

Daniel Riordan

Sensing Systems

Munster Technological University

Head of Department - Technology, Engineering & Mathematics

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Expertise

- Development and deployment of sensors systems (electronics and software)
- Data amalgamation and analytics
- Autonomous agricultural systems
- Digital signal processing
- Vision systems

Research focus in VistaMilk

Development and deployment of sensors systems and process automation systems for application within the dairy sector (electronics and software)

Research outcomes

- PhD supervision leading to novel inventions; automated animal health monitoring, machine monitoring & autonomous agri-vehicles navigation
- 4 Invention Disclosure Forms and 2 Patents filed (EP4018362A2 & DE102015101508 - Both licenced to industrial Partners)
- Development & deployment of sensor systems in agriculture; water quality, machine monitoring, animal monitoring (on & off animal), animal housing monitoring, soil health/composition



Han Shao

Electrochemistry

Tyndall National Institute, University College Cork

Researcher

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Expertise

- Nanomaterial development
- Electrochemical sensor fabrication and characterisation
- Analytical chemistry

Research focus in VistaMilk

Develop multi-function sensors to provide real time data on nutrients monitoring in both soil and slurry to enable reducing fertiliser usage and efficiently utilising slurry to increase farmer income and mitigate environmental risks

Research outcomes

- Soil sensor 6 months employment in field
- Patent submitted UK2309536.7, June 23, 2023
- Enterprise Ireland Innovation Arena 2022 – Research Emerging from a 3rd Level Award
- Award for Innovator of the Year in Physical Sciences, University College Cork 2022
- Enterprise Ireland Feasibility Study Grand funded 2023



James Sweeney

Statistics

University of Limerick

Associate Professor in Dept of Mathematics & Statistics

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Expertise

- Spatio-temporal statistical modelling
- Statistical models for disease spread
- Design of experiments in field trials and animal studies
- Bayesian statistics
- Applied statistical modelling including non-parametric modelling

Research focus in VistaMilk

Contribute to development of spatial statistical models for geo-referenced data including soil, water, fertiliser. Disease modelling, particularly the spread of bovine tuberculosis amongst cattle herds

Research outcomes

- Lead investigator on SFI Challenges project GREEN-GRID. The project is focused on the development of spatio-temporal maps for wind and solar resources nationwide with a view to expediting the move to 100% electricity generation from renewables
- Lead investigator on SFI New Frontiers project 3-EX. The project is focused on the development of the next generation of respiratory disease spread models to ensure preparedness for future pandemics
- Contributor to World Health Organisation (WHO) proof-of-concept project on COVID-19 integrated epidemiological-economic modelling.

Lee Coffey

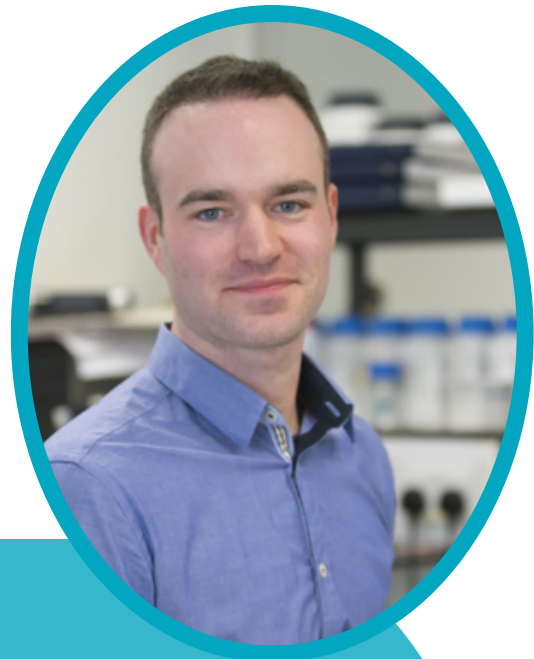
Molecular Biology

South East Technological University

Lecturer and Researcher, Department of Science

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Expertise

- Molecular biology techniques including gene screening, expression, genome editing
- Synthetic biology, directed evolution
- Enzymes for food/feed/agritech/environmental/pharma/health/industrial applications
- Biological molecular communications for DNA data storage and biological health monitoring

Research focus in VistaMilk

Use of synthetic biology, organ-on-a-chip and novel implantables/ingestible bio-devices to monitor and improve animal health

