University of Limerick
Ollscoil Luimnigh

FACULTY OF
Science & Engineering

Newsletter

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In this issue:

Centre for Research Training in Foundations of Data Science

In partnership with University College Dublin and Maynooth University, University of Limerick is to lead a new €21 million SFI Centre for Research Training in Foundations of Data Science, with industry partners coordinated by Skillnet Ireland, under the leadership of Prof James Gleeson, UL.

Announced by Minister Heather Humphreys TD Minister for Business, Enterprise, and Innovation, and Minister of State for Training, Skills, Innovation, Research and Development, John Halligan TD, the centre has been awarded funding of **€13.6 million** by Science Foundation Ireland. The Centre for Research Training (CRT) will train 139 PhD students towards a world-class foundational understanding of Applied Mathematics, Statistics, and Machine Learning.

This represents the largest ever investment in mathematical sciences research in Ireland. This large-scale collaborative initiative between UL, UCD, MU and Skillnet Ireland will address existing skills gaps in data analytics such as advanced analytics, high-performance computing, and the ability to create bespoke algorithmic methods to turn data into knowledge. The CRT will impact real-world challenges in the areas of Data Analytics, Privacy and Security, Smart Manufacturing, Health and Well-being and sectors including agriculture, automotive technologies, consulting, data protection, economics, electronics, finance, health care, information technology, insurance, manufacturing, pharmaceuticals, and weather forecasting.

The 139 PhD students trained in the CRT will gain a fundamental understanding that will make them uniquely adaptable to the rapidly-evolving needs of Ireland's data science industry. Students will engage with industries and enterprises coordinated by Skillnet Ireland, and will develop an understanding of the real-world applications of data science, gaining transversal skills and an appreciation for true impact in the process.

Students will also undertake academic placements at internationally renowned collaborating institutions, benefiting from exposure to the research activities in world-class universities.

Speaking about the announcement UL's Professor James Gleeson said: "Graduates from the CRT will positively impact all aspects of Irish society and will become Ireland's future leaders, innovators, entrepreneurs and employers. Students will get a unique opportunity to work with some of the best researchers and innovative companies working in this area."

IOP ROSSE Medal 2019

Sarah Markham, a PhD student of the Department of Physics and Bernal Institute at UL, was awarded the 2019 Institute of Physics in Ireland (IOPI) Rosse Medal at a recent ceremony.

The Dooradoyle native was among 25 physics postgraduate students from higher education institutions across Ireland competing for the medal, which was awarded at the Institute of Physics in Ireland's annual Spring Meeting, held on March 30th. The medal, which commemorates contributions to science of the 3rd Earl of Rosse, Sir William Parsons, is awarded annually for graduate research communication, with particular emphasis on how the research is communicated to a broad audience via a poster and oral presentation.

Sarah's research emanated from an industry targeted project on developing image contrast of devices during endoscopic ultrasonic imaging and is funded through the Science Foundation Ireland (SFI) Centre for Medical Devices, CURAM. Dr Christophe Silien and Professor Tofail Syed from the Department of Physics and Bernal Institute, University of Limerick jointly supervise her PhD thesis.

UL President Dr Des Fitzgerald said: "Well done to Sarah on winning the IOPI Rosse Medal award, which is a tremendous result in a tough competition. This is the third year in a row that the medal has gone to the UL School of Physics and indeed UL PhD physics students have won this medal four times in the past five years, which is a wonderful achievement and testament to the strong work that is being done there."

Famelab Ireland Final

Eileen Courtney is a PhD student in the Department of Physics under the supervision of Prof Ursel Bangert, studying nanotechnology and material characterisation. Specifically, she is trying to characterise materials using electron microscopy. Eileen received the audience prize and 3rd place overall in the Famelab final in Dublin on the 11th April 2019.

School of Design and the Enterprise Ireland Student Entrepreneur Awards 2019

Two Product Design + Technology 4th year projects succeeded in reaching the final of the EI Student Entrepreneur Awards held on June 7th in CIT, Cork. *EZ Reader,* a product designed by Chris Barrett, Conor Biggins, Killian Fleming and Mark O'Sullivan, is a stabilisation device to help those with Parkinson's disease stay connected through the use of their mobile devices. *Cula*, designed by Killian Fleming is a wearable sleep system which facilitates the tracking and optimisation of an individual's sleep through the control of their perception of their environment.

The two projects reached the top 10, from over 1000 entries and both received merit awards for their work.

Neil Wilson, Intellicom and Brendan O'Malley

Limerick man Brendan O'Malley wins Career Recognition Award 2019

Brendan O'Malley, General Manager of Limerick headquartered Lero, the Irish Software Research Centre from 2010 to 2018 won the "The Career Recognition Award" sponsored by Intellicom in the Tech Excellence Awards 2019 presented in Dublin on May 23.

Commenting on the award, Professor Brian Fitzgerald, Director of the world-leading Science Foundation Ireland (SFI) research centre said, "Through his work with Lero and before that with the National Microelectronics Applications Centre, Brendan has been a major promoter for the adoption of software and microelectronics in Ireland. He has played a key role in building technology research collaboration between academia and industry."

Fulbright Irish Student Award

Elaine O'Connor, a PhD Candidate in the School of Engineering under the supervision of Dr Alan Ryan, was awarded a Fulbright Irish Student Award to study in Stanford University. Elaine received her Bachelor's degree in Biomedical Engineering and a Masters in Technology from UL. She is a researcher with the Dairy Processing Technology Centre, DPTC, which is hosted by UL. Her research focuses on Environment and Sustainability where she investigates water recovery technologies with a view to reuse water in the Dairy Industries in Ireland. As a Fulbright Student to Stanford University, she will complete a series of interviews with Food Industries to determine international perceptions on reusing recovered water in processing areas.

Irish Architecture Awards 2019

Now marking the 30th year of the prestigious annual Irish Architecture Awards, the RIAI announced 23 Award Winners across 14 categories, including Adaption & Re-Use, Culture or Public Building, International, Learning, Living, Public Space, Well-Being and Workplace. All of the projects on the shortlist were designed by RIAI-registered architects, based in Ireland and overseas, and were completed in 2018. The award winners include projects in Cork, Dublin, Galway, Limerick, Meath as well as London.

SAUL's Noreile Breen won the inaugural Research Award for her Postgraduate Research Masters on '*The Living Light*', whose research was funded by the Government of Ireland Postgraduate Scholarship and the Irish Research Council.

SAUL's Peter Carroll won Best Housing Award and the Sustainability Award for the Rapid Delivery Housing at George's place, Dún Laoghaire, a collaborative design between A2 Architects (which Peter directs) and DLR Architects Dept.

Robbie McAdam Scholarships

Awards sponsored by Analog Devices were made to three top performing LM118 Electronic & Computer Engineering students from the Department of Electronic & Computer Engineering, at a presentation ceremony onsite in Analog Devices (Raheen, Limerick) June 13th. Mike Mulqueen, Director of Consumer Engineering opened the award ceremony. The scholarship programme was established in 2010 through a gift of €125,000 made by Analog to the University of Limerick (UL) Foundation.

In 2015 Analog Devices (ADI) announced an extension to its investment to the formally known Hank Krabbe scholarship programme, which was established in 2010 in memory of the founding Managing Director of ADI in Limerick. The new scholarship programme which was launched in memory of the late Robbie McAdam, former Senior Vice-President of Analog Devices, who died in February 2015. To date Analog has now invested €157,000 in scholarship funding.

The deserving recipients of these awards were Bryan McSweeney who received the 2nd year scholarship this based on his 1st year results received €4,000. Connie Collins the 3rd year award based on his 2nd year performance received €2,000 and Oisin Watkins the 4th year award including the Robbie McAdam Medal, again this based on his final results received €4,000.

IOP Juno Practitioner Status

Juno Practitioner status has been awarded to the Department of Physics, University of Limerick. This is in recognition of the excellent work being taken forward to progress the Juno principles within the school. The Juno Practitioner status will be in place for three years and can be renewed once.

