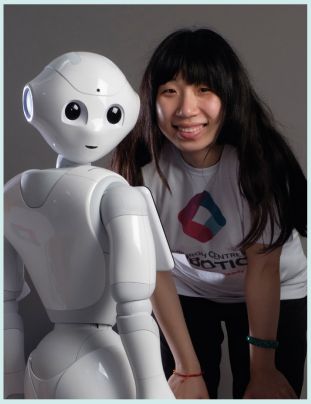
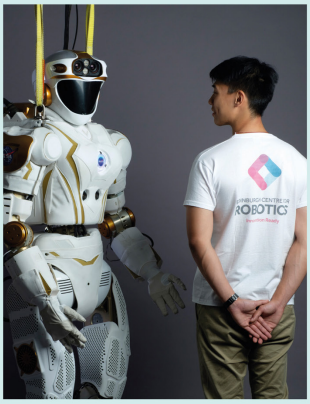
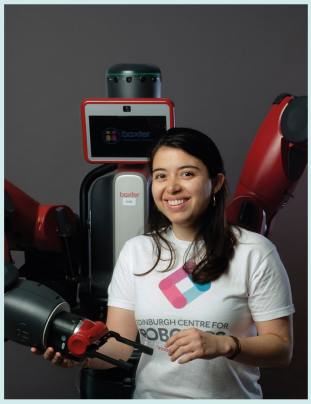
EDINBURGH CENTRE FOR ROBOTICS

Innovation Ready


# EPSRC Centre for Doctoral Training in Robotics and Autonomous Systems Newsletter

## Summer 2020

### In this edition

**COVID-19**

**CDT staff and students have been working remotely since mid-March and will continue to do so for the foreseeable future to ensure all remain safe and well. Students and supervisors are holding weekly virtual meetings and the CDT is also supporting students during this challenging time through monthly on-line coffee mornings.**

**Although lock-down has had a major impact on the research work that our students have been able to carry out, we are delighted to see that a number of our students and some staff members have been successful in getting papers accepted for conferences.out, we are delighted to see that a number of our students and some staff members have been successful in getting papers accepted for conferences.**

# ACHIEVEMENTS

EDINBURGH CENTRE FOR ROBOTICS

Dr Adam Stokes, an academic from University of Edinburgh, has had a paper accepted at the RoboSoft 2020 Virtual Conference (http://RoboSoft2020.org: Soft Non-Volatile Memory for Non-Electronic Information Storage in Soft Robots). The paper was authored alongside Asst. Prof. Markus Nemitz (Worcester Polytechnic Institute, USA); Asst. Prof. Dan Preston (Rice University); and Dr Christoffer Abrahamsson, Lukas Wille and Prof. George Whitesides (all from Harvard University). The full text of the paper is available here: https://softsystemsgroup.com/2020/05/26/soft-non-volatile-memory-for-non-electronic-information-storage-in-soft-robots/

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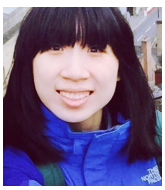
Xinnuo Xu, who is in her final year of her PhD, has had a paper accepted at the 58th Annual Meeting of the Association for Computational Linguistics (ACL) (https://acl2020.org/) which is being held virtually from 5th to 10th July 2020. The title of the paper is "Fact-based Content Weightin for Evaluating Abstractive Summarisation".



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Hugo Sardinha who is also in the final year of his PhD has had a paper accepted at the 17th European Conference on Multi-Agent Systems (EUMAS) (https://eumas2020.csd.auth.gr/eumas2020/) being held from 14th to 15th September 2020. This work presents a hybrid model merging deterministic co-ordination and stochastic exploration strategies for cooperative coverage missions in aerial swarms.

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Ronnie Smith, who is in the first year of his PhD, will be presenting a contribution on the use of passive Radio-Frequency Identification (RFID) for wearable-free human monitoring in Ambient Assisted Living (AAL) environments at the 2020 International Symposium on Ambient Intelligence (ISAMI) which is being held from 7th to 9th October 2020 in L'Qquila, Italy (https://www.isami-conference.net/). This work is the result of collaboration between Ronnie's group, the Cognitive Assistive Robotic Environments (CARE) Group (https://care.hw.ac.uk), and colleagues in the Institute of Sensors, Signals and Systems at Heriot-Watt University who specialise in microwave engineering. Their approach is one of few in its class to be evaluated in a real home environment, taking advantage of the centre's Robotic Assisted Living Testbed (RALT) (https://ralt.hw.ac.uk).