Research outcomes

- Developed bacteria that act as information relays and base stations
- Successful use of synthetic biology for a range of applications such as to enhance gene therapy and in molecular communications
- Founder of an EI-funded spin-out company, with >4000 biological technologies licensed and patent pending technologies developed
- Principal Investigator for previous SFI Project 20/COV/0097
- Published two articles '*Modulated Molecular Channel Coding Scheme for Multi-Bacterial Transmitters*' and '*Hydrogel-based Bio-nanomachine Transmitters for Bacterial Molecular Communications*'



Pádraig Lyons

Renewable Energy

Tyndall National Institute, UCC

Head of Group, International Energy
Research Centre

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Expertise

- Renewable energy
- Energy storage (electrical/thermal)
- Real-time digital simulation
- Energy policy
- Energy systems integration

Research focus in VistaMilk

Renewable energy and energy efficiency in agriculture, agri-photovoltaics, energy data analytics, electrification of farming, energy system integration in agriculture, electrical infrastructure utilisation and smart grids

Research outcomes

- Development of a research programme that informed the development of system services for Transmission System Operators that support the integration of renewables on the electrical power system. The approach utilised co-simulation using laboratory based energy storage to emulate grid-scale storage in collaboration with real-time digital simulation known as Power Hardware in the Loop
- Led research that led to unique data set that provided insights into the real world operation of heat pumps in retrofitted Irish homes
- Led research as part of Energy Policy Insights for Climate Action (EPICA) programme that was funded by the Department for Energy Climate and Communications that has influenced the development of the Irish Government's Climate Action Plan and other government policy

Sara Morrissey Tucker

Digital Immersive Media
Munster Technological University
Research Fellow
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Expertise

- Digital immersive media
- Virtual reality
- Augmented reality
- Machine translation
- Sign languages

Research focus in VistaMilk

Contribute to the development of immersive reality technology solutions including annotated digital 360-video-based based content and graphic virtual training environments

Research outcomes

- >€850k in research funding brought to AgriTech sector and partners for the development and delivery of training and digital immersive technology solutions
- Amelioration of training practices in industry partners in terms of standardisation, resourcing, and quality through the creation and delivery of immersive employee training experiences
- Development of the first example-based data-driven machine translation system for sign languages

Paul Galvin

Sensing Systems

Tyndall National Institute, UCC

Head of ICT for Health Strategic Programmes,
Head of Life Sciences Interface Group, and Head
of Bioelectronics Cluster

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Expertise

- Development of biosensors and systems for wearable, minimally invasive and implantable applications
- Development of sensors and systems for liquid bioprocess monitoring
- Development of sensors, systems and artificial intelligence for monitoring animal welfare
- Biosensors for monitoring of selected biomarkers indicative of health and wellbeing.

Research focus in VistaMilk

Renewable energy and energy efficiency in agriculture, Agri-photovoltaics, energy data analytics, electrification of farming, energy system integration in agriculture, electrical infrastructure utilisation and smart grids

Research outcomes

- Prototype miniature electrochemical instrument
- Prototype smart bolus system for microbiome sampling and pre-processing
- Prototype biosensor system for inline processing of complex media
- AI solution for identification of animal posture from wearable sensor devices
- Electrochemical sensors for monitoring of stress and other biomarkers

Claire Gormley

Statistics

University College Dublin

Professor, in School of Mathematics and Statistics

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Expertise

- Statistical modelling
- High-dimensional data
- Modelling spectral data
- Bayesian methods

Research focus in VistaMilk

Develop novel, next generation analytical techniques to appropriately model the multimodal, multiresolution and multipurpose data generated across the soil to society pathway

Research outcomes

- Development of probabilistic approaches to predict milk traits from spectral data, providing predictions and their associated uncertainty
- Provision of open source software to facilitate widespread use of developed tools

Daniela Iacopino

MicroNano Systems

Tyndall National Institute, UCC

Senior Researcher

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Expertise

- Nanomaterials synthesis and self-assembly
- Printing and writing fabrication (laser, pen, inkjet printing, screen printing)
- Electrochemical (sustainable) sensing and energy storage
- Lateral flow devices
- Raman and surface enhanced raman scattering

Research focus in VistaMilk

Development of lateral flow devices with dual detection, sensors for food quality monitoring, electrochemical sustainable sensors, wearable sensors