Project Juno

The aim of Project Juno is to recognise and reward physics departments, schools, institutes and organisations that can demonstrate they have taken action to address gender equality in physics and to encourage better practice for all staff. Becoming involved in Project Juno enables departments to work towards developing an equitable working culture in which all students and staff can achieve their full potential.

New Member of the Royal Irish Academy

Prof Andrew Fowler, Mathematics Applications Consortium for Science & Industry became a member of the Royal Irish Academy at a ceremony in Dublin at the recent 2019 admittance day This is the leading body of experts in the Sciences and Humanities that champions, research, identifies, and recognises Ireland's world-class researchers.

Prof Andrew Fowler on his admittance to the RIA with Head of Department Dr Sarah Mitchell.

SOPHia: Science Outreach to Promote Physics to Female Students (UL)

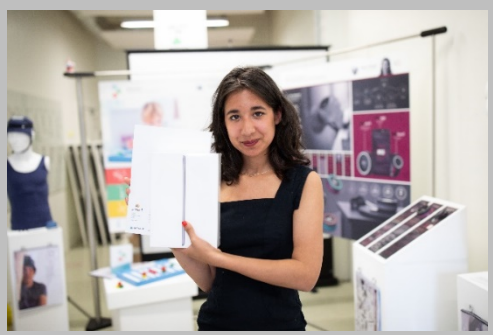
Minister for Training, Skills, Innovation, Research and Development, John Halligan TD, announced a national investment of €3.6 million through Science Foundation Ireland's Discover Programme. The funding has been awarded to 41 diverse projects, to improve public understanding of science, technology, engineering and maths (STEM) and to support education initiatives for under-represented groups

The successful awardees were carefully selected through international peer-review. A number of the projects receiving funding are specifically targeted towards engaging girls and women in STEM.

Pictured (l-r): Dr Sinéad McNally (DCU), Dr Gráinne Walshe (UL), Prof Merrilyn Goos (UL), Minister Halligan, Margie McCarthy (SFI), Judith Harford (UCD); and Brendan Tangney (TCD

One of the projects being funded is SOPHia: Science Outreach to Promote Physics to Female Students (Department of Physics, UL) – This project aims to encourage female students to take up physics as a Leaving Certificate Subject through an ambitious school visit programme with training for undergraduate facilitators and improved workshop design, a student competition for projects researching famous physicists/important physics discoveries/local physics, a showcase event to inform teachers of the issues with regards to gender in physics, an interactive website for parents, teachers and students, to supplement the school visit programme, with curriculum-linked activities

Dr. Dermot McInerney, Course Director and Mark O'Sullivan



Maya Brennan

Product Design & Technology - End of Year Showcase.

The Product Design & Technology end of year showcase took place this year in the PDT Design Studios from the 16th – 23rd May. The show was opened by Prof. Edmond Magner and was a night for 31 students, their families and friends to celebrate the culmination of 4 years of design education.

Several prizes were awarded on the night, most notably the 4th year prize: Logitech Designer of the year award. 1st place went to Mark O'Sullivan for his design *Bloom* – a product that offers pro-active care during pregnancy, with Roisin O'Regan and Killian Fleming taking the runner up spots.

Our longstanding partners ProCAD, again sponsored the annual 1st year PDT student of the year. This award was presented by Cormac Lyons to PDT student Maya Brennan.

69th Lindau Nobel Laureate

The scientific review panel of the Council for the Lindau Nobel Laureate Meetings selected Dr Sarah Guerin, Postdoctoral research in the Department of Physics/ Bernal Institute to participate in the 69th Lindau Nobel Laureate Meeting which took place from 30 June to 05 July 2019 in Lindau, Germany. Only the 600 most qualified young scientists can be given the opportunity to enrich and share the unique atmosphere of the Lindau Nobel Laureate Meetings. Over 30 Nobel Laureates were in attendance. Sarah is funded by Science Foundation Ireland, and is currently working with Dr Damien Thompson and Dr Tofail Syed on developing experimentally-validated models for directed protein assembly-from crystallisation to aggregation. Her active projects include the study of piezoelectric peptides with Weizmann Institute of Science, molecular electronics modelling in collaboration with the National University of Singapore, and structural health modelling using piezoelectric materials in conjunction with University College Dublin.

FAIM 2019

The School of Engineering hosted the 2019 International Conference in Flexible Automation and Intelligent Manufacturing (FAIM) from June 24-28, 2019.

The theme of the conference was: Beyond Industry 4.0: Industrial Advances, Engineering Education and Intelligent Manufacturing

FAIM is a leading international forum to disseminate the most recent and relevant research, theories and practices on Automation and Manufacturing. It links researchers and practitioners from industry and academia specializing in automation, manufacturing and other related engineering disciplines from around the world.

Molecular Foundry Funding

Two proposals by Prof. Ursel Bangert, leader of the TEMUL group in the Bernal Institute and Department of Physics, in conjunction with her PhD student Eileen Courtney and her postdoc Dr. Michele Conroy were accepted for funding by the Molecular Foundry, located in the Lawrence Berkeley National Laboratory (LNL). The proposals provide one year free access to laboratories, equipment and personnel located in the Foundry, allowing for collaborations and transfer of staff between the Foundry and the University of Limerick. The proposed projects will be the start of collaborations of Prof. Bangert's TEMUL group at UL with leaders in the world of 4D-STEM and other new experimental microscopy techniques, simulations and processing of big data.

The first project "Investigating metal-2D material interaction by HAADF STEM and simulations", which PhD student Eileen Courtney will spend time on in LNL, is aimed at using the simulation expertise of Dr. Colin Ophus, a world leader in the field of microscope data post processing and quantitative simulation, in order to understand the interaction between metals and 2D materials for electronics applications.

The second project "Investigating the ferroelasticity governing negative capacitance of dynamic charged domain walls by 4D STEM and simulations", which Dr. Michele Conroy will partially carry out in LNL, is in collaboration with Prof. Marty Gregg at Queen's University Belfast's on an ongoing and already impactful US/Ireland project on ferroelectric materials. Investigations on this project will now, to a higher degree, be carried out in Berkeley, using 4DSTEM, a novel microscopy technique, capable of creating strain and electric field maps of materials simultaneously at atomic resolutions. Dr. Jim Ciston and Dr. Colin Ophus, of LNL, world leaders in 4DSTEM, will assist in data acquisition and processing.

BES 2019

The Faculty of Science and Engineering hosted the BES 2019 XXV International Symposium on Bioelectrochemistry and Bioenergetics from 26th to 30th May. The conference drew 210 delegates from all over the world. The organising committee was chaired by Prof Edmond Magner, Faculty Dean.

The aim of the conference is to provide a forum on all the various aspects of bioelectrochemistry, to disseminate the knowledge of bioelectrochemistry and promote exchanges on recent findings and collaborations. The symposium features all aspects of the highly interdisciplinary areas of Bioelectrochemistry and Bioenergetics on the following themes: Biopower and Bioenergetics; Electroporation and Electrophysiology; Sensing and Biointerfaces; New Materials/Materials Chemistry for Bioelectrochemistry; Protein Electrochemistry and Protein Engineering; Emerging Topics in Bioelectrochemistry

Environmental Protection Agency Research Programme

Principal investigator Dr Bernadette O'Regan and her research team have been working on four projects funded under the Sustainability Pillar of the Environmental Protection Agency's Research Programme 2014-2020. These projects inform national policy by development of solutions to environmental challenges through provision of strong evidence-based scientific knowledge. The EPA projects include: (1) *Developing the Potential of Third Level Campuses as Change Agents in Transition to Sustainable Communities*, (2) *Sustainable Voluntary Communities: Supports for Sustainable Environmental, Social and Economic Development*, (3) *Developing Frameworks for Evaluation and Mitigation of Environmental Impact of Infant Feeding Decisions on Healthcare and Society*, (4) *Developing the Potential of Community Energy Action Groups Towards Transition to a Low Carbon Society*. Due to the multidimensional nature of transitions towards environmental sustainability the research team collaborates with local community groups, higher education institutions and national agencies to inform environmental best practice at a local level and the potential for scaling of solutions nationally. Testament to the great work carried out by Dr. O'Regan's research team includes consultation in development of national government policy for Ireland's *National Planning Framework 2040*. Project reports and links to papers/conferences available from www.epa.ie

Visitors from BUET

Building and expanding on the International Credit Mobility partnership UL, and BUET signed an MOU on 17th April 2019 committing to exploring opportunities for further collaboration and cooperation. Professor Saiful Islam, Honorary Vice Chancellor, BUET and Professor Fahmida Gulshan, Head of the Department of Materials and Metallurgical Engineering, BUET were present for the signing with Prof Kerstin Mey, Vice President Academic Affairs and Student Engagement, UL.

