

EDINBURGH CENTRE FOR ROBOTICS

Innovation Ready



Annual Review 2014/2015

Contents

- 05** Introduction
 - Foreword
 - About us
 - Contacts
 - Management Structure
- 09** Centre for Doctoral Training in Robotics and Autonomous Systems
 - EPSRC Centre for Doctoral Training
 - Key Benefits
 - Research Themes
 - Academic Supervisors
 - Students
- 16** Industrial Sponsorship and Partners
 - Industrial Studentships
 - Industrial Partners
- 18** ROBOTARIUM
- 20** Highlights of the year
 - News in brief
 - Awards

To view our Annual Review online, please visit:
www.edinburgh-robotics.org/reports
This publication can also be made available in alternate formats on request.

Foreword

Welcome to the first annual review highlighting key aspects and activities of staff and students in the Edinburgh Centre for Robotics during 2014/2015.

This has been the first year of operation of our EPSRC Centre for Doctoral Training in Robotics and Autonomous Systems (RAS), one of three such Centres in the UK. Following student intakes in 2014 and 2015, the Centre now has 28 full time Ph.D. students engaged in the four-year Ph.D. programme, and a similar number of affiliated students working on relevant Ph.D. programmes or various local and international Masters. Seven of our industrial supporters are now providing full financial support to studentships, augmenting those of EPSRC.

The ROBOTARIUM equipment is now providing important underpinning facilities in the Centre. For example, students are working on Baxter and PR2 humanoids to demonstrate intention aware planning for co-operative assembly with humans. Also, the IVER autonomous underwater vehicle with Hydrason Biosonar and Evologix acoustic modems was extensively used in robotic archaeological survey experiments in Sicily and Estonia in the summer of 2015. The instrumented treadmill (and peripherals including full body motion capture facilities and the active lower limb support devices) has enabled engagement with the NHS on upper and lower limb prosthesis research. The rapid prototyping equipment is being used as part of the development of an all-terrain vehicle for wheelchair bound people, and to fabricate wearables for children and adults with special needs. The iCub humanoid expressive head 'Nikita' has proved a big hit with the media featuring on the BBC and at industrial exhibitions.

Planning for new building and refurbishments in the HWU Lyell Centre, Earl Mountbatten Building and UoE Informatics Forum is in full swing, enabling the final equipment procurements to shortly be installed. These include the ROBOTARIUM West human-robot interaction space and the impressive NASA-UoE redesign of the Valkyrie humanoid to be used for the NASA Space Robotics Challenge, following its introduction at the DARPA Robotics Challenge.

Exciting new research grant wins by staff include six from the EU H2020 programme developing innovations in shopping mall entertainment robots (MuMMER), gardening robots for hedge trimming (TrimBot), fish lateral line sensing (LAKHsMI), all-terrain wheelchairs (BEACONING), the European Academy for Marine and Underwater Robotics (ROBOCADEMY), and a twinning arrangement with European partners INEST TEC in Portugal (STRONGMAR). We are also part of the UK EPSRC RAS Network connecting 11 UK RAS-active Universities, and partners in the recently awarded NERC-EPSRC Centre for Doctoral Training in Smart

and Autonomous Observation Systems for environmental science (NEXUSS).

During this period, Centre staff have made several strategic international visits to locations including the US, Japan and Brazil, resulting in sponsorship from new partners Kawasaki Heavy Industries, Hitachi Ltd. (CERL) and a NEWTON award collaborating with the Brazilian Neuroscience Institute.

We have also enjoyed visits and seminars from top class international roboticists including Professors Hiroshi Ishiguro (Osaka University), Ikuo Yamamoto (Nagasaki University), Jean Paul Laumond (LAAS-CNRS), Benjamin Kuipers (University of Michigan), Nikos Tsagarakis (IIT Genoa) and Andrew Blake (Microsoft Research and now UK Alan Turing Institute). We also welcome four new appointments to the academic team, Dr Maurice Fallon (MIT), Dr Mustafa Suphi Erden (EPFL), Dr Katrin Lohan (Bielefeld & IIT Genoa) and Dr Frank Broz (Plymouth) strengthening our expertise in assistive robotics, humanoid perception, planning and human-robot interaction.

We have had a very successful series of Gateway events, allowing the student cohort to interact closely with several leaders in the RAS domain, in an informal setting. Also, the cohort has benefited significantly from workshops on improving presentation skills and effective communication. EPSRC institutional grants are helping us synergise the UK Humanoid Robotics community through an open call for participation in a series of sandpits and hands-on training exercises, led by the RAS CDT students as key mentors – developing important leadership and technical skills.

