UNIVERSITY OF BIRMINGHAM | westmere University Graduate School

# The University Graduate School
## Presents

# Images of Research
# 2018

## *The Catalogue*

UNIVERSITY OF BIRMINGHAM | Westmere University Graduate School

# Images of Research 2018

*Can you tell the story of your research in a single image?*

The University Graduate School presented this challenge to our postgraduate researchers and this booklet includes contributions from 60 postgraduate researchers across a variety of departments from all five Colleges (Arts and Law, Engineering and Physical Sciences, Medical and Dental Sciences, Social Sciences and Life and Environmental Sciences). The images and abstracts in this booklet highlight the cutting-edge research conducted by our postgraduate researchers at the University of Birmingham and we hope you will enjoy learning more about these exciting research projects.

Special thanks to our postgraduate researchers for taking part in Images of Research 2018:

Aileen Baird
Alex Pritchard-Jones
Ali Mohammed
Arooj Al Raee
Ayse Elmali
Azwan Azmi
Bibiane Manga Atangana
Cai Lyons
Carol J. Sanders
Catherine Dunlop
Charles Goode
Chloe Alexander
Chris Oliver
Ciara Harris
Conner Gettings
Cosmin Minea
Diana Cruz de Oliveira
Diletta Pegoraro
Fatemeh Ghaderiardakani
Georgina Fitzgibbon
Håkan Wennlöf
Hadeel AL-Dawsari
Hannah Millard
Hannah Comer
Helen Tatlow
James Shaw
Jaspal Gharu
Jemma Saunders
Jennifer Steil
Jinxing Sun
Julia Wolska
Karn Vohra
Kevin Buckland
Laura Moreno Galindo
Laverne Smith
Louise Coopey
Marie Rowley-Brooke
Marie Allegre
Mario Forcione
Mehmet Emin Uyanik
Nabiela Moolla
Nahid Khan
Natasha Nigar
Paolo Passaretti
Paulina Poplawska
Ren Warom
Richard Bufton
Richard Kendall
Rob Greene
Saifullah Jabarkhyl
Sarah Alzeer
Shuan Ryan Huo
Stephanie Katz
Stephen Hewett
Stewart Campbell
Suleiman Suleiman
Syeda Anam Hashmi
Xiaoxuan Liu
Yaqi Li
Zoe Screti

The University Graduate School
Westmere House

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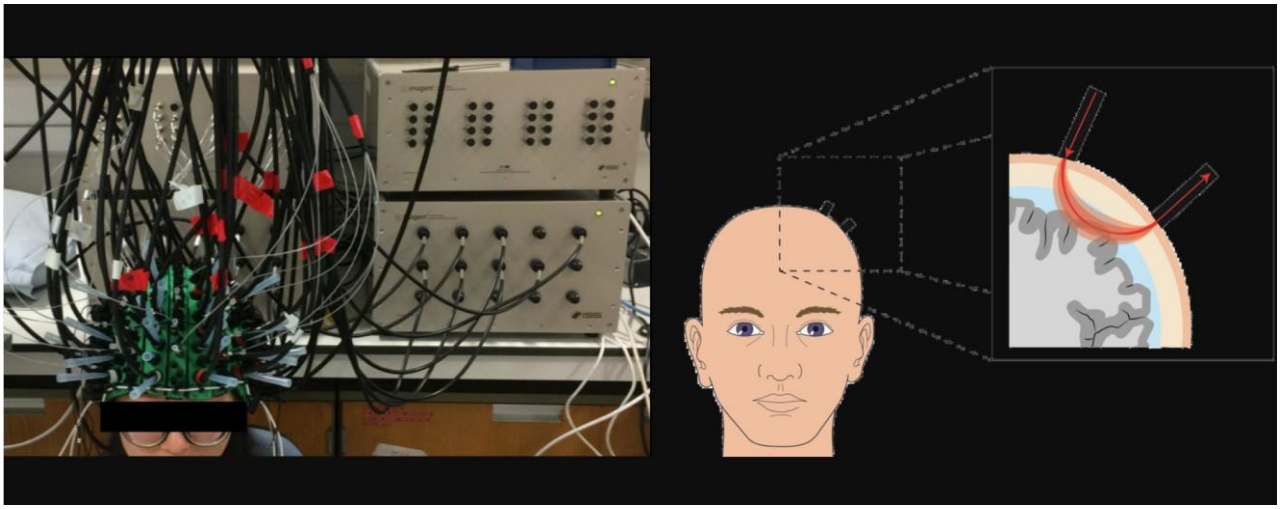
## Contents

## Windows into a Cistercian world

***Georgina Fitzgibbon*, History, College of Arts and Law**
@GeorgieFitzg

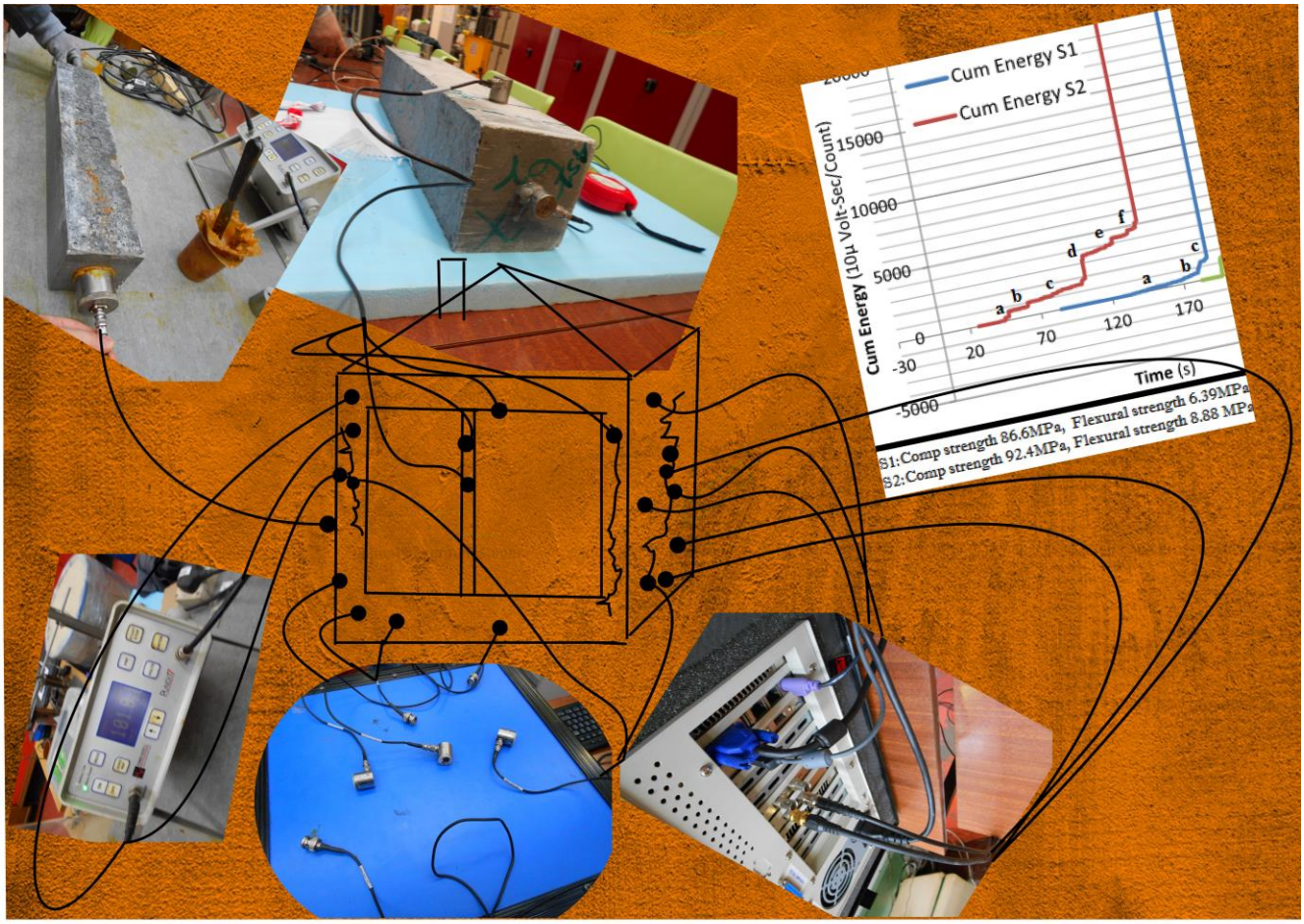
This image shows part of the ruined monastery at Furness Abbey in Cumbria. Medieval monasteries forged social and spiritual identities through the acquisition, veneration and circulation of relics. My research addresses a historiographical lacuna by exploring the extent to which Cistercian identity in the twelfth and thirteenth centuries relied upon relic occlusion and the restriction of lay access to the holy. The importance of audience in the presentation of Cistercian relics and miracles is demonstrated through a range of sources; hagiography, exempla collections, letter collections, and statutes.



