



University of
Strathclyde
Glasgow



Images of Research

Exploring the Unseen

Welcome



I am delighted to welcome you to
Images of Research 2024.

The theme for the competition this year is **Exploring the Unseen**, and the exhibition aims to showcase visually captivating images or illustrations that highlight the hidden, often overlooked aspects of research. Whether through the lens of a microscope, data visualization, or artistic interpretation, these images share a glimpse into the unseen world behind research and innovation, and demonstrate the real-world impact being created at the University of Strathclyde.

This year Strathclyde celebrates the Diamond Jubilee, marking 60 years since the Royal Charter was signed. We are pleased that there is a special category in the competition this year to reflect this significant milestone.

The other categories reflect our ethos and strategy focussing on collaboration, sustainability, society, and health and wellbeing, and we are pleased to showcase the wealth of research taking place across the University's four faculties. The images resonate with our own Strategic Themes – areas of strength which underpin the research – as well as with the UN's sustainable development goals.

The Images of Research exhibition and launch event form part of our Engage with Strathclyde programme of events. The exhibition will be located in the Learning and Teaching Building between 30 April – 10 May and then, for the first time, to Glasgow Central Station between 27 May – 10 June, and will form part of the Glasgow Science Festival.

We hope you enjoy the exhibition which illustrate the breadth and quality of research taking place at Strathclyde and encourage you to engage further with us.

Best wishes,

A handwritten signature in black ink that reads "James McDonald". The signature is fluid and cursive, with the first name "James" and last name "McDonald" clearly legible.

Professor Sir Jim McDonald
Principal and Vice-Chancellor

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Images of Research 2024

Images of Research is an annual competition open to academics, researchers and PhD students conducting research at the University of Strathclyde. In the University's Diamond Jubilee year, marking 60 years since the Royal Charter was signed, we asked staff and PhD students from across the university to capture their research and knowledge exchange in a single image, with the aim of demonstrating the real-world impact being created at Strathclyde.

This year the five categories in the competition are:

- **Capturing Collaboration** - showcasing the transformative power of collaboration and partnership working within the realms of research, knowledge exchange and innovation.
- **Preserving Our Planet** - showcasing research focused on lessening the impact of human activities on the environment.
- **Societal Spark** - Igniting change through innovation. This category centres on showcasing how research and innovation can bring about positive, real-world impact and tackle societal challenges.
- **The Human Element** - shining a spotlight on research in the health, care and wellbeing space exploring the diversity of work in this area.
- **Diamond Jubilee - Exploring the Unseen** - this open category captures the unseen and often-overlooked aspects of research.

The Images of Research competition and exhibition is part of Engage with Strathclyde – the University's flagship events programme. Prizes for our category winners are kindly donated by Jessops.



For more information and to view all of the competition entries in the online gallery please visit:

www.imagesofresearch.strath.ac.uk

Meet the Judges

Professor Madeleine Grealy **Deputy Associate Principal**



Madeleine is a Deputy Associate Principal for Research and Knowledge Exchange and a Professor of Psychology. She joined Strathclyde in 2000 having previously worked at

the University of Glasgow, the University of Edinburgh and the MRC Human Movement and Balance Unit in London. Her research focuses on developing and evaluating rehabilitation programmes for people with brain injuries.

Manish Joshi **CEO Strathclyde's Students' Union**



Manish is the CEO of Strathclyde Students' Union where he oversees the governance and strategic direction of the Student Union. The Union provide a range of activities,

volunteering opportunities, advice and support to Strathclyde Students as well as places to eat, drink and study. He is also currently leading on the Social Innovation Cluster at Strathclyde.

Gordon Hodge **Head of Conferencing & Events**



A native of Oban and a graduate of the University of Glasgow, Gordon joined Strathclyde in 2013 and currently heads up the University's award-winning Conferencing & Events

team, who market and operate the Technology & Innovation Centre and the wider campus as a venue for conferences, meetings and events. Gordon and his team provide conference management services to academic colleagues and deliver the University's programme of corporate events, including graduation ceremonies and honorary degrees.

Professor John Liggit Professor of Polymer Science and Technology



John undertook his PhD research on polymer degradation chemistry at the University of Glasgow, subsequently working at Heriot-Watt University and ICI on Teesside before joining the University of Strathclyde, where he is now Professor of Polymer Science and Technology.

John's research is very applied in nature and is focused on solving specific problems for businesses, often supporting the manufacturing process. Recent research projects include industry-funded programmes on fire retarded polyurethanes foams for the oil and gas sector, pre-ceramic materials for the welding of silicon carbide heating elements, and the scale-up of gelatin functionalisation chemistry for biomedical device manufacture.

Professor Jill MacBryde, Associate Principal



Jill is Associate Principal, Entrepreneurship and Enterprise at Strathclyde. She is also Professor of Innovation and Operations Management.

Jill is Co-Director of the ESRC

Made Smarter "InterAct" network, which aims to bring insights from the social sciences to support the innovation and diffusion of digital technologies that will result in a stronger, more resilient, manufacturing base.

