

University of
South Wales
Prifysgol
De Cymru

POSTGRADUATE RESEARCH SHOWCASE

PROGRAMME

17-18 JUNE 2026
BOOI, BRECON BUILDING
TREFOREST CAMPUS

WELCOME

WE ARE DELIGHTED TO WELCOME YOU TO THIS YEAR'S POSTGRADUATE RESEARCH STUDENT SHOWCASE.

Professor Martin Steggall (Pro-Vice Chancellor, Research and Innovation) and Dr Elaine Huntley (Graduate School Manager).

This year's theme is Impact. On day one, we are delighted to welcome Professor Eric Jensen, a social scientist and research impact expert. Professor Jensen will deliver a keynote presentation "Fast track your research impact", followed by a panel session on day two. During this session, members of USW staff will discuss what research impact and engagement means. The panel will include Professor Mike Chick (Humanities Research and Innovation Group), Dr Tracie McKinney (Earth, Ecology and Environment Research and Innovation Group), Professor Chris Hill (Humanities Research and Innovation Group) and Professor Katy Holloway (Criminology Research and Innovation Group). The panel will be chaired by Professor Brendan Cropley (Sport and Exercise Research and Innovation Group Lead).

This year's event provides an opportunity for around 40 postgraduate researchers to showcase their work to a diverse audience of peers and staff. Most of our Research and Innovation Groups are represented across the two days. For our presenters - some of you may have only just started your studies and you may not have had an opportunity to present at an external conference yet. Rest assured that today provides a nurturing, kind and respectful environment to gain some great experience. As postgraduate researchers you will be well versed in discussing detailed, challenging topics with your supervisors but getting your message across to a non-specialist audience can be tricky and draws on a different skillset, even more so when your topic is very technical. Today provides a perfect opportunity to practice this in a safe space. Similarly, if you have questions following the presentations please do ask as presenters will be appreciative of this. We would like everyone to have this opportunity and would just ask for the audience to be considerate in this space.

Our presenters will be presenting on a range of topics and in one of three categories – oral presentation (ten minutes plus five minutes for questions), three-minute thesis (3-MT©) presentation (three minutes and one slide only) and Images of Research exhibition. You can view some fantastic images and read about how they relate to the presenter's topic in the exhibition in the foyer during the breaks. As always, we will have a judging panel for each category and prizes will be awarded for the best presentations at the end of day two.

We would like to thank all our speakers, chairs, judges, academic and professional services staff, and audience for supporting this event. We hope you enjoy!

DAY ONE

Wednesday 17 June 2026

TIME	SESSION	CHAIR/FACILITATOR
09.30-10.00	Arrival and registration	
10.00-10.10	Welcome and Introduction Professor Martin Steggall <i>Pro Vice-Chancellor for Research and Innovation</i>	Professor Martin Steggall
10.10-10.15	Introduction of Keynote Speaker Professor Martin Steggall	
10.15-11.15	Keynote Presentation – “Fast track your research impact” Professor Eric Jensen <i>Fellow HEA and CEO and Research Director of Institute for Methods Innovation</i> Professor Eric Jensen is a social scientist with a PhD from the University of Cambridge in sociology. He is a part-time professor at the University of Warwick, where he has led courses on public engagement, science policy, audience research and social research methods (including surveys and statistics). He is also a doctoral research supervisor for the University of Oxford and a visiting research scientist at the National Center for Supercomputing Applications at the University of Illinois.	
11.15-11.30	Break	
11.30-12.45	Oral Presentations Can songwriting support communities’ mental wellbeing? Laura-Ann Moulding <i>Creative Industries Research and Innovation Group</i> The chronic effects of rugby on the brain Danny Walmsley <i>Sport and Exercise Research Group</i> WRU Schools & Colleges Physical Profiling Project: Monitoring and Identifying Talented Athletes William Raymond <i>Sport and Exercise Research Group</i> Professional Dissonance and Teacher Well-Being in Further Education: Operating with Care in a Marketised FE Landscape Thomas Gregory <i>Pedagogy Research and Innovation Group</i>	Chair: Professor Sandra Esteves Judges: Professor Martin Steggall & Dr Elaine Huntley

DAY ONE

Wednesday 17 June 2026

TIME	SESSION	CHAIR/FACILITATOR
	Cracked Columns and Leaky Pipelines: investigating why women leave Civil Engineering Rhiannon Jones <i>Pedagogy Research and Innovation Group</i>	
12.45-13.45	Lunch and Images of Research Exhibition	Judges: Professor Carolyn Wallace and Donna Szarun
13.45-15.00	Oral Presentations Impact of Psychological Stress on Cardiovascular Disease Nia Davies <i>Sport and Exercise Research Group</i> Effecting Policy Change to Enhance Climate Change Resilience Within Threatened Communities in Nepal Bishnu Bahadur Khatri <i>Social Policy Research and Innovation Group</i> A General Concept to Software Validation for Medical Device Quality Management Systems (QMS) Shady Rezk <i>Business Research and Innovation Group</i> A Bioelectrochemical Route to Sustainable Succinic Acide Production Sai Tejaswini Gone <i>Sustainable Environment Research Centre</i> Understanding Waste Glass in Low-Carbon Geopolymer Materials Sri Ganesh Mohan Kumar <i>Engineering Research and Innovation Group</i>	Chair: Professor Sandra Esteves Judges: Professor Martin Steggall & Dr Elaine Huntley
15.00-15.30	Break	
15.30-16.45	Oral Presentations Towards Low-carbon High-Strength Concrete Immanuel Rwandalla <i>Engineering Research and Innovation Group</i>	Chair: Dr Gina Dolan Judges: Professor Martin Steggall & Dr Elaine Huntley

DAY ONE

Wednesday 17 June 2026

TIME	SESSION	CHAIR/FACILITATOR
15.30-16.30	Oral Presentations cont. Identity-Related and Corporate-Related Determinants of Customer Loyalty in Islamic Banks in Oman Yousuf Al-Yahmadi <i>Business Research and Innovation Group</i> Resilience and Innovation in a UK Health Charity: A Case Study of the British Heart Foundation during the COVID-19 Pandemic. Sonaina Sharif <i>Business Research and Innovation Group</i> Development of a low-cost high precision tunable DFB laser array data acquisition system using FPGA Tintu Koodathumpara Thampy <i>Engineering Research and Innovation Group</i>	
16.30	Closing remarks Professor Martin Steggall Pro Vice-Chancellor for Research and Innovation	
17.00-18.30	Barbecue (Patio Area outside Stilts, Treforest campus)	

DAY TWO

Thursday 18 June 2026

TIME	SESSION	CHAIR/FACILITATOR
09.30-09.55	Arrival and registration	
09.55-10.00	Welcome to Day 2 and introduction to Q&A event Professor Martin Steggall <i>Pro Vice-Chancellor for Research and Innovation</i>	
10.00-10.50	How to identify Impact in your Research Q&A session Panel, to include: Dr Tracie McKinney, Professor Mike Chick, Professor Katie Holloway and Professor Chris Hill	Chair: Professor Brendan Cropley
10.50-11.20	Oral Presentations Monkeying around in the movies: The use of primates in film, 1990-2025 Brooke Aldrich <i>Earth, Ecology and Environment Research and Innovation Group</i> Mapping and mobilising traditional orchards and heritage apples in Wales Niamh Breslin <i>Earth, Ecology and Environment Research and Innovation Group</i>	Chair: Dr Gina Dolan Judges: Professor Martin Steggall & Dr Elaine Huntley
11.20-11.45	Break	
11.45-12.30	Oral Presentations Assessing IoMT Network Resilience: A Comparative Performance Analysis of Simulated Attacks using NS-3 Ramadhan M Rajab <i>Computing, Cybersecurity, Mathematics and Informatics Research and Innovation Group</i> Dissemination and variation of selected ARGs in differently fertilised soils and the role of heavy metals as AMR co-selectors of greenhouse grown lettuce. Darshanika Arambegedara <i>Earth, Ecology and Environment Research and Innovation Group</i>	Chair: Dr Marta Minier Judges: Professor Martin Steggall & Dr Elaine Huntley

DAY TWO

Thursday 18 June 2026

TIME	SESSION	CHAIR/FACILITATOR
11.45-12.30	Oral Presentations cont. Developing a low cost, high resolution, handheld 3D thermal imaging device Mahmod Sahal <i>Engineering Research and Innovation Group</i>	
12.30-13.30	Lunch and Images of Research Exhibition	Judges: Professor Carolyn Wallace and Donna Szarun
13.30-14.30	3MT© (3 Minute Thesis) Showcase The Welsh Dimension for Social Prescribing: What does Creativity mean to you? An exploration of creativity within Welsh social prescribing practice. Dr Maria Susy Rogers <i>Health, Care and Wellbeing Research and Innovation Group</i> Investigating Sustainable Recovery, Reuse, and Lifecycle Extension of Quarantined Aircraft Parts and Components Lalita Ghandi <i>Engineering Research and Innovation Group</i> Exploring Social Capital among Pregnant International Students in Wales Adebusola Ogunyemi <i>Health, Care and Wellbeing Research and Innovation Group</i> Self-Defence by Algorithm? Governing User-Led AI Against Cyberbullying Afsana Swarna <i>Criminology, Policing and Security Research and Innovation Group</i> The Safety Net we already have: Rethinking who stops the abuse Sunday Olaniyi <i>Health, Care and Wellbeing Research and Innovation Group</i>	Chair: Professor Brendan Cropley Judges: Dr Gina Dolan and Professor Sandra Esteves

