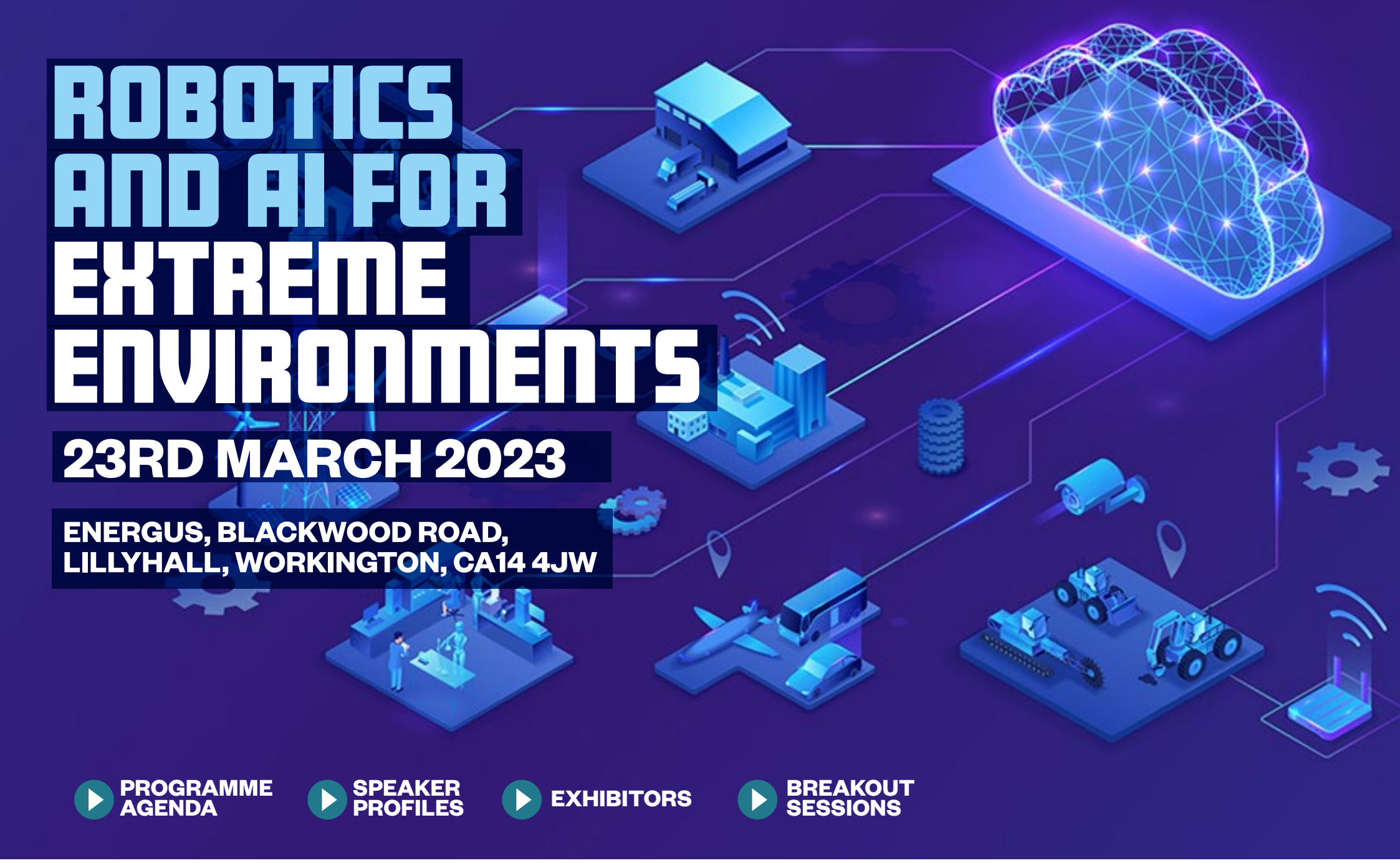
ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

23RD MARCH 2023

ENERGUS, BLACKWOOD ROAD, LILLYHALL, WORKINGTON, CA14 4JW



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Hosted by

GAMECHANGERS
DELIVERING NUCLEAR INNOVATION

Sellafield Ltd

RAICo1
ROBOTICS & ARTIFICIAL INTELLIGENCE COLLABORATION 1

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

PROGRAMME AGENDA

23RD MARCH 2023

09.00 – 09.45 (ATRIUM)
REGISTRATION, EXHIBITION & NETWORKING

09.45 – 10.00 (AUDITORIUM)
WELCOME AND AIMS OF THE DAY
Chris Ballard, Robotics and AI Programme Manager, Sellafield Ltd
Alison Gray, Event Facilitator, Skillfluence

10.00 – 10.15 (AUDITORIUM)
THE IMPORTANCE OF ROBOTICS AND INNOVATION IN NUCLEAR DECOMMISSIONING
Robin Ibbotson, Chief Technology Officer, Sellafield Ltd

10.15 – 11.00 (AUDITORIUM)
ROBOTICS AND AI COLLABORATION SESSION
Barry Lennox, Professor of Applied Control, University of Manchester
Rob Buckingham, OBE, FREng. Director, UKAEA
Rav Chunilal, Head of Robotics and AI, Sellafield Ltd
Kate Canning, Head of R & D, Nuclear Decommissioning Authority

11.00 – 12.00 (ATRIUM)
COFFEE BREAK AND EXHIBITION

12.00 – 12.15 (AUDITORIUM)
DEVELOPING TRUSTWORTHY AI FOR MISSION-CRITICAL USES
Caroline Gorski, Chief Executive, R2 Factory at Rolls-Royce

12.15 – 12.30 (AUDITORIUM)
COBRA: INDUSTRIAL TO MEDICAL SURGERY
Abdelkhalik Mohammed, Assistant Professor in Mechatronics, University of Nottingham
Oladejo Olaleye, Consultant Head & Neck, Robotic Surgeon, University Hospitals of Leicester NHS Trust

12.30 – 12.45 (AUDITORIUM)
BUILD FOR THE FUTURE: CLOUD INNOVATION FOR THE NUCLEAR INDUSTRY AMAZON WEB SERVICES (AWS)
Maria King, Account Manager, AWS

12.45 – 14.15 (ATRIUM)
LUNCH AND EXHIBITION

14.15 – 14.45
PARALLEL SESSIONS
Can we prevent industrial robots from going rogue? (ENTERPRISE)
Jonathon Loo, Chair Professor of Computing and Communication Engineering, University of West London

Game Changers - a success story (AUDITORIUM)
Frank Allison, CEO FIS360 Ltd
James Hill, Director, Eadon Consulting Ltd
Alex Allen, Technical Lead, Sellafield Ltd

15.00 – 15.30 (AUDITORIUM)
Launch of Game Changers challenge
Asset Inspection Through 19mm Diameter Access Ports
David Hargreaves, Technical Specialist, Sellafield Ltd
Stephen Israel, Spent Fuel Management Technical, Sellafield Ltd
Karim Bahou, Project Manager, FIS360 Ltd