Jill was previously Director of the Hunter Centre for Entrepreneurship. She is currently a member of the Innovate UK/ESRC Innovation Caucus and a member of the Innovate UK Future Flight Advisory Board.

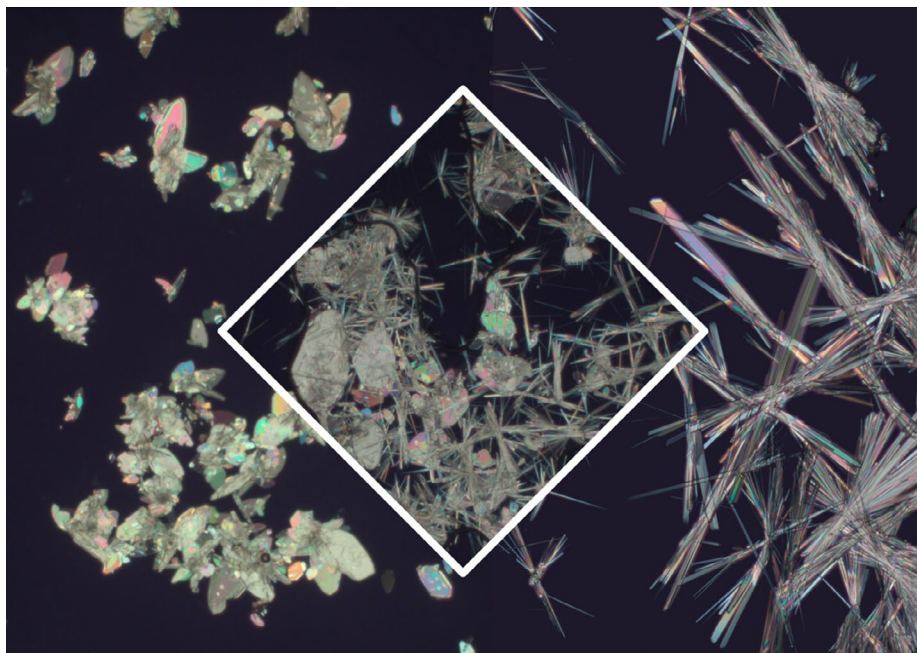
Capturing Collaboration



Cow in the loop

This image shows hourly energy consumption (brown) and renewable energy production (green) for a dairy farm located in Rhins of Galloway (a designated Less Favoured Area of Scotland). We are revolutionising sustainable agriculture with digital innovation by co-designing load scheduling with the dairy industry. Tackling UN SDGs 2, 7, 8, 9 and 12, we leverage on low carbon technology investment together with digital innovation to accelerate the transition to net-zero farming.

Entrant: Apostolos Vavouris
© 2024 Apostolos Vavouris



Molecular Metamorphosis

Many medicines are produced as crystals; the shape and size are critical to make sure the medicine is safe and effective. These pictures, taken on a placement at AstraZeneca, show a new drug spontaneously changing from plate (left) to needle shaped crystals (right) in a few seconds and only visible with a microscope. This behaviour is difficult to predict but very important to understand and is being researched in universities and industry.

Entrant: Samira Anker

© 2024 Samira Anker; AstraZeneca



Protecting ocean culture and human rights

During colonial rule, the Topnaar people in Namibia were forcibly displaced from their coastal dwelling places, with their access to marine resources and fishing grounds restricted. In contemporary Namibia, the Topnaar continue to be excluded from ocean decision-making. The One Ocean Hub is supporting research by the Topnaar to preserve their surviving ocean-related culture, and through that, have their human rights linked to the ocean recognised and considered by national policy-makers.

Entrant: Elisa Morgera
© 2024 Nessim Stevenson

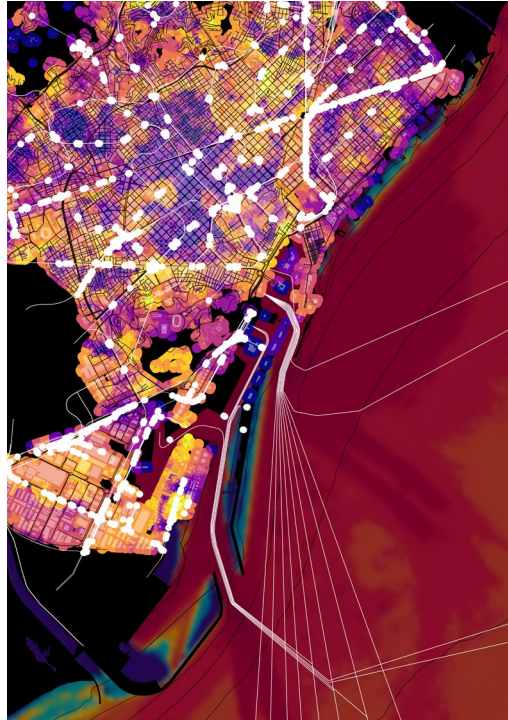


Synergy Station

Imagine a bustling train station, symbolizing the intersection of diverse paths in AI governance and research. Each track and passenger represent a unique discipline and perspective, converging to navigate the complex challenges of bias, privacy, and ethical decision-making. This collaboration ensures the journey towards innovative, ethical AI solutions is not only progressive, but inclusive, embodying the essence of connectedness and interdisciplinary views.