DAY TWO

Thursday 18 June 2026

TIME	SESSION	CHAIR/FACILITATOR
13.30-14.30	3MT© (3 Minute Thesis) Showcase cont. Access to Higher Education in Wales: Opportunity, Regulation, and Inequality John Whitcher <i>Pedagogy Research and Innovation Group</i> Why Public Sector Transformation Fails: Explaining Implementation Across Complex Systems Gareth Cooke <i>Health, Care and Wellbeing Research and Innovation Group</i> Be(com)ng We: Pathways to sharing ways of being in the world to support an understanding of autism Emma Reardon <i>Pedagogy Research and Innovation Group</i> Enhancing Transaction-Level Security in Digital Banking through an Adaptive Zero Trust Architecture with Integrated Risk Scoring Manasa Pushparanjan <i>Computing, Cybersecurity, Mathematics and Informatics Research and Innovation Group</i> Impact of Loneliness on Health and Well-being of International Students in Wales, United Kingdom Lasith Dissanayake <i>Health, Care and Wellbeing Research and Innovation Group</i>	
14.30-14.45	Break and Judging Panel Discussion	
14.45	Prizes and close	

PLENARY SPEAKER

Professor Eric Jensen

Professor Jensen draws on more than 20 years of social research, evaluation and engagement experience to strengthen evidence based research impact.

Professor Jensen is a social scientist with a PhD from the University of Cambridge in sociology. He is a part-time professor at the University of Warwick, where he has led courses on public engagement, science policy, audience research and social research methods (including surveys and statistics). He is also a doctoral research supervisor for the University of Oxford and a visiting research scientist at the National Center for Supercomputing Applications at the University of Illinois.

Professor Jensen has been an invited trainer for numerous research and innovation institutions and governments around the world on topics relating to engagement, evaluation and evidence-based research impact. He has delivered training in English, Spanish, and Brazilian Portuguese to more than 18,000 researchers, policymakers, and learning and impact professionals from over 1,000 institutions in 75+ countries, including in person programs in 30 countries.

Professor Jensen has authored 200+ peer reviewed articles (3,000+ citations) in outlets such as PLOS ONE, Public Understanding of Science, PNAS, and Nature; books with Cambridge University Press and SAGE; chapters in books published by Oxford University Press, Springer, and Palgrave; and commissioned reports for UNESCO and the European Space Agency.

“WHAT RESEARCH IMPACT AND ENGAGEMENT MEANS” PANEL

Chair

Brendan Cropley

Professor Brendan Cropley is the Sport and Exercise Research and Innovation Group Lead and the Head of the Centre for Football Research in Wales. He is widely regarded as a research expert in the field of reflective practice and the potential it has for developing effective practice and facilitating human flourishing. Brendan joined USW in 2017 having previously worked at Swansea and Cardiff Metropolitan University.

Panel members

Katy Holloway

Professor Katy Holloway is a member of the Criminology, Policing and Security Research and Innovation Group and is the head of the Substance Use Research Group (SURG). Katy completed her PhD at the University of Cambridge in 2000 and joined the university in 2002 as a Research Fellow and became a permanent member of staff within Criminology in 2008. During the course of her academic career Katy's research has focused on substance use.

Tracie McKinney

Dr Tracie McKinney is a Senior Lecturer in Biological Anthropology. Dr McKinney is a member of the IUCN Primate Specialist Group Section for Human-Primate Interactions, where she works to ensure that our research and policies around primates include the human dimension. Tracie is particularly interested in the relationships people have with other animals, how animals respond to changing environments, and ways to support wildlife conservation in human-dominated landscapes.

She is currently working with collaborators in Costa Rica to install aerial bridges to reduce road fatalities for the Vulnerable mantled howler monkey.

Mike Chick

Professor Mike Chick is a teacher educator and researcher and is also the University's Refugee Champion.

His research interests surround language education for people seeking sanctuary in Wales and he has recently completed a commissioned review of the Welsh Government's migrant language education policy.

He is currently researching the role of minority language education in creating a sense of belonging and inclusion amongst forced migrants in Wales. He was appointed Professor of ESOL in June 2024.

Christopher Hill

Professor Chris Hill specialises in environmental history, imperial history and the history of science and technology. His recent research, funded by the Arts and Humanities Research Council (AHRC), has explored the multifaceted role of imperialism across the cycle of nuclear development in Britain, from uranium extraction in Namibia and South Africa to nuclear weapons tests in Australia and the Pacific. Chris was Principal Investigator for the Office for Veterans' Affairs project: An Oral History of British Nuclear Test Veterans. His next book, *Radiant Empire: Namibian Uranium and Nuclear Britain*, is contracted to Stanford University Press.



ABSTRACTS FOR ORAL PRESENTATIONS

EFFECTING POLICY CHANGE TO ENHANCE CLIMATE CHANGE RESILIENCE WITHIN THREATENED COMMUNITIES IN NEPAL

Bishnu Khatri

Social Policy

My practice-based research is in the high mountain communities of Mustang and Myagdi districts of Nepal. These communities are highly vulnerable to climate change and its impact. Communities in these regions are already experiencing climate impacts in their lives, livelihood and culture. The research focuses on strengthening community agency so people can document their lived experiences, build their confidence, critically reflect their voices, and create dialogue with stakeholders and policy makers for the climate related policies and decision making.

Grounded in participatory film ethnography, an asset-based approach, and inspired by Paulo Freire's concept of critical consciousness, my research engages women from socio economically marginalized communities. The methodology includes seven interconnected states: identification and networking; community scoping and engagement; filmmaking workshops and capacity building; community filming; screening, critical reflection, and cross community exchange; alignment with scientific knowledge and policies; and dialogue.

I have been integrating creative monitoring and evaluation tools, including River Journey reflections, wellbeing thermometers, artistic activities, and short Likert scale assessments. The process strengthened confidence, community agency and dialogue. I am also developing an interactive visual resource web portal as one of the artifact research outputs to document my visual research outputs in a single platform.

MONKEYING AROUND IN THE MOVIES: THE USE OF PRIMATES IN FILM, 1990-2025

Brooke Aldrich

Earth, Ecology and Environment

The use of live primates as film "actors" (PAs) is a tradition almost as old as cinema itself, but the practice is damaging to primates as individuals and as species. I will present the results of two related pieces of research on the use of PAs between 1990 and 2025, exploring the frequency and nature of such use during that time period. I will put this into the context of what is known about the welfare consequences of the use of PAs, which centre around the social and physical deprivation that is innate to the practice. I will also discuss the negative effects that exposure to images of primates in inappropriate contexts is thought to have on public attitudes and beliefs and on conservation efforts. This work is part of a PhD on the integration of primate conservation, welfare and advocacy.

THE CHRONIC EFFECTS OF RUGBY ON THE BRAIN

Danny Walmsley

Sport and Exercise

Rugby union carries an inherent risk of repetitive head impacts. These accelerations of the brain, which can accumulate into the thousands over a professional career, have serious implications for cerebral blood supply and functional capacity. This work examines the vascular, biochemical, and clinical consequences of rugby play within a cohort of retired players aged 30 to 59.

Vascular health is assessed using non-invasive ultrasound techniques to gauge the efficacy of the cerebral vascular network. Simultaneously, molecular assays are employed to identify objective biomarkers of damage in blood and saliva. Correlating these novel and established biomarkers with cognitive performance can provide robust measures of neurodegeneration, benefiting both athletes and non-athletes who suffer head injuries.

Finally, because cognition directly influences quality of life, a comprehensive battery of cognitive tests is utilised to evaluate diverse domains of brain function, from memory to attention.

DISSEMINATION AND VARIATION OF SELECTED ARGs IN DIFFERENTLY FERTILISED SOILS AND THE ROLE OF HEAVY METALS AS AMR CO-SELECTORS OF GREENHOUSE GROWN LETTUCE.

Darshanika Dinushi Arambegedara

Earth, Ecology and Environment

Antibiotic Resistant Genes (ARGs) are prevalent in agricultural soils due to organic fertiliser amendments. To tackle Antimicrobial Resistance (AMR) it is important to understand how the presence of heavy metals (both natural and in the fertiliser amendments) may influence AMR entering the food chain and find evidence on the impact of heavy metals as a selective pressure for AMR dissemination in agriculture. The objective of this greenhouse trial was to evaluate the effects of two organic fertilisers, a chemical fertiliser and topsoil on the AMR of soil and to identify how heavy metals may act as a selective pressure on AMR. High throughput qPCR was used to quantify the ARGs and elemental compositions determined using the SEM-EDX. Levels of AMR in chemically fertilised soils displayed a pattern where the first week had highest levels in comparison to the following weeks. Followed by three weeks of comparatively high AMR levels, the final six weeks, along with the death of lettuce displayed reduction and stabilisation of AMR levels. Digestate fertilised soil and topsoil, displayed a similar pattern of AMR level changes with the highest levels observed in the first week of transplant and levels stabilising towards the harvest. It is the biofertilised soil that displayed a difference in the patterns of AMR levels over time. With highest AMR levels observed during the 8th - 9th weeks and lowest levels observed in week 6. It is also the only fertiliser to display a negative correlation between the ARGs analysed. Digestate and topsoil saw significant AMR reductions over the course of the trials. Interestingly, the two heavy metals observed Pd and Fe were positively correlated to the ARGs analysed. Early analysis shows that digestate shows promise as an organic fertiliser and also a positive correlation between heavy metals and ARGs.

