UCD
STEM
RESEARCH DAY

The event aims to bring a diverse group of faculty and research staff (Postdoctoral and Research Fellows) together and encourage new cross-School and cross-College collaborations. We hope that colleagues from right across UCD will join us for this event and that fruitful interactions can take place during networking sessions.

Importantly, the organising Colleges are providing substantial College STEM-Funding to support research activities arising from this Research Day. The hope is that these interactions will lead to world-class research outputs and joint funding applications, and enable research ideas to reach their full potential.

Vice Principals for Research, Innovation and Impact

Lorraine Brennan
VPRII College of
Health and Agricultural
Sciences

Elaine O'Reilly
VPRII College of
Science

Aoife Gowen
VPRII College of
Engineering and
Architecture

09:00- 09:30	Arrival & Registration				
09:30-09:45	Welcome Remarks & Opening Address				

09:45- 10:45	**Session 1** Flash Talks Chair: Aoife Gowen	1	Assoc. Prof. Vikram Pakrashi	School of Mechanical and Materials Engineering	🟡
		2	Ms. Uxia Yanezrami	School of Veterinary Medicine	🔵
		3	Dr Usman Safder	School of Chemical and Bioprocess Engineering	🟡
		4	Ms. Soukaina Barroug	School of Biosystems and Food Engineering	🟡
		5	Ms. Sonia Soubam	School of Biosystems and Food Engineering	🟡
		6	Asst. Prof. Simone Marcone	School of Biology and Environmental Science	🟠
		7	Assoc. Prof. Brian O'Donoghue	School of Medicine	🔵
		8	Assoc. Prof. Liliana Pasquale	School of Computer Science	🟠
		9	Assoc. Prof. Daniel McCrum	School of Civil Engineering	🟡
		10	Asst. Prof. Soumyabrata Dev	School of Computer Science	🟠

10:45- 11:30	Morning Break & Networking				

11:30- 13:00	**Session 2** Flash Talks Chair: Elaine O'Reilly	11	Dr Sofia Javerfelt	School of Medicine	🔵
		12	Asst. Prof. Peter Byrne	School of Chemistry	🟠
		13	Asst. Prof. Michelle Carey	School of Mathematics and Statistics	🟠
		14	Assoc. Prof. Kieran Meade	School of Agriculture and Food Science	🔵
		15	Dr Nakisa Soltani	School of Biosystems and Food Engineering	🟡
		16	Dr Julie Worrell	School of Medicine	🔵
		17	Asst. Prof. Gary Brennan	School of Biomolecular and Biomedical Science	🟠
		18	Dr Raghu Krishnamoorthy	School of Chemical and Bioprocess Engineering	🟡
		19	Asst. Prof. Jufan Zhang	School of Mechanical and Materials Engineering	🟡
		20	Dr Sara Cardoso Esteves	School of Biosystems and Food Engineering	🟡
		21	Dr Carl Tolentino	School of Computer Science	🟠
		22	Asst. Prof. Fatemeh Golpayegani	School of Computer Science	🟠
		23	Asst. Prof. Fengnan Gao	School of Mathematics and Statistics	🟠
		24	Assoc. Prof. Junli Xu	School of Biosystems and Food Engineering	🟡
		25	Asst. Prof. Donal Holland	School of Mechanical and Materials Engineering	🟡
		26	Dr Ashish Neve	School of Medicine	🔵

13:00-14.15	Lunch Break and Networking				

14:15- 15:15	**Session 3** Flash Talks Chair: Lorraine Brennan	27	Asst. Prof. Olayinka Aremu	School of Nursing, Midwifery and Health Systems	🔵
		28	Assoc. Prof. Miguel Bustamante	School of Mathematics and Statistics	🟠
		29	Dr Ibrahim Khalil	School of Agriculture and Food Science	🔵
		30	Dr Beatriz Lopes	School of Biosystems and Food Engineering	🟡
		31	Asst. Prof. Chris Howland	School of Mathematics and Statistics	🟠
		32	Asst. Prof. Muhammad Gulzari	School of Civil Engineering	🟡
		33	Dr Qasim Khan	School of Civil Engineering	🟡
		34	Asst. Prof. Colm Collins	School of Biomolecular and Biomedical Science	🟠
		35	Dr Mary Ajide	School of Chemical and Bioprocess Engineering	🟡
		36	Asst. Prof. Adam Kane	School of Biology and Environmental Science	🟠
		37	Dr Illia Diahovchenko	School of Electrical and Electronic Engineering	🟡

15:15- 15:45	Afternoon Break & Networking				

15.45- 16:15	**Previous STEM Challenge Awardees**	1	Asst. Prof. Eoin Brennan	School of Medicine	🔵
		2	Asst. Prof. Daniela Boehm	School of Chemical and Bioprocess Engineering	🟡
		3	Asst. Prof. Joseph Byrne	School of Chemistry	🟠

16:15- 16:30	Announcement of STEM Challenge Funding Call 2025				

🟡 College of Engineering and Architecture   🔵 College of Health and Agricultural Sciences   🟠 College of Science

Research Challenge /
Expertise Required

Assoc. Prof. Vikram Pakrashi

School of Mechanical and Materials Engineering

Aran Island Research Station (AIRS)

AIRS is located on the west coast of Ireland and equipped with meteorological, geophysical, engineering & oceanographic measurement instruments, along with foreshore license. It has facilitated fundamental data collection and high impact STEM research, fostering close collaborations beyond disciplinary boundaries. It has also been a hub of engaged social research & training. We aim to strategically expand its activities via a medium term, sustainable plan and make it a world-class facility. We want to hear from researchers with existing projects/those interested in AIRS for research/training.

