UNIVERSITY OF SURREY

"DESIGNING AI FOR HOME WELLBEING" WORLD CAFÉ & AI SEMINAR

EVENT PROGRAMME

11-12 July 2022

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The Institute of Advanced Studies (IAS) at the University of Surrey sponsors workshops and Fellowships at the 'cutting edge' of science, engineering, social science and the humanities. Through this scheme the Institute fosters interdisciplinary collaborations and encourages a flow of international scholars to visit, enjoy their stay at Surrey and leave behind excellent ideas and innovations.

ias.surrey.ac.uk

The Centre for Vision, Speech and Signal Processing is an internationally recognised leader in audio-visual machine perception research. With a diverse community of more than 150 researchers, it is one of the largest audio and vision research groups in the UK. Research in the Centre has led to award-winning spin-out companies in the biometric, communication, medical and creative industries.

surrey.ac.uk/artificial-intelligence

The new People-Centred AI Institute at the University of Surrey brings together Surrey's core AI-related expertise in vision, speech and signal processing, computer science, and mathematics, with its domain expertise across engineering and physical sciences, human and animal health, law and regulation, business, finance and the social sciences. The new Institute will work in partnership with industry, the public sector, government and national AI organisations to deliver a step-change in AI research, training and innovation to deliver the knowledge and skills required to ensure UK leadership of an inclusive and responsible AI-driven economy.

surrey.ac.uk/centre-vision-speech-signal-processing

Workshop Chairs:
Dr Emily Corrigan-Kavanagh, University of Surrey
Prof Mark Plumbley, University of Surrey

Workshop Co-Chairs:
Dr Helen Cooper, University of Surrey
Dr Arshdeep Singh, University of Surrey

Administrative support:
Vicki Blamey, IAS, University of Surrey

INTRODUCTION

"Designing AI for Home Wellbeing" has potential to radically change the way we think about and use AI. It is a multidisciplinary topic given the many areas that have AI applications and can influence wellbeing such as healthcare and security.

"Designing AI for Home Wellbeing" demonstrates originality in AI scholarship through its multidisciplinary nature that sits in contrast to the traditional process of AI development that can be technology centric and routinely seeks end-user feedback at the end of its conceptualisation. AI in health monitoring for instance normally focuses on the technology's ability to recognise markers for illness rather than supporting greater human agency through personalisation and feedback of the system and usefulness of results. Furthermore, AI in health monitoring mostly concerns physiology wellbeing whereas home wellbeing is multifaceted and includes psychological aspects too, such as quality of social interactions, feelings of security, and connection to and personalisation of space.

Moreover, when AI technologies are developed from an ethical governance perspective, concepts focus on mitigating negative impacts, through ethical frameworks and law for example, rather than supporting user experiences that actively foster wellbeing, including AI technologies for the home.

We therefore propose "Designing AI for Home Wellbeing" as a new AI methodology to significantly advance the field towards new technologies that puts people at the heart of AI to foster human flourishing.

The development of "Designing AI for Home Wellbeing" is timely with the upcoming launch of the *Surrey Institute for People-Centred AI* that aims to be the national centre of excellence in people-centred AI research, innovation and training, as well as research emerging from the "*AI for Sound*" project that is starting to show a gap in user-centred design frameworks for developing AI. It also aligns with the research interests of researchers from the SIG "Home Wellbeing" as well as the "Life Long Health" strategy theme at University of Surrey.

We therefore propose setting in motion this new area by organising this collaborative World Café event to converge wide ranging expertise in AI technology and explore definitions, challenges, and research priority areas for "Designing AI for Home Wellbeing".

PROGRAMME

WORLD CAFÉ – MONDAY 11TH JULY

(GMT)	
10.30	Registration/tea/coffee
11.00	Welcome and introductions
11.10	Presentation on background to topic/Question 1 introduced
	Question 1 Discussion Session:
11.20	Round 1 for Question 1
11.45	Round 2 for Question 1
12.10	Round 3 for Question 1
12.35	Chairs feedback
12.50	Lunch
	Question 2 Discussion Session:
13.50	Question 2 introduced
13.55	Round 1 for Question 2
14.20	Round 2 for Question 2
14.45	Round 3 for Question 2
15.10	Chairs feedback
15.25	Break
	General Discussion Session:
15.45	Introduction to Harvest Session
15.50	Harvest Session
16.30	Final remarks/close

