UNIVERSITY of BRADFORD

Faculty of Engineering & Informatics

Faculty of Engineering and Informatics Newsletter

May 2022

Welcome from the Dean

There is much to celebrate in the strong performance of the Faculty in the recently published national Research Excellence Framework (REF2021) results; well done to all those submitted and those who crafted and supported the submissions:

- Computer Science returned, unlike the previous exercise in 2014
- All Engineering disciplines returned, unlike 2014
- Improvements in all areas of assessment
- Far more staff returned with an inclusive strategy.

Useful links are:

www.ref.ac.uk

www.timeshighereducation.com/news/ref-2021-computer-science-and-informatics

www.timeshighereducation.com/news/ref-2021-engineering

(Note the University has an online subscription for THE (times higher education) through the Library but you can read several articles per month free as a guest)

Congratulations to our Pi of the Tiger Team who battled the elements on Wednesday 25 May and ascended the team rankings, up to 7th place, in the TeamBradford Festival. A special thank you to Joanna Wood who assembled the willing volunteers, who were also eager to dress up for the occasion (see photos coming up in the next Newsletter!!)

We have recently held successful showcase / poster events for our final-year UG students in Computer Science and Chemical Engineering on 12 May and the other Engineering disciplines on 26 May. The final UG Showcase event for this academic year will be for MDT students, in the Atrium, on 9 June 2022. For our PGR students, their chance to give presentations is at the Annual Innovative Engineering Research Conference on 17 June 2022, in the Norcroft Auditorium. My thanks to all staff involved in delivering these events.

The next opportunity for academic staff to submit applications for regrade is coming soon. Cases must be submitted via HR ServiceNow, by Wednesday, 6 July 2022. You must contact your line manager to discuss in the first instance. Details of forms, University process, etc, are here>>

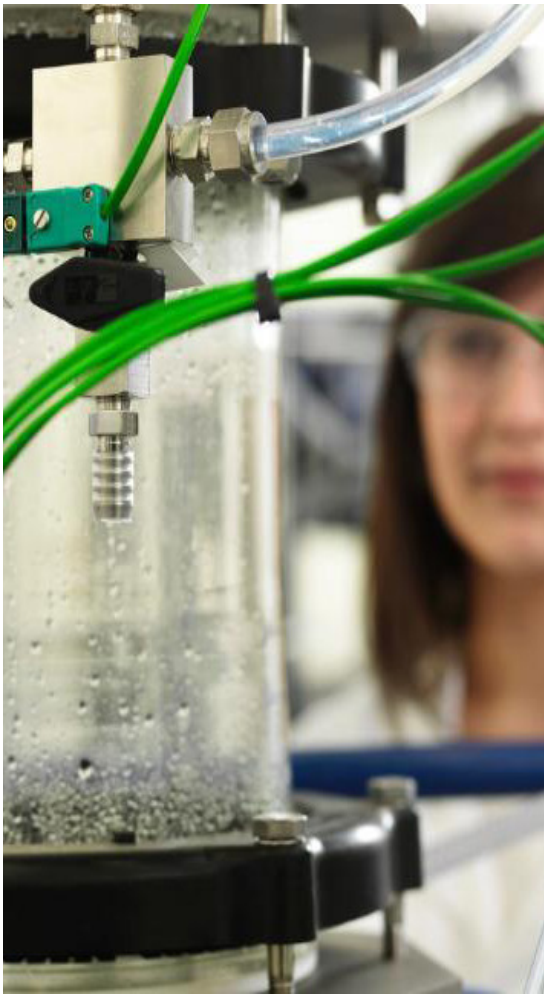
The process for Professional Services regrades is slightly different in that job evaluation is required first. Again, you must contact your line manager in the first instance. The relevant dates are Friday 29 July 2022 (Job Evaluation Deadline) and Friday 26 August 2022 (Full Submission).