Ms. Uxia Yanezramil

School of Veterinary Medicine

Developing a synthetic uterine microbiome to treat reproductive tract inflammatory disease in dairy cattle

We seek to initiate collaborations with research groups with expertise in microbiology and bioengineering. Our aim is to develop a synthetic uterine microbiome as an alternative to antibiotic treatment for reproductive disease in dairy cows. We will identify the core uterine microbiome in silico from healthy dairy cows pregnant after first artificial insemination. Using samples from the same animals, we will isolate and culture the identified bacterial species to investigate their functional capacities, community dynamics, and interactions with endometrial cells. Samples are already available.

Dr Usman Safder

School of Chemical and Bioprocess Engineering

Designing Energy Self-Sufficient, Carbon-Neutral Wastewater Resource Recovery Facilities in Ireland

This project aims to optimize energy efficiency in wastewater resource recovery facilities by integrating renewable energy sources, including biogas, wind turbines, and membrane-based power generation technology. We are looking to collaborate with expertise in offshore wind turbine design to help refine the integration of offshore wind in the proposed system configurations. Our aim is to demonstrate the proof-of-concept methodology, publish, and through collaborative efforts, secure joint funding to scale and expand the project.

Ms. Soukaina Barroug

School of Biosystems and Food Engineering

Developing a 3D orthopaedic infection model and introducing cold plasma technology and antibiotics for treatments

We are looking for an advance approach to image the infection establishment, the interaction of bacterial cells with different treatments (cold plasma and antibiotics), and identify the mechanism of action associated with cell inactivation.

Ms. Sonia Soubam

School of Biosystems and Food Engineering

Handlebar-Integrated EDA Logger for Large-Scale Mapping of Cyclist Stress Hotspots

Ongoing pilot with wearables and GoPro explores if synced electrodermal activity (EDA) + GPS can pinpoint cycling stress hotspots, but the €2k multi-device rig—and its charging burden—blocks scale-up. We are building a single USB-powered logger (BOM < €200) embedding EDA electrodes in handlebar grips and fusing IMU, GPS and optional video. The module can be mounted to any bike to create city-wide "stress maps" for safer infrastructure. Seeking collaborators in (1) product/industrial design for ergonomic grips and (2) materials science for durable and effective conductive surfaces.

Asst. Prof. Simone Marcone

School of Biology and Environmental Science

Seeking Collaborators to Tackle Obesity-Associated Cancer Risk in Barrett's Oesophagus

We aim to understand how obesity-driven inflammation and metabolic dysfunction promote Barrett's oesophagus progression to oesophageal cancer. Our translational project evaluates a novel anti-inflammatory drug (Q8), alone and combined with liraglutide/statins, using human explants and animal models. We seek expertise in bioengineering, nanomedicine, or imaging technologies to help develop non-invasive diagnostics and enhance drug delivery strategies to Barrett's tissue. We are also interested in collaborating on biomarker discovery and AI-driven analysis to support clinical stratification.

Research Challenge /
Expertise Required

Assoc. Prof. Brian O'Donoghue

School of Medicine

Prevention of antipsychotic induced weight gain for people affected by psychotic disorders

Psychotic disorders, such as schizophrenia, are severe mental health disorders and affected individuals have a reduced life expectancy of at least 15 years. The majority of these early deaths are due to cardiovascular disease and there are higher rates of obesity, smoking and sedentary behaviours in this population. Antipsychotic medications, the first line treatment, can cause significant weight gain and contributes to this cardiovascular risk. We are looking at ways to prevent this weight gain and other metabolic complications from the antipsychotic medications.

Assoc. Prof. Liliana Pasquale

School of Computer Science

Building Secure Systems Once and For All" Expertise in Applied Psychology and Engineering

Building secure systems not only requires expertise in cybersecurity and AI but also in related disciplines such as applied psychology and engineering. Applied psychology helps design user-friendly interfaces, reducing errors that could compromise security, while engineering allows creating an understanding of the infrastructure where these systems will be deployed to ensure that the system is adaptable and resilient. Combining these fields results in systems that are both secure and usable, reducing vulnerabilities and ensuring sustainability.