## Functional Near-Infrared Spectroscopy

***Mario Forcione*, Inflammation and Ageing, College of Medical and Dental Sciences**
@mario_forcione

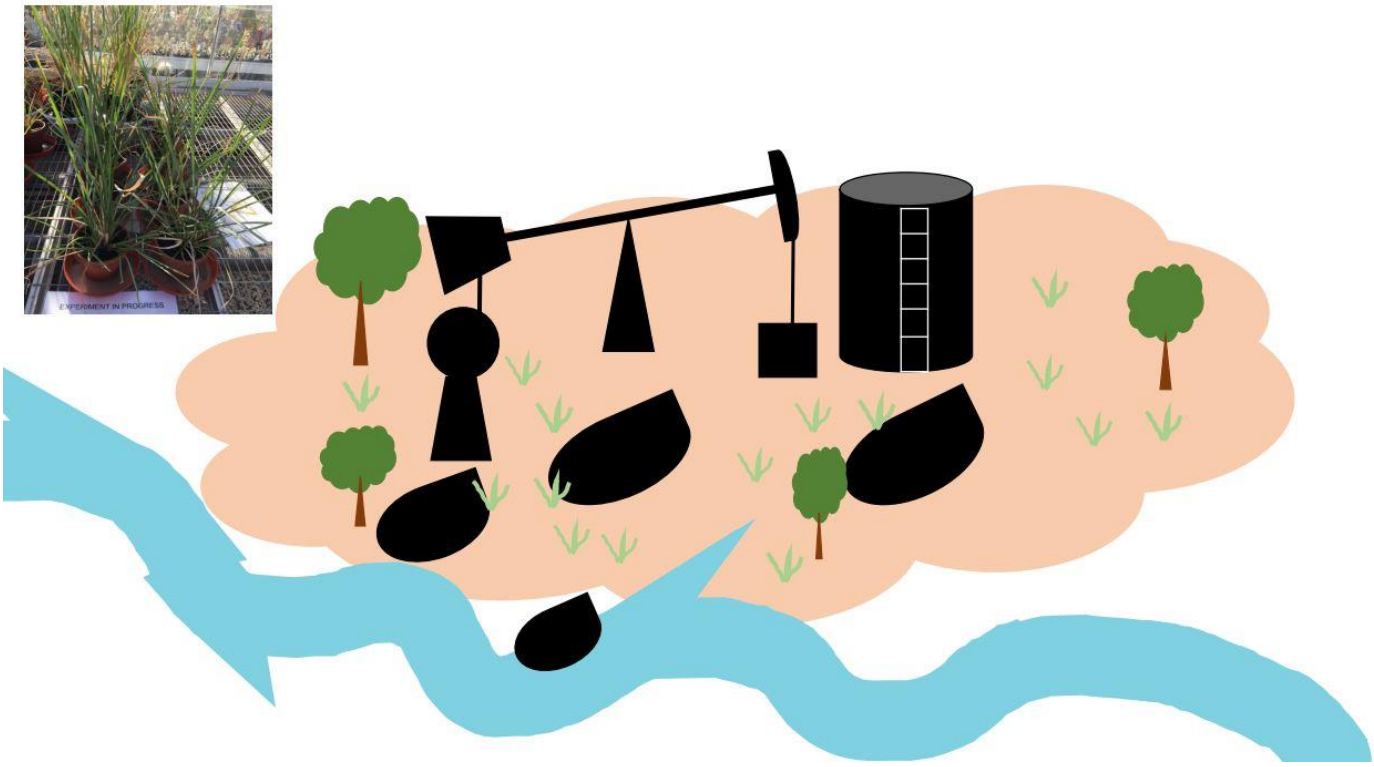
Mild traumatic brain injury patients (mTBI) may have impairments in their brain activations. Functional Near-Infrared Spectroscopy (fNIRS) is a non-invasive neuroimaging technique which uses near-infrared light. The photons travel through the scalp reaching the surface of the brain called the neocortex (as shown on the right of the picture). The absorption of photons is related to the quantities of oxy- and deoxy-haemoglobin present. Analysis of the changes in their concentrations during neurocognitive tasks allows one to detect brain activation patterns. Currently, studies are undertaken on healthy volunteers in the UoB using fNIRS to observe normal brain activations (as shown on the left of the picture).




## Non-destructive tests for concrete structures

***Mehmet Emin Uyanik*, Metallurgy and Materials, College of Engineering and Physical Sciences**

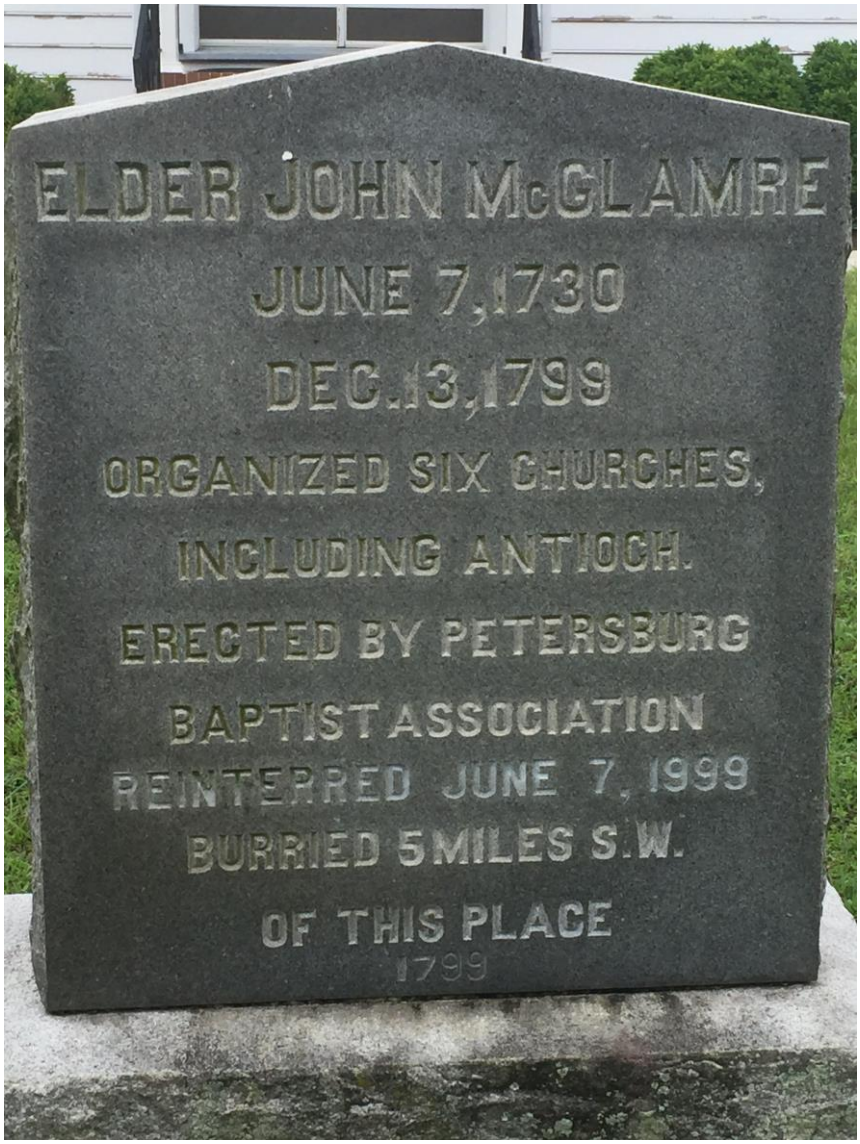
The focus of this research study is the investigation of ''non-destructive test methods for concrete structures''. For this reason, ultrasonic pulse velocity, acoustic emission and visual inspection tests have been selected since they having been frequently used on concrete structures to obtain information about concrete quality without any damages. We have used ultrasonic tester and acoustic emission test devices. Generally, pulse velocity tester produce sound travelling inside concrete from transducer to receiver and we measure pulse velocity of this sound to obtain information about concrete quality. Apart from this, we have used acoustic emission device to listen and record sounds of minor, major cracks inside concrete structures by using sensors.



