



BRINGING RESEARCH TO LIFE | OUR DYNAMIC EARTH
EDINBURGH
6 NOVEMBER 2018

PROGRAMME 2018



sicsa* **ScotlandIS**

DemoFest is the annual technology showcase of leading Informatics and Computing Science research in Scottish Universities.

SUPPORTED BY

Morgan Stanley

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CEO & Founder
ZoneFox

5. Ali Shah
Head of Emerging Technology
& Strategic Direction
BBC

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19. Robotics & Autonomous Systems

20. Understanding Complex Systems

21. User-Experience

AGENDA

15:45

Registration Opens

16.15

Welcome & Introduction
to the Keynote Speakers
Polly Purvis OBE
CEO ScotlandIS

16.20

Keynote Talk
**How to Build your Tech
Company in N Easy Steps**
Dr Jamie Graves
CEO & Founder
ZoneFox

17.00

Keynote Talk
AI Commons for Common People?
Ali Shah
Head of Emerging Technology
& Strategic Direction
BBC

17.40

DemoFest 2018 Showcase
with Networking, Food & Beverages

19.30

Event Closes

WELCOME

#DemoFest2018

I'm delighted to welcome you to DEMOfest 2018, a unique opportunity for businesses and organisations throughout Scotland to explore the wealth of exceptional research taking place within our universities.

Lifting the lid on the very best near-to-market research, DemoFest highlights innovation across the spectrum of digital technologies, from Artificial Intelligence and Machine Learning to Data Science, Cyber Security, Robotics, User-Experience, Networks and Cloud Computing.

As we move into the next industrial revolution, having access to this treasure trove of opportunity provides businesses with insights, the potential for new products and services and a chance to meet talented researchers.

Now the largest event of its kind in Scotland, DemoFest 2018 promises to be bigger and more industry-focused than ever, featuring 52 technology and product demonstrations from across Scotland and industry-focused keynote talks on Big Data and Cyber-Security.

Demofest is organised by SICSA, the Scottish Computer Science and Informatics Alliance. At ScotlandIS we have strong links with all the universities and have been pleased to work with SICSA to develop and promote DemoFest.

Bringing together 14 Scottish Universities, SICSA works to develop and extend Scotland's position as a world leader in Informatics and Computer Science research and education.

SICSA works closely with The Data Lab and CENSIS, the Innovation Centres working with industry and academia to harness the opportunities that digital technologies provide.

I'd particularly like to offer our collective thanks to today's sponsors, Morgan Stanley; the guest speakers and the exhibitors; and not to mention the dedicated team at SICSA who work tirelessly to make DemoFest such a success year after year.

I do hope you enjoy the DemoFest 2018 programme and take away ideas, inspiration, new contacts and opportunities for future collaboration from meeting the exhibitors and fellow delegates.

Welcome!

POLLY PURVIS OBE
CEO, ScotlandIS





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Associate

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Morgan Stanley

COMPANY PROFILE

Morgan Stanley is a leading global financial services firm providing a wide range of investment banking, securities, investment management and wealth management services.

The Firm's employees serve clients worldwide including corporations, governments and individuals from more than 1,200 offices in 43 countries.

As a market leader, the talent and passion of our people is critical to our success. Together, we share a common set of values rooted in integrity, excellence and strong team ethic.

Morgan Stanley can provide a superior foundation for building a professional career – a place for people to learn, to achieve and grow. A philosophy that balances personal lifestyles, perspectives and needs is an important part of our culture.

TECHNOLOGY PROFILE

Technology works as a strategic partner with Morgan Stanley business units and the world's leading technology companies to shape and protect how we do business in ever more global, complex, and dynamic financial markets.

Morgan Stanley's sizeable investment in technology results in quantitative trading systems, cutting-edge modelling and simulation software, comprehensive risk and security systems, and robust client-relationship capabilities, plus the worldwide infrastructure that forms the backbone of these systems and tools.

Our insights, our applications and infrastructure give a competitive edge to clients' businesses—and to our own.

KEYNOTE TALK

How to Build your Tech Company in N Easy Steps

DR JAMIE GRAVES

CEO & Founder
ZoneFox

Jamie is a security software entrepreneur who has spent the past 10 years building ZoneFox into an award-winning product that provides customers with visibility into human behaviour to help protect their data.

He span ZoneFox out of Edinburgh Napier University after working on the technology during his PhD.

In this talk he will outline the lessons he's learned from the many failures and successes it took to get a tech company off the ground and why people are key to everything he does and are not going to be replaced any time soon by AI.



KEYNOTE TALK

AI Commons for Common People?

ALI SHAH

Head of Emerging
Technology & Strategic
Direction
BBC

A BBC nationally
representative survey of AI
has highlighted the diversity
of viewpoints on AI amongst
the general public.

In this talk, Ali Shah, Head of Emerging Technology & Strategic Direction for the BBC, will share the results of the survey, and the dilemma that we all face.

Join us to understand how society is being shaped, and to discuss how we might commonly shape society in the citizen interest.



EXHIBITING PARTNERS

#DemoFest2018

SCOTLANDIS

Event Co-Organiser

ScotlandIS is the trade body for the digital technologies industry in Scotland, representing software, IT, telecommunications businesses and digital agencies, from multinationals with a Scottish base to start-ups.