Assoc. Prof. Daniel McCrum

School of Civil Engineering

AI for the certification of innovative construction products

The current approach to certify innovative/new construction products is time consuming (up to 2 years) and costly. Certification is required for new products and building systems in construction in order to demonstrate the product or building system complies with the Irish building regulations for structure, fire, durability, thermal performance, etc. A step change is needed to accelerate the certification process, reduce cost and bring more sustainable products/systems to market to help us meet our sustainability goals.

Asst. Prof. Soumyabrata Dev

School of Computer Science

Bridging AI and Environmental Science for Next-Generation Solar Energy Forecasting

Solar energy forecasting bridges computer science and environmental science. My research develops AI models using remote sensing and meteorological data to predict solar irradiance. I seek complementary expertise in atmospheric science, meteorology, and renewable energy to integrate physical models, improve data interpretation, and validate forecasts. Together, we aim to create next-generation forecasting systems that enhance grid stability, support smarter energy management, and accelerate the transition to sustainable energy futures.

Dr Sofia Javerfelt

School of Medicine

Labelling of mucins in biological samples

Mucins are large, hydrated and heavily glycosylated proteins. Due to their inherent properties, they are difficult to isolate, detect and label in biological samples. Current detection methods rely on composite gels that are complicated to make and mass spectrometry that suffer from limited coverage of the mucin domain. Labelling of mucins relies on lectins with broad binding specificity, or in vivo labelling of sugar residues by biorthogonal labelling coupled to click-chemistry. However, specific labelling of mucins in vivo and ex vivo still remains a challenge.

Asst. Prof. P Byrne, Asst. Prof. R Jones, Asst. Prof. R Halim

School of Chemistry

Minimising and Recycling Waste in Pharmaceutical Synthesis

"We are developing methodology to enable pharmaceutical synthesis with minimal waste. We seek collaborators that can assist in:

1. Quantification of waste generation and life cycle analyses.
2. Development of ""green"" methods for regenerating our phosphorus-based reactants from our reaction by-products, e.g., using enzymes.
3. Immobilisation of the phosphorus reagent to aid separation.

More generally, we aim to turn our by-products into other useful compounds, and hence seek collaborators interested in turning waste into a resource and in applications of phosphorus-containing materials."

Research Challenge /
Expertise Required

Asst. Prof. Michelle Carey

School of Mathematics and Statistics

Call for Biological Expertise: Interpreting Gene Expression Insights from AI and Mathematical Models

Our team develops advanced mathematical and AI-based tools to analyse gentic data, including microarray, RNA-Seq, and single-cell datasets. These tools enable us to identify sets of significantly differentially expressed genes between experimental conditions such as healthy and diseased states. However, our current expertise does not extend to the biological interpretation of these gene lists. We are therefore seeking collaborators with a strong background in molecular biology, genomics, or related fields to help contextualise our results, and advance the biological relevance of our findings.

Asst. Prof. Kieran Meade

School of Agriculture and Food Science

To identify bovine host defence peptides effective against Mycoplasma (& other bacteria/viruses/yeasts)

We are looking for a collaborator in microbiology, and preferably with experience of mycoplasma to develop reliable in vitro antimicrobial assays to assess host defence peptide activity. We also seek guidance on optimal expression systems for same (preferably in eukaryotic cells). Our goal is to demonstrate the proof-of-concept methodology, publish our collaborative work and apply for joint funding to expand the project.

Dr Nakisa Soltani

School of Biosystems and Food Engineering

Personalised exercise plans for obesity guided by real-time cytokine profiling via wearable biosensors

With experience as an athlete, Nakisa applies elite performance-enhancing training strategies to address societal issues like obesity. At UCD, she works with Dr. Anna Molter and Prof. Brian Caulfield to investigate stress in cyclists using wearables. While exercise physiology highlights individual differences as a core principle in planning, interventions lack personalisation in obesity. Monitoring inflammatory profiles via sensor arrays offers a novel solution. She seeks expertise in biomaterials engineering to prototype a wearable and build a foundation for grant applications for postdocs.

Dr Julie Worrell

School of Medicine

To develop a bioprinted substrate that models the topography of the fibrotic lung

Idiopathic pulmonary fibrosis is a rare, progressive, and fatal lung disease with limited treatments. Current therapies may slow decline but can't reverse progression, highlighting a key unmet need. In vitro lung modelling is challenging due to complex architecture and microenvironment. Recreating these features is essential to improve understanding, advance therapies, and reduce animal use. We seek a collaborator in bioprinting/tissue engineering to model the lung microenvironment and build a proof-of-concept platform for future funding.

Asst. Prof. Gary Brennan

School of Biomolecular and Biomedical Science

Decoding the Shift to Seizure: EEG-Based Prediction of Chemogenetic-On Demand Seizure Induction

We're seeking a collaborator with expertise in computational analysis, machine learning, or AI to help us analyse EEG recordings from mice undergoing chemogenetically-induced seizures. Our aim is to identify subtle EEG changes that reliably predict the transition into a seizure (ictogenesis). This will enable precise molecular profiling of the pre-seizure state, with the ultimate goal of uncovering the mechanisms that drive spontaneous seizure development.

