UNIVERSITY of BRADFORD

Research and Innovation Annual Report 2023/24

Making Ideas Happen

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Foreword

Professor Sherif El-Khamisy,
Pro Vice-Chancellor,
Research, Innovation
and Engagement

By Professor Sherif El-Khamisy, Pro Vice-Chancellor, Research, Innovation and Engagement

As I step into the role of Pro Vice-Chancellor for Research and Innovation at the University of Bradford, an institution with a rich history of serving humanity through education, research and innovation, I want to acknowledge the dedication and very hard work of our staff which has underpinned our successes this year.

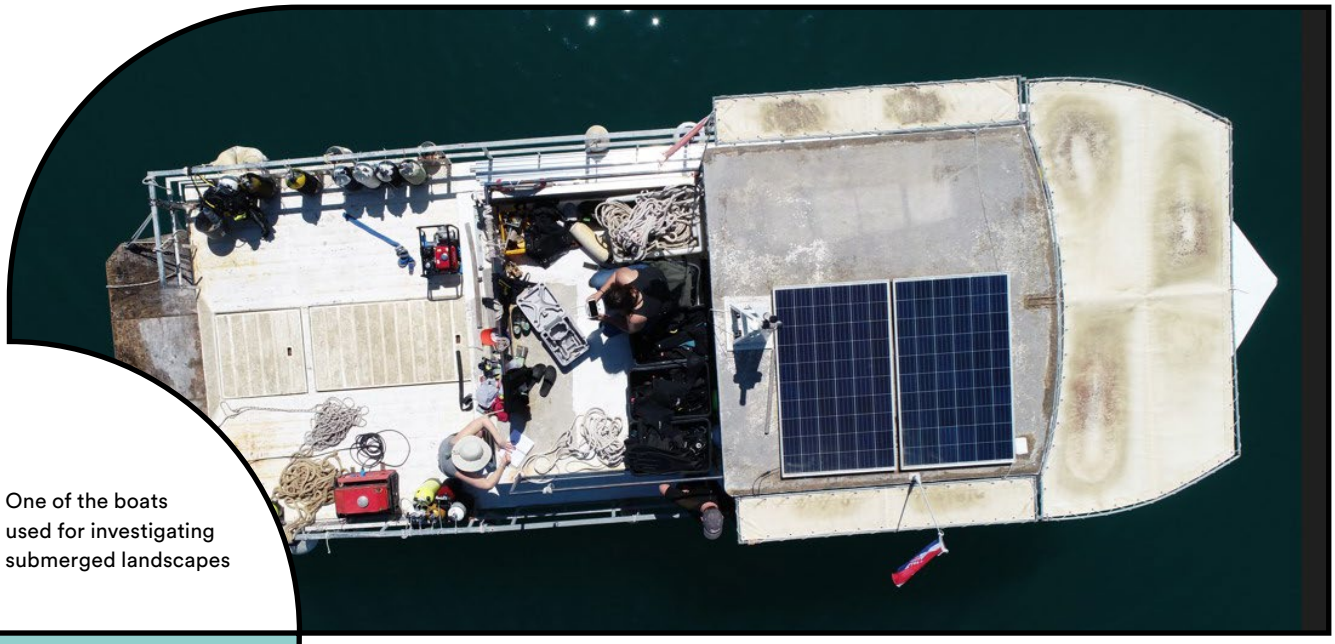
The 12 months covered here in our second annual research report have seen significant developments in research and innovation at the University, such as historic awards for the Centre for Submerged Landscapes and the Centre for Digital Innovations in Health and Social Care alongside many other successful awards; commercial success through projects with Incanthera and Coegin Pharma; a Future Leaders Fellowship award, and much more.

We're proud to be a part of the diverse, creative and pioneering community of Bradford, and I'm excited by the fantastic opportunity we have as a strategic partner in UK City of Culture 2025 to engage in activities which will amplify our role as a beacon of research excellence and innovation. We have also welcomed fellows from Yorkshire & Humber Policy Engagement and Research Network (Y-PERN) and the Zero Carbon Knowledge Hub, looking at the small business economy around Bradford and industrial decarbonisation in Bradford manufacturers.

I'm delighted to present this report which showcases the depth and diversity of our research, covering a broad spectrum of applied and vocational learning, with impact across critical themes such as health and wellbeing, engineering innovation, and sustainable societies. You'll discover our exciting new initiatives, supported by fresh talent and forward-thinking programmes which are helping to drive forward an ambitious and progressive Research and Innovation Strategy.

In the pages ahead, I invite you to consider how we embody the University value of **Innovation**, and within it the themes **Brave, Pioneering, Inventive, Inquisitive, Creative and Problem Solving,** and our vision for **Making Ideas Happen** in the stories featured.

Whether you're a student, an academic, an industry leader, or simply someone interested in innovation, I hope you'll find inspiration and something that resonates with your own passions here. Join us on this journey as we work to make a lasting impact through research and innovation, shaping a better tomorrow for all.



One of the boats used for investigating submerged landscapes

Find out more

Capturing undersea history before it vanishes

The last year has been a landmark for the Submerged Landscapes Research Centre, which has received €8 million (just under £7 million) in funding from the prestigious European Research Council for an ambitious collaborative project to map the seabed in the Baltic and North Seas.

Principal investigators from Moesgaard Museum and Aarhus University in Denmark, the University of Bradford and German research institute NIhK are working together on the project, SUBNORDICA, which will apply the latest technologies to map the seabed, using AI and computer simulation to identify areas where long-lost settlements may still survive and can be explored, enabling ethical development of the seabed.

Work has begun already, with excavations taking place off the coast of Denmark, and at the University a huge planning exercise is underway on a large ship expedition which will spend a minimum of 120 days at sea. This will include techniques such as optically stimulated luminescence dating, measuring the age of sedimentary particles based on how much light they have received.

A range of other projects at the Submerged Landscapes Research Centre are making timely investigations in undersea environments before they are no longer possible, due to climate and industrial changes including the development of offshore renewable energy such as wind turbines.

Professor Vince Gaffney, Director of the Centre gives an overview of its current projects:

> **"The work we're doing is becoming increasingly important, and urgent - many areas in the North Sea marked for development align with submerged ancient landscapes that we're seeking to map and explore, so we're in discussions with Historic England and industrial partners about creating exclusion zones**
>
> **Elsewhere, we're working off the American coast with indigenous groups who have territorial claims; the Life on the Edge expedition in the Adriatic and North Sea revealed the remains of an astonishing network of streams, rivers and other geological features off the Croation coast; plus we've got projects in China and Japan in the early stages."**

The team will also soon be releasing a downloadable tool that will allow users to explore the impact of rising sea levels on the North Sea. Created as part of the Unpath'd Waters project, the interactive digital map of Doggerland (a once-inhabited area of the North Sea, now totally submerged) will show how the hills, river valleys and human settlements of the region looked thousands of years ago.

Exploring and documenting disappearing heritage

An award-winning archaeological research project on the Scottish island of Rousay, Orkney, is revealing a wealth of information about life on the island from 1000BCE to 1200CE, but coastal erosion in the area means that there may only be a few years left for the investigations.

The large settlement, known as the Knowe of Swandro, consists of Iron Age roundhouses, Pictish buildings (built by Scottish peoples from around 400CE – 900CE), a Viking settlement and a Norse Long Hall, and is considered an area of extreme historical importance by Historic Environment Scotland, who work closely with our researchers on the project.