Entrant: Jai Geelal
© 2024 Jai Geelal

Exploring the Unseen



Barcelona between Life and Industry

Modern cities struggle balancing industry and equality. In Barcelona, which ranks high on global city liveability indices, we observe the railway network nodes coinciding with the highest rates of Gini inequality index. The iron arteries link to sea trade fostering opportunity, but slice through the urban landscape creating barriers locally, connecting and dividing in equal measure. Our research analyses urban form to understand its relationship with industry, infrastructure, and culture.

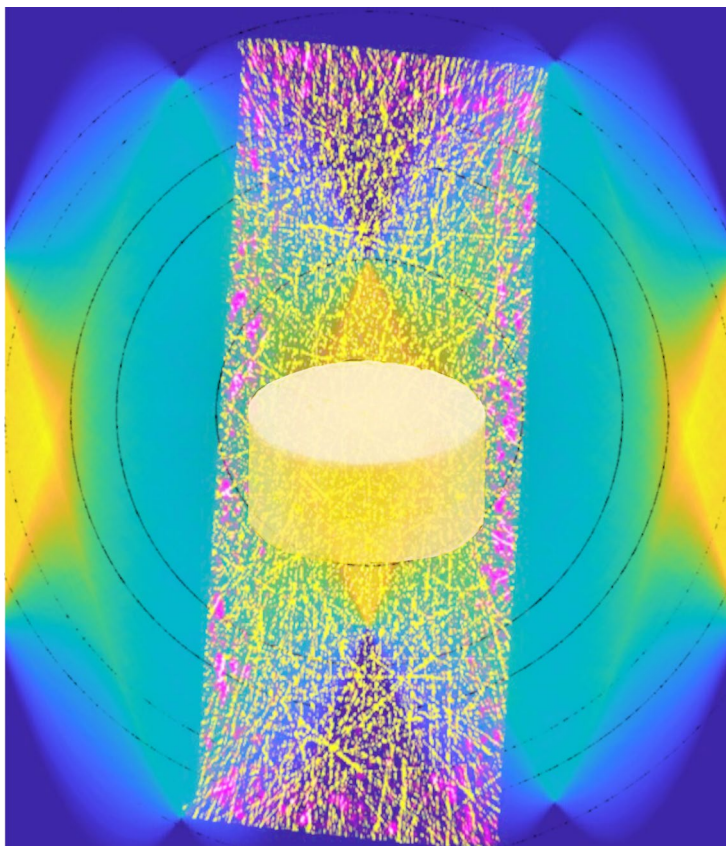
Entrant: Carolina Rigoni
© 2024 Carolina Rigoni and Katrin Djapanova



Ear to Ear

Crickets have ears like us, with eardrums, but behind that eardrum is a hidden world that has baffled scientists for decades. The right-hand image of the cricket ear is captured using micro-CT imaging. Everything in red is less than 10 micrometres thick, revealing three interlinked membranes that both transmit and tune signals. This finding could help inspire the innovation of new microphones, especially the type used to improve hearing aids.

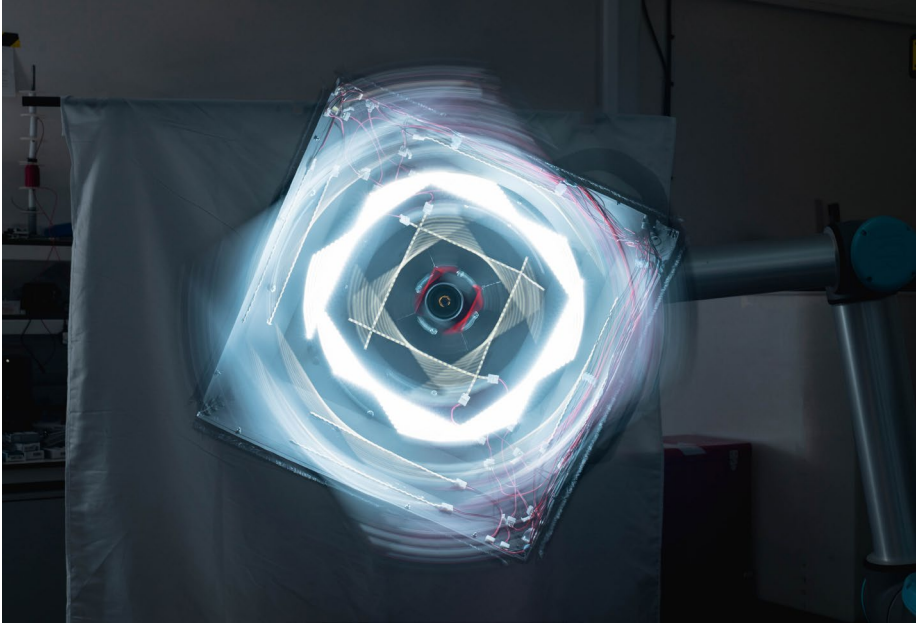
Entrant: Brendan Latham
© 2024 Brendan Latham