This partnership was developed by Prof Tofail Syed, Department of Physics and Bernal Institute

Conference Presentations

Dr. Neil O Connor, CSIS, attended and participated in the IRCAM Forum Works held in Paris, France in April were he gained experience on new and upcoming audio processing and transformation software. Between April and May, Neil presented papers at the following conferences: Art of Record Productions Conference at the Berkeley School of Music , Boston, AES (Audio Engineering Society's 148th in Dublin and at EMS (Electroacoustic Music Society) Conference at Greenwich University, London. Neil's collaboration album, *Ordnance Survey* was also released by Scintilla Recordings, and features Sean Mc Erlaine, Kate Ellis (Crash Ensemble), Linda Buckley and John Mc Entire (Tortoise), recorded at his studio at the National Concert Hall, Dublin.

Artistic Director

Dr. Nora O Murchú has been announced as the new Artistic Director of Transmediale. Commencing the role from the 2021 edition, Nora will be the festival's fifth artistic director and the first woman to take this position in its 33-year history.

Irish Signals and Systems Conference

Dr. Mike Johnson and Dr. Martin Hayes won the best paper prize at the Irish Signals and Systems Conference held in NUI Maynooth. The paper title is 'Low cost Empirical String Stability Experimentation using a Mobile Robotic Testbed'

First Irish President of Association for Information Systems

Professor Brian Fitzgerald, Director of Lero, the Irish Software Research Centre, has been elected President of the International Association for Information Systems (AIS). He is the first Irish person to be elected to the role and will serve a three-year term.

Headquartered in Atlanta, USA, the AIS is a global professional association for individuals and organisations who lead the research, teaching, practice and study of information systems worldwide. It comprises almost 5,000 members globally and runs four international conferences annually.

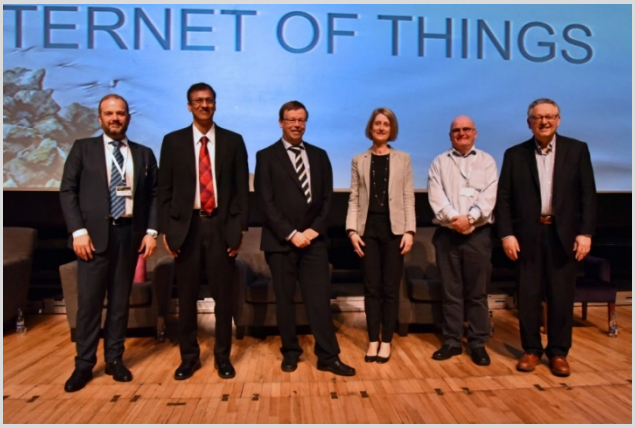
Smart Remotely Operated Vehicles Lecture

Professor Daniel Toal, Director, CRIS – Centre for Robotics & Intelligent Systems and Chair of Electrical Engineering and Robotics, Department of Electronic & Computer Engineering, gave a lecture on "Smart Remotely Operated Vehicles (subsea and airborne) for work on Marine energy infrastructure". The talk focused on the engineering challenges to be addressed in operations support of Marine Renewable Energy through all stages from scoping out the resources, selecting best sites, construction/installation of MRE infrastructure, cable laying, inspection, repair maintenance, ongoing monitoring, etc. The lecture was organised by IET (Ireland Network) as a part of their programme of public talks.

Opinion Paper Published

Dr Achim Schmalenberger, Department of Biological Science published an opinion paper at RTE (Brainstorm) titled: European agriculture is highly dependent on phosphate for fertilisation, but with supplies running out, we have to change our attitude towards waste and treat it as a valuable resource. The full paper can be found at the following link: https://www.rte.ie/brainstorm/2019/0608/1054178-life-after-phosporus-why-we-need-to-rethink-crop-fertilisation/

IEEE 5th World Forum on Internet of Things



From left to right: Nikolaos Isaris (EU DG Connect), Thyaga Nandagopal (NSF USA), Heinrich Stüttgen (Co-Chair of IoT WF 2019), Aisling McEvoy (Science Foundation Ireland, Elfed Lewis (Co-Chair of IoT WF 2019) and Adam Dobot (Co-Chair of IoT WF 2019)

The 5th IEEE World Forum on the Internet of Things (WF-IoT 2019) was held at the University of Limerick, from April 15th to 18th 2019. The IEEE World Forum on IoT is the premier IEEE event on IoT organized by the multi society IEEE IoT Initiative. It brings together distinguished participants from industry, the public sector, and the research community. The theme of this year's event was "IoT and the Digital Revolution" in recognition of strides and leadership that the host location of Limerick and Ireland has made in developing operating principles, and policies for the deployment of "Smart" technologies. The theme also underscores the importance of IoT technologies in enabling the "Digital Revolution" and making it a reality. The papers, presentations, and events at the conference were focused on contributions that nurture, cultivate, enhance and accelerate the adoption of IoT technologies and applications for the benefit of society

The 4-day event featured: Twelve keynote speeches delivered by distinguished speakers from industry, academia and the public sector. A program of Technical Sessions in the form of oral and poster presentations reporting on the latest novel results from the research community, technical Workshops focusing on the latest trends in various technologies, and Tutorials for in depth understanding of various aspects of IoT; a Program of dedicated Tracks for practitioners, policy makers, and executives built around applications of IoT to Vertical Markets and exploring cross cutting Topical Areas important to IoT; and lastly an Entrepreneurial Track dedicated to innovation around IoT and early stage IoT Companies.

This year's forum included a special full day event entitled 'Women in Engineering' and occurred on April 17th. The event included presentations and panel discussions by leading women practitioners from the wide area that IoT represents. The session organiser, Dr Sinead O'Keeffe of the Optical Fibre Sensors Research Centre (UL) and Dr Donna O'Shea (the keynote) were subsequently interviewed as part of the BBC Radio World Service magazine programme 'Click' which was recorded at the Forum and was a special programme dedicated to women working in Science and Technology. It focussed on many of the topic areas of the event and included interviews with some of the contributors. The program contained strong involvement from the public sector and industry aimed at deepening the understanding, the fostering the necessary dialog, and actions needed to accelerate the adoption and deployment of IoT.

Selected Topics in Mixed-signal IC Design

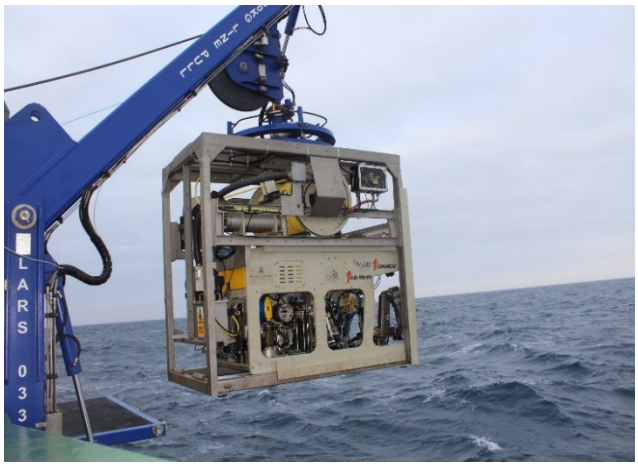
A 2-day short-course titled "Selected Topics in Mixed-signal IC Design" was facilitated by Circuits & Systems Research group (CSRC) within the Dept. of Electronic and Computer Engineering, University of Limerick (UL) on the 24th/25th June 2019. The course instructor was Prof. David A. Johns from the Dept. of Electrical and Computer Engineering at the University of Toronto. The two-day seminar series attracted 86 delegates from various countries like Czech Republic, Portugal, Spain, Scotland, England and Ireland. Delegates also attended from the regular major industrial partners such as Analog Devices, Xilinx Onsemi and Cypress semiconductor.