TOWARDS LOW-CARBON HIGH-STRENGTH CONCRETE

Immanuel Rwandalla

Engineering

Concrete is one of the most widely used materials in the world, and it is an essential material for the construction of buildings, roads, bridges, and other infrastructure. However, producing traditional concrete has a serious environmental impact because it relies heavily on cement, which generates large amounts of carbon emissions during manufacturing. This presentation explores ways to producing concrete that is not only more environmentally friendly but also much stronger and more durable than conventional concrete. The presentation describes how alternative materials, including industrial by-products that would otherwise go to waste, can be used to reduce the amount of cement needed while still creating high-strength concrete suitable for modern construction. The presentation also showcases how the involvement of laboratory testing with modern digital technologies can be utilised to better understand how high-strength concrete behaves. The long-term goal is to support more sustainable concrete practices while helping reduce the environmental impact of the built environment. This presentation highlights how engineering and innovation can contribute towards safer, stronger and more sustainable cities in the future.

CAN SONGWRITING SUPPORT COMMUNITIES' MENTAL WELLBEING?

Laura Ann Moulding

Creative Industries

My research aims to explore whether songwriting can be beneficial for our mental wellbeing through a community focus lens. Building on the work already developed by Baker (2015) and Macdonald et al. (2013), who discuss a variety of themes relating to music and wellbeing, and songwriting's use within music therapy.

My methods include hosting sessions where I shall mentor members to create their own song/songs. I would like to monitor multiple sessions which would include lyric writing (the words) and the music creation (melody, and rhythm). I aim to work with charity and community groups, as well as seek guidance in creating these workshops suitable for students and wellbeing teams. Spintge and Droh (1992) highlight how music has regrown in supporting our wellbeing, whilst Gustavson et al. (2021) suggests that music can build our confidence, mood regulation, identity and self-expression. Beech (2015), Heck et al. (2025) and Gustavson et al (2021), share how music within our daily lives brings relief, whilst songwriting for those with depression and anxiety felt peaceful. The reason behind this research comes from lived experience, my business 'The Sound Tree', and through conversations with people I've met who have struggled with their mental health.

DEVELOPING A LOW COST, HIGH RESOLUTION, HANDHELD 3D THERMAL IMAGING DEVICE

Mahmod Sahal
Engineering

The project presents the development of a low-cost handheld 3D thermal imaging system that combines stereo vision with long-wave infrared (LWIR) sensing to generate metrically reliable three-dimensional thermal models. Although 3D reconstruction and thermography are well-established fields, integrating them into portable and affordable systems remains challenging due to calibration instability, thermal sensor artefacts, and high computational demands.

The proposed system consists of two monochrome visible-light cameras arranged as a stereo pair and a handheld thermal camera. A cross-modal calibration framework is introduced using a UV-ink calibration target detectable in both visible and thermal imagery, enabling robust calibration without expensive heated targets. To improve calibration accuracy, a thermal image inpainting method is proposed to remove the central hot-spot artefact commonly present in compact LWIR cameras.

A computationally efficient thermo-geometric fusion pipeline is developed using Semi-Global Matching (SGM) for stereo depth estimation, followed by thermal projection onto reconstructed geometry to generate dense 3D thermal models. Experimental evaluation demonstrates improvements in calibration accuracy, reconstruction quality, and runtime performance. Case studies in electronics inspection and building diagnostics highlight the practical applicability of the system. The research contributes reproducible methods and datasets that support future developments in 3D thermal imaging and AI-based vision applications.

IMPACT OF PSYCHOLOGICAL STRESS ON CARDIOVASCULAR DISEASE

Nia Davies
Sports and Exercise

Cardiovascular disease (CVD) remains a leading cause of death and disability worldwide, accounting for around one third of global mortality. While established risk factors such as lifestyle and genetics explain much of this burden, the role of psychological stress is less clearly understood.

Emerging evidence from the Neurovascular Research Laboratory (NRL) at USW suggests that psychological stress may increase the tendency for blood to clot (a hypercoagulable state), potentially through mechanisms involving oxidative stress. This study investigated the acute effects of psychological stress on haemodynamic responses and blood clotting factors (coagulation parameters). Ten biological females attended the NRL on two occasions and were exposed to either an induced psychological stress test or a 15-minute quiet sitting control condition. Rheological, cardiorespiratory, and various hormone measurements were collected and compared between conditions.

Acute psychological stress was associated with changes in coagulation markers and sex hormone levels both pre- and post-intervention, as well as relative to the control condition. These findings suggest that acute psychological stress may influence haemostatic function and contribute to mechanisms associated with increased CVD risk. However, further research with larger sample sizes is required to confirm these findings and establish long-term clinical relevance.

MAPPING AND MOBILISING TRADITIONAL ORCHARDS AND HERITAGE APPLES IN WALES

Niamh Breslin

Earth, Ecology and Environment

Traditional orchards and heritage apples are vital natural and cultural assets that have declined sharply since the mid-20th century. Though designated as UK priority habitats, traditional orchards remain understudied and continue to be lost or degraded; and despite over 2,500 apple varieties identified across the nation - and many regional varieties remaining unidentified - we import over 60% of our apples. This highlights a significant disconnect between available resources and current food systems, and with climate change impacting crop production abroad we need to revisit how we value and use our homegrown varieties. The sensitive management practices typical of historic orchards support high biodiversity, carbon storage, and landscape connectivity; and heritage apple varieties, being genetically diverse and adaptable, help sustain productivity under increasingly variable conditions. Recent years have seen renewed interest in restoring and creating traditional orchards on a community scale; alongside identification and propagation of heritage apples. Using community mapping and citizen science approaches, this PhD research aims to highlight best practice and foster greater interest and investment in traditional orchards and heritage apples, with a focus on South Wales. This is multidisciplinary research drawing from interactions in human geography, social science, geospatial science and environmental conservation.

ASSESSING IOMT NETWORK RESILIENCE

Ramadhan Rajab

Computing, Cybersecurity, Mathematics and Informatics

The Internet of Medical Things (IoMT) advances healthcare capabilities but it exposes critical cybersecurity vulnerabilities. This study evaluates five attack types—DoS, DDoS, MITM, Blackhole, and MQTT broker flooding—within an IEEE 802.11-based IoMT network simulated in NS-3, featuring Baxter Wireless Infusion Pump and Hexoskin Smart Health Shirt devices. However, some limited native support in NS-3 led to some abstractions designed to reflect realworld featured simulations. A Statistical Analysis of 540 network flows across throughput, one way delay (OWD), packet delay variation (PDV), and packet loss revealed that the MITM attack was the most disruptive, with a statistically significant packet loss (mean = 11.50%, $p < 0.0001$) and latency issues. Despite performance degradation, Bluetooth energy consumption remained constant (2.580 J), underscoring the inadequacy of energy metrics alone for anomaly detection. MITM compromises data integrity and timing, posing direct risks to patient safety. While blockchain enhances authentication, its computational demands challenge constrained IoMT devices. The study recommends mitigation strategies such as Deep Packet Inspection (DPI), Network Behavioural Analysis (NBA), Anomaly Detection (NAD), and Federated Learning (FL), supported by encryption and packet cleansing. These approaches collectively offer a foundation for secure, resilient, and performance aware IoMT deployments in healthcare environments.

CRACKED COLUMNS AND LEAKY PIPELINES: INVESTIGATING WHY WOMEN LEAVE CIVIL ENGINEERING

Rhiannon Jones

Pedagogy

Despite a welcome increase in women enrolling in civil engineering degrees, the UK engineering and construction sector faces a staggering retention crisis. Every year, approximately 35% of new female engineering graduates walk away from the profession entirely, leaving the field during that critical transition from university to early-career practice. This research aims to look past surface-level statistics to explore why this pipeline is leaking so severely. By examining the disconnect between an inclusive higher education environment and the traditional, male-dominated cultures often found in industry workplaces, this study will uncover the hidden structural barriers that stifle career progression and belonging.

Using data from the Higher Education Statistics Agency (HESA) alongside graduate career tracking surveys, this presentation explores the points where early-career trajectories diverge. As the foundational phase of the doctoral study, these preliminary macro-level findings will establish the baseline for upcoming qualitative focus groups and industry interviews.

The ultimate goal of this doctoral project is to create practical, evidence-based frameworks that change industry culture. By identifying these barriers, we can empower universities and workplaces to cultivate future engineering professionals as 'EDI Champions' – ensuring that the women we train are supported to build long-term, impactful careers in engineering.

