Ulster University

School of Engineering

Research and Innovation Annual Report
1 August 2023 - 31 July 2024

@UUEngineering

CONTENTS

1. **Foreword: Research Director, Prof. John Byrne** 1
2. **Research Students** 3
3. **Research Outputs** 7
   - 3.1 Journal Articles
   - 3.2 Books/Chapters in Books
   - 3.3 Research Reports
   - 3.4 Conference Contributions
4. **Research Funding** 27
5. **Note from the Associate Dean** 31




1. FOREWORD

Research Director
Prof. John Anthony (Tony) Byrne

In presenting the Annual Report for Engineering for the academic year 2023-2024, it is encouraging to report yet another successful year for our research activities. Engineering Research involves a multi-disciplinary group of over 150 researchers. Our work is broadly conducted in two overarching themes relating to the Healthcare Technologies and Advanced Future Materials and Manufacturing (AFMM). Within these themes, and cross-cutting between themes, we have clusters of research in healthcare sensor systems, biomaterials and tissue engineering, environmental engineering, composites, advanced manufacturing, plasmas, and nanotechnology. We have a growing cluster in communications engineering. We aim to sustain our excellent performance in REF21 in which Engineering research at Ulster has continued to grow both in terms of scale and quality. We more than doubled the number of our staff submitted to REF since 2014 and our percentage of research deemed to be world-leading has more than tripled. Conducting impactful research in line with the Sustainable Development Goals, has always been key to our strategy and we were recognised amongst the top tier of Universities delivering exclusively 3* and 4* research impact in engineering. We have strived to create an environment that supports all our researchers in their ambition to realise the highest quality research and are delighted to also have the entirety of our research environment recognised as 3*/4*. The school has a strong EDI ethos as evidenced by our Silver Athena Swan Award.

This was another successful year for Engineering Research contributing to research income of £20 million, 16 PhD Researcher graduations, and the publication of 98 peer reviewed journal articles in the reporting period. It is particularly encouraging to secure a second EPSRC New Investigator Award, this time for Dr Calvin Ralph. Engineering's participation in the newly funded Artificial Intelligence Collaboration Centre is an exciting opportunity.

Engineering research at Ulster aligns with two major funding developments for research within Engineering funded under the Belfast Region City Deals. The £43M **Centre for Digital Healthcare Technology (CDHT)** led by Ulster will provide a world-class space for academia, industry, and clinicians to come together to innovate and boost the productivity of the Life and Health Sciences sector, as well as medical device and related sector activity in Northern Ireland. It will bring together internationally leading Computing-SERG (AI to IOT), Engineering-NIBEC (Digital Health Technology to diagnostic devices) and Biotechnology strengths (Molecular Diagnostics) from three Ulster schools leading to multidisciplinary research focused on many of the world's key challenges including rising healthcare costs and healthy ageing. Currently this initiative is operating in virtual mode with space allocated for hosting companies, which currently include Dell, BT, and PWC; a newly set-up Integrated Diagnostics Laboratory and the commissioning of a new Digital Twin, IOT, and Robotics Laboratory. The construction of a 5-storey building, based at the Northland House site, is currently being tendered for and the design of a clinical living-lab is underway at the BHSCT.

The £96M **Advanced Manufacturing Innovation Centre (AMIC)** is aimed at securing Northern Ireland's manufacturing future and will be a springboard for manufacturing innovation in Northern Ireland. AMIC will operate at the interface between academia and industry, by creating new opportunities for innovative manufacturing in the Belfast City Region. The involvement of both Queen's University Belfast and Ulster University will ensure that real-world industrial challenges based on market need are solved through cutting-edge research. AMIC builds on 50 years of sustained innovation and industry support through the Northern Ireland Technology Centre (NITC), the Polymers Processing Research Centre (PPRC) and the more recent university-industry partnership, NI Advanced Composites and Engineering (NIACE), and will consolidate and enhance these existing facilities.

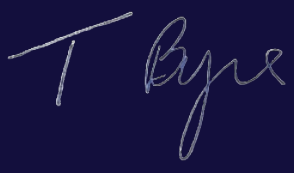
Also of note was the recruitment for the first cohort of PhD researchers into the Centre for Doctoral Training in Digital Health Technologies. This is a collaboration between Ulster University & University College London with £11.7m funding from UKRI. Recruiting 75 researchers, the PhD programme will advance digital health technologies such as virtual hospital wards and hospital-at-home programmes that enable earlier diagnosis and personalised treatment strategies, alleviating pressure on the healthcare system.

"We have strived to create an environment that supports all our researchers in their ambition to realise the highest quality research[.]"

Professor Pilar Fernandez-Ibanez was admitted to the Royal Irish Academy which is an outstanding achievement. Engineering performed extremely well in the Ulster Research Excellence Awards with Dr Amir Farokh Payam Future receiving the Research Leader Faculty and Champion Award, Professor Alistair McIlhagger receiving the Senior Distinguished Research Faculty Award, Dr Gourav Bhattacharya receiving the Research Recognition Faculty Award, and Dr Edward Archer receiving the Excellence in PhD Research Supervision Faculty Award.

We continue to enhance our research environment. We host the Engineering Seminar Series with lectures from visiting researchers, academic staff, research staff, and PhD researchers. We hosted visiting researchers from countries including India, Brazil, and Israel. The School has also hosted a number of major research events including the 12th European Conference on Solar Chemistry and Photocatalysis: Energy and Environmental Applications in June 2024. We also actively engage in outreach and participate annually in the Northern Ireland Science Festival with Engineering Futures showcasing our research to primary school pupils.

Further details of our research, facilities, staff profiles and research expertise can be found at Engineering Research or by contacting **Charly Mifsud** (Academic Excellence Executive Assistant) at **Email:** c.mifsud@ulster.ac.uk; **Tel:** +44 28 9536 7635.



Professor John Anthony (Tony) Byrne
Research Director, School of Engineering

2. RESEARCH STUDENTS

NAME	PROJECT TITLE
Akram, Muhammad Shakeel	Cardio-AI-ReAccel: Reconfigurable Accelerators for Artificial Intelligence in Cardiology
Anderson, Christopher	Development of Automated Multi-fibre Manipulation (AMM) Technology
Arshad, Waqas	Mapping and Analysis of Solid-Liquid Interfaces using 3D Scanning Force Microscopy
Aston, Will	Industrialised manufacturing processes for 3D printable biomedical sensor devices
Bradley, Zoe	Enabling low-cost multiplexing for rapid point of care diagnosis of sepsis
Clinton, Charlene	Meeting future global engineering challenges: Investigating how engineering skills and values can enable effective engagement with global responsibility and the UN Sustainable Development Goals
Daha, Muhammad Yunis	Edge Intelligence for 5G Networks and Beyond
Doggart, Peter	Artificial Intelligence Enhanced Electrocardiography in Emergency Departments
Fairooz, Towfeeq	A Study of the Role of Deep Learning in Image-Analysis of Biosensing Colorimetric Elements
Gallagher, Courtney	Morphology characterisation of additive manufacturing powder through automated image analysis algorithms
Gilpin, Victoria	Design of wearable electrochemical sensor systems for monitoring the wellbeing of ostomy patients
Hasson, Frances	3D printed Polymer/ Bioceramic Composites for Medical Devices
Islam, Kd M Raziul	Intelligent Electromagnetic Surface-Based Microwave Beamformers
Kashyap, Apoorva	Low energy plasma radiotherapy – could this be a route to gentle and effective treatment of cancer or antibiotic-resistant microbes?
Khalid, Hafiz Usman	Prevention of biofouling of polymer composites for application in the marine environment
Khalid, Hifza	Prevention of biofouling of polymer composites for application in the marine environment

Khalil, Sameh	Novel nanostructures for high efficiency solar energy harvesting
Kirch, Brian	Implementing Mechatronic Control and Analysis of Carbon Fibre Weaving
Lawson, James	Strengthening of 3D-printed parts using Advanced Manufacturing techniques
Lionadi, Indrianita	Visualization, characterization and treatment of cancer cells using nanoparticles
McCartney, Ben	An investigation into paediatric out of hospital cardiac arrest and resuscitation; role and optimisation of PADs
McCausland, Christopher	Automatic detection of sleep arousals using deep learning and a visual representation of time-frequency analysis of EEG signals
McCrickard, Conor	Dimensional stability of 3D printed medical devices
McGreeghan, Aine	Understanding the influences on the self-efficacy of female engineering students in Northern Ireland.
McLarnon, Liam	Development of Fibrous Ophthalmic Biomaterial Scaffolds for Wound Healing & Ophthalmic Tissue Engineering
McMath, Regan	Microneedle Array Patch for the continuous monitoring of diabetes in interstitial biofluid
McMullan, Reshma	Studying the 3D printing on PEKK with respect to different grades and suppliers
Montgomery, Callum	Advancing composite preforming technologies for complex loaded maritime structures
Muldoon, Kirsty	High Precision 3D Printing for Novel Biomedical Applications
Nasr, Sara	Advanced techniques for detection and removal of biofilm in marine vessels using electric sensors
New, Sarah	Novel multilayer porous structures with controllable nanoscale interactions for biomedical applications
O'Boyle, Adam	Development of an autonomous tufting machine for carbon laminate reinforcement
O'Donnell, Eimear	3D printing for manufacturing medical devices
Pestano, Zamir	Air-Dis Development of novel air disinfection systems

Rooney, Karyn	Analysis of Materials, Processes and Design of Continuous Multilayer Composite Pipe
Rose, Cara	Enhanced Obstacle Avoidance System for Parcelcopters in Dynamic Environments
Scott, Cameron	Laser-Induced Graphene: Novel Approaches for Sensing and Drug Delivery Applications
Spence, Cody	Development of advanced preforming technologies for use in complex marine structures
Stinson, Harley	Wire Arc Additive Manufacturing of Thin Walled Stiffening Features
Wucherer, Stefanie	Developing a hybrid model and supervised learning approach for automated handling tasks using tactile feedback