WWI Ship Wrecks

The Centre for Robotics and Intelligent Systems (CRIS) team has investigated a series of unknown shipwrecks off the west coast of Ireland during the ship-time operations in January this year. The survey cruise was carried out using the MRE ROV Etain, funded through SFI and piloted using University of Limerick's advanced control software known as OceanRINGS. The ROV uses machine vision for autonomous controls unlocking a high level autonomy and enabling the scientists to operate in more challenging weather conditions and deep-water shipwrecks sites.

The ship time cruise had a number of scientific and technical goals, which included the mapping of unknown shipwrecks between 200m and 80m of water and the investigation of the habitats which have formed on these wrecks over the past 100+ years. In recent years, technical scuba divers have explored some of these wrecks located as deep as 150 metres. Invariably, the divers report that wrecks aggregate fish and in some cases provide a substrate for corals and other species of epifauna. As such, the wrecks act as artificial reefs and given the number of shipwrecks in Irish waters, may make an important contribution to maintaining coral and other species by providing refuge and stepping stones for colonisation. Profiting from favourable weather conditions for this time of year, the survey aboard the Research Vessel Celtic Explorer, successfully located and surveyed three unknown shipwreck sites between 80 and 200 metres of water. The shipwrecks, two of which are longer than 100 metres are believed to be a German U-boat, an Ocean Liner and an armed cargo vessel. A high definition TV survey of one of the wrecks revealed that intact parts of the ship were colonised by various colourful epifauna: anemones, solitary corals, oysters and brachiopods. The biggest surprise was finding a colony of the coral reef forming Lophelia pertusa, a stony coral species usually found below 500 metres or deeper in Irish waters. The colony was hanging from the apex of two plates where it was likely protected from fishing but still received a plentiful food supply. The discovery and high detailed survey of these shipwreck sites were possible for the first time through the technological innovations that the CRIS team have been trialling.

The survey was carried out through the Marine Institute's Shiptime Program, under the SFI research centre MaREI and in collaboration with scientists from National University of Ireland Galway and Ulster University, Coleraine.



MRE ROV Etain on board of the Research Vessel Celtic Explorer.

Lero contributes over half a billion Euro to Irish economy

A new report finds that every €1 invested by the State and industry in Lero, one of Ireland's national research centres, generates over five times the value to the economy. The study by Kemmy Business School at University of Limerick assessed the economic impact of Lero, the Irish Software Research Centre, on the Irish economy through its expenditure. The centre is funded by Science Foundation Ireland (SFI) as well as by contracts from Irish and international technology corporations. The report found that for the period 2005-2018, every €1 invested by public funding agencies and industry partners in Lero contributed €5.25 to the Irish economy on average. This represents a contribution by Lero to national gross output of over €515 million during this period. In addition, the Kemmy Business School Report finds that Lero's economic activity has contributed to the creation of 2,678 jobs nationally. A copy of the report can be downloaded from: https://www.lero.ie/research/economic-impact/kbs-study

International Collaboration with Brazil

As part of an on-going research collaboration between Dr Ian Grout of the Department of Electronic and Computer Engineering and Professor Alexandre César Rodrigues da Silva of the Faculdade de Engenharia - Câmpus de Ilha Solteira, Universidade Estadual Paulista "Júlio de Mesquita Filho" (UNESP) in Ilha Solteria (São Paulo), a visit by Ian Grout to UNESP in June 2019 was undertaken. The collaboration between the two partners is focused on the field of embedded sensor system design and applications using microcontroller and FPGA (field programmable gate array) technologies.

The visit to UNESP this year was based on two key activities. Firstly, to undertake research into sensor system design and results analysis involving software and hardware based approaches. Secondly, both academics are co-supervising a PhD Student (Willian de Assis Pedrobon Ferreira) based in UNESP and the visit allowed face-to-face contact and discussions to support his research. The project is based on research into and development of environmental monitoring using hardware techniques and embedded machine learning with the FPGA as the target hardware.

Professor Alexandre César Rodrigues da Silva (left), Willian de Assis Pedrobon Ferreira (centre) and Dr Ian Grout (right) on the Faculdade de Engenharia campus (Campus-III) in Ilha Solteira.

In addition to the two key activities, a link through UNESP was developed to be involved in a project inside cross-border MARCA Program. In the project named "Preparándonos para el Internet de las Cosas (IoT)" coordinated by Professor Edgar R. Ramos Silvestre, at Universidad UNIVALLE - Cochabamba – Bolívia and by Professor Suely Cunha Amaro Mantovani, at UNESP, Campus de Ilha Solteira, each partner provides an on-line IoT service for environmental monitoring from their locations where the data is available through an on-line database for analysis purposes. Access has been given to Limerick to access the service, to utilise the database for collaborative data analysis and to establish a sensor node in Ireland that can provide additional data. The Program MARCA - Movilidad Académica Regional para los Cursos Acreditados – is developed with Argentina – Bolívia – Brazil - Paraguai.

Seminar on "Getting started with Python and TensorFlow for machine and deep learning" in UFG, 11th June 2019

As part of this visit, an invitation was extended to visit Professor Tércio Alberto dos Santos Filho from the Departamento Computação (Instituto de Biotecnologia – Ibiotec) within the Universidade Federal de Catalão (UFCat). UFG is based in the city of Catalão in Goiás, approximately 300 kms south of Brasilia and 530 kms from Ilha Solteira.

This visit had three key aims. Firstly, it allowed for interaction with students within UFG through the delivery of a seminar and discussions with the students after the seminar. The seminar was delivered to 150 students in UFG with the aim to provide an introduction to the use of Python and Gogole TensorFlow with application to machine and deep-learning. Secondly, it allowed for the academics to discuss research collaboration potential in the field of embedded sensor system design. The research in this field within UFG is run jointly with UNESP and involves the design and development of a city-wide wireless network for environmental monitoring that can be accessed as an IoT service. The sensor nodes set-up around the city were visited and the practical issues involved in setting-up such a system were discussed. Thirdly, it allowed for interaction with academics within UFG and a discussion into research areas of mutual interest. This also involved a visit to the lake and region close to Três Ranchos, approximately 30 kms from Catalão, to see the different types of conditions that their wireless monitoring systems have to work in and the varied environmental conditions that exist in Brazil.

Dr Ian Grout (left), Professor Sergio Francisco Da Silva (middle) and Professor Tércio Alberto Santos Filho (right) beside the lake close to Três Ranchos.

UL Science and Engineering Summer Camps 2019

Students from schools all over Ireland took part in the University of Limerick's Explore Science & Engineering Summer Camp during the month of June. The Science and Engineering Camp provided an opportunity to discover university life while participating in hands-on experiments in a fun-filled and safe environment. The camp activities allowed students to explore all aspects of science, engineering and technology and to check out exciting career options available in the many different science and engineering fields. The target participants were post-primary students (Junior Certificate, Transition and Fifth Years). The goal of the UL Science and Engineering Summer Camp is not only to help increase the number of students who go on to study science and engineering at third-level but also to better prepare students for the experience. Students often opt for courses based on points rather than what actually motivates and interests them. The Camp allows them the opportunity to sample a range of aspects of science and engineering courses which gives them a more informed choice when deciding on their third level degree option.