## Using vetiver grass for treating crude oil contaminated soil (Chrypsopogon zizanioides)

***Suleiman Suleiman*, Geography, Earth and Environmental Sciences,**
**College of Life and Environmental Sciences**
@suleimilo123

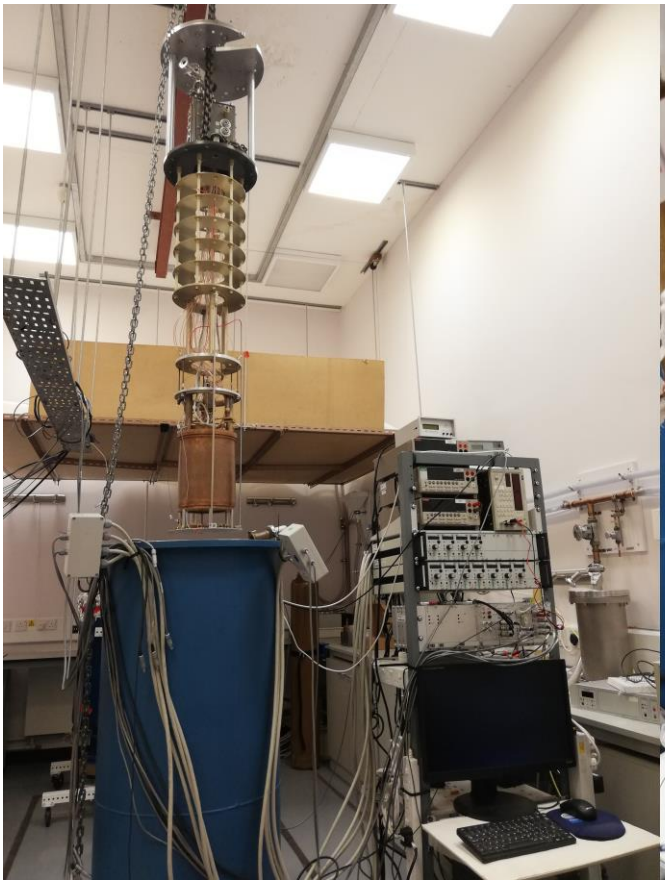
Soil contamination is mainly attributed to industrialization and population growth putting pressure on petroleum resources. As a result the petroleum industry affects the environment through oil spills which affects human health and the surrounding ecosystem. This research compares the efficiency of vetiver grass in treating crude oil contaminated soil. The methodology involved growing vetiver grass in a crude oil contaminated soil treated with bio-surfactants and N.P.K fertilizer and the level of degradation of pollutants was assessed using Gas Chromatography Mass Spectrometry (GC MS). The result has revealed improvement in plant and microbial biomass and it is also highly anticipated that the plant will help in breaking down more contaminants.

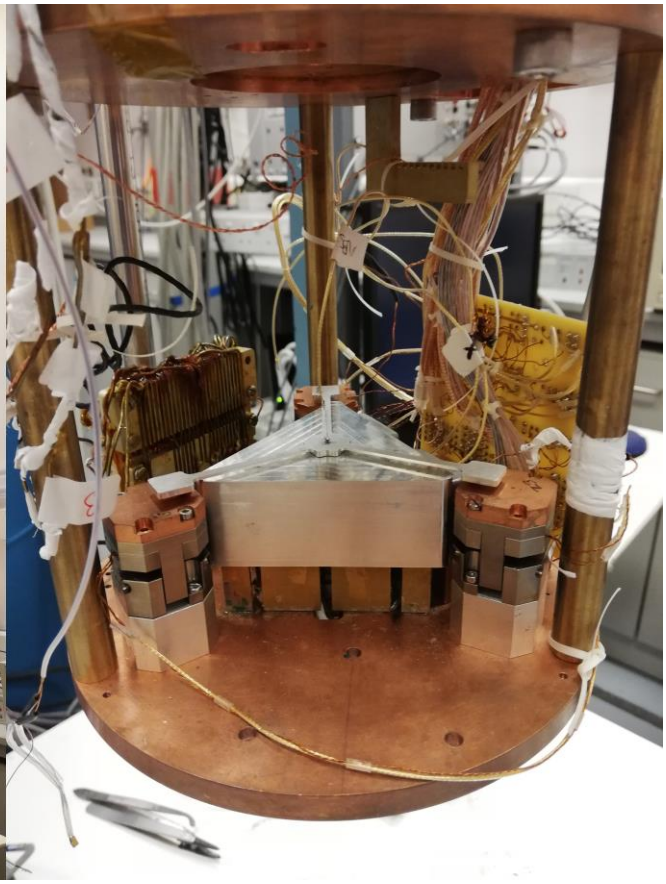



## Visiting an old friend

***Laverne Smith*, History, College of Arts and Law**

This is a photograph of a monument commemorating Regular Baptist Elder John McGlamre near Antioch Baptist Church in Sussex County, Virginia. My thesis examines the social contributions of Regular Baptists in mid to late eighteenth century Virginia, during the transition from colony to commonwealth. Meglamre led efforts to establish Baptist churches in southeastern Virginia. The monument was erected by Petersburg Baptist Association. Antioch Baptist Church, acknowledging its past, moved Rev. and Mrs. Meglamre's coffins to this location in 1999. This photo was taken by me on July 25, 2018 at 3:14 pm.

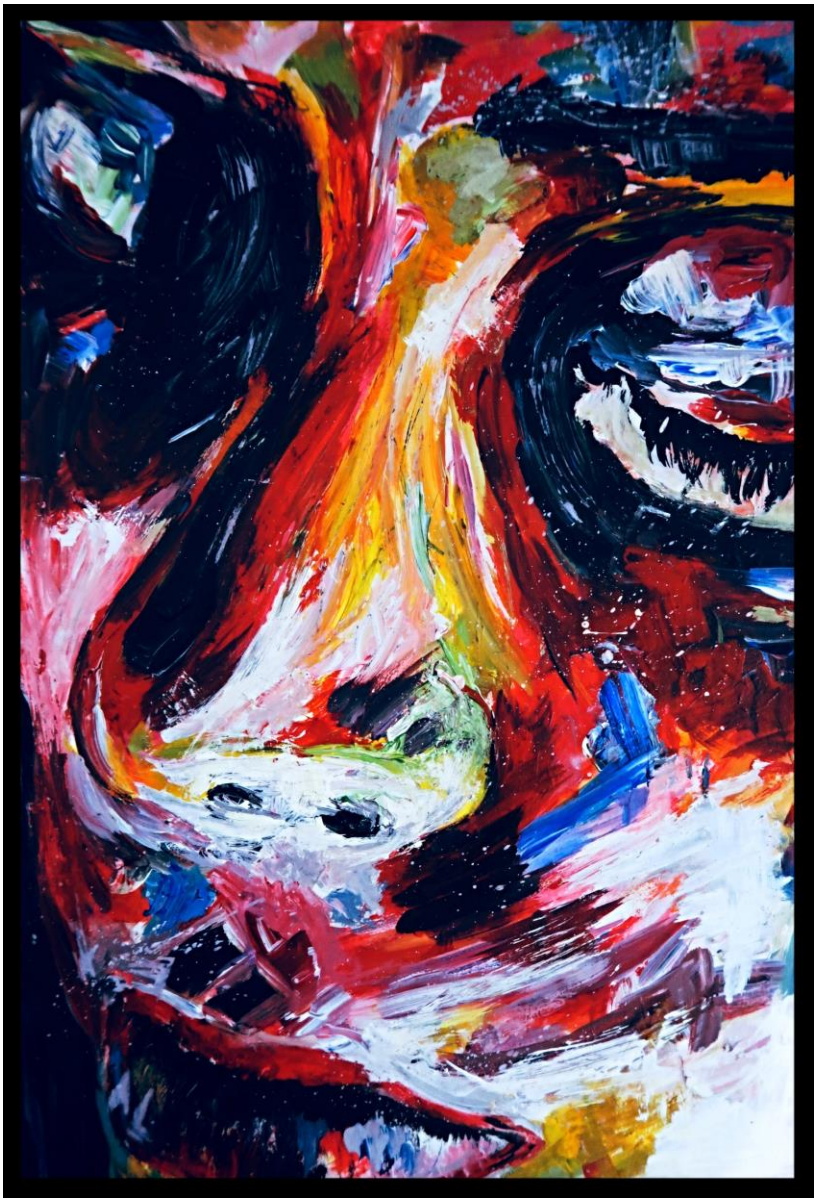




## Getting Close to Gravity: An Experiment to Measure Gravity at Micrometre Ranges

***Conner Gettings*, Physics and Astronomy, College of Engineering and Physical Sciences**

This photograph shows an experiment that is being designed to measure the gravitational force between masses at separations of the order of micrometres. This has never been done before. The left part shows the experiment in its full scale; as a large piece of apparatus that is lowered into a cryogenic dewar of liquid helium. The right part shows the centre of the experiment up close; a superconducting levitating torsion balance. This is being done to prove theories of extra spatial dimensions that exist in addition to the three we are used to in everyday life. As well as trying to provide answers to some of the riddles that gravity poses in modern physics.