A BIOELECTROCHEMICAL ROUTE TO SUSTAINABLE SUCCINIC ACID PRODUCTION

Sai Tejaswini Gone

Sustainable Environment

Succinic acid is a high-value C₄ dicarboxylic acid and recognised platform chemical with established applications in bioplastics, pharmaceuticals, food additives, and fine chemicals, yet commercial production remains almost entirely petroleum-dependent. Conventional fermentation routes are further constrained by incomplete carbon recovery, CO₂ evolution, and byproduct formation, collectively limiting yield and sustainability. Microbial electrofermentation offers a compelling solution — applying an electrical current to augment microbial metabolism, supplying reducing equivalents from the cathode to reshape NAD⁺/NADH balance and reinforce reductive TCA flux towards succinic acid.

This research investigates electrofermentation of succinic acid using *Actinobacillus succinogenes* in purpose-built bioelectrochemical reactors, systematically optimising applied potential, redox mediators, and electrode architecture. Our latest results demonstrate that combining 1.0V applied potential with neutral red as a redox mediator and carbon veil electrodes achieved a glucose-to-succinic acid conversion efficiency of 61.31% and a yield of 0.60 g g⁻¹ glucose, significantly outperforming conventional fermentation showcasing the fundamental benefit and critical interplay between electrostimulation, mediator facilitated electron shuttling and electrode configuration.

Currently we have extended this platform to other feedstocks including cheese whey, molasses etc establishing an integrated waste valorisation pathway and progressing towards a carbon-negative, bio-based alternative to petrochemical succinic acid production.

A GENERAL CONCEPT TO SOFTWARE VALIDATION FOR MEDICAL DEVICE QUALITY MANAGEMENT SYSTEMS (QMS)

Shady Rezk

Business

This presentation will explore how software used in quality management systems (QMSs) can be effectively validated within the medical device industry. Medical device companies rely on many digital tools throughout the product lifecycle, including design, testing, manufacturing, packaging, distribution, and complaint handling. Because these systems support patient safety and regulatory compliance, they must function reliably and meet the requirements of ISO 13485 standards.

The research examines current industry practices for validating application software used in QMSs and identifies the main challenges organisations face when maintaining compliance in a highly regulated environment. It will also investigate the activities required during software validation, including risk assessment, testing procedures, and the development of Order Requirement Specifications (ORS). These activities help ensure that software performs as intended and supports product quality and operational efficiency.

In addition, the study proposes a conceptual framework to improve the management of software validation processes. The framework considers how digital tools, structured planning, and effective scheduling practices can reduce costs, improve efficiency, and strengthen compliance. The findings aim to provide practical guidance for organisations seeking to manage software validation more consistently and effectively across the medical device sector.

RESILIENCE AND INNOVATION IN A UK HEALTH CHARITY: A CASE STUDY OF THE BRITISH HEART FOUNDATION DURING THE COVID-19 PANDEMIC

Sonaina Sharif

Business

The COVID-19 pandemic disrupted fundraising, stakeholder engagement, and service delivery, posing health charities with unprecedented challenges. This study investigates how the British Heart Foundation (BHF) maintained its organizational resilience during and after the pandemic by adapting to these difficulties through technological and financial innovation. Limited research has examined how innovation contributes to resilience within UK health charities, despite the growing interest in innovation during crises. Using a qualitative interpretivist approach, this research adopts a single-case study design focused on the BHF. Semi-structured interviews with employees, managers, volunteers, and other relevant stakeholders will be used to gather data. Additionally, organizational documents like annual reports and strategic communications will be analyzed. Patterns related to innovation and resilience will be identified through the use of the six-step framework developed by Braun and Clarke for thematic analysis. The study is informed by Resource-Based View, Stakeholder Theory, and Systems Theory, positioning organisational resilience as a dynamic capability shaped by innovation, leadership, and organisational culture. The findings are expected to contribute both theoretically and practically by offering insights into how health charities can strengthen resilience and prepare for future disruptions through innovative practices.

UNDERSTANDING WASTE GLASS IN LOW-CARBON GEOPOLYMER MATERIALS

Sri Ganesh Kumar Mohan Kumar

Engineering

The construction industry faces growing pressure to reduce carbon emissions and reduce dependence on traditional cement-based materials. At the same time, large volumes of industrial waste and waste glass continue to be sent to landfill. Geopolymer materials offer a promising low-carbon alternative by converting waste-derived materials into more sustainable construction binders.

This research investigates how waste glass powder behaves within geopolymer systems and how it influences long-term durability and material performance. While many existing studies focus mainly on compressive strength, strong materials are not necessarily durable over long periods of service. This lack of understanding around long-term reliability remains one of the major barriers preventing wider use of geopolymer materials in construction.

The study examines waste glass powder in combination with industrial by-products including Pulverised Fuel Ash (PFA) and Ground Granulated Blast Furnace Slag (GGBS). Through material characterisation, reaction analysis, and durability testing, the research aims to understand how waste glass interacts within these binder systems and how these interactions affect long-term behaviour and durability.

The findings aim to support the development of more reliable and durable low-carbon construction materials while improving understanding of how waste-derived materials can be safely and effectively used in sustainable infrastructure.

PROFESSIONAL DISSONANCE AND TEACHER WELL-BEING IN FURTHER EDUCATION: OPERATING WITH CARE IN A MARKETISED FE LANDSCAPE.

Thomas Gregory

Pedagogy

What factors influence teacher well-being in FE colleges and how do teachers make sense of those experiences? My research has aimed to answer this question by conducting semi-structured interviews with nine FE college teachers in South Wales. These interviews were analysed using an Interpretative Phenomenological Analysis (IPA), with close attention given to how participants interpreted and made meaning from their professional experiences. While surface-level factors such as workload, pastoral care and relationships with colleagues were shown to influence the teaching participants' well-being, a cross-case analysis of the interview data revealed an underlying professional dissonance running through their accounts. Each participant expressed a desire to provide ethical, care-oriented learning experiences, grounded in relational-pedagogic practices. However, they are required to do so within a marketised FE landscape, which prioritises measurable outcomes and institutional performance. This generates a conflict in values, which undermines their professional well-being. By focusing on FE college teachers' experiences, this research reveals the lived tensions behind teacher well-being, showing how teaching with care and relational-pedagogic practices can be both deeply meaningful and professionally demanding within an increasingly marketised and performance-driven FE landscape.

DEVELOPMENT OF A LOW-COST HIGH PRECISION TUNABLE DFB LASER ARRAY DATA ACQUISITION SYSTEM USING FPGA

Tintu Thampy
Engineering

Accurate distance measurement is essential in modern technologies such as robotics, aerospace systems, industrial inspection, and precision manufacturing. Frequency Scanning Interferometry (FSI) is a laser-based technique capable of measuring absolute distance with very high accuracy. However, existing FSI systems are expensive and affected by laser non-linearity, where the laser wavelength changes unevenly during operation. This directly affects tuning rate estimation and reduces distance measurement accuracy.

This research aims to develop a low-cost, high-precision FPGA-based data acquisition and control system by replacing the existing expensive tunable laser with a tunable DFB laser. The project further focuses on direct real-time control of the DFB laser to reduce laser non-linearity, thereby improving the overall accuracy and performance of the system. An HCN gas cell with certified absorption wavelengths is integrated into the system as a wavelength reference. The absorption peaks are used to identify the exact wavelength positions during laser sweeping. These wavelength positions are then used to determine the non-linearity of the system, enabling more accurate tuning rate estimation and improved distance calculation.

To achieve wider tuning bandwidth and larger measurement ranges, future work will focus on implementing and controlling DFB laser arrays in real time, creating a scalable and cost-effective high-precision FSI system.

WRU SCHOOLS & COLLEGES PHYSICAL PROFILING PROJECT: MONITORING AND IDENTIFYING TALENTED ATHLETES

Will Raymond
Sport and Exercise

Researchers have seldom considered the physical development of adolescent rugby players through performance pathways into senior rugby (Bevan et al., 2022). Consequently, calls for longitudinal assessments of players' physical profiles have become widespread, as such research could provide the evidence required to reduce selection biases and increase progression through pathways (Owen et al., 2023). To address these calls, the aim of the current Welsh Rugby Union (WRU) schools and colleges physical profiling project is to model and benchmark the physical characteristics of 16-18 year old male rugby players over time. Tests assessing speed, power, strength and aerobic capacity have been completed seven times over two years by 14 schools and colleges (WSC) and 4 regional age-grade (RAG) squads, covering ~900 athletes (~350 have completed testing at least twice). Initial findings indicate that RAG players possess greater physical profiles than their WSC counterparts across most playing positions and tests. These insights afford practitioners opportunities to compare the physical characteristics between pathway steps and set informed benchmarks for their players. Future studies from this project will offer practitioners insight into changes of physical profiles across multiple testing instances and identify if physical characteristics predict match performance, in addition to the benchmarks provided.

TITY-RELATED AND CORPORATE-RELATED DETERMINANTS OF CUSTOMER LOYALTY IN ISLAMIC BANKS IN OMAN

Yousuf Al Yahmadi

Business

Customer loyalty has become a critical concern in the increasingly competitive banking environment of Oman, where Islamic and conventional banks coexist and offer similar financial services. While Islamic banking is rooted in ethical and religious principles, customers today evaluate banks not only on moral alignment but also on service performance and institutional credibility. Despite the growing body of research in Islamic banking, existing studies have largely examined identity-related factors (such as religiosity and cultural values) and corporate-related factors (such as service quality, corporate social responsibility, and reputation) in isolation.