Ghosts in the Tablet

We investigate the effects of pressure on pharmaceutical tablets using X-ray diffraction Computed Tomography (XRD-CT). During compaction, pharmaceutical materials can undergo changes in their crystal structure which can have adverse effects on tablet manufacture and performance. We “Explore the Unseen” by analysing full pharmaceutical tablets, revealing the spatial distribution of the materials in the tablet, and the changes that have occurred during the tableting process without the destruction of the tablet.

Entrant: Iain Oswald/Stephen Price
© 2024 University of Strathclyde REA Scheme;
Cambridge Crystallographic Data Centre;
Deutsches Elektronen Synchrotron



Lights, Camera, Inspection!

Regular inspections of structures such as buildings, bridges and dams are vital to ensuring their longevity. However, current human-led approaches are inconsistent and put people at risk. We are studying how robotics and lighting can be used to improve both the safety and accuracy of inspections, helping the construction industry adapt to modern methods of identifying defects. Ensuring structures are maintained proactively reduces the need for new, carbon-emitting construction projects.

Entrant: Hamish Dow
© 2024 Hamish Dow



N!om as the San's Living Law

Our research project involved engaging collaboratively with members of a small community in Namibia to explore new ways of presenting their legal claims to land and self-determination. N!om is the invisible potency that represents the law and is released by the healers through dance and the communication with ancestors. In this picture we make the healing power of the ancestors - N!om visible when we witnessed it in N//homa.

Entrant: Saskia Vermeylen
© 2024 Luke Kaplan



Networks of Movement and Space

In the past 30 years the global trade network has experienced an immense restructuring with new streams of freight being planned, developed, and proposed almost annually. This intangible movement of people, services, goods, and knowledge has been evolving since the dawn of the first complex human civilisations. The recently proposed economic corridors are shown in red, the existing railway system in light grey, and the connecting global ports in white.

Entrant: Katrin Djanova
© 2024 Katrin Djanova



Shedding Light on What's Beneath

This image combines an X-ray scan of microscopic mica clay particles with a cityscape. Despite their presence in most soils, clays remain largely unexplored. Through X-ray Computed Tomography (CT), this research unveils clays' micromechanical behaviour, to enhance soil mechanics predictability and design practices. The cityscape is a metaphor of our daily environments, highlighting the unseen but pervasive presence of clays beneath us, with implications for construction, natural hazards, and environmental sustainability.

Entrant: Maria Giulia Migliorelli
© 2024 Maria Giulia Migliorelli

Preserving our Planet



Bridging the Environmental-Urban Divide

In the intricate dance between urban development and environmental preservation; Lady Justice beckons towards a path of reconciliation. This research unveils the power of alternative dispute resolution; offering a beacon of hope in resolving conflicts arising from UK urban expansion. Through understanding the societal impacts and legal intricacies; inclusive dialogue and sustainable progress pave the way for a future where nature and cities thrive in harmony.

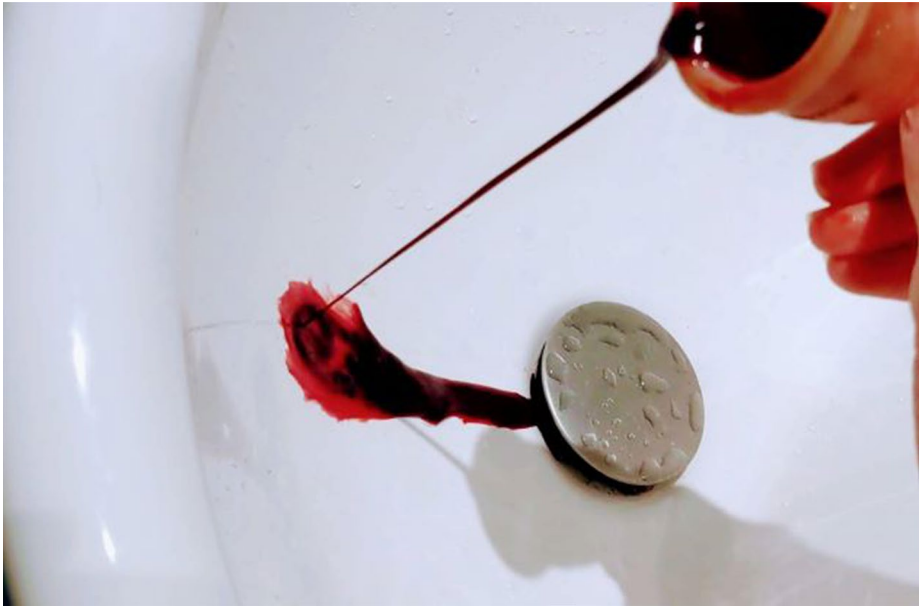
Entrant: Sneha Selina Bonomally
© 2024 Sneha Selina Bonomally



Dressing Our Way to Extinction

This image reveals the stark dichotomy between the glamour of fashion and its hidden repercussions. I explore how the fashion industry impacts environmental degradation and the pressure of self-presentation projects under the pursuit of perfection perpetuated by the media-fashion-celebrity alliance. The challenge lies in unravelling these complex connections to illustrate why reforming our consumption habits is vital for a sustainable and equitable future.

