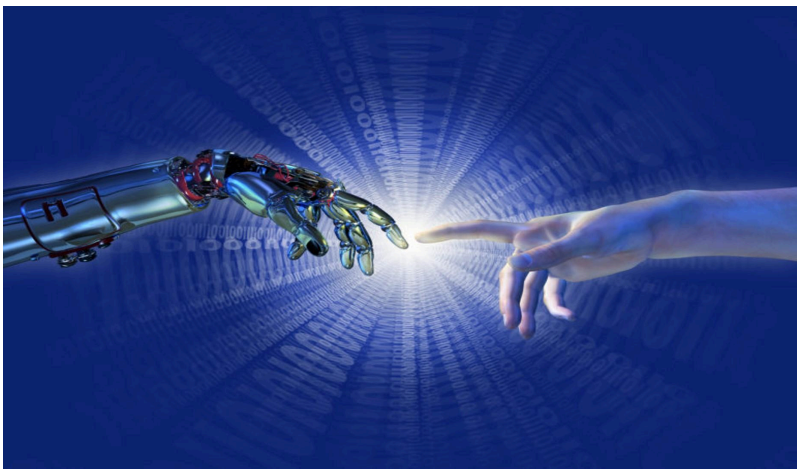


Human-Robot Interaction, Social and Ethical Challenges

Wednesday 21st February 2024 - 14.00 - 15.30

The Diamond Building, Lecture Theatre 9, second floor

Chair: Prof Praminda Caleb-Solly,

Professor of Embodied Intelligence in the School of Computer Science, University of Nottingham

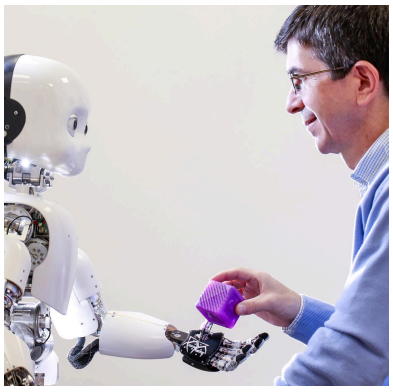
14.00 - 14.15	Professor Praminda Caleb-Solly, University of Nottingham Title: Benchmarking Competitions for Trustworthy Robots - An approach to improve standards and regulations for assistive robots
14.15 - 14.30	Professor Angelo Cangelosi, University of Manchester Title: Trust and Theory of Mind in Human-Robot Interaction
14.30 - 14.45	Dr Oya Celiktutan Dikici, King's College London Title: What is social acceptance in human-robot interaction?
14.45 - 15.00	Dr Paula Boddington, University of West London Title: Cyclical bodily rhythms and their significance in designing healthcare interventions
15.00 - 15.15	Rob Deaves, Dyson and Royal Academy of Engineering Fellow Title: Towards ‘Invisible’ Cleaning Robots
15.15 - 15.30	Panel discussion

Prof Praminda Caleb-Solly, University of Nottingham

Title: Benchmarking Competitions for Trustworthy Robots - An approach to improve standards and regulations for assistive robots

Abstract: Successful deployment of intelligent assistive robotics systems requires engendering trust and careful consideration of how the new technologies comply with requisite standards and regulations. We also need to consider the performance criteria for the assistive robot capabilities that are required by health and social care professionals, service users and unpaid carers, particularly when related to safety assessments. Based on my experience of organising and defining the criteria, protocols and evaluation metrics for benchmarking competitions over the years, I will explore the transformative impact of benchmarking and competitions on the development and regulation of assistive robotics. I will discuss how by employing a progressive and iterative approach, benchmarking ensures comprehensive evaluation, which encompasses both technical capabilities and crucial non-functional qualities. Competitions stimulate innovation, revealing the potential and limitations of current technologies. The insights gained are instrumental in informing nuanced regulatory standards that ensure robots that are safe, effective, and socially accepted.

Bio: Praminda Caleb-Solly is Professor of Embodied Intelligence in the School of Computer Science where she leads the Cyber-physical Health and Assistive Robotics Technologies (CHART) research group. She is also co-founder and co-director of Robotics for Good, a Community Interest Company. She holds a BEng in Electronic Systems Engineering, MSc in Biomedical Instrumentation Engineering and a PhD in Interactive Evolutionary Computation. She joined the University of Nottingham in September 2021. Prior to joining Nottingham she was Professor of Assistive Robotics and Intelligent Health Technologies at the Bristol Robotics Lab, UWE, where she was leading the Robotics Engineering and Computing for Health Research Group and held the post of Associate Head of Department for Research and Scholarship.From 2014 to 2018, she was also Head of Electronics and Computer Systems at Designability, a not-for-profit SME who design Assistive Technology. She currently leads an EPSRC Healthcare Technologies Network+ programme, Emergence, Tackling Frailty: Facilitating the Emergence of Healthcare Robots from Labs into Service.



Professor Angelo Cangelosi, University of Manchester

Title: Trust and Theory of Mind in Human-Robot Interaction

Abstract: In this talk we will look at experimental and modelling approaches to the investigation of trust in human-robot interaction. The talk will focus on the role of Theory of Mind for enhancing trust during interaction between people and robots.