It networks the industry through a range of events, including its annual conference, ScotSoft, and the Digital Technology Awards.

FURTHER INFORMATION
scotlandis.com

ScotlandIS

CENSIS

CENSIS is the centre of excellence for sensing, imaging and Internet of Things (IoT) technologies.

We help organisations explore innovation and overcome technology barriers to achieve business transformation.

As one of Scotland's innovation centres, our focus is not only creating sustainable economic value in the Scottish economy, but also generating social benefit. To do this, our industry-experienced engineering and project management teams work directly with companies or in collaborative teams with specialist university research experts.

Working with us allows organisations to implement quality, efficiency and performance improvements and fast-track the development of new products and services for global markets.

FURTHER INFORMATION
censis.org.uk
@CENSIS121



THE DATA LAB

The Data Lab is an innovation centre that facilitates and enables industry, public sector and academia to innovate and develop new data science capabilities in a collaborative environment.

It provides resources and funding to kick-start projects, deliver skills through education programmes, and help to develop the local ecosystem by building a cohesive data science community.

Its core mission is to generate significant economic, social and scientific value from data for Scotland.

FURTHER INFORMATION
thedatalab.com



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ENERGY TECHNOLOGY PARTNERSHIP

ETP is the Scottish Academic Research Pool in energy, an autonomous alliance of 13 independent Scottish HEIs, each with areas of outstanding research capability in the energy sector.

Its projects lead the way in realising a low carbon future for Scotland, and it has 11 energy themes, which enable it to focus on areas of particular academic strength: Bioenergy; Marine Energy; Carbon Capture and Storage (CCS); Oil & Gas; Energy Conversion and Storage (ECS); Power Systems and Networks; Energy Utilisation in Buildings (EUB); Solar PB; Heat; Wind; Energy, People and Society.

FURTHER INFORMATION

etp-scotland.ac.uk



GLASGOW CITY OF SCIENCE & INNOVATION

Glasgow City of Science and Innovation is a pioneering partnership of over 90 organisations spanning academia, the arts, business and government.

We have the collective vision to work smarter in partnership to raise the profile of Glasgow and the West of Scotland as a world-class science destination, and leverage science and innovation for sustainable economic growth.

FURTHER INFORMATION

glasgowcityofscienceandinnovation.com



THE HIGGS CENTRE FOR INNOVATION

The Higgs Centre for Innovation at the Royal Observatory is a joint venture between the STFC (Science & Technology Facilities Council) and University of Edinburgh for incubating space technology and data intensive start-ups.

FURTHER INFORMATION

www.roe.ac.uk/higgscentre



INTERFACE

Based regionally throughout Scotland, and with connections into all Scotland's universities, research institutes and colleges, Interface works with individual and groups of businesses of all sizes, in all sectors, to match them to world-leading academic expertise, research, technologies and specialist facilities to help them grow.

FURTHER INFORMATION

interface-online.org.uk



FIND YOUR WAY AROUND

List of Exhibitors & Exhibition Plan

ARTIFICIAL INTELLIGENCE

1. Neil Urquhart
2. Christopher Stone
3. Mohd Khairul Azmi Hassan & Yun-Heh (Jessica) Chen-Burger
4. Stewart Massie & Glenn Forbes
5. Carlos Francisco Moreno García & Laura Jamieson
6. Sadiq Sani
7. Kyle Martin
8. Anjana Wijekoon
9. Javier Suquia
10. Ulrich Germann & Alexandra Birch
11. Ruth Hoffmann
12. Ian Miguel
13. Kenneth N Reid
14. Bruce Graham

BIG DATA

15. Diana Bental & Fiona McNeill
16. Zezhong Wang
17. Rui Zhao
18. Fotis Savva & Christos Anagnostopoulos
19. Konstantinos Kolomvatsos & Christos Anagnostopoulos
20. Iulia Popescu
21. Azwa Abdul Aziz & Andrew Starkey
22. Nikos Ntarmos
23. Atoshum S Cahsai

CYBER SECURITY

24. Idris Zakariyya
25. Sara Albakry & Kami Vaniea

NETWORKING, THE CLOUD & INTERNET OF THINGS

26. Ibrahim Alghamdi
27. Jeremy Singer & Tony Garnock-Jones
28. Tanveer Ahmed

ROBOTICS &

AUTONOMOUS SYSTEMS

29. Ingo Keller & Frank Broz
30. Helen Hastie & David Robb
31. Mary Ellen Foster
32. Heriot-Watt University Robotics Society