This study aims to provide a comprehensive understanding of customer loyalty in Islamic banks in Oman by integrating and comparing the influence of identity-related variables (IRV) and corporate-related variables (CRV) within a single framework. Drawing on Social Identity Theory and the Commitment–Trust Theory, the study adopts a quantitative approach using a structured questionnaire to examine how these variables shape customer loyalty.

The research seeks to identify which set of factors exerts a stronger influence on loyalty and how moral alignment and organisational performance interact in shaping long-term customer relationships. The findings are expected to contribute to both theory and practice by offering insights into how Islamic banks can balance ethical authenticity with service excellence to enhance sustainable customer loyalty.



ABSTRACTS FOR 3MT[®]

THE WELSH DIMENSION FOR SOCIAL PRESCRIBING: WHAT DOES CREATIVITY MEAN TO YOU?

Dr Maria Susy Rogers

Health, Care and Wellbeing

What does creativity mean to you? This three-minute overview presents emerging findings from a mixed-methods study examining the critical success factors, to support the sustainability of Social Prescribing Art-on-Prescription initiatives in Wales. The first phase of this second doctoral project captures insights from service providers and incorporates the use of GroupWisdom™ software to analyse collective perspectives. Guided by Professor Carolyn Wallace, Director of the Wales School for Social Prescribing Research (WSSPR), this work contributes to the ongoing development of social prescribing across Welsh communities, with a strong emphasis on person-centred healthcare.

Building on this foundation, Dr Rogers continues to advance her research into community wellbeing through creative arts. The second phase focuses on gathering data from service users' perspectives, using robust and validated tools such as the South Wales Social Wellbeing Scale (SWSWBS). Central to her approach is the belief that creativity plays a vital role in supporting health and wellbeing—captured in her guiding principle, "Creativity is your Lifeline."

The final stage of the research will triangulate findings from both service providers' and service users' insights, aiming to assess whether community-based services, in Wales, effectively meet user expectations as well as contributing to sustainable wellbeing outcomes, through Social Prescribing.

EXPLORING SOCIAL CAPITAL AMONG PREGNANT INTERNATIONAL STUDENTS IN WALES

Adebusola Ogunyemi

Health, Care and Wellbeing

Pregnancy during higher education presents significant challenges, which may be compounded for international students due to migration, cultural adjustment, separation from established networks and support systems, financial pressures, unfamiliarity with healthcare services, language barriers, and the competing demands of academic study and pregnancy. Despite the increasing number of international students in the UK, there is limited research on the well-being of pregnant international students.

This study explores social capital among pregnant international students in Wales. Social capital in this research refers to the resources and benefits accessed through social networks and relationships. The study aims to examine the networks available to pregnant international students, the support they receive, how they access it, its perceived benefits, and the support they desire. The research adopts a qualitative design that involves in-depth, semi-structured interviews with participants studying at the University of South Wales who are either pregnant or within 3 months postnatal.

Findings from this research highlight three themes: Navigating Pregnancy and Academic Life in a Foreign Environment, Trajectory of Networks and Supports, and Selective Disclosure and Social Integration. These findings provide insights into how social capital shapes the pregnancy experiences and wellbeing of pregnant international students in Wales.

SELF-DEFENCE BY ALGORITHM? GOVERNING USER-LED AI AGAINST CYBERBULLYING

Afsana Swarna

Criminology, Policing and Security

Cyberbullying remains a persistent threat to wellbeing and safe participation online. As artificial intelligence becomes more accessible, AI tools are increasingly used to detect, filter, and report abuse, adopting a protective role once confined to platforms and regulators. Existing legal and ethical frameworks, however, were designed for institutional AI, and how they apply to user-led deployment remains poorly understood.

The project's main argument is that frameworks built for platforms map poorly onto individuals. As a result, the central research question of this project is how and why individuals are currently using AI to combat cyberbullying, and what legal and ethical challenges does this practice raise around privacy, accountability, algorithmic bias, and freedom of expression?

The study adopts a mixed-methods design. Quantitative expert surveys of legal scholars, AI ethicists, and policy and platform professionals will map current practice and areas of contention, while qualitative semi-structured interviews will explore users' lived experience and reasoning in greater depth. Triangulating these sources, the research will characterise an emerging practice and, on that evidence, develop proportionate ethical principles and legal safeguards for responsible AI use, digital rights, and safer online communities.

BE(COM)ING WE:PATHWAYS TO SHARING WAYS OF BEING IN THE WORLD TO SUPPORT AN UNDERSTANDING OF AUTISM.

Emma Reardon

Pedagogy

Autism knowledge has traditionally been created by people who are not themselves Autistic, and dominant discourses tend to pathologise autism. Autistic-created knowledge is recognised as more relevant and less stigmatising. My PhD portfolio contains personal and professional writings about autism and I explore the importance of authenticity in the portfolio materials and how they have been used to support an understanding of autism across a range of audiences.

Autoethnography is used as a research method for analysing and interpreting my projects and for connecting my personal experiences to broader cultural phenomena. The capacity of autoethnography to communicate with others and improve lives is especially pertinent in Autistic autoethnography given the recognised need for Autistic knowledge producers.

The critical review reveals how I challenge pathologised perspectives on autism by offering detailed and authentic strengths-based counter-narratives of autism, that highlight oppressive societal conditions, and strategies that Autistic people utilise to be safe within those oppressive conditions. I explore how I engage people and draw upon my identities as professional, parent and Autistic person to connect with audiences in relatable ways and I explore a collective capacity for change within society.

My thesis advances Autistic-authored knowledge, positioning lived experience as expertise that can reshape educational, social and cultural understandings of autism, and reframe autism as a form of human diversity, not pathology.

WHY PUBLIC SECTOR TRANSFORMATION FAILS: EXPLAINING IMPLEMENTATION ACROSS COMPLEX SYSTEMS

Gareth Cooke

Health, Care and Wellbeing

This research examines why implementation often breaks down across complex public-sector systems, even when organisations appear committed to change.

While implementation science frameworks such as the Consolidated Framework for Implementation Research (CFIR 2.0) help identify factors influencing implementation, they may provide limited explanation in systems characterised by distributed governance, organisational interdependence, and shared accountability. Using a comparative multiple-case study design, my PhD research analyses implementation across three public-sector cases in Wales: a national NHS digital transformation programme, regional health and social care commissioning arrangements, and the development of a Health Determinants Research Collaboration within local government.

The research applies CFIR 2.0 as a structured analytical framework to identify implementation determinants across the cases. However, the findings demonstrate that similar determinants were present across all three settings despite very different implementation trajectories and outcomes.

The study argues that implementation in complex public-sector systems is shaped not only by determinants within organisations, but also by how decision-making structures, inter-organisational relationships, and the timing of decisions interact across organisational boundaries over time. The research contributes to implementation science by strengthening explanation of implementation across distributed multi-organisational systems.

ACCESS TO HIGHER EDUCATION IN WALES: OPPORTUNITY, REGULATION, AND INEQUALITY

John Witcher

Pedagogy

For thousands of adults in Wales, Access to Higher Education courses provide a second chance to attend university. These courses were originally designed for people excluded from traditional educational routes because of poverty, disrupted schooling, caring responsibilities, or social disadvantage. Yet despite their importance, little research has explored whether the current system still meets the needs of learners in the twenty-first century.

My research critically examines the regulation, policy, and delivery of Access to Higher Education in Wales. Using interviews with practitioners and stakeholders alongside policy and historical analysis, the study investigates how Access courses have evolved and whether they remain aligned with Welsh educational priorities.

The findings reveal growing tensions within the system. While Access courses continue to transform lives and widen participation, they are increasingly affected by inconsistent assessment practices, unclear regulatory responsibilities, and changing learner demographics. The research argues that Access education in Wales has drifted away from its original social justice mission and now operates within a fragmented regulatory landscape.

Ultimately, this study proposes that Access to Higher Education should be recognised not simply as an alternative qualification, but as a strategically important part of Wales's future educational and social policy.

INVESTIGATING SUSTAINABLE RECOVERY, REUSE, AND LIFECYCLE EXTENSION OF QUARANTINED AIRCRAFT PARTS AND COMPONENTS

Lali Gandhi

Engineering

This research critically investigates how aircraft maintenance practices, regulatory frameworks, and circular economy principles can support the sustainable recovery, reuse, and lifecycle extension of quarantined aircraft parts and components within the aviation sector.

The study focuses on aircraft parts and components that retain residual service life but remain quarantined due to damage, limited approved maintenance or repair procedures, storage limitations, documentation discrepancies, uncertainty, or regulatory constraints. Current aviation maintenance systems frequently favour disposal or replacement, potentially contributing to unnecessary operational costs, material waste, and environmental impacts.

The research aims to examine how sustainable maintenance strategies, component recovery pathways, and lifecycle management approaches may enhance the utilisation of quarantined aircraft parts and components whilst maintaining airworthiness, safety, and regulatory compliance.

Furthermore, the study seeks to identify opportunities to improve maintenance decision-making processes and policy effectiveness within circular aviation maintenance systems. The findings are expected to contribute towards the development of more sustainable, efficient, and resource-conscious aviation maintenance practices within the evolving circular economy era.