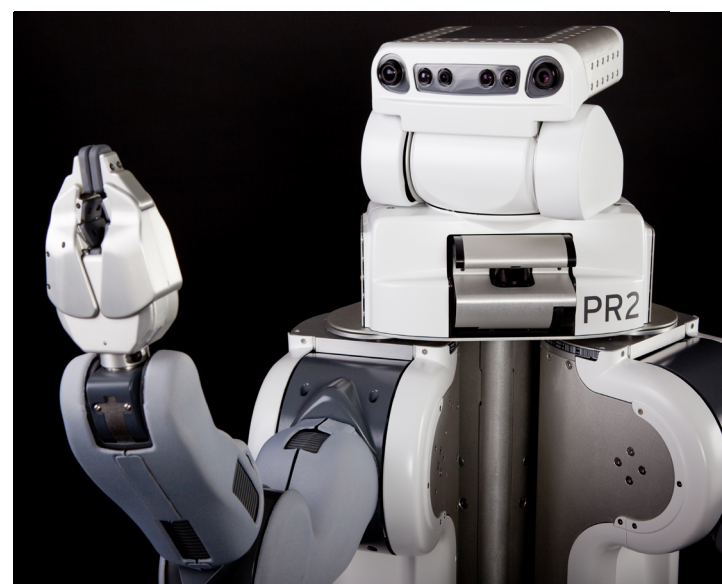
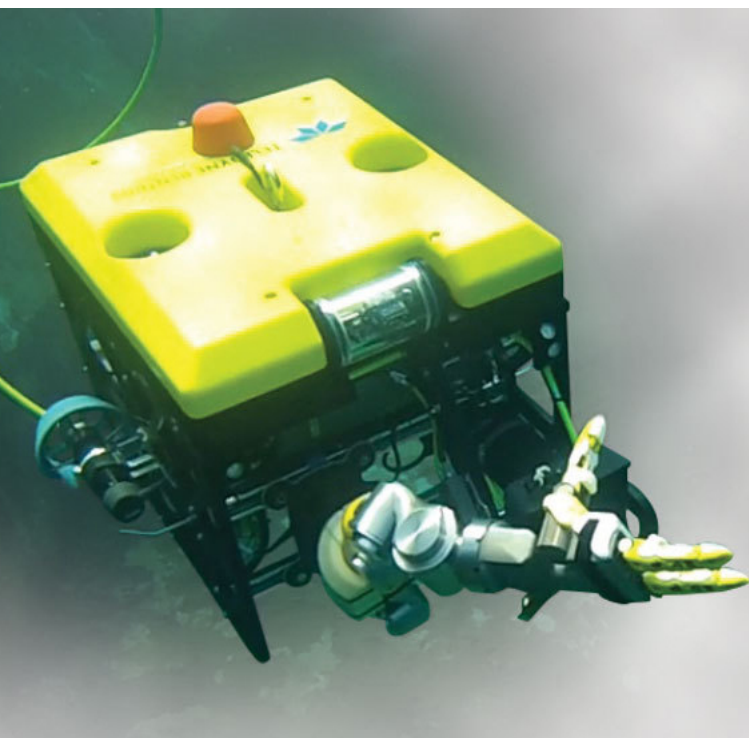
Finally, the Centre has featured frequently on television and radio news both locally on BBC Scotland, nationally on BBC and Sky News, and internationally on BBC World. In the spring, BBC Science Correspondent David Shukman visited the Centre and delivered a report broadcast on the BBC News at Ten. In September, it was exciting and challenging to have Sky News broadcast live from our labs, on the hour, every hour, for nearly a whole day. Also in September, three of our leading women roboticists broadcast an afternoon of live demonstrations with Click's Spencer Kelly from BBC Television Centre in London as part of Intelligent Machines week.

These are just a snapshot of the activities that have been underway in the Centre during its first full year. Our next year promises to be even busier with return missions to both China and Japan, further new faculty appointments, full commissioning of ROBOTARIUM and the efforts of the 2015 cohort of CDT students.

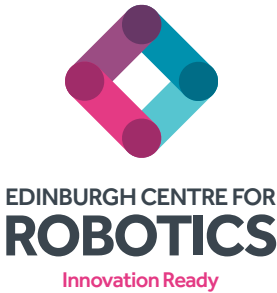
Watch our progress on latest developments and activities at: www.edinburgh-robotics.org

Prof David Lane
Edinburgh Centre for Robotics
Director
Heriot-Watt University

Prof Sethu Vijayakumar
Edinburgh Centre for Robotics
Director
University of Edinburgh



About us



The Edinburgh Centre for Robotics (ECR) is a £35M joint venture between Heriot-Watt University and the University of Edinburgh, supported by EPSRC, Industry and the Universities.

It captures the expertise of over 30 principle investigators of international standing from 12 cross-disciplinary research groups and institutes across the School of Engineering and Physical Sciences and the Department of Computer Science at Heriot-Watt University, and the Schools of Informatics and Engineering at the University of Edinburgh.

The Centre includes an EPSRC Centre for Doctoral Training in Robotics and Autonomous Systems which trains innovation-ready postgraduates, and the ROBOTARIUM, a £7.2M national capital equipment facility.