This event will be followed up by a "Designing AI for Home Wellbeing" AI Seminar Day on 12th July, featuring a range of speakers presenting future AI future AI technologies for home wellbeing as well as the social implications of implementing them. Registration and further details are available here

AI SEMINAR DAY – TUESDAY 12TH JULY

(GMT)	
10.00	Registration/tea/coffee
10.30	Welcome and introduction
	Speaker Session 1
10.40	*Detection and Characterization of Systematic Deviations in Data and AI Models*, Dr Girmaw Abebe Tadesse, AI Research Scientist, IBM Research|Africa
11.20	*Exploring a Human-Centred Approach to AI in the Context of the Home and Wellbeing*, Dr Andrew Rogoyski, Director of Innovation and Partnerships, Surrey Institute for People-Centred AI
11.35	*Exploring Fundamental Challenges in Explainable Reasoning, Acting, and Learning in Human-centered AI/Robot Systems*, Dr Mohan Sridharan, Reader in Cognitive Robot Systems, University of Birmingham
11.50	Q&A
12.00	Break
	Speaker Session 2
12.20	*Optimising User Security Recommendations for AI-powered Smart-homes*, Dr Manos Panaousis, Associate Professor of Computer Science (Cyber Security), University of Greenwich
12.35	*User Interaction with the Autonomous IoT*, Dr Enrico Costanza, Associate Professor & Deputy Director UCL Interaction Centre
12.50	*Acoustic Machine Learning for Health Monitoring* Dr Ivan Kiskin, Lecturer in AI for Multimodal Health Monitoring, Surrey Institute for People-Centred AI

Continued ▶

(GMT)

13.05 *Exploring Ethical Trade-offs in Human-Centred Autonomous Systems* Dr Catherine Menon, Principal Lecturer, University of Hertfordshire

13,20 Q&A

13.30 Lunch

Speaker Session 3

14.15 *Crafting Homes: Household Agency and Automation for Wellbeing and Sustainable Futures* Prof Bridgette Wessel, Professor in the Sociology of Inequalities, University of Glasgow

14.45 *A lane departure warning for living' Next Generation Smart Homes: Supporting Independence and Rehabilitation*, Paul Doyle, Assistive Technology Consultant, Bush & Company

15.00 *AI, ML and computational design: Improving houses*, Dr Silvio Carta, Associate Professor and Head of Art and Design & Foteini Papadopoulou, Research Assistant, University of Hertfordshire

15.15 Q&A

15.25 Break

Expert Panel

15.45 Panel discussion on research priority areas for "Designing AI for Home Wellbeing" with: Prof Bridgette Wessel, Dr Girmaw Abebe Tadesse, Paul Doyle, Dr Mohan Sridharan

16.30 Closing Remarks

16.35 Close

FEATURED PARTICIPANT BIOGRAPHIES

Dr Girmaw Abebe Tadesse
AI Research Scientist, IBM Research Africa

Dr Tadesse is an AI Research Scientist at IBM Research Africa, working on trustworthy AI, particularly on detecting and characterizing systematic deviations in data and AI models. Prior to that, Dr Tadesse worked as a Postdoctoral Researcher at the University of Oxford, where he primarily develoxped deep learning techniques to assist diagnosis of infectious diseases. As a result, he worked in multiple projects with international collaborations including clinicians and researchers in China and Vietnam.

Professor Bridgette Wessels
Professor and Director of Digital Society and Economy Interdisciplinary Research Theme, University of Glasgow

Bridgette Wessels is Professor and Director of Digital Society and Economy Interdisciplinary Research Theme at the University of Glasgow. Bridgette has undertaken research in the innovation and use of digital technology for 20 years. She takes an interdisciplinary approach to the study of the social and cultural shaping and use of digital technologies. One of the projects she is currently undertaking is one that focuses on *domestication of automation in homes in rural Scotland*, She has written eight books on the development and use of digital technologies, and she has *published in many key journals*

Dr Andrew Rogoyski
Innovation Director at the Surrey People-Centred AI Institute, University of Surrey

Andrew's experience spans 30 years in industry, government and academia. Originally a physicist at the Rutherford Appleton Lab, Andrew joined Logica at the height of the early AI boom, a decade later moving to space consultancy Esys, then became MD of QinetiQ's Space Division. Andrew subsequently worked as a strategist, specialising in innovation and cyber security, including secondment to Cabinet Office, before becoming CGI's Vice President of cyber security. Andrew eventually joined Roke Manor Research as Innovation Director, most recently returning to academia as Director of Innovation and Partnerships at Surrey's new Institute of People-Centred Artificial Intelligence.