Newsletter summary:

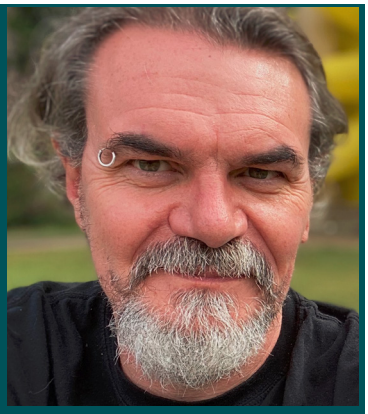
1. Academic in profile

2. RKT News (grants applications, open calls, presentations and awards)

3. Staff and Students' news



Academic in profile:

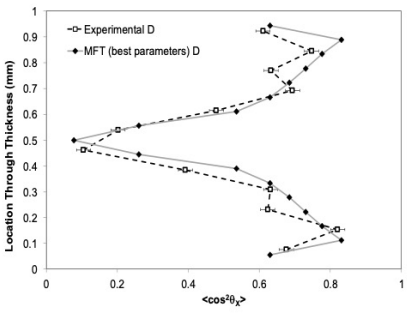


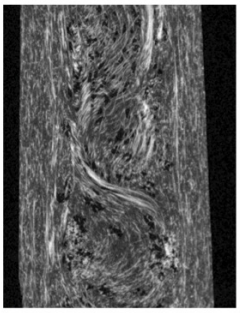
Dr Fin Caton-Rose

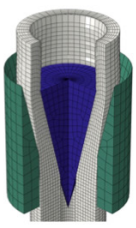
Fin graduated in Engineering for Design and Manufacture (BEng) at Hull University in 1992 before starting work on the design, build and testing of a ceramic water pump for the Water Hydraulics Research Group at the same University. In 1995 he registered for an industrially sponsored PhD studying computer modelling of large strain deformation for geogrid applications. In 1999 he joined the Polymer Engineering research group as a research member of staff and joined the academic staff as a Research Investment Lecturer in 2003. He was promoted to Senior Lecturer in Polymer Engineering in 2006 and to Reader in 2020. In 2013 he became Head of Product Design, in the School of Engineering, Design and Technology, and in 2014 was appointed Head of Design in the newly formed School of Media, Design and Technology until November 2015. In 2022 he took on the role of Head of Department for Media Design and Technology.

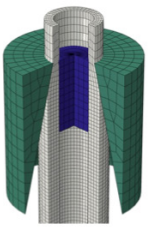
Fin is also the Manager of the Solid Phase Polymer Processing Group and Manager of the Computer Modelling Research Centre within the Polymer IRC. He is a member of the Centre of Advanced Materials Engineering and Centre for Polymer Micro and Nano Technology where he carries out research in finite element analysis, composite materials (nano and micro-reinforced), injection moulding analysis, 3D visualisation and solid phase polymer processing for the manufacture of shape memory and high stiffness materials.

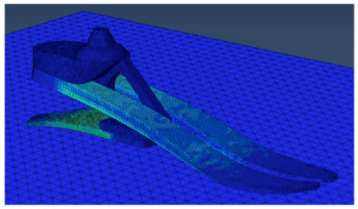
Fin has taught across Design and Engineering disciplines with specific interests in computer aided design, finite element analysis, digital prototyping and product design studio projects. Fin also now teaches motion capture and digital scanning within the Department of Media Design and Technology as well as supporting final year projects.

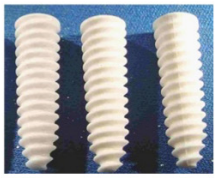


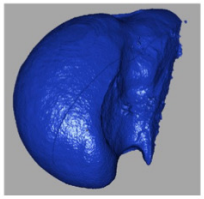


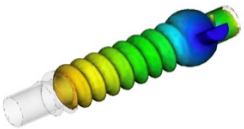












Current research interests:

- fibre orientation and fibre breakage studies during the injection moulding of composite materials (both computational and experimental)
- advanced process visualisation
- solid phase deformation
- biocompatible and bioresorbable polymers
- shape memory polymers
- reverse engineering and rapid prototyping.

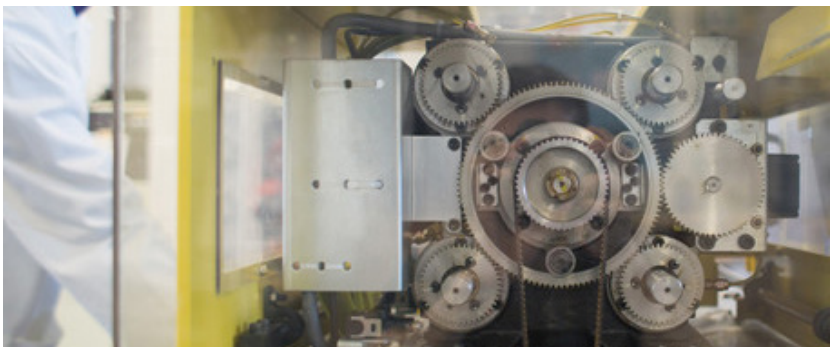
Research projects:

- EPSRC Smart Manufacturing of Medical Devices for soft tissue fixation
- EPSRC High efficiency value-added bulk recycling of polymers by solid state shear milling
- Sabic
- Sinopec

Research and Innovation

Project Pipeline:

- Opening the Black Box of AI: What Can Humans Teach Machines About Inequality and Uncertainty?, Mai Elshehaly
- Development of demountable steel composite beam using sustainable concrete, Xianghe Dai
- Bio-Copilot: Human-level Automated Bio-modeller for Synthetic Biology, Savas Konur
- Enabling urban flood risk quantification considering spatially distributed uncertainties, Yakun Guo



Advanced Materials Workshop

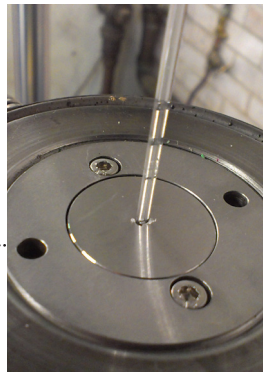
The FoEI Strategic Research Landscape exercise carried out in 2021, setting up the research environment for the next REF period, has identified four over-arching research themes for the Faculty - Smart Health Systems, Sustainable Environments, Advanced Materials and Smart Industrial Systems. This exercise was driven by the individual PRIPs returned by academic staff and the RGAPs (Research Grant Action Plans) produced by the Research Centres and Groups.

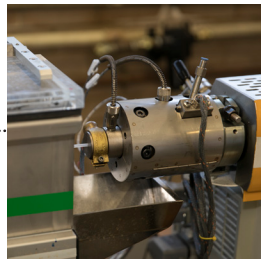
The Advanced Materials workshop was arranged on 26th April for over 20 active researchers who have an interest in engaging in activities relevant to this theme.

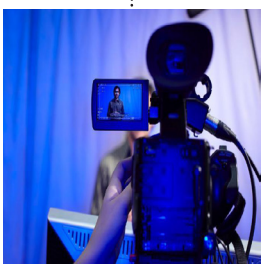
The workshop identfied the following areas of interest: Smart materials/ Ultraprecision manufacturing, additive manufacturing and characterisation /Circular economy and material recycling/ Computer modelling and computer vision.

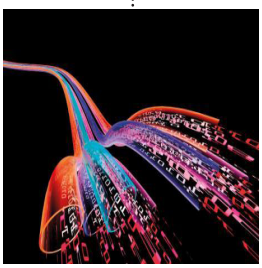
Open calls for funding:

- Expression of interest: digital health hub pilot scheme, Closing date: 11 August 2022 16:00 UK time
- Host the Creative Industries Policy and Evidence Centre: stage one, losing date: 21 July 2022 16:00 UK time
- Work with Brazilian researchers: NERC FAPESP lead agency, Closing date: Open - no closing date
- Innovate UK Smart grants, Closing date: 27 July 2022 11:00 UK time