Bio: Angelo Cangelosi is Professor of Machine Learning and Robotics at the University of Manchester (UK) and co-director and founder of the Manchester Centre for Robotics and AI. He was selected for the award of European Research Council (ERC) Advanced grant (UKRI funded). His research interests are in cognitive and developmental robotics, neural networks, language

grounding, human robot-interaction and trust, and robot companions for health and social care. Overall, he has secured over £40m of research grants as coordinator/PI, including the ERC Advanced eTALK, the UKRI TAS Trust Node and CRADLE Prosperity, the US AFRL project THRIVE++, and numerous Horizon and MSCAs grants. Cangelosi has produced more than 300 scientific publications. He is Editor-in-Chief of the journals *Interaction Studies* and *IET Cognitive Computation and Systems*, and in 2015 was Editor-in-Chief of *IEEE Transactions on Autonomous Development*. He has chaired numerous international conferences, including ICANN2022 Bristol, and ICDL2021 Beijing. His book "Developmental Robotics: From Babies to Robots" (MIT Press) was published in January 2015, and translated in Chinese and Japanese. His latest book "Cognitive Robotics" (MIT Press), co edited with Minoru Asada, was recently published in 2022.

Dr Oya Celiktutan Dikici, King's College London

Title of Talk: What is social acceptance in human-robot interaction?

Abstract: As robots develop autonomy and integrate into daily environments to assist and collaborate with humans, they should not only perform tasks successfully but also adhere to social norms and expectations. In this talk, I will give an overview of definitions and key concepts as well as the challenges involved in building socially acceptable robots. I will draw from our ongoing research to present examples, including how robots can navigate crowded environments with social awareness, how they can explain their actions to users, and how they can learn to imitate human behaviours.

Bio: Oya Celiktutan is a Senior Lecturer in Robotics at the Department of Engineering, King's College London, UK, where she leads the Social AI and Robotics Laboratory. Her research, at the intersection of machine learning and human-robot interaction, explores two broad questions through an interdisciplinary lens: how to learn human behaviour from multimodal data, and how to transfer this knowledge to robots for learning, action, and interaction. Her work has been supported by EPSRC, The Royal Society, and the EU Horizon, as well as through industrial collaborations. Her team's research has been recognised with several awards, including the Best Paper Award at IEEE Ro-Man 2022, NVIDIA CCS Best Student Paper Award Runner Up at IEEE FG 2021, First Place Award and Honourable Mention Award at ICCV UDIVA Challenge 2021.

Dr Paula Boddington, University of West London

Title of Talk: Cyclical bodily rhythms and their significance in designing healthcare interventions

Abstract: Social science research methods, such as ethnography and the study of rhythms, can prove valuable tools in assisting with the design of robotics and other interventions, with both benefits and limitations. In healthcare contexts, routines are important, yet can be subject to disruption, hence the study of time and of rhythms may prove beneficial in understanding the causes and consequences of routines, and the environment in which technology operates or into which it may be introduced. Henry Lefebvre's notion of Rhythmanalysis proposes that the complex rhythms of our lives may operate in harmony, or in arrhythmia where clashes occur, and can provide a means to observe and analyse how the natural cyclical circadian rhythms of our bodies may be subject to forms of control from linear institutional rhythms. Could such analysis help to identify how, when, and why – or why not - to employ technology within the complex social world of a hospital? People living with dementia on hospital wards have been found to have difficulty in complying with the 'rules of the ward', which may contribute to their deterioration upon admission. Here I outline work which draws upon rhythmanalysis as part of a large scale ethnography in an attempt to analyse how and why disruption to natural rhythms can occur on the hospital ward and what conclusions could be drawn from this.

Bio: Paula Boddington is Associate Professor of Philosophy and Healthcare in the Geller Institute of Aging and Memory at the University of West London. Her work has concerned applied topics in medicine, science, and technology, with a particular focus on ethical and philosophical issues arising from artificial intelligence. She also works with an interdisciplinary team focused on improving the care of people living with dementia. Publications include Towards a Code of Ethics for Artificial Intelligence, Springer 2017, and AI Ethics: A Textbook, 2023.

Professor Rob Deaves, Dyson

Rob has over 35 years of engineering experience gained at 3 iconic companies: BAE Systems, STMicroelectronics and Dyson respectively.

Title: Towards 'Invisible' Cleaning Robots

Abstract: Robots that perform vacuuming of the home environment are becoming hugely popular, including the recently released 360VisNav by Dyson. Human interactions between the human and robot rapidly change after the 'out-of-box' experience: Initial interaction has the owner observing the robot to gain confidence (the confidence phase) in its fundamental capabilities. This is quickly followed by the collaborative phase where the user and robot interact to improve performance. Finally, the relationship evolves to the robot efficiently cleaning the home in the absence of the user … the 'invisible' phase!

Bio: At Dyson, Rob is a Roboticist working on full product lifecycle. He was the Product Technical Lead for the 360Heurist and System Architect for the 360VisNav; autonomous vacuum cleaners that have achieved mass market, World-wide sales.

He was awarded a RAEng Visiting Professorship at ICL in 2017 enabling teaching support for 29 national/international universities. Further, he is an Honorary Professor at the School of Engineering, Birmingham University. He has also chaired EPSRC/ERDF research projects with total funding of £15M (including PAMELA, Brains-on-Board, CRADDLE and IROHMS).

Rob is a chartered engineer (CEng) and has achieved fellowships of the Institution of Engineering Technology (FIET) and Higher Education Academy (FHEA). He has also been awarded fellowships of the Learned Society of Wales (FLSW) and of the Royal Academy of Engineering (FREng).