The strategic aim of the Centre is to supply the urgent need for skilled, industry and market aware researchers in Robotics and Autonomous Systems. Interactions between robots, autonomous systems, their environments and people present some of the most sophisticated scientific challenges we must solve to realise productive and useful assistive or remote systems in our homes, workplaces and industries.

The Edinburgh Centre for Robotics is training a new generation of researchers to take a key role in solving such problems. These innovation-ready Ph.D. students are being prepared

to enter, lead and create the UK's innovation pipeline in this area for jobs and growth.

The Centre focuses on autonomous robot interaction with environments, people, systems and each other. We aim to apply fundamental theoretical methods to real-world problems, using real robots to solve vital commercial and societal needs.

Research is conducted using state of the art humanoid and field robotic platforms, in interactive spaces with fabrication facilities for soft embodiments, embedded microsensors and dedicated computing. Centre partners include global companies in the oil and gas, assisted living, transport, defence, medical and space sectors.

Contacts



Prof David Lane
Director
Heriot-Watt University
D.M.Lane@hw.ac.uk



Prof Sethu Vijayakumar
Director
University of Edinburgh
sethu.vijayakumar@ed.ac.uk



Prof Nick Taylor
Deputy Director
Heriot-Watt University
n.k.taylor@hw.ac.uk



Dr Michael Herrmann
Deputy Director
University of Edinburgh
Michael.Herrmann@ed.ac.uk



Anne Murphy
Administrator
Heriot-Watt University
anne.murphy@hw.ac.uk



Selina Aragon-Camarasa
Administrator
University of Edinburgh
Selina.Aragon@ed.ac.uk

@EDInrobotics
 Edinburgh Centre for Robotics
 Edinburgh Centre for Robotics
enquiries@edinburgh-robotics.org

Management Structure

The Executive

The Executive is chaired by the Directors and is responsible for day-to-day operations of the Centre. Membership of the Executive is made up from the leadership teams from each University, Centre Administrators and student representatives. The Executive is responsible for student recruitment, progress and pastoral matters, public outreach, administering budgets, supervisor selection, organisation of annual conference and guest lectures, #Cauldron training programme, and commercialisation processes. It is also the first arbiter in the conflict resolution process with partners and students.

The Steering Group

The Steering Group consists of the Directors, senior academics from the Postgraduate Studies Committees at Heriot-Watt University and the University of Edinburgh, as well as a representative from industry (the Chair), EPSRC and from the RAS CDT student body. The remit of the Steering Group is to monitor the progress of the Centre, IP and licensing arrangements and relations with industry members, and to review and propose strategy and policy. The Steering Group will also act as final arbiter in the conflict resolution process for students and partners.

The External Advisory Board

The External Advisory Board reports to the Steering Group and comprises representatives from the Industry Members engaged with the Centre, plus two international academics and the Centre Management team. It will meet at least annually to monitor the work of ECR, provide strategic advice, support development of new business relationships and promote best practice. Members of the External Advisory Board serve in a non-executive capacity.

The Academic Board

An Academic Board involving all active supervisors and both Universities' representatives will also report to the Steering Group. Meeting annually, and chaired by the Directors, it will monitor the academic quality and delivery of both the taught courses and the research projects, and will deal with formal student progression.

EPSRC Centre for Doctoral Training

Robotics and Autonomous Systems



Robots that can learn, adapt and take decisions will revolutionise our economy and society over the next 20 years. They will work for us, beside us, assist us and interact with us. It is estimated that by 2025 such advanced robotic and autonomous systems (RAS) could have a worldwide economic impact of \$1.7 trillion to \$4.5 trillion annually, with an emerging market value €15.5Billion.

The Edinburgh Centre for Robotics aims to help the UK realise its industrial potential in this revolution, by producing a new generation of highly skilled researchers, trained to take a leading role, technically skilled, industry and market aware, and prepared to create and lead the UK's innovation pipeline for jobs and growth.

Our Doctoral students are part of a multi-disciplinary enterprise, requiring sound knowledge of physics (kinematics, dynamics), engineering (control, signal processing, mechanical design), computer science (algorithms for perception, planning, decision making and intelligent behaviour, software engineering), as well as allied areas ranging from biology and biomechanics to cognitive psychology. Our students specialise in one of these areas, gaining a deep understanding of technical aspect and theoretical foundations. They also receive broad training across these fields so as to meaningfully engage with a wide cross section of the robotics community.

“A community has built up around the RAS-CDT – every student knows what all the others are doing, where they are, and we discuss research, any issues and organise social events.”

Emmanuel – Ph.D. Student, 2014 Cohort

Achieving impact with robotics also requires non-technical skills, for example an understanding of technology translation, creativity and entrepreneurial processes. These are an essential component of the CDT programme, captured in the #Cauldron training programme.

We offer around 15 studentships per year. Funding comes from EPSRC, Industrial Partners, Heriot-Watt University and the University of Edinburgh.