GRADUATED DEC 2023

NAME	PROJECT TITLE
Abdullah	Artificial intelligence enabled rapid low-cost in-situ fluorescence sensor platform and excitation-emission matrices for faecal contamination detection in water
Alkharabsheh, Salem	UVA-Photoelectrocatalytic reactor for the treatment of wastewater effluents - emerging pollutants degradation and bacteria inactivation
Cameron, Sarah	Chronic wounds in the community: A smart device approach to detecting the early onset of infection
Samy Antony, Anto	Development of simulation models for additive manufacturing of semi-crystalline polymers

GRADUATED JULY 2024

NAME	PROJECT TITLE
Davidson, Scot	Epileptic Seizure Classification using AI for Multi-Modal Classification and Real-Time Implementation
Dooley, Christopher	Peptide Functionalised Gold Nanoparticles for Cancer Treatment
Duffy, Sean	Development Of Multifunctional Polyether Ether Ketone (PEEK) Composites
Macartney, Robyn	Electrospun Polymer Biomaterials for Periodontal Regeneration in Type 1 Diabetes
McCallan, Niamh	Advancements In Epileptic Seizure Detection and Seizure Type Classification in Multidimensional Biomedical Signals
McFerran, Aoife	Multifunctional Nanocomposite Coatings Deposited Via Layer-By-Layer Assembly for Tissue Engineered Scaffolds
Moore, Michael	Development Of 3D Calcium Phosphate Scaffolds Produced Using Additive Manufacturing Technology with Solvent Free Inks
Nguyen, Chi	Deep Learning Models for Channel Estimation and Modelling in Wireless Networks
Rioja Cabanillas, Adriana	Photocatalytic And Photoelectrocatalytic Oxidation of Nitrogen Compounds in Wastewater
Kambley, Ankur	Novel Quantum Dots and Perovskites for Next-Generation Photovoltaics
Khalid, Hessan	Plasma Driven Exsolution from Perovskite Oxide for Catalytic Application
Zhang, Xushuo	Point-Of-Care Lateral Flow Analysis for Cystatin C Based Kidney Function Diagnostics

3. RESEARCH OUTPUTS

This section reports those outputs published and/or delivered over the period of this report and classified as either: journal articles, books/chapters in books, research reports, published conference papers, or live conference contributions. https://pure.ulster.ac.uk/.

3.1. JOURNAL ARTICLES

A Shirsath, M, O'Connor, JD, Boyle, R, Newman, L, Knight, SP, Hernandez, B, Whelan, R, Meaney, JF & Kenny, RA 2024, 'Slower speed of blood pressure recovery after standing is associated with accelerated brain aging: Evidence from The Irish Longitudinal Study on Ageing (TILDA)', Cerebral circulation - cognition and behavior, vol. 6, 100212, pp. 1-7. https://doi.org/10.1016/j.cccb.2024.100212

Abbasi, AB & Hadi, MU 2023, 'Optimizing UAV computation offloading via MEC with deep deterministic policy gradient', Transactions on Emerging Telecommunications Technologies, vol. 35, no. 1, e4874, pp. 1-19. https://doi.org/10.1002/ett.4874

Abdelrahim, SA, Mandour, OM, Okaz, A, Shehata, N & Kandas, I 2024, 'Investigating Optical Up-conversion Process of Erbium-doped Ceria Nanoparticles in Photonic Bilayer Bragg structure', Journal of Luminescence, vol. 272, 120644, pp. 1-11. https://doi.org/10.1016/j.jlumin.2024.120644

Afkhami, A, Brown, A, Sabogal-Paz, LP, Dixon, D, Ternan, NG & Dunlop, PSM 2023, 'A comprehensive approach to simulation of cartridge filtration using CFD', Journal of Environmental Chemical Engineering, vol. 11, no. 5, 110756, pp. 1-14. https://doi.org/10.1016/j.jece.2023.110756

Alessi, B, Kambley, AU, McDonald, C, Xu, Z, Matsui, T & Svrcek, V 2024, 'Improvement in stability of perovskite solar cells by adlayer of laser treated FAPbI3 quantum dots', Nano Energy, vol. 128, 109846. https://doi.org/10.1016/j.nanoen.2024.109846

Alkan, R, De Lazzari, B, Capoccia, M, De Lazzari, C & Bozkurt, S 2023, 'Computational Evaluation of IABP, Impella 2.5, TandemHeart and Combined IABP and Impella 2.5 Support in Cardiogenic Shock', Mathematics, vol. 11, no. 16, pp. 1-17. https://doi.org/10.3390/math11163606

Alkharabsheh, S, McMichael, S, Singhal, A, Rioja-Cabanillas, A, Zamora, P, Monsalvo, V, Rogalla, F, Byrne, JA & Fernández-Ibáñez, P 2024, 'Bench-scale photoelectrocatalytic reactor utilizing rGO-TiO2 photoanodes for the degradation of contaminants of emerging concern in water', Process Safety and Environmental Protection, vol. 182, pp. 833-844. https://doi.org/10.1016/j.psep.2023.12.009

Allan, D, Tooby, J, Starling, L, Tucker, R, Falvey, É, Salmon, D, Brown, J, Hudson, S, Stokes, K & Jones, B et al. 2024, 'The Incidence and Propensity of Head Acceleration Events in a Season of Men's and Women's English Elite-Level Club Rugby Union Matches', Sports Medicine, vol. 54, no. 10, pp. 2685-2696. https://doi.org/10.1007/s40279-024-02064-7

Al-Nahhal, M, Al-Nahhal, I, Dobre, OA & Soman, SKO 2023, 'Parallel Neural Network Structures for Signal-to-Noise Ratio Estimation in Optical Fiber Communication Systems', Journal of Lightwave Technology, vol. 42, no. 6, pp. 1941-1954. https://doi.org/10.1109/jlt.2023.3332484

Arshad, MS, Ayub, A, Zafar, S, Rana, SJ, Muhammad, SA, Aleem, A, Onaiwu, E, Nazari, K, Chang, M-W & Ahmad, Z 2024, 'Fabrication of miconazole nitrate solid lipid nanoparticle loaded microneedle patches for the treatment of Candida albicans biofilms', RSC Pharmaceutics, vol. 1, no. 3, pp. 458-471. https://doi.org/10.1039/d4pm00042k

Asharindavida, F, Nibouche, O, Uhomoibhi, J, Liu, J, Vincent, J & Wang, H 2023, 'Miniature spectrometer data analytics for food fraud', Journal of Consumer Protection and Food Safety, vol. 18, no. 4, pp. 415-431. https://doi.org/10.1007/s00003-023-01439-8

Baturalp, TB & Bozkurt, S 2024, 'Design and Analysis of a Polymeric Left Ventricular Simulator via Computational Modelling', Biomimetics, vol. 9, no. 5, 269, pp. 1-16. https://doi.org/10.3390/biomimetics9050269

Beckers, J, Berndt, J, Block, D, Bonitz, M, Bruggeman, PJ, Couëdel, L, Delzanno, GL, Feng, Y, Gopalakrishnan, R & Greiner, F et al. 2023, 'Physics and applications of dusty plasmas: The Perspectives 2023', Physics of Plasmas, vol. 30, no. 12, 120601, pp. 1-52. https://doi.org/10.1063/5.0168088

Benedet, M, Gallo, A, Maccato, C, Rizzi, GA, Barreca, D, Lebedev, OI, Modin, E, McGlynn, R, Mariotti, D & Gasparotto, A 2023, 'Controllable Anchoring of Graphitic Carbon Nitride on MnO2 Nanoarchitectures for Oxygen Evolution Electrocatalysis', ACS Applied Materials and Interfaces, vol. 15, no. 40, pp. 47368-47380. https://doi.org/10.1021/acsami.3c09363

Benedet, M, Gasparotto, A, Rizzi, GA, Maccato, C, Mariotti, D, McGlynn, R & Barreca, D 2023, 'XPS investigation of MnO2 deposits functionalized with graphitic carbon nitride', Surface Science Spectra, vol. 30, no. 2, 024018, pp. 1-17. https://doi.org/10.1116/6.0002827

Bhattacharya, G, Lionadi, I, Stevenson, A, Ward, J & Payam, AF 2023, 'Tailored Microcantilever Optimization for Multifrequency Force Microscopy', Advanced Science, vol. 10, no. 33, 2303476, pp. 1-11. https://doi.org/10.1002/advs.202303476

Bhattacharya, G, Lionadi, I, Ward, J & Payam, AF 2024, 'Optimizing The Laser Spot Positioning on Tailored Microcantilevers Used in Atomic Force Microscopy', IEEE Transactions on Instrumentation and Measurement, vol. 73, pp. 1-10. https://doi.org/10.1109/tim.2024.3406824

Botero, L, Galeano, L, Montoya-Jaramillo, LJ, Machado, A, Byrne, J, Fernandez-Ibanez, AP & Pérez, MH 2023, 'Aeromonas hydrophila in surface water and their removal using a POU technology for drinking in rural communities', Environmental Advances, vol. 13, 100425, pp. 1-9. https://doi.org/10.1016/j.envadv.2023.100425

Bozkurt, S & Bhalla, N 2023, 'Sensor-Free Biosensing of Mitral and Aortic Valvular Function During Continuous Flow Left Ventricular Assist Device Support', IEEE Sensors Journal, vol. 23, no. 16, pp. 18515-18523. https://doi.org/10.1109/JSEN.2023.3292803

Bozkurt, S & Bozkurt, S 2023, 'Evaluation of Potential Effects of Increased Outdoor Temperatures Due to Global Warming on Cerebral Blood Flow Rate and Respiratory Function in Chronic Obstructive Disease and Anemia', Global Challenges, vol. 7, no. 10, 2300120, pp. 1-17. https://doi.org/10.1002/gch2.202300120

Bozkurt, S 2023, 'Computational evaluation of heart failure and continuous flow left ventricular assist device support in anaemia', International Journal for Numerical Methods in Biomedical Engineering, vol. 40, no. 1, pp. 1-18. https://doi.org/10.1002/cnm.3781

Bozkurt, S 2024, 'Use of instructional videos to teach mechanical systems analysis based on the finite element method in a class with local and overseas students', Engineering Reports, vol. 6, no. 10, e12880, pp. 1-13. https://doi.org/10.1002/eng2.12880