Professor Adrian Hilton
Professor of Computer Vision, founding Director of the Surrey Institute for People-Centred AI and Director of the Centre for Vision, Speech and Signal Processing, University of Surrey

Adrian Hilton is Professor of Computer Vision, founding Director of the *Surrey Institute for People-Centred AI* and Director of the *Centre for Vision, Speech and Signal Processing* at the University of Surrey. His research focuses on Perceptual AI enabling machines to understand and interact with the world and has led research in 3D and 4D computer vision for entertainment manufacture and healthcare. He has won various academic awards as well as held a Royal Society Wolfson Research Merit Award (2013–18) and a Royal Society Industry Fellowship (2008–11) with Framestore to investigate multi-view and 3D video in film production. He was elected Fellow of the Royal Academy of Engineering in 2019 and Fellow of the Institute of Engineering and Technology 2012 and received the IET Achievement Medal in 2018.

Dr Enrico Costanza
Associate Professor of Human-Computer Interaction and Deputy Director of the UCL Interaction Centre, University College London (UCL)

Dr Enrico Costanza is Associate Professor of Human-Computer Interaction and Deputy Director of the UCL Interaction Centre. His current research focus is on helping people make sense of data and on interaction with AI and autonomous systems in everyday situations. Enrico's work lies at the intersection of design and technology and it is influenced by behavioural and social sciences. He has published about designable visual markers, wearable interfaces, and tangible interfaces for music composition and performance. He holds a PhD in Computer Science from EPFL, an MS in Media Art and Science from MIT, and an MEng in Electronics and Communications Engineering from York.

Dr Silvio Carta
Associate Professor and Head of Art and Design at the University of Hertfordshire

Dr Silvio Carta is a trained architect, Associate Professor and Head of Art and Design at the University of Hertfordshire. His research focuses on the application of technology and computational design to improve the physical environment to encourage positive societal change. Since 2008 Silvio is the head of the editorial board of Seoul-based C3 magazine and since 2014 serves as a journal editor of AMPS Architecture Media Politics and Society (UCL Press). Silvio is the author of Big Data, Code and the Discrete City (Routledge 2019) and Machine Learning and the City: Applications in Architecture and Urban Design (Wiley 2022).

Ms Foteini Papadopoulou
Research Assistant, University of Hertfordshire

Foteini Papadopoulou is a research assistant at the University of Hertfordshire and has worked as an interior designer for over 20 years. She holds an MA in Interior Architecture and Design from the University of Hertfordshire. Her research interests include the architecture of therapeutic environments, automated spatial configurations, data-driven approaches and computational design. Foteini has participated in the development of the AISLA project (Analyse and Improve Spatial Layout) of care homes (Carta et al. 2022); she is also co-author of an ATINER publication (Safe houses: design principles, potentials and limitations – An analysis through data-driven approaches) (Papadopoulou et al. 2022).

Dr Mohan Sridharan
Reader in Cognitive Robot Systems, University of Birmingham

Dr. Mohan Sridharan is a Reader in Cognitive Robot Systems in the School of Computer Science at the University of Birmingham (UK). Prior to his current appointment, he held academic positions at The University of Auckland (NZ) and at Texas Tech University (USA). Dr. Sridharan received his Ph.D. from The University of Texas at Austin (USA). His research interests include knowledge representation, cognitive systems, and machine learning, as applied to robots and agents collaborating with humans. He is also interested in developing algorithms to promote automation and sustainability in non-robotics domains such as transportation, agriculture, and climate informatics.

Dr Saber Fallah
Associate Professor In Mechatronics, University of Surrey

Dr Saber Fallah is an expert in Deep Reinforcement learning and its application to Robotics and Autonomous Systems (RAS). The focus of his research is to enable RAS of the future to co-exist with their users in a way that society considers them trustworthy and safe. Dr Fallah is the Director of the Connected Autonomous Vehicles Lab (CAV-Lab), where he leads several research activities funded by the UK and European governments (e.g. EPSRC, Innovate UK, H2020, KTP) in collaboration with major companies active in autonomous robot technologies.