Key Benefits

- Fully funded studentships covering tuition fees and maintenance at prevailing EPSRC rates.
- Access to our world class infrastructure, enhanced through our £7.2m ROBOTARIUM facility.
- Students benefit from supervision by academic experts from both institutions and graduate with a joint Ph.D. from University of Edinburgh and Heriot-Watt University.
- Excellent training opportunities, including masters level courses in year one, supplemented by training in commercial awareness, social challenges and innovation.
- Enterprise funds available to support development of early commercialisation prototypes.
- Opportunity for competitive

selection for funding from Cambridge IGNITE and MIT Sloan School of Management Entrepreneurship Programmes.

- Opportunities to compete in international robot competitions (RoboCup, DRC, SAUC-E Autonomous Underwater Vehicle Challenge Europe).



ASV C-Enduro, Robotarium West, Heriot-Watt University

“I really like the wide variety of opportunities both universities offer. During this year, I have attended seminars, courses, talks, events at both universities, being able to get an idea of what other researchers are doing, benefiting from other experiences that are not completely related to my research” Jose – Ph.D. Student, 2014 Cohort

Research Themes



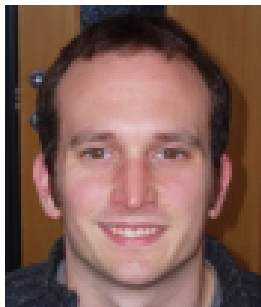
Research in the Centre is underpinned by established bodies of theoretical work. We apply fundamental theoretical methods to real-world problems on real robots to solve pressing commercial and societal needs. The central theme running throughout our research is **Interaction**.

- Environment Interactions** deals with physical interactions between a robot and the environment.
- Multi-Robot Interactions** involves autonomous sensing and decision making for collaborative interactions.
- People Interactions** deals with interactions between robots and people in smart spaces that transcend the physical and virtual divide.
- Self-Interactions** deals with robotic introspection for condition monitoring, prognostics and health management.
- Enablers** involve architectural system design, linked to novel embodiment using soft materials, micro and nanosensors, and embedded multi-core computing.

		Underpinning Theory					
Interaction Themes		Modelling & Estimation	Logic & Semantic Representation	Search & Optimisation	Learning & Adaptation	Bio-Inspired Methods	Cognitive Modelling
1	Environment Interactions: Control, Actuation, Sensing, Planning, World Modelling	x	x	x	x	x	
2	Multi-Robot Interactions: Collaborative Decision Making, Swarming	x		x	x	x	
3	People Interactions: Affective Computing, Smart Spaces	x	x	x	x		x
4	Self-Interactions: Condition Monitoring, Health Management, Prognostics, Persistent Autonomy	x	x	x	x		x
5	Enablers: Architectures and Embodiments, Validation & Verification	x	x	x	x	x	

Academic Supervisors

We are indebted to the academic supervisors of the 2014 & 2015 cohorts, who are fundamental to the success and direction of the research undertaken in the Centre.



Dr Daniel Clark
d.e.clark@hw.ac.uk
Heriot-Watt University



Prof David Corne
d.w.corne@hw.ac.uk
Heriot-Watt University



Dr Matthew Dunnigan
m.w.dunnigan@hw.ac.uk
Heriot-Watt University



Dr Mustafa Suphi Erden
m.s.erden@hw.ac.uk
Heriot-Watt University



Dr Maurice Fallon
maurice.fallon@ed.ac.uk
University of Edinburgh



Dr Michael Herrmann
michael.herrmann@ed.ac.uk
University of Edinburgh



Prof David Lane
D.M.Lane@hw.ac.uk
Heriot-Watt University



Prof Oliver Lemon
o.lemon@hw.ac.uk
Heriot-Watt University



Dr Katrin Lohan
k.lohan@hw.ac.uk
Heriot-Watt University



Prof Yvan Petillot
y.r.petillot@hw.ac.uk
Heriot-Watt University



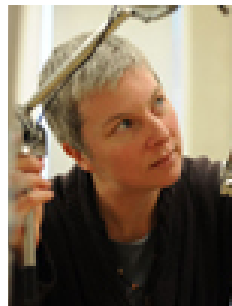
Dr Neil Robertson
n.m.robertson@hw.ac.uk
Heriot-Watt University



Dr Adam Stokes
adam.stokes@ed.ac.uk
University of Edinburgh



Prof Nick Taylor
n.k.taylor@hw.ac.uk
Heriot-Watt University



Prof Barbara Webb
bwebb@inf.ed.ac.uk
University of Edinburgh



Dr Theo Lim
T.Lim@hw.ac.uk
Heriot-Watt University



Dr Subramanian Ramamoorthy
s.ramamoorthy@ed.ac.uk
University of Edinburgh



Prof Sven-Bodo Scholz
s.scholz@hw.ac.uk
Heriot-Watt University



Dr Patricia Vargas
p.a.vargas@hw.ac.uk
Heriot-Watt University



Prof Sethu Vijayakumar
sethu.vijayakumar@ed.ac.uk
University of Edinburgh

Our Students

2014 Cohort



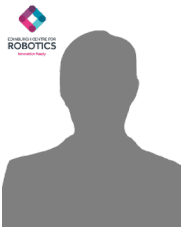
Marco Caravagna
m.caravagna@sms.ed.ac.uk
Motion Planning Algorithms for Humanoid Manipulation