Bradley, Z & Bhalla, N 2024, 'Combating Prozone Effects and Predicting the Dynamic Range of Naked-Eye Nanoplasmonic Biosensors through Capture Bioentity Optimization', ACS Measurement Science Au, vol. 4, no. 4, pp. 452-458. https://doi.org/10.1021/acsmeasuresciau.4c00010

Bradley, Z, Cunningham, D & Bhalla, N 2023, 'Refractive Index-Modulated LSPR Sensing in 20–120 nm Gold and Silver Nanoparticles: A Simulation Study', ECS Sensors Plus, vol. 2, no. 4, pp. 1-6. https://doi.org/10.1149/2754-2726/ad08d8

Buerkle, M, Padmanaban, DB, McGlynn, R, Mariotti, D & Svrcek, V 2024, 'Unexpected Electronic Features of NiO Quantum Dots Produced by Femtosecond Pulsed Laser Ablation in Water', Journal of Physical Chemistry Letters, vol. 15, no. 15, pp. 4185-4190. https://doi.org/10.1021/acs.jpclett.4c00458

Cafolla, C, Voïtchovsky, K & Farokh Payam, A 2023, 'Simultaneous quantification of Young's modulus and dispersion forces with nanoscale spatial resolution', Nanotechnology, vol. 34, no. 50. https://doi.org/10.1088/1361-6528/acf8ce

Casimero, C, Smith, RB & Davis, J 2023, 'Integration of Riboflavin-Modified Carbon Fiber Mesh Electrode Systems in a 3D-Printed Catheter Hub', Micromachines, vol. 15, no. 1, 79, pp. 1-13. https://doi.org/10.3390/mi15010079

Channegowda, M, Verma, A, Arabia, I, Meda, US, Rawal, I, Rustagi, S, Yadav, BC, Dunlop, P, Bhalla, N & Chaudhary, V 2024, 'High selectivity and sensitivity through nanoparticle sensors for cleanroom CO 2 detection', Nanotechnology, vol. 35, no. 31, 315501. https://doi.org/10.1088/1361-6528/ad3fbf

Charlton, SGV, Jana, S & Chen, J 2024, 'Yielding behaviour of chemically treated Pseudomonas fluorescens biofilms', Biofilm, vol. 8, 100209, pp. 1-8. https://doi.org/10.1016/j.bioflm.2024.100209

Choudhury, S, Deepak, D, Bhattacharya, G, McLaughlign, J & Roy, SS 2023, 'MoS 2 -Polyaniline Based Flexible Electrochemical Biosensor: Toward pH Monitoring in Human Sweat', Macromolecular Materials and Engineering, vol. 308, no. 8, 2300007, pp. 1-12. https://doi.org/10.1002/mame.202300007

Deepak, D, Vuruputuri, V, Bhattacharya, G, McLaughlin, JA & Roy, SS 2023, 'Fabrication of Gold Nanoparticles Embedded Laser-Induced Graphene (LIG) Electrode for Hydrogen Evolution Reaction', C- Journal of Carbon Research, vol. 9, no. 4, 118, pp. 1-14. https://doi.org/10.3390/c9040118

Dsouza, SD, Buerkle, M, Alessi, B, Brunet, P, Morelli, A, Farokh Payam, A, Maguire, P, Mariotti, D & Svrcek, V 2023, 'Synthesis of water-stable and highly luminescent graphite quantum dots', Nanotechnology, vol. 34, no. 50. https://doi.org/10.1088/1361-6528/acf7cc

Ekerete, I, Garcia-Constantino, M, McCullagh, P, Nugent, CD & McLaughlin, J 2023, 'Data Mining and Fusion Framework for In-Home Monitoring Applications', Sensors, vol. 23, no. 21, 8661, pp. 1-16. https://doi.org/10.3390/s23218661

Gamal, K, Gamal, M, Okaz, A, Shehata, N & Kandas, I 2024, 'Comprehensive performance analysis of perovskite solar cells based on different crystalline structures of MAPbI 3', Optical and Quantum Electronics, vol. 56, no. 5, 827, pp. 1-22. https://doi.org/10.1007/s11082-024-06655-6

Gardner, LL, O'Connor, JD & McMahon, SJ 2024, 'Benchmarking proton RBE models', Physics in medicine and biology, vol. 69, no. 8, 085022. https://doi.org/10.1088/1361-6560/ad3329

Gilmour, A, Ulrichsen, A, Jackson, W, Tabatabaeipour, M, Dobie, G, Macleod, CN, Murray, P & Karkera, B 2023, 'Using Phased Array Ultrasound to Localize Probes During the Inspection of Welds', IEEE Open Journal of Instrumentation and Measurement, pp. 1-11. https://doi.org/10.1109/OJIM.2023.3327484

Hadi, MU, Danyaro, KU, AlQushaibi, A, Qureshi, R & Alam, T 2024, 'Digital Predistortion Based Experimental Evaluation of Optimized Recurrent Neural Network for 5G Analog Radio Over Fiber Links', IEEE Access, vol. 12, pp. 19765-19777. https://doi.org/10.1109/ACCESS.2024.3360298

Hadi, MU, Qureshi, R, Ahmed, A & Iftikhar, N 2023, 'A lightweight CORONA-NET for COVID-19 detection in X-ray images', Expert Systems with Applications, vol. 225, 120023, pp. 1-14. https://doi.org/10.1016/j.eswa.2023.120023

Hassanin, AH, Elnabawy, E, Salah, M, Nair, R, Gamal, M, Omran, N, Popelka, A, Kandas, I & Shehata, N 2023, 'Multi-functional wet-electrospun piezoelectric nanofibers sensing mat: Manufacturing, characterization, and applications', Materials Science in Semiconductor Processing, vol. 166, 107708, pp. 1-10. https://doi.org/10.1016/j.mssp.2023.107708

Huang, J-D, Wang, H, Power, U, McLaughlin, JA, Nugent, C, Rahman, E, Barabas, J & Maguire, P 2024, 'Detecting Respiratory Viruses Using a Portable NIR Spectrometer—A Preliminary Exploration with a Data Driven Approach', Sensors, vol. 24, no. 1, 308. https://doi.org/10.3390/s24010308

Islam, AKMK, Dunlop, PSM, Bhattacharya, G, Mokim, M, Hewitt, N, Huang, Y, Gogulancea, V, Zhang, K & Brandoni, C 2023, 'Comparative performance of sustainable anode materials in microbial fuel cells (MFCs) for electricity generation from wastewater', Results in Engineering, vol. 20, no. 101385, 101385, pp. 1-12. https://doi.org/10.1016/j.rineng.2023.101385

Islam, KMR, Rahimian, A, Goncalves Machado, G, Abbasi, MAB, Cheema, AA & Meenan, BJ 2024, 'Design and Experimental Performance Evaluation of a Single-Layer Polarization-Insensitive Asymmetric Microwave Metasurface Absorber', IEEE Transactions on Antennas and Propagation, vol. 72, no. 8, pp. 6520-6529. https://doi.org/10.1109/TAP.2024.3424952

Jacob, J & Bozkurt, S 2023, 'Automated surgical planning in spring-assisted sagittal craniosynostosis correction using finite element analysis and machine learning', PLoS ONE, vol. 18, no. 11, e0294879, pp. 1-15. https://doi.org/10.1371/journal.pone.0294879

Jacob, J & Bozkurt, S 2024, 'Interrelations Between Surgical Outcome and Bone, Spring and Surgical Parameters in Scaphocephalic Skulls Treated with Spring-Assisted Cranioplasty', Advanced Theory and Simulations, vol. 7, no. 7, 2400218, pp. 1-12. https://doi.org/10.1002/adts.202400218

Jarrar, S, Hussain, S, Haq, AU, Bhattacharya, G, Saadeddin, I, Servera, L, Ruiz, JM, Janem, A & Daraghmeh, A 2024, 'Binder-free all-carbon composite supercapacitors', Nanotechnology, vol. 35, no. 30, 305708. https://doi.org/10.1088/1361-6528/ad41e9

Kandas, I, Gamal, M, Omran, N, Noman, S, Magdy, G, Hassanin, AH & Shehata, N 2023, 'Nonlinear-Optical Piezoelectric Electrospun Nanofibers', Materials Research Bulletin, vol. 171, 112600. https://doi.org/10.1016/j.materresbull.2023.112600

Kausar, S, Kausar, AU, Hadi, MU & Mehrpouyan, H 2023, 'Multi-beam high gain steerable transmitarray lens for satellite communication and 5G mm-Wave systems', International Journal of Electronics and Communications, vol. 173, 154888. https://doi.org/10.1016/j.aeue.2023.154888

Kurnaz, Ç, Alsharif, F & Cheema, AA 2023, 'Determination of the breast cancer tumor diameter using a UWB microwave antenna system', Sigma Journal of Engineering and Natural Sciences, vol. 41, no. 5, pp. 999-1012. https://doi.org/10.14744/sigma.2023.00047

Lan, YX, De Yan, J, Su, HL, Wu, CC, Kuo, CH, Chiu, CC, Chang, MW, Takemoto, L, Wu, CC & Wang, HMD 2023, 'Exploring the potential of dual-sensitive hydrogels for personalized precision medicine applications', Journal of the Taiwan Institute of Chemical Engineers, vol. 163, 105303. https://doi.org/10.1016/j.jtice.2023.105303

Le, B, Omran, N, Elnabawy, E, Hassanin, AH, Mahmoud, K, Shehata, N & Shyha, I 2024, 'Exploring advances in nanofiber-based face masks: a comprehensive review of mechanical, electrostatic, and antimicrobial functionality filtration for the removal of airborne particulate matter and pathogens', Emergent Materials, vol. 7, no. 3, pp. 765-800. https://doi.org/10.1007/s42247-023-00622-9

Lin, N, Tierney, G & Ji, S 2024, 'Effect of impact kinematic filters on brain strain responses in contact sports', IEEE Transactions on Biomedical Engineering, vol. 71, no. 9, pp. 2781-2788. https://doi.org/10.1109/TBME.2024.3392859