15.00 – 16.00 (EXCELLENCE AND ENERGY SUITE)
AUTONOMOUS SORT AND SEGREGATION OF NUCLEAR WASTE
Createc Ltd, Barrnon Ltd, Atkins Ltd, Veolia Nuclear Solutions and Cavendish Nuclear

15.30 – 16.00
PARALLEL SESSIONS
The importance of innovation and technology transfer in nuclear (AUDITORIUM)
Katherine Eilbeck, Head of R & D, Sellafield Ltd
Sara Huntingdon, Head of Innovation, Nuclear Decommissioning Authority
Kirsty Hewitson, Interim CEO, Innovate UK KTN
Hilary Royston-Bishop, R & D Manager, Sellafield Ltd

The Sellafield Supply Chain and how to do business with Sellafield Ltd (ENTERPRISE)
Eirini Etoimou, Head of Corporate Sustainability and Supply Chain Development, Sellafield Ltd
Beatrice Fraser, Procurement Lead for Technology, Sellafield Ltd

16.15 - EVENT CLOSE

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ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

ABDELKHALICK MOHAMMAD

EXASSISTANT PROFESSOR IN MECHATRONICS, UNIVERSITY OF NOTTINGHAM

University of Nottingham
The Rolls-Royce UTC in Manufacturing and On-wing Technology

Abdelkhalick has a strong theoretical and experimental experiences in robotics (e.g., industrial, continuum and soft robotics); mechatronics systems (e.g., on-wing maintenance and inspection systems); machine tool control (e.g., 5-axis CNC machine tool control), and control system theory (e.g., sliding mode control) and its application for complex mechanical systems.

Dr Abdelkhalick has authored more than 30 original research papers that have been published in reputable journals (e.g. IEEE Transaction on Industrial Electronics) and well-known conferences (e.g. American Control Conference). As a result of his excellent research results, he has received a prestigious award for young researchers from MAZAK Corporation, Japan, and the best paper award during the International Conference on Mechatronics and Robotics Engineering (ICMRE2017), Paris. Dr Abdelkhalick has participated in a number of projects funded by EPSRC, UK (RAIN: Robotics and AI for Nuclear); Innovate UK (FLARE 2016-2018 and INSPECT 2018-2020); A*STAR Industrial Robotics Program, Science and Engineering Research Council, Singapore, (2014-2017). In addition, he is a reviewer for several top robotic and mechatronics journals (e.g., IEEE/ASME Transactions on Mechatronics, IEEE Transaction on Industrial Electronics and Robotics and Computer Integrated Manufacturing).

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

ALEX ALLEN

TECHNICAL LEAD, SELLAFIELD LTD.

Alex Allen works for Sellafield Ltd as the Technical Lead on Condition Monitoring & Inspection technology development and delivery for Retrievals (the waste packages produced from retrieval of legacy wastes).

In the 21 years Alex has been with Sellafield Ltd he has also been Technical Manager for a rapid delivery spent fuel drying project; developed Sellafield's integrated waste strategy and effluents strategy, including predicting future effluent discharges; performed feasibility assessment of the new ventilation stack that has been built at Sellafield; performed design work for a waste treatment plant; and provided technical advice for managing waste during decommissioning of the Capenhurst site. Alex has also spent 2 years working in aerospace in the UK and US on novel technology development for Serck Aviation, who manufacture compact heat exchangers for jet engines. Alex holds an MEng in Chemical & Process Engineering from Newcastle University and is a Chartered Engineer and Fellow of the Institution of Chemical Engineers. He is chair of Governors for a local Primary School and a STEM ambassador, and in his spare time plays trumpet in various swing and jazz bands.

Sellafield Ltd

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

BARRY LENNOX

PROFESSOR OF APPLIED CONTROL, UNIVERSITY OF MANCHESTER

Barry Lennox is Fellow of the Royal Academy of Engineering and Professor of Applied Control and Nuclear Engineering Decommissioning at The University of Manchester. He was the director of the Robotics and AI for Nuclear Hub and is the academic lead for RAICo.

He holds a Royal Academy Chair in Emerging Technology and has considerable experience in transferring leading edge technology into industry.

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ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

BEATRICE FRASER

PROCUREMENT LEAD FOR TECHNOLOGY, SELLAFIELD LTD

Beatrice Fraser is a procurement lead for technology at Sellafield. Her role focuses on the robotics, artificial intelligence and technology Sellafield uses. Sellafield want to take their people away from extreme environments and technology is a vital part of this.

Beatrice has held similar roles in health, local government and the police. She has also worked on procurements for the nuclear submarine programme at BAE Systems Marine Ltd.

Beatrice has worked for Sellafield for the past 10 years. She started in Sellafield's Design Service Alliance (DSA). This was the first of Sellafield's long-term collaborative contracts. It focussed on delivering standardisation and efficiencies in the area of design engineering. Beatrice now drives improvements to Sellafield's Technical Services Agreement. This agreement is the contract Sellafield use to deliver technical services to the Sellafield site.

As procurement lead she also works with academia and Sellafield's supply chain.

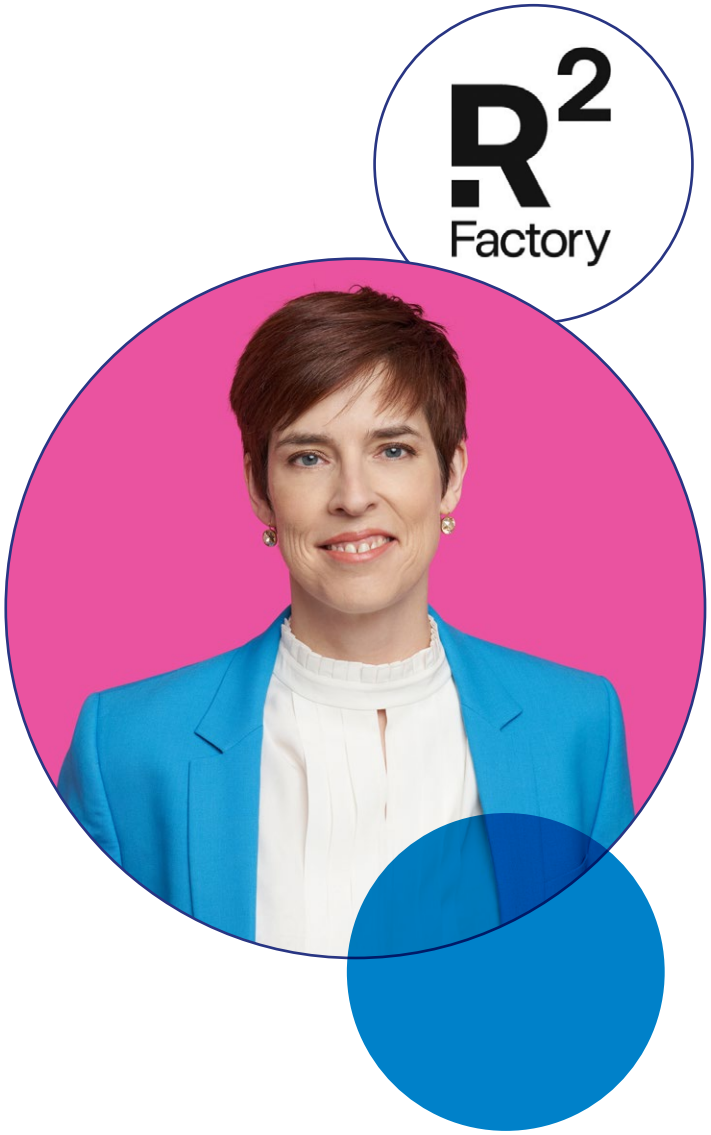
"I really enjoy getting people to see the benefit and value of the whole technical portfolio and being able to find compliant routes to market to allow the development of innovative solutions to meet Sellafield's needs. The development of the whole technical portfolio will allow this to happen faster."