Staff and Students' news

UK-China polymer partnership marks 10th anniversary

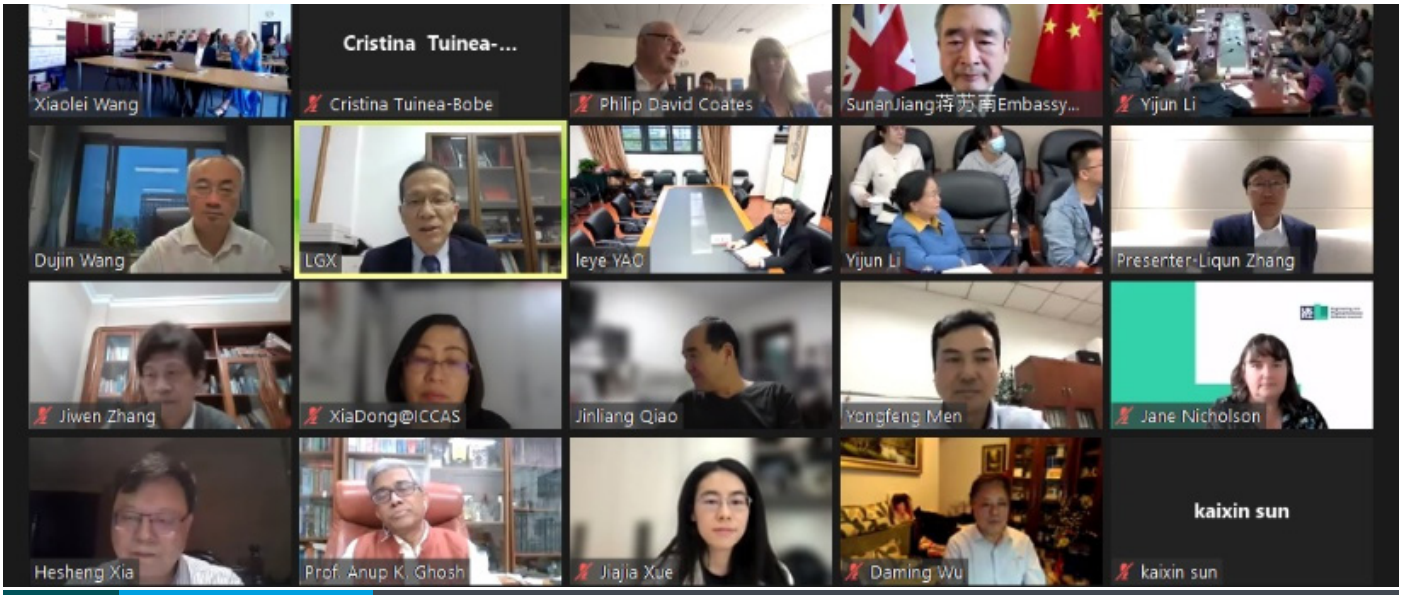
The University of Bradford marked the 10th anniversary of a ground-breaking partnership with China to promote research into polymers.

The Science Bridges China collaboration was dubbed "second to none in the world" by its founder Prof Phil Coates, director of the University's Polymer IRC (Interdisciplinary Research Centre). The partnership led to the formation of the UK-China Advanced Materials Research Institute, which has over 300 academics involved in joint research projects and has already resulted in numerous scientific breakthroughs, principally in healthcare, but with applications in other areas such as engineering and energy use.

In 2018, Prof Coates (pictured below) received China's top scientific award for overseas academics presented by President Xi Jinping at a ceremony in Beijing.

Science Bridges China celebrated this decade of partnership with a special conference on May 18 and 19, which included high level government speakers and a number of online seminars. Prof Shirley Congdon opened the event and welcomed the participants to this significant event.

More about the event here >>



Staff and Students' news

Bradford-Renduchintala Centre for Space AI tackles Cyber Attacks for Resilient Air Traffic Management System using Machine Learning

Prof. Fun Hu, the Centre Director of the Bradford-Renduchintala Centre for Space AI, presented the work carried out by the Bradford SINAPSE research team and on behalf of the SINAPSE project consortium on 'Machine Learning and Cyber Security: Robust Protection Against Digital Attack' in the EU thematic webinar 'Innovative Solutions for ATM Resilience' organised by the Single European Sky ATM Research Joint Undertaking held on 28th April 2022.

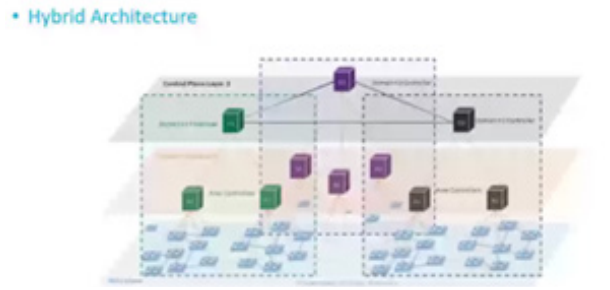
The project aims to define an intelligent and secured aeronautical datalink communications network architecture design, based on the software defined networking (SDN) augmented with AI to predict and prevent safety services outages, to optimize available network resources and to implement cybersecurity functions to protect the network against digital attacks. The University of Bradford leads the Cyber Security workpackage.
Prof. Fun Hu said "We have derived an innovative security framework to tackle potential digital attacks on aeronautical communication networks using collaborative machine learning. While preliminary results showed good performance indicators, a lot still needs to be done to ensure that the framework can be efficiently and realistically applied to the real aeronautical environment. Currently we rely on open datasets to test our framework. The next stage of development will involve testing the algorithm on real traffic and attack patterns of the aeronautic communications applications. There are also other research issues that need to be resolved."
Mr Kanaan Abdo, the SINAPSE project coordinator said, "The Braford University team is proposing a creative approach for building a collaborative Cyber Security model that is learned collectively while ensuring data privacy, without sharing data but only AI footprint. This type of solution will be a crucial building block for a secured future aeronautical communication infrastructure."