Dr Raghu Krishnamoorthy

School of Chemical and Bioprocess Engineering

Scale-down bioseparation techniques for natural food products

The proposed challenge is to develop optimized bioprocesses to achieve good health and well-being using plant-based foods alternatives. The aim is to investigate novel processing routes for high-value food pigments with anti-inflammatory properties. An in-depth pre-clinical evaluation on its ability to potentially lower the prevalence of severe heart conditions is required. Specific designs leading to both pre-clinical and clinical studies are envisaged to demonstrate the utility of these food products to improve human cardiovascular health. We are looking to collaborate with health researchers who have interests in protein engineering and have closely worked with cardiologists for transformative healthcare applications.

Research Challenge /
Expertise Required

Asst. Prof. Jufan Zhang

School of Mechanical and Materials Engineering

AI-driven large-volume data processing for in-vitro diagnostics

We generate a large volume of data from in-vitro diagnostics experiments, including DNA sequencing, virus infection identification, and cancer diagnosis. We seek a collaborator with expertise in AI-driven data processing to efficiently detect anomalies within complex datasets. Our goal is to develop an integrated hardware-software solution to advance medical practice, publish our collaborative research, and secure joint funding to expand the project.

Dr Sara Cardoso Esteves

School of Biosystems and Food Engineering

Effect of lipid composition changes in the oleaginous Nannochloropsis in inflammation resolution

Preliminary tests suggest that lipid extracts from Nannochloropsis exhibit anti-inflammatory properties. As lipid extract composition changes during growth, and we aim to optimize culture conditions for maximum anti-inflammatory activity, potentially leading to novel bioactive compounds with therapeutic potential. We seek a partner in the area of metabolomics to track lipid changes and identify interacting metabolites, and another working on inflammation to test the lipids in other models, expanding the knowledge on the properties of these extracts, and to publish the findings.

Dr Carl Tolentino

School of Computer Science

HearAI: Hearing Enhancements using Augmented Reality and AI

I am a MSCA postdoctoral fellow working on a project to improve the listening experiences of people with hearing impairments. I am using augmented reality (AR) to analyse live music performances and adapt them based on listener needs and preferences. I am eager to collaborate with health experts and AR developers to discuss how the system can effectively benefit the hard-of-hearing community. In the future, my colleagues and I aim to submit a consortium proposal to tackle this challenge in different contexts, e.g. conversational speech in a cocktail party.
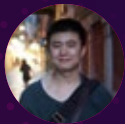
Asst. Prof. Fengnan Gao

School of Mathematics and Statistics

Two-sample testing and changepoint detection in high-dimensional linear regression

Together with T. Wang (LSE), we discovered a novel and computationally attractive way to statistically distinguish two-samples apart. Say, you have two populations, and our methods can distinguish (optimally) if the two samples follow different mechanisms (under the assumption that the relation of interest can be described as linear regression). Furthermore, our methods can estimate where the change in relations (described by high-dimensional regression) take place, assuming the relation of interest experienced a sudden change (i.e. genetic mutation in population, climate catastrophe).

Assoc. Prof. Junli Xu

School of Biosystems and Food Engineering

Uncovering the human health impact of micro(nano)plastics

We are seeking collaborators with expertise in clinical studies, in vitro human blood models, and non-mammalian animal testing models. Our primary objective is to investigate and elucidate the human health impacts of micro- and nanoplastics. Through this collaboration, we aim to generate preliminary data, publish our collective findings, and apply for joint funding opportunities to expand and further develop the project.

Asst. Prof. Donal Holland

School of Mechanical and Materials Engineering

A statistical shape model of the back, buttocks, and thigh for improved wheelchair seating design

We are seeking collaborators from two domains: statistical shape analysis and modelling; and medical imaging. Our goal is to develop a statistical shape model of the seated human body based on imaging data, for use in biomechanical simulations. This work is part of a collaboration with Enable Ireland SeatTech to reduce the risk of pressure injuries for wheelchair users by optimising the design of custom-contoured seating. We aim to create a proof-of-concept model that could be publishable in its own right, and will support a joint funding application on this topic.

Research Challenge /
Expertise Required

Dr Ashish Neve
School of Medicine

Precision targeting of XBP1s: a selective intervention to modulate pro-survival IRE1 activity

We are seeking collaborators with expertise in structural biochemistry, RNA-protein interactions, or drug discovery to develop a selective strategy to inhibit the IRE1-generated transcription factor XBP1s. Existing RNase inhibitors of IRE1 suppress both functions of IRE1α (XBP1s formation and RIDD). Our aim is to explore the structural features specific to XBP1s and develop small molecules or biologics that selectively inhibit XBP1s activity. This approach offers a novel way to inhibit the IRE1–XBP1s axis, with potential therapeutic applications across multiple disease contexts.