The UL Science and Engineering Camp provided an exciting two-day, non-residential programme of highly interactive science and engineering activities. It offered participants the opportunity to work in state-of-the-art laboratories and engage in an interactive, action-packed programme that gave invaluable insights into exciting areas of engineering, science and technology while exploring future career opportunities. Participants worked closely in small groups with group leaders and faculty covering sessions exploring areas such as: aircraft design, aerodynamics and structures, application of chemistry in analysing painkillers, design innovations, robotics and automation, civil engineering, physics, environmental science, electronic engineering, the life sciences including biology, nutrition and health. The Camp was designed to complement students' learning stages, with practical-based experiments and activities that were enhanced to enable students to have a "practical' approach to investigating the different aspects of science, engineering and technology.

I WISH 2019 Campus Week @UL

Monday 14th – Friday 18th January 2019

I WISH is an initiative to inspire, encourage and motivate young female students to pursue careers in Science, Technology, Engineering and Mathematics (STEM). It features annual conferences, interactive exhibitions and campus-based programmes. The UL I WISH Campus week was a female-only programme designed to introduce Transition Year students to the diverse, exciting and rewarding career opportunities available in STEM. It is organised by the Faculty of Science and Engineering in UL, through the voluntary efforts of its vast STEM community. I WISH students had an opportunity to explore all forms of Engineering, Science and Technology through hands-on experiments, site visits, lectures and group activities.

Young Modellers Project

As part of Science Foundation Ireland's mission to spread the STEM message, they have funded a new project under the SFI Discover programme to empower students and their teachers to identify and apply the maths and stats that they learn in class to real-world problems. The Young Modellers project led by the University of Limerick will confront students with unfamiliar "real-world" problems. It will empower Transition Year students to explore the modelling needed for problems that do not automatically appear to lend themselves to mathematical analysis; examples includes locating the black box of a crashed aeroplane, forecasting the cost of cancer screening programmes or optimising the operation of a lift in a multi storey building.

The Young Modellers programme aims to engage approximately 450 students nationally, including approximately 225 female and 225 male students and 90 students from socially, economically or educationally disadvantaged groups. The Young Modellers project will allow students to "get under the hood", exploring the basics of modelling real-world problems using concepts from applied maths, maths and physics and will encourage increased numbers to study these subjects at leaving cert.
During the 12-week programme students will develop an enhanced understanding of the links between the maths learned at school and the many applications of mathematical sciences in the real-world. The programme will support the development of collaboration, communication, and perseverance skills with students exploring multiple different ways of problem solving. Recognising that data science has become one of the most desirable and lucrative career options for mathematically-literate graduates, the Young Modellers project will offer students an insight into the mathematical principles underlying real world data problems.
Supporting teachers is a vital component of the Young Modellers project. Director of the MACSI centre at the Department of Mathematics and Statistics at UL Prof James Gleeson, Director of EPI*STEM at the National Centre of STEM Education UL Prof Merrilyn Goos, and the lead teacher of the pilot study at Clongowes Wood College Stephen O'Hara ran a 3-day residential teacher-training workshop on the 4th & 5th June 2019. Teachers will also receive ongoing online and offline support when implementing the programme in schools from September to December 2019. The Young Modellers project recruited 15 teachers across 15 schools to participate in the programme, with the training benefit valued at €5,000 per school. Teachers from girl, mixed-gender, and DEIS Schools were strongly encouraged to apply.

'COMPASS' TY Competition on Developing Alternative Energy Opportunities

Shannon Foynes Port Company 'COMPASS' competition was established to raise awareness of the potential of the Shannon Estuary and SFPC as an economic driver of national importance. This year's Compass TY competition was based on the theme 'Transforming the Waves of the Shannon Estuary – Developing Alternative Energy Opportunities'. Five schools were shortlisted from a record number of entries for the competition from schools across Clare, Kerry and Limerick. The Awards Ceremony of the competition was held at the Foynes Flying Boat & Maritime Museum on Friday, February 8th. The winners were presented with their awards by Minister of State at the Department of Finance Patrick O'Donovan. Also present were Limerick's All-Ireland winning manager John Kiely, MEP Sean Kelly among other invitees from social, educational and political life in the region. Centre for Robotics and Intelligent Systems (CRIS) team member Joseph Coleman was one of the judges together with Committee Chairman and SFPC Harbour Master Mick Kennelly; Helen Downes, CEO of Shannon Chamber; Anne Morris, Skillnet Manager Limerick Chamber; and Lindsay Sharpe, Strategic Marketing Specialist, ESB Networks.

Composite Materials Summer School

Composite materials and structures are finding extensive applications in automobile, aerospace and wind energy industries due to their outstanding performance and weight saving capabilities. Along with the increased interest and use, there are new challenges to engineers to address spanning from design, analysis, manufacturing and viability. This summer school aimed to provide engineers and researchers with a rapid knowledge of the state-of-the-art in this field (design, manufacturing and testing) via a hands-on experience. Hands-on experience included the advanced methods of composites manufacturing using laser assisted tow placement (LATP), resin transfer moulding (RTM), thermoplastic composites manufacturing, autoclave processing and joining/welding of composite parts. The attendees also had the opportunity to learn the test methods used to assess the quality of manufactured composite parts.

18 participants from University of Luxembourg, University of Bristol, TU Delft and University of Limerick attended the school. The summer school was part of a EU funded project (TWINNING-DRIVEN) of which University of Luxembourg, University of Limerick, University of Texas at Austin (USA) and INRIA (France) are the partners.

Dell STEM ASPIRE programme

The Electronic & Computer Engineering Department (E&CE) together with the Limerick Institute of Technology (LIT) continue to contribute to the Dell STEM ASPIRE programme. This programme is targeted at final year and Masters level female students. This initiative provides opportunities for UL/LIT female students to connect with female mentors within DELL. The event was held again this year onsite in Dell, Wednesday 13th February. Eleven female students from the E&CE department attended. Feedback was very positive, some remarking it as a great platform for networking with industrial partners.

Limerick4Engineering Show

As part of 2019 Engineering week activities, the Centre for Robotics and Intelligent Systems (CRIS) team participated in the Limerick4Engineering showcase held on the 7th of March at Shannon Airport. The event targeted secondary school pupils, parents, teachers and those interested in engineering as a career. It was an excellent opportunity to meet local companies and colleges to find out about the various engineering courses and exciting careers available. Forty-eight of the region's leading-edge companies along with UL, LIT, Government, local agencies and Engineers Ireland had come together again to showcase engineering career opportunities in the Mid-West region. The event was well attended and an excellent way to encourage young people to study Engineering and Science.

Edin Omerdic, Isela Ibrahimovic and Oran Dolphin-Murray at Limerick4Engineering Show

'Collaborative Robots' talk at Pint of Science event

Andrew O'Riordan and James Coady (both PhD researchers with the Centre for Robotics and Intelligent Systems (CRIS) and Confirm Research Centre) presented together at the Pint of Science. The event was held at JJ Bowles Pub, Limerick, on Wednesday May 22nd. Their topic focused on Collaborative Robots (i.e. Cobots) and how versatile a tool these robots can be, allowing them to be utilised not only in the manufacturing industry but also in a wide variety of applications (such as a replacement for bar staff for mixing cocktails!). Throughout their presentation they spoke of the capabilities and limitations of cobots, the kinematics that drive the robotic movements, while also adding some humour to their talk to make it not only informative, but both engaging and fun for all involved. An added value to this presentation was the use of the cobot arm to pour and mix all of the ingredients to make a long island iced-tea in which a few members of the audience even got involved and tasted the drink.

UL hosts national Scratch Coding Competition final

The National Scratch Coding Competition, supported by Lero, was held at University of Limerick as part of Tech Week 2019. The winners were selected from over 500 entries nationwide and judged to be the best in their respective categories. Scratch is a visual programming language that makes it easy for young people to create their own interactive stories, animations, games, music, and art – and share their creations on the web. Using Scratch allows students to develop creative and critical thinking, problem-solving and communication skills as they work collaboratively or individually on Scratch projects.