## Euphoria

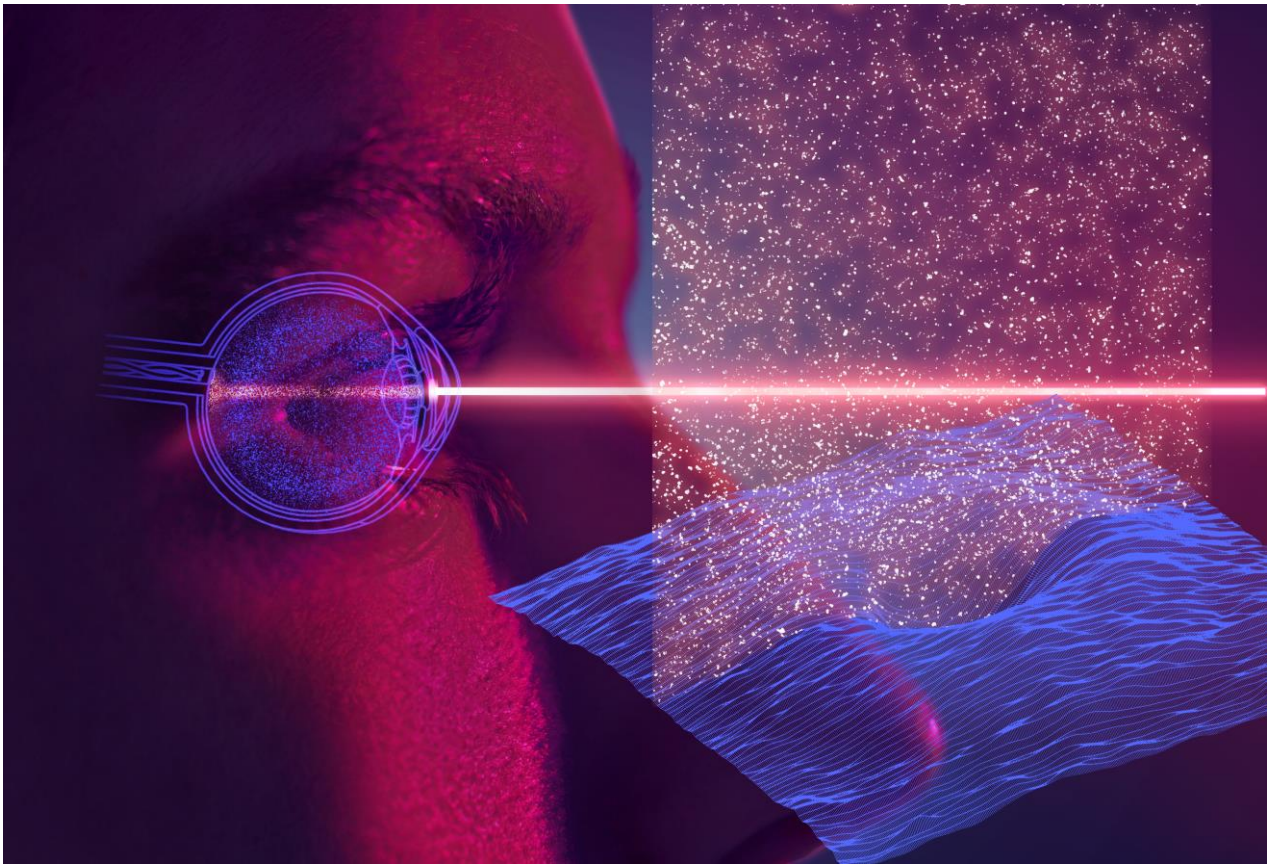
**Jaspal Gharu, Philosophy, College of Arts and Law**
@JazGharu_

My expressionist painting depicts the euphoric stage of romantic love. For me, romantic love is like entering another dimension, a flight mode fuelled by pure euphoria. Romantic love is a huge part of our society, impossible to escape. Just think about advertisements, films and songs. However, what exactly is romantic love? Philosophers have tried to capture the nature of romantic love as a relation of concern, valuing and emotions. I turn to analytic metaphysics aiming to advance the philosophy of romantic love. In a nutshell, my research focuses on trying to understand philosophically the relation between X and Y, when we say 'X is in love with Y'.

## The Invasion of the Others in Game of Thrones

***Louise Coopey*, Film and Creative Writing, College of Arts and Law**
@CoopeyLouise

This image is a still that HBO released to promote the seventh series of Game of Thrones. It is the single image that most effectively encapsulates my research on the series' representation of the 21st century Other. The Other refers to social identities that oppose or challenge the status quo and several individuals to whom that label may be applied are depicted here. Daenerys Targaryen is othered as an outsider, a powerful woman and the Mother of Dragons. Her "children" are monstrous creatures that may be weaponised and invoke fear. Varys, a eunuch, and Tyrion, a dwarf, challenge society's physical norms. The question is whether this literal invasion of Others effectively subverts those norms and serves to normalise otherness?



## Imaging Inflammation in the Eye

***Xiaoxuan Liu*, Inflammation and Ageing, College of Medical and Dental Sciences**
@DrXiaoLiu

"An accurate diagnosis is the first step to getting effective treatment. No one should suffer because the right tests were not available." -Tedros Adhanom, WHO Director-General. Uveitis (inflammation in the eye) is a major cause of blindness. One of the biggest challenges for patients with uveitis is the lack of a sensitive test for active inflammation. This affects day-to-day treatment decisions and hampers all clinical trials in the field. This picture illustrates a new diagnostic technique, which uses an imaging technology called optical coherence tomography to measure inflammatory particles in the eye. My PhD is about developing this method for use in clinic, to monitor inflammation and inform treatment-decisions for preventing sight loss.

## ‘In the midst of chaos there was shape’: The Real in Negative

***Marie Allegre*, English Literature, College of Arts and Law**

You start with tracing the contours of wave-like shapes with a fountain pen. Then you fill the remaining spaces with smaller shapes, being careful to leave gaps between them. This creates the impression that someone has erased the ink to reveal paths in the bluish matter. However interpreted, these holes appear as negative space. This is my personal transcription of what Virginia Woolf’s prose achieves: form bearing witness to the Unspeakable, framing the ‘holes’ in language; widening the gap between a word and what it represents. The narrative voice stresses the impossibility of fully exhausting any moment with words. Yet motifs – both verbal and pictorial – frame the indeterminate flow of experience – for the mind to feast on them.

## 'The People: Where Will They Go?'- The Green Belt and England's Housing Crisis

***Charles Goode*, Centre for Urban and Regional Studies, College of Life and Environmental Sciences**

This photo shows the Oxford Green Belt with the city in the background. Green Belts form a tight planning restriction around many of England's cities. Indeed, partly because of Green Belts, there is often widespread popular and political opposition to new house building, despite England's serious housing shortage. My research aims to critically evaluate how far the Green Belt is contributing to the housing crisis, assess who gains and loses from the policy and explore how it could be reformed. It uses a range of methods including interviews with planning stakeholders, a questionnaire and focus groups with campaign groups. The West Midlands is the main case study and the project's overall goal is to influence the national policy debate on planning/housing.

