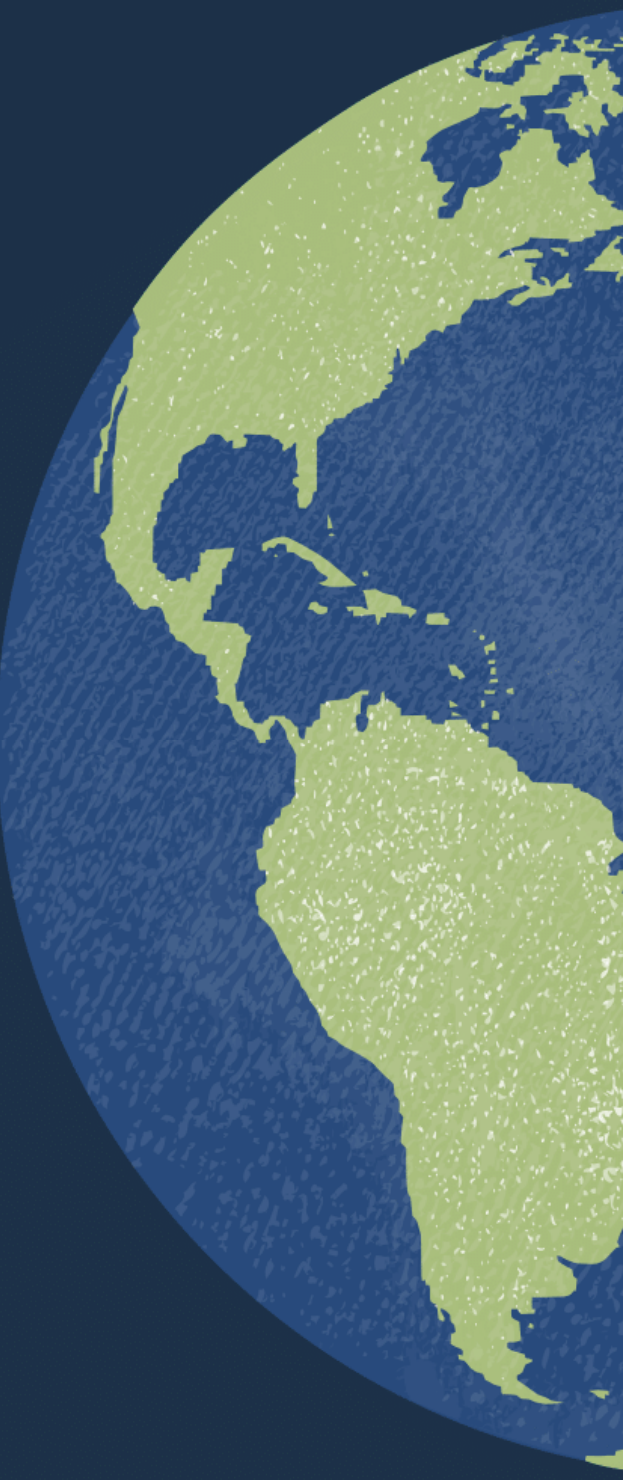
FIFTH ANNUAL CDT-SIS CONFERENCE

CREATING A SUSTAINABLE FUTURE



www.cdt-sis.soton.ac.uk

20th November 2019
The Hartley Suite, University of Southampton

EPSRC
Pioneering research and skills

Sustainable Infrastructure Systems

UNIVERSITY OF Southampton

Contact Us

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Centre for Doctoral Training in Sustainable Infrastructure Systems

Graduate School Office

Faculty of Engineering and the Environment

Building 13, Room 2043

University of Southampton

Southampton

SO17 1BJ

United Kingdom

CDT in Sustainable Infrastructure Systems/ EngD in Transport & The Environment

Prof Paul Kemp

Welcome to the annual cohort conference for the EPSRC funded Centre for Doctoral Training in Sustainable Infrastructure Systems (CDT-SIS) held in collaboration with the new UKCRIC CDT in Sustainable Infrastructure for Cities. We are now entering an era of exciting change with our CDT programmes, as we have recruited our final cohort of CDT students, and are entering the early stages of building the new CDT. At the same time, the new National Infrastructure Laboratory has come on line, providing world leading state-of-the-art laboratories that will service research in the infrastructure domain. Furthermore, we are also involved in exciting initiatives at the Southampton Science Park to develop over the next two years a Future Towns Innovation Hub with our partners, the EM3 Local Enterprise Partnership and Research England. This new building will be a UK leading centre for excellence in developing infrastructure in the realms of Water, Energy and the Environment, and to promote economic prosperity and growth in the local region.