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

CAROLINE GORSKI

CHIEF EXECUTIVE, R2 FACTORY AT ROLLS-ROYCE



Caroline has worked at the transformational edge of emerging digital technologies for more than 25 years, leading businesses' strategic response to technology and executing on organisational changes, new market developments and new business model launches.

Following senior roles at Telefonica, Sodexo, O2 and the Digital Catapult, Caroline led Rolls-Royce's R² Data Labs for five years, delivering £400m of value back into the Group. During the pandemic, she pioneered the Emergent Alliance, which convened over 50 corporates, individuals, NGOs and governments for the first time to leverage expertise, data and resources to aid societal recovery. Now leading the R² Factory founding team, Caroline drives the company's strategic vision to create 'a safe space to do hard things' by blending unique experience, cutting-edge capability, thought-leadership and new ways of working to create new opportunities and business models. Voted one of the most influential people in UK technology (Computer Weekly UKTech50, 2022), Caroline holds a Masters degree from Oxford and has an unfinished PhD in modern gothic literature and how we all use scary monsters to help contain social anxiety.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

CHRIS BALLARD

ROBOTICS AND AI PROGRAMME MANAGER, SELLAFIELD LTD

Chris Ballard is a chartered Technical Leader who is passionate about technology, from innovation to adoption and everything in the middle.

His current role allows him to harness that fascination to focus on robotics, artificial intelligence, and technology which provide Sellafield with the means to remove people from extreme environments and assist in its mission to decommission and clean-up the site in a safer, faster and cheaper way.

Chris graduated from the University of Salford with a BSc in Computer Science and then advanced his academic career by achieving his Post-Graduate Certificate in Education (PGCE) while lecturing at the university. His professional career began at Capula in Westlakes and was followed by a move to Sellafield as a Control Systems engineer in THORP in 2006.

Capitalising on his background in teaching, Chris led a new initiative to improve and update the training at Sellafield through the use of eLearning and smarter, more effective tools, before taking on the role of IRT lead for Robotics, within the Technical team, in 2019.

Under Chris's lead, the use of robotics at Sellafield has grown rapidly, by establishing links across the business and promoting the potential of this pioneering technology to change the way that people work. As a result, robotics is now seen as a key enabler to achieve Sellafield's mission by providing the interface between people and the extreme environments.

Chris manages the RAI programme, which is centred on developing an Enterprise-wide long-term roadmap for innovation and providing oversight to numerous cross-cutting projects. He is keen to share his expertise and raise awareness of the wholesale potential of robotics, particularly amongst young people and is engaging with academics to establish and progress an apprenticeship programme in this area.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

DAVID HARGREAVES

TECHNICAL SPECIALIST, SELLAFIELD LTD

David works within the Magnox Reprocessing and Effluent Plants Technical team which is part of the Spent Fuel Management Strategy and Technical department.

David joined Sellafield Ltd via the graduate scheme in 2010 following 2 years in the steel industry after completing his Engineering Doctorate in Steel Technology. His primary role is to manage a programme of asset care inspections across several plants within the Spent Fuel Management OU. Alongside this he provides materials science technical support to these plant areas as well as governance of the output from the inspections themselves. He is passionate about the deployment and development of both existing and novel techniques and technologies to help improve the quality and output of asset care inspections.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

EIRINI ETOIMOU

HEAD OF CORPORATE SUSTAINABILITY & SUPPLY CHAIN DEVELOPMENT AND SOLUTIONS, SELLAFIELD LTD

Eirini Etoimou is Sellafield's Head of Supply Chain Development, Innovation and Sustainability, responsible as well for the Supply Chain Solutions. She is also the Chair of the Manchester Branch of the Chartered Institute of Procurement & Supply (CIPS).

Eirini is an executive with more than 15 years' experience in global, senior management positions. She holds a MSc in Procurement, Logistics and Supply Chain Management, and an MBA in Leadership and Sustainability, and speaks four languages. She participates as a guest speaker at universities, and at UK and international conferences as a passionate advocate of human rights, promoting ethical supply chains and sustainability principles. Additionally, Eirini contributes with content about leadership, sustainability, business strategy, procurement and supply chain in academic journals and business columns. She also acts a volunteer consultant for institutions, supporting them to develop their sustainable plans.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

FRANK ALLISON

CHIEF EXECUTIVE OFFICER, FIS360 LTD

Frank is CEO of FIS360 Ltd and an expert in the commercialisation of early stage cutting edge technologies, from concept to commercial product.

He has developed and delivered several commercialisation initiatives, including the UMIP's Energy Innovation Fund (in collaboration with National Grid and Scottish and Southern Energy), Innovus (focused on facilitating the creation of high-tech jobs in Cumbria by providing grant funding and commercialisation support to inspirational research and technology development), Game Changers Innovation Programme and Createc's Fusion programme.

Frank has over 15 years' experience commercialising early-stage technologies into a wide range of sectors including manufacturing, textiles, energy and renewables, nuclear, artificial intelligence, robotics and agri-tech. He spent 10 years working at University of Manchester's technology transfer company, with responsibility for commercialising a portfolio of spin-out companies, and licensing technologies. A highlight of his career was working in the Middle East to establish a technology transfer business unit, open innovation programme and innovation investment fund for Dhahran Techno Valley Company (DTVC).

Frank has lived and worked in Cumbria since 2016, where he heads up FIS360 Ltd, a team of commercialisation and innovation programme delivery specialists with broad scientific and technical backgrounds and significant experience in international industry and academia. Since Frank founded the business in 2013, he and the team have worked with hundreds of organisations within the UK and around the world, supporting them in raising millions in grant and equity investment and leading to the commercialisation of many products.

Frank mentors early-stage companies, sits on several innovation committees, including the Cumbria LEP Innovation Strategy Group and the industrial advisory board at Lancaster University, and has a real passion and enthusiasm to make a difference.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

HILARY ROYSTON-BISHOP

R&D MANAGER, SELLAFIELD LTD

Hilary has 15 years of experience in radioactive waste management and has recently started as R&D Manager at Sellafield. For the past three years she has been the technical lead for Sellafield and the NDA on an Innovate UK competition into autonomously sorting and segregating nuclear waste.