UNDERSTANDING

COMPLEX SYSTEMS

33. Petros Papapanagiotou & Jacques Fleuriot

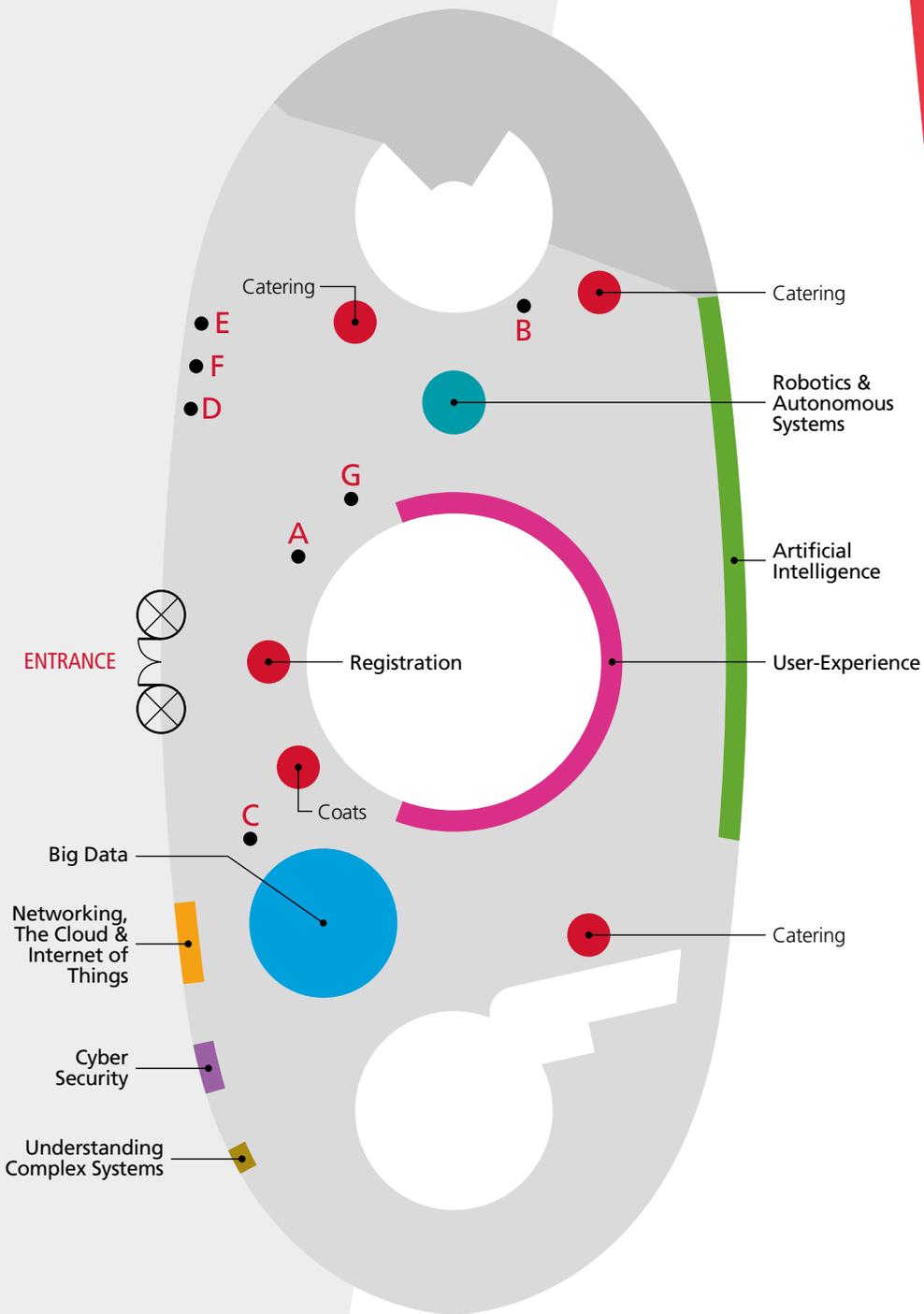
USER-EXPERIENCE

34. Adam A Gray
35. Laura Muir & Gabriele Maffoni
36. Augusto Esteves
37. Theodoros Georgiou
38. Stefano Padilla & Thomas S Methven

39. Tanya Howden
40. Ana-Maria Salai
41. Gareth Tigwell & Rachel Menzies
42. Michael Crabb
43. Tom MacGillivray
44. Aljawharah Alabdullatif
45. Lynda Webb
46. Robin Hill & Clare Llewellyn
47. Antoine Loriette
48. Euan Freeman
49. Jamie Ferguson & Alberto González Olmos
50. Craig W Docherty
51. Stamos Katsigiannis & Naeem Ramzan
52. Linda Crearie & Costas Iliopoulos

EXHIBITING PARTNERS

- A ScotlandIS Event Co-Organiser
- B CENSIS
- C The Data Lab
- D Energy Technology Partnership
- E Glasgow City of Science & Innovation
- F The Higgs Centre for Innovation
- G Interface



EXHIBITORS

Artificial Intelligence

Artificial Intelligence

1. HELPING USERS UNDERSTAND COMPLEX PROBLEMS AND CHOOSE A SOLUTION



EXHIBITOR
NEIL URQUHART
Edinburgh Napier University

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Many complex optimisation problems in fields such as logistics have many, possible solutions. State of-the-art optimisation algorithms change the problem from 'how do I solve this?' to 'how do I choose a solution?'. We present a tool that allows a user to easily browse through solutions and search for one that meets their particular requirements.

We present a tool that allows a user to easily browse through solutions and search for one that meets their particular requirements.

Artificial Intelligence

2. MULTIPROBLEM BENCHMARK FOR LARGE SCALE PLANNING



EXHIBITOR
CHRISTOPHER STONE
Edinburgh Napier University

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We present a benchmark where the task is to solve a variety of different problems using the same overlying system.

The goal is to move from handcrafted specific algorithms toward a more general ecosystem of algorithms that collectively produce and organise a solver able to deal with the appearance of radically new problems.