The CDT-SIS focuses on the 3 key infrastructure sectors of Water, Energy and Transport with the view to training future leaders in engineering and science needed to develop the national and global infrastructure systems that are essential for economic growth, security, societal wellbeing and environmental sustainability. The EPSRC Centre is developing a new way of thinking amongst engineers and scientists capable of leading the transformation of the national infrastructure from our current sectorized, carbon intensive inheritance to the integrated, low carbon, digitally enabled systems that will be the hallmark of successful economies in the 21st century.

The University of Southampton provides an ideal base because of the strength and breadth of its engineering and applied science expertise, and its excellent links to industry and academia across the globe. CDT-SIS ethos of developing and applying the fundamental science and engineering research needed to address the key problems facing society today, within the context of social responsibility and environmental sustainability.

The success of the CDT programme depends first and foremost on the hard work and application of the cohort of students. However, it would not be possible without the support of the industrial partners, a pool of supervisory academics, and the administrative team based within the Graduate School of the Faculty of Engineering and Environment. I would especially like to thank our past CDT-SIS administrators for their unstinting hard work.

How to get to the university

By Car

Postcode for Satnav: SO17 1BJ

From M3: Exit at junction 14 (Southampton A33)

From M27: Exit at junction 5 (Southampton Airport)

Parking: Pay and display parking accessible from University Road

By Rail

Fast trains from London and Bournemouth/Weymouth stop at Southampton Central and Southampton Airport Parkway. Trains from Portsmouth and Bristol/South Wales stop at Southampton Central. There are also regular trains from major airports such as Gatwick and Heathrow to Southampton Central. You can find details of routes and timetables on the National Rail website.

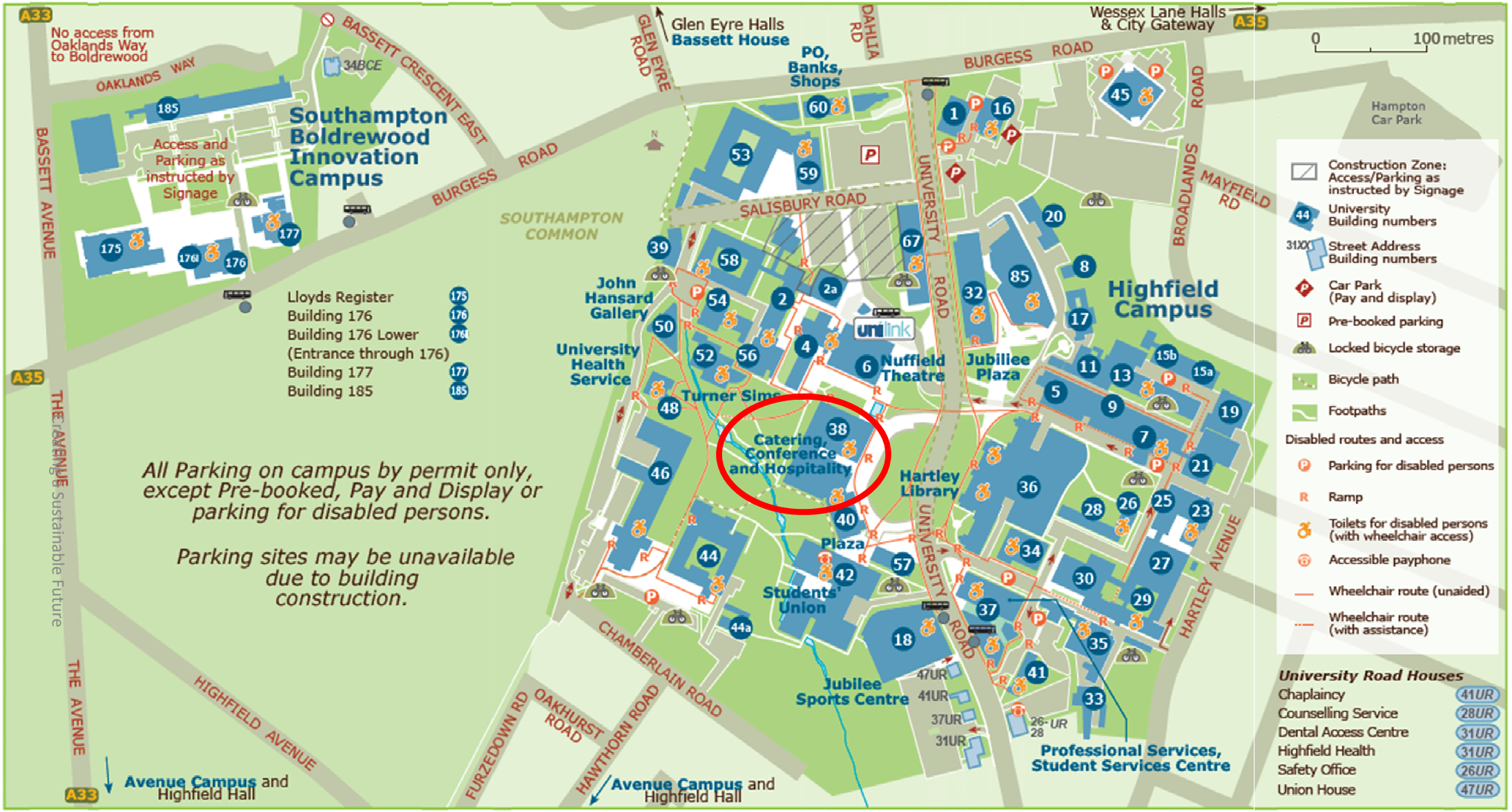
Highfield Campus is three miles from Southampton Central, and two miles from Southampton Airport Parkway. You can get the Unilink bus: U1 from either of these stations to Highfield Campus.