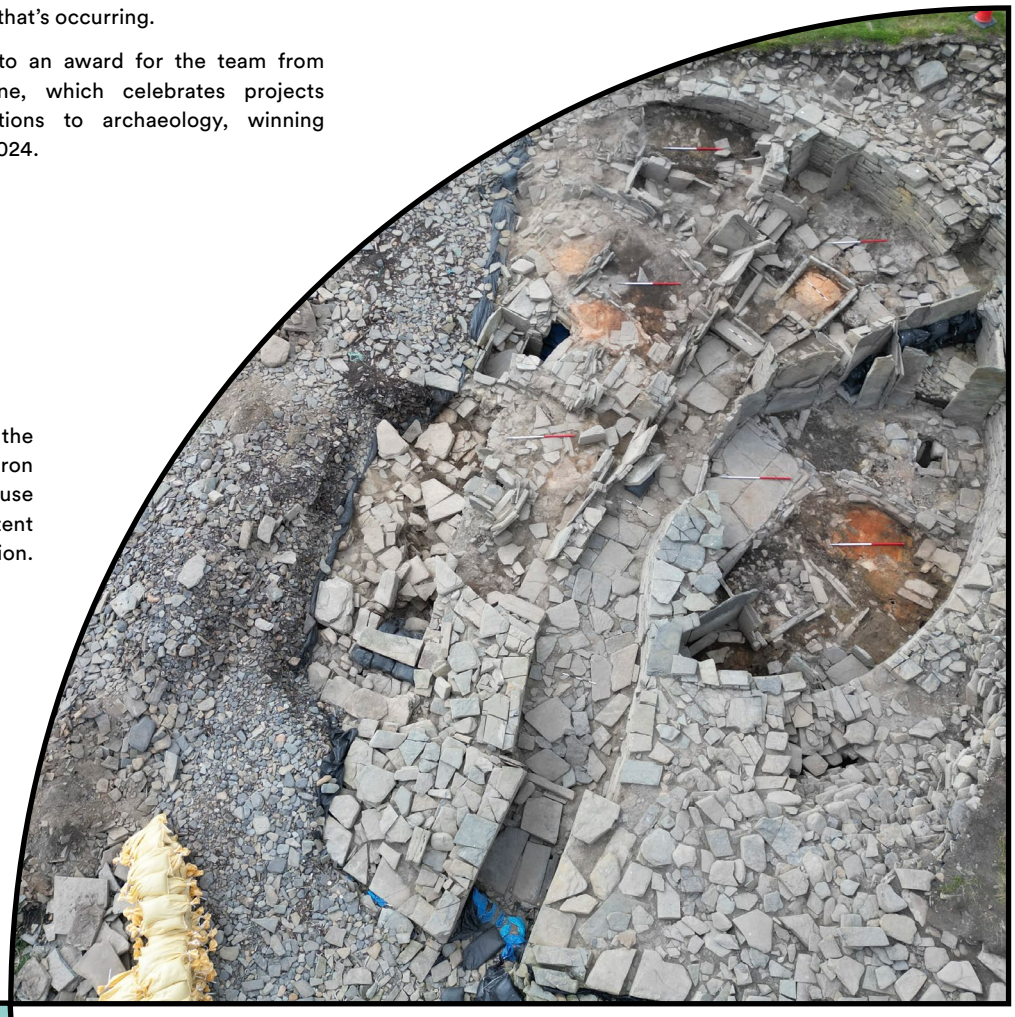
Dr Julie Bond and Dr Steve Dockrill from the School of Archaeological and Forensic Sciences have led the University's involvement on the island since 2010. Over the years the Archaeology team has employed a variety of techniques to understand the unique site, including traditional excavation, which has led to the recent unearthing of a rare Iron Age comb and belt buckle; isotope analysis which gives insight into the specific environment of the time; and visualisation techniques using the University's specialist 3D imaging equipment to document the area and log the rate of change that's occurring.

This innovative approach led to an award for the team from Current Archaeology magazine, which celebrates projects making outstanding contributions to archaeology, winning 'Rescue Project of the Year' in 2024.

Dr Bond explains the significance of the changing site, and the team's role:

> **"It's really important to understand that half of this special site is already gone and the rest will soon follow, and that there are hundreds, if not thousands, of sites all around the British Isles which are disappearing in the same way. We have an opportunity to educate people about their heritage, and also the direct results of sea level rise and climate change."**

Dr Bond and Dr Dockrill have been documenting their progress through reports for Historic Environment Scotland which will also be used as part of a comprehensive book detailing their work and the history it has revealed. They have also created a smaller book that will be distributed to every household on the island for free, to ensure the current residents are engaged and invested in the research taking place there.



Aerial view of the excavated Iron Age roundhouse showing the extent of coastal erosion.

Find out more

Plastic engineering transforming the way medicines are administered

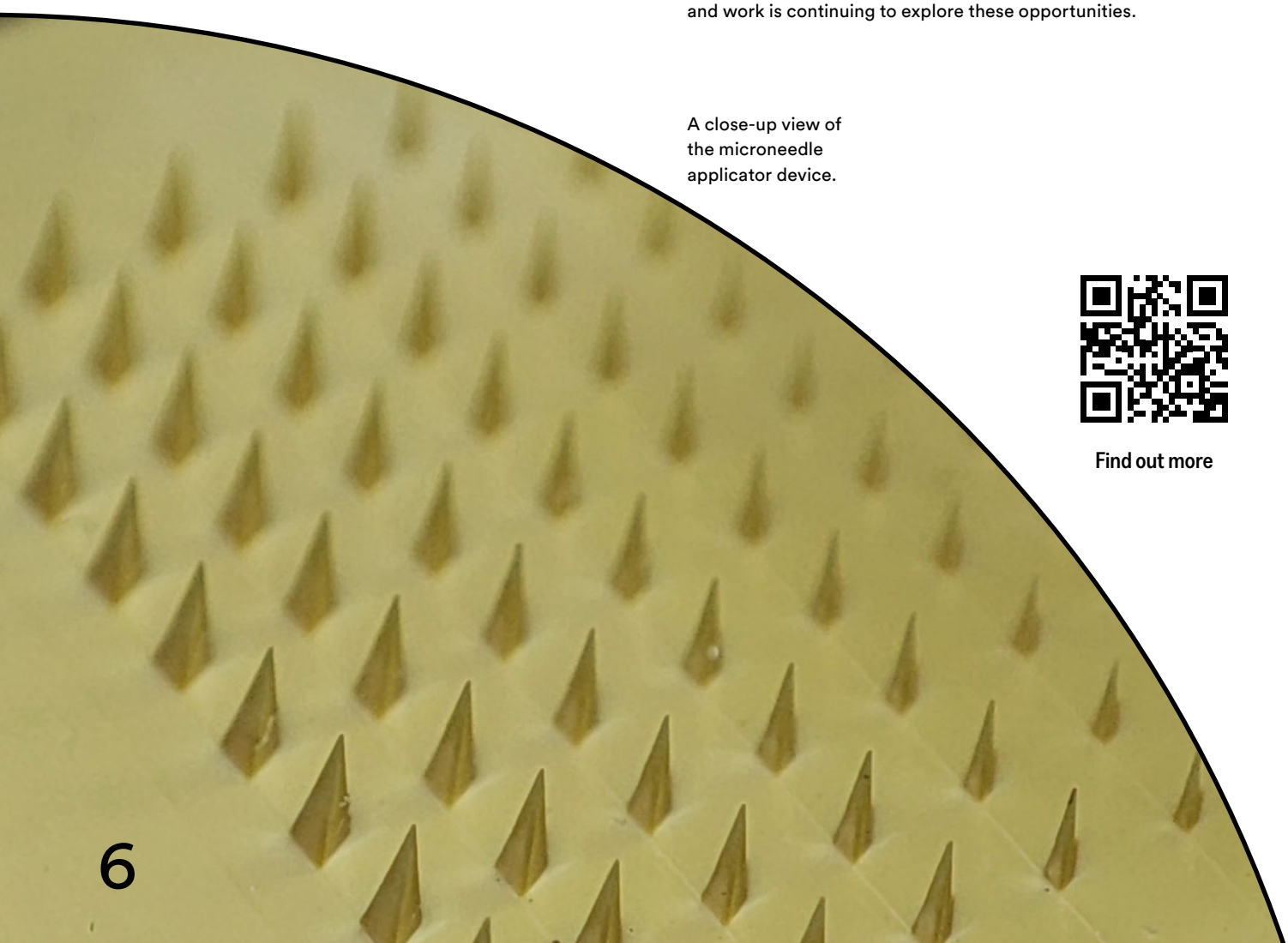
A team from our Polymer Interdisciplinary Research Centre are working on a large project with funding from the Gates Foundation 'To design a microneedle platform that delivers long-acting contraceptive drugs as a solution for family planning in low and middle income countries'. The successes of the project to date have meant the original grant of £5 million has been extended into 2026 to take the product to full scale clinical trials.

The pharmaceutical element of the project is led by Professor James Birchall from the School of Pharmacy at Cardiff University, who approached the University of Bradford because of our reputation for expertise in polymer manufacturing methods. Complementary activities underway in the labs also include a project with KU Leuven University in Belgium, who have sent two visiting researchers over to Bradford to explore collaborations using laser machining, and industry partnerships in support of making the device into a viable commercial product.

Ben Whiteside, Professor of Precision Manufacturing describes our role:

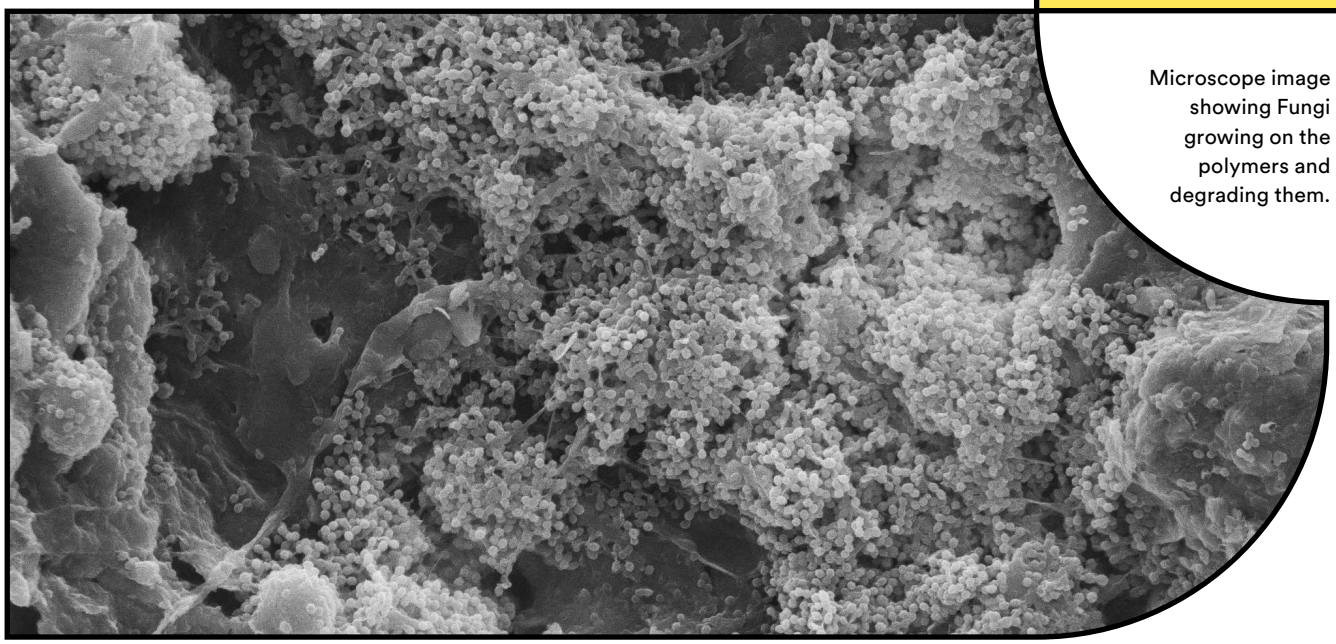
> **"We created an array of microneedles, 100-200 tiny needles less than a millimetre in length attached to a delivery patch, which are inserted pain-free into the skin and provide controlled dispensing of a contraceptive hormone. We're developing the blend of materials to give the right release behaviour, and an applicator device design that pushes those needles into the skin so that they remain in place and continue to safely deliver the contraceptive over a six-month period. The skin is a challenging environment, and to ensure that the release is consistent has been one of the landmark achievements we've managed this year."**

