

#UKRAS21: The 4th UK Robotics and Autonomous Systems Conference

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On behalf of the Organising and Advisory Committee we take great pleasure in welcoming students, researchers and experts in robotics virtually to #UKRAS21, the 4th UK-RAS Conference for PhD Students & Early-Career Researchers, organised by the EPSRC UK-RAS Network¹ in collaboration with Robot House² at the University of Hertfordshire. This exciting virtual event is specifically designed for PhD students and early-career robotics and autonomous systems researchers of the UK-RAS Network and will foster research progress and offer opportunities for networking.

I. AIMS

The aim of #UKRAS21 is to promote quality research, networking, and community building for PhD students and practitioners at the frontier of science and technology in intelligent robots and systems, by discussing the latest advancements in this fast growing and exciting field. In the call for papers, we were particularly looking for submissions in areas including:

- Artificial Intelligence and Robotics
- Assistive Technologies and Rehabilitation
- Smart-Home and Robotics
- Virtual and Remote Robotics
- Robotics Research Methods During Social Restrictions
- Novel and Enabling Technologies

II. TOPICS

This year's theme focuses on *robotics at home*. We have identified three focus areas to examine robotics and autonomous systems within our call for papers that are each covered by an inspiring keynote and four oral presentations from authors of accepted papers: The focus area *robotics for use in the home* considers aspects of rapid prototyping, safety, assisted living, rehabilitation robotics, technology acceptance, and diverse user groups. Keynote speaker Prof. Ana Paiva (Instituto Superior Técnico, University of Lisbon and coordinator of GAIPS at INESC-ID) will talk about the engineering of sociality and collaboration between humans and robots. The oral paper presentations in this area are Exploring Human-Dog Attachment Behaviours and their Translation to a Robotic Platform [1]; Older adults' perceptions of Socially Assistive Robots [2]; Requirements for a home-based rehabilitation device for hand and wrist therapy after stroke [3]; and Robot House Human Activity Recognition Dataset [4].

Patrick Holthaus (University of Hertfordshire) and Farshid Amirabdollahian (University of Hertfordshire) are General Chair and General Co-Chair of #UKRAS21. Claire Asher (UK-RAS Network) and Arthur Richards (Bristol Robotics Lab) are Technical Chair and Programme Chair of #UKRAS21.

¹<https://ukras.org/>

²<https://robohouse.herts.ac.uk/>

A second focus area of #UKRAS21 aims to discuss innovations in delivering robotics research while *working from home*, addressing challenges in remote working, on-line experimentation, digital twinning, or simulation. A keynote talk will be held by Prof. Ana Cavalcanti (Royal Academy of Engineering Chair in Emerging Technologies, University of York) about the RoboStar modelling stack and how to tackle the reality gap. The oral presentations in this area are: Test Framework for a Virtual Competition Testbed [5]; Visually-based Prediction of Artist's Drawing [6]; Design of a Transforming Myriapod Robot for Multimodal Locomotion [7]; and Development of a Teleoperative Quadrupedal Manipulator [8].

In a third focus area, we seek to understand how different robotic and autonomous systems *make themselves at home* by being tailored to suit their respective working environments, such as factories, offshore platforms, power plants, or disaster scenes. We are looking forward to a keynote by Dr Jelizaveta Konstantinova (Ocado Technology) that addresses robots the innovation at Ocado and the SecondHands project. The oral presentations in this area are: An Augmented Reality System for Safe Human-Robot Collaboration [9]; Firefighter Assistance Robot [10]; Small datasets for fruit detection with transfer learning [11]; and A Non-Axisymmetric Parallel Manipulator for Head Stabilisation in Vitreoretinal Surgery [12].

III. STATISTICS AND FORMAT

We have received 35 submissions, of which 12 were accepted as oral presentations in a single track conference format. 17 submissions were invited to produce a brief video clip of their work that we will present in a compilation during the main conference. Authors can then discuss their work with the other delegates in a parallel interactive session, which is our online replacement for the poster session in previous years. We want to thank Claire Asher and Christoph Salge for their dedication in preparing and running the online meeting. In total, we accepted 84% of submissions. Accepted papers are from 22 UK universities and one international collaboration, with ratios shown in Fig. 1. Last year's host institution and this year's host of TAROS³, the University of Lincoln as well as this year's host, the University of Hertfordshire and King's College London are the most frequent author affiliations.