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ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

JAMES HILL

DIRECTOR, EADON CONSULTING LTD

James has experience in engineering consultancy spanning fifteen years, bringing a first-principles approach to problem solving.

In 2008 he co-founded Eadon Consulting and has since delivered design and analysis projects in a wide variety of industries including nuclear decommissioning. Recent R&D and prototyping commissions with Sellafield have included the cost-effective deployment of diamond-wire cutting tools into inaccessible areas, a fresh approach to waste container design, and a modular access system for Post Operational Clean Out.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

JONATHAN LOO

CHAIR PROFESSOR OF COMPUTING AND COMMUNICATION ENGINEERING, UNIVERSITY OF WEST LONDON

Professor Loo has over 20 years of experience in research, graduated over 20 PhD students and co-authored over 400 academic papers. He recently won an InnovateUK grant for developing a proof of concept for robot security surveillance called ROS-PCON (robotic operating system – preventive control).

UNIVERSITY OF WEST LONDON

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

KARIM BAHOU

PROJECT MANAGER, FIS360 LTD

Karim graduated with a MSci degree in Natural Sciences from University College London and then completed a PhD in Synthetic Organic Chemistry at Imperial College London, including a secondment to CSIRO in Melbourne, Australia.

After a short career in academic research and lecturing in synthetic chemistry and transition metal catalysis, Karim joined FIS360 as a Project Manager (Technology and Innovation) in 2022. He has a passion for technology and innovation and works on various programmes, including the Game Changers Innovation Programme and developing FIS360's innovation forum.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

KATE CANNING

HEAD OF R&D, NUCLEAR DECOMMISSIONING AUTHORITY

Kate has been NDA's Head of R&D since 2021. A civil engineer by training, Kate started her career in academic research, investigating waste and soil treatment technologies.

Kate then spent 18 years at Arup, the global built environment consultancy firm. She built and led Arup's geoenvironmental team across the North West, specialising in brownfield development, sustainable reuse of materials and site remediation. Kate led Arup's framework contract for the NDA Direct Research Portfolio from 2013, delivering a range of commissions on decommissioning, remediation, waste management and knowledge management. Kate was also Arup's Research Leader for the UK, Middle East and Africa for over 5 years, responsible for delivery of Arup's regional research portfolio and strategic research relationships.

Kate is the NDA lead for RAICo, and has been working on the collaboration for the past 18 months.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

KATHERINE EILBECK

HEAD OF R&D, SELLAFIELD LTD

Katherine has worked for Sellafield Ltd for over 20 years in various strategic and technical delivery roles. Over the years she has provided technical oversight to the placing of new multi-million pound commercial contracts for technical services, delivered technical programmes of work and driven multi-million cost savings into the business.

Katherine currently manages the Sellafield central R&D team which is responsible for a number of ground-breaking technical projects which will improve the way Sellafield decommission radioactively contaminated facilities and manage hazardous waste. Many of the projects within the R&D portfolio use Robotics and Artificial Intelligence (RAI) to achieve significant acceleration of Sellafield's clean-up programme and improve the working environment of their workforce. As part of her current role she sits on the steering groups of the two nuclear EPSRC funded Hubs undertaking R&D on Robotics and Artificial Intelligence in Extreme and Challenging (Hazardous) Environments.

Through her many years of working and delivering technical projects at Sellafield Katherine has developed a comprehensive and clear understanding of what makes a successful R&D project which can deliver value to the nuclear decommissioning industry. She also has a good understanding of the challenges that are faced by the nuclear Industry that could be solved through the application of RAI.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

KIRSTY HEWITSON

INTERIM CHIEF EXECUTIVE OFFICER, INNOVATE UK KTN

Kirsty is currently interim Chief Executive Officer at Innovate UK KTN and also Executive Director of Capability where she is responsible for leading teams across a wide range of sectors including materials, manufacturing, robotics, space and security. Innovate UK KTN's mission is to connect ideas, people and communities to respond to challenges and drive positive change through innovation. Innovate UK KTN's diverse connections span business, government, funders, research and the third sector.

Kirsty is also currently a Director and Executive Committee member of Women in Nuclear which is driving gender equality across the nuclear sector.

Kirsty previously held the position of VP Strategy and Innovation at the National Nuclear Laboratory (NNL) where she was responsible for identifying, translating and commercialising early-stage technology opportunities together with embedding a culture of innovation across the organisation. In addition, Kirsty led the development of NNL's strategy across diverse target areas from clean energy to nuclear medicine.

Before NNL, Kirsty was VP Life Sciences at Ploughshare Innovations, converting defence and security innovations, from across the Ministry of Defence, into civilian applications. Before Ploughshare, Kirsty was Director of Life Sciences at Helsinki Innovation Services and held responsibility for all innovation matters, across the life sciences, at the University of Helsinki. Previously, Kirsty worked within the field of pre-clinical drug discovery including a spin-out company from the University of Oxford. Kirsty holds an MChem and a PhD in bio-organic chemistry, both from the University of Oxford.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

MARIA KING

ACCOUNT MANAGER, AMAZON WEB SERVICES

Maria King is the Account Manager for nuclear energy within UKPS at AWS.

This is her third year at the company and her primary role is supporting customers in their transition to the cloud and adoption of cloud services.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

RAV CHUNILAL

HEAD OF ROBOTICS AND AI, SELLAFIELD LTD

Rav Chunilal is Sellafield Ltd's Head of Robotics and Artificial Intelligence (RAI) responsible for leading the RAI capability across the Nuclear Decommissioning Authority (NDA) group to accelerate the delivery of opportunities presented by the nuclear decommissioning challenges.

Rav champions novel process engineering solutions for deployment onto the Sellafield site and creating partnerships. Rav has advised national and international governments and their agencies on environmental topics, allowing future strategic options to be developed. Rav also holds roles with other non-nuclear organisations to drive strategic and innovation improvements.

Sellafield Ltd

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

ROB BUCKINGHAM OBE FRENG

DIRECTOR OF THE UK ATOMIC ENERGY AUTHORITY, UKAEA

Rob is a Director of the UK Atomic Energy Authority (UKAEA) and the first Head of RACE, the centre for Remote Applications in Challenging Environments.

Rob was lead author of the UK's Robotics and Autonomous Systems 2020 Strategy (2014, 2020 update) and is a member of the UK Robotics Growth Partnership. Before joining the UKAEA, Rob co-founded and was Managing Director of OC Robotics which developed and commercialised snake-arm™ robots. He is a Fellow of the Royal Academy of Engineering and a Fellow of the Institute of Engineering and Technology. He received an OBE for services to robotics engineering in the 2021 New Year Honours.

UK Atomic Energy Authority

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

ROBIN IBBOTSON

CHIEF TECHNOLOGY OFFICER, SELLAFIELD LTD

Robin joined Sellafield in 2022 as the Chief Technology Officer having previously held the post of Director of Technology and Industrial Strategy at BAE Systems.