Yaniel Carreno and Eric Pairet Artau, who are both in the 2nd year of their PhD's, have had their joint work presented at the AAMAS (Autonomous Agents and Multi-Agent Systems) International Conference (https://aamas2020.conference.auckland.ac.nz/), which was held from 9th to 13th May 2020 in Auckland, New Zealand. AAMAS is the leading scientific conference for research in autonomous agents and multi-agent systems. AAMAS 2020 is the 19th edition of the AAMAS conference, and the first time AAMAS was held in New Zealand.

Yaniel and Eric presented their work on autonomous agents and their interaction making, with emphasis on task allocation strategies for heterogeneous robots. This work provides a solution to real-world problems associated with the autonomous maintenance and supervision of structures in the offshore oil and gas industry sector.

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## EPSRC funding wins for Prof. Verena Rieser

Prof. Verena Rieser, an academic from Heriot-Watt University, has been awarded £5.5M from EPSRC to work on two projects related to AI.

The first project in collaboration with Dr Ekaterina Komendantskaya, also from Heriot-Watt University, is titled "AISEC: AI Secure and Explainable by Construction". This project will run until August 2023 and has several project partners including St Andrews University, Five AI Ltd and Boston University.

The second project is titled "Designing Conversational Assistants to Reduce Gender Bias" will run until May 2023 and is in partnership with the BBC, Equate Scotland, Google and The Scottish Parliament.

Both are multi-disciplinary projects: AISEC will be combining Machine Learning with formal verification and law with applications in NLP and robotics. The latter will address gender stereotypes in technology and combine ML, NLP, psychology and education to fight these stereotypes.

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## MAAH video and Converge Challenge Success for Student

Alexandre Colle, a year 1 PhD student in the CDT, with a background in design, has collaborated with others to develop MAAH, a robot designed to bring comfort and companionship to users, while blending in with the home environment. Now, in collaboration with Swen Gaudl, Research Fellow from Falmouth University and Reiner Rockel, PhD Researcher from Agrotextiles, Alexandre has created a HRI2020 video of MAAH.

The video, which can be viewed here, describes the process of development of the first prototype of the MAAH, explaining the main idea behind its conception and the major steps required to reach a functional device. Alexandre advised that MAAH represents a provocation for the robotic community and is an attempt at offering a different view of a social robot.

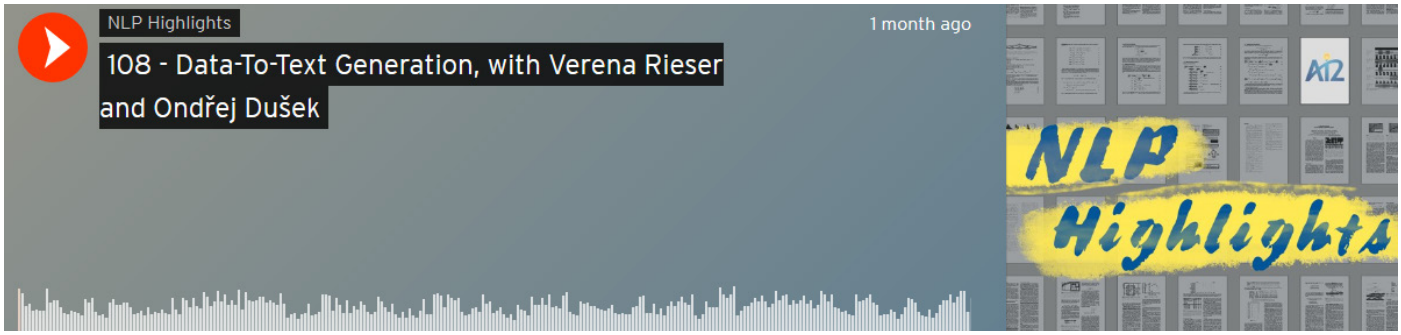
Alexandre's MAAH robot design has also led to him being named as a finalised in the Heriot-Watt cohort of the Converge Challenge 2020 in the Creative Challenge section.

# Prof. Verena Rieser delivers a NLP podcast

Prof. Verena Rieser was invited by NLP Lab (Natural Language Processing) to talk about her work in natural language processing in a podcast with Ondřej Dušek from the Charles University in Prague.

In the podcast they talk about the complexities of generating natural language when there is some kind of structured meaning representation as input, when you might want to do this, which is often some kind of dialog system, but also generating game summaries, and even some language modelling work.  They also talk about why this is hard, which is due in large part to the difficulty of collecting data, and how to evaluate the output of these systems.