Macartney, R, Burke, G, Lamprou, DA, Weaver, E, Wylie, MP & Irwin, R 2024, 'Liposomal Encapsulation of Amoxicillin via Microfluidics with Subsequent Investigation of the Significance of PEGylated Therapeutics', International Journal of Pharmaceutics, vol. 650, 123710, pp. 1-11. https://doi.org/10.1016/j.ijpharm.2023.123710

Macartney, R, Weaver, E, Irwin, R, Wylie, MP, Burke, G & Lamprou, D 2024, 'Co-delivery of VEGF and amoxicillin using LP-coated co-axial electrospun fibres for the potential treatment of diabetic wounds', Biomaterials Advances, vol. 158, 213765, pp. 1-17. https://doi.org/10.1016/j.bioadv.2024.213765

Mansouri, TS, Wang, H, Mariotti, D & Maguire, P 2024, 'Distinguishing methane from other hydrocarbons using machine learning and atmospheric pressure plasma optical emission spectroscopy', Journal of Physics D: Applied Physics, vol. 57, no. 34, 345202, pp. 1-11. https://doi.org/10.1088/1361-6463/ad4f97

McAlister, O, Harvey, A, McCartney, B, Crawford, P, Bond, RR, Finlay, D & McEneaney, D 2023, 'Ventricular fibrillation waveform properties influenced by thoracic impedance guided chest compressions in a porcine model', Computer Methods and Programs in Biomedicine, vol. 241, 107780, pp. 107780. https://doi.org/10.1016/j.cmpb.2023.107780

McCann, C, Gilpin, V, Scott, C, Pourshahidi, LK, Gill, CIR & Davis, J 2023, 'Moving towards in pouch diagnostics for ostomy patients: exploiting the versatility of laser induced graphene sensors', Journal of Materials Science, vol. 58, pp. 14207-14219. https://doi.org/10.1007/s10853-023-08881-x

McCartan, A, Cummins, D, Morgan, M & Joseph-Richard, P 2023, 'Exploring Students' Motivation to Participate in Entrepreneurial Marketing Education', Journal of Marketing Education, vol. 45, no. 3, pp. 278-295. https://doi.org/10.1177/02734753231178501

McCormick, R, Buckley, E, Donnelly, PJ, Gilpin, V, McMath, R, Smith, RB, Papakonstantinou, P & Davis, J 2024, 'Anthranilic Acid: A Versatile Monomer for the Design of Functional Conducting Polymer Composites', Journal of Composites Science, vol. 8, no. 6, 208, pp. 1-21. https://doi.org/10.3390/jcs8060208

McGlynn, R, Brunet, P, Chakrabarti, S, Ganguly, A, Moghaieb, H, Bo, Z, Maguire, P & Mariotti, D 2023, 'A Single-Step Process to Produce Carbon Nanotube-Zinc Compound Hybrid Materials', Small Methods, vol. 8, no. 1, 2300710, pp. 1-12. https://doi.org/10.1002/smtd.202300710

Millen, S, Ralph, C, Dahale, M, Archer, E, McIlhagger, AT, Antony Samy, A, Thompson, K, Fisher, T, Ramaswamy, K & Ullah, Z et al. 2023, 'Modelling low-velocity impact damage and compression after impact of 3D woven structures considering compaction', Composite Structures, vol. 318, 117104. https://doi.org/10.1016/j.compstruct.2023.117104

Moghaieb, HS, Khalil, S, Ganguly, A, Maguire, P, Mariotti, D & Chakrabarti, S 2024, 'Metal-organic framework (MOF) dispersion based fluids for solar-thermal energy conversion', Solar Energy, vol. 273, 112542, pp. 1-11. https://doi.org/10.1016/j.solener.2024.112542

Nair, AM, Wilson, C, Kamkari, B, Huang, M, Griffiths, P, Hewitt, N & Locke, J 2024, 'Advancing thermal performance in PCM-Based energy Storage: A comparative study with Fins, expanded Graphite, and combined configurations', Energy Conversion and Management:X, vol. 23, 100627, pp. 1-18. https://doi.org/10.1016/j.ecmx.2024.100627

Nibouche, O, Asharindavida, F, Wang, H, Vincent, J, Liu, J, Ruth, SV, Maguire, P & Rahman, E 2024, 'A new sub-class linear discriminant for miniature spectrometer based food analysis', Chemometrics and Intelligent Laboratory Systems, vol. 250, 105136, pp. 1-13. https://doi.org/10.1016/j.chemolab.2024.105136

Padmanaban, DB, Sadhu, S, Dsouza, SD, Mushtaq, W, Holman, Z, Svrcek, V & Mariotti, D 2024, 'One-step synthesis and deposition of metal oxides: NiO quantum dots as a transport layer for perovskite photovoltaics', Advanced Engineering Materials, vol. 26, no. 11, 2400826, pp. 1-10. https://doi.org/10.1002/adem.202400826

Parsa, N, Kamkari, B & Abolghasemi, H 2024, 'Enhancing thermal performance in shell-and-tube latent heat thermal energy storage units: An experimental and numerical study of shell geometry effects', International Communications in Heat and Mass Transfer, vol. 154, pp. 1-16. https://doi.org/10.1016/j.icheatmasstransfer.2024.107398

Payam, AF, Khalil, S & Chakrabarti, S 2024, 'Synthesis and Characterization of MOF-Derived Structures: Recent Advances and Future Perspectives', Small, vol. 20, no. 32, 2310348, pp. 1-53. https://doi.org/10.1002/smll.202310348

Pichel Mira, N, de Souza, FH, Sabogal-Paz, LP, Shah, PK, Adhikari, N, Pandey, S, Shrestha, BM, Gaihre, S, Pineda-Marulanda, DA & Pérez, MH et al. 2023, 'Field-testing solutions for drinking water quality monitoring in low- and middle-income regions and case studies from Latin American, African and Asian countries', Journal of Environmental Chemical Engineering, vol. 11, no. 6, 111180, pp. 1-12. https://doi.org/10.1016/j.jece.2023.111180

Pritam, A, Bhattacharya, G, Sain, S, Shrivastava, V & Roy, SS 2024, 'Multiple relaxation mechanisms in SrBi 2 Nb 2 O 9 ceramic tweaked by tin and samarium incorporation in assistance with single-step microwave sintering', Applied Physics A, vol. 130, no. 5, 342. https://doi.org/10.1007/s00339-024-07482-y

Puyol McKenna, P, Naughton, P, Dooley, JSG, Ternan, NG, Lemoine, P & Banat, IM 2024, 'Microbial Biosurfactants: Antimicrobial Activity and Potential Biomedical and Therapeutic Exploits', Pharmaceuticals, vol. 17, no. 1, 138, pp. 1-13. https://doi.org/10.3390/ph17010138

Ralph, C, Baker, L, Archer, E & McIlhagger, AT 2023, 'Optimization of soft armor: the response of homogenous and hybrid multi-ply para-aramid and ultra-high molecular weight polyethylene fabrics under ballistic impact', Textile Research Journal, vol. 93, no. 23-24, pp. 5168-5186. https://doi.org/10.1177/00405175231194365

Raziul Islam, KM, Rahimian, A, Machado, GG, Babar Abbasi, MA, Cheema, AA & Meenan, BJ 2024, 'A compact single-layer reflective metasurface for high-efficiency polarisation conversion applications in C and X bands', IET Microwaves, Antennas and Propagation, vol. 18, no. 5, pp. 369-381. https://doi.org/10.1049/mia2.12465

Reyneke, B, Morris, TC, Fernández-Ibáñez, P, Mcguigan, KG, Heida, A, Hamilton, KA & Khan, W 2023, 'Decentralised solar-based water treatment – Bridging the last mile to water security in low- and middle-income countries?', Water Security, vol. 20, 100146, pp. 1-9. https://doi.org/10.1016/j.wasec.2023.100146

Rioja-Cabanillas, A, McMichael, S, Tolosana-Moranchel, A, Alkharabsheh, S, Skillen, N, Fernandez-Ibanez, P & Byrne, JA 2023, 'Solar photoelectrocatalytic oxidation of urea in water coupled to green hydrogen production', Journal of Cleaner Production, vol. 419, 138200. https://doi.org/10.1016/j.jclepro.2023.138200

Rodzeń, K, O'Donnell, E, Hasson, F, McIlhagger, A, Meenan, BJ, Ullah, J, Strachota, B, Strachota, A, Duffy, S & Boyd, A 2024, 'Advanced 3D Printing of Polyetherketoneketone Hydroxyapatite Composites via Fused Filament Fabrication with Increased Interlayer Connection', Materials, vol. 17, no. 13, 3161, pp. 1-15. https://doi.org/10.3390/ma17133161

Roe, G, Whitehead, S, Starling, L, Allan, D, Cross, M, Falvey, É, Kemp, S, Owen, C, Readhead, C & Salmon, D et al. 2024, 'Embracing the impact from instrumented mouthguards (iMGs): A survey of iMG managers' perceptions of staff and player interest into the technology, data and barriers to use', European Journal of Sport Science, vol. 24, no. 6, pp. 670-681. https://doi.org/10.1002/ejsc.12101

Saeed, K, McIlhagger, A, Dooher, T, Ullah, J, Manzoor, F, Velay, X & Archer, E 2024, 'Lap Shear Strength and Fatigue Analysis of Continuous Carbon-Fibre-Reinforced 3D-Printed Thermoplastic Composites by Varying the Load and Fibre Content', Polymers, vol. 16, no. 5, 579, pp. 1-16. https://doi.org/10.3390/polym16050579

Safak, KK, Baturalp, TB & Bozkurt, S 2023, 'Parametric Design and Prototyping of a Low-Power Planar Biped Robot', Biomimetics, vol. 8, no. 4, 346, pp. 1-15. https://doi.org/10.3390/biomimetics8040346

Safari, V, Kamkari, B & Gharbi, A 2024, 'Wedge-shaped fins to enhance thermal performance of shell and tube heat exchangers containing phase change material: An experimental study', Thermal Science and Engineering Progress, vol. 49, 102474, pp. 1-10. https://doi.org/10.1016/j.tsep.2024.102474