All papers have received two or more independent reviews from the 40 reviewers that participated in the selection process. The majority of reviews are from the Universities of Hertfordshire, Leeds, Lincoln, and Sheffield Hallam. Fig. 2 depicts all 16 reviewer affiliations.

³<https://lcas.lincoln.ac.uk/wp/taros-2021/>

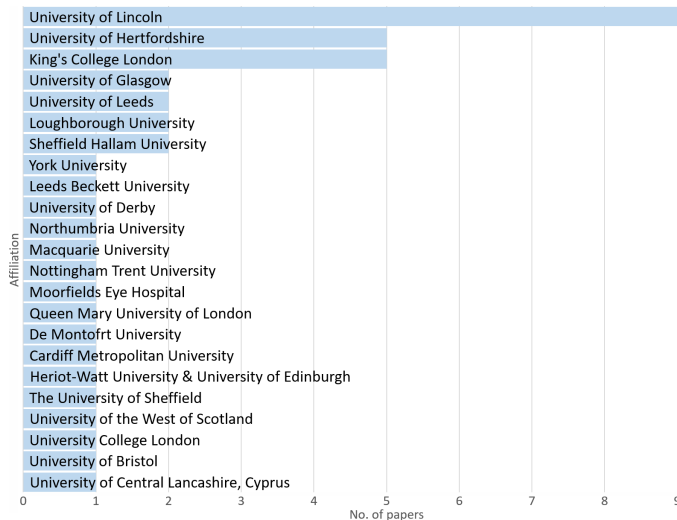


Fig. 1. Distribution of author affiliations

IV. PROGRAMME

We would like to express our gratitude for handling the review process and the selection of papers to the members of the programme committee, consisting of Farshid Amirabdollahian, Claire Asher, Frank Förster, Charles Fox, Patrick Holthaus, Gabriella Lakatos, Arthur Richards, Alessandra Rossi, and Christoph Salge.

The committee encouraged authors that are early career researchers to participate in the review process and paired each of them with a more experienced researcher from another institute. We greatly acknowledge the support of 17 reviewers who we consider early career researchers. Additional reviewers were sourced from other UK-RAS member organisations. In total, all submissions have been reviewed by at least two independent reviewers, scoring between 3 (strong accept) and -3 (strong reject), with 0 as borderline. Occasionally, papers were reviewed more than twice, for example where reviewer opinions differed significantly. The conference aims to be inclusive so all papers with average scores of 0 or greater have been accepted.

The 12 highest scoring papers were selected for oral presentation, subject to a limit of no more than one oral presentation per author. Keynotes were invited at the discretion of the programme committee as well established experts within their respective focus area. Awards will be given to the best paper and interactive presentation as selected by a committee comprising programme committee members of #UKRAS21.

We would particularly like to thank Abolfazl Zaraki, Adrian Salazar Gomez, Aidan Scannell, Alessandro Di Nuovo, Amy K. Hoover, Antonia Tzemanaki, Ataollah Ramezan Shirazi, Bente Riegler, Burak Kizilkaya, Catherine Menon, Chengxu Zhou, Christopher Peers, Dan Dai, Elizabeth Sklar, Emanuele De Pellegrin, Emily Rolley-Parnell, Florence Sherry, Hans Natalius, Ildar Farkhatdinov, Ionut Moraru, Junfeng Gao, Karen Archer, Kaspar Althoefer, Leonardo Guevara, Luke Wood, Mark Judge, Maryam Banitalebi Dehkordi, Md Zia Ud-