The next stage will be to take the positive results and look at scaling up production ahead of releasing the product to the marketplace, both to developing countries and western markets, as well as continuing to build on international research relationships through placements and other collaborations. The device also has huge potential for other medical applications including vaccinations, and work is continuing to explore these opportunities.



A close-up view of the microneedle applicator device.

Find out more



Microscope image showing Fungi growing on the polymers and degrading them.

Find out more

Making compostable plastics with the help of fungi

Our researchers are using chemistry and polymer expertise to develop polyurethanes that will degrade much quicker than current products by using fungi and bacteria in soil to break them down.

Polyurethanes are a versatile plastic used in many applications, including foam for sponges, insulation and upholstery, flexible straps, and hard plastics used as components in consumer and industrial products. Due to this diversity, plus the use of additives in lots of applications, polyurethanes can be very difficult to reprocess and recycle, but this innovation is looking to harness the natural environment to create a more sustainable product.

Stephen Rimmer, Professor of Chemistry, explains the use of fungi:

> **"The unique research here is looking at the biology behind this, the types of fungi and bacteria that exist which are the most important microorganisms in the environment for degradation. Surprisingly little is known about these fungi - only around 20% are identifiable - so we're investigating them by extracting DNA from soil samples, looking at genetic information of the thousands of different species present to identify which are most effective in the degradation process."**

The material has additional environmental benefits - this new type of polyurethane is designed to contain phosphates, which help to feed the fungi and stimulate the biological activity that leads to the degradation process, and in turn adding nutrients back into the soil. Plus, the product can be made from plant-based materials (as opposed to traditional oil-based production) which means that the products can be made without the added carbon burden from oil extraction.

As well as understanding the biological processes behind the degradation, the challenge is creating a product with the properties of commercial polyurethanes, so the team has been collaborating with our Polymer Interdisciplinary Research Centre to prove the viability of this new material. Successful tests have shown that it can be extruded and moulded in the same ways as other polyurethanes, so the next steps will be working with industrial partners to develop this as an environmentally-friendly alternative that can be used in a range of products.

Dr Arathyram Ramachandra Kurup Sasikala (second from right) and her research team.

Find out more

Tackling cancer in a variety of ways

The Institute of Cancer Therapeutics (ICT) is a specialist facility that includes the expertise of medicinal chemists, pharmacologists, biologists and other researchers who are all working towards treatments for cancer in a variety of forms, as this selection of stories from the last year demonstrates.

Breast cancer test that could reduce costs and unnecessary treatment

A new breast cancer test which may be able to accurately and quickly predict those at risk of their cancer spreading is being trialled which could mean those at low risk could avoid gruelling follow-on treatment, as well as potentially saving the NHS millions of pounds a year.

In pilot studies as part of the project led by Professor Chris Twelves, ICT Clinical Director, the test has proved 98 per cent accurate in predicting which patients are at low risk of their cancer spreading or returning - referred to as metastasis - after their initial treatment. Now a trial funded by Innovate UK is being conducted to assess whether the test, known as Ran Diagnostics, works in practice.

As well as indicating who may benefit from extra treatment and those at low risk if successful, the test will also help to avoid expensive genetic tests, as it could be carried out within a hospital's own pathology lab, with results available within hours, for around a few hundred pounds; a fraction of the current cost.

Tracking the spread of dangerous cancers

Dr Karthic Swaminathan, Lecturer in the Centre for Skin Sciences, has secured £125,000 to conduct ground-breaking cancer research from the Academy of Medical Sciences, who provide funding to support biomedical scientists to launch their research careers.

The money will pay for equipment, lab space and time to better understand the spread of malignant melanomas, a dangerous form of skin cancer. Part of Dr Swaminathan's research will involve 'tagging' cancer cells with fluorescent particles and watching them as they spread, with a view to developing new treatments.

Dr Swaminathan said:

"My research involves a specific type of skin cancer, but one which is quite common. In the majority of cancer cases the problem occurs once the cancer moves away from its primary site. It is then that we lose track of the cancer. This metastasis accounts for over 90 per cent of cancer-related deaths. We want to find out how this shift occurs and why."

Encouraging men in the family to support cancer screening uptake

A new study set up by Dr Aliya Darr, Research Fellow in the Faculty of Health Studies and funded by Yorkshire Cancer Research, aims to increase the uptake of cancer screening amongst South Asian Muslim women in Bradford, through working with the men in their families.

Women from South Asian backgrounds have poor screening uptake for breast, cervical and bowel cancer and often present later with more advanced disease - in certain Bradford postcodes up to 50 per cent of South Asian women eligible for screening are not up to date with one or more screens.

Researchers are taking a family-centred approach to this issue by educating male family members about screening, delivering workshops to more than a thousand Muslim males in the community, examining their views about cancer, and their ability to support female family members to engage with screening. The team will also be collecting data on screening uptake from 32 GP practices in the area of focus to help assess the impact of the study.

Two projects tackling deadly brain tumours

Dr. Arathyram Ramachandra Kurup Sasikala, Assistant Professor in Formulation Science, has secured two prestigious research grants from the Royal Society and the Engineering and Physical Sciences Research Council (EPSRC), to advance ground-breaking nanoparticle technologies aimed at treating glioblastoma (GBM), one of the deadliest brain tumours in adults.

The Royal Society-funded project focuses on creating nanoparticles designed to enter the brain and deliver Magnetic Hyperthermia Therapy (MHT), using magnetic particles to generate heat and destroy cancer cells. A new altering magnetic field generator was acquired to conduct studies into the technology.

The second project, made possible with an EPSRC Early Career Researcher International Collaboration Grant, will explore precise editing of genes linked to tumour growth, offering a targeted therapeutic strategy to slow or stop the spread of GBM.

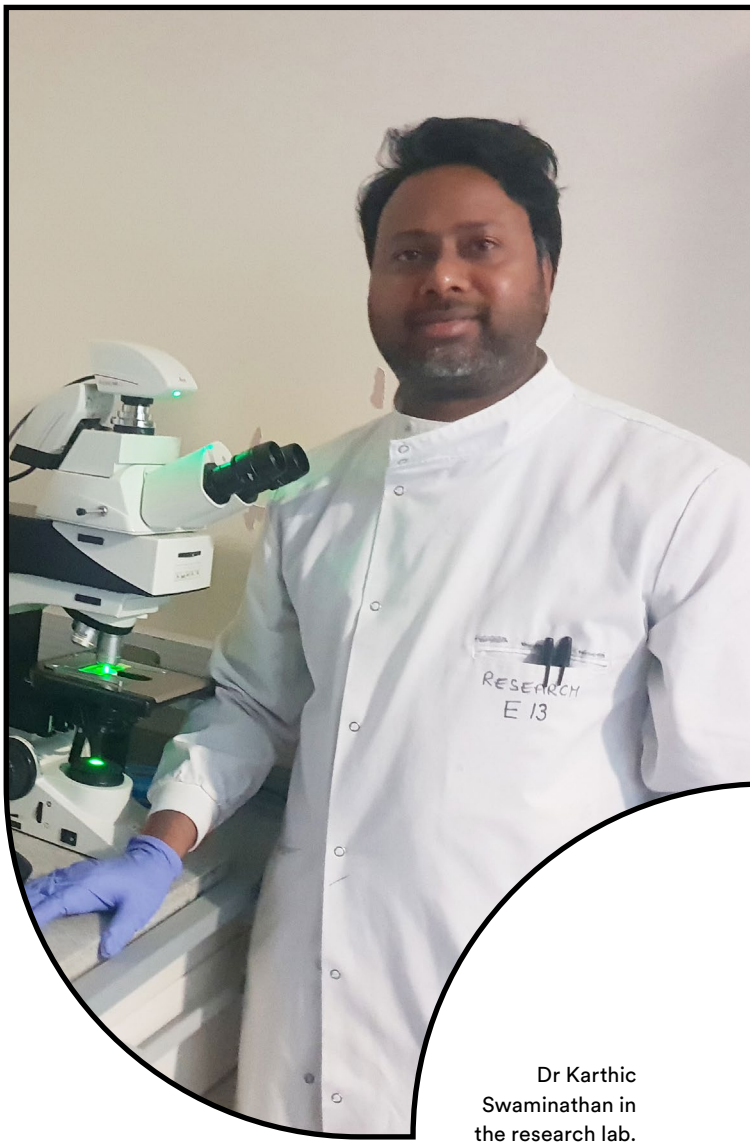
The project, in collaboration with University Hospital Düsseldorf, will convene a panel of glioblastoma experts to guide the research and establish an international research network. “By combining cutting-edge gene-editing technology with our advanced nanoparticle delivery system, we aim to tackle GBM at the genetic level,” explained Dr. Sasikala. “This international collaboration will accelerate progress in developing effective, patient-centred treatments.”