Artificial Intelligence

3. A FORMAL AGENT-BASED PERSONALISED MOBILE SYSTEM TO SUPPORT EMERGENCY RESPONSE

EXHIBITORS
MOHD KHAIRUL AZMI HASSAN & YUN-HEH (JESSICA) CHEN-BURGER
Heriot Watt University

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We created a new suite of formal foundation to enable a personable mobile emergency response system to assist personal and large-scale disaster relief.

They are designed to meet the dynamics and communication needs of real emergency response scenarios and EM rescue life cycles.

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Artificial Intelligence
**4. INDEPENDENT
HEALTHY AGEING
FROM SMART HOME
SENSOR DATA**



EXHIBITORS
**STEWART MASSIE &
GLENN FORBES**
Robert Gordon
University

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Smart Home sensors are often used for home automation and security. In contrast this project develops a falls prediction system that monitors the activities and behaviours of a person within their home using in-home sensors.

The system is being trialled at Albyn's Dalmore 'FIT Homes' village near Inverness. It helps residents live independently and well in their homes for longer.

Artificial Intelligence
**5. DIGITALISATION
OF COMPLEX
ENGINEERING
DIAGRAMS FROM THE
OIL & GAS INDUSTRY**



EXHIBITORS
**CARLOS FRANCISCO
MORENO GARCÍA &
LAURA JAMIESON**

Robert Gordon
University

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The purpose of this research is to identify and solve problems in the Oil & Gas industry related to the interpretation of engineering drawings such as Piping and Instrumentation Diagrams and Sensor Diagrams, implementing computer vision and machine learning methodologies.

We present application demos on risk analysis, visualisation and connectivity detection.

Artificial Intelligence
**6. PERSONALISED
HUMAN ACTIVITY
RECOGNITION USING
MATCHING NETWORKS**



EXHIBITOR
SADIQ SANI
Robert Gordon
University

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Our research addresses the problem of providing a personalised human activity recognition model that better models individual variations in activity patterns, gait and posture between different individuals.

Our research proposes a solution that is more feasible for real-world applications than building separate models for each user.

EXHIBITORS

Artificial Intelligence

Artificial Intelligence

7. USING DEEP METRIC LEARNING TO MODEL SIMILARITY OF TELECOMMUNICATION ENGINEERING TASKS



EXHIBITOR

KYLE MARTIN

Robert Gordon University

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The aim is to allow engineers to retrieve the most similar previous work example. In expertise-reliant domains this is challenging because of the specialist vocabulary.

This research examines the use of deep metric learners to model the similarities between telecommunication engineering tasks. Deep metric learners are neural networks that consider multiple examples simultaneously and so can improve clustering of related concepts.

Artificial Intelligence

8. ZERO-SHOT LEARNING WITH MATCHING NETWORKS FOR OPEN-ENDED HUMAN ACTIVITY RECOGNITION



EXHIBITOR

ANJANA WIJEKOON

Robert Gordon University

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A robust solution for Human Activity Recognition (HAR) should cover a variety of activities and adapt to unseen activities, referred to as open-ended HAR.

We look at solving open-ended HAR as a Zero-Shot Learning (ZSL) problem. ZSL produces a model that recognises classes never seen during training by using a high-level description of unseen classes.

Artificial Intelligence

9. MEDICAL VISUALISATION IN MIXED REALITY



EXHIBITOR

JAVIER SUQUIA

University of Dundee

E: jsuquia@dundee.ac.uk

Visualising patients' health conditions is vital for doctors to develop effective treatment plans. Tools such as MRI scans require great expertise to be interpreted correctly and even then, the inherent nature of the scan being a stack of 2D images leaves room for error.

Converting these 2D scans into 3D and visualising them in Mixed Reality will give a more complete and natural insight.

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Artificial Intelligence

10. SUMMA: SCALABLE UNDERSTANDING OF MULTILINGUAL MEDIA



EXHIBITORS

**ULRICH GERMANN
& ALEXANDRA BIRCH**
University of
Edinburgh

E: ugermann@inf.ed.ac.uk

SUMMA is a scalable, open-source software platform to automatically monitor multilingual media: record them, transcribe audio, translate foreign content, identify topics, cluster and summarise news items, recognise mentions of people and places, and extract and store information about them in a structured knowledge base. Browser-based interfaces give users easy access to all this information.

Artificial Intelligence

11. AUTOMATING THE VERIFICATION OF CONCURRENT SYSTEMS



EXHIBITOR

RUTH HOFFMANN
University of
St Andrews

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The use of concurrent systems, such as cloud computing, has become commonplace in daily life. However, reliably verifying the hardware and software components of concurrent systems to protect against both errors and exploits currently requires highly specialised mathematical skills.

I work towards automated verification tools that require minimal manual work and specialist knowledge.

Artificial Intelligence

12. CONSTRAINT PIPELINE: AUTOMATING OPTIMISATION



EXHIBITOR

IAN MIGUEL
University of
St Andrews

E: ijm@st-andrews.ac.uk

Many decisions involve different criteria which interact in complex ways. Often there is also an objective to optimise, such as maximising profit or minimising waste. Our research helps to make such decisions automatically and optimally, from a high-level description of the desired outcome.

The Constraint Pipeline software tools implement our ideas, achieving state of the art performance on hard instances.