Asst. Prof. Olayinka Aremu
School of Nursing, Midwifery and Health Systems

Enhancing IENs' competency through simulation-based training to improve integration into Irish healthcare

The project aims to address the integration challenges faced by Internationally Educated Nurses (IENs) in Ireland. Through a simulation-based training program, it seeks to enhance IENs' clinical, communication, and decision-making skills. This initiative will improve IENs' professional competency, support NMBI registration preparation, and ultimately contribute to tackling Ireland's nursing workforce shortages by ensuring a smoother transition for internationally educated nurses into the Irish healthcare system.

Assoc. Prof. Miguel Bustamante
School of Mathematics and Statistics

Collaborations in Fluid Dynamics

We are organising the prestigious European Fluid Dynamics Conference (efdc2.com, UCD, 26-29 August 2025), with over 1,100 abstracts accepted worldwide. Of these, 40 are from Ireland (18 from UCD), placing us within the top 10 countries according to number of talks. In 2025 we earned an IRC New Foundations Award to create a "Fluid Dynamics for Sustainability Network", led by UCD. We propose collaborations in a range of expertise, including: Environmental / Geophysical / Industrial Fluid Dynamics, Multiphase Flows, Wind & Water Power, Fluid-Structure Interaction, Heat Transfer & Phase Change.

Dr Ibrahim Khalil
School of Agriculture and Food Science

Development and Integration of a Hydrological Module for HOLOS-IE

We seek a collaborator to develop a hydrological module for HOLOS-IE, an agricultural system digital platform enhancing low-carbon farming. Reviewing models, utilising databases, and monitoring landscape-level nutrients, water, sediment, and pollutants will identify sources and estimate nutrient budgets by comparing inputs and outputs. This will also inform algorithm development and validation for the new module to quantify nutrient losses and assess ecosystem services. The module, coded in C#, will be designed for seamless integration into HOLOS-IE, balancing measurable input requirements.

Dr Beatriz Lopes
School of Biosystems and Food Engineering

Development a 3D-printed cancer model for drug screening

We are looking for collaboration with people with expertise in cell models optimization (3D, co-culture and bioprinting) and cellular analysis for identification of pathways/cellular characteristics affected by the drugs. The main goal is to determine possible target pathways for new treatments, publish the collaboration work and apply to possible funding opportunities.

Asst. Prof. Chris Howland
School of Mathematics and Statistics

High Performance Computing for Fundamental and Applied Mechanics

Recent developments in high performance computing, such as the rollout of large GPU-accelerated clusters, present great opportunities for the efficient simulation and analysis of complex physical systems. At UCD, these also present an opportunity to collaborate on the development of new computational tools that can bring novel insights for fluid and solid mechanics and their applications. I hope to bring together the existing expertise in UCD on high performance computing and theoretical mechanics to drive collaboration in the spirit of open science.

Research Challenge / Expertise Required

Dr Qasim Khan
School of Civil Engineering

Integrating climate data with geophysical measurements for railway embankment condition monitoring

We are developing a framework to assess the condition of railway embankments by integrating climatic data, distributed acoustic sensing (DAS)-based geophysics, and laboratory geotechnical testing. We are seeking collaborators with expertise in climate science and geophysical data interpretation to co-develop approaches for combining these diverse datasets. The aim is to improve our understanding of embankment behaviour, support predictive condition monitoring, and ultimately inform more resilient infrastructure maintenance strategies.

Dr Mary Ajide
School of Chemical and Bioprocess Engineering

Predicting Complex Material Behaviours with Advanced Machine Learning and Ab Initio Methods

This research uses DFT and MLFF to predict how defects and doping in hematite and HOPG affect their electronic, structural, and interfacial properties. By efficiently simulating large, water-interfaced systems, we reveal behaviours critical to real-world applications. Expertise in ab initio methods, ML modelling, and HPC is essential. The goal is to accelerate next-generation materials design for AI hardware, catalysis, energy storage, and sustainable technologies by integrating quantum mechanics, machine learning, and materials science.

Asst. Prof. Adam Kane
School of Biology and Environmental Science

Disease and dietary profiling of urban gulls through cloacal swabs

Animal handling required for fitting GPS tags provides a valuable opportunity to collect samples facilitating additional research. We are collecting cloacal swab samples from herring gulls and lesser black-backed gulls and seeking collaborators to assist in screening the collected samples to create disease and diet profiles. This will complement existing collaborations performing dietary analysis and testing specifically for avian influenza. Both factors will also be included in statistical models to assess how disease burden affects gull movement dynamics.

Dr Illia Diahovchenko
School of Electrical and Electronic Engineering

Power Quality Impacts on Electric Energy Metering

We are looking for a collaborator with a background in electrical or electronic engineering and interest in power quality and electricity metering for technical and commercial (billing) purposes. Our goal is to demonstrate the proof-of-concept methodology, publish our collaborative work and apply for joint funding to expand the project.