Patents for exciting new treatments

ICT Director Professor Robert Falconer reports on new intellectual property (IP) developments this year:

> **“We’ve submitted patent applications in three exciting areas; The first is for new compounds that inhibit proteins called integrins that are important in cancer metastasis (Dr Helen Sheldrake). The second is for novel anticancer compounds derived from natural products that can be used in a new type of therapy which are a hot topic in cancer therapy, namely ‘antibody drug conjugates’ (Professor Klaus Pors, Professor Robert Falconer, Dr Goreti Ribeiro Morais). Finally, Professor Sherif El-Khamisy and Dr Francis Barnieh have had a patent granted for new data around how to approach ‘dormant’ cancer cells that are involved in tumour resistance and are very difficult to treat.”**

Commercial partners are being sought for these areas, and in the case of the second project, a new spin-out company, UNIK Biotherapeutics, is in the early stages of development, supported by the Bradford-Renduchintala Enterprise Ecosystem.



Dr Karthic Swaminathan in the research lab.

Photo of Kiritimati taken on Dr Alexis-Martin's visit to the island.

Find out more

Advocating for nuclear justice in the Pacific and beyond

Dr Becky Alexis-Martin, Lecturer in Peace, Science and Technology presented her research on nuclear weapons 'Epistemic Nuclear Justice: Changing What We Don't Know', to United Nations delegates in Geneva, Switzerland this year.

Epistemic nuclear justice aims to ensure communities know that they have a right to their own history, their health issues are taken seriously, and any environmental harms are recognised. It also looks to ensure communities have an opportunity to take part in the democratic process of making global policy, which is why the paper is co-authored by both community leaders and international academics, including the former leader of Pacific Island Kiritimati, Teburoro Tito.

The research is based on previous fieldwork by Dr Alexis-Martin in the pacific, seeing first-hand the effects of historical nuclear testing and climate change - for years, Kiritimati has seen babies born with deformities, and according to the Kiritimati Association of Atomic Cancer Patients, 189 families became unwell after the tests. Health options are also basic, with a lack of modern facilities on the island. On top of this, climate change means that crops like papaya and banana don't grow well anymore and fish in the surrounding waters can give serious food poisoning, meaning their food security is precarious.

The research illustrates the need for nuclear justice for this island and other nations impacted by nuclear testing (including Kazakhstan and the Marshall Islands), and the UN can support in delivering this, as Dr Alexis-Martin explains:

> **"Irrespective of their nationalities and origins, justice should be about trying to heal individuals and their communities and remediating their impacted land. The funds must go to the people who need them, so the country as a whole can benefit.**
>
> **The other goal of this work is the need for states that test nuclear weapons to accept and acknowledge their responsibilities and apologise for the harm it has caused."**

Dr Alexis-Martin is part of the Department of Peace Studies and International Development, which celebrated its 50th anniversary in 2024. Her work is part of the rich history of the department, which has seen academics providing expertise to organisations including the UK Government, United Nations Peacekeeping and NATO, and work alongside peacekeepers in conflicts including Israel-Palestine, the Balkan Wars and the Iraq War.

Find out more

Creating a policy of peace across the Pacific Islands

Dr Colins Imoh, Assistant Professor in Peace Studies and International Development, was part of a group of UK academics who travelled to Fiji to support the Prime Minister of Fiji's vision of the pacific islands as an 'Ocean of Peace'.

Prime Minister Sitiveni Rabuka is championing the concept of the region as an 'Ocean of Peace' to make the area an example to others and see an increase in development, tourism and investment, and in turn help to reduce foreign aid dependency. There are also urgent environmental concerns in the region that would potentially benefit from this unified approach.

Dr Imoh's involvement in the project and the Fiji visit was supported by the UK Foreign Commonwealth and Development Office with the endorsement of the Fiji Ministry of Foreign Affairs (MOFA). He was invited to contribute due to his expertise in community peace building. He explains his role:

> **"I'm part of a team of academics from the UK invited to offer advice and support in drafting a guidance document on the principles of the Ocean of Peace idea. Having worked in various communities in Africa, my expertise is looking at the different dynamics within community groups and how they can work together to build peace. From my discussions during the visit, I saw interesting ways in which different groups of people in Fiji view peace - young people have a very different perception to faith-based people, for example, and it's important to acknowledge this when representing the country's values."**

The resulting ten principles of Ocean of Peace were presented to the Pacific Islands Forum, made up of 18 islands and territories in the region, as part of Fiji's foreign policy white paper in August 2024. The hope is that the principles will be adopted and implemented by the other members, and UN agencies active in the region will also use the document as a guide.

As a result of the project, Dr Imoh has built a relationship with the University of Fiji, where he has accepted a position as Adjunct Professor of Peacebuilding, a non-permanent role that will allow him to collaborate on other research into the impact of the Ocean of Peace principles. He is also involved in a research paper based on the team's experiences working with the Fijian government.

Dr Colins Imoh

Prof Krzysztof Poterlowicz presenting to ELIXIR UK Data Stewardship Fellows

Find out more

Unlocking the power of big data for researchers

Through our expertise in research data management, we are helping to create a system that makes information accessible to a diverse range of users under the FAIR principles, which are: Findable, Accessible, Interoperable (i.e. usable across different platforms), and Reuseable. The goal is to ensure that the vast amounts of data (known as big data) gathered in research, healthcare and other projects are both accessible and reusable across institutions. And, as AI becomes more widely used, the quality and reliability of data becomes increasingly important, as flawed or incomplete data can lead to biased outcomes, errors in models, and misguided decisions.

Krzysztof Poterlowicz, Professor of Bioinformatics and Biomedical Data Science, is engaged in several projects related to improving FAIR data management processes. He gives context for the work:

"It's estimated that in 2025 the world will generate approximately 180 zettabytes of data – that's 180 trillion gigabytes. However, 60-90% of data is not easily accessible, shareable, or reusable, leading to increased costs, wasted resources, slower progress, and missed opportunities for collaboration and innovation. This is why global organisations like UNESCO advocate for the application of the FAIR principles in data management to ensure it has a role in achieving Sustainable Development Goals (SDGs)."

Professor Poterlowicz is working with BioFAIR, a new £34 million digital research infrastructure funded by UK Research and Innovation, aiming to improve productivity for researchers. He was responsible for bringing a BioFAIR roadshow to campus in April 2024 where there were discussions and workshops to help shape the direction of the platform, which aims to raise the quality of data sets and promote best practices in research data management.

He is also Training Coordinator for ELIXIR UK, which brings together life sciences research organisations from across Europe (and are also a partner in BioFAIR):

"As part of our UK Research and Innovation funded activities, we coordinate the Data Stewardship Fellowship across 17 UK universities and institutes. We support fellows in developing policies and creating and providing training in FAIR data practices. This year, fellows have successfully delivered training sessions within their organisations and communities, acting as advocates in both UK and international research networks."

The team have also secured additional funding to focus on delivering outcomes and enhancing digital upskilling, building a diverse community of data managers and supporting their professional development.

Putting research at the heart of City of Culture 2025 events

Along with the whole of the district, we were given a huge boost with the news that Bradford was chosen as UK City of Culture 2025, and we are working hard as a strategic partner to make the year's programme of events and activities a success.

Karina Croucher, Professor of Archaeology, Heritage and Wellbeing, is the University's Academic Lead for City of Culture research activities, and will work closely with both the Bradford 2025 delivery team and our researcher community:

> **"One of the crucial aspects of our approach to Bradford 2025 is to use culture to support and inform economic development. We also want to show how the arts and humanities can work alongside science, technology, engineering and maths – which the University of Bradford is already well-known for – to tackle societal challenges. Harnessing our world-leading academic expertise, research and innovation, we aim to create a legacy – one which includes arts, humanities and cultures – that will benefit the city and our communities for years to come."**

Professor Croucher also co-runs the University's Culture and Identity Research Group alongside Dr Mark Goodall. The group, formed to share and discuss common interests between academics across the University, began with regular seminars, and has developed into a platform for opportunities around cultural activities. In the last year it has facilitated funded projects which connected our researchers with artists, including 'Pictures of Health', using creative imagery to help give a better understanding of the human body and health conditions; and 'Culture, Identity and the Anthropocene', a series of interactive creative workshops with Theatre in the Mill. The group has also collaborated with the University of Leeds on developing projects leading to longer term community collaboration and partnerships in Bradford.