Entrant: Marsaili Mainz
© 2024 Marsali Mainz



Inclusive Environmentalism; Period.

My research explores the impact of social and political pressure on women and girls in Scotland through the lens of menstruation. Findings highlight that pressure to lessen environmental harm through reusable menstrual products compounds structural inequalities, such as gender, class, and disability. Creating exclusions in place of environmental collectives due to the cost, availability, and accessibility of these products. An inclusive approach is paramount to preserving our environment.

Entrant: Kate Molyneaux
© 2024 Kate Molyneaux



Securing Our Future: Vertical Farming Safeguards Earth

In a world facing environmental challenges, vertical farming emerges as a beacon of hope. Through innovative techniques, this sustainable agricultural method not only secures our food supply but also safeguards our planet. As towering structures rise, they symbolise a harmonious union between technology and nature ensuring food security while protecting the earth's precious resources. Vertical farming stands as a testament to humanity's commitment to a greener, more sustainable future.

Entrant: Nour Hallas
© 2024 Nour Hallas

Societal Spark



Cultural Identity Preservation Through Heritage Buildings

Historic buildings serve as repositories of cultural identity within societies. Regrettably, they are frequently abandoned, and eventually demolished to allow for new constructions, despite their role in reinforcing community cultural heritage. These architectural treasures encapsulate the identity of the communities where they stand. My research investigates the impact of heritage buildings in Nigeria's South-South region on preserving the cultural identity of its inhabitants, aiming to conserve them for future generations.

Entrant: Samuel Etopidiok
© 2024 Samuel Etopidiok



Empowering the Feminine Spirit

The focus of my research is the significant impact of entrepreneurship in empowering women from non-western contexts. This empowerment leads to a remarkable shift in societal norms. However, the presence of cultural hurdles and limited resources highlights the need for the establishment of supportive networks and inclusive policies. These measures are essential for ensuring the continued growth and sustainability of female entrepreneurship as an empowering force.

Entrant: Nasreen Hasan
© 2024 Nasreen Hasan



Mapping for Justice

During the apartheid era, the Kosi Bay community in South Africa was removed from their ancestral land for purposes of nature conservation. One Ocean Hub supported mapping of their culturally relevant areas and customs, as evidence of their customary and human rights and ecological knowledge of the area. “By mapping fish traps we can prove that the community’s customary system includes fishing rights”, Wilmien Wicomb (Legal Resources Center).

Entrant: Philile Mbatha
© 2024 Nessim Stevenson



Nature-based Experiences in Urban Preschool Environment

Nature deficit disorders among children are rising, alarming urban dwellers. This study emphasises the significance of children accessing nature, notably pre-schoolers spending most of their time at school. It addresses challenges on the importance of children's perspectives in architecture-nature interactions and validates the benefits for children's wellbeing. This research will assess architecture-nature integration in urban preschools in Glasgow and Kuala Lumpur.

Entrant: Farhana Mohammed Isa
© 2024 Farhana Mohammed Isa

The Human Element



#CATS Creating Autistic Trauma Stories

Depression and suicide are high in autistic people, who feel stigmatised and discounted. Our project explores how engaging with a neurodivergent artist during emotion-focused creative workshops helps autistic adults to narrate their unheard trauma stories. The image depicts the 'ugliness' (ravens) created by the pain of interpersonal encounters, whose burden (stones) is relieved by the cat (Creating Autistic Trauma Stories), which collects and reimagines the trauma, promoting rejuvenation and healing.

Entrant: Anna Robinson
© 2024 Jon Adams



Evoking the Memory of Old Neighbourhoods

This collection of diverse people, socio-cultural activities, and old and new buildings represent the importance of an inclusive socio-cultural environment in the old Chinese neighbourhood. Changes in China during the late 20th century led to a transformation in demographics and neighbourly dynamics, resulting in the decline of the 'collective culture' of the communist era. My research develops socio-cultural strategies focused on the communal activities in public spaces for future urban planning of neighbourhoods to enhance quality of life.