Daniel Gordon
Daniel.Gordon@ed.ac.uk
Multi-contact balance of a humanoid robot



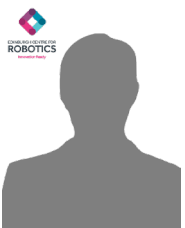
Teun Krikke
t.krikke@sms.ed.ac.uk
Who are you? Recognizing faces and voices with Deep Learning



Thibault Lacourtablaise
tl3@hw.ac.uk
Geometric Formation Tracking Control of Multiple AUVs



Jose Part
jpg30@hw.ac.uk
Attribute Prediction using Deep Convolutional Neural Networks



Hans-Nikolai Viessmann
h.viessmann@ed.ac.uk
An Investigation into the Performance Portability between Single-Assignment C and OpenCL



James Garforth
james.garforth@ed.ac.uk
Scale-Aware Real-Time Scene Reconstruction for a Micro Aerial Vehicle



Emmanuel Kahembwe
ekahembwe@ed.ac.uk
Planning Coordinated Actions with Trajectory Clusters



Iris Kyranou
ik5@hw.ac.uk
Real-Time Classification of Multi-Modal Sensory Data for Prosthetic Hand Control



Wolfgang Merkt
wolfgang.merkt@ed.ac.uk
Dense Visual Mapping and Planning for Robust Autonomous Manipulation



Raluca Scona
rs1@hw.ac.uk
Multiple Vehicle Localisation in the Maritime Domain

2015 Cohort



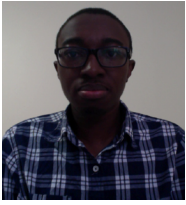
Marian Andrecki
ma804@hw.ac.uk



Vibhav Bharti
vb97@hw.ac.uk



Andrew Brock
ajb5@hw.ac.uk



Omoni Elekima
owe1@hw.ac.uk



Calum Imrie
s1120916@sms.ed.ac.uk



Ross McKenzie
s1021998@sms.ed.ac.uk



Joao Moura
J.M.Pousa-De-Moura@sms.ed.ac.uk



Christian Rauch
Christian.Rauch@ed.ac.uk



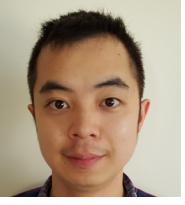
Jan Stankiewicz
J.T.Stankiewicz@sms.ed.ac.uk



Daniel Angelov
s1129256@sms.ed.ac.uk



Jonathan Bowles
jonathan.bowles@ed.ac.uk



Derek Chun
derek.chun@ed.ac.uk



Graham Henderson
graham.henderson@ed.ac.uk



Tatiana Lopez
tl201@hw.ac.uk



Boris Mocialov
bm4@hw.ac.uk



Benedict Pfender
blp1@hw.ac.uk



Eli Sheppard
ems7@hw.ac.uk

Industrial Studentships



Kawasaki
Powering your potential

Statistical Methods for AUV Underwater Pipeline Tracking in Multi Sensor Data
Kawasaki Heavy Industries, Kobe, Japan
Pipeline tracking is a challenging task for Autonomous Underwater Vehicles because sections of the pipe may be deliberately buried and not visible from the surface. This project investigates multi-sensor solutions to tracking pipelines in and out of burial from an AUV flying low over the pipe using multi-sensor data, to be selected from sub bottom sonar, wideband biosonar, magnetometer, laser and video. The PhD work focuses on statistical methods for tracking, starting with the Probability Hypothesis Density filter.



Schlumberger

Cooperative Control of Drilling Equipment
Schlumberger, UK
As automation of drilling processes is developed, operation will be split between completely automated tasks and tasks that are carried out by humans. The project looks at how teams comprising human and robotic actors can collaborate to achieve complex and uncertain tasks in drilling operations.



touch bionics

Robust Sensory Interfaces for Advanced Prosthetics
Touch Bionics, UK
This project aims to address the long standing challenge of obtaining alternate robust and reliable sensory interfaces and attempts a step-change in the dexterous control of advanced prosthetics and validate them through integration on cutting edge prosthetic limbs. The student explores appropriate methods for obtaining robust and reliable data through new sensory interfaces for prosthetics.



RENISHAW
apply innovation

Interactive robotic inspection strategies using unstructured data
Renishaw, UK
Document based 2D technical drawings rather than a digital 3D model are still the main format in a production-inspection workflow. This research is focused on using unstructured data such as the symbolic representations of geometric dimensioning and tolerance (GD&T) as input to conduct a teach-execute regime for coordinate measuring robots.