Following his doctorate in Photonics and a period in academia, he moved into the defence sector and conducted research on pulsed power systems followed by digital networks. During his broad career he has covered a wide range of technologies, markets and business areas relating to ethics, export, technology exploitation and market strategy.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

SARA HUNTINGDON

HEAD OF INNOVATION, NUCLEAR DECOMMISSIONING AUTHORITY

Sara is an experienced civil servant who joined the NDA in July 2019 as its Head of Innovation. She has worked in a wide range of technical, project management and business change roles within the UK public sector, including at the UK Space Agency and Ministry of Defence.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

SPEAKER PROFILES

STEPHEN ISRAEL

SPENT FUEL MANAGEMENT TECHNICAL, SELLAFIELD LTD

Stephen works within the Magnox Reprocessing and Effluent Plants Technical team which is part of the Spent Fuel Management Strategy and Technical department.

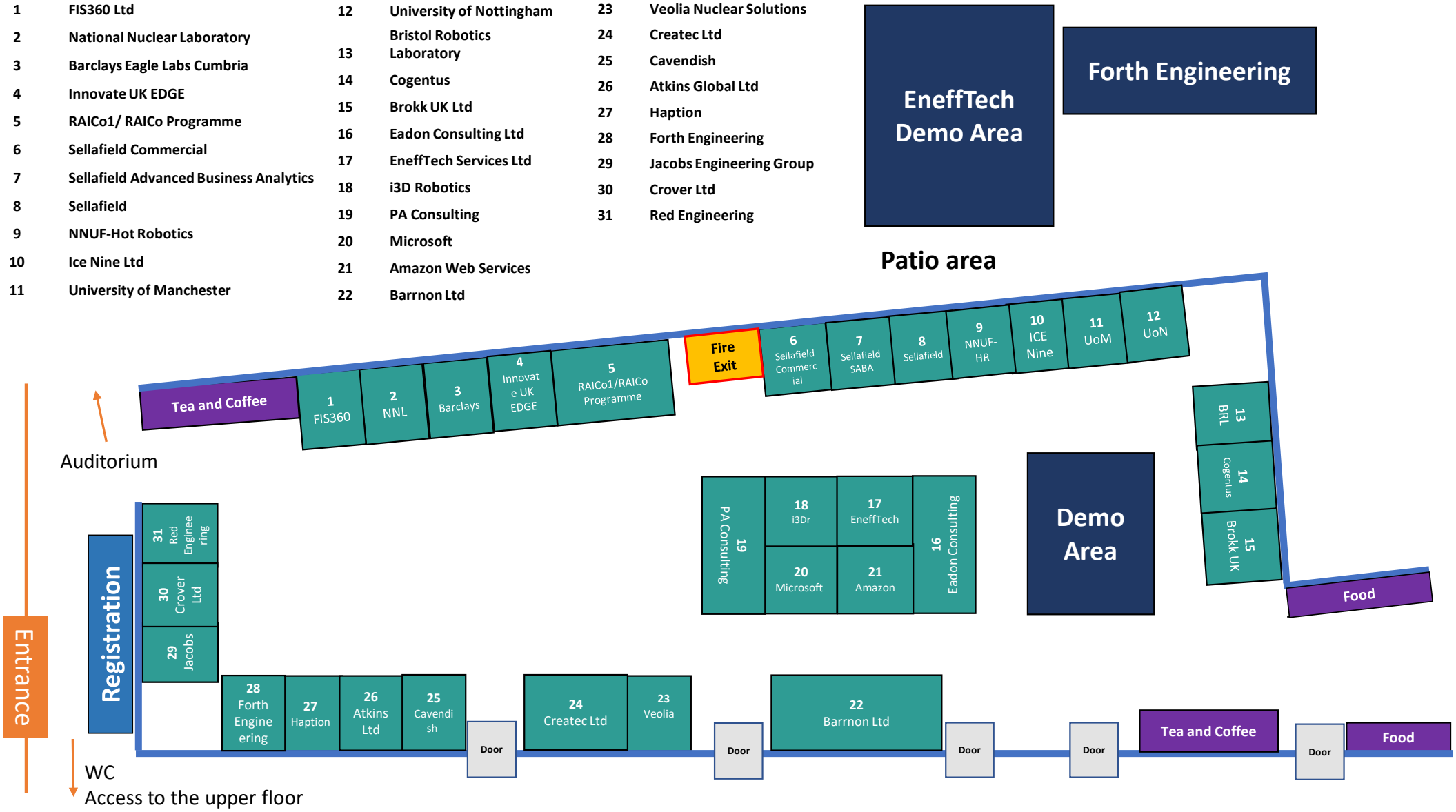
Stephen joined Sellafield Ltd in 2014 via the Technical Specialist Trainee scheme, spending the first 7 years of his career supporting the Magnox Reprocessing plant. His role is to manage a programme of asset care inspections, primarily focusing on Magnox Reprocessing facilities, as well as providing technical governance for inspection outputs and resulting actions. Due to the transitioning operational status of these facilities, he is committed to continued development of inspection techniques and technologies to ensure any opportunities afforded by this transition can be best taken advantage of. Stephen also enjoys taking an active role in the deployment of these techniques and technologies.

Sellafield Ltd

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

EXHIBITORS

1	FIS360 Ltd
2	National Nuclear Laboratory
3	Barclays Eagle Labs Cumbria
4	Innovate UK EDGE
5	RAICo1/ RAICo Programme
6	Sellafield Commercial
7	Sellafield Advanced Business Analytics
8	Sellafield
9	NNUF-Hot Robotics
10	Ice Nine Ltd
11	University of Manchester
12	University of Nottingham
13	Bristol Robotics Laboratory
14	Cogentus
15	Brokk UK Ltd
16	Eadon Consulting Ltd
17	EneffTech Services Ltd
18	i3D Robotics
19	PA Consulting
20	Microsoft
21	Amazon Web Services
22	Barrnon Ltd
23	Veolia Nuclear Solutions
24	Createc Ltd
25	Cavendish
26	Atkins Global Ltd
27	Haption
28	Forth Engineering
29	Jacobs Engineering Group
30	Crover Ltd
31	Red Engineering



ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

EXHIBITORS

AMAZON WEB SERVICES

Amazon Web Services (AWS) is the world's most comprehensive and broadly adopted cloud platform, offering over 200 fully featured services from data centres globally. Millions of customers are using AWS to lower costs, become more agile and innovate faster.

Maria King, nuclear energy Account Manager, and Jenny Vega, Solutions Architect, will be at the AWS booth that features an interactive demo centred around robotic simulations capabilities. Attendees will be able to discuss a variety of use cases and watch a selection of videos around AWS capabilities around robotics.

ATKINS LTD

Atkins is at the forefront of integrating COTS robotics, tooling and sensors, with cutting edge software, augmented reality, and machine learning, to deliver efficient and effective nuclear glovebox decontamination and decommissioning.