IMPACT OF LONELINESS ON HEALTH AND WELL-BEING OF INTERNATIONAL STUDENTS IN WALES, UNITED KINGDOM

Lasith Dissanayake

Health, Care and Wellbeing

This study assessed the prevalence of loneliness, anxiety, depression, and poor mental well-being among international students at universities in Wales, explored the perceived underlying factors contributing to these conditions, and examined their subsequent impact on overall health and well-being. An explanatory sequential mixed-methods design was used. An online survey and in-depth semi-structured interviews were conducted between March and December 2024 with international students enrolled in undergraduate or postgraduate courses at four universities in Wales. Quantitative data were analysed using descriptive and non-parametric statistical tests, and the qualitative data were analysed using Reflexive Thematic Analysis.

The point prevalence of any loneliness (moderate to very severe) was 90.1% (95% CI: 85.5–93.6), with 49.6% (n=115) reporting severe or very severe loneliness. Poor mental well-being was reported by 50.9% (n=118) of participants, while 42.7% met the threshold for moderate-to-severe anxiety and 47.8% for moderate-to-severe depression. Living alone was identified as the strongest and most consistent predictor of loneliness and social isolation. Spearman's correlation analysis confirmed significant relationships between all four outcome variables. Reflexive Thematic Analysis generated ten themes across three categories: Navigating an Unfamiliar Environment, Disconnected in a Crowded Place, and Silent Struggles. The findings reveal a significant, multidimensional mental health burden shaped by relational, cultural, academic, financial, and institutional factors, which existing national policy frameworks and university support services have failed to address adequately.

ENHANCING TRANSACTION-LEVEL SECURITY IN DIGITAL BANKING THROUGH AN ADAPTIVE ZERO TRUST ARCHITECTURE WITH INTEGRATED RISK SCORING

Manasa Pushparanjan

Computing, Cybersecurity, Mathematics and Informatics

When-ever you make an online payment, the bank trusts you; not because it has verified you, but because it has checked at the beginning during login and it assumes that nothing will be changed. That assumption is where the problem starts.

When the fraudsters take over an account, usually they do not break the lock they simply walk through the door; by a stolen credentials, compromised session or by manipulating customers to transfer the funds themselves. Bank security would have given the green signal by the time transaction happens. This is the structural blind spot of the perimeter-based security model and till now in the UK alone it costed over £460 million a year in push payment fraud.

My research paper introduces you to the Transaction Risk Scoring Engine - TRSE - a Zero Trust Framework, it treats each payment as its security decision rather than just trusting the session like PBS also it can score 11 risks in real time - device identity, authentication strength, geographical anomaly, transaction velocity, behavioural deviation, payee and more.

Within 0.006milliseconds, it assigns the transaction to the security tier for approval, to step up verification or block it right away. I have tested across 500 transactions, TRSE detected 97 % of intra session fraud that conventional security missed entirely; at zero false positives, and well within payment procession time limits. The architecture is explainable, regulatorily grounded and ready to be built.

THE SAFETY NET WE ALREADY HAVE: RETHINKING WHO STOPS THE ABUSE

Sunday Olaniyi

Health, Care and Wellbeing

Every day in Ibadan, Nigeria, a woman who faces domestic abuse does not call the police. She knocks on her neighbour's door. She whispers to her market friend. She asks her church elder for help. But are these community led responses actually working?

Governments and NGOs spend millions on top down programmes. Yet many fail because they ignore local culture, trust, and relationships. My research asks a different question: What if the best solution already lives inside the community?

I am evaluating grassroots initiatives in Ibadan – support groups, awareness campaigns, safe spaces, and training programmes run by local people and/or non-profits. Using surveys and in depth interviews, I measure what reduces violence and what does not. Does a weekly women's circle work better than a one off rally? Does training locals to spot abuse make a difference?

Early findings suggest one thing matters above all: trust. When a respected neighbour leads an initiative, women join. When an outsider runs it, they stay away. My research will not end violence overnight. But it will give communities a proven toolkit – built by them, for them. Because the person who stops the abuse might not be a policymaker. It might be the woman next door.



IMAGES OF RESEARCH



ANAMIKA KHANOM

'Fibre Optic Sensing for Real-Time Anomaly Detection in Civil Structural Health Monitoring'

Structural Health Monitoring (SHM) plays a vital role in assessing the safety, serviceability, and long-term performance of critical infrastructure such as bridges, buildings, and transportation networks. This study focuses on the application of advanced fibre optic sensing techniques for real time structural anomaly monitoring particularly in railway bridge systems subjected to dynamic train loading. The proposed monitoring concept uses Distributed Fibre Optic Sensors (DFOS) installed along critical regions of the bridge girder, including support zones where shear forces are highest and mid-span regions where bending moments are most significant. These sensors enable high-resolution strain measurement,

accurate damage localization, and reliable detection of anomaly detection, such as concrete crack-induced signal changes. By integrating fibre optic sensors with a data acquisition and analysis station, strain responses and crack development can be continuously monitored through real-time signal interpretation. This enables early identification of structural damage, improved understanding of load-induced behaviour, and enhanced decision-making for maintenance and safety management. Overall, this work demonstrates the potential of fibre optic sensing as a powerful tool for real-time crack monitoring and future smart infrastructure management.



BISHNU KHATRI

‘Effecting Policy Change to Enhance Climate Change Resilience Within Threatened Communities in Nepal’

I have been working with 14 community women researchers to document their own and communities lived experiences. This image shows community women researchers interviewing other women from their community using a smartphone, demonstrating women’s community agency-building in practice. Smartphone have become important tools for documenting lived experiences and connecting them with scientific knowledge to foster dialogue and positive transformation.

I am undertaking practice-based research that works collaboratively with communities from high mountain of Nepal. The research focuses on strengthening community agency so that people can document their lived experiences, build confidence, critically reflect on their realities, and engage in dialogue with stakeholders and policymakers on climate related decision making.

Grounded in participatory film ethnography and an asset-based approach, and inspired by Paulo Freire’s concept of critical consciousness, this study engages women from socioeconomically marginalized communities as community researchers through participatory, film-based storytelling. The methodology includes seven interconnected stages: identification and networking; community scoping and engagement; filmmaking workshops and capacity building; community filming; screening, critical reflection, and cross-community exchange; alignment with scientific data and policies; and dialogue. I am also developing an interactive visual web portal as one of the research artefacts to document visual outputs in a single platform documented by community researchers.



FATHIMA FARMICK

'Silence to belonging'

This image represents the educational journey of refugee and asylum-seeking children in Welsh schools, focusing on their transition from silence and exclusion to belonging and inclusion. The daffodil reflects the Welsh context, the difference between black and white illustrates the shift from isolation, uncertainty, and language barriers to hope, inclusion and personal growth.

The darker side symbolises the background of many refugee learners with interrupted education, trauma, uncertainty, forced displacement, separation from friends and family, cultural adjustment, emotional issues and barriers to learning a new language. While the brighter half symbolises the growth, inclusion, empowerment, positive effects, supportive teachers, inclusive teaching practices, peer relationships and support they get on educational experience and wellbeing.

The flower metaphor emphasises resilience and change. Just as a flower needs care to grow, refugee learners require care, emotional support, language help, multilingual education, understanding, and the welcoming environment to build confidence and a sense of belonging to flourish. This image aims to raise awareness of both the barriers and possibilities within refugee education system in Wales. It also reflects the core focus of my PhD research: exploring how schools support on language acquisition, and social integration on refugee and asylum-seeking learners in Welsh schools.