Now in its ninth year, the National Scratch Competition has established itself among both teachers and students as a leading platform and showcase for Ireland's aspiring digital creators. The competition is run by the ICS Foundation, the social enterprise arm of the Irish Computer Society and supported by Lero, the Irish Software Research Centre. Tech Week provides hands-on opportunities to learn about how computing and related technology are shaping every area of life. The aim is to stimulate thinking around future opportunities for study and careers in technology, through learning in the wider areas of science, technology, engineering and maths (STEM) subjects.

Abdul-Marteen Ojo from Confey College, Leixlip, Co. Kildare won the top prize for his entry 'Magic Wizard'.

MSc in Artificial Intelligence.

The academic year 2018/19 saw the University of Limerick add Ireland's first Masters in Artificial Intelligence (AI) to its postgraduate offering, delivered by ECE, CSIS and the Kemmy Business School. Artificial intelligence has had a much more significant role in day-to-day life in recent years and is at the centre of current and future activities of business and technology worldwide. The ability of a computer to observe and learn from data has been the driving force behind many new technologies. Industry-led and developed with the support of a range of companies working in this field in Ireland, the MSc in AI will equip participants with a knowledge-base and an advanced skillset to enable them to become highly capable experts in this strategically important sector.

Dr. Martin Hayes, Head of Department, Electronic & Computer Engineering speaking at Industry Day.

On the 13th May 2019, the MSc in AI held its first Industry Day, a successful event that brought together the students, academics and industry with a focus on AI projects. We were delighted to have so many attendees on the day from industries such as Dell, Valeo Vision Systems, Analog Devices, First Data, Accucode, Ericsson and many more.

We are delighted to announce that Andrew Kenny, a student on the Certificate in Artificial Intelligence has been shortlisted for Data Science Student of the Year at this year's The European DatSci & AI Awards 2019. We wish Andrew the best of luck in the final awards to be held this coming September.

Transmission Electron Microscope

A further transmission electron microscope, a Tecnai F20 (in addition to the Jeol 2100 and the Titan Themis) has now been installed in the MSSI/Bernal Institute. This instrument will serve a wide user community requiring materials characterisation, as it has the added benefit that it can be used with the in-situ holders (originally and recently acquired and established for enhancement of the Titan Themis capabilities), enabling observations under heating and biasing, in liquids and gaseous atmospheres, as well as under cryo-conditions. Imaging in the Tecnai F20 can be carried out down to the atomic scale. This instrument will also have the specific purpose for use in pre-screening and carrying out initial experiments on samples, which are to undergo further and special characterisations in the Titan Themis, so as to prove their aptness for investigations in this high-end instrument.

MoU with SkyNRG Signed

The Bernal Institute at University of Limerick has signed a MoU with SkyNRG, global market leader in SAF to explore the development of sustainable aviation fuel manufacturing in Ireland. The memorandum of understanding (MoU), which will see Bernal and Netherlands-based firm SkyNRG, collaborate on the development of sustainable aviation fuels, was signed in the presence of Dutch Minister of Trade, Sigrid Kaag, during the Dutch Royal Visit and Trade Mission in the National Botanic Gardens in Dublin. The Bernal Institute of the University of Limerick and SkyNRG are collaborating to explore the potential of a regional Sustainable Aviation Fuel (SAF) value chain in Ireland, with a strong focus on academic collaboration at University of Limerick.

Visiting Professor

Prof. Erdmann Spiecker from the Universität Erlangen-Nürnberg, Head of the Institute of Micro- and Nanostructure Research and of the Centre for Nanoanalysis and Electron Microscopy (CENEM), spent part of his sabbatical year (April and May) in the Bernal Institute hosted by Prof. Ursel Bangert's group. His work focuses on defect manipulation of 2D materials and bi-layer graphene, and in-situ probe microscopy. This will be the start of collaboration between UL and the well-known German electron microscopy laboratory, complimenting each other in their capabilities, and thus, in combination, leading to a unique and world-renowned facility.

DMARC Cultural contributions to the UL President's Gala Dinner

DMARC presented a selection of works, some specially created for this occasion, that explore the possibilities of technology and computing in the field of art and music. These works included *Sportscape,* a sound environment that used a 25-channel, loudspeaker array using networked microcomputers installed at guests tables that created a soundscape consisting of the sound of sports that accompanied the evenings events in the ballroom. Also specially created for the evening was an audio-visual exploration of the sport of cycling featuring string trio, electronic sounds and video. Performed by ICO violinist Diane Daly, Crash Ensemble Artistic Director Kate Ellis and Musici Ireland's Beth McNish, the work, entitled *Photo Finish,* integrated the worlds of instrumental sound and filmed footage with computer generated sounds and visuals. Other specially created works included Dr. John Galvin's *Horse Triptych*, focusing on the anatomy, musculature and motion of horses, and Dr. Giuseppe Torre's *Jazz Code* where original jazz soundscapes were mixed with those created by lines of computer code. Dr. Nicholas Ward and Jürgen's Simpsons recent RTÉ commission, *Quartet for Four Parallel Planes*, offered an insight into how music compositional processes unfold over time by visualising the real-time interactions between sonic events using a network of lights presented within a three dimensional sculptural work. Finally, a number of works presented showcased interaction, projection mapping and hybrid moving/still image works.

Pictured receiving their doctoral degrees at the winter conferring were, far left, Dr Shayon Bhattacharya with his supervisor Dr Damien Thompson, and Dr Gayathri Kollamaram, far right, with the Dean of Science & Engineering Prof. Edmond Magner

Electronic/Computer Music Performance and Art Tours

Since January, Dr. Kerry Hagan has continued her performance and art tours with her two electronic/computer music duos, *the Higgs whatever* and *The Bowers-Hagan Duo*. These duos consist of Kerry and her international research collaborators, Prof Miller Puckette (UC San Diego) and Prof John Bowers (Newcastle University Culture Labs), respectively. In February, *The Bowers-Hagan Duo* performed at the Electroacoustic Improvisation Summit in Brooklyn, NY. In March and April, *the Higgs whatever* featured at three international festivals. At the Moxsonic festival (Missouri), they presented a networked performance of *Cover Fire* (2018) conducted from San Diego, CA. *the Higgs whatever* were joined by renowned studio percussionist, Irwin, from Los Angeles, as the *Miller Puckette Trio* at *Callejón del Ruido*, the principal new music festival in Guanajuato, Mexico. Kerry installed *remnant* (2018), created by *the Higgs whatever,* at the University of Birmingham's festival of electroacoustic music for spatial audio (BEAST FEaST). In June, Kerry presented co-authored papers with her collaborators at the International Computer Music Conference in New York, publishing the new DSP algorithms used for *remnant* and the interaction design principles employed by *The Bowers-Hagan Duo*. At this conference, Kerry officially started her role as a newly-elected Europe Regional Director for the International Computer Music Association. Kerry's work for the RTÉ National Symphony Orchestra, *Agus í á bá*, was premiered on Lyric FM as part of the NSO Composer Lab. This is the first year the orchestra permitted composers to include electronics in their pieces, and she was one of two composers to do so. Due to the logistically prohibitive nature of large-scale works with electronics, pieces for orchestra and electronics are unusual and rarely performed, making this premiere a particularly remarkable event. Kerry's approach to the electronics required assistance from two students from the MA/MSc in Art & Technology, providing an unparalleled educational opportunity for them.

New Unmanned Aerial Vehicle (UAV)

In the Centre for Robotics and Intelligent Systems (CRIS), we have been preparing to receive our new Unmanned Aerial Vehicle (UAV), CGT50 SLT. The vehicle was manufactured by A-techsyn, a company who is specialised in UAVs technology. This UAV model has vertical take-off and landing with a wingspan of 4.5m, an endurance of 6 hours and a payload capacity of 4 kg. It is one of the first UAVs to use electric engines for take-off and landing and a combustion engine during fixed-wing flight. The CRIS researchers, Ger Dooly, Oran Dolphin-Murray, and Anthony Weir, attended the UAVs' training at A-techsyn's facilities in Turkey. The training included vertical take-offs and extended endurance flights operations, survey operations targeting coastal monitoring, SAR and offshore infrastructure inspection. It is expected that the new vehicle will be in our lab at the end of May when we will also be able to carry out the first tests over the Irish sky.