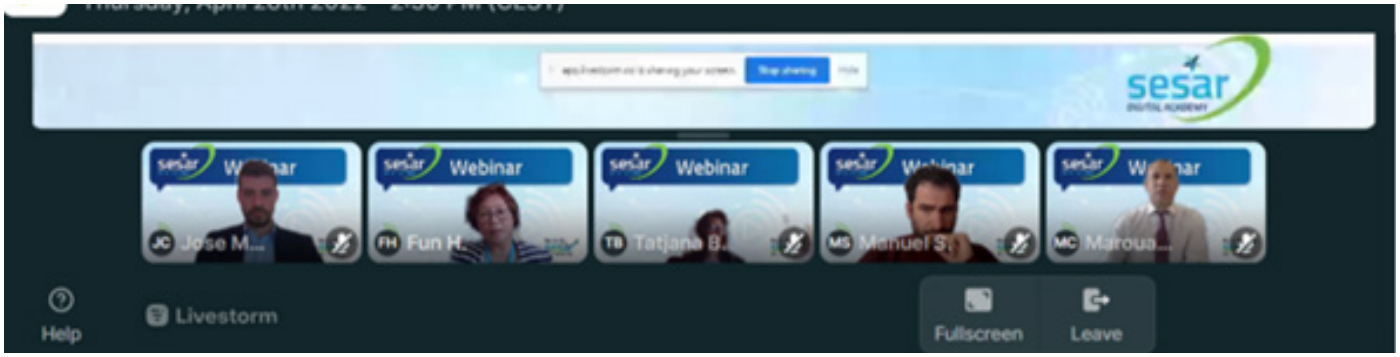
Personal Research and Innovation Plans (PRIP)

The Personal Research and Innovation Plans (PRIP) are designed to help us all plan for, and support, research across the University. Completing our PRIPs gives us all the opportunity to reflect on our research and help us develop plans for the future. Staff can use their plan to help inform both the Workload Model and Performance Development Review discussions as well as being part of the Bradford Academic Career Journey. The PRIPs also give us a better understanding of the support needed from Professional Services to facilitate the research that we are planning. The move to a five-year research planning cycle is an essential part of planning for our future research across the University and forms a fundamental cog of our Research and Innovation strategy.

This year's survey will close on 8th July 2022 and you can go into it at any time during that period to complete it. You can save the form and return to it at a later date.

You can access the 2022 PRIP Survey here>>





Staff and Students' news

Erasmus+ PhD student awarded the SCI Graham symposium poster prize

Aryane Vigato, a visiting Erasmus+ PhD student from the Federal University of ABC-Brazil has been awarded the SCI Graham symposium poster prize that took place in London earlier this month.

Her project at Bradford supervised by Bana Shriky, Tim Gough and Mohammad Isreb from FoLS focuses on the characterisation and optimisation of Pluronic based organogels for topical drug delivery.

Aryane is a chemist, and was awrded the Lavoisier Award by the Regional Chemistry Council (IV Region) for the best chemistry student of UFABC in 2018. She has experience in drug-delivery, nanostructured carriers, development of new technologies in health and cosmetics, and physical-chemical interactions between pharmaceutical formulations and the skin.

Equality, Diversity and Inclusion Events

11th May was the National Staff Network Day. Staff joined to learn more about the EDI-related issues and events in our University, of sharing your experience so that others can learn from that, and of finding support for areas that need it. Staff networks have a significant impact on decisions that affect all members of the University and provide a voice for the personal lived experiences of staff.

The Centre for Inclusion and Diversity (CfID), organised the 11th. Making Diversity Interventions Count Annual Conference (MDICAC) 2022 on 25th May. This conference attracted contributions from renowned national and international speakers; and features the latest research and development as well as the synthesis and application of knowledge. The conference focused on exploring the varying interventions aimed at advancing equality, with the objective of informing the development of good practice in the effective use of diversity interventions in organisations.

More about the event here>>

Staff and Students' news

Outstanding Achiever Awards 2022

The event took place on 5th May and combined the celebration of our colleagues that have dedicated 25 and 40 years service, with recognising individuals and teams who have been outstanding achievers over the last 12 months.