COSTAIN

Shared Autonomy for Kinesthetic Tools
Costain, UK
The goal of this industrially sponsored project is to research and extend previous techniques to give a new approach to categorising motion and inferring intent to support robust maritime autonomy decisions in Unmanned Surface Vehicles.



RSSB

Sharing responsibility
RSSB, UK
This project investigates how the task of driving a train is likely to evolve in the next 10 years, what other changes in rail and related industries are driving this change, how driver selection and training processes will evolve to support this change, how these changes will be received by existing train drivers and operational staff.

Intention-aware Motion Planning
UK
Many repetitive industrial tasks require significant cognitive load which results in operator fatigue and in turn can become dangerous. The development of robotic sensing technology and compliant feedback technology will allow semi-autonomous robotics systems to improve this type of work flow. This project aims to explore methods in which a robotic system with shared autonomy can contribute to the operation of a Kinesthetic tool (such as a piece of machinery) and in doing so reduce the cognitive load and fatigue of the human operator.

Industrial Partners



BAKER HUGHES



Balfour Beatty



BAE SYSTEMS
INSPIRED WORK



bp



COSTAIN



D4C
PERFORMANCE CAPTURE



dyson



HRI Europe
Honda Research Institute



HYDRA SOLUTIONS



industrial systems and control



Kawasaki
Powering your potential



KINOVA ROBOTICS



KUKA



MACTAGGART SCOTT
Innovators since 1898



MARZA
ANIMATION PLANET



NII 国立情報学研究所
National Institute of Informatics



OC Robotics



RENISHAW
apply innovation



RSSB



SCISYS



Schlumberger



seebyte



Selex ES
A Finmeccanica Company



Shadow ROBOT COMPANY



sicsa* The Scottish Informatics & Computer Science Alliance



SMD



subsea 7



THALES



touch bionics



TRL



YDREAMS



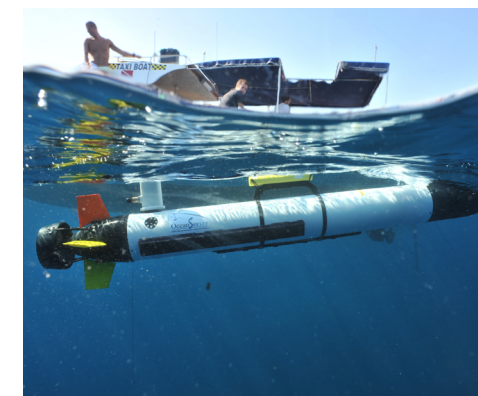
Robotarium



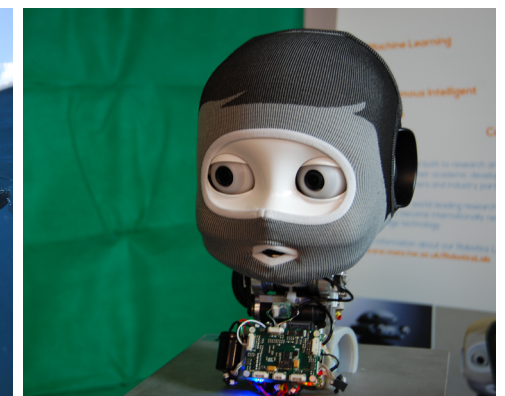
ROBOTARIUM comprises four integrated and interconnected components. It is available to researchers inside and outside the Edinburgh Centre for Robotics as well as industry as a national UK research facility.

- ⬆ Interaction Spaces for humans and robots to work together in physically separate indoor spaces (ROBOTARIUM West and East).
- ⬆ Field Robotic Systems (comprising humanoids and unmanned vehicles) for operations inside or outside the spaces.
- ⬆ MOBOTARIUM, a human driven sensorised and connected mobile vehicle for data assimilation/situation awareness and interaction for an operator with robots and intelligent agents in the field.
- ⬆ These are underpinned by a set of Enabling Facilities comprising rapid prototyping and micro-assembly equipment for fabrication and inexpensive duplication of novel (bioinspired) robot embodiments, their sensors and their on-board computing. Also, state of the art computing accelerators with programmable hardware to develop power efficient computation suitable for autonomous deployments.

Together, these create an integrated capability unique in the world, for exploring collaborative interaction between remote teams of humans, robots and their environments at all levels. It is transformational in the range of robot scales and environments that can be experimentally configured, and in the way the study of physical interaction through robot embodiment can be linked to the study of human interaction/expression, robot collaboration and real in-field remote operations for mapping and intervention.