Dr Goodall explains how our research contributes to the culture of Bradford:

> **"As an integral part of the history of Bradford, the University has unique skills that it can bring to the City of Culture - we dig deep to find things that are forgotten and create engaging stories, activities and events that everyone can enjoy."**

Looking forward to Bradford 2025 events, there are some exciting initiatives being planned, including: the 'Stories from Valley Parade' project, creating a digital visualisation of football fans' experiences; activities around the story of the Somali Village in Lister Park in 1904; and the history of a forgotten Bradford cinema.

Find out more

Prof Chris Gaffney from the University of Bradford and Davide Longo, Bradford City's Chief Commercial Officer, at the launch of the Stories from Valley Parade project.

Dr Muhammad Ali presenting electrical engineering in a fun way to families at the UNIfy Community Day in April 2024

Sharing research with the community

We're proud of our research here at the University, so we want to make sure we share our stories with the communities who benefit from the work we do, and inspire and enlighten everybody with the fascinating research that takes place here.

Here are some examples of how we're making our research accessible to communities in Bradford and beyond.

Local Events

UNIfy Festival April 2024

Unify is our annual festival of events, workshops and activities aimed at sharing and celebrating University of Bradford projects running across the district. This year's theme was 'What a difference!', recognising people, projects and research that are making a difference, and how brilliant things can happen when people come together.

Our researchers were well represented at the 2024 UNIfy Community Day, with activities for all ages around our research into Space, Satellites and Sustainability, the Born in Bradford: Age of Wonder project (which follows Bradford teenagers' development), cardiovascular health, the Plastic Surgery and Burns Research Unit and organ transplantation, among others.

Pint of Science May 2024

Now a recurring event in the calendar, The Pint of Science festival is a celebration of science which brings researchers and the public together through accessible talks in local pubs and cafes, taking place in 41 towns and cities across the UK. This year there were four events at Café Liza and BrewDog Bradford city centre organised by Jacobo Elies, Associate Professor in the Faculty of Life Sciences, and team. Subjects included the environmental impact of cars, nanoparticles and microorganisms in the body, patient care in the NHS, and weapons of mass destruction. The sessions had great feedback from attendees and received attention from a range of local media.

Soapbox Science June 2024

Soapbox Science is a public outreach platform for promoting the work women and non-binary scientists do. The events, held in the UK and across the world, transform public areas into arenas for public learning and scientific debate, and for Bradford this saw twelve female scientists from the Universities of Bradford and Leeds standing on wooden soapboxes in Bradford's Centenary Square to share their research and passion for science, and promote gender equality in STEMM (Science, Technology, Engineering, Mathematics and Medicine) fields. A total of 263 attendees from all age groups participated in interactive discussion and engaging talks covering a wide range of topics from fatigue to weight gain, blood vessels to the blood-brain barrier, artificial intelligence, gene-drug matching, and sustainable health products.

FROLIC Festival February 2024

The FROLIC (Fun-day Related to Learning about the Institute of Cancer Therapeutics) Festival was organised by Dr Amalia Ruiz, lecturer and researcher at the University of Bradford, around the celebration of World Cancer Day on 4 February. Now in its second year, the event took place at the Broadway shopping centre in Bradford and aimed to make science more accessible to children through games and activities, experiments, and microscope analysis.

Cafe Scientifique

Café Scientifique is a regular lecture series featuring the latest ideas and research in science and technology co-organised by Bradford's Science and Media Museum and the University of Bradford. Each month, guest speakers present exciting topics in their area of expertise, and this year's sessions have included our academics Dr Marizah Minhat on finance, Dr Kirsten Riches-Suman on the science of whisky, Dr Peter Nicholls on cells, and Dr Samantha McLean on medicine for psychosis and schizophrenia.

Bradford Literature Festival 2024

The hugely popular festival celebrated its tenth anniversary in 2024, and our academics contributed to a number of sessions, including Professor Hassan Ugail, AI Fighting Crime; Professor Christopher Gaffney, The Bradford Exhibition of 1904; Professor Paul Rogers, chair of The World Today discussion panel; and Professor John Russell, Russia 100: From Stalin to Putin.

Bradford Inaugural lectures

Our inaugural lectures are public events held at the university to celebrate when an academic is promoted to Professor. This year, Professor Karina Croucher's talk 'What's the point of the past?' addressed themes such as dealing with death, memorialisation, identity and place. Professor Simon Tweddell's session, 'A Journey through Educational Change: An Intrepid Adventure' covered his journey as he's tried to inspire educational change within higher education.

Selected Bradford research in the media

Royal Institution's 2023 Christmas Lectures

Hassan Ugail, Professor of Visual Computing, appeared in the popular BBC lecture series with a presentation related to his work on AI in face recognition.

Podcasts

The University's podcast series 'Let's talk University of Bradford' features invited researchers sharing the interesting facets of their research. This year's episodes have featured Digital Heritage and Archaeology with Professor Andrew Wilson; Sociology and identity with Dr Yunis Alam; Developing Innovative Health Technology with Professor Rebecca Randell; New Priestley Postscripts with Dr Mark Goodall and the Plastic Surgery and Burns Research Unit with Dr Kirsten Riches-Suman.

The Conversation

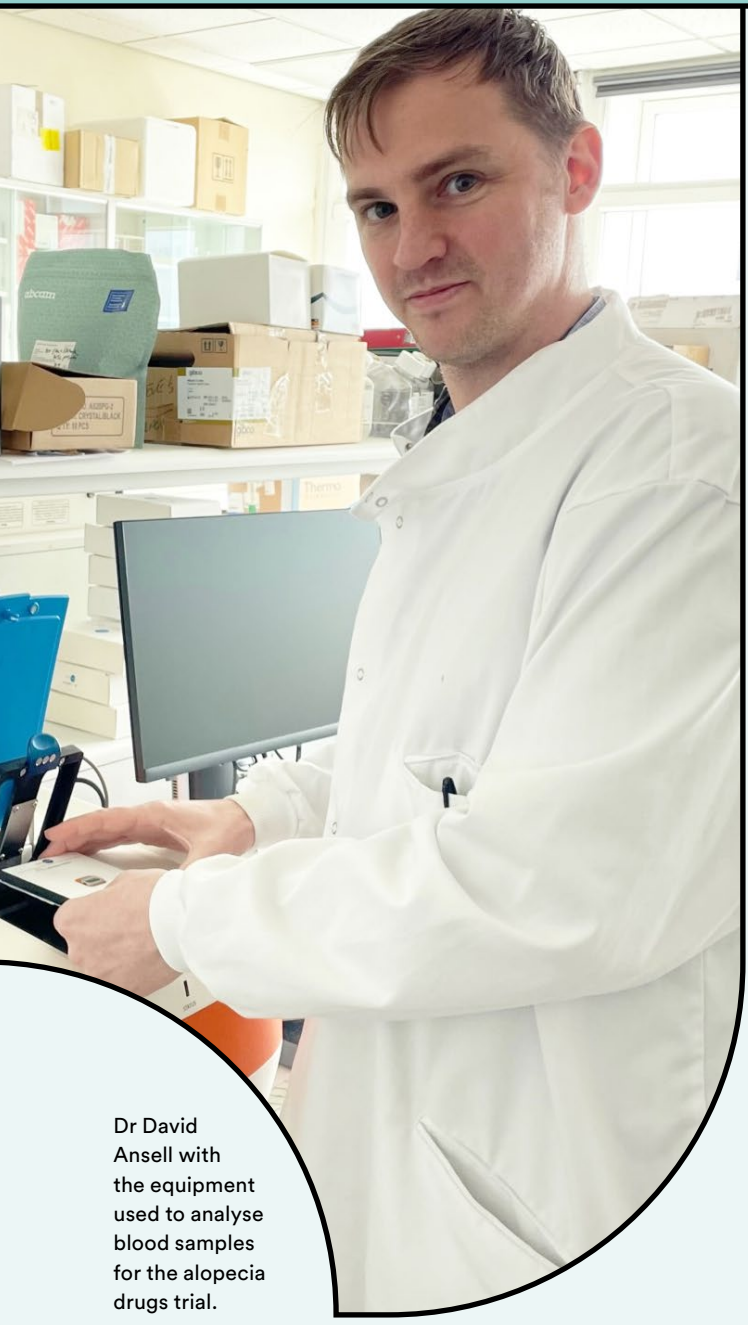
The Conversation is a web platform featuring news analysis and informed comment written by academic experts working with professional journalists. Our researchers contribute regularly, and in the last year 21 authors have written 38 articles, the most popular of which, co-authored by Gokcay Balci on Red Sea Shipping disruption, has been read more than 50,000 times. In the same period, articles by our academics have been read more than 690,000 times.

Find out more

A family at the FROLIC festival stand in the Broadway Centre Bradford in February 2024

Find out more

Working with industry to treat hair loss in different ways



Dr David Ansell with the equipment used to analyse blood samples for the alopecia drugs trial.

Researchers at the Centre for Skin Sciences (CSS) are currently involved in a range of projects investigating possible treatments for alopecia areata, a form of auto-immune hair loss that will affect around two per cent of people at some point during their lifetime.