If a task is dirty, dull or dangerous, we believe robotics should lead the way. Our goal is to help you enhance site safety, by removing people from potential harm, reduce your decommissioning timescales, through greater automation and deliver tangible cost savings over more traditional remediation methods. Connecting people, data and technology to transform decommissioning services.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

EXHIBITORS

BARCLAYS EAGLE LABS CUMBRIA

We incubate, inspire and educate UK founders, startups and scaleups and help them to succeed and scale. You've got the big idea; we've got the network to help you succeed. From idea to exit, we can help you build, learn and scale faster.

We have everything to supercharge your progress, with like-minded entrepreneurs and experts to support you.

BARRNON LTD

Barrnon is a UK-based, specialist engineering company providing exceptional turnkey solutions to address some of the world's most challenging environmental threats. We specialise in robotic engineering solutions for harsh environments – including the decommissioning of some of the most prominent historic nuclear facilities.

We succeed by thinking differently – and by combining the skills of an exceptional, world-class team of designers, engineers and technicians.

Working to the highest technical standards, we've established a global reputation in a number of industrial sectors including nuclear decommissioning, oil & gas, defence & security, marine and agricultural. Our end-to-end capabilities and agile working practices allow us to rapidly research, develop, prototype and test new designs while working closely at every stage with our on-site manufacturing team. This seamless integration of design and manufacturing capabilities reduces development time and ensures the delivery of complete solutions that are fit-for-purpose and ready to be deployed. people, data and technology to transform decommissioning services.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

EXHIBITORS

BRISTOL ROBOTICS LABORATORY

The Bristol Robotics Laboratory (BRL) is a centre of excellence in robotics research. It is a unique collaboration between the two universities in Bristol, the University of the West of England and the University of Bristol. Together, a community of over 450 academics, PhD students, MSc and undergrad students, and industry practitioners are working on the vision of the ubiquitous robot. Robotics technology being used by humans and for humans in challenging, dynamic, everyday environments.

At their booth, the BRL team presents three live robot demonstrators for nuclear decommissioning tasks. The first demonstrator is an immersive teleoperated mobile robot that can be operated with the help of a virtual reality headset. The second demonstrator is a presentation of using virtual reality and sonification for displaying hazards to operators using audio data. The third demonstrator is a crawling robot that is using whegs, wheeled legs, for crawling over dynamic terrains. All visitors are invited to test the demonstrators themselves.

This work was supported by UK Engineering and Physical Sciences Research Council (EPSRC) for the Robotics for Nuclear Environments Programme Grant.

BROKK UK LTD

Brokk are the world's leading manufacturer of remote-control demolition robots, if you need to operate in high radiation or harsh environments, give us a call, we have COTS solutions for cutting, picking and placing, long reach, and retrievals from hard-to-reach places. All our equipment is tried, tested, and rugged. We have supplied machines to the nuclear industries in the UK, US, France, Germany, Belgium, Sweden, China and Japan.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

EXHIBITORS

CAVENDISH NUCLEAR

Cavendish Nuclear: Creating a safe and secure world, together. From decommissioning redundant nuclear facilities, through supporting the continuous at sea deterrent, to supporting the operation and build of nuclear power plants, our role in Cavendish Nuclear is to clean up the nuclear legacy and create a world where nuclear plays a key contribution in protecting our nation, ensuring security of energy supply and meeting our net zero commitments.

As part of the NDA/Innovate UK Sort & Segregate competition Cavendish Nuclear presents OptiSort - an integrated, autonomous technology that sorts and segregates radioactive waste from decommissioning into optimally packed containers.

COGENTUS

The Idea Catalog is a knowledge management platform specifically designed to help the nuclear supply chain get more for less. It avoids reinventing the wheel - build on ideas rather than duplicating what already exists.

It works like “Pinterest” for Nuclear Clean Up! It’s a visual discovery engine for finding ideas on topics like robotics, decontamination techniques, waste treatment technologies, and more. It has thousands of ideas, from the nuclear sector and elsewhere to spark inspiration. The Lessons Learned catalog helps to share experiences from across the world and the Problem definition tools link the Ideas to a Need.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

EXHIBITORS

CREATEC LTD

Createc are the organisation behind some of the most innovative technologies in the nuclear sector. We aim to demonstrate both our product and service offerings at the Robotics & AI for Extreme Environments event.

Our stand will demonstrate mobile robotics, in the form of the Boston Dynamics Spot, and a virtual reality controlled manipulator arm. Createc will also demonstrate their radiometrics offerings on a small stand-alone display and on one of the Spot robots.

CROVER LTD

Crover's robotic grain storage monitoring system provides grain storage operators and merchants with the first autonomous solution to keep their grain and investment safe.

The system is based on the CROVER robot, which, thanks to our proprietary method for locomotion in granular media, can fluently "swim" through bulk solids and powders, like cereal grains, constantly monitoring their conditions while they are still in storage without leaving any grain unchecked. The grain condition readings (namely humidity and temperature) have a higher resolution than ever possible, eliminating the shortcomings of traditional methods, by monitoring zones of the bulk that traditional systems cannot reach.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

EXHIBITORS

EADON CONSULTING LTD

Eadon Consulting are an engineering business with expertise in design and analysis in the nuclear sector. We develop solutions from concept through to detailed design and deployment.

We have developed REACH, a high payload capacity, modular system for long-range mapping, data collection and tool deployment in hazardous environments. REACH offers a reusable and configurable toolkit that can be adapted to suit different instruments, tools and environments. REACH improves efficiency and safety whilst reducing deployment preparation time and cost.

ENEFFTECH SERVICES LTD

As a solutions provider, our team including our suppliers and affiliates will be able to support most if not all of your UAV requirements.

We aim to strive for excellence and aggregate what is best in the UAV industry. Turn theory into reality and in doing so we will help reduce risk, cost and increase safety with regard to industrial inspection and security using remotely piloted aircraft systems (RPAS) or what is now commonly known as drones. Our vision is very much like that of the National Aerospace Centre of Malta; “Knowing is not enough; we must apply, being willing is not enough; we must do.”

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

EXHIBITORS

FIS360 LTD

We are a truly independent and international company with an exceptional reputation for delivering successful innovation programmes, and for adeptly guiding businesses and organisations through the challenges of technology commercialisation. At FIS360 Ltd we share a passion for exploring and developing the potential of innovation and technology.

As development and delivery partners of commercialisation initiatives including the Game Changers Innovation Programme and Createc's Fusion entrepreneurship opportunity, we have worked with hundreds of organisations within the UK and around the world, supporting them in raising millions in grant and equity investment.

FORTH ENGINEERING

Forth Engineering (Cumbria) Ltd are delighted to attend the Robotics and AI for extreme environments event where we will showcase some of the technologies we have developed for use in industries that operate in hazardous environments.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

EXHIBITORS

HAPTION

Remote Operation of robot, Haption presents TREX, a real-time force feedback bilateral control of robot.

I3D ROBOTICS

We specialise in:

- **Stereo vision systems**
- **Flexible 3D vision systems for autonomous and robotic applications**
- **Systems for high temperature and harsh industrial environments**

Our 3D stereo vision algorithms were originally developed by our academic partners for the Mars Rover missions. These algorithms use semi-global matching (SGM), an algorithm considered one of the leading dense stereo matchers. Benefits include fast processing speeds, parallelisation, robustness and accuracy, making SGM the preferred choice in a wide range of practical applications such as robotics, navigation and industrial processes.