By Coach

National Express provides regular coach services to Southampton from central London, Heathrow, Birmingham, Bournemouth and the north. Southampton Coach Station is at Western Esplanade, in the city centre. Some coach services also stop at Highfield Campus.

From Southampton Coach Station you will need to walk to the nearby Civic Centre, where can continue your journey to Highfield Campus using our own Unilink bus U1 or taxi. The Unilink bus fare is £2.50 for a single or £3.70 for an all-day pass. Taxi fares from the city centre are usually £6-10.

The Conference will take place in The Hartley Suite, located in building 38 (see map overleaf)



University Buildings: Highfield Campus

Building 1	1	Energy Centre CHP	11	Faraday	21	EEE	32	Early Years Centre	41	Mountbatten	53
Arts	2	Tizard	13	Building 23	23	E&F Maintenance	33	Students' Union	42	Mathematics	54
Building 2 Annexe	2a	Wolfson	15a	EScience	25	Education	34	Shackleton	44	Human Performance Lab.	56
Law	4	Rayleigh	15b	Building 26	26	David Kiddle	35	Building 44a	44a	Students Union Shop	57
Eustice	5	Building 16	16	Chemistry	27	Library	36	SHPRS	45	Murray	58
Nuffield Theatre	6	R J Mitchell Wind Tunnel	17	Froude	28	George Thomas	37	Physics	46	Zepler	59
Lanchester	7	Jubilee Sports Centre	18	Graham Hills	29	Catering Conf. & Hospitality	38	University Health Centre	48	Gower	60
A B Woods Laboratory	8	ISVR	19	Synthetic Chemistry	30	Social Statistics	39	John Hansard Gallery	50	Nightingale	67
Engineering Workshop	9	Tony Davies High Voltage Lab.	20	Hartley Store	31	Garden Court	40	Turner Sims Concert Hall	52	Life Sciences	85

Morning Programme

9:00
Registration and Welcome Talk
by Prof Paul Kemp

10:00
Advanced Heat Engine for Low Grade Waste Heat Recovery
by Curtis Howell

10:30
UK Water Industry Research Zero Leakage 2050: Acoustic Leak
by Dr Jen Muggleton

11:00
Coffee Break

11:15
Development of a sustainable, hydro-powered, water-saving irrigation system
by Magali Rodriguez

11:45
Zero Power Water Meter: Developing Energy Harvesting Powered Wireless Sensor Node for Gaussian
by Wojciech Rozowski

12:15
Lunch and Poster Presentations

Afternoon Programme

13:00
Keynote: Investing in sustainable technologies
by Richard Burrett

13:30
Investigation on hollow fiber forward osmosis membrane for resource recovery from municipal wastewater
by Khaled Almoalimi

14:00
Morphing wings in ground effect to improve efficiency of marine vehicles
by Dominic Clements

14:30
Coffee Break

14:45
The Great Orbital Debris Patch
by Prof Hugh Lewis

15:15
Gold-based Electro-catalysts on Titanium Nanotubes Support for Direct Oxidation of Borohydride
by Recep Dag