Asst. Prof. Jessica Whelan
School of Chemical and Bioprocess Engineering

Machine learning supported biopharmaceutical process development

I am interested in collaborating with others in order to explore the opportunities to leverage machine learning to accelerate process development for biopharmaceuticals. I am currently working across a range of modalities: therapeutic proteins, AAVs, MSCs and EVs and a range of process steps: cell expansion and inoculum, production bioreactors, chromatography and filtration. I would like to work with others who expand or strengthen the range of modalities and/or steps or have additional expertise in the areas of machine learning or bioanalytics.

Assoc. Prof. Annetta Zintl
School of Veterinary Medicine

Effects of environmental protection measures on potential disease vectors

We are interested in exploring the effects of environmental measures such as ACRES on the distribution of vectors such as ticks, midges, mosquitoes, their hosts, predators and competitors.

Assoc. Prof. Gavin Stewart
School of Biology & Environmental Science

Gastrointestinal Physiology: request for collaborators to co-supervise funded MSc. projects

My research investigates gastrointestinal membrane transporter proteins in various mammalian species. My lab uses a range of molecular biology techniques including PCR, western blotting, proteomics and immunolocalization. The key focus are the transporters crucial to the symbiotic relationship between mammals and their microbiome. I am looking for collaborators to investigate any gastrointestinal tissues/microbiomes – with the short-term aim of co-supervising MSc summer research projects (where consumable funding is already available).

Research Challenge /
Expertise Required

Assoc. Prof. Madhusanka Liyanage
School of Computer Science

Building Resilient and responsible AI Systems: Towards Automatic and Scalable AI Verification mitigate to Adversarial Threats, Ethics, and Security Challenges

As AI becomes embedded in every critical sectors such as Telecom, healthcare and finance, ensuring security, fairness, and reliability of AI systems is crucial. Current verification methods struggle with scalability, leaving AI models vulnerable to adversarial attacks, bias, and unintended failures. An automated and scalable AI verification framework can provide continuous assessment, vulnerability detection and trust reinforcement in AI-driven system. Moreover, regulatory policies, ethical concerns, and legal accountability must align with verification frameworks to enable responsible AI.

Ms. Urbi Roy
School of Biomolecular and Biomedical Sciences

To develop an in vivo drug delivery system for PAX8 oligoTRAFTACs targeting ovarian cancer cells

We seek a collaborator with expertise in oligonucleotide delivery systems, such as lipid-based nanoparticles and biomimetic peptide systems, to facilitate the adaptation of PAX8 oligoTRAFTACs to in vivo models and improve their bioavailability. The genetic dependency and high expression of PAX8 in HGSOC cells make it an attractive therapeutic target. We have demonstrated proof-of-concept in vitro and now aim to advance these compounds in vivo. We also plan to publish our collaborative work and pursue joint funding to advance the project and enable the clinical translation of the compounds.

Asst. Prof. Anna Molter
School of Architecture, Planning and Environmental Policy+ SBFE

Using the Liquid Galaxy to create a hyper-realistic cycling simulator

We are looking for collaborators with expertise in computer science, HCI or 3D modelling of road environments. Our goal is to set up a cycling simulator that uses the Liquid Galaxy system (https://www.liquidgalaxy.eu/) with Streetview imagery and/or 360 degree camera footage and is connected to a bike on a turbo trainer (similar to this but with cycling: https://tinyurl.com/2p9vaexj). The initial aim would be to develop a prototype and then to apply for joint funding to develop a larger installation that can support multiple use cases.

Asst. Prof. Dearbhaile Dooley
School of Medicine

Human induced pluripotent stem cell (iPSC)-derived CNS organoids as a model to investigate the neuroinflammatory response after spinal cord injury

We are looking for a collaborator with expertise in human iPSC-derived CNS organoids to build on our lab's expertise with mouse CNS organoids, in order to modulate the CNS neuroinflammatory response after trauma. Our goal is to demonstrate proof-of-concept methodology, publish our collaborative work and apply for joint funding to expand the project.

Dr Indrani Bera
School of Medicine

Studies that provide insights to proteolysis in healthy and diseased states

We are looking for a collaborator with access to interesting study design and samples related to healthy and diseased states for proteomic/peptidomic (and maybe metabolomic) analysis. We are particularly interested in proteolytic or other metabolic changes in gut during digestion, and in germinating seeds. Expected output: Collaborative publication | Joint MSc project | Preliminary data for grant application.

Asst. Prof. Michael Fop
School of Mathematics and Statistics

Expertise in innovative statistical and machine learning methods for collaborative data-driven research

My research focuses on developing novel statistical and machine learning methods for analysing complex and high-dimensional data. My work lies at the intersection of methodological statistics, machine learning, and applied data analysis, often driven by interdisciplinary scientific challenges that demand innovative approaches. I specialize in methods designed to uncover hidden patterns in data, particularly clustering, network analysis, and dimension reduction. I am interested in collaborating with colleagues from diverse scientific fields, whose research is motivated by data-driven problems.

Research Challenge /
Expertise Required

Mr Qiancheng Zhang

School of Physics

What Can Collagen's Piezoelectricity Reveal About Health and Aging?