Safari, V, Kamkari, B, Hewitt, N & Hooman, K 2024, 'Experimental comparative study on thermal performance of latent heat storage tanks with pin, perforated, and rectangular fins at different orientations', Thermal Science and Engineering Progress, vol. 48, 102401, pp. 1-18. https://doi.org/10.1016/j.tsep.2024.102401

Saif, WS, Soman, SKO & Dobre, OA 2024, 'Deep Learning-Assisted Nonlinearity Compensation in Subcarrier-Multiplexing Coherent Optical Systems', Journal of Lightwave Technology, pp. 1-11. https://doi.org/10.1109/jlt.2024.3427121

Scott, C, Gilpin, V, McCreadie, K & Davis, J 2023, 'Exploiting Laser-Induced Graphene Composites as Substrates for Copper-Mediated Nitrate Reduction', Journal of Composites Science, vol. 7, no. 9, 397, pp. 1-13. https://doi.org/10.3390/jcs7090397

Shoukat, H, Khurshid, AA, Daha, MY, Shahid, K & Hadi, MU 2024, 'A Comparative Analysis of DNN and Conventional Signal Detection Techniques in SISO and MIMO Communication Systems', Telecom, vol. 5, no. 2, pp. 487-507. https://doi.org/10.3390/telecom5020025

Simpson, L, Pourshahidi, LK, Davis, J, Slevin, M, Lawther, R, O'Connor, G, Porrett, T, Marley, J & Gill, CIR 2023, 'Living with and without an intestinal stoma: Factors that promote psychological well-being and self-care: A cross sectional study. Factors that promote psychological well-being and self-care: A cross-sectional study', Nursing Open, vol. 10, no. 12, pp. 7811-7825. https://doi.org/10.1002/nop2.2030

Sreekumar, S, Chakrabarti, S, Hewitt, N, Mondol, J & Shah, N 2024, 'Performance Prediction and Optimization of Nanofluid-Based PV/T Using Numerical Simulation and Response Surface Methodology', Nanomaterials, vol. 14, no. 9, 774, pp. 1-26. https://doi.org/10.3390/nano14090774

Sreekumar, S, Ganguly, A, Khalil, S, Chakrabarti, S, Hewitt, N, Mondol, J & Shah, N 2024, 'Thermo-optical characterization of novel MXene/Carbon-dot hybrid nanofluid for heat transfer applications', Journal of Cleaner Production, vol. 434, 140395, pp. 1-17. https://doi.org/10.1016/j.jclepro.2023.140395

Sulaiman, AY, Cotter, D, Wilson, C, Kamkari, B & Hewitt, N 2023, 'Energetic and exergo-environmental analysis of transcritical high-temperature heat pumps with low GWP refrigerants for industrial waste heat recovery', International Journal of Refrigeration, vol. 156, pp. 12-28. https://doi.org/10.1016/j.ijrefrig.2023.09.021

Tierney, G, Rowson, S, Gellner, R, Allan, D, Iqbal, S, Biglarbeigi, P, Tooby, J, Woodward, J & Payam, AF 2024, 'Head Exposure to Acceleration Database in Sport (HEADSport): a kinematic signal processing method to enable instrumented mouthguard (iMG) field-based inter-study comparisons', BMJ Open Sport & Exercise Medicine, vol. 10, no. 1, e001758, pp. 1-9. https://doi.org/10.1136/bmjsem-2023-001758

Tooby, J, Till, K, Gardner, A, Stokes, K, Tierney, G, Weaving, D, Rowson, S, Ghajari, M, Emery, C & Bussey, MD et al. 2024, 'When to Pull the Trigger: Conceptual Considerations for Approximating Head Acceleration Events Using Instrumented Mouthguards', Sports Medicine, vol. 54, no. 6, pp. 1361-1369. https://doi.org/10.1007/s40279-024-02012-5

Tri Dat, L, Nguyen, CC, Duy Vy, N & Farokh Payam, A 2023, 'Tuning the flexural frequency of overhang-/T-shaped microcantilevers for high harmonics', Japanese Journal of Applied Physics, vol. 62, no. 10, 107002, pp. 1-7. https://doi.org/10.35848/1347-4065/ad00a0

Tsai, Y-H, Tseng, C-C, Lin, Y-C, Nail, HM, Chiu, K-Y, Chang, Y-H, Chang, M-W, Lin, F-H & Wang, H-MD 2024, 'Novel artificial tricalcium phosphate and magnesium composite graft facilitates angiogenesis in bone healing', Biomedical journal, pp. 1-42. https://doi.org/10.1016/j.bj.2024.100750

Tzaferis, K, Tabatabaeipour, M, McMillan, R, Dobie, G & Gachagan, A 2023, 'A shear horizontal phased array steering excitation technique for remnant wall thickness quantification', Ultrasonics, vol. 136, 107142, pp. 1-16. https://doi.org/10.1016/j.ultras.2023.107142

ul Haq, A, Fanelli, F, Bekris, L, Martin, AM, Lee, S, Khalid, H, Savaniu, CD, Kousi, K, Metcalfe, IS & Irvine, JTS et al. 2024, 'Dielectric Barrier Plasma Discharge Exsolution of Nanoparticles at Room Temperature and Atmospheric Pressure', Advanced Science, vol. 11, no. 34, 2402235, pp. 1-15. https://doi.org/10.1002/advs.202402235

Umer, M, Brandoni, C, Jaffar, M, Hewitt, N, Dunlop, PSM, zhang, K & Huang, Y 2024, 'An Experimental Investigation of Hydrogen Production Through Biomass Electrolysis', Processes, vol. 12, no. 1, 112, pp. 1-17. https://doi.org/10.3390/pr12010112

Walls, GM, McCann, C, O'Connor, J, O'Sullivan, A, I Johnston, D, McAleese, J, McGarry, CK, Cole, AJ, Jain, S & Butterworth, KT et al. 2024, 'Pulmonary vein dose and risk of atrial fibrillation in patients with non-small cell lung cancer following definitive radiotherapy: an NI-HEART analysis', Radiotherapy and Oncology, vol. 192, 110085, pp. 1-39. https://doi.org/10.1016/j.radonc.2024.110085

Walls, GM, O'Connor, J, Harbinson, M, Duane, F, McCann, C, McKavanagh, P, Johnston, DI, Giacometti, V, McAleese, J & Hounsell, AR et al. 2024, 'The Association of Incidental Radiation Dose to the Heart Base with Overall Survival and Cardiac Events after Curative-intent Radiotherapy for Non-small Cell Lung Cancer: Results from the NI-HEART Study', Clinical Oncology, vol. 36, no. 2, pp. 119-127. https://doi.org/10.1016/j.clon.2023.11.029

Wucherer, S, McMurray, R, Ng, KY & Kerber, F 2023, Learning to Predict Grip Quality from Simulation: Establishing a Digital Twin to Generate Simulated Data for a Grip Stability Metric. arXiv. https://doi.org/10.48550/ARXIV.2302.03504

Xiang, D, Shui, T, Qiao, H, Tan, W, Harkin-Jones, E, Zhang, J, Ji, P, Wang, P, Wang, B & Zhao, C et al. 2023, 'Enhanced interfacial interaction, mechanical properties and thermal stability of basalt fiber/epoxy composites with multi-scale reinforcements', Composite Interfaces, vol. 30, no. 12, pp. 1387-1409. https://doi.org/10.1080/09276440.2023.2220500

Zhang, J, Soliman, A, El-marghany, A, Morsy, A, Mohamed, A, Shehata, N, Fadl, EA & Morsy, A 2024, 'Utilization of MOF-enhanced hydrophilic nanocomposite reverse osmosis membrane for desalination with antifouling capabilities', Polymer Engineering and Science, vol. 64, no. 9, pp. 4430-4441. https://doi.org/10.1002/pen.26858

3.2. BOOKS/BOOK CHAPTERS

Goncalves Machado, G, Abbasi, MAB & Fusco, V 2023, 6G radio hardware - contributing to the net-zero target. in MA Imran, A Taha, S Ansari, H Usman & QH Abbasi (eds), The Role of 6G and Beyond on the Road to Net-Zero Carbon. 1 edn, vol. 1, IET Digital Library, pp. 19-36. https://doi.org/10.1049/PBTE108E

3.3. RESEARCH REPORTS

Archer, E, McIlhagger, AT, Gault, A, McIvor, MJ, Ralph, C, Golbang, A, Macrae, J & Porter, P 2024, Reviving Northern Ireland's Textile Heritage.

McIvor, MJ, McIlhagger, AT, Archer, E, Dooher, T, Gault, A, Golbang, A, Ralph, C, Macrae, J, Porter, P & Quigley, P 2024, A natural fibre supply chain in Northern Ireland.

McIvor, MJ, Archer, E, Macrae, J, Ralph, C, Golbang, A, Puttaswamy, S, Ward, J & McIlhagger, AT 2024, A Green Carbon Fibre Opportunity in Northern Ireland.

3.4. CONFERENCE CONTRIBUTIONS

Akram, MS, Sharat Chandra Varma, B & Finlay, D 2024, Embedded DNN Classifier for Five Different Cardiac Diseases. in H Zheng, I Cleland, A Moore, H Wang, D Glass, J Rafferty, R Bond & J Wallace (eds), Proceedings of the 35th Irish Systems and Signals Conference, ISSC 2024. Proceedings of the 35th Irish Systems and Signals Conference, ISSC 2024, IEEE United Kingdom, 35th Irish Systems and Signals Conference, 13/06/24. https://doi.org/10.1109/ISSC61953.2024.10602922

Antony Samy, A, Dahale, M, Ralph, C, Pantelelis, N, Archer, E & McIlhagger, A 2023, 'Digitalisation of Resin Transfer Moulding (RTM) in Composite Manufacturing', International Conference on Composite Materials - 23, 30/07/23 - 4/08/23.