15:45
Carbon Fibre Reinforced Polymer Composites: Reducing Weight in theAerospace Industry
by Keiran Ball

16:15
Closing Remarks
by Prof Paul Kemp

Speakers

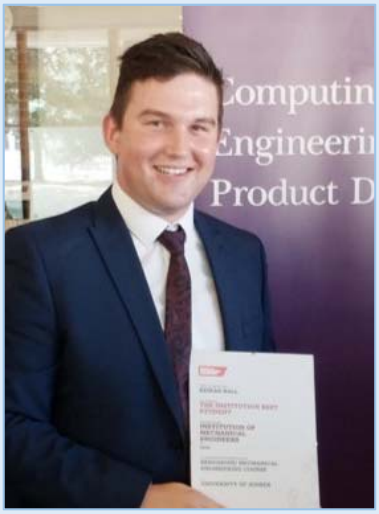
Curtis Howell

Advanced Heat Engine for Low Grade Waste Heat Recovery

Curtis is a first year PhD student in the Water and Environmental Engineering group, supervised by Dr Gerald Muller and Professor Andy Cruden. Curtis has developed an interest for research in sustainable energy production through design projects during his undergraduate degree. Curtis has a Masters in Chemical Engineering from the University of Surrey where he was awarded the Tailby prize and nominated for the Cadzow Smith award. Curtis has previously held positions in the Oil & Gas and Pharmaceutical industries through placements completed in fulfilment of his degree, operating in roles involving design and product industrialisation.

Keiran Ball

Carbon Fibre Reinforced Polymer Composites: Reducing Weight in the Aerospace Industry



Keiran achieved a 1st Class BEng (Hons) from the University of Sussex and received several awards. He has taken a keen interest in the applications of materials, as well as sustainability of engineering systems. Keiran is now a postgraduate doctoral researcher in the field of advanced fibre reinforced polymer composites and part of the CDT SIS. He uses advanced imaging techniques such as µ-CT to assess the damage response mechanisms of carbon fibre composites in order to better inform next generation computational modelling approaches. His research will contribute to further use of CFRP's in the aerospace industry to lightweight aircraft reducing carbon emissions.

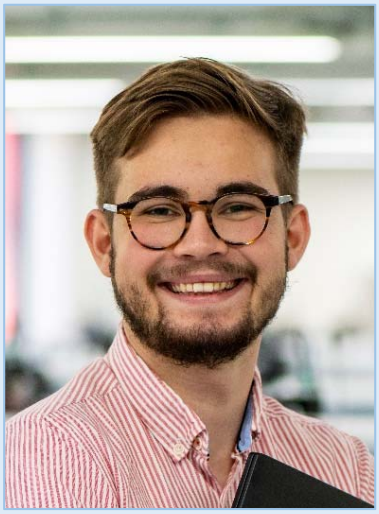
Magalí Rodriguez

Development of a sustainable, hydro-powered, water-saving irrigation system

Magalí Rodriguez is a Postgraduate Researcher at the WEEG Research Group at the University of Southampton. She is investigating the use of ultralow-head hydropower converters in shallow supercritical flows. Her research focuses on the development of a sustainable, cost-effective system that employs the available hydropower in irrigation canals to drive water-saving irrigation systems. She graduated with an MSc in Hydraulic Civil Engineering (cum laude), in Trieste (Italy), and became a Licensed Professional Engineer. Following her master's degree she worked at Idrostudi srl on projects aimed at mitigating the effects of droughts. Preceding this role, she did an internship at Alto Adriatico Water Authority (AAWA) in Venice, where she developed a methodology to estimate the irrigation need of crops during drought periods.

Wojciech Rozowski

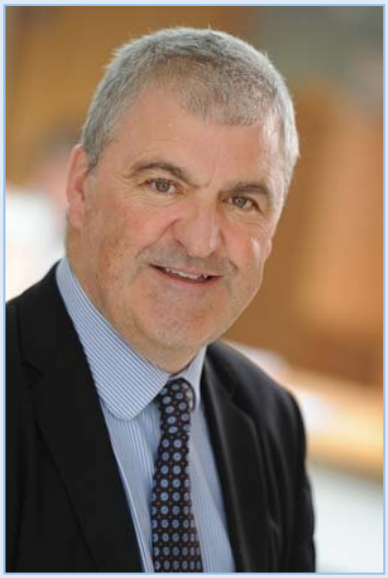
Zero Power Water Meter: Developing Energy Harvesting Powered Wireless Sensor Node for Gaussian



Wojciech is currently a second year BSc Computer Science student and a holder of ECS Excellence Scholarship. He has been working as a Research Intern in the Cyber Physical Systems research group, where he has been involved in the study of wireless low-power communication and energy-harvesting based systems. His research interests include low-level and kernel development. Before working in CPS, he has been involved in a project about optimising kernel-level shared memory synchronisation, using hardware transactional memory mechanisms.