You can listen to the podcast here.

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# Dr Subramanian Ramamoorthy wins grant from UK National Physical Laboratory

Dr  Subramanian Ramamoorthy, an academic from University of Edinburgh, has been awarded a grant from the UK National Physical Laboratory (https://www.npl.co.uk/).  Dr Ramamoorthy's project, on "Trustworthy control synthesis" builds on recent work on Safe AI and addresses how he can develop methods to ensure safety in machine-learning enabled robot control systems. The grant is in the form of a Metrology Fellowship, providing £164K.

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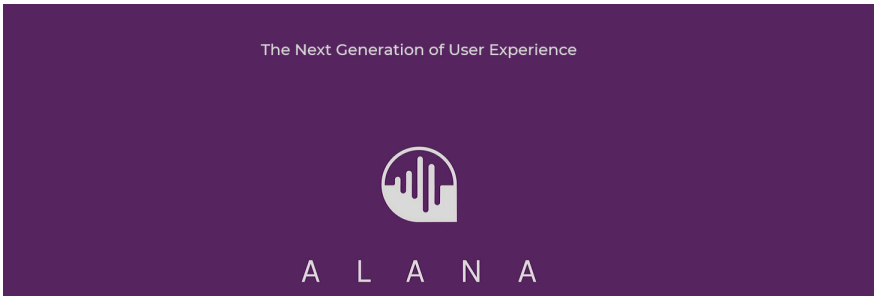
# New AI Company ALANA Launches

Alana, a spin-out company from Heriot-Watt University is developing artificial intelligence (AI) software that can understand and respond to human conversation.

The founding team of Prof. Verena Rieser, Prof. Oliver Lemon, Dr Ioannis Konstas and Dr Arash Eshgi are already seeing significant demand across a range of sectors for the technology which previously was successful in bringing a team to the finals of the Amazon Alexa Prize in two consecutive years.

Prof. Verena Rieser, Director of the Natural Language Processing lab at Heriot-Watt says: "Alana is different from the voice-activated assistants on the market today, such as Alexa and Siri, as the software enables long, extended conversations in machine learning research with well established solutions for customer facing interfaces".



# CogX 2020 Conference

Prof. David Lane, Director of Edinburgh Centre for Robotics, led sessions at the Virtual CogX 2020 Conference on Monday, 8th June 2020 on the Next Gen Infrastructure and Cloud Services stage. Prof. Lane spoke with Paul Clarke, CTO, Ocado and Sabine Hauert, University of Bristol about "Digital Twins in a Crisis". They later met with Prof. Nefti-Meziani from Salford University and James Kell from Rolls-Royce to discuss how to go about "Unlocking the smart robotics revolution".

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# Congratulations to Eli Sheppard

Congratulations to Eli Sheppard who passed his viva.

Eli's thesis entitled "Multimodal Representation Learning: 'an Unsupervised Approach to Symbol Grounding'" focused on developing methods to learn a joint representation of vision and language without human intervention. The system Eli designed is capable of learning which visual properties (colour, shape, size, etc.) relate to which words from a dataset of aligned images and verbal descriptions. The descriptions are turned into text using automatic speech recognition and then a multimodal auto-encoder neural network learns a joint representation of the words and images, regenerating images from descriptions and descriptions from images. You can read one of Eli's papers here.

His external examiner was Prof. Angelo Cangelosi (University of Manchester) and his internal examiner was Dr Christian Dondrup (School of Mathematical and Computer Sciences, Heriot-Watt University). Eli's supervisors were Dr Katrin Lohan and Dr Oliver Lemon from the School of Mathematical and Computer Sciences at Heriot-Watt University.

Since mid-April Eli has been working for Lincoln University as a PDRA (currently remotely). Eli is working on the vision system for a mushroom picking robot, developing techniques for 3D pose estimation using depth cameras.

Well done Dr Sheppard!

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EVENTS
EDINBURGH CENTRE FOR ROBOTICS

**Tuesday, 6th October 2020 - save the date!**

**Centre for Doctoral Training in Robotics and Autonomous Systems Conference 2020**

**By invitation only**

**The Centre is very active on social media and we would encourage you to follow us on Twitter @EdinRobotics to keep up to date with our activities.**

**If you have comments about the newsletter, questions about what we do or how to engage with us, please feel free to get in touch.**

UKRI Engineering and Physical Sciences Research Council

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