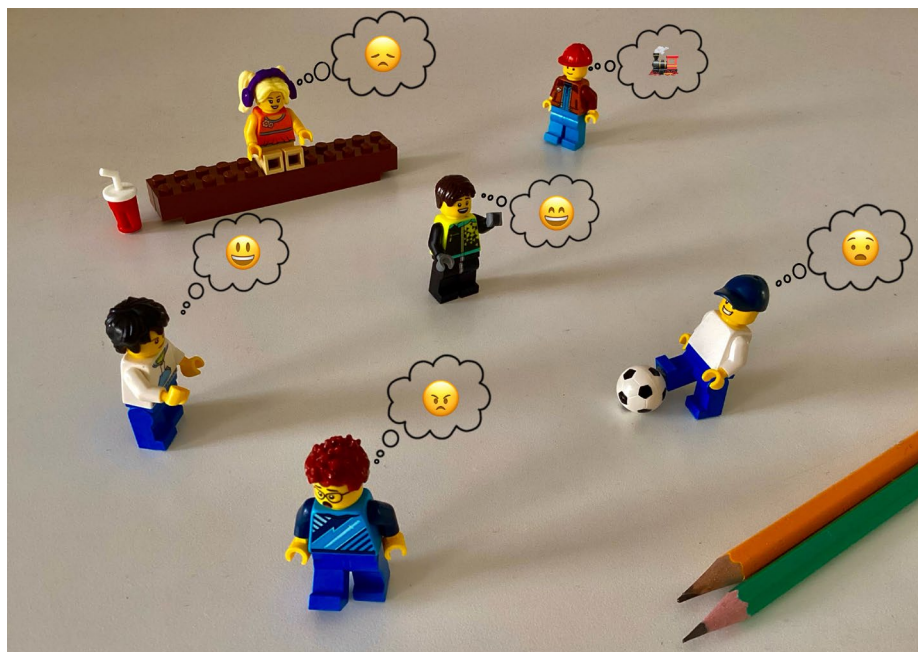
Entrant: Yaozhong Zhang
© 2024 Yaozhong Zhang



Feasting on Knowledge

The food we eat can impact how our bodies absorb and utilise drugs, a phenomenon known as “food effect” on drug bioavailability. The presence or absence of food in our intestine can dramatically alter how our bodies respond to treatment. Our research focuses on the effect of gastrointestinal fluid components on drug solubility in both fasted and fed states which provides the first step to assess the food effect on drug effectiveness.

Entrant: Rana Abu-Rajab Tamimi
© 2024 Rana Abu-Rajab Tamimi



Let's Play!

For autistic children, participating in Physical Activity (PA) can be challenging, resulting in significantly lower PA levels and higher rates of sedentary behaviour and obesity compared to their typically developing peers. Using LEGO®, we explore with autistic learners their (often unseen) experiences, feelings, and interests to develop together an active play programme fostering their participation in PA that meets their needs, strengths, and preferences.

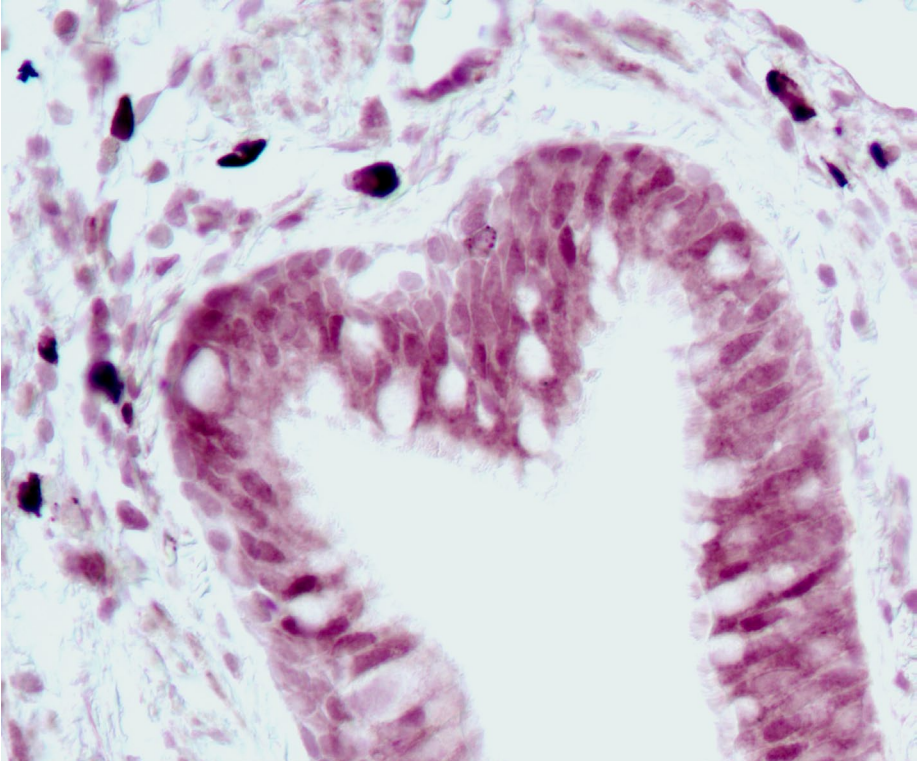
Entrant: Stella Gkegka
© 2024 Stella Gkegka



Life After Suicide Loss

Losing a loved one to suicide can increase someone's risk for dying by suicide as well. Our research is exploring the best way to encourage post-traumatic growth following suicide bereavement of a loved one. By supporting these bereaved individuals in finding renewed meaning, we can help them to see that hope and beauty still exist in life in the face of suffering.