AUV, Robotarium West, Heriot-Watt University



Nikita, iCub Head, Robotarium West, Heriot-Watt University

Left page image: Valkyrie, Nasa Humanoid, Robotarium East, University of Edinburgh

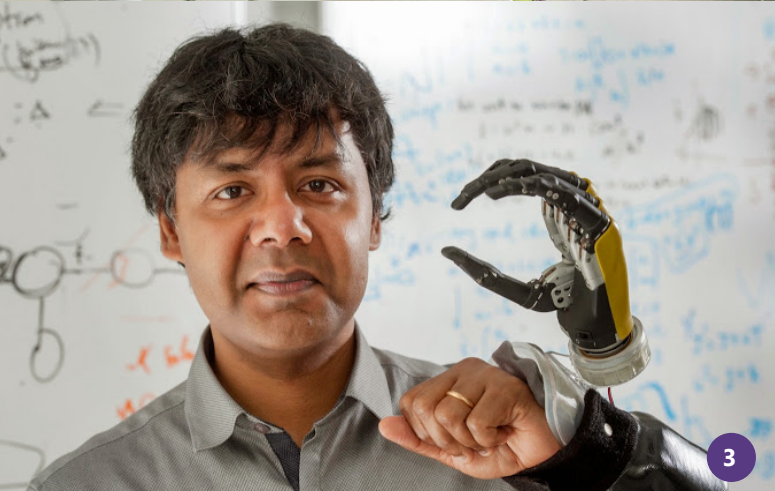
News in brief



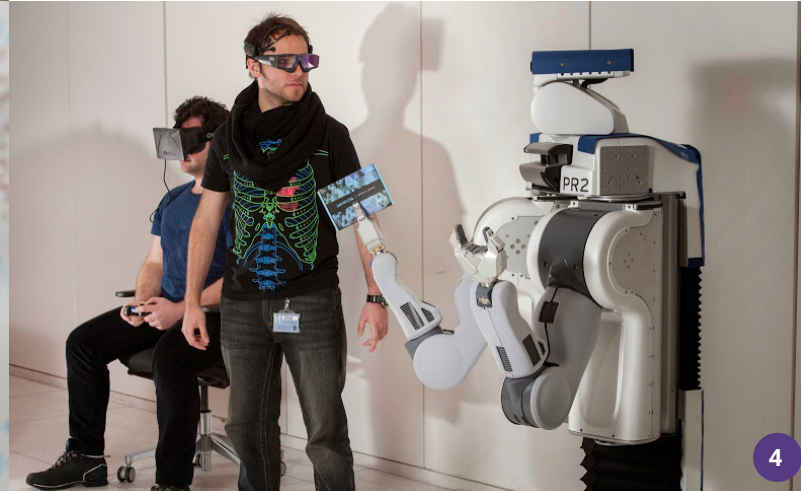
1



2



3



4



5



6



7



8

1 Edinburgh Centre for Robotics Official Launch

The Edinburgh Centre for Robotics held its official launch event on Monday 22nd September 2014, at the Informatics Forum, University of Edinburgh. The launch began with a keynote lecture from Professor Andrew Blake, Laboratory Director at Microsoft Research.

2 The BBC visits the Edinburgh Centre for Robotics

At the beginning of March, the Edinburgh Centre for Robotics played host to the BBC's Science editor, David Shukman. He visited both the Heriot-Watt and University of Edinburgh sites, and got a taste of our current research. It was a great way to showcase the facilities, technology and research that the centre has to offer. As a result of this visit, the Centre was featured on BBC News at Ten.

5 Sky News visits Robotarium East (University of Edinburgh)

On 2nd September 2015, Sky News correspondent James Matthewson visited the Robotarium facilities at the School of Informatics, University of Edinburgh. 'Jazz', 'BLUE', 'The Castle', a Prosthetic Hand, and other robots featured each hour from 9:30, as part of the Robot Revolution week at Sky News.

6 Robot Tutor visits Beeslack Community High School

Two Heriot-Watt researchers, Amol Deshmukh and Dr Srin Janarthanam, recently took two robots into Beeslack Community High School in Penicuik. The researchers, led by Prof Ruth Aylett and Dr Helen Hastie, are part of a large European project EMOTE (www.emote-project.eu), which also has partners in Sweden, Germany and Portugal.

7 Robotarium West in the Sunday Herald

"Robots that can understand human emotions are being brought into Scottish schools to help with teaching." Dr Patricia Vargas, Prof Ruth Aylett and other researchers from the Centre talk about their research in the article "Reading, writing, arithmetic... and robots: the emotionally literate teaching machines being pioneered in Scotland" published in the Sunday Herald.

8 Robotarium West visits BBC in London

Three academics from the Robotics Lab at Heriot-Watt University, Dr Patricia Vargas (Director), Dr Katrin Lohan (Deputy Director) and Prof Ruth Aylett plus 3 other researchers, Steven Kay, Ingo Keller and Srinivasan Janarthanam, went down to London to give interviews at the BBC and present demos to show their work. They took Robotarium West equipment, including three NAOs, several e-pucks, one airdrone and Nikita, the iCub talking head.