EXHIBITORS

Artificial Intelligence / Big Data

Artificial Intelligence

13. EMPLOYEE ROSTERING: EVOLUTIONARY RUIN & STOCHASTIC RECREATE WITH VARIABLE NEIGHBOURHOOD SEARCH



EXHIBITOR

KENNETH N REID
University of Stirling
E: Ken@kenreid.co.uk

For decades scheduling problems have been solved with a variety of techniques. Many proven algorithms to these problems exist; however, there is no method to solve all the problems that exist across many sub-fields with differing datasets.

We apply Evolutionary Ruin & Stochastic Recreate, equipped with an Exponential Monte Carlo acceptance criterion control mechanism and VNS, to a real-world employee scheduling problem.

Artificial Intelligence

14. CONTEXTUAL LEARNING AND PROCESSING FOR PREDICTION, CLASSIFICATION AND DECISION-MAKING



EXHIBITOR

BRUCE GRAHAM
University of Stirling
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Context guides how we perceive the world and how we react to it. Machine learning can extract meaningful patterns from complex data for performing prediction, classification and decision-making, but performance can be fragile due to lack of realworld context.

By making the use of context explicit and transparent, machine learning for real-world applications will be made more robust.

Big Data

15. FACILITATING INFORMATION SHARING AND TRUST FOR DECISION-MAKING IN CRISIS MANAGEMENT



EXHIBITORS

DIANA BENTAL & FIONA MCNEILL
Heriot Watt University
E: d.s.bental@hw.ac.uk

CEM-DIT addresses widely recognized bottlenecks in crisis and disaster management when different organisations share information. It automatically reformulates queries so that they return relevant results despite variations in data structure and terminology between organisations, and compares the information to a provenance policy. Information is presented according to both its relevance and the reliability of its sources.

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Big Data

16. DATA COMICS FOR DATA-DRIVEN STORYTELLING



EXHIBITOR

ZEZHONG WANG

University of Edinburgh

E: wangzezhong2016@gmail.com

Communicating information in data has become increasingly important in a variety of domains. Rather than just 'showing' data, effective communication involves connecting to the audience and presenting the content in a form appropriate to the message and the attention span of the audience.

Inspired by the way people read and understand comics, data comics provide a novel format for data-driven storytelling.

Big Data

17. MODELLING DATA GOVERNANCE RULES: INFERENCEABLE TERMS AND CONDITIONS



EXHIBITOR

RUI ZHAO

University of Edinburgh

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Rules constraining the use of research data are widespread, produced in natural languages by governance bodies. Without automation, compliance with these rules in complex research environments is difficult.

We seek to model these rules in a logic understood by machines and humans, leveraging them to overcome this difficulty.

Big Data

18. LARGE-SCALE ANALYTICS ON SMALL-SCALE EDGE DEVICES



EXHIBITORS

FOTIS SAVVA

& CHRISTOS

ANAGNOSTOPOULOS

University of Glasgow

E: f.savva.1@research.gla.ac.uk

Exploring huge volumes of data often comes at a cost as companies that are not in position to own big data centres resort to cloud solutions. Such solutions, charge for infrastructure that allows analysts to go through abundance of information.

Our solution leverages Machine Learning to aid companies in the analysis of large volumes of data.

EXHIBITORS

Big Data / Cyber Security

Big Data 19. INNOVATE



EXHIBITORS
**KONSTANTINOS
KOLOMVATSOS
& CHRISTOS
ANAGNOSTOPOULOS**
University of Glasgow

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INNOVATE introduces bio-inspired intelligent decision making in three axes:

1. Data Relevance via an intelligent mechanism to assign queries only to relevant Query Processors over only relevant data;
2. Progressive Analytics via on-line providing aggregate responses over partial analytics;
3. Swarm-based Optimization via abstracting the Query Controllers as 'swarms' over distributed relevant streaming data for query processing optimization.

Big Data 20. RECOMMENDATIONS WITHOUT BORDERS



EXHIBITOR
IULIA POPESCU
University of Glasgow

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Our research aims to develop new 'bridges' to link groups of users and to improve the diversity of the recommendations they would get in different categories/fields.

Two of the main problems that we tackle are how to build the 'bridges' without exchanging the users' data and how to recommend modular items that have dependencies/prerequisites.

Big Data 21. AUTOMATIC APPROACHES TO ANALYSE TEXT USING CONTEXTUAL ANALYSIS



EXHIBITORS
**AZWA ABDUL AZIZ
& ANDREW STARKEY**
University of Aberdeen

E: a.aziz@abdn.ac.uk

Contextual Approach (CA) is a newly proposed technique to transform unstructured text data into meaningful information for fact-based decision making (e.g. brand reviews, social media and political campaign analysis).

The main difference from existing Supervised Machine Learning (SML) approaches is the ability to understand the relation of words in texts. It also can be used to detect the degradation of performance of proposed ML models.

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Big Data

**22. Project PRIMES:
GEO-DISTRIBUTED
PERSONALISED
RECOMMENDATIONS**



EXHIBITOR

NIKOS NTARMOS

University of Glasgow

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Project PRIMES aims at delivering a smart, personalised e-learning experience by constructing complete tailored courses based on the student's background, learning needs and future aspirations, with a special focus on younger (secondary school) learners. Our work straddles several scientific sub-fields within computing science, including but not limited to graph processing, Big Data systems, (geo-)distributed systems and analytics, recommender systems and e-learning.