As part of this, the CSS is working closely with industrial partners to provide scientific insights, such as its successful collaboration with Soterios Pharma, a UK-based life sciences company who develop medicines for skin diseases. They have recently released positive clinical trial results for a new drug called STS-01, seen as a potential approved therapy treatment for mild or moderate alopecia areata.

Bradford's research team, led by Dr David Ansell, Assistant Professor in Life Sciences, is testing blood samples collected from the participants of the clinical trial, taken before and after six months of treatment. Our research is helping to shed light on how the drug works and establish whether it is having an effect locally on the skin where it is being applied, or is having a systemic effect on the whole body.

Dr Ansell describes the current activities:

> **"We're in a really strong position at the moment - companies are seeking us out because we're one of the few places doing this work, and we have access to unique samples and resources that mean we're at the forefront of research in this area. We've also got an interesting project working with master's students to explore the relationship between the gut microbiome and alopecia areata, so we're able to look at it from a range of angles."**

Another project in its early stages is with a biopharmaceutical company who are developing a drug for alopecia areata using an entirely different approach. They are using the specialist facilities and expertise at the Centre for Skin Sciences to help focus their area of investigation.

These collaborations are part of the CSS's ongoing strong relationship with industry partners that includes companies such as Aveda, BASF and Johnson & Johnson, who utilise the centre's unique range of knowledge in skin and hair conditions to help create new products and resources.

Eye surgery in progress

Find out more

Ensuring better outcomes for cataract surgery patients

A Knowledge Transfer Partnership between our Visual Computing experts and ophthalmology company CustomLensAi has produced an AI-based tool that will allow surgeons to assess potential complications in cataract surgeries and work with patients to set precise expectations of the results.

Knowledge Transfer Partnerships, or KTPs, are projects where a business with an idea or specific need is connected to an academic expert at a university. The university also provides a KTP associate, generally a graduate with knowledge of the subject area who will work in the organisation directly on the project, usually for two or three years. For this project the associate is Ali Maysara, a Bradford graduate in AI and Data Science.

The academic supervising this project is Rami Qahwaji, Professor of Visual Computing, whose research interests in artificial intelligence and big data have applications in everything from space exploration to medical diagnostics, particularly the eye.

Professor Qahwaji gives an overview of the University's role in the project:

> **"For CustomLensAi, the brief was to create an intelligent computer system for surgeons that can predict and improve the visual outcomes of cataract surgery. The challenge is that there is a lot of variability on how the surgery can be done which can affect the outcome, and lots of different data formats from the various equipment manufacturers. Our role is to provide AI-based tools that can help to improve the quality of the data and extract useful information, and build an application which will work at any eye clinic across the world."**

The project is making use of CustomLensAi's network of contacts to draw upon the knowledge of a range of senior ophthalmologists from around the world to verify the accuracy of the machine learning element of the application. The KTP is now entering its third and final year, where the product will be refined and released, but so far the project is progressing well and a prototype has been showcased at a number of international conferences to great interest.

Mr. Milind Pande, the Founder and CEO of CustomLensAi said:

> **"At CustomLensAi our collaboration with the University of Bradford is a game-changer in personalised healthcare. Together, we're pioneering AI-driven solutions that enhance surgical precision and patient outcomes, transforming the future of ophthalmology."**

Working with local Roma communities for change

Find out more

A group of Roma children

(Credit: Connecting Roma)

Researchers from the Department of Sociology and Criminology have been working alongside Barnardo's children's charity and Connecting Roma, a Bradford-based community enterprise established by Roma individuals, to better understand the extent to which child exploitation impacts Roma communities living in Bradford and how services can best support Roma families at risk of exploitation.

Dr Gareth Addidle and Dr Sarah Shorrock have been leading on the Roma Voices for Change project, which has involved training individuals from Roma backgrounds, as well as Barnardo's practitioners, to collect and analyse data as part of the research process. Connecting Roma helped researchers to overcome language barriers enabling them to gain the trust of Roma communities and develop knowledge of Roma culture, with accounts of lived experiences helping to explain why Roma families may be mistrustful of public services and at an increased risk of child exploitation.

The research has also involved interviewing stakeholders within education, safeguarding, the police, local authority, health and other third sector organisations in Bradford to understand the structures in place and their experiences of dealing with Roma people.

Relationships developed from the research, alongside emerging findings, have led to new funding from the Vulnerability and Policing Futures Research Centre. Dr Shorrock described the work:

> **"By continuing conversations with Roma communities around identity and exposure to exploitation, we are able to develop a culturally sensitive training package that can be accessed by a range of organisations within Bradford, helping to standardise best practice. More importantly, Roma individuals have an opportunity to debunk misconceptions relating to Roma identity and culture, maintaining the core aim of making changes with Roma communities, not for them. Once a training package has been created, the next step is to try and upscale the resource to a national level, whilst monitoring the impact the resource has on relationships between Roma communities and statutory agencies within Bradford."**

Dr Addidle and Dr Shorrock, alongside other colleagues, are involved in several research projects exploring exploitation, modern slavery, violence against women and girls and police practices dealing with child exploitation and modern slavery, including county lines gangs. Underpinning these projects are the strong connections established with the police, local authorities and other organisations within West Yorkshire, allowing the skills and expertise within the Department and across the University to be aligned with knowledge gaps and research requests from the local area.

A power station in South Africa, among those contributing to climate change across Africa.

Ensuring women have a voice in climate law and governance

Dr Pedi Obani, Associate Professor in the School of Law, has been awarded Future Leaders Fellowship status by the UK Research and Innovation (UKRI) funding body, one of just 68 scholars to receive the prestigious award nationally. Dr Obani will receive £1.28 million in funding for a four-year project. She explains the context of the research:

> **"Women across Africa are affected by extreme weather caused by climate change. For example, heatwaves can cause health problems directly or mean that women can no longer take part in recreation or education because they are spending more time on other tasks, such as collecting water or caring for relatives; they are also mainly excluded from decision-making processes. We will examine ways in which climate change adversely impacts women, and will co-create a framework for addressing these problems working closely with women and other relevant groups and communities."**

In prior research on climate change in Africa, Dr Obani and team covered eight countries in Africa, including speaking to key people in government and other relevant organisations. This helped to identify three case study countries: Nigeria, South Africa and Kenya, which will be the focus of the fellowship project. The funding will help to establish a base of research in each country to include a postdoctoral researcher with local knowledge and cultural awareness gathering the experiences of women and their priorities for climate action. The research teams in each country will also benefit from training and development opportunities.

This project will also explore how women can be part of the solution in terms of equal political and legal representation. The aim is to not only highlight the demand for justice, but to create opportunities that enable female lawyers to take on and represent climate cases.

The findings will be presented to the governments of Nigeria, South Africa and Kenya, and could have wider implications across African nations, but also in Europe. For example, earlier this year, a group of Swiss women took their own government to the European Court of Human Rights, arguing the Swiss government's inadequate response to climate change was damaging their right to health and life. They won their case, but the Swiss parliament subsequently voted to reject the court's ruling, putting the issue of 'climate justice' for women centre stage.

Find out more

Find out more

Revolutionary tanning product collaboration a decade in the making

Swedish biotech company Coegin Pharma has entered into an exclusive agreement with the University of Bradford to complete product development and commercialise a ground-breaking patented process which can naturally boost the natural pigment in the skin, developed in the Centre for Skin Sciences (CSS).

The new technology represents an alternative to chemical-based stains or exposure to UV radiation as it works with the body's own melanocytes to give a tanned appearance. Melanocytes are the cells that produce the pigment that gives skin and hair their colour and protects them from the sun, and this process uses amino acids to encourage the production of melanin in the cells and transport it to the surface of the skin.

The collaboration with Coegin Pharma began in 2019, but the development of the technology at the University dates back much further. The University's Commercial Innovation team, part of Research and Innovation Services, has supported researchers in the Centre for Skin Sciences (CSS) through the decade-long process of creating a commercial application for the process and finding a suitable partner in industry.