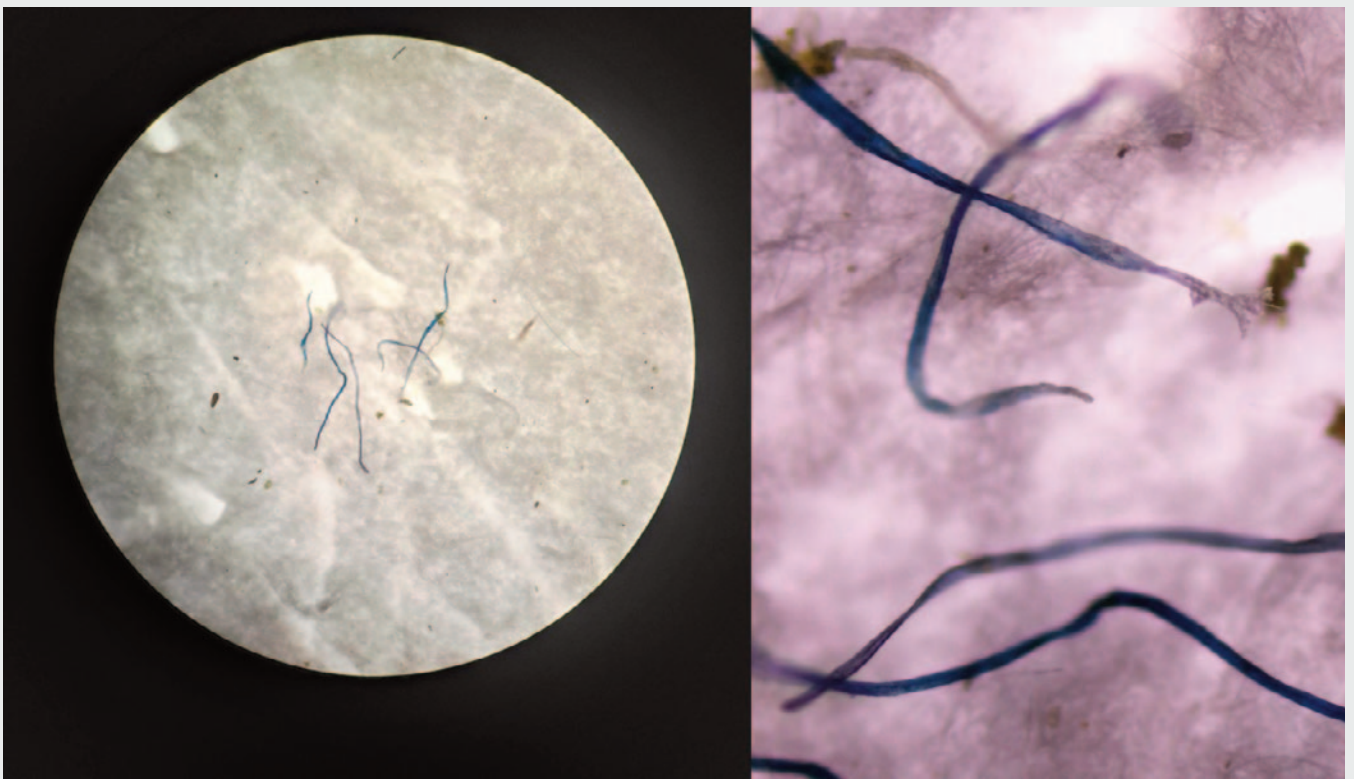
GIANLUCA REED

'Exploring Men's Lived Experiences of Obsessive-Compulsive Disorder (OCD)'

This image represents the lived experiences of men navigating Obsessive-Compulsive Disorder (OCD). The solitary figure walking through a narrow path surrounded by dense branches and trees symbolises the emotional isolation and recurrence of distressing intrusive thoughts often described by participants in my Counselling Psychology doctoral research. The enclosing trees represent the overbearing nature and persistent presence of intrusive thoughts, while the restricted path represents the difficulty of moving freely through everyday life when thoughts and compulsions become overwhelming.

The image also explores the tension between struggle and hope. Although the pathway is dark and constricted, the figure continues to walk towards the light. This symbolises moments of resilience and recovery that have emerged within participants' unique narratives.

Rather than depicting OCD through common stereotypes, this image aims to convey the internal, emotional, and often isolated experience of living with the condition. This photograph invites reflection on how men experience and make sense of living with OCD, and the psychological suffering and isolation that is often unseen by others.

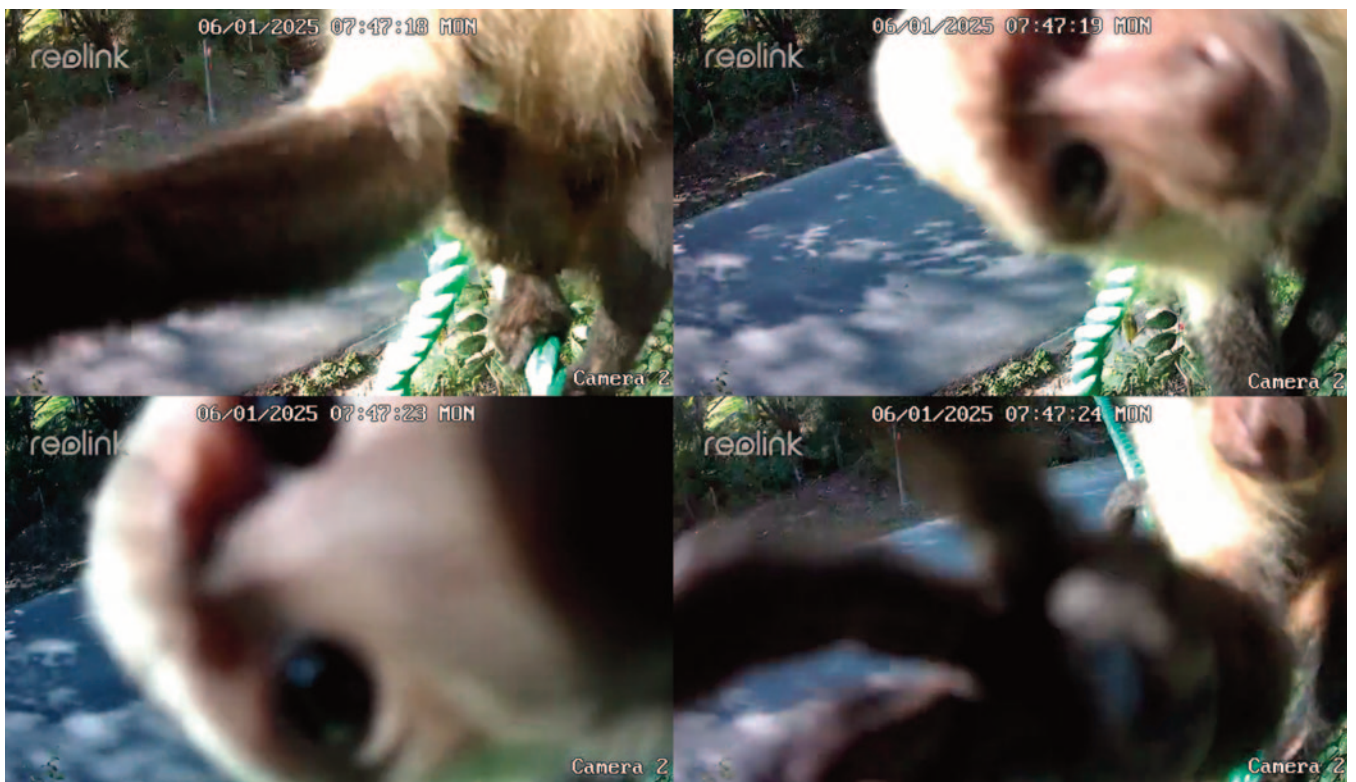


LAKSHIKA RATHNAYAKE

'Identification and Quantification of Microplastics in Environmental Samples'

The effective analysis of microplastics is essential for understanding the distribution and environmental impact of synthetic polymer contamination. Microplastics are abundant in most environmental samples, including water, wastewater, sediments, and air. Light microscopy can provide significant information about the presence, shape, colour, and size of microplastics in environmental samples. These small particles and fibres can be further characterised using FTIR and Raman spectroscopy to identify polymer types. Although these microscopic and spectroscopic techniques are useful for identifying particles $> 50 \mu\text{m}$, they often lack sufficient sensitivity and standardisation for reliable quantification of smaller particles $< 50 \mu\text{m}$.

However, particles $< 50 \mu\text{m}$ and present at low concentration levels can be quantified using Pyr-GCMS, which offers greater sensitivity for polymer detection in complex environmental matrices. Effective extraction of microplastics from environmental samples can be achieved through alkaline digestion and oxidative digestion methods, which remove organic matter and improve polymer recovery prior to analytical identification and characterisation. This research focuses on optimising these digestion methods to enable more accurate identification and quantification of microplastics in complex environmental samples while minimising contamination and polymer degradation.



MEGAN LAYTON

'Technological advances help monitor the natural world'

To conserve the natural world, it is vital to be able to monitor wildlife and landscapes. Traditionally this has mostly been done via observation by researchers. Surveys have been developed and refined for the data to be as representative as possible; however, these surveys are often a snapshot as longer term monitoring can be difficult for several reasons, such as inaccessibility of habitats and time constraints.

Due to these difficulties, technological advances are now helping shape how we monitor the natural world around us. This has led to the rise of remote sensing, which is the science of acquiring data from a distance without physical contact, typically using satellites or devices left in-situ.

For this project we used camera trapping to monitor rope canopy bridges which were established due to arboreal species using powerlines to cross linear infrastructure. Being in the tree canopy above infrastructure means the sites are inaccessible. However, cameras equipped with mobile data and solar power allowed for the videos to be automatically uploaded and monitored remotely. There were some unexpected challenges: monkeys have unplugged the cameras!



NILUFA RUPA

‘Feeling the air - Learning Through Limited Information’

You all probably know Po, the famous panda who learned kung fu. Now imagine Po trying to fight blindfolded. How would he react to a punch if he could not see it coming? At first, he would struggle. But gradually, he would begin to sense subtle changes around him, movement in the air, footsteps, shifts in position and over time, he would start recognising patterns. Eventually, he could learn to react, dodge, or block without relying entirely on sight. This idea is known as partial observation: making intelligent decisions using limited information.

A similar principle exists in nature. Birds do not measure every movement directly, yet they continuously sense airflow around their wings and instinctively adapt their motion to maintain stable and efficient flight. Inspired by this concept, this research explores how future UAV wings could learn to interpret airflow in a similar way.

Rather than relying on large numbers of complex sensors, the proposed intelligent framework focuses mainly on airflow pressure around the wing. By learning how changing pressure patterns relate to aerodynamic behaviour, the system can estimate wing conditions and adapt wing shape in real time. Combining morphing structures with machine learning, the aim is to develop resilient and more adaptive wing system with limited sensing requirements.