Awards



EU: MuMMER: Multi-Modal Mall Entertainment Robot

In collaboration with the University of Glasgow, the project will develop a humanoid robot (based on Aldebaran’s Pepper platform) able to engage and interact autonomously and naturally in the dynamic environments of a public shopping mall, providing an engaging and entertaining experience to the general public. The project team will develop and integrate new methods from audiovisual scene processing, social-signal processing, high-level action selection, and human-aware robot navigation.



EU: TrimBot: Gardening Robot for Rose, Hedge and Topiary Trimming

The project will research the underlying robotics and vision technologies and prototype the first outdoor garden trimming robot. The robot will navigate over varying terrain, approach rose bushes, hedges and boxwood topiary, to trim them to an ideal shape. The robot will be based on a modified commercial robot lawn mower, which will navigate using a user-defined garden map and 3D scene analysis, and then visually servo a novel electric plant-cutter.



EU: BEACONING: Design and Fabrication of Pervasive, Intelligent and Wearable Low Cost Structures

BEACONING is a pan-European project of 15 partners setting a forefront in multifaceted education technologies through the large-scale piloting of a digital learning platform that blends physical and digital spaces. Aimed at developing the skills for today’s abled and physically challenged learners and workforce BEACONING innovation strategies create and combine new ICTs in multiple ways that merge formal, non-formal and informal learning. The RAS RMDS lab will play an important role in designing and fabricating of wearables and other low-cost structures for BEACONING technologies.



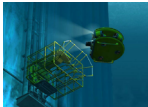
EU: LAKHSMI: Sensors for Large Scale Hydrodynamic Imaging of Ocean Floor

LAKHSMI will develop a new bio-inspired technology to make continuous and cost-effective measurements of the near-field, large-scale hydrodynamic situation for environmental monitoring in cabled ocean observatories, performance and damage detection in marine renewable energy and unwanted ingress in port/harbour security. The project will design, manufacture, and field test prototype smart sensor cables that measure differential pressure and temperature on the ocean floor, enabling high resolution imaging of the surrounding volume in space and time through simple, inexpensive, very low power transduction. The project involves a consortium of engineers, computer scientists, oceanographers, environmentalists and companies, from Tallinn, Groningen, Aberdeen, Orkney and Edinburgh. <https://ec.europa.eu/programmes/horizon2020/en/news/fish-inspired-innovation-help-track-movement-water>



EU: ROBOCADEMY ITN: European Academy for Marine and Underwater Robotics

The Robocademy ITN will establish a European training and research network to develop key skills and enabling technologies in underwater robotics for the scientific and economic exploration of the oceans (e.g. offshore oilfield of the future). Through the close collaboration of leading research institutes, academia, industry, and SMEs in robotics, marine technology, marine science, and offshore industry, Robocademy will provide first-class training and research opportunities for Early Stage Researchers.



EU: STRONGMAR: Strengthening Maritime Technology Research Centre

This is an H2020-TWINN-2015 twinning project, creating a multidisciplinary network of excellence in marine science and technology with leading EU organisations in marine robotics, and in particular with INESC-TEC in Porto, Portugal. The project comprises a series of co-ordination activities, including summer/winter schools, scientific meetings, participation in international scientific events, conference and workshops, staff exchanges, industrial and user engagements and public outreach activities.



NERC and EPSRC: NEXUSS: Centre for Doctoral Training: Next Generation Unmanned Systems Science

The Centre will train a new generation of environmental scientists skilled in the use of Smart and Autonomous Observation Systems (SAOS) to tackle major environment monitoring challenges where progress requires real-time, continuous, sustained and high-resolution observations. It will develop, deliver and disseminate the world’s first environmental science doctoral training programme founded around competitive team Grand Challenges (GCs) that are sponsored fully by industry. Other major UK organisations involved include the British Antarctic Survey, the National Oceanography Centre, the Scottish Association for Marine Science, the University of Southampton and the University of East Anglia.



EPSRC: Robotics and Autonomous Systems Network

The EPSRC UK Robotics and Autonomous Systems Network (UK-RAS Network) was established in March 2015 with the mission to provide academic leadership in Robotics and Autonomous Systems (RAS), expand collaboration with industry and integrate and coordinate activities at eight Engineering and Physical Sciences Research Council (EPSRC) funded RAS capital facilities and Centres for Doctoral Training (CDTs) across the UK.

This publication is available online at
www.edinburgh-robotics.org/reports

This publication can also be made available in
alternate formats on request.

Published by :

Edinburgh Centre for Robotics
Heriot-Watt University
University of Edinburgh

Designed by:

Selina Aragon-Camarasa
Selina.Aragon@ed.ac.uk
University of Edinburgh

Printed by:

Printing Services, University of Edinburgh
Infirmary Street, Edinburgh

Thank you to all students and staff who
helped in the production of this publication.

www.edinburgh-robotics.org