Big Data

**23. REVISITING
ExactKNN QUERY
PROCESSING WITH
PROBABILISTIC
DATA SPACE
TRANSFORMATIONS**



EXHIBITOR

ATOSHUM S CAHSAI

University of Glasgow

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For kNN processing, using Tree-based indexing approaches, the current state of the art methods suffer from efficiency and scalability problems that result from increasing index sizes that grow with a dataset size.

We propose a novel mv index with several orders of magnitude smaller memory footprint, low indexing time, easy and fast recoverability, high applicability in high dimensions and similar or better performance.

Cyber Security

**24. ANOMALY
DETECTION TECHNIQUE
FOR DISTRIBUTED
WIRELESS SENSOR
NETWORKS**



EXHIBITOR

IDRIS ZAKARIYYA

Robert Gordon
University

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This research aims to address the security challenges in Wireless Sensor Networks (WSNs).

An anomaly detection technique is highly demanded in Industry, IT & Health Care domain. Meanwhile, description of various attacks and their effects in WSNs is genuinely required.

EXHIBITORS

Cyber Security / Networking, The Cloud & Internet of Things / Robotics & Autonomous Systems

Cyber Security

25. ANTI-PHISHING: CAN YOU READ A URL?

EXHIBITORS

SARA ALBAKRY &
KAMI VANIEA

University of
Edinburgh

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Auto-blocking all incoming phishing messages containing malicious links is impossible. Consequently, companies provide their employees with security advice on ways to recognise those links without clicking on them.

A common piece of advice asks users to 'check the link for an expected site'. This assumes users know how to read and determine links' destinations, which we have found to not be the case.

Networking, The Cloud & Internet of Things

26. TIME-OPTIMIZED TASK OFFLOADING DECISION MAKING IN MOBILE EDGE COMPUTING



EXHIBITOR

IBRAHIM
ALGHAMDI

University of Glasgow

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In Mobile Edge Computing, mobile users are roaming around Edge Analytics Nodes providing real-time local computing and data analytics capabilities.

Given that mobile users wish to offload computing and analytics tasks over their collected data within a deadline, when is the optimal offloading time and which is the optimal EAN based on the current load of the available EANs?

Networking, The Cloud & Internet of Things

27. RASPBERRY PI MICRO-DATACENTERS FOR EXTREME ENVIRONMENTS



EXHIBITORS

JEREMY SINGER
& TONY GARNOCK-
JONES

University of Glasgow

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The Federated Raspberry Pi micro-Infrastructure Testbed (FRUIT) is a scalable federation of heterogeneous edge-, cloud- and personal-computing facilities.

Raspberry Pi clusters make tiny, cheap, low-power, portable micro-datacenters. By combining these with existing mobile, fixed and cloud resources, we are building a flexible architecture for distributed applications.

SPREAD THE WORD

#DemoFest2018

Networking, The Cloud & Internet of Things

28. REAL TIME REMOTE MONITORING OF RAILWAY POINT MACHINE USING INTERNET OF THINGS (IOT)



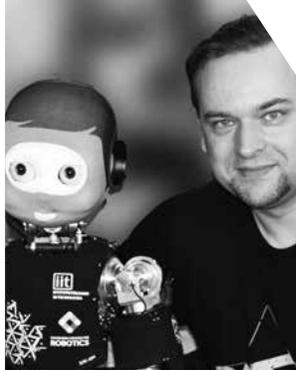
EXHIBITOR
TANVEER AHMED
University of the West of Scotland
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Railway point machines divert trains between two alternative routes. The current monitoring system used by UK railways gives an indirect measurement of only the machine's front drive force.

This situation causes delay in finding faulty components and in predicting failure, which leads to train delays and financial loss. More measurements means a faster, more accurate response.

Robotics & Autonomous Systems

29. ALYX: A SOCIAL SKILLS TRAINING ROBOT FOR ADULTS WITH AUTISM



EXHIBITORS
INGO KELLER & FRANK BROZ
Heriot Watt University
E: ijk1@hw.ac.uk

Adults with autism encounter difficulties while seeking and securing employment due to a lack of social intelligence. Social skills and employment training programmes are effective but are not widely available.

A robot designed to deliver elements of this training could help to improve individual's social saviness and employment prospects, whilst also providing greater nationwide coverage.

Robotics & Autonomous Systems

30. MIRIAM: A VOICE ASSISTANT FOR OPERATORS OF REMOTE AUTONOMOUS SYSTEMS



EXHIBITORS
HELEN HASTIE & DAVID ROBB
Heriot Watt University
E: h.hastie@hw.ac.uk

Remote autonomous systems, such as underwater vehicles, lack transparency resulting in low situation awareness and trust.

The multimodal interface, MIRIAM, gives the operator the ability to gather information on the remote vehicle through a graphical interface or speech or both.

Along with mission and vehicle status, explanations help improve the operator's mental model of how the vehicle operates autonomously.