The six award categories, each one sponsored by a member of the University's Executive Team, are:
- Category 1: Outstanding Postgraduate Research Supervisor
- Category 2: Outstanding Support for Students
- Category 3: Outstanding Contribution to Equality, Diversity and Inclusion
- Category 4: Outstanding Contribution to Business and Community Engagement
- Category 5: Outstanding Contribution - Team award
- Category 6: Outstanding Contribution - Individual award

The Health Technologies for Quality & Safety Group (FoHS/FoLS/FoE&I) - won the Outstanding Contribution to Business and Community Engagement for their significant engagement with health and social care providers. Dr Mai Elshehaly is integral part of this team.

More here>>

Succesful competion of the Exa Networks KTP

The aim of the KTP, lead by Dr Ci Lei, was to build an optimal classification system specifically for the task of filtering /separating acceptable and inappropriate web content that improves the accuracy of the content classification system in the KTP Company Partner' web content filter deployed in educational institutions, e.g. schools, using an Artificial Intelligence (AI) approach.

One of the challenges of the project was to identify representative and meaningful samples for the training of the Machine Learning (ML) model. For the project, the team used the largest publicly accessible web dataset, Common Crawl Corpus, which provides 'a copy' of the internet and contains billions of hosts and their connections (edges).

Another challenge is how to handle and make use of such big dataset. We took an innovative approach and considered the web as a big graph of interconnected nodes where nodes containing similar kind of content tend to be linked with each other.

The fruitful working relationship established with the Company Partner will lead to future collaborations in research and grant applications.

Staff and Students' news

£618k grant to help traditional cracker maker Rakusen's more sustainable secured

A team led by Dr Savas Konur at University of Bradford's Faculty of Engineering and Informatics and Sheffield Hallam's National Centre of Excellence for Food Engineering (NCEFE) will work alongside Rakusen's to transform production methods to support the business to reduce emissions and energy consumption by 60%.

The project will also support the 100-year-old business that produces flame-baked water crackers and biscuits in the UK, to meet demand for growth in international markets and help it to meet net zero targets while maintaining its heritage.

The two-year project, funded by Innovate UK, aims to transform Rakusen's using digital technologies and food science to minimise the company's carbon footprint and maximise capacity without the need to change the existing machinery.

The business currently uses legacy equipment which provides limited manufacturing control and restricts the introduction of new product lines. The future of the business requires it to address these challenges and invest in innovation which is sympathetic to its heritage-based offering. Through this project, machine intelligence will capture knowledge and skills, moving to intelligent decision-making to support significant reduction in energy usage, carbon footprint and material waste.The project will also have a positive impact on the workforce by upskilling staff through training and introducing culture change as well as having an impact regionally as most ingredients are supplied locally.

Previously, the University of Bradford collaborated with Rakusen's on a Knowledge Transfer Partnership, using 'big data' to improve production.

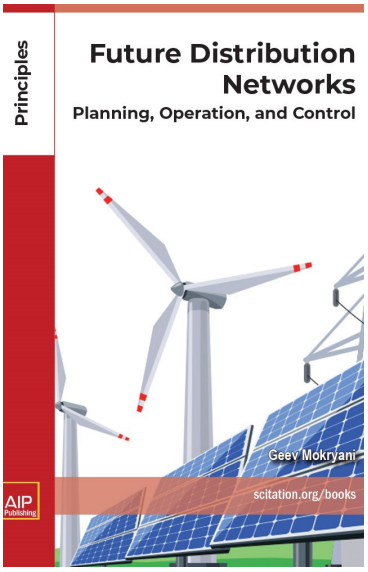
More about this here>>

Clean air project part of national 'climate action' campaign

Dhaval is leading the University of Bradford's involvement in a project to improve air quality in the city. The project has been chosen as part of a national campaign on climate action by Universities UK. Breathe Better Bradford is a council-run project which uses specialist air quality sensing equipment supplied by the University. It will now feature as one of 40 projects as part of the #MadeAtUni: Climate Action campaign, which launches today - UUK is the collective voice of UK universities, comprising more than 140 institutions.
More info here>>

Staff and Students' news

Dr Mokryani's book by American Institute of Physics (AIP) Publishing



Geev's book entitled 'Future Distribution Networks: Planning, Operation, and Control' presents a curated collection of leading information on the planning and operation of smart grids and next-generation distribution networks. It offers a look into the future of electricity networks that enable sustainable energy services and examines how these networks will link small- and medium-scale sources with consumer demand. It discusses how intelligent grid infrastructure provides flexibility for supply and demand.

