

SICSA Research Theme Activity Report

Please complete all sections of this reporting template and submit within 3 months of your event or activity taking place. This report will allow the SICSA Directors to provide detailed information about the progress of the SICSA Research Themes to the Pool funders, SFC, and your cooperation is appreciated.

Name of event organiser: Katrin Lohan, Subramanian Ramamoorthy

Email address: k.lohan@hw.ac.uk, s.ramamoorthy@ed.ac.uk

Institution: Edinburgh Center for Robotics, University of Edinburgh and Edinburgh Center for Robotics, Heriot Watt University, MACS

Title of proposed event: Workshop on Cyber Physical Systems

Proposed Location: University of Edinburgh

Proposed Date (can be approximate): 16/11/2018 (09:00-16:00)

From which SICSA Research Theme are you seeking funding?

Cyber Physical Systems

From which SICSA Research Theme was this event funded?

Total funds claimed for event: £1146.52

Details:

Catering: £660.75

Invited speaker: £485.77

Please outline in brief what took place at the event, providing details of speakers and titles of talks:

With this workshop we will bring together interested students, academics and industrial participants from the field of Cyber Physical Systems. Overall the workshop will discuss how CPS is best described by the bringing together of a variety of techniques and concerns. In particular, we will have invited speakers who will talk about human interfaces, surgical applications of autonomy and modern perceptual systems including the use of machine learning. These will anchor poster sessions from other SICSA participants, and set the scene for a multi-disciplinary discussion.

We will bring together researchers and students from multiple Scottish as well as from the rest of Europe, conducting cutting edge research in cyber physical systems.

The Workshop in Cyber Physical Systems is taking place on 16 November in room G.03, Bayes Center, University of Edinburgh.

Schedule 16.11.2018 08:45-16:00

08:45-09:15 Registration with coffee and biscuits

09:15-09:45 Introduction (Organisers: Katrin Lohan and Subramanian Ramamoorthy)

09:45-10:30 Felicity Mehendale (Honorary Senior Clinical Lecturer, University of Edinburgh)

10:30 - 11:00 Discussion session - Opportunities in healthcare

11:00 - 11:15 Coffee break

11:15 - 12:00 Dr. Alessandra Sciutti (funded by SICSA) (Italian Institute of Technology and University of Genova)

12:00 - 12:30 Discussion session - Machine learning for CPS

12:30-13:30 Lunch break

13:30 - 14:15 Dr Jason Alexander (funded by SICSA) (Lancaster University)

14:15 - 14:45 Discussion session - Humans in the CPS loop

14:45 - 15:45 Poster session

15:45 - 16:00 Closing remarks and next steps

Title and Abstract of invited talks:

Felicity Vidya Mehendale MBBS, MS(Gen Surgery) FRCS, FRCS(Plast), EBOPRAS Fellow

Title: Welcoming Robots to the Surgical Team

Abstract:

Surgery has seen many advances in technology, equipment and the specialisation of surgical teams. However, there are still many unanswered questions and unsolved problems.

Surgeons and medical doctors have limited knowledge of the range of expertise and knowledge amongst robotics researchers. Some familiarity with existing robotic capabilities, could allow clinicians to identify areas where robotics could make a positive difference to clinical medicine.

Similarly, some familiarity with what happens inside an operating theatre, may mean that robotics researchers will easily identify areas where their work could make surgical care better.

Interdisciplinary collaboration between clinicians and robotics researchers is therefore crucial - with the aim of finding productive overlaps between clinicians' wish lists and robotic developments that are looking for potential clinical applications.

So this talk gives an overview of surgical practice, focusing on the surgical operation, the operating theatre and early post-operative care; as well as a brief overview of the use of technology and surgical robots; and concludes with a wish list and thoughts on future areas where robotics may help to make surgery better.

Dr. Alessandra Sciutti, Italian Institute of Technology

Title: Mutual understanding for better human-robot interaction.

Abstract:

Humans show a great natural ability at interacting with each other. Such efficiency in joint actions depends on a synergy between planned collaboration and emergent coordination, a subconscious mechanism based on a tight link between action execution and perception. This link supports phenomena as mutual adaptation, synchronization, and anticipation, which cut drastically the delays in the interaction and the need for complex verbal instructions and result in the establishment of intuitive social interaction. We propose that robots should leverage these natural mechanisms to attain mutual understanding with their human partners, by sending and understanding those unconscious signals (e.g., unintentional movements or gazing) which are intrinsic to human movement and provide prospective information about the partner's goals, needs and attentional status. To this aim, I will present several examples of research where the humanoid robot iCub is used as an "interactive probe" to unveil the sensory and motor mechanisms underlying human-

human interaction and I will argue that modelling these mechanisms is an important step toward the generation of more human-friendly robots.