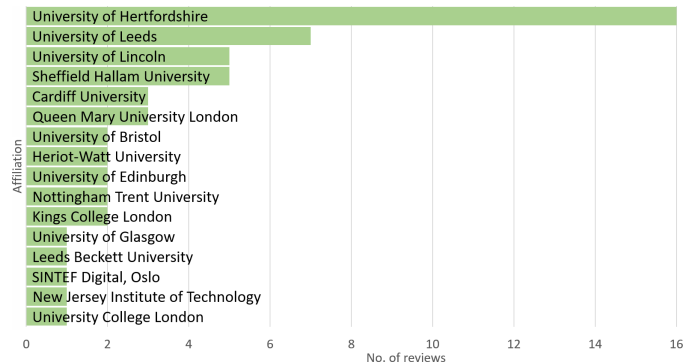


Fig. 2. Distribution of reviewer affiliations

din, Mohamad Reza Shahabian Alashti, Mohammad Hossein Bamorovat Abadi, Mohammed Rezwan Rahman, Moustafa Motawei, Mubashir Ahmad, Nicola Camp, Nicola Catenacci Volpi, Robert Richardson, Simon Parsons, Steve Maddock, Vignesh Velmurugan, and Yaniel Carreno for contributing their reviews to the conference.

REFERENCES

- [1] K. Riddoch, E. Cross, and R. Hawkins, "Exploring Human-Dog Attachment Behaviours and their Translation to a Robotic Platform," in *Proceedings of the 4th UK-RAS Conference: Robotics at Home (#UKRAS21)*, 2021.
- [2] N. Camp, J. Johnston, M. Lewis, M. Zecca, K. Hunter, A. D. Nuovo, and D. Magistro, "Older adults' perceptions of Socially Assistive Robots," in *Proceedings of the 4th UK-RAS Conference: Robotics at Home (#UKRAS21)*, 2021.
- [3] V. Velmurugan, L. Wood, and F. Amirabdollahian, "Requirements for a home-based rehabilitation device for hand and wrist therapy after stroke," in *Proceedings of the 4th UK-RAS Conference: Robotics at Home (#UKRAS21)*, 2021.
- [4] M. H. B. Abadi, M. R. S. Alashti, C. M. Patrick Holthaus, and F. Amirabdollahian, "Robot House Human Activity Recognition Dataset," in *Proceedings of the 4th UK-RAS Conference: Robotics at Home (#UKRAS21)*, 2021.
- [5] L. Wellacott, E. Nault, I. Skottis, A. Colle, S. N. Gowda, P. Nicolay, and E. Rolley-Parnell, "Test Framework for a Virtual Competition Testbed," in *Proceedings of the 4th UK-RAS Conference: Robotics at Home (#UKRAS21)*, 2021.
- [6] C. Jansen and E. Sklar, "Visually-based Prediction of Artist's Drawing," in *Proceedings of the 4th UK-RAS Conference: Robotics at Home (#UKRAS21)*, 2021.
- [7] F. Sherry and C. Zhou, "Design of a Transforming Myriapod Robot for Multimodal Locomotion," in *Proceedings of the 4th UK-RAS Conference: Robotics at Home (#UKRAS21)*, 2021.
- [8] C. Peers, M. Motawei, R. Richardson, and C. Zhou, "Development of a Teleoperative Quadrupedal Manipulator," in *Proceedings of the 4th UK-RAS Conference: Robotics at Home (#UKRAS21)*, 2021.
- [9] Y. E. Cogurcu and S. Maddock, "An Augmented Reality System for Safe Human-Robot Collaboration," in *Proceedings of the 4th UK-RAS Conference: Robotics at Home (#UKRAS21)*, 2021.
- [10] M. Judge and L. Riches, "Firefighter Assistance Robot," in *Proceedings of the 4th UK-RAS Conference: Robotics at Home (#UKRAS21)*, 2021.
- [11] D. Dai, J. Gao, S. Parsons, and E. Sklar, "Small datasets for fruit detection with transfer learning," in *Proceedings of the 4th UK-RAS Conference: Robotics at Home (#UKRAS21)*, 2021.
- [12] H. Natalius, P. Lambert, L. da Cruz, and C. Bergeles, "A Non-Axisymmetric Parallel Manipulator for Head Stabilisation in Vitreoretinal Surgery," in *Proceedings of the 4th UK-RAS Conference: Robotics at Home (#UKRAS21)*, 2021.