Asharindavida, F, Liu, J, Uhomoibhi, J & Nibouche, O 2024, Compact, Optimized, and Effective: The CNNSpectra Approach to Deep Learning in Spectral Data Analysis. in 2024 4th International Conference on Neural

Networks, Information and Communication Engineering, NNICE 2024. 2024 4th International Conference on Neural Networks, Information and Communication Engineering, NNICE 2024, IEEE, pp. 1624-1629. https://doi.org/10.1109/nnice61279.2024.10498604

Babu, B, Daha, MY & Hadi, MU 2024, Enhancing Signal Detection in 6G Networks through LSTM-based MIMO Technology. in H Zheng, I Cleland, A Moore, H Wang, D Glass, J Rafferty, R Bond & J Wallace (eds), Proceedings of the 35th Irish Systems and Signals Conference, ISSC 2024. Institute of Electrical and Electronics Engineers Inc., 35th Irish Systems and Signals Conference, ISSC 2024, Belfast, United Kingdom, 13/06/24. https://doi.org/10.1109/ISSC61953.2024.10603097

Bashir, S, Rohail, K, Sadak, F, Hadi, MU, Muneer, A, Ragab, MG, Awais, M & Qureshi, R 2023, Exploring the Impact of Preprocessing Techniques on Retinal Blood Vessel Segmentation Using a Study Group Learning Scheme. in 2023 IEEE Signal Processing in Medicine and Biology Symposium (SPMB). pp. 1-6. https://doi.org/10.1109/spmb59478.2023.10372702

Brown, A 2024, Decarbonising Thermodynamics: Teaching mechanical engineering thermodynamics for a net-zero future. in Proceedings of the 2024 Engineering Education Research Network Annual Symposium. UK and Ireland Engineering Education Research Network Annual Symposium 2024, Belfast, United Kingdom, 17/06/24.

Brown, L & Brown, A 2024, 'The incidence of maths anxiety in applied mathematical subjects at undergraduate level and the impact of mindfulness techniques as a pedagogical strategy', Paper presented at UK and Ireland Engineering Education Research Network Annual Symposium 2024, Belfast, United Kingdom, 17/06/24 - 18/06/24.

Castelino, C, Khandelwal, S, Sharat Chandra Varma, B & Shanker, S 2024, An Energy-Efficient HSI Analysis Accelerator on FPGAs for Satellite Imagery. in Euromicro Conference on Digital System Design (DSD). IEEE. https://doi.org/https://arxiv.org/html/2407.17647v1

Corbett, H, Solan, B, Tretsiakova-McNally, S & Fernandez-Ibanez, AP 2024, 'Monitoring Environmental Resilience in Northern Ireland: The Importance of Legislation in Managing Wastewater Discharges Impact on the Environment', 34th Irish Environmental Researchers Colloquium, Waterford, Ireland, 25/03/24 - 27/03/24 pp. 165.

Daha, MY, Rafferty, J, Ashraf, MI & Hadi, MU 2023, AIDETECT - AI-based Integratable Detection for Beyond 5G Networks. in 2023 3rd International Conference on Electrical, Computer, Communications and Mechatronics Engineering (ICECCME), Spain-2023. International Conference on Electrical, Computer, Communications and Mechatronics Engineering, ICECCME 2023, IEEE Xplore, pp. 1-5. https://doi.org/10.1109/ICECCME57830.2023.10252334

Daha, MY, Rafferty, J, Ashraf, MI & Hadi, MU 2023, DM-DETECT – A Deep MIMO Detector for Beyond 5G Networks. in 2023 Second International Conference on Augmented Intelligence and Sustainable Systems (ICAISS). Proceedings of the 2023 2nd International Conference on Augmented Intelligence and Sustainable Systems, ICAISS 2023, IEEE Xplore, pp. 1381-1385. https://doi.org/10.1109/ICAISS58487.2023.10250495

Daha, MY, Rafferty, J, Ashraf, MI & Hadi, MU 2024, Optimizing MIMO Detection with DM-Detnet in 6G Networks. in H Zheng, I Cleland, A Moore, H Wang, D Glass, J Rafferty, R Bond & J Wallace (eds), Proceedings of the 35th Irish Systems and Signals Conference, ISSC 2024. Institute of Electrical and Electronics Engineers Inc., 35th Irish Systems and Signals Conference, ISSC 2024, Belfast, United Kingdom, 13/06/24. https://doi.org/10.1109/ISSC61953.2024.10603372

Doggart, P, Kennedy, A, Bond, RR & Finlay, D 2024, 'Uncertainty Calibrated Deep Regression for QT Interval Measurement in Reduced Lead Set ECGs', Paper presented at 35th Irish Signals and Systems Conference (ISSC 2024), Belfast, United Kingdom, 13/06/24 - 14/06/24. https://doi.org/10.1109/ISSC61953.2024.10603025

Gilmour, A, Tabatabaeipour, M, McMillan, R, Tzaferis, K, Hampson, R, Jackson, W, Zhang, D, Lawley, A, Mohamed, A & MacLeod, C et al. 2023, Robotic Ultrasonic Inspection of Large and Complex Structural Assets. in S Farhangdoust, A Guemes & F-K Chang (eds), Structural Heath monitoring 2023: Designing SHM for Sustainability, Maintainability, and Reliability. DEStech Publications, Inc., pp. 2099-2106, 14th International Workshop on Structural Health Monitoring, California, California, United States, 12/09/23.

Goncalves Machado, G, Abbasi, MAB, McKernan, A, Gu, C & Zelenchuk, D 2023, 'Wideband Dual-Polarized 1-Bit Unit-cell Design for mmWave Reconfigurable Intelligent Surface', Paper presented at 18th European Conference on Antennas and Propagation, Glasgow, United Kingdom, 17/03/24 - 22/03/24. https://doi.org/10.23919/eucap60739.2024.10501256

Gu, C, Zhang, Z, Qin, F, Shang, X, Shang, X, Cotton, S, Ullah, J & Contreras, A 2024, A Fully Additive Manufactured D-Band SIW Antenna. in 18th European Conference on Antennas and Propagation, EuCAP 2024. 18th European Conference on Antennas and Propagation, EuCAP 2024, IEEE Xplore, pp. 1-5, 18th European Conference on Antennas and Propagation, Glasgow, United Kingdom, 17/03/24. https://doi.org/10.23919/EuCAP60739.2024.10501404

Hadi, MU, Daha, MY, Soman, SKO & Ijaz, M 2024, Experimental Analysis of A-RoF Based Optical Communication System for 6G O-RAN Downlink. in H Zheng, I Cleland, A Moore, H Wang, D Glass, J Rafferty, R Bond & J Wallace (eds), Proceedings of the 35th Irish Systems and Signals Conference, ISSC 2024. Proceedings of the 35th Irish Systems and Signals Conference, ISSC 2024, Institute of Electrical and Electronics Engineers Inc., pp. 1-6, 35th Irish Systems and Signals Conference, ISSC 2024, Belfast, United Kingdom, 13/06/24. https://doi.org/10.1109/ISSC61953.2024.10603165

Henry, R, Morgan, M, Beagon, U, Bowe, B, Jani, R & McKennedy, J 2023, Addressing Challenges Of The SDGs: Stakeholder Perspectives On Skills Required By Engineering Students On The Island Of Ireland. in G Reilly, M Murphy, BV Nagy & H-M Järvinen (eds), 51st Annual Conference of the European Society for Engineering Education (SEFI): Engineering Education for Sustainability. SEFI 2023 - 51st Annual Conference of the European Society for Engineering Education: Engineering Education for Sustainability, Proceedings, European Society for Engineering Education, pp. 566-575, SEFI Conference 2023, Dublin, Ireland, 11/09/23. https://doi.org/10.21427/NKX8-V179

Henry, R, Morgan, M, Beagon, U, Bowe, B, Jani, R & McKennedy, J 2024, Engineering Skills to Respond to SDGs: A Survey of Employers, Academics and Students. in the 39th International Manufacturing Conference proceedings. 1 edn, vol. 65, Engineering Proceedings, Irish Manufacturing Council, pp. 1-4, The 39th International Manufacturing Conference, Derry/Londonderry, Northern Ireland, 24/08/23. https://doi.org/10.3390/engproc2024065015

Jing, M, Owen, K, Mac Namee, B, Menown, I & McLaughlin, J 2023, Investigating Temporal Features of Carotid Intima-Media Thickness from Ultrasound Imaging with Recurrent Neural Networks. in 2023 45th Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC). vol. 2023, IEEE, pp. 1-4, The 45th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Sydney, Australia, 24/07/23. https://doi.org/10.1109/EMBC40787.2023.10340661

Joseph-Richard, P, Cummins, D, Morgan, M & McCartan, A 2023, 'Embedding Entrepreneurship Education Across Disciplines: Undergraduate Students' Views on How Entrepreneurship Should be Taught', pp. 1-10.

Machado, GG, Islam, KMR, Fusco, V & Abbasi, MAB 2024, Amplitude Only Direction of Arrival Estimation. in 20th SBMO/IEEE MTT-S International Microwave and Optoelectronics Conference, IMOC 2023. 20th SBMO/IEEE MTT-S International Microwave and Optoelectronics Conference, IMOC 2023, IEEE, pp. 124-126. https://doi.org/10.1109/IMOC57131.2023.10379750

McCausland, C, Biglarbeigi, P, Bond, RR & Finlay, D 2024, 'Advancing Sleep Studies: An Exploration of Phase-Based Approaches for Sleep Staging', Paper presented at 35th Irish Systems and Signals Conference, 13/06/24 - 14/06/24. https://doi.org/10.1109/ISSC61953.2024.10602946

McCausland, C, Bond, R, Finlay, D, Kennedy, A & Biglarbeigi, P 2023, Transforming Polysomnography: Time-Frequency Transforms to Visualise and Classify Polysomnography Data. in eSleep2023.

McGreeghan, A 2024, You Can Engineer It: Engineering Outreach for Females Aged 4–12. in Proceedings of the 39th International Manufacturing Conference. 1 edn, vol. 65, Engineering Proceedings, MDPI. https://doi.org/10.3390/engproc2024065011

Mensah, A, Larraneta, E, Acheson, J, Callan, J, Tambuwala, M & Courtenay, A 2023, 'Macromolecule uptake and characterisation of hydrogels designed for gingival crevicular fluid sampling for periodontal disease diagnostics.', Academy of Pharmaceutical Sciences, Reading, 5/09/23 - 7/09/23.