## 'A Holy Communion, a wise Socialism'

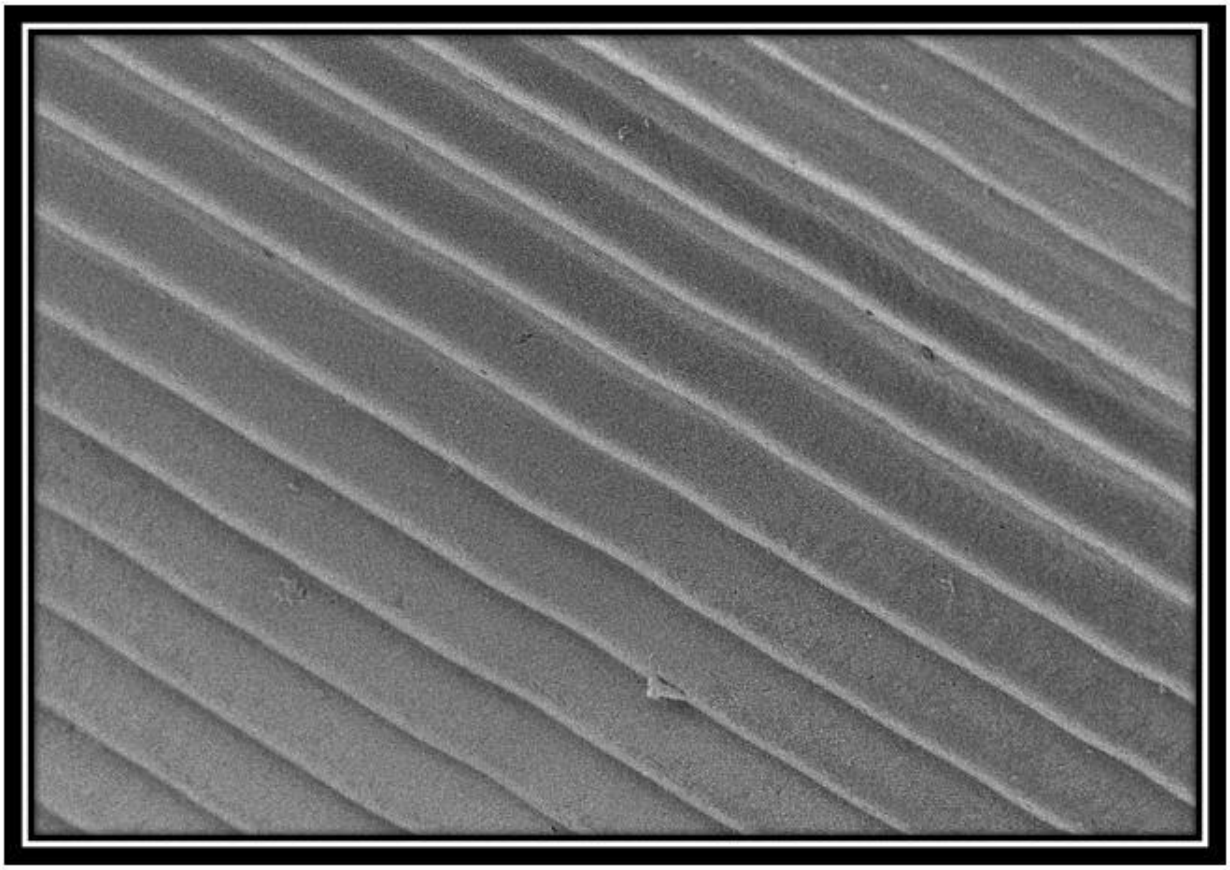
***Stephen Hewett*, History and Cultures, College of Arts and Law**

George Dawson, founder of Birmingham's Civic Gospel and champion of the public library movement, described the latter as: 'the largest and widest church ever'. This picture shows Spring Hill Library in Ladywood, one of the oldest remaining public libraries in Birmingham. My PhD research will be exploring the history of Birmingham's 'Free' libraries and the impact they had on the social and cultural life of the community. It will also cover the visual aspects of these early buildings, considering how the architectural styles and their interior layout reflected both the social and cultural conventions of the time and the aspirations and motivations of the city's civic leaders and those chosen to administer the libraries.

## Blind Date Corner for "Leftover" women and men in China

***Yaqi Li*, Social Policy, College of Social Sciences**
@rachelliyaqi

This image was taken in a blind date corner in People's Park, Chengdu, China. The elderly usually come to display or exchange their own son or daughter's information, including birth year, qualifications, salary, property and their prerequisites for a future partner. It is usually the parents who evaluate potential partners' suitability for marriage, arranging a match if appropriate. The subjects of the matchmaking – the people behind those documents – are conspicuously absent from this photo: those aged between 25 and 40; the ones called "leftover" women and men. My research focuses on the experiences of Leftovers in China receiving stigma and discrimination of their single status and being pushed by their parents to marry and quickly have children.



## The Third Industrial Revolution-Additive Manufacturing (3 D Printing)

***Jinxing Sun*, Metallurgy and Materials, College of Engineering and Physical Sciences**

Additive manufacturing-also known as 3D Printing – is a diverse group of manufacturing techniques that build objects by adding materials layer-by-layer according to a 3D CAD model data. Compared to traditional manufacturing technology (Subtractive manufacturing), AM is already a disruptive technology in the real world because of the ability to fabricate new products with customized shapes, so it has been used in various areas. My research topic focus on 3D Printing of ceramics, this image was created using a Scanning Electron Microscope in order to investigate the combination between adjacent layers in a submicron scale. The image shows an excellent interlaminar bonding to allow desired mechanical properties of printed parts.

## Talyllyn

***Kevin Buckland*, Music, College of Arts and Law**

My PhD research will endeavour to move away from the purely visual, and reconnect with the sonic element of the spaces in which we live using soundscape composition. Each day we journey in a complexity of physical space, yet our perception is generally focused inwardly. We seldom stop and listen to the sounds around us, when we do pause then it can become evident just how much we are encroaching into the landscape that surrounds us. The photograph; taken by me in August shows Talyllyn Lake in Wales. It represents perfectly the theme of my research, it shows an extremely beautiful scene that in real life is spoiled by the noisy busy road running along two sides of the lake.

## Battling giants!

***Richard Bufton*, Biosciences, College of Life and Environmental Sciences**
@HeatIslandBirds

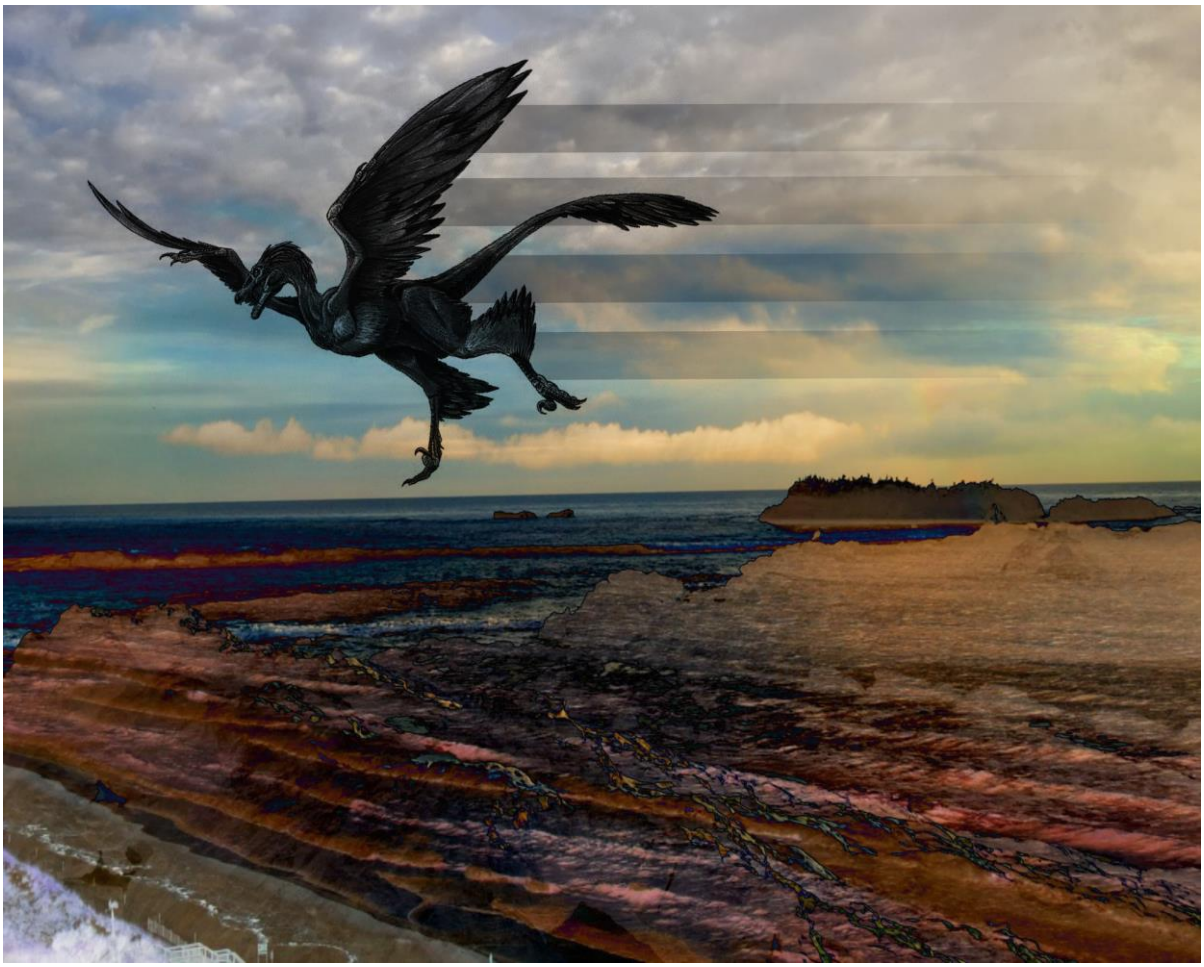
I am studying how the extra heat in cities affects bird activities, particularly breeding. While checking nest boxes this year, I came across this female Blue Tit, sitting on her eggs and determined to defend them against an intruding giant! Her wing feathers are disorganised as she has been flicking her wings, hissing and striking like a snake to scare me away. Female Blue Tits weigh about 12 grams, I weigh over 120 kilograms. I am more than 10,000 times her size, but her eggs are precious! After checking her nest, I left her in peace, with her treasured eggs, feeling small, beaten by a tiny but very tough bird!