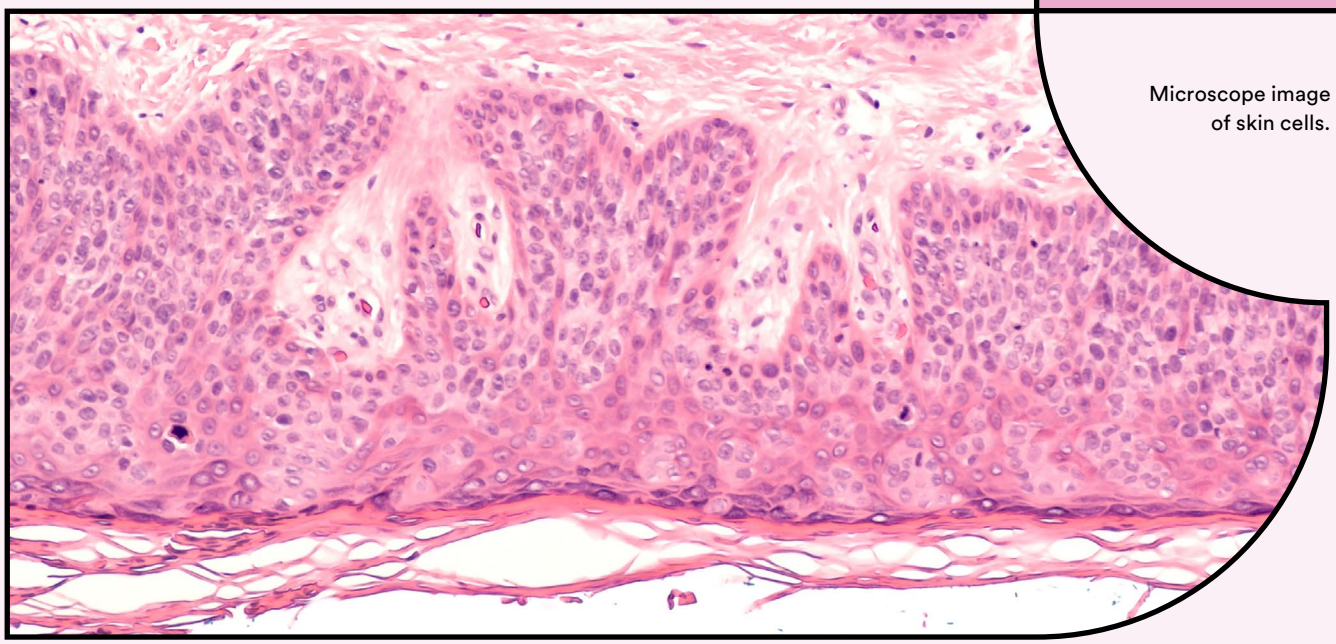
Russell Hodgetts, Head of Commercial Innovation, describes the journey:

> **"The initial patent itself covered a molecule and a process of deriving some active peptides from that molecule. While this was an exciting breakthrough, the delivery of that molecule through the skin was very difficult, so we provided funding for a research programme out of which came the development of amino acids that could penetrate the skin effectively, which made the patent much more commercial."**

So with a product to license, we put together the information that an investor would need to make their decision, as well as the work involved in identifying suitable potential partners. Eventually we found a great partner in Coegin Pharma whose goals fitted with ours, and now my role is to foster an ongoing relationship working with the CSS on other projects that will inform our research and hopefully create more licensable products."

Coegin Pharma has exclusive rights to license and commercialise the pigmentation peptides globally and aims to launch the first cosmetic products for pigmentation as early as 2026 in collaboration with commercial partners.

COEGIN PHARMA



Microscope image of skin cells.

Find out more

Ongoing support for spin-out company pays dividends

A Bradford innovation in cancer medicine was the basis for spin-out company Incanthera, and during the COVID-19 pandemic we supported the business again, enabling successful developments at the company and a big boost to its share price.

Research at the Institute of Cancer Therapeutics (ICT), undertaken by Professors Paul Loadman, Jason Gill, Rob Falconer and Laurence Patterson demonstrated the potential of a cancer treatment using colchicine, also used as a gout medication, which was modified to be activated only in tumours leaving healthy tissue unharmed. This was patented as ICT2588, and in 2010 we established a spin-out company - a business formed as separate legal entity from the parent organisation generally created to commercialise innovations – to develop the molecule's drug development potential. The company, known as Incanthera, raised funding to progress this and related projects, and in July 2017, Ellipses Pharma acquired the rights to ICT2588 for £4.9 million.

Incanthera floated on London's AQSE Growth Market (a stock market for smaller enterprises) in February 2020 focusing on Sol, a potentially innovative topical product for the treatment of skin damage from the sun and prevention of skin cancers, but the COVID-19 pandemic and associated lockdown created difficulties for the company, and it was in danger of not being able to fulfil its obligations. Due to the strong relationship with the University of Bradford, the company reached out for support, and the decision was made by the ICT, Research and Innovation Services and the University's finance team to offer funding as a convertable loan.

This meant that we could convert the loan to shares, and this has proved to be a sound investment as Incanthera has recently made a deal for one of their top cosmetic products in Europe and their share price more than tripled, providing an excellent return.

We are also investing in business ideas from our staff, students, researchers and the local community through an initiative launched this year. The Bradford-Renduchintala Enterprise Ecosystem provides dedicated advice, support and mentoring programmes supporting all forms of business and entrepreneurial ideas, which has been made possible by a £1.25 million donation from Alumnus Dr Murthy Renduchintala matched by the University.

incanthera

Find out more

Improving the lives of people with young onset dementia

Dory and Julie from the DYNAMIC project management group. Julie, left, lives with young onset dementia.

Researchers from the University's Centre for Applied Dementia studies (CfADS), led by Jan Oyebode, Professor of Dementia Care, are currently involved in a National Institute for Health and Care Research (NIHR) funded project, the DYNAMIC study, to assess the social care provision for people living with young onset dementia and make recommendations for improvements. The team identified a need for a deeper understanding of the unique social support needs for people living with the condition, as Professor Oyebode explains:

> **"Young onset dementia affects people under the age of 65. First signs vary a lot, but could include struggles with organising workload, loss of empathy or visual problems. Over time it affects the ability to live independently and look after yourself. There are no effective treatments in place currently, so people need increasing support, but the impact is very different from dementia later in life because younger people can have dependents, such as children or elderly parents. It's likely they will have responsibilities, have to earn a living, pay a mortgage, etc., and as a result, they need individual support packages including things like financial and employment advice, and opportunities to remain active and engaged."**

In the study's first year, the team have interviewed people with young onset dementia or their close supporters about their experiences and expectations of social care, and have done a national survey of staff involved in providing or commissioning social care about their experiences and current provisions. The analysis of this research will be presented at an event where stakeholders will identify three priorities for change.

The team will address the priorities through development of resources and recommendations that could feed into social care practice. This will be done jointly with people living with young onset dementia, families and professionals, and the Young Dementia team within the charity Dementia UK.

The University is also playing a key role in a £3 million NIHR-funded Policy Research Unit for Dementia and Neurodegenerative Diseases, led by the University of Exeter to produce research summaries to inform national policy and guidelines. CfADS are leading on two projects: addressing inequalities for minority ethnicities across the care trajectory, led by Dr Sadhia Parveen, and the gap between policy and practice for carers led by Dr Catherine Quinn.

A group testing a simulation exercise

Find out more

Using empathy to engage with communities on climate issues

A research team in the Department of Peace Studies and International Development are exploring interesting ways to engage with communities that are facing difficult choices as they seek to adapt to a changing climate.

Associate Professors Dr Ute Kelly and Dr Rhys Kelly have a background in conflict resolution and encouraging meaningful conversations about difficult and potentially divisive issues. Their analysis of existing research and practice on community engagement in climate adaptation contributed to the Environment Agency's National Flood and Coastal Erosion Risk Management Strategy for England. This review highlighted challenges in community engagement, including the 'readiness' of communities, professionals and other stakeholders to engage in complex and emotionally challenging conversations about adaptation choices and the trade-offs involved. Afterwards, they were involved in piloting different approaches to assessing and enhancing 'readiness'. This included role-play simulations as one potential way to build trust, knowledge and an understanding of different perspectives. Building on similar approaches from the US and elsewhere, the team developed simulations suitable for use in UK contexts.

Dr Ute Kelly describes the process:

> **"The development of our simulations was informed by conversations with people affected by flooding and coastal change and also with professionals who are trying to negotiate complex choices. Getting a sense of their experiences and perspectives enabled us to create realistic scenarios and participant roles.**
>
> **The resources we produced helped people understand their character, inhabit other roles and understand more fully the difference, issues, and perspectives at play. These simulations were designed to help participants recognise that there are good reasons why people feel strongly about particular issues, and to foster empathy for others in their community."**

The team developed two simulations – one on responses to urban flooding, the other on adaptation choices in the face of coastal change. The resources have been tested in a range of settings, and the learning from them has been shared with a range of professionals involved in community engagement and adaptation planning. Drs Kelly and Kelly are now taking their experience into a new multidisciplinary project funded by UK Research and Innovation that focuses on coastal change and historic landfill sites.

Find out more

Improving children's health in schools locally and globally

Professor Andy Daly-Smith presenting at the WSPA conference in June 2024

Research at the University into children's health and wellbeing, particularly in the Bradford region, has shown significant progress in the last year, demonstrated by high-quality publications, the development of a movement skills assessment tool for Sport England and other related projects, and an international conference where findings and knowledge were shared and discussed.

In June 2024, around 300 delegates from 24 countries attended the first international Whole-School Physical Activity (WSPA) conference, hosted by the University of Bradford - we also led the organisation of the event alongside the Wolfson Centre for Applied Health Research and Yorkshire Sport Foundation. Two successful co-production workshops with research, policy and practice stakeholders were embedded within the conference and Dr Anna Chalkley, Senior Research Fellow in the Faculty of Health Studies, is leading on a report to present the findings in a policy brief to the Department for Education.

A key message throughout the conference was the importance of schools as the vehicle to change deep-rooted inequalities that lead to lower life expectancies and poorer health outcomes in later life for many children. This is the basis for the Creating Active Schools (CAS) programme, a framework that supports schools in putting physical activity at the heart of school life, led by Andy Daly-Smith, Professor in Physical Activity and Child Health and the Yorkshire Sport Foundation.