RAMADHAN RAJAB

'Assessing IoMT Network Security and Resilience'

The Internet of Medical Things (IoMT) advances healthcare capabilities but it exposes critical cybersecurity vulnerabilities. This study evaluates five attack types—DoS, DDoS, MITM, Blackhole, and MQTT broker flooding—within an IEEE 802.11-based IoMT network simulated in NS-3, featuring Baxter Wireless Infusion Pump and Hexoskin Smart Health Shirt devices.

However, some limited native support in NS-3 led to some abstractions designed to reflect realworld featured simulations. A Statistical Analysis of 540 network flows across throughput, oneway delay (OWD), packet delay variation (PDV), and packet loss revealed that the MITM attack was the most disruptive, with a statistically significant packet loss (mean = 11.50%, $p < 0.0001$) and latency

issues. Despite performance degradation, Bluetooth energy consumption remained constant (2.580 J), underscoring The inadequacy of energy metrics alone for anomaly detection. MITM compromises data integrity and timing, posing direct risks to patient safety. While blockchain enhances authentication, its computational demands challenge constrained IoMT devices. The study recommends mitigation strategies such as Deep Packet Inspection (DPI), Network Behavioural Analysis (NBA), Anomaly Detection (NAD), and Federated Learning (FL), supported by encryption and packet cleansing. These approaches collectively offer a foundation for secure, resilient, and performance aware IoMT deployments in healthcare environments.



RICARDO ROSSOUW

'Exploring Compassion in Black Home-Based Care Relationships'

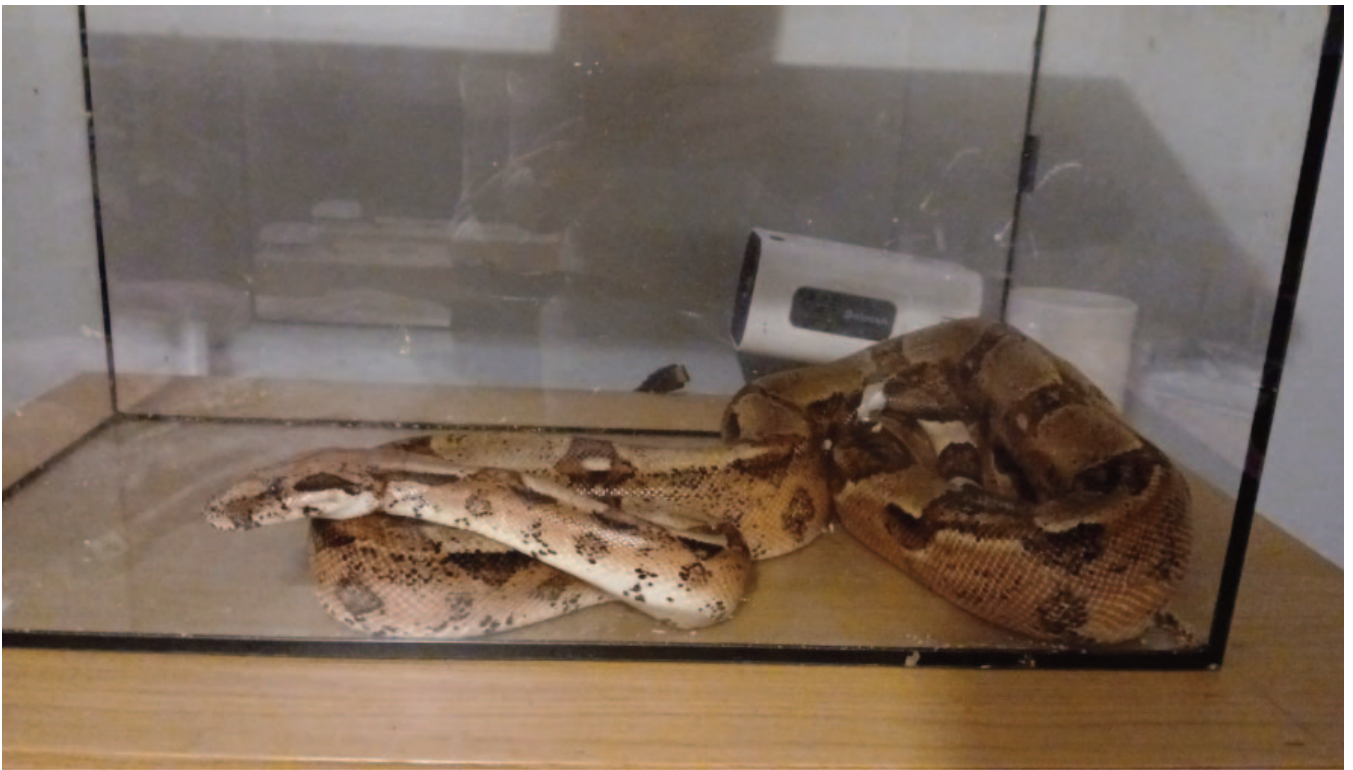
This image symbolically portrays the research question: What does compassion look like in Black home-based care settings?

The researcher is depicted with many arms to portray that there are many roles we take on when doing research. These roles include listening, taking notes, asking questions, protecting participants, and advocating for participants.

The notebook and microphone signify collecting lived experiences through multiple data collection methods, while amplifying voices that have gone unheard. The heart symbolizes the researcher's own passion for caring for others, being humane, and connecting on emotional levels to the research process as a whole. The scale with the blindfold signifies justice and balance, as well as the ethical piece of approaching each story with equality and fairness.

The care receiver is seen as transparent because individuals that need care can often be transparent to society but hold so much humanity within them. The transparency also symbolizes the ethical practice of protecting the identity of the participants. The care provider has a blurred face to signify confidentiality, while also portraying those that provide care behind closed doors are often unseen.

The image as a whole asks how those that receive care, family members, and home care providers define compassion and how can we practice compassion in homes where vulnerability, culture, identity and humanity converge.



RUBY MCGUIGAN

'Assessing the Welfare of Captive Large Constrictor Snakes in the United Kingdom'

Large constrictor snakes are widely kept in captivity yet remain significantly underrepresented within animal welfare science, with less than 1% of welfare literature focusing on reptiles. The image shows a captive 7ft long boa constrictor being housed in a barren enclosure and highlights the central questions of this research: what constitutes good welfare for large constrictor snakes, and how can it be reliably assessed? What are the gaps within literature and legislation that has allowed for minimum standards for survival over husbandry that allows them to thrive? Historically, reptile husbandry has focused on survival-based measures such as feeding success, growth, and disease prevention. However, growing evidence demonstrates that reptiles are behaviourally and cognitively complex animals capable of experiencing a range of affective states, requiring welfare assessment approaches that extend beyond basic husbandry.

This study evaluates the welfare of captive large constrictor species in the United Kingdom. To address the lack of taxa-specific welfare tools data collected from private keepers, exotic veterinary professionals, and reptile rescue organisations will be used to evaluate current practices and identify areas where welfare standards can be improved. Ultimately, this research aims to support evidence-based husbandry and advance reptile welfare science.



SAI TEJASWINI GONE

'USW's Project Frankenstein: Turning Waste into one of the World's Most Useful Molecule'

What if I say the secret to a greener world was hiding in a skip?

Look at the image from left to right. That murky bottle on the left has waste- agricultural scraps, food residues, dairy waste etc. Materials nobody wants. On the right sit the products that industries worth billions depend on- biofuel, skincare, food additives, pharmaceuticals, biopolymers etc. And in the middle? A bioreactor crackling with electricity, filled with bacteria doing something extraordinary.

This is microbial electrofermentation. Plug in electricity. Add bacteria (*Actinobacillus succinogenes*). Feed them waste. Watch them transform it into succinic acid- a single molecule

that sits at the heart of products you use every day, currently made almost entirely from crude oil. My research at USW asks a simple question with an enormous and green answer: can we replace petroleum chemistry with a flask, some microbes, and a power socket? Dr. Frankenstein was ridiculed for believing electricity could create something miraculous. He wasn't entirely wrong- he was just two centuries too early. In our lab, electricity does not reanimate the dead. It reanimates waste. It gives bacteria a purpose. And it gives industries a future that does not begin with an oil rig.

The monster is microscopic. The revolution is not.



TINTU THMPY

'Development of a Low-Cost High-Precision Tunable DFB Laser Array Data Acquisition System Using FPGA '

Accurate distance measurement is essential in applications such as robotics, aerospace systems, industrial inspection, and precision manufacturing. This research focuses on the development of a low-cost, high-precision Frequency Scanning Interferometry (FSI) system using a tunable Distributed Feedback (DFB) laser and an FPGA-based data acquisition and control system. The work aims to improve measurement accuracy while reducing the cost and complexity of conventional FSI systems.

An HCN gas cell is used as a wavelength reference to identify absorption peaks during laser wavelength sweeping. Experimental data obtained from laboratory measurements were

processed using MATLAB to detect absorption dips, perform peak fitting, estimate frequency sweep slope, and calculate distance from the FFT beat spectrum. Real-time FPGA-based control is used to improve laser tuning behaviour and reduce non-linearity, resulting in improved distance accuracy and system stability.

The image visually presents the overall system architecture, signal-processing workflow, and experimentally obtained MATLAB results used for distance measurement and non-linearity compensation. The work also explores future implementation of tunable DFB laser arrays for wider tuning bandwidth and scalable high-precision measurement systems.