| Words in Context from The British National Corpus (BNC) | | | Frequency per million word based on the BNC |
|---|---|---|---|
| body's defence system so that it cannot fight infection. | How | is infection transmitted? | 1007 |
| This virus affects the body's defence system so that it | can | not fight infection. How is infection transmitted? | 2363 |
| Ten years after the discovery of AIDS | we | are entering into a new era in the global pandemic | 3565 |
| your needs with you. This means that you can | decide | on your own care support. Practical Support ACET volunteers are | 67 |
| who are ill with HIV/AIDS to live and die at home, | if | that is their wish, and appropriate to their needs. | 2575 |
| and are often very busy. You don't have to make | a | firm commitment but obviously we like you to give us some idea | 22014 |
| ago I was diagnosed as being HIV positive. It was no | particular | shock when I found out; I had expected the test to | 293 |
| to call 'modernity'; for I know of no better | word | to express the idea I have in mind. He makes it | 190 |
| Here is a suggested first reading | list | , which I've put together to provide a broadly representative | 127 |
| this chronic condition alone. Did you know? there | is | no vaccine or cure currently available. 10 million people | 10073 |
| from a type of septicaemia, he is clearly having a | good | spell. We make the most of this and scoot off to | 823 |
| to face this chronic condition alone. Did you know | ? | there is no vaccine or cure currently available. | |

## Is it a good word list?

***Sarah Alzeer*, English Language and Linguistics, College of Arts and Law**
@sara_sarooona

The image shows my main research question displayed as a list of words in the middle of a text with the number of word occurrence in the BNC corpus (large collections of texts). Most word lists today use corpus to select words based on frequency, sometimes combined with other measures, to direct the language learning process towards the most useful words. With the advances in corpus tools, many word lists have been developed and published to serve different pedagogical purposes including course design, development of teaching materials or vocabulary tests. My study aims to explore the different methods for evaluating word lists and selecting the most suitable list for the target users and purpose.



## Mapping Fantasy

***Stephanie Katz*, English, College of Arts and Law**

Fantasy literature is unique in that it provides readers with a complex, whole other imaginary world different from the world we live in. In fantasy, more so than other genres, world and world-building play an active role in the development of the story itself. These worlds often include diverse topography, multiple created races of peoples and creatures each with their own histories, prejudices, and cultural practices, as well as detailed maps to accompany the story. These secondary storyworld elements help provide a richly immersive literary experience. It is my goal to examine the relationship between fantasy worlds and story structure to better understand how fantasy worlds function and how they aid or work in conjunction with narrative development.


## Ach! Ah! Achoo!

***Helen Tatlow*, Modern Languages, College of Arts and Law**
@Helen_Tatlow

Three versions of one enigmatic story. 'Amphitryon', an 1807 play by the German writer Kleist, is the story of a woman, Alkmene, discovering that she is unable to trust her own senses: she has been deceived and impregnated by a god. Banville, a Booker-prize-winning Irish novelist, has written two adaptations. How are the play's themes affected if the story is adapted by an English-speaking, modern-day author, and set in 1798 revolutionary Ireland (Banville's 'God's Gift'), or in a parallel universe (Banville's 'The Infinities'), rather than the Ancient Greece of Kleist's German play? Alkmene's ambiguous, iconic final line, 'Ach!' ('Ah!'), has mystified and fascinated critics. Banville plays on this to humorous effect: 'Ach!' becomes 'Achoo!'

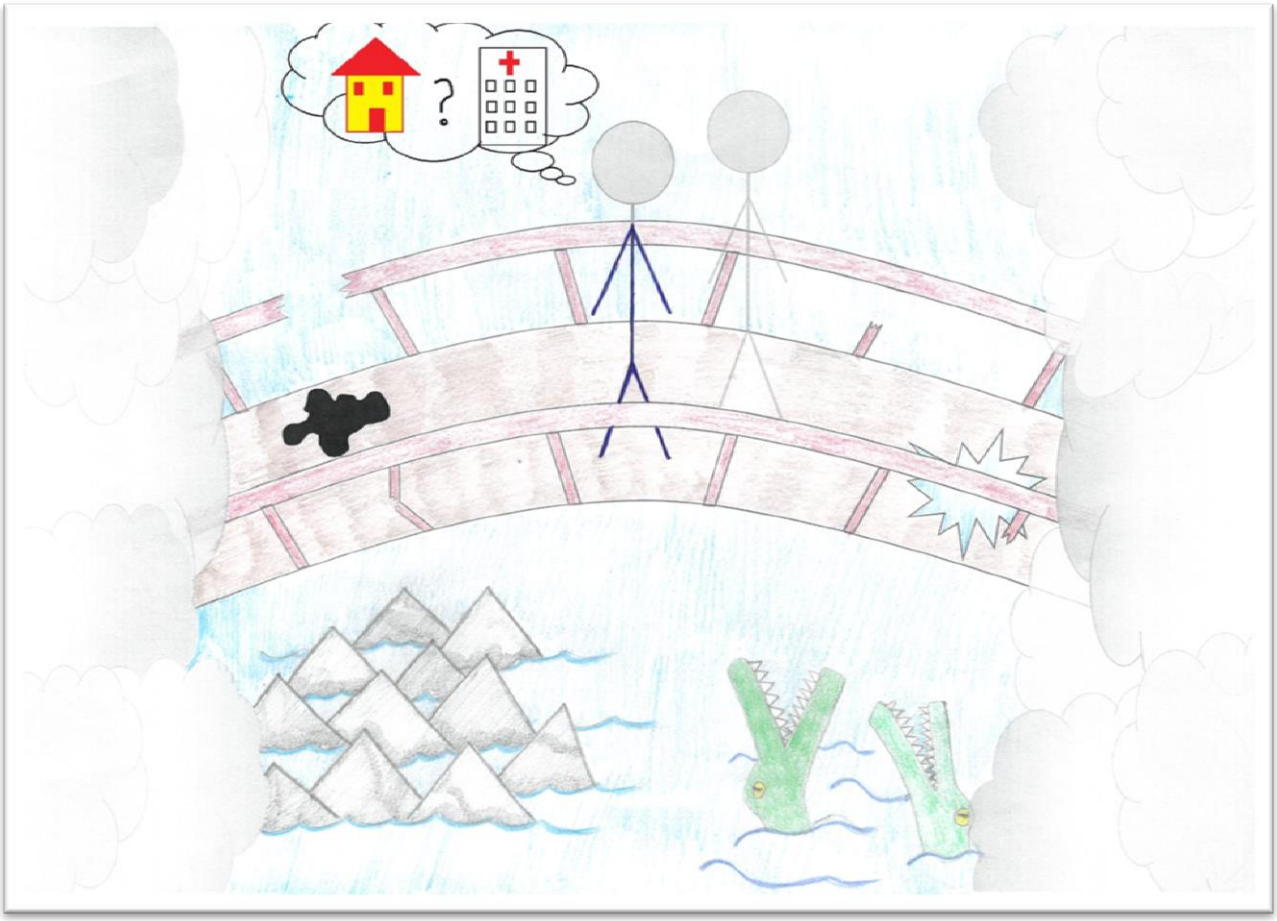
RUBRIFY THIS. . .