Richard Burrett

Investing in sustainable technologies



Richard Burrett is Chief Sustainability Officer at Earth Capital, a sustainability focused investment group, and is a member of the Investment Committee

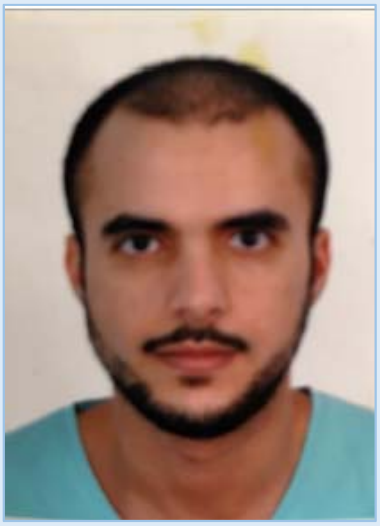
Richard has spent over 30 years working in international banking and finance. He joined AMRO Bank in 1988, becoming Managing Director and Global Head of Project Finance in 2001. In this role he was instrumental in the development of the Equator Principles, creating a market recognised standard for the management of environmental and social risk within project financing. He started to work directly on ABN AMRO's award-winning sustainability agenda in 2004, becoming Global Head of Sustainability before leaving the Bank in May 2008.

He was Co-Chair of the United Nations Environment Programme Finance Initiative (UNEP FI) from 2010 to 2012 working with 200 institutions, including banks, insurers, and investors to bring about systemic change in finance to support a sustainable world. During that period he was involved in the development and launch of the Principles of Sustainable Insurance at the Rio Earth Summit in 2012. He has been an Advisory Board Member of the Climate group and a Board Member of Forest Renewables part of the Scottish Forestry Commission – whose strategy was to help drive forward the development of 2 GW of renewable wind and hydro power on Scotland's national forest estate (2011-2014). He has advised independently the Carbon Disclosure Project, Grosvenor Fund Management, Kelda, the Private Infrastructure Development Group (PIDG) at board level inter alia.

He is currently an independent Non Exec Director of Triodos Bank UK (a leader in sustainable banking), the FMO (Dutch Development Bank) nominated non-exec Director of Union Bank of Nigeria PLC and a Senior Adviser to the Earth Security Group (helping companies and governments to align their growth strategies with a global framework of sustainable development). He is a Fellow of the Cambridge University Institute for Sustainability Leadership (where he has worked with a range of international companies at Board and Senior Executive level) and a Board Member of Forest Trends, a Washington-based organisation promoting market-based approaches to forest conservation. He holds a BA in Modern Languages and a MBA both from Durham University.

Khaled Almoalimi

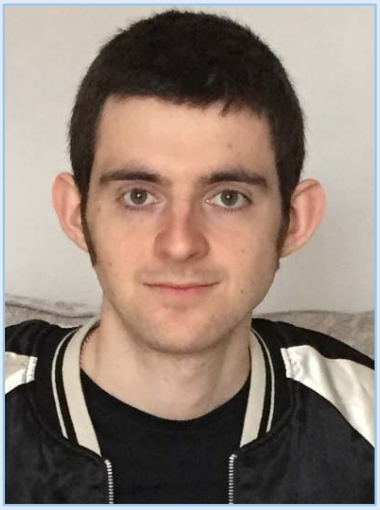
Investigation on hollow fiber forward osmosis membrane for resource recovery from municipal wastewater



Khaled Almoalimi is a PhD student in Water and Environmental Engineering Group at University of Southampton. He worked as a lecturer at King Saud University from 2010 to 2015 and has a Master's degree in Environmental Engineering Technology/Environmental Technology (University of Nottingham) and a Bachelor's in Civil and Environmental Engineering (King Saud University).