CRIS team members Gerard Dooly, Anthony Weir and Oran Dolphin-Murray at UAV training in Turkey.

Analog Devices Technology Day

The Centre for Robotics and Intelligent Systems (CRIS) was delighted to take part in Analog Devices Inc. Technology day, representing the MaREI centre and showcasing our research. The event featured some great guest speakers, including Zoran Zvonar (Director of ADI University Programme), Mark Ferguson (SFI Director General), and Colette Moloney (head DG Unit, European Commission). Our team presented the OceanRINGS+ demo and our recent trials carried out off the west coast of Ireland. It was a great opportunity for discussion with many industry stakeholders and academia representatives.

In-situ Electron Microscopy

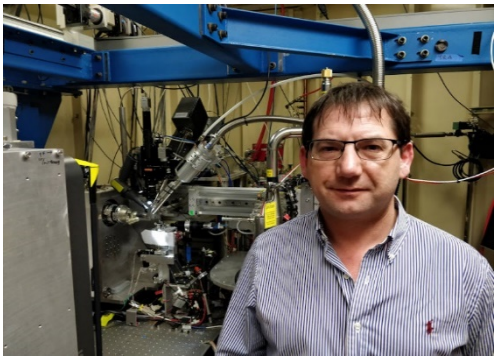
Dr. Jennifer Cookman, member of the TEMUL group in the Bernal Institute, has been recognised by the European Microscopy Society for her excellence in the field of in-situ electron microscopy. She has been awarded the chair and organising position for a session on in-situ liquid microscopy at the European Microscopy Congress 2020 in Copenhagen. This international microscopy conference is only held once every 4 years, so to be given a session is high praise from the European society.

Connections between Bauhaus and Aircrafts

Celebrating the centennial of the Bauhaus and investigating its far-reaching impact on current design culture, UCD, UCC, NCAD and the Goethe Institute organised the "Bauhaus Effects" conference, held in Dublin, 7–9 February 2019. Jan Frohburg from SAUL contributed to this international conference by highlighting aspects of the convergence of art and technology in modern design, specifically the impact of aviation on modern architecture. Under the title "Bauhaus and Aircrafts" he presented a well-received paper which relates to his on-going doctoral research project.

UL President's Excellence Awards for Staff 2019

Unravelling the underlying mechanisms which have led to making bacteria antibiotic resistant



Dr. Leen at the Advanced Light Source, Berkeley Lab, California

Dr Gabriel Leen, Senior Research Fellow has become an Affiliate by invitation of Lawrence Berkeley Lab, California, which is a U.S. Department of Energy National Laboratory managed by the University of California. 13 Nobel Prizes have been awarded to Berkeley Lab scientists (www.lbl.gov). Dr. Leen is contributing to methodologies which are designed to carry out time resolved investigations into the physics/biology of how enzymes known as beta-lactamases cause antibiotic resistance by breaking down the antibiotics' structure.

This is an exciting and significantly important piece of research for world health. The World Health Organisation States : "Without urgent action, we are heading for a post-antibiotic era, in which common infections and minor injuries can once again kill"

Key facts from WHO regarding antibiotic resistance:

- Antibiotic resistance is one of the biggest threats to global health, food security, and development today.
- Antibiotic resistance can affect anyone, of any age, in any country.
- Antibiotic resistance occurs naturally, but misuse of antibiotics in humans and animals is accelerating the process.
- A growing number of infections – such as pneumonia, tuberculosis, gonorrhoea, and salmonellosis – are becoming harder to treat as the antibiotics used to treat them become less effective.
- Antibiotic resistance leads to longer hospital stays, higher medical costs and increased mortality.

The research being undertaken is challenging and involves the use of some of the world's most sophisticated molecular imaging facilities, including the Japanese SPring-8 Angstrom Compact free electron Laser, which uses in-vacuum, short-period undulators to achieve sub-Ångstrom wavelengths of 0.6 Å at a relatively much shorter distance of 0.7 km, compared to other similar XFELs. Dr Leen will be participating in upcoming experiments being led by Prof Allen Orville, Dr. Pierre Aller, Dr. Agata Butryn and Dr. Peter Docker from Diamond Light Source, Oxfordshire, UK, at the SACLA XFEL later this year. Dr. Leen has already participated in related experiments earlier this year undertaken at the Linac Coherent Light Source, Stanford Linear Accelerator Center , Menlo Park, California

The Japanese X-FEL SACLA

Dr. Leen is an SFI funded researcher (grant no: 15/CDA/3598) developing novel optical fibre based sensors for scientific, industrial and medical applications; a founder of the UL spin-out company PolyPico Technologies Ltd.; and has around 100 academic publications.

Multiphase Flow Conference

Research fellows Mohammad Pourtousi and Arman Safdari together with PhD students Sudharsan Srinivasan and Corné Muilwijk each presented a talk at the 10th International Conference on Multiphase Flow (Rio de Janeiro, Brazil, May 19-24, 2019). Mohammad spoke about simulating surfactants in liquid mixtures, Arman presented a study of the size distribution of the droplets that form when a mixture of two liquids is sheared, and Sudharsan described simulations of flowing suspensions of many solid particles. All are under the supervision of Prof. Harry van den Akker and Dr. Orest Shardt, School of Engineering. PhD student Corne Muilwijk, supervised by Prof Van den Akker made a presentation on the experimental analysis of a quasi-2d bubbly mixing layer.

Funding Secured

- Professor Michael Zaworotko, Bernal Chair of Crystal Engineering and Science Foundation of Ireland Research Professor at the Bernal Institute University of Limerick, has been awarded €967,441.20 through the Irish Research Council 2019 Advanced Laureate Awards Programme.

- Faculty members, Dr Jakki Cooney, Dept. of Biological Sciences and Dr Sarah Hudson, Dept of Chemical Sciences secured significant funding in the €5 million Disruptive Technologies Innovation Fund award led by Cala Medical. The project entitled "Therapeutic enzymes as a treatment for sepsis and other immune disorder diseases" is led by Cala Medical, Nexus Centre, UL, and SME Curran Scientific, Raheen, Limerick and aims to tackle global challenges for the treatment of diseases including sepsis, psoriasis, arthritis and Crohn's disease.

- SSPC investigators, Sarah Hudson (Chemical Sciences, Bernal Institute, UL), Luis Padrela (Chemical Sciences, Bernal Institute, UL) and Lidia Tajber (TCD) were recently successful in securing €1.29 million in funding under the Marie Curie ITN European Industrial Doctorate programme. Their proposal, LongActNow, will design a novel platform technology for the development of long acting (LA) suspensions of complex active pharmaceutical ingredients (API), involving innovative manipulation of API crystal formation and growth and solvent removal. LA formulations have become a game-changer in terms of bringing existing and new API in more cost-efficient and comfortable ways to patients, often directly impacting commercial viability of new products. However, existing technology platforms are only applicable to a limited part of the pharma portfolio and do not allow to fully unlock all benefits linked to LA. LongActNow is a unique European Industrial Doctorate initiative that aims to meet the current and future demand for highly skilled scientists and engineers in pharmaceutical development and manufacturing of LA formulations. The initiative is leveraged by fusing the capabilities of four significant international academic and industrial centres (University of Limerick (UL), Trinity College Dublin (TCD), Technische Universität Dortmund (TUD) and Janssen Pharmaceutica (Janssen)) with specific expertise in crystallisation, solution behaviour, modelling, solvent switching, pharmacokinetics and formulation.

All Ireland Thesis Symposium

Gráinne Smith Muldowney and Eoin Horgan, current Y5 B.Arch. students at SAUL presented their architecture thesis work in progress to two hundred students of architecture from a number of Irish schools of architecture at the All Ireland Thesis Symposium held at Linenhall campus of Technical University Dublin on Thursday 24th January 2019. Dr. Anna Ryan of SAUL participated in a panel discussion at this Symposium on Thesis in Architecture along with faculty from UCD, TU Dublin, and WIT.