| Score→ Parts of a Poem | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| Duende | No dark, no light, no angel, no muse, works have no movement and are stagnant | Some dark, some light, some musicality | Either dark or light are in the poems | Dark and light and what rides in between (Duende) from the edge of these are in the poems. |
| Images | Zilch images, Has no idea how to make one. | Minor images Though too much expository language. | Intermediate images | Poems have advanced images that light up the senses |
| Metaphor | Zilch metaphor | No tenor, no vehicle, no simile | Minor metaphors (attempts them) | Advanced & original metaphors |
| Emotion | Zilch emotion, or worldview-less attempts to cover the relatively insignificant day to day trifles such as dream poems, torn ACL poems, poems about poetry, etc. | Some emotion, Some experience. | Intermediate emotion, poet has experience though the poems do not move beyond the personal. | Poems have emotion (heart) and this is a significant element because the poems move across socio-economical and racial barriers. |
| Intellect | Zilch wit | Obviously used a thesaurus | Shows some complexity | Does not insult the reader's intellect while still educating the audience. |
| Experimental (Originality) | Uses cliché-ish phrases and subjects, takes no risks (artistically with new forms or poems are soulless and personally gives us nothing new). | Attempts some risk with form though they fall short because the words are dancing around the page and have no significance to anything, no image, no metaphor, no intellect, no heart. | The poems are not completely journalistic and are not overly cryptic. Use of language is original with some attempts to introduce new forms. | Poems are original and have Duende, images, emotion, intellect, metaphor. They show maturity and move across what divides us as a human species. |

## Rubrify This

***Rob Greene*, Creative Writing, College of Arts and Law**
@RaleighReview

"Rubrify This. . ." is on one hand meant to be taken seriously if we are discussing poems of experience. At the same time, it is meant to poke fun at those who believe they have a rubric for everything. In short, you cannot rubrify creativity. This figure attempts to define the poetry school of experience as this poetry school has not been defined as of yet. The universality of poets who write of the human condition no matter their socioeconomic status, race, religion, nationality, gender identity, etcetera expands to indivudal hardships and recovery from loss, love and work, parenting and caretaking as these universal experiences force us to empathize with one another. "Rubrify" is my verb, it ain't a word yet though I hope it will make it there one day.



## Decisions, Decisions ... Hospital or Home?

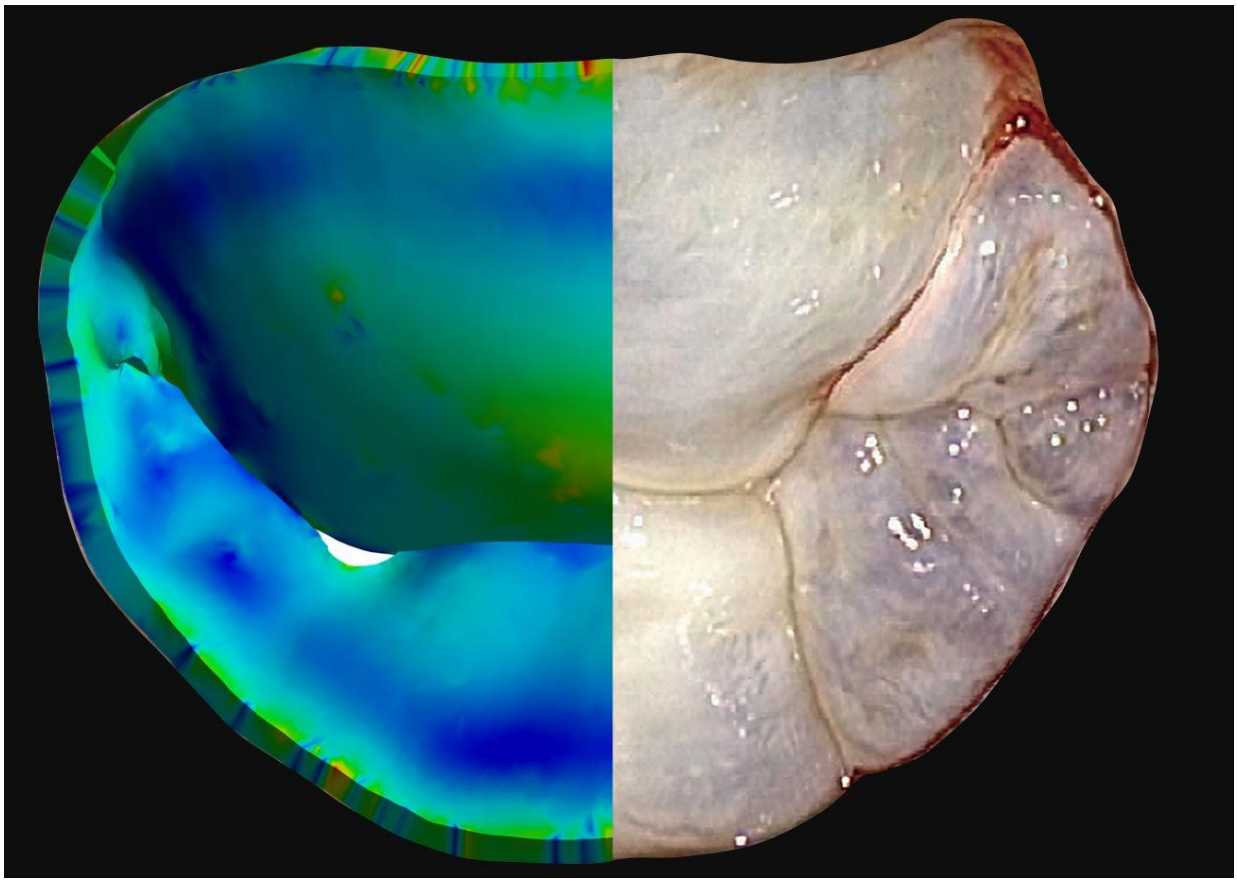
***Ciara Harris*, Applied Health Research, College of Medical and Dental Sciences**

My research focuses on Ambulatory Care (acute healthcare delivered somewhere other than in hospital) and attitudes towards Risk among those involved in 'location of care' decisions. The main figure is the patient, who, after becoming unwell, must decide which path to take off the bridge - one direction represents admission to hospital and the other represents treatment at home. They must decide which path involves the risks they are willing to take, as both admission and ambulatory care have risks. The background figure is the healthcare professional, advising the patient which path to take, although they potentially see the risks from a different perspective. Neither party can see the outcome of either decision, as the ends of the bridge are obscured.

## Reflections on our future climate

***Aileen Baird*, Geography, Earth and Environmental Sciences,**
**College of Life and Environmental Sciences**
@alienbaird