Collagen is the most abundant protein in the human body, and it is piezoelectric - the protein generates an electric charge under mechanical stress. Studying collagen piezoelectricity can lead to biomedical applications. Structural differences in collagen, such as those observed in conditions like osteogenesis imperfecta, significantly influence its mechanical and electromechanical properties. This project involves characterizing the nanoscale piezoresponse of collagen and comparing it across samples sourced from healthy, unhealthy, and aging tissues.

Dr Niraj Khemka

Systems Biology Ireland, School of Medicine

To develop digital twin models using multi-omics data

We are developing digital twin models of neuroblastoma cancer to revamp diagnosis and treatment approaches. Our platform integrates multi-omics data from RNA-seq, proteomics, phospho-proteomics, and metabolomics to gain comprehensive insights into the molecular mechanisms driving this aggressive childhood cancer.

Asst. Prof. Stephen Thorpe

School of Medicine

Understanding the role of metabolism in cellular response to stiff tumour microenvironments

A characteristic of solid tumours is a stiff extracellular stroma or matrix. Cells sense this stiffness and this can drive proliferative and pro-metastatic cell behaviours. It is well established that metabolism changes in tumour cells, and this is thought to be driven by availability of nutrients. We wish to understand whether biomechanical signals such as tissue stiffness and topography can also drive changes in how cancer cells create energy. We are looking for experts in metabolomics and cancer metabolism.

Asst. Prof. Carol Aherne

School of Medicine

Serum binding properties of a GPCR agonist

Our research on intestinal wound healing has demonstrated protective effects of a GPCR agonist. This effect is blunted in assays where serum is present in the media. We are seeking assistance in clarifying the binding properties of the agonist prior to the planned publication of our results.

Asst. Prof. Martina Wallace

School of Agriculture and Food Science

Development of methods to study the impact of mechanical cues on metabolic flux in myofibroblasts

Substrate stiffness promotes myofibroblast activation, a key event in fibrosis that involves metabolic changes. However, quantitative data on how mechanical cues affect metabolic flux are limited. This challenge seeks expertise in testing the impact of mechanical cues on cell function to complement my own expertise in assessing metabolic flux.

Dr Charlene Vance

School of Chemical and Bioprocess Engineering

Modelling Irish electricity and gas demand by 2050: transport expertise needed

We are looking for a collaborator who could advise on realistic electric vehicle uptake scenarios and projected charging profiles for a project assessing the feasibility of decarbonizing the Irish electricity and gas sectors by 2050. Expected outputs of this collaboration include scientific publication, workshop presentation, and contribution to road mapping activities within the NexSys Programme (https://www.nexsys-energy.ie/).

Prof. Brian Rodriguez

School of Physics

Seeking functional materials for nanocharacterization

Are you developing materials to solve energy-related challenges? Do you require nanoscale electrical or mechanical characterization to advance your research on materials for energy conversion (e.g., solar cells, piezo/pyroelectrics, catalysts) and storage (e.g., battery electrodes, supercapacitors)? Let's collaborate to accelerate your materials development!

Research Challenge /
Expertise Required

Asst. Prof. Emma Feeney

School of Agriculture and Food Science

Taste receptors in the gut - what is their role, and does genetic variation affect metabolic response to foods?

We study genetic differences in taste receptor cells (TRCs) and how these can affect perception of individual foods/ tastants, using psychophysical methods. While oral taste receptors have been a focus, TRCs are found throughout the body, with multiple, unknown roles. This challenge will explore TRCs in the gut and beyond, to understand how gene variants affect metabolic response to nutrients, with the potential for personalised nutrition applications. We welcome any collaborations or expertise related to this topic, including: cell/animal/ human models of gene variants /clinical gut biopsy.

Assoc. Prof. Tadhg Ó'Cróinín

School of Biomolecular and Biomedical Science

Using new technologies to study biofilms by bacterial pathogens on medical devices or other surfaces

I'm interested in developing collaborations with other researchers interested in studying biofilm formation by bacterial pathogens on medical devices. Either through new imaging technologies to study these biofilms or through new coatings which might prevent biofilm formation. I have expertise and recently published on biofilm formation by bacterial pathogens on medical devices as well as biofilm formation by food-borne pathogens.

Asst. Prof. Joseph Byrne

School of Chemistry

Pathogens with carbohydrate-binding proteins as targets for sugar-containing metallodrugs

With the aim of developing new therapies or diagnostic tools for bacterial and fungal infections, my group build sugar-functionalised metal complexes. We have shown these can target carbohydrate-binding proteins in P. aeruginosa and C. albicans to inhibit adhesion or sense proteins. I am seeking new collaborators in human or animal health with expertise in any organism or disease which could exploit our molecules for further impact, or with whom we could tailor new drug candidates or functional materials. I am also interested in UCD colleagues with whom toxicity for these can be determined.