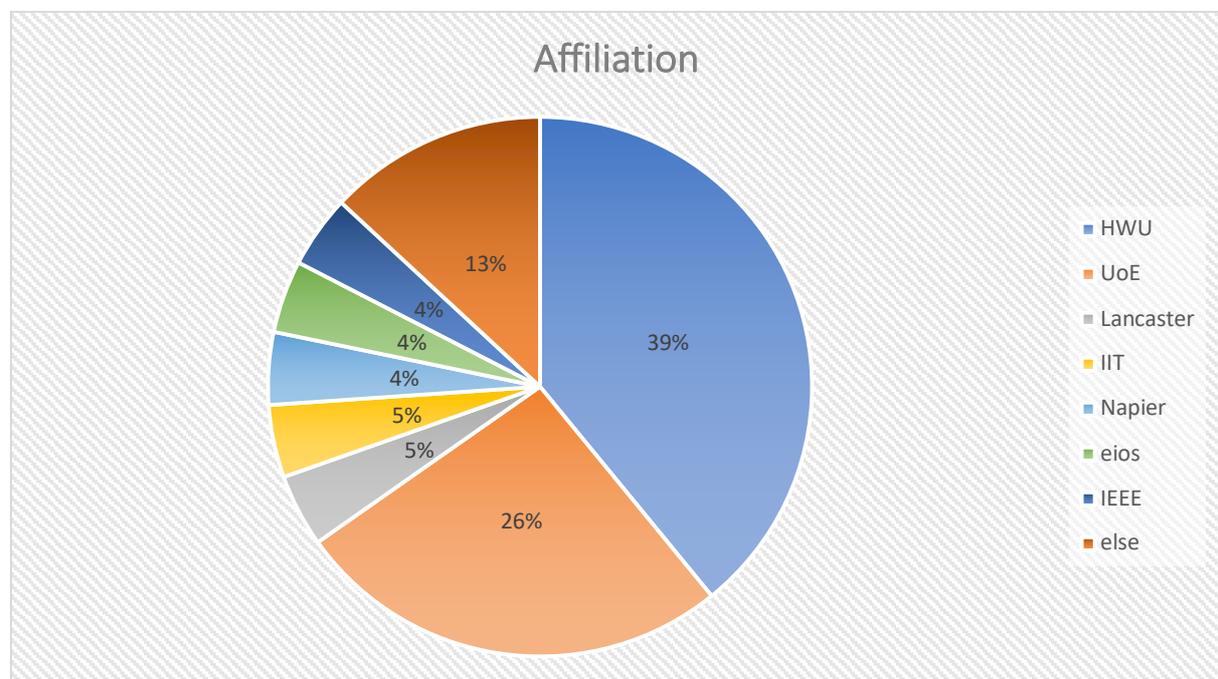
Dr. Alexander, Lancaster University

Title: Shape-changing Displays: how can robotics radically change a touchscreen?

Abstract:

Shape-changing displays dynamically change their physical geometry based on the underlying digital content. They have wide application from 'pop out' buttons on touch-screens to novel physical data representations. While Human-Computer Interaction researchers have begun to explore this area, their efforts are constrained by technology availability and limited cross-disciplinary collaboration with researchers with mechatronics, robotics, and material science expertise. This talk will describe shape-changing displays and the grand challenges faced by the field. It will particularly highlight areas where robotics can play a key role in their development as an undisguised call for collaborators who are interested in bringing their expertise to this area.

Participants:



Outcomes:

Please give details of any research papers that have come or are pending as a result of this activity:

Please provide details of any grant applications that have come or are pending as a result of this activity:

Currently Dr. Alexander and Dr. Lohan are working on a EPSRC project proposal as a result from this workshop.

Please provide details of any further outcomes that have come as a result of this activity:

The overall activity has resulted in fruitful discussions with the participants towards the topics of technology for healthcare, IoT and perception of robotics. Overall, there was a very good discussion on all topics discussed and all participants were engaged well with the discussion.

One particular outcome is that Dr Mehendale's participation facilitated her getting involved in the sAlfer surgery initiative lead by Dr Ramamoorthy, as part of his Turing Fellowship.

Do you have any plans to bid for further SICSA Theme Funding in the future?

We are currently planning to apply for funding of the next years UK Robotics CDT conference: <http://aims.robots.ox.ac.uk/epsrc-cdt-student-conference-oxford-bristol-and-edinburgh/> from the SICSA Conference Sponsorship. Supporting to open the conference to all SICSA PhD students.