Morgan, M, Mahon, C, McMurray, R, Brown, A, O'Gorman, P, Burke, G, Holman, R & Keenan, M 2023, 'Customising Best Practice in Studies Advice For Undergraduate Engineering Students', pp. 1-10. https://doi.org/10.21427/TA4R-9J43

Naz, F, Fahim, M, Cheema, AA, Viet, NT, Cao, TV & Duong, TQ 2024, Features Inspired PM2.5 Prediction: A Belfast City Case Study. in N-S Vo, D-B Ha & H Jung (eds), Industrial Networks and Intelligent Systems - 10th EAI International Conference, INISCOM 2024, Proceedings. Lecture Notes of the Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering, LNICST, vol. 595 LNICST, Springer Science and Business Media Deutschland GmbH, pp. 204-212, 10th EAI International Conference on Industrial Networks and Intelligent Systems, INISCOM 2024, Da Nang, Viet Nam, 20/02/24. https://doi.org/10.1007/978-3-031-67357-3_15

O'Boyle, A, Quinn, J, Archer, E & Mc Garrigle, C 2023, 'Examining the Effects of Tufting Patterns on Carbon Laminates', 26th Sir Bernard Crossland Symposium, Limerick, Ireland, 14/09/23 - 15/09/23.

Puyol McKenna, P, Dooley, JSG, Ternan, NG, Banat, IM, Lemoine, P & Naughton, P 2023, 'Investigation of the anti-biofilm properties of purified biosurfactants in Enterococcal biofilms'.

Rajathanakodi, R & Hadi, MU 2024, MAD-STORM: Maneuverable Autonomous Drone with Sensing Technologies for Observing Rainfall and Meteorology in Northern Ireland. in H Zheng, I Cleland, A Moore, H Wang, D Glass, J Rafferty, R Bond & J Wallace (eds), Proceedings of the 35th Irish Systems and Signals Conference, ISSC 2024. Proceedings of the 35th Irish Systems and Signals Conference, ISSC 2024, Institute of Electrical and Electronics Engineers Inc., pp. 1-6, 35th

Irish Systems and Signals Conference, ISSC 2024, Belfast, United Kingdom, 13/06/24. https://doi.org/10.1109/ISSC61953.2024.10603132

Rose, C, McMurray, R & Hadi, MU 2024, A Reinforcement Learning Control and Fault Detection Method for the MADNI Drone. in H Zheng, I Cleland, A Moore, H Wang, D Glass, J Rafferty, R Bond & J Wallace (eds), Proceedings of the 35th Irish Systems and Signals Conference, ISSC 2024. Proceedings of the 35th Irish Systems and Signals Conference, ISSC 2024, Institute of Electrical and Electronics Engineers Inc., pp. 1-6, 35th Irish Systems and Signals Conference, ISSC 2024, Belfast, United Kingdom, 13/06/24. https://doi.org/10.1109/ISSC61953.2024.10602956

Sharma, S, Chakraborty, A & Soin, N 2024, Decarbonisation Begins at Port: Hydrogen Technologies for Electrifying Australian Ports. in 2023 33rd Australasian Universities Power Engineering Conference (AUPEC). 2023 33rd Australasian Universities Power Engineering Conference (AUPEC), IEEE, 33rd Australasian Universities Power Engineering Conference, Ballarat, Australia, 25/09/23. https://doi.org/10.1109/aupec59354.2023.10502806

Thoong, NQTT, Cheema, AA, Khosravirad, SR, Dobre, OA & Duong, TQ 2024, Channel Estimation for Reconfigurable Intelligent Surface-aided 6G NOMA Systems using CNN-based Quantum LSTM Model. in Channel Estimation for Reconfigurable Intelligent Surface-aided 6G NOMA Systems using CNN-based Quantum LSTM Model. The 2024 IEEE 100th Vehicular Technology Conference (VTC2024-Fall), IEEE, 2024 IEEE 100th Vehicular Technology Conference, 7/10/24.

Tran, B-ND, Fahim, M, Cheema, AA, Czarnuch, S, McNiven, BDE, Dobre, OA & Duong, TQ 2024, 'Estimation of Energy Expenditure in Wearable Healthcare Technology by Quantum-Based LSTM Modeling', Paper presented at International Conference on Quantum Communications, Networking, and Computing, Kanazawa, Japan, 1/07/24 - 3/07/24.

Tzaferis, K, Tabatabaeipour, M, Dobie, G, Pierce, G, Papaelias, M, MacLeod, C & Gachagan, A 2023, The Effect of Complex Corrosion Profiles on Remaining Wall Thickness Quantification Using Shear Horizontal Guided Waves. in S Farhangdoust, A Guemes & F-K Chang (eds), Strcutural Health monitoring 2023: Designing SHM for Sustainability, Maintainability, and Reliability. DEStech Publications, Inc., pp. 567-575, 14th International Workshop on Structural Health Monitoring, California, California, United States, 12/09/23.

Tzaferis, K, Tabatabaeipour, M, Dobie, G, Pierce, SG, Lines, D, MacLeod, CN & Gachagan, A 2023, Dual Mode Inspection Using Guided Waves and Phased Array Ultrasonics

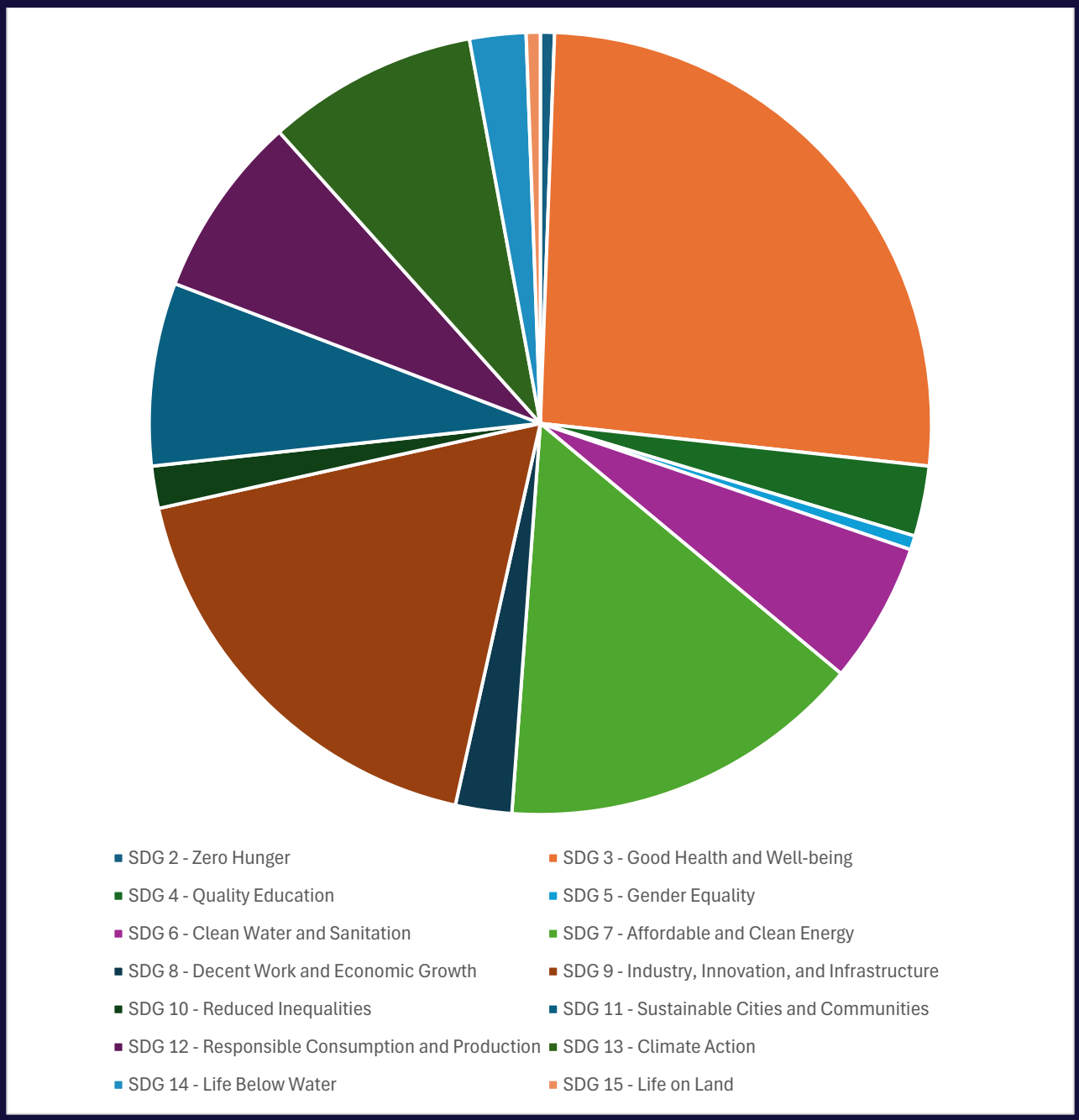
from a Single Transducer. in P Rizzo & A Milazzo (eds), European Workshop on Structural Health Monitoring, EWSHM 2022. vol. 270, Lecture Notes in Civil Engineering, vol. 270 LNCE, Springer, Cham, Switzerland, pp. 79-88, 10th European Workshop on Structural Health Monitoring - Palermo, Italy, Palermo, Italy, 4/07/22. https://doi.org/10.1007/978-3-031-07322-9_9

Una, B, McKennedy, J, Jani, R, Bowe, B, Morgan, M & Henry, R 2024, 'Examining the Effectiveness of a Summer School to Equip Engineering Students with Competence

s Required to Achieve the SDGS', Paper presented at 52nd Annual Conference of the European Society for Engineering Education (SEFI) , Lausanne, Switzerland, 2/09/24 - 5/09/24.

SUSTAINABLE DEVELOPMENT GOALS

Universities and knowledge institutions have a critical role to play in the achievement of the United Nations Sustainable Development Goals (SDGs). Here is a breakdown of the Research Outputs for the School of Engineering, according to their SDGs.