The book contains: structure and clarification to the concept of 'smart grids' offering a clear, agreed-upon definition, up-to-date information in smart grids and next-generation energy distribution networks, including industry and academic/laboratory contributions and recent developments in planning, operation and control of future distribution networks and smart grids with penetration of renewable energy sources.

Read more information here >>

Dr Nejat Rahmanian Outreach Activities

Dr Rahmanian visited Qatar University (Center of Advanced Materials), Texas A&M University and Qatar Shell Research Center over the Easter Break. He has delivered a presentation on Climate Change to the students and staff at the Center of Advanced Materials and Gas Processing Center at Qatar University. He also introduced the Faculty's areas of research to staff members of the Department of Chemical Engineering, Texas AM and Qatar Shell Research Center. Nejat is happy to discuss potential collaboration with Qatari partners with anyone in the faculty who has an interest in research oil/gas and CO_2 issues.

Nejat also visited our industrial internship final year student based in Pembroke Refinery. He delivered a presentation to the operational staff and some staff in the engineering department and the placement students from other UK universities.

Nejat's new article entitled 'Acid Gas Removal by Superhigh Silica ZSM-5: Adsorption Isotherms of Hydrogen Sulfide, Carbon Dioxide, Methane, and Nitrogen' was published by American Chemical Society.

Staff and Students' news

Roll Royce Science and Technology award STEM PPE Enrichment Project

Students from Hanson School Bradford completed a range of initial research into issues seen in the news and online of NHS staff struggling with issues wearing goggles during Covid as well as issues generally with women wearing poorly fitting PPE such as stab vests. They also researched how 3D technologies were used to manufacture stop gap components for ventilators and covid visors during the initial Covid outbreak using 3D printers and specialist materials.

The students proposed 5 iterations for the NHS goggles following the visit to Polymer IRC labs where they were hosted by Prof Ben Whiteside, Prof Hassan Ugail, Dr Fin Caton-Rose and Dr Cristina Tuinea-Bobe.

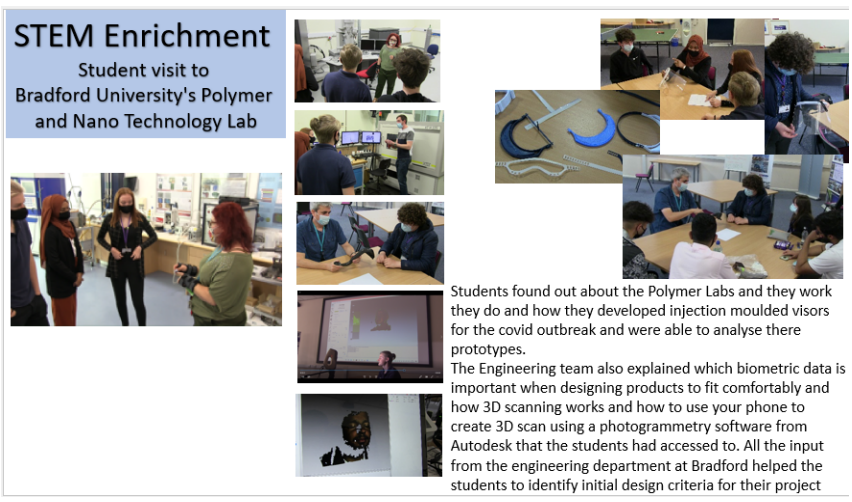
The school will be integrating 3D printing, design and manufacturing knowledge from this project into the school curriculum in a variety of different learning scenarios.

Early Career Research Seminar (ECRF)

Dr Pedro Arcelus Arrillaga gave a presentation on 'Hydrothermal processing of unconventional resources to produce fuel and added value products'.
Dr Cristina Tuinea-Bobe gave an introduction to PRIP and its importance.

Our next meeting is on 15th June 2022, 13.00, and is followed by a 'Shut-up and write' session.

More here>>



Students found out about the Polymer Labs and they work they do and how they developed injection moulded visors for the covid outbreak and were able to analyse there prototypes.
The Engineering team also explained which biometric data is important when designing products to fit comfortably and how 3D scanning works and how to use your phone to create 3D scan using a photogrammetry software from Autodesk that the students had accessed to. All the input from the engineering department at Bradford helped the students to identify initial design criteria for their project