EXHIBITORS

Robotics & Autonomous Systems / Understanding Complex Systems / User-Experience

Robotics &
Autonomous Systems

31. MuMMER: MULTIMODAL MALL ENTERTAINMENT ROBOT



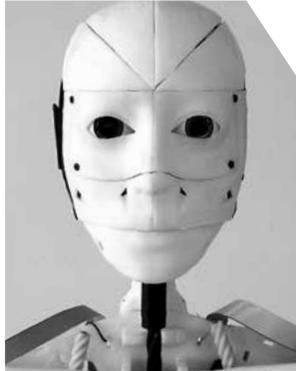
EXHIBITOR
**MARY ELLEN
FOSTER**

University of Glasgow
E: MaryEllen.Foster@
glasgow.ac.uk

In MuMMER, we are developing a humanoid robot that can offer information and entertainment services in a public shopping mall. We are working together with stakeholders to design and implement truly engaging and socially intelligent robot behaviour.

Robotics &
Autonomous Systems

32. ROBOT BUTLER: COLLABORATIVE FRAMEWORK FOR BUTLER-LIKE BEHAVIOURS



EXHIBITOR
**HERIOT-WATT
UNIVERSITY
ROBOTICS SOCIETY**
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Robotics Society from the Heriot-Watt University in Edinburgh is promoting a low-cost 3D-printed robot (InMoov) as a platform for butler-like behaviours. Researchers, students, and laymen can contribute to the advancement of algorithms for automation, perception, and manipulation that will be tested in real-world scenarios.

Understanding
Complex Systems

33. DigiFlow: DIGITISING INDUSTRIAL WORKFLOW, MONITORING AND OPTIMIZATION



EXHIBITORS
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DigiFlow is an Industry 4.0 project for the digitisation, monitoring, and optimisation of industrial workflows.

It offers a unique combination of IoT, Cloud, and workflow technologies to provide manufacturing companies better monitoring of their floors, and decision support that optimises efficiency.

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User-Experience

34. CONSTRUCT & CREATE: A FRAMEWORK FOR NARRATIVE CREATION



EXHIBITOR

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The narrative creation process is an important one, and can more often than not impact the success of the medium the narrative is attached to.

The framework is a tool to help creators with the narrative creation process, guiding them to consider all aspects of their narrative, to create the most engaging narrative possible, focussed around its central concept.

User-Experience

35. EYE TRACKING DURING FACE MATCHING AND RECOGNITION FOR APPLICATION TO VIDEO SURVEILLANCE



EXHIBITORS

LAURA MUIR & GABRIELE MAFFONI
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This research takes a human-centred design approach to addressing the need for accurate and efficient face recognition in security and surveillance operations.

It aims to develop an enhanced software environment and specialist training for security staff that will improve the quality of their interaction with video images.

User-Experience

36. WaveTrace: SMART HOME CONTROL USING SELF-DISCOVERABLE MID-AIR GESTURES



EXHIBITOR

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WaveTrace is an Internet-of-Things (IoT) control system where smart devices display interface elements that move.

Unlike traditional gestural systems where the user needs to learn and memorise different gesture sets, in WaveTrace, users interact with smart devices by simply tracking the various motions they display. Input is captured using any wrist-worn device with embedded motion sensors (e.g. smart watches).

EXHIBITORS

User-Experience

User-Experience

37. THE HAPTIC BRACELETS: WEARABLE HAPTIC METRONOME FOR GAIT REHABILITATION OF NEUROLOGICAL CONDITIONS



EXHIBITOR

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Walking to a metronomic rhythm can improve gait, leading people with neurological gait deficits to assume a healthier walking pattern.

Delivering metronomic cues haptically (through the sense of touch) as opposed to via audio, offers a new perspective to gait rehabilitation, leaving hearing free for socialising, situation awareness and safety.

User-Experience

38. EXPLOITING IMPACT USING A MODULAR DECISION-MAKING TOOLSET

EXHIBITORS

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We have created a highly usable pipeline of tools which allows organisations to take large collections of unorganised documents and make them easily explorable.

Using state-of-the-art machine learning techniques, our pipeline infers underlying structure before creating intuitive, interactive, and insightful layouts.

The pipeline is also designed to be easily deployed on either cloud services or internal business servers.

User-Experience

39. THEME-BASED OVERVIEWS OF LITERATURE SOURCES



EXHIBITOR

TANYA HOWDEN

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Since the explosion of data available on the web, we now have access to a diverse collection of literature sources.

These are usually filtered using keywords and listed based on the relevance of the title. However, how can we organise our approach to navigate such large and sometimes overwhelming environments in an attempt to try and find appropriate texts?

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User-Experience

40. UNDERSTANDING AND IMPROVING THROUGH MOBILE TECHNOLOGY USERS' EXPERIENCE OF BLADDER TRAINING



EXHIBITOR

ANA-MARIA SALAI

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The aim of this research is to investigate whether a mobile phone application could be an appropriate tool to help people with Overactive Bladder symptoms:

1. Increase adherence to treatment
2. Assist during their rehabilitation treatment
3. Help them better understand their condition and symptoms.

User-Experience

41. BrightLights: GAMIFYING DATA CAPTURE FOR SITUATIONAL VISUAL IMPAIRMENTS



EXHIBITORS

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Situational Visual Impairments (SVIs) are a common problem when using mobile devices (e.g. struggling to read messages on a sunny day). To address this, we developed BrightLights – a game for measuring how people perform when the screen contrast changes under different levels of lighting. BrightLights data will help to provide designers with guidelines to mitigate SVIs through designs.