Dominic Clements

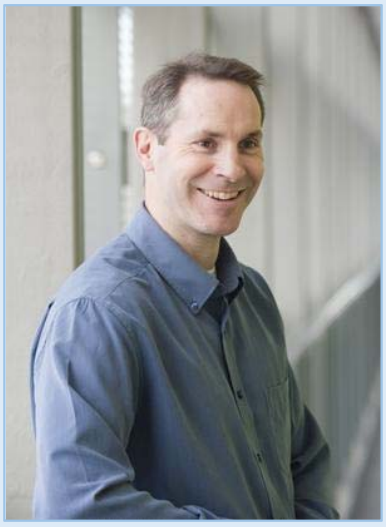
Morphing wings in ground effect to improve efficiency of marine vehicles.



Dominic is currently a second year PhD student in the Computational Engineering and Design research group here at the University of Southampton researching morphing wings in ground effect.
Having completed a foundation degree at the University of Southampton in 2014, Dominic completed a Master's degree in Mechanical Engineering achieving a First Class Honour's Degree in 2018. Dominic has carried out work for Soton UAV at the University of Southampton before commencing his PhD in 2018. Dominic gained a strong interest in Computational Fluid Dynamics and Aerodynamics during his undergraduate course which influenced him to carry out a PhD in these areas.

Prof Hugh Lewis

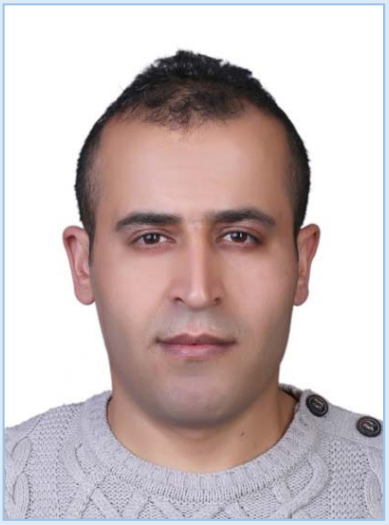
The Great Orbital Debris Patch



Hugh is a Professor of Astronautics and Head of the Astronautics Research Group at the University of Southampton. He has been researching the space debris problem for nearly 20 years and is the author of numerous computer models for understanding how the space debris population might evolve in the future. He is a member of the UK Space Agency delegation to the Inter-Agency Space Debris Coordination Committee, the world's leading forum for the discussion of space debris technical issues, and has represented the UK at meetings of the Scientific and Technical Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space.

Recep Dag

Gold-based Electro-catalysts on Titanium Nanotubes Support for Direct Oxidation of Borohydride



Recep Dag was born in 1988 in Adiyaman, Turkey. He received a BS degree in chemical engineering from Firat University (2012) and a MSc degree in 'Sustainable Energy and Technologies' program from University of Southampton (2018). He is currently pursuing PhD in developing new anode catalysts for a direct borohydride fuel cell at University of Southampton, supervised by Dr. Dmitry Bavykin, Dr. Carlos Ponce de Leon Albarran, and Dr. Zheng Jiang.

Dr Jen Muggleton

UK Water Industry Research Zero Leakage 2050: Acoustic Leak Detection

Jen graduated from Imperial College, London in 1985 with a first class honours degree in Aeronautical Engineering. She subsequently registered for a PhD at the ISVR, whilst being employed at the Admiralty Research Establishment at Portland, Dorset. During her time at Portland she worked mainly on sound propagation and radiation problems concerned with submerged structures. In 1992 she completed her PhD entitled 'Acoustic power flow in fluid filled tubes and cavities'.

In 1994 she returned to Southampton as a Research Fellow in the Mechanical Engineering Department, and spent the next four years working on the biomechanics of the human spine, along with image processing and analysis of fluoroscopic images of the human spine in motion. This resulted in the development of the OSMIA system for back pain.

In 1999 Dr Muggleton was appointed as a Research Fellow in the Dynamics Groups within ISVR where the main focus of her work has been on wave propagation in pipes, initially relating to water leak detection and, more recently, to buried pipe location and detection. In 2004 she instigated the vibroacoustic element of Mapping the Underworld in which she has been extensively involved ever since. In addition, she has undertaken research on automotive tyre vibration as well as on a number of other smaller structural dynamics projects. In 2007 she was promoted to Principal Research Fellow.

Poster Presentations

During Lunch Break

1. Sagar Sumaria
2. Mair Thomas
3. Boniface Hima
4. Amelia Holgate
5. Maria Suarez
6. Wojciech Rozowski

Session Chairs

1. Lewis Dolman
2. Keiran Ball
3. Chris Tacon
4. David Stanley

Conference Organisers

1. Christopher Tacon (Conference Chair)
2. Lee Chisman
3. Sam Reeve
4. David Stanley
5. Lewis Dolman