We are the lead organisation on a new £4m demonstrator programme named IRIFIO which is focused on mapping & defect detection on key industries including ceramics, metals, glass and nuclear.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

EXHIBITORS

ICE NINE LTD

Ice Nine develop innovative mobile robotic solutions to inspect and characterise a range of hazardous environments.

With expertise in ground-based ROVs, submersibles, floating, aerial and autonomous systems, we are able to adapt our technology to suit challenging tasks. Having deployed multiple systems across the decommissioning estate, we are capable of meeting stringent regulatory and safety requirements to ensure a successful mission. Please come and speak to us to hear how our robotic solutions can help.

INNOVATE UK EDGE

Innovate UK EDGE is a key part of the UK innovation agency's deep investment in the pioneering businesses that drive economic growth.

This support includes:

Exploiting business innovation:

Developing a commercial strategy and building a team to deliver it; protecting & harnessing your IP; improving innovation management & accessing the innovation ecosystem globally.

Sourcing funding and finance:

Applying the right strategy to secure grants and capital for your business, enhancing investor appeal and getting investment ready to propel your growth.

Opening new markets:

Creating connections to partners & leveraging insights to expand into vertical & international markets and achieve scale.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

EXHIBITORS

JACOBS ENGINEERING GROUP

At Jacobs, we're challenging today to reinvent tomorrow by solving the world's most critical problems for thriving cities, resilient environments, mission-critical outcomes, operational advancement, scientific discovery, and cutting-edge manufacturing, turning abstract ideas into realities that transform the world for good.

The Robotics Development Team is a new addition to Jacobs Engineering Group and we are eager to share this exciting new technology that is being developed for micro robotics for extreme environments. The team will be demonstrating their upcoming MicroROV project – an extremely small ROV capable of full autonomy and complex on-board processing.

MICROSOFT

Microsoft's mission is "to empower every person and every organisation on the planet to achieve more." AI & robotics are key technologies to be able to achieve this. We are also working with both NDA and Sellafield to understand where AI & robotics can help them.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

EXHIBITORS

NATIONAL NUCLEAR LABORATORY (NNL)

As the UK's national laboratory for nuclear fission, NNL is harnessing nuclear science to help solve some of the world's biggest challenges – from achieving deep decarbonisation to delivering lifesaving healthcare.

Working closely with our customers, academia, and the supply chain, NNL provides technical support to Robotics and Artificial Intelligence programmes for Sellafield Ltd and the wider industry, nationally and internationally. NNL is a partner for the collaborative National Nuclear User Facility for Hot Robotics (NNUF-HR), funded by EPSRC, providing one of the largest nuclear robotics test facility in the UK North West for the nuclear community to access NNL's unique robotics facilities and capabilities with an offsite de-risked opportunity to demonstrate new technology.

NNUF- HOT ROBOTICS

The National Nuclear User Facility for Hot Robotics (NNUF-HR) is an EPSRC funded facility to support UK academia and industry to deliver ground-breaking, impactful research in robotics and artificial intelligence for application in extreme and challenging nuclear environments.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

EXHIBITORS

PA CONSULTING

We believe in the power of ingenuity to build a positive human future.

As strategies, technologies and innovation collide, we create opportunity from complexity.

Our diverse teams of experts combine innovative thinking with data, artificial intelligence and breakthrough technologies to progress further, faster, together.

Our clients adapt and transform, and together we achieve enduring results.

By challenging industry norms, scaling-up technology and driving innovation, we help companies across the nuclear eco-system optimise performance and contribute towards a positive carbon neutral future.

PA. Bringing Ingenuity to Life.

RAICO1/RAICO PROGRAMME

RAICo is a collaboration which has been formed to bring together academia, the supply chain and the end user to solve nuclear decommissioning challenges.

The core members of the collaboration are SL, UKAEA, the University of Manchester and the NDA. Our aim is to deliver decommissioning safer, cheaper, and quicker utilising robotics and AI. Providing access to innovative technology across the nuclear industry. We also have a facility in Whitehaven, RAICo1, used to test and demonstrate technology which has been developed as part of the collaboration.

A key driver for the RAICo collaboration is providing socio-economic benefit to West Cumbria. The ethos of our presentation on STEM is the fostering of future talent, with the focus on development of STEM activities to engender interest for the local young community in the upcoming technological challenges in industry.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

EXHIBITORS

RED ENGINEERING

Established in 2008, RED Engineering is a company of professional engineers with a mission to make working in hazardous environments safer.

As a trusted partner, we have an extensive track record of enabling the most challenging projects working for a range of sectors, including nuclear decommissioning, offshore oil and gas, and defence.

Our core expertise relates to the development of engineering solutions for construction, maintenance and decommissioning activities with services ranging from engineering consultancy, the fast-track design and build of bespoke equipment to qualification testing.

SELLAFIELD LTD

The FGMSP at Sellafield holds radioactive skips, in order to save storage space at MBGWS, two skips are to be automatically size reduced and placed in a third skip before being packed in a container and sent to the MBGWS.

The MOX demonstration facility produced fuel for LWRs, they used gloveboxes in this process which also need to be size reduced before being placed into waste containers.

Sellafield will be showing videos of the active demonstrators (laser cutting system) for the ILW Skip Size Reduction Facility and Alpha Glovebox Size Reduction Facility, that together reduce operator risk.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

EXHIBITORS

Sellafield Ltd

SELLAFIELD LTD - COMMERCIAL

Sellafield Enterprise Strategy targets safe, secure and sustainable site stewardship, progress at pace and lifetime value for money to enable a clean and safe environment for future generations.

The Supply Chain are a fundamental part of achieving this mission and can only be achieved through meaningful and robust partnerships with the supply chain.

Sellafield Ltd

SELLAFIELD LTD - SELLAFIELD ADVANCED BUSINESS ANALYTICS

The MSSS Relocation Tool (VR) has been developed in collaboration with SAKER Solutions to assist the operations team plan the movement of SEP machines and large ancillary items required for retrieval operations.

The tool uses 3D BIM and VR to create an immersive experience for the user. This allows activities previously conducted on plant to be moved to satellite offices, saving time, and reducing dose uptake to operators.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

EXHIBITORS

THE UNIVERSITY OF MANCHESTER

Robotic capability from The University of Manchester including ground vehicle and aquatic robots developed through the RNE and RAIN Hub programmes including MallARD, MIRRAX, CARMA and the Lyra which was recently deployed at Dounreay.

UoM has a growing group of research engineers and scientists working to apply robotics solutions to challenges in extreme environments including nuclear decommissioning. A selection of robots from the National Nuclear User Facility for Hot Robotics (NNUF-HR) will also be showcased.