User-Experience

42. DEVELOPING FUTURE WEB ACCESSIBILITY TOOLS FOR DEVELOPERS



EXHIBITOR

MICHAEL CRABB

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The goal of this work is to assist in providing a major revision to the Web Content Accessibility Guidelines (WCAG) standard, and, as part of the update, to incorporate requirements for user agents and authoring tools as needed.

We are investigating different methods that can be used to assist developers in understanding and interacting with accessibility tools and how these can be used in an industrial context.

EXHIBITORS

User-Experience

User-Experience

43. VAMPIRE: A SMART SOLUTION FOR UNLOCKING THE RETINA TO DETECT DISEASE IN THE BRAIN AND BODY



EXHIBITOR

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Imaging the retina has the potential to be a quick test for detecting conditions that affect the body and brain such as high blood pressure and dementia.

It could help improve the identification of susceptible people, give early indicators of illness, and assess the effectiveness of new therapies. This will revolutionise patient care and reduce healthcare costs by helping target those people who need treatment.

User-Experience

44. SUPPORTING FRIENDSHIP BETWEEN CHILDREN WITH AUTISM AND THEIR TYPICALLY DEVELOPING PEERS



EXHIBITOR

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Children with autism are at a high risk of depression and anxiety which can be caused by loneliness and lack of friends. Deficit in social skills makes developing friendships with peers difficult for those children.

This research explores the role of technology in creating a supportive environment where children with autism can develop friendships.

User-Experience

45. ENHANCE: DIGITAL INNOVATIONS FOR BEHAVIOUR-BASED ENERGY REDUCTION IN ORGANISATIONS



EXHIBITOR

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Large organisations have a responsibility to reduce their carbon footprint. Whilst efficiencies can be achieved through material and infrastructure improvements, there are also substantial opportunities to tackle energy reduction from the perspective of behaviour change.

The Enhance Project has been working with the City of Edinburgh Council and the University of Edinburgh to co-design digital innovations for behaviour-based energy reduction.

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User-Experience

46. PERSUASIVE POWER IN A DIGITAL WORLD



EXHIBITORS

**ROBIN HILL &
CLARE LLEWELLYN**

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Utilising a combination of biometrics, neuroimaging and Big Data analysis, the Neuropolitics Research Lab unravels the processes behind information consumption, propagation and dissemination.

Do we want to believe the message? Should we trust the source? Are we communicating with a real person? What drives the impulse to 'click here' or to actively promote something by 'liking' or retweeting?

User-Experience

47. SHAPING GAMES: ELICITING PHYSICAL EXERCISING THROUGH COMMON GAMEPLAY



EXHIBITOR

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Fostering user engagement for physical training and rehabilitation remains a challenge. Common techniques use our natural propensity to engage in play (gamification or serious gaming) but few use ready-made video games.

This work demonstrates how altering the players' interaction loop allows for users' favourite video games to elicit arbitrary physical exercises while maintaining their in-game performance and engagement.

User-Experience

48. LEVITATE



EXHIBITOR

EUAN FREEMAN

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We manipulate sound to create new computer interfaces that people can see, hear and feel. Our project uses ultrasound to levitate small objects, to focus sound, and for haptic feedback.

We are exploring how these capabilities can be used for new interactive experiences.

EXHIBITORS

User-Experience

User-Experience

49. INFORMATION THROUGH TOUCH: INVESTIGATING THE DESIGN AND APPLICATION OF HAPTIC INTERFACES

EXHIBITORS

JAMIE FERGUSON & ALBERTO GONZÁLEZ OLMOS

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Tactons are vibration patterns used to convey information through touch. We present two approaches to designing Tactons: one based on perceptions of vibrations in relation to everyday metaphors and another based on how quickly people can learn to use Tactons that represent a vocabulary of information.

Our work has applications in providing information nonvisually in hazardous situations such as spaceflight as well as in contexts where information can't be easily classified or quantified such as expressing the level of arousal of a person to another.

User-Experience

50. COMPARING GAMES & NON-GAMES FOR PUBLIC ENGAGEMENT & EDUCATION IN TREE & PLANT HEALTH



EXHIBITOR

CRAIG W DOCHERTY

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The use of Games and Gamification is new for the Department for Environment, Food & Rural Affairs, as well as being a young field in itself.

This particular piece of research addresses whether a game or non-game approach works better – and which is enjoyed more by the users. This will form the basis for further research in this area.

User-Experience

51. INTERACTIVE SMART-EXERCISE-BIKE SYSTEM



EXHIBITORS

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Studies have shown that physical inactivity is the fourth leading cause of death globally. To address this issue, we designed and developed a cycling exergaming system that can transmit signals from the exercise bike to a computer in order to control multimedia applications and provide a fun and stimulating environment for the otherwise dull task of cycling indoors on an exercise bike.

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User-Experience

52. MILLENNIAL/ CENTENNIAL STUDENTS AND TECHNOLOGY: IMPLICATIONS FOR LEARNING



EXHIBITORS

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Recently there have been rapid advances in technology that young people are using today. This has meant that many have grown up in a world that takes smart devices for granted. They often use technology for many hours each day.

How has this changed behaviour, online activity, and expectations of interactions with technology, and what are the implications for learning?

NOTES

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