Research outcomes

- Developed novel lateral flow systems with dual visual/ surface enhanced raman scattering detection.
- Decreased the production cost of the device by using direct pen writing techniques to deposit the diagnostic components of the test
- Demonstrated detection of residual penicillin B in milk
- Developed dual electrochemical/surface enhanced raman scattering detection of food contaminants melamine in milk and antibiotics in tap water
- Currently developing flexible electrochemical sensors for detection of antibiotics
- Developed low cost supercapacitors for the powering of small IoT devices



Pierre Lovera

Electrochemistry

Tyndall National Institute, UCC

Researcher

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Expertise

- Surface enhanced raman spectroscopy
- Electrochemistry
- Sensors
- Surface functionalisation

Research focus in VistaMilk

To develop the surface enhanced raman sensors systems - explore combination of surface enhanced raman spectroscopy and electrochemistry and develop affordable readout systems

Research outcomes

- Development of surface enhanced raman scattering sensors based on electrochemical deposition of silver nanodendrites
- Development of functionalisation of surface enhanced raman scattering sensors for the detection of pesticides
- Combination of surface enhanced raman scattering based pH sensor with associated chemometrics
- Development of electrochemical sensors for detection of heavy metals (copper)



Michael Nolan

Materials Modelling

Tyndall National Institute, UCC

Head of Group and Interim Chief Scientist

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Expertise

- First principles simulations
- Surface chemistry
- Catalysis
- Methane conversion

Research focus in VistaMilk

Use state of the art atomistic simulation and experiment to develop new catalysts to promote low temperature methane activation in a prototype wearable device

Research outcomes

- Developed new atomistic simulation methodologies for prediction of the chemistry of etching and deposition in materials processing. Now widely used in the community
- Industry supported projects on developing new processes for (1) metal, (2) polymer, (3) metal oxide dielectric deposition: implemented into process flows through these partners
- Development of new low friction polymer coating and a deposition process - Invention Disclosure Form with MedTech company
- SFI-AMBER project on new low friction coatings
- Development of new chemical catalysts and Invention Disclosure Form of same.

Brendan O'Flynn

Sensing Systems

Tyndall National Institute, UCC

Head of Group - Wireless Sensor Networks

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Expertise

- Embedded systems design and deployment
- Flexible sensors
- Wearable sensors
- Data analytics, robust edge artificial intelligence
- Smart sensing

Research focus in VistaMilk

Animal – Sensing Technologies : Chipless radio frequency identification RFID and wearable solutions for real time monitoring of cow and calf reproduction and health care. Emerging Tech – Methane sequestration systems and embedded systems integration for deployment

Research outcomes

- Currently exploring and developing novel smart sensing technologies which develop, define and lead the research activities of the Wireless Sensor Networks group at Tyndall National Institute developing smart sensing systems
- As part of these academic and industry partnerships, the circuits, and systems, developed using a hardware software co-design approach and including complex data fusion algorithms to analyse multiple sensor streams, and the exploitation of the relevant IP licensed to commercial partners in the form of:
 - ~60 Inventions Disclosure with 20 licenses/assignments to industry Partners
 - Enabling 3 Start-up companies out of WSN related research activities - Tyndall /NMRC
 - Inpact Microelectronics 1999. Miniaturised (MCM) wireless systems (Founder & Co-Owner)
 - ENDECO – 2010. Building energy management for the retail sector
 - GRASP – 2014. Gait monitoring systems for athletes



James Rohan

Electrochemistry

Tyndall National Institute, UCC

Senior Staff Researcher

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Expertise

- Electrochemistry of catalytic materials
- Micro and nanoelectrochemical sensors
- Electrochemical simulations for device design
- Metal and alloy deposition for sensor applications
- Interdigitated electrodes for enhanced sensing with local environment control

Research focus in VistaMilk

Abundant and non-toxic catalyst materials deposition for low temperature and efficient conversion of methane to a fuel such as methanol aligned to climate action plans

Research outcomes

- Novel electrochemical sensors simulated, microfabricated and then demonstrated to enhance sensor performance
- Novel low-cost catalytic sensor materials have been identified and deposited for efficient sensing with lower limits of detection
- Redox cycling using interdigitated sensor arrays used to enhance signal outputs
- Local environment control such as modifying pH demonstrated and utilised to enhance the sensor performance