ROLLS-ROYCE UTC IN MANUFACTURING AND ON-WING TECHNOLOGY AT THE UNIVERSITY OF NOTTINGHAM

Rolls-Royce UTC in Manufacturing and On-wing Technology at the University of Nottingham is a multi-disciplinary research team exploring all aspects of aerospace manufacture, with a particular interest in the areas of fixturing and on-wing inspection and repair robotic systems.

Robotic systems for in-situ repair is one of the research areas for UTC team. We focus on developing fundamentally novel, miniaturised robotic systems, e.g. walking hexapod and continuum robot, for inspection, maintenance and repair operations in challenging environments (e.g. aero-engines, nuclear).

EXHIBITORS

VEOLIA NUCLEAR SOLUTIONS

Veolia Nuclear Solutions (VNS) aims to be the future leader in the decontamination and decommissioning of nuclear installations.

It offers the most comprehensive range of technologies and services for facility management, decommissioning, and the treatment of radioactive waste, nurtured by nuclear experts and backed by thousands of Veolia staff worldwide. It is helping to clean up global environmental threats by providing bespoke technologies and services for the most challenging clean up and decommissioning dismantling projects. VNS, supported by industry experts in robotics and artificial intelligence, has most recently brought to life an autonomous waste sort and segregation demonstrator. Incorporating the intelligence and capability of identifying when human intervention is needed, VNS is innovating to deliver safer, faster and cheaper solutions to the nuclear sector.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

WORKSHOPS AND PARALLEL SESSIONS

AUTONOMOUS SORT AND SEGREGATION OF NUCLEAR WASTE

The 'Sort & Seg' innovation competition, launched in July 2020, set the challenge of finding ways to sort and segregate mixed radioactive waste at some of the UK's oldest nuclear sites. Five UK companies progressed to the second phase of the £5.5m competition. During this session you'll have the opportunity to hear from all five companies and learn about the solutions they've been developing.

CAVENDISH NUCLEAR – OPTISORT

The project aimed to develop an integrated, autonomous toolkit which sorts and segregates radioactive waste generated from nuclear decommissioning activities into optimised containers. A group of 5 organisations came together to develop OptiSort, a scalable system with flexibility of deployment.

BARRNON LTD - INNOVATIVE SORT & SEGREGATE SYSTEM

The company has designed the Barrnon Limited Innovative Sort and Segregate System (BLISSS) - a concept that takes the tasks that human operatives do during nuclear decommissioning and replaces them with an artificial system with the ability to sort and segregate nuclear waste. The principle of the system is biomimetic - it is a synthetic system that emulates the strategy, tactics and techniques of biological organisms, nuclear operatives, doing the same task.

CREATEC LTD– ISOSORT

The project provides an integrated and innovative modular robotics automated solution to sort and segregate heterogenous nuclear decommissioning wastes. ISOSort offers a complete end to end automated solution from picking, scanning and packing waste items.

ATKINS LTD - MOBILE AUTONOMOUS SORT AND SEGREGATE SYSTEM

The system represents an innovative and cutting-edge capability that has the potential to provide benefits to nuclear and non-nuclear industries. Operator safety is enhanced by using robots instead of people for hazardous and laborious tasks. The MASS team provided an adaptable solution, which allows for tailoring of characterisation systems and waste containers, delivering the capability to enhance or reduce the range of categorisation measurements to meet the specific needs of a given facility.

VEOLIA NUCLEAR SOLUTIONS - BLENDED INTELLIGENCE FOR SAFE & EFFICIENT NUCLEAR SORT & SEGMENTATION

Veolia Nuclear Solutions (VNS), supported by a consortium of experts in robotics and artificial intelligence, proposed to solve the problem by building a solution around automating Dexter, a VNS-owned telemanipulator system. The aim was to integrate the Dexter system with advanced characterisation and tracking technologies to enable it to operate autonomously to identify, classify, pick-up, transfer, trace and package waste.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

WORKSHOPS AND PARALLEL SESSIONS

CAN WE PREVENT INDUSTRIAL ROBOTS GOING ROGUE?

Industrial robots are widely integrated within a network ecosystem for remote interaction, leaving robots subject to cyber-physical attacks, due to vulnerabilities in Network, Robotic Operating System (ROS) and human factors.

Trend Micro, a cyber security software company, found 83,000 robots are exposed on the internet. Robotic security comes in two forms. The first line of defence is front-end prevention, such as the security hardening. It helps, but it isn't a reliable solution on its own as hackers will always manage to find a way in. Existing solutions are built into the system, scanning for vulnerability and attempting to prevent front line security breach, such as system penetration. But what happens when this fails or robot controllers are compromised undetected, meaning hackers can take control and launch stealthily on robotic operations? That's where ROS-PCon (InnovateUK funded PoC) comes in. Standing at the second line of defence, it learns the robotic movement through the robot execution feedback based on deep learning technology while the robot is performing its role in a controlled, best-case environment. It can then highlight anomalies when it spots something that deviates from the control, which would be otherwise invisible to the human eye.

HOW TO DO BUSINESS WITH SELLAFIELD

Redirecting the focus to improving the supply chain experience, but at the same time, to building meaningful and mutually beneficial business relationships, we discuss how the last year's interactions, active listening, and constructive dialogue, progressed to a number of important changes for both our supply chain and our business.

THE IMPORTANCE OF INNOVATION AND TECHNOLOGY TRANSFER IN NUCLEAR

In this session we'll discuss how innovation culture has changed in the nuclear sector in recent years and explore the future opportunities and challenges of implementing innovation and technology transfer.

GAME CHANGERS – A SUCCESS STORY

Game Changers is the UK's leading nuclear innovation programme, finding solutions and developing technologies to overcome some of the most complex challenges facing the nuclear industry. In this session we'll explain how the programme works, discuss what makes it so successful and explain how you can get involved.

ROBOTICS AND AI FOR EXTREME ENVIRONMENTS

WORKSHOPS AND PARALLEL SESSIONS

LAUNCH OF GAME CHANGERS CHALLENGE

Today's event is part of a call for innovation, highlighting a specific challenge for which robotic solutions are currently being sought by Sellafield Ltd through the Game Changers innovation programme. Funding and technical support will be available for innovative ideas which can demonstrate the potential to meet Sellafield's robotic needs. The Game Changers challenge:

Asset Inspection Through 19mm Diameter Access Ports

Sellafield Ltd are seeking solutions to enable the remote, visual inspection of duct systems. The solution should provide high-quality still images and real time video feed to the operator, where access to the duct system is constrained to a 19 mm diameter bore through 0.35m - 1m of concrete.

Delegates at today's event will be given further information on the nature of the challenge, constraints, and the solutions being sought.

A complete challenge statement, further information on the Game Changers innovation programme and details on the application process can be found at www.gamechangers.technology

Please note that photographs and film footage will be taken throughout the Robotics and AI for Extreme Environments event. These images and footage may be used by FIS360 Ltd and Sellafield Ltd for publicity in our publications, on our websites and in social media. Please contact the event organiser if you have any concerns or if you wish to be exempted from this activity.

Hosted by GAMECHANGERS DELIVERING NUCLEAR INNOVATION · Sellafield Ltd · RAICo1