Entrant: Spence Whittaker
© 2024 Spence Whittaker

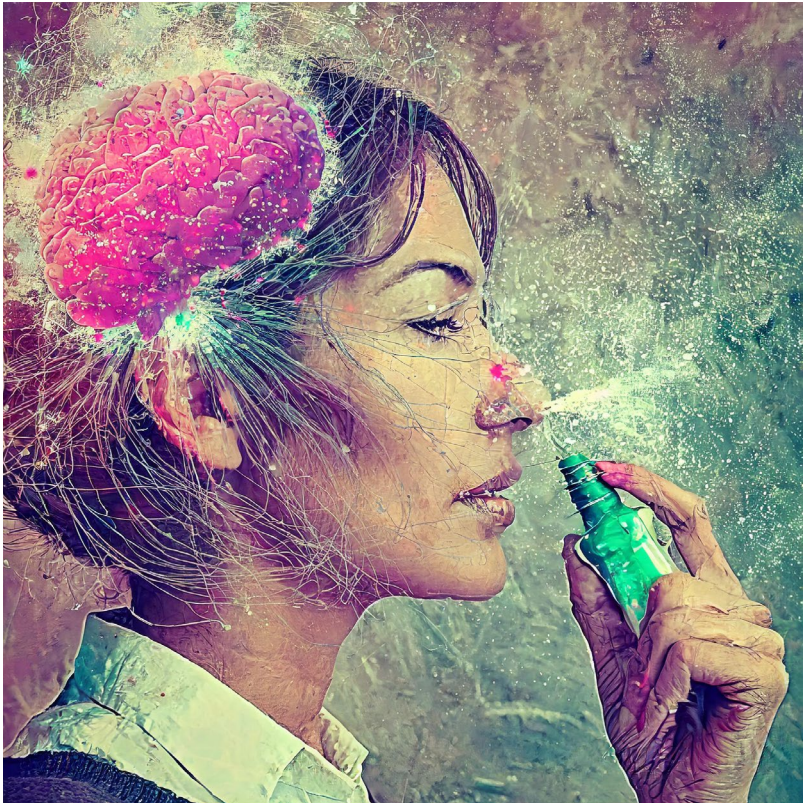


Oestrogen at the Heart of Lungs

The image is of the enzyme that makes oestrogen (aromatase) in an airway of the human lung. It is curiously shaped like a heart which reflects oestrogen being at the heart of many lung diseases both in men and in women. The airways and arteries of the lung make oestrogen, more-so in women, and this may account for sex differences in lung diseases.

Entrant: Mandy MacLean

© 2024 Mandy MacLean / Margaret Nilsen



Smell of Happiness

My research is developing nasal sprays which can deliver drugs to the brain after nasal application. This enables drugs to travel quickly to the brain and exert its therapeutic effect. Antidepressants (ketamine), opioid antagonists (naloxone), anti-migraines (sumatriptan) and many other life-altering drugs can be given this way. In some cases, like suicide-prone individuals, the drug is best if it works almost instantaneously. The key to human wellbeing might lie in “smelling the happiness”!

Entrant: Debanjan Das
© 2024 Debanjan Das

Entry Information

Capturing Collaboration index

Cow in the Loop

Entrant: Apostolos Vavouris
Department: Electronic & Electrical Engineering
Funding: UKRI Digital Dairy Chain Innovation Voucher (KE&I)
Collaborators: Lina Stankovic, Vladimir Stankovic, Outer Blair Farm

Molecular Metamorphosis

Entrant: Samira Anker
Department: Chemical & Process Engineering
Funding: EPSRC Grant ref: EP/P006965/1; CMAC; AstraZeneca
Collaborators: Kirstie Milne, Anna Jawor-Baczynska, Lauren Agnew, Chemical Development, Pharmaceutical Technology & Development, Operations, AstraZeneca, Macclesfield, UK

Protecting Ocean Culture and Human Rights

Entrant: Elisa Morgera
Department: One Ocean Hub
Funding: UK Research and Innovation (UKRI) through the Global Challenges Research Fund (GCRF)
Collaborators: Glenn Kasper (Topnaar Youth Representative and co-researcher), Elsemi Olwage (University of Namibia)

Synergy Station

Entrant: Jai Geelal
Department: Accounting & Finance

Exploring the Unseen index

Barcelona between Life and Industry

Entrant: Carolina Rigma
Department: Architecture
Collaborators: Katrin Djapanova

Ear to Ear

Entrant: Brendan Latham
Department: Electronic & Electrical Engineering
Funding: EPSRC Doctoral Training Partnership
Collaborators: Andrew Reid, Joseph Jackson-Camargo, Jonathan Williams, James Windmill

Ghosts in the Tablet

Entrant: Iain Oswald
Department: Strathclyde Institute of Pharmacy & Biomedical Sciences
Funding: University of Strathclyde REA Scheme: Cambridge Crystallographic Data Centre; Deutsches Elektronen Synchrotron
Collaborators: Julia Gasol Cardona (CMAC, SIPBS), PhD students and data collector & data reduction, Daniel Markl (SIPBS), Research collaborator & Stephen Price (Finden) data analysis and Image processing, Olof Gutowski (DESY) Beamline staff, Andrew Maloney (CCDC) ideas and funding

Lights, Camera, Inspection!