This model has already been adopted by more than 50 schools in Bradford and 200 across the UK. Professor Daly-Smith explains the unique approach:

> **"Our publications assessing CAS so far show how it has had an impact on organisational culture for physical activity, and how it's seen by schools as a programme that aligns with the way they work. There are further challenges that we need to overcome, and this is where a systems-based approach that uses feedback from the different stakeholders helps the ongoing development of the programme, as schools adapt as they learn what works best for them."**

Due to the project's success to this stage, every school in Bradford will soon have the opportunity to be part of CAS, with the hope of engaging around 40 more schools in the next academic year, building the network of educators and practitioners helping to implement and improve the programme.

A medical consultation aided by technology

Find out more

New research centre developing and evaluating innovative health technology

The Centre for Digital Innovations in Health and Social Care (CDIHSC) was awarded £4.86 million in January 2024 through Research England's Expanding Excellence in England Fund to provide expert input into the digital transformation of our health and care system, an area identified by the Department of Health and Social Care as a top priority. The centre was awarded funding to operate two flagship research programmes:

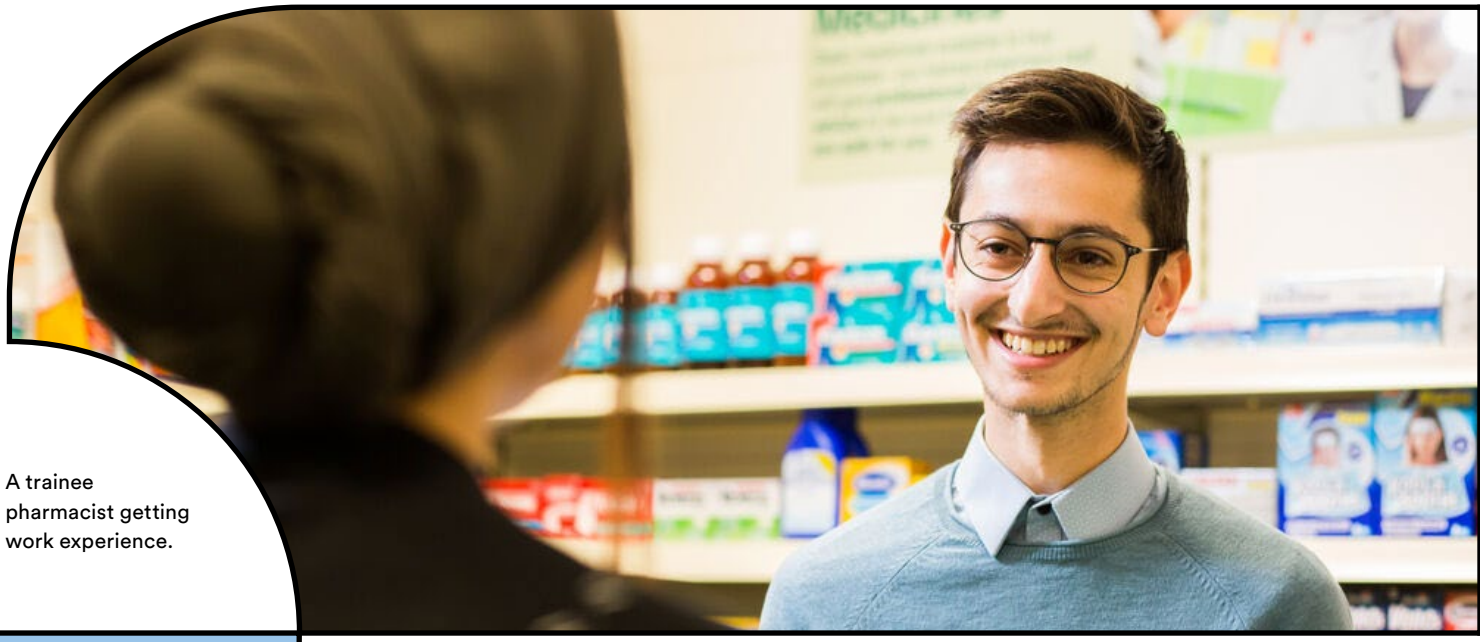
- To create novel technologies that disrupt current practices to improve decision-making and alleviate electronic documentation burden
- To develop and evaluate technologies that reduce the health and care system's carbon footprint while improving patient care

The work of CDIHSC will build on the success of the Health Technologies for Quality and Safety research group and complement the business engagement and innovation activities of our Digital Health Enterprise Zone (DHEZ), which links digital health businesses and health and social care partners with University expertise.

Professor of Digital Innovations in Healthcare Rebecca Randell, said:

> **"It's great to have validation of the Centre's philosophy, which is about developing a deep understanding of the challenges that health and care providers face in order to design technologies that really support them and lead to better patient care.**
>
> **In addition to being a long-term investment, we will be working with digital health companies, offering training and knowledge transfer projects, and working with them to evaluate their products, all of which will mean Bradford will become a testbed for health care related innovation."**

The Centre's core team is now established and includes a Translational Research Fellow who will spend one year at Airedale NHS Foundation Trust. There will also be nine PhD students recruited in 2025 who will all spend some of their time in health and care organisations to build knowledge and refine their research questions.



A trainee pharmacist getting work experience.

Find out more

Team-Based Learning at the heart of new training for pharmacists

Our reputation for high-quality Pharmacy courses has helped to position us at the forefront of innovative programmes aiming to restructure the pharmacy profession.

Dr Gemma Quinn, Associate Professor in the School of Pharmacy and Medical Sciences, is leading on four programmes commissioned by NHS England, including a pilot of training and assessment methods around independent prescribing; this represents a big shift in how pharmacists are trained at undergraduate level, as currently qualified pharmacists usually take an independent prescribing course around two years after graduating. Under the new structure, prescribing will be part of the foundation training year - we will be evaluating the pilot to inform the future direction of the delivery and assessment of the foundation training year and will be publishing the findings as a research paper.

Dr Quinn is also co-chair of the Postgraduate group of the Pharmacy Schools Council, and is collaborating with NHS England, the Royal Pharmaceutical Society and other key stakeholders working on the implementation of prescribing and other strategic goals across England.

Dr Quinn describes the range of projects, and how research plays a role in the work:

> **"The independent prescribing pilot is one of four programmes commissioned by NHS England and we're doing innovative things in all of them, so they're all lending themselves to undertaking some research. We've recently had a publication from a programme that we do for foundation training across the north of England, which we presented at conferences; we've got a national mental health pathway where we use Team-Based Learning (TBL) online, that we're in the process of evaluating, and we've also just started a critical care for pharmacy technicians programme where we're delivering teaching, but coming out of that is also some research."**

The University's TBL approach, originally introduced in 2012, is seen as one of our unique selling points and a key reason that the University was chosen for these projects. Research has shown the benefits of TBL in terms of inclusivity, achievement attainment, and positive student feedback.

Find out more

Delivering data-centric engineering skills for the global aerospace and automotive industries

A group of global companies has turned to the University to deliver an innovative training programme for engineers across the world that uses our expertise in data-centric engineering - using data science, mathematical modelling and AI to improve processes.

Known as the SAFI Consortium, the partnership is made up of Airbus, Stellantis (which includes Citroën, Fiat, Vauxhall and Peugeot), Renault Group and Valeo (an automotive supplier specialising in safety and green technology), with the University of Bradford.

The collaboration started in 2017 when these companies were seeking to enhance the skills of their engineers and improve the reliability, safety and environmental sustainability of large automotive and aerospace systems. They looked to the University's Automotive Research Centre because of its longstanding track record of collaborative research and industry training with Jaguar Land Rover and Ford.

Automotive Research Centre Director Professor Felician Campean explains the programme:

> **"Our fresh approach to delivering integrated data science for engineers includes both problem- and team-based learning, and also features experts from industry delivering daily technical talks with examples of challenges and best practice to give industrial context.**
>
> **There is a high level of interaction due to our 'blended' delivery, with technical sessions, small group tutorials and exercises, and we provide a Bradford Utilities toolbox to support individual learning that's applicable to the day-to-day work they are doing.**
>
> **We've also recently launched a monthly seminar series, featuring guest lectures from senior staff in leading European organisations. These are available to anyone interested from industry, as well as our students, who can benefit from the insights on offer."**

The successful delivery of the programme to date has led to a contract extension for three years until 2027, and working relationships have continued to strengthen and include more research. Valeo in particular have engaged us as a partner on a large research project, which funds two doctoral researchers at the University of Bradford, with a further PhD student on the Industrial Partnership Route based at Valeo in Germany. Valeo's Global Director for Reliability, Regulation and Carbon Neutrality, Dr David Delaux, has been appointed visiting professor at Bradford, and is a very proactive Chairman of the SAFI Project Board.

Plans for 2025 include the launch of SAFI operations in India to train the engineers at the Renault and Valeo technical centres in Chennai.

UNIVERSITY of BRADFORD

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Bradford research and innovation in numbers 23/24

£15.5 million
new awards

257 academics
engaged in research funding

£6 million
research income

6 patent
applications filed to protect arising intellectual property developed at the University

46 projects
working with external organisations with
£1.56 million funding*

Bradford Scholars Repository of Publications

610,724 downloads
September 2023 - 2024

7,071 articles
in the repository at the end of August 2024

*Figures from January – September 2024 only