Project tested on a microgravity flight

A group of secondary school students investigating ways of growing crops in space are to have their project tested on a microgravity flight. The team from Skerries Community College in Dublin will be the first ever Irish teenagers selected for the flight due to a unique partnership between the Irish Composites Centre (IComp) at University of Limerick's Bernal Institute and Project PoSSUM (Polar Suborbital Science in the Upper Mesosphere). Students were asked to design an experiment for testing on a parabolic flight and the Skerries team hope to address some of the challenges associated with developing sustainable sources of food for long term space exploration. PoSSUM will fly a number of microgravity flights in Ottawa, Canada at the National Research Council (NRC) that will include a number of different experiments, including the Irish one. The initiative was led by Dr Norah Patten, Project Manager at IComp, who said: "This is an opportunity for students to develop skills in STEM, teamwork, research and creativity – all of which are skills that are required throughout our careers. And what better place to develop these skills than a microgravity flight opportunity.

The October flight itself is planned for 18 parabolas, a curved flight path which provides researchers with an opportunity to test an experiment for 15-20 seconds in microgravity. The team will now work with experts at IComp and UL's Bernal Institute to prepare the experiment for the October flight. This opportunity was made possible thanks to the sponsorship received through IComp, The Bernal Institute, Varicomp and The Faculty of Science and Engineering at UL.

SAUL Student Study Trips

Y1 Study Trip : Dublin : February 2019.

Over the course of three days Y1 students were introduced to a range of public spaces and private rooms distributed throughout the centre of Dublin. Though the overall bias was toward the study of domestic space and collective housing we also had an opportunity to visit (and in some cases revisit) some of our outstanding modern and historic buildings. These gems were threaded by a walking tour under unseasonably blue skies, through Georgian, Victorian and contemporary streets and squares that demonstrated vividly the best qualities of Irish Architecture. As ever the community of local architects were generous with their time and opened doors locally to the enduring benefit of the class, seeding much and varied inspiration for the remainder of the academic year and beyond.

Y2 Study Trip to London March 2019

The general policy of outreach at SAUL, of empowering architecture students as agents of change in the world, was continued in the spring semester of 2019 with a focus on one of the most pressing issues of our time - housing. A trip to London was organised to visit and record the prime examples of housing types in the post-war reconstruction of Camden Town, with the help of historian and critic Irénée Scalbert. In a packed schedule lasting three days, the students researched a lot of examples of public sector housing, but also visited the upmarket new private sector development zone at King's Cross, which is nearing completion. Two very different scales, very different contexts – yet, remarkably, they are directly comparable in the application of universal architectural principles – shelter, space, ground treatment – in short, design for people.

Curator Shumi Bose of Central St. Martin's, University of the Arts London, presenting her social housing exhibition "A Home for All" at the V & A Museum to our SAUL students

The trip included a presentation from curator Shumi Bose of her social housing exhibition "A Home for All" at the Victoria and Albert Museum, as well as visits to landmark housing projects by Erno Goldfinger, Neave Brown, Wells Coates and Benson Forsyth. A stop by the Drawing Matter symposium at the "Alternative Histories" exhibition in Cork Street, featuring work by our own Noreile Breen, was a good way to close out a fascinating study trip.

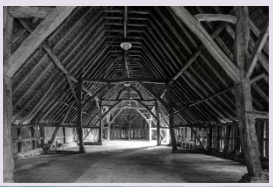
SAUL Year 3 Study Trip Paris / Amiens / Beauvais : 10th – 15th February '19

The Gothic cathedrals Y3 visited in St. Denis, Paris, Amiens and Beavais can be taken in almost in their entirety from a single vantage point – this is simple, however in every other way, these are incredibly complex and beguiling buildings. These cathedrals can appear both regular and irregular (to the eye) their constant adjustment throughout construction and over time only becomes apparent through careful observation through drawing. Through a process of drawing Y3 were able to discover some of the complexities; drawing the plan; drawing the bays; measuring the dimensions with their bodies; learning the proportions; figuring out the height and width of the nave; the number of bays; the rhythm of the arches; how load paths work in the arches; how lateral load is distributed and its implication on the section; what is the fundamental difference between the inside and the outside of the building;

Y4/Y5 Timber Technology Elective Study Trip to Littlebourne, Kent, UK: Jan.20-22 2019

This timber technology elective study trip set out to carry out a full exploration of Littlebourne Barn in England as well as a detailed in-situ study of joints and construction logic through drawings and models in order to represent three interdependent interests: representing the system, representing the nature of the tree and lastly representing time. The ingenious medieval joinery techniques and the resolution of structural load paths distinguish this aisle barn where nature meets geometry and connects wood through complex and self-sustaining joints.

During our study trip some technological issues immediately became evident: a barn, maintained over such a long period of time, is therefore imminently maintainable; a barn is technically complex, but legible, even today, and it is neither simple nor facile. The modesty surrounding the upkeep of the barn is also evident - considerable improvisation is visible, as are instances of redundancy, wear and incompleteness.



Meeting Royalties and the President

On the 23th May, Ass Professor Elizabeth Hatz of SAUL, School of Architecture at UL, attended a reception with the King of Sweden Carl XVI Gustav and Queen Silvia at the The Stephen's Green Hibernian Club during their State visit to Ireland. She also attended the dinner at Trinity College, the same evening, in honour of President Michael D Higgins. Professor Hatz exchanged a few words with Her Majesty the Queen about the work at SAUL in Limerick, and likewise with President Michael D Higgins.

Fulbright Irish Scholarship 2020

PhD student Oisín Kavanagh has been awarded a Fulbright Irish Scholarship to study at the University of Michigan. There he will continue his research in crystal engineering to unlock the potential of new and old medicines in novel therapeutic contexts under the supervision of Professor of Pharmaceutical Sciences, Nair Rodriguez-Hornedo. Oisín will start his research at the University of Michigan in January 2020, he is currently based at SSPC and the Department of Chemical Sciences under the supervision of Prof. Gavin Walker and Denise Croker.

2019 Island Dynamics 'Darkness' Conference

Claire Downey, a SAUL PhD candidate, presented a paper at the 2019 Island Dynamics 'Darkness' Conference, which took place in Longyearbyen, Svalbard, from 14 to 16 January. Approximately 100 presenters were on hand for the three-day conference, which looked at the implications of darkness in cultural, architectural, media and environmental studies, including the growing academic research surrounding urban night studies. Ms. Downey presented a paper entitled 'Shades of darkness and discontinuity at the heart of the City of Lights,' as well as chairing a panel (Artic Darkness in Literature and the Arts) on 15 January.

Dates for your Diary

Autumn Conferring	26th – 30th August 2019
Orientation	2nd – 6th September 2019
Autumn Semester	9th September – 17th December 2019
UL Open Days	17th and 18th October 2019
Science Week	9th – 16th November 2019
S&E Faculty Board	23rd October 2019 4th December 2019
Winter Exam Board	5th December 2019
Graduate Career Information Evenings	24th October: LM124/LM125 31st October: LM099/LM076 14th November: LM123/LM068/LM093

Bereavements

The Faculty extends its deepest sympathies to the following:

Dr Andrew Niven, School of Engineering, on the death of his mother-in-law Mrs Vera Coughlan.

Mr. Noel Guinane, School of Architecture, on the death of his brother Mr Patrick Guinane.

Ms. Gemma Swift, CSIS Department, on the death of her father Mr. Gerard Ryan.

Mr. Anthony Rynne, School of Engineering, on the death of his father Mr. Thomas Rynne.

Prof Michael Quilligan, School of Engineering, on the death of his father Mr. Patrick Quilligan.

The family of Mr Pat McNamara (retired) formerly from the Department of Materials Science and Technology.

Ms. Jackie Kennedy, Dept. of Biological Sciences, on the death of her mother Mrs Anna Kennedy.

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