Entrant: Hamish Dow
Department: Civil & Environmental Engineering
Funding: University of Strathclyde's Advanced Nuclear Research Centre (ANRC) and Scottish Funding Council (BE-ST and CENSIS)
Collaborators: Mr Hamish Dow, Dr Jack McAlorum, Dr Marcus Perry, Mrs Sanjeetha Pennada

N!om as the San's Living Law

Entrant: Saskia Vermeylen
Department: Law
Funding: UKRI GCRF Transforming Education Systems for Sustainable Development (TES4SD) Network Plus (Grant Ref: ES/Too2646/1)
Collaborators: Project concept developed collaboratively by Kileni Fernando, Luke Kaplan, Dylan McGarry, Ivan Vaalbooi and Saskia Vermeylen, and supported by UKRI/ESRC, Transforming Education for Sustainable Futures (Bristol University), Environmental Learning Research Centre (Rhodes University), the Namibian San Council, and the National Arts Council

Networks of Movement and Space

Entrant: Katrin Djapanova
Department: Architecture
Funding: Overall research sponsored by UKRI studentship

Shedding Light on What's Beneath

Entrant: Maria Giulia Migliorelli
Department: Civil & Environmental Engineering
Funding: Strathclyde International Strategic Partnership (ISP) fund
Collaborators: Matthew Divers (scan acquisition),
Elisa Carsetti (graphic suggestions)

Preserving our Planet index

Bridging the Environmental-Urban Divide

Entrant: Sneha Selina Bonomally
Department: Architecture

Dressing Our Way to Extinction

Entrant: Marsaili Mainz
Department: Marketing
Funding: Economic and Social Research Council (ESRC) Grant Ref: ES/P000681/1
Collaborators: Adobe Stock Image Library. The Model Team: Model Rebecca Liddell

Inclusive Environmentalism; Period.

Entrant: Kate Molyneaux
Department: Education

Securing Our Future:Vertical Farming Safeguards Earth

Entrant: Nour Hallas
Department: Architecture

Societal Spark index

Cultural identity preservation through heritage buildings

Entrant: Samuel Etopidiok
Department: Architecture

Empowering the Feminine Spirit

Entrant: Nasreen Hasan
Department: Hunter Centre for Entrepreneurship
The use midjourney and
photo-mosaic.co.uk

Mapping for Justice

Entrant: Philile Mbatha
Department: One Ocean Hub
Funding: The One Ocean Hub is funded by UK Research and Innovation (UKRI) through the Global Challenges Research Fund (GCRF)
Collaborators: One Ocean Hub researcher Dr Jackie Sunde, human rights lawyer Wilmien Wicomb and community researchers Jerry Mngomezulu and Themba Mkhonto

Nature-based Experiences in Urban Preschool Environment

Entrant: Farhana Mohammed Isa
Department: Architecture
Funding: Majlis Amanah Rakyat (MARA) Graduate Excellence Programme Malaysia
Collaborators: Dr. David Grierson

The Human Element index

#CATS Creating Autistic Trauma Stories

Entrant: Anna Robinson
Department: Education
Funding: The John and Lorna Wing Foundation
Collaborators: Jon Adams Artist

Evoking the Memory of Old Neighbourhoods

Entrant: Yaozhong Zhang
Department: Architecture

Feasting on Knowledge

Entrant: Rana Abu-Rajab Tamimi
Department: Strathclyde Institute of Pharmacy & Biomedical Sciences
Engineering & Physical Sciences Research Council (EPSRC)/Strathclyde University
Funding:

Let's Play!

Entrant: Stella Gkegka
Department: Education
Funding: Economic and Social Research Council (ESRC)

Life After Suicide Loss

Entrant: Spence Whittaker
Department: Psychology
Funding: Global Research Award Studentship, University of Strathclyde
Collaborators: Susan Rasmussen, PhD

Oestrogen an the heart of lungs

Entrant: Mandy MacLean
Department: Strathclyde Institute of Pharmacy & Biomedical Sciences
Funding: British Heart Foundation
Collaborators: Margaret Nilsen

Smell of Happiness

Entrant: Debanjan Das
Department: Strathclyde Institute of Pharmacy & Biomedical Sciences
Collaborators: Aikaterini Lalatsa (Strathclyde faculty)

The research presented in this exhibition is funded from a variety of sources including, but not limited to, UK and international research councils, government, public and third sector organisations, as well as private sector support.

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