Dr Samenah Kouchaki
Lecturer in Machine learning for Healthcare, University of Surrey

Dr Samaneh Kouchaki is Lecturer in Machine learning for Healthcare at the Department of Electronic and Electrical Engineering and a member of the Centre for Vision, Speech and Signal Processing (CVSSP) at the University of Surrey. Her research interests include machine learning, health informatics, biomedical signal processing and computational biology.

Professor David Frohlich
Professor of Interaction Design and Director of Digital World Research Centre (DWRC), University of Surrey

Prof David Frohlich is Director of Digital World Research Centre (DWRC) at the University of Surrey and Professor of Interaction Design. He currently leads a programme of work at DWRC on Assistive media for health and wellbeing in ageing. Prior to joining Digital World, David worked for 14 years as a senior research scientist at HP Labs, conducting design research on the future of mobile, domestic and photographic technology. He has a PhD in psychology from the University of Sheffield and post-doctoral training in Conversation Analysis from the University of York.

Dr Ivan Kiskin
Lecturer in AI for Multimodal Health Monitoring, Surrey People-Centred AI Institute, University of Surrey

Dr. Ivan Kiskin joined as a lecturer in AI for Multimodal Health Monitoring at the Surrey Institute for People-Centred Artificial Intelligence in January 2022. He has obtained his PhD in acoustic machine learning with the Machine Learning Research Group of the University of Oxford. Ivan's interests include Bayesian deep learning, acoustical and multimodal signal processing. Ivan is currently working on a feasibility study of COVID classification from acoustic data in collaboration with UKHSA and the Turing Institute. As part of the HumBug project, he has been leading the development of machine learning acoustic monitoring solutions for mosquito recognition for the purpose of data-driven approaches to malaria prevention.

Mr Paul Doyle
Assistive Technology Consultant (Expert Witness)

Paul has been engaged in the field of Assistive Technology since 1995 in a variety of operational and strategic roles. Paul provides AT consultancy support, with current clients in the telecare, assistive robotics and smart home industries.
Paul has collaborated with academia, industry and government on national and international Assistive Technology and assisted living programmes, including 3D printing, and design, robotics for independence and Apps for individuals with cognitive challenges.
Paul is active in the All Party Parliamentary Group on Assistive Technology (APPGAT) where he champions the need for nationally recognised and accredited education and training programmes and professional recognition for the role of assistive technologist."

Dr Marwa Mahmoud
Lecturer in Socially Intelligent Technologies, University of Glasgow
Visiting Fellow, University of Cambridge

Dr Marwa Mahmoud is a Lecturer in Socially Intelligent Technologies in the School of Computing Science at University of Glasgow, and a Visiting Fellow in the Department of Computer Science and Technology at University of Cambridge, UK. Her research interests focus on computer vision for social signal processing and multimodal signal processing, especially within the context of affective computing, behaviour analytics, human behaviour understanding and animal behaviour understanding. She applied her research in the areas of automotive applications, mental healthcare, and animal welfare. She is interested in 'AI for Social Good', combining computer vision research with health for human well-being and animal welfare applications.

Dr Catherine Menon
Principal Lecturer, Hertfordshire University

Catherine Menon is a Principal Lecturer at the University of Hertfordshire in Computer Science. She has worked in both academia and industry with a strong focus on autonomous systems, and is a founding member of the Safety of Autonomous Systems Working Group. Her research interests lie in the intersection of ethics and safety, and she is a member of several international standards committees, including the IEEE P7009 Working group on fail-safe design of autonomous systems, and the BSI AMT/10/1 committee developing guidance for ethics of autonomous systems.

Dr Ferdian Jovan
Research Scientist, University of Bristol

Ferdian Jovan is a research scientist at University of Bristol. He completed his Ph.D from University of Birmingham in 2018 on modelling temporal patterns of human occupancy from robots' unreliable sensors and then worked at the Department of Engineering Science, University of Oxford to develop generative models for predicting battery health and its remaining useful life on real-world data. In 2019, he joined the artificial intelligent lab led by Prof. Sara Bernardini where he developed multi-agent planning system for inspection and maintenance of wind turbines using various autonomous robots. His current research focuses on multimodal machine learning to evaluate and measure disease's progression based on smart home sensory data.

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