4. RESEARCH FUNDING

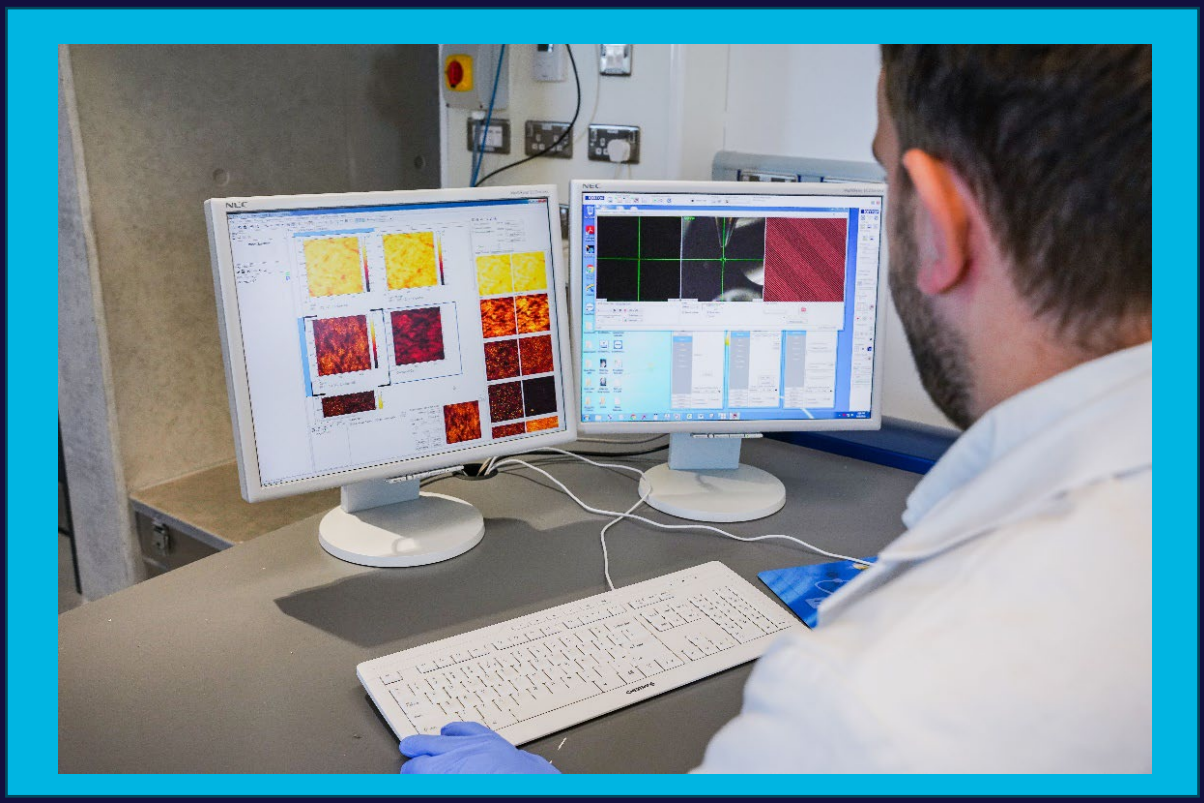
Portfolio of Research Grants awarded during period 1 August 2023 - 31 July 2024

UoA MEMBER(S)	PROJECT TITLE	FUNDER	VALUE	AWARD DATE
Dr Calvin Ralph	Novel 3D+ multi-axial preforms for complex loaded composite applications	Engineering & Physical Sciences Research Council	£403,795.00	23.08.2023
Prof. Michaela Black Prof. John Byrne Prof. Dewar Finlay Prof. James McLaughlin Prof. Brian Meenan	Artificial Intelligence Collaboration Centre (AICC)	Invest Northern Ireland	£13,830,161.00	24.08.2023
Dr Christopher McHugh Dr Adrian Boyd	States of Clay / Positions at Play: Squatting between Plasticity and Porosity	Arts & Humanities Research Council	£43,318.00	08.09.2024
Dr Patrick Dunlop	Gas-phase advanced oxidation for improved indoor air purification	EirChemicals	£14,421.49	11.09.2023
Prof. Justin Magee Professor John Byrne Dr Patrick Dunlop Professor Antonia Fernandez-Ibanez Professor Alistair McIlhagger	AHRC Green Transition Ecosystem: Future Island-Island	Arts & Humanities Research Council	£4,122,377.00	12.09.2023
Dr Jonathan Acheson	Ion release profiles from Calcium Phosphate coated resorbable Magnesium implants	The Royal Society	£46,298.42	30.10.2023
Dr Patrick Dunlop	Development of novel air disinfection systems (CAST)	Ilimex	£32,400.00	02.11.2023

Dr Nikhil Bhalla Dr Saikat Jana	Ultrafast detection of foodborne bacteria with acoustics	Quadram Institute	£15,300.00	01.12.2023
Professor Antonia Fernandez-Ibanez Professor John Byrne Mr Stuart McMichael	Photoelectrocatalytic inactivation of the waterborne emerging parasite Cryptosporidium in peroxymonosulfate solutions	NI Department for the Economy	£4,500.00	08.01.2024
Dr Saikat Jana	Transport of nanoparticles and nano swimmers in cystic fibrosis biofilms	NI Department for the Economy	£9,950.00	08.01.2024
Dr Juliana Gerard Dr Muskaan Singh Dr Muhammad Usman Hadi	Adaptive Education: Harnessing AI for Academic Progress	NI Department for the Economy	£40,020.41	10.01.2024
Dr Gabriel Goncalves Machado Dr Adnan Ahmad Cheema Prof. Dewar Finlay Prof. Alistair McIlhagger Dr Ardavan Rahimian	Building Digital Future using Transformative Technologies: a joint initiative of Ulster University and Brazil	NI Department for the Economy	£13,156.00	10.01.2024
Prof. Margaret Morgan Ms Rosalind Henry	PROFESS 12 Mark II	NI Department for the Economy	£19,370.00	15.01.2024
Prof. Pagona Papakonstantinou	Early Career Fellowships in Research and Innovation 2023/24	British Council	£180,000.00	07.02.2024
Dr Patrick McAllister Prof. Dewar Finlay	Artificial Intelligence assisted echocardiography to facilitate accurate image capture and transmission for congenital heart defects diagnosis in Sub-Saharan Africa	National Institute of Health (US)	£93,281.31	26.02.2024

Dr John O'Connor	BANFA: Biomechanically adjusted neurovascular function assessment	The Royal Society	£18,093.08	28.02.2024
Dr George Burke Liam McLarnon	3D Medical Polymers for Cell Culture Technologies	Invest Northern Ireland	£129,114.00	14.03.2024
Dr Morteza Tabatabaeipour	Robotic Fusion: Integrating Machine Vision and Ultrasonic Inspection for Enhanced Composite Material Analysis	Engineering & Physical Sciences Research Council	£49,571.47	14.03.2024
Prof. John Byrne Prof. Antonia Fernandez-Ibanez	SAFEWATER POC	Invest Northern Ireland	£148,937.00	20.03.2024
Prof. Alistair Mcilhagger Dr Edward Archer	Interface strengthening and damage self-sensing mechanisms of basalt fibre reinforced polymer composites	The Royal Society	£12,000.00	29.03.2024
Dr Kok Ng	Empowering Green Futures: Developing Energy Mapping Digital Twin Technology for Sustainable Wind Turbine Energy in Northern Ireland	Engineering & Physical Sciences Research Council	£49,666.00	29.04.2024
Prof. Frank Lyons Dr Adnan Ahmad Cheema Prof. Dewar Finlay Dr Ardavan Rahimian	The Belfast 5G Innovation Region (5G Film Anywhere)	Department for Science, Innovation and Technology	£832,400.00	29.05.2024
Prof. Dewar Finlay Prof. James McLaughlin Prof. Brian Meenan	EPSRC Centre for Doctoral Training in Digital Health Technologies	Engineering & Physical Sciences Research Council	£4,122,678.73	06.06.2024
Prof. John Byrne	MP PoC Stage 1	Invest Northern Ireland	£14,818.00	10.07.2024

Dr Amir Farokh Payam	Quantifying the fluidity, mechanical and viscoelasticity properties of cancer cells using V23D multifrequency force microscopy V2	The Royal Society	£12,000.00	28.07.2024
Dr Patrick McAllister Prof. Dewar Finlay	Transforming Neonatal Cardiac Diagnostics with AI: Networking and Partnership Initiative in Sao Paulo	NI Department for the Economy	£20,651.97	29.07.2024
Dr Nikhil Bhalla Dr Amir Farokh Payam Dr Abhijit Ganguly Dr Saikat Jana Prof. James McLaughlin Prof. Pagona Papakonstantinou	UK-India collaborations on Semiconductor Healthcare Technologies	NI Department for the Economy	£39,913.94	29.07.2024



5. NOTE FROM THE ASSOCIATE DEAN

The 2023-24 Annual Research Report for the School of Engineering reflects Ulster University's ongoing commitment to delivering impactful research excellence in areas that actively contribute to the economy of Northern Ireland and to society more generally.

The scope and scale of the research undertaken by the School is reflected in the high quality of the various outputs reported here and the direct positive impact that it is having on society through our various partnerships with industry and other national and international institutions.

The University Strategy: 'People, Place and Partnership' seeks to deliver 'Sustainable Futures for All' with research and innovation central to its success (People, Place and Partnership - People, Place and Partnership). The associated University Research Strategy (2023-2028) focuses on how our core values of Collaboration, Enhancing Potential, Inclusion, and Integrity underpin a sector-leading enviroment for the continued development of talent and opportunity across our designated research themes (Ulster University Research Strategy 2023-2028).

"[W]e are focused on further increasing our world-leading and internationally excellent research that impacts both locally and globally[.]"

As we to plan our submissions to relevant subject areas in the 2029 UK Research Excellence Framework exercise (REF2029), we are focused on further increasing our world-leading and internationally excellent research that impacts both locally and globally with Open Research as a central tenet of our ambitions.

Professor Brian J. Meenan
Associate Dean for Research and Innovation

REF 2021

Ulster University

Research Centres and Groups

Advanced Future Materials and Manufacturing **(AFM2)**

Nanotechnology and Integrated Bioengineering Centre **(NIBEC)**

ulster.ac.uk

For internal use only