Asst. Prof. Mario Manresa

School of Biomolecular and Biomedical Science

Immune roles of stromal cells

We study the immune-related functions of stromal cells, particularly in the digestive system. We would be interested in building collaborations to: A) Deliver 3D platforms for the study of cell-cell interactions; B) Expand our studies to ex vivo clinical samples.

Asst. Prof. Ivan Lokmer

School of Earth Sciences

Development of pseudo-analytical method for simulating rotational seismic ground motion in heterogeneous media (applied mathematics)

This project aims to develop a pseudo-analytical mathematical scheme tailored for simulating rotational ground motion in heterogeneous media in a computationally efficient manner. If successful, it would facilitate advancement of our understanding of the impact of seismic ground rotations on engineering structures. It's quite novel and neglected area of geohazards, due to the poor availability of rotational instruments.

Dr Sewon Lee

School of Public Health, Physiotherapy and Sports Science

Development of tools and methodologies for combined exposure pattern of hazardous chemicals in consumer products

People use consumer products such as cleaning and personal care products in daily lives. These products contained various chemicals and exposure to some chemicals is associated with adverse health effects. However, patterns of consumer product use and chemicals in the products have not been well studied. To overcome these gaps, I am planning to 1) develop tools to collect daily consumer product and chemical information, 2) analyse individual's chemical exposure patterns.

Mr Uche Mbaka

School of Mathematics and Statistics

Functional Data Analysis for Longitudinal and Sensor Data

Our research focuses on Functional Data Analysis (FDA) for longitudinal data, including complex sensor outputs. We address challenges such as sparse functional observations by developing more accurate techniques for estimating functional principal component analysis (FPCA), and have extended these techniques to multivariate FPCA. We seek collaborations to apply these methods to data from wearables, health monitoring, environmental sensors, and more. By applying and refining our methods, and combining them with methodologies in FDA and domain expertise, we aim to extract meaningful patterns.

Research Challenge / Expertise Required

Mr. Anupa de Silva

School of Computer Science

To develop remuneration mechanism for inter-satellite communications

We are seeking expertise in satellite communications engineering to develop a standardized remuneration mechanism for inter-satellite communications using blockchain technology. This initiative aims to ensure equitable, transparent, and efficient cost-sharing among satellite operators. With the rising demand for data relay and space-based networking, it is crucial to establish a framework that compensates service providers for bandwidth usage, data relay, and network access. Our objective is to demonstrate a proof-of-concept methodology and publish our collaborative research.

Assoc. Prof. Lennon Ó Náraigh

School of Mathematics and Statistics

Mathematical Modelling of Disease Spread

As an applied mathematician specializing in modelling and computation, I am seeking a collaboration with scientists studying the dynamics of infectious disease outbreaks. I would like to use existing mathematical models, and combine them with real-world data to improve their predictive power and inform control strategies. I am especially interested in partnering with researchers who have access to epidemiological data and field insights, with the main aim being to enhance understanding of disease spread, and support evidence-based interventions in animal health and biosecurity.

Asst. Prof. Alison Reynolds

School of Veterinary Medicine

To use AI to develop better small molecule drugs for dry eye disease

We are seeking a collaborator with expertise in chemistry and/or chemistry AI tools to collaborate on a project developing novel small molecule drugs for dry eye disease. Our goal is to use data gathered from empirically tested compounds as an initial AI dataset to perform medicinal chemistry, predict molecular properties/interactions and design new safer and more efficacious therapies. New compounds will be synthesised and tested for safety in zebrafish and for efficacy in in vitro models of dry eye disease. We will publish our work and apply for follow-on funding including a co-supervised PhD student.

Prof. Virginie Gautier & Dr. Tristan Russell

School of Medicine

Pathogen Discovery Using Viral Metagenomics for Global Health Challenges

CEPHR untargeted metagenomics Next Generation Sequencing (mNGS) workflow enables the identification and phylogenetic characterisation of pathogenic, zoonotic and novel viruses across diverse sample matrices including tissues, fluids and swabs. Currently used for pathogen discovery in infectious diseases of unknown aetiology, collaborating with computer scientists, ecologists and veterinarians on One Health themed projects would complement our molecular virology experience to increase the pipeline applications. Integrating expertise in animal movement, interactions, behaviour and health will enhance epidemiological insights while bioinformatic analyses of genetic data can predict protein structure and viral properties providing valuable outputs for diagnostics and research.

Assoc. Prof. Zarah Korb

School of Mechanical and Materials Engineering

To develop a computational model of cell-matrix interactions to optimise culture matrix design

We are looking for a collaborator with expertise in discrete element modelling to help us model how the viscoelastic properties of synthetic extracellular matrices influence cell mechanics. We have extensive microscale and bulk viscoelastic property data from newly designed stimuli-responsive culture matrices, alongside cell lineage and proteomics data from organoids cultured within these matrices. Our goal is to computationally explore linkages between viscoelastic properties and cell differentiation in multi-cellular structures and use these models to refine future material design campaigns. We aim to publish this collaborative work and use it as a basis to apply for further joint funding.