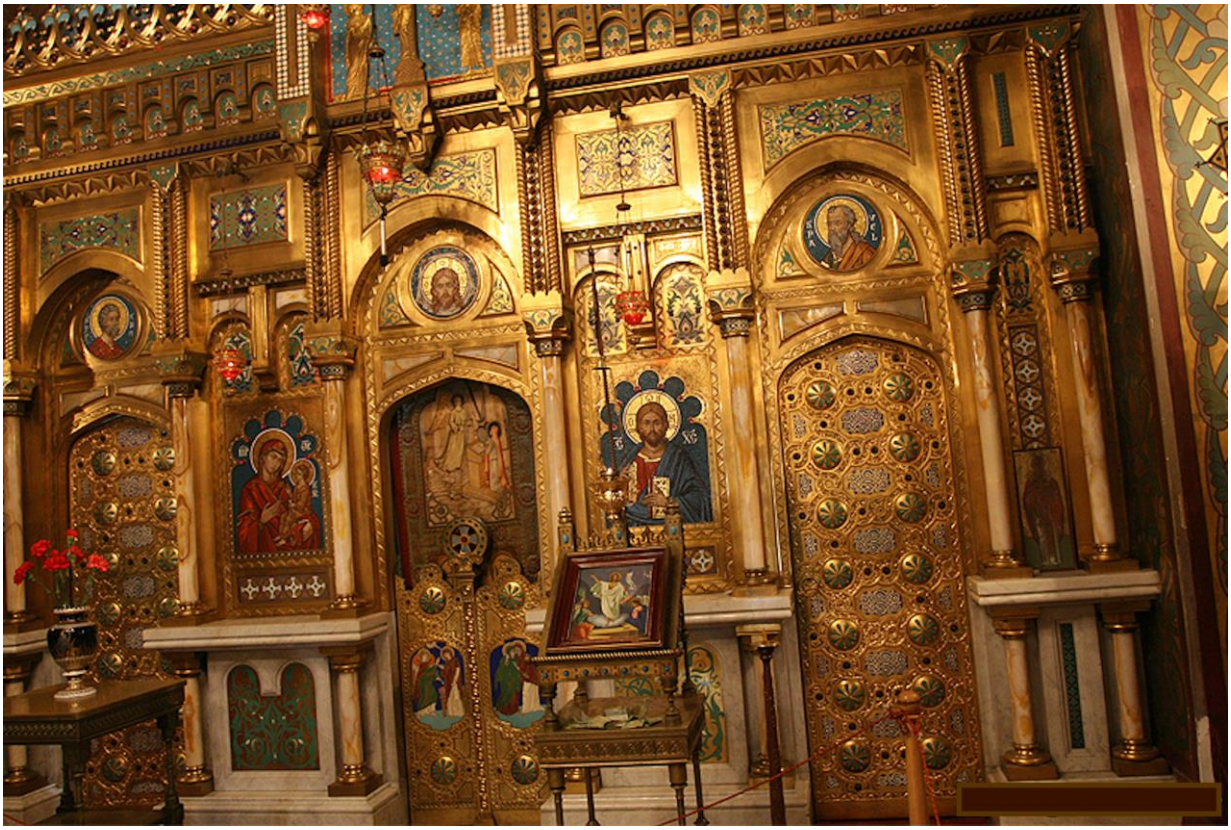
This photo was taken at the Birmingham Institute of Forest Research Free Air Carbon dioxide Enrichment (BIFoR FACE) experiment where extra $CO_2$ is pumped into areas of an oak woodland. With this, we can study the effects of future climate on the forest- enabling us to make better predictions about our future Earth. I am investigating how future $CO_2$ concentrations affect fungi, one of the essential components of the forest carbon cycle. This photo shows one of the experiments I do at BIFoR FACE- I survey and take samples of the forest fungi. You can see 3 fungal fruiting bodies, or mushrooms, here in the photo, and some of the large $CO_2$ enrichment towers in the reflection.



## From in vivo to computational systems: unlocking heart valve function

***Diana Cruz de Oliveira*, Mechanical Engineering,**
**College of Engineering and Physical Sciences**
@diana_mco

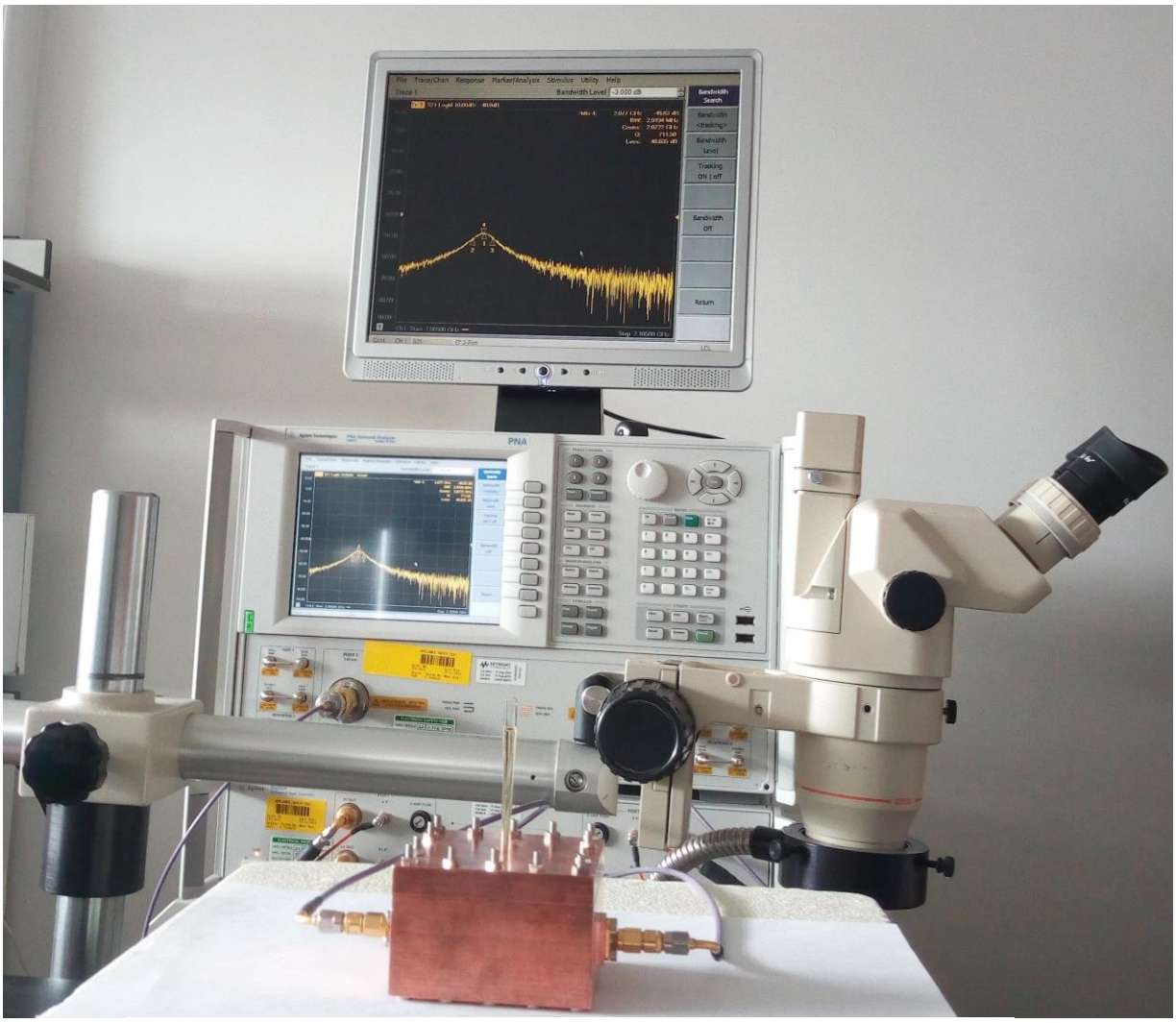
Accurately evaluating scenarios of cardiovascular disease is crucial for better surgical planning; to this end, computational modelling has been vastly used, providing useful information not accessible otherwise. However, the accuracy of such models is sensible to valve geometry, since dimensional changes are associated with onset and progression of disease. That's exactly where my research lays: I aim to develop a computational tool that automatically generates realistic geometrical models of this valve and study the impact of its shape on function. This mirror image represents that translation from an in vivo mitral valve configuration to the stress patterns associated with a computational model.



## The Iconostasis of Curtea de Argeș Cathedral (1885)

***Cosmin Minea*, Art History, Curating and Visual Studies, College of Arts and Law**
@cosminea

The wall of icons and ornaments that separates the altar from the rest of the church, called iconostasis in the Eastern Orthodox Christianity, is truly unique at Curtea de Argeș Cathedral. The stone frame and most of the decorations were created in Paris, the mosaic icons and the precious stones in Venice and the wood carvings in Vienna. The iconostasis was assembled in France in 1885 and shipped to a small town in Romania, to be placed in a 16th century church, as part of a modern restoration. My PhD looks at the intricate transnational artistic dialogue in late 19th century Europe and how it shaped a cultural identity for the new nation-state of Romania.



## Liquid Sensing

***Ali Mohammed*, Electrical, Electronics & Systems Engineering,**
**College of Engineering and Physical Sciences**

Liquid is one of the primary state of matter that has importance in our lives. The fact that every liquid has distinct property called the dielectric constant. It gives us the opportunity to measure and analyse various form of liquids by simply exposing them to some sort of electrical signal. Today this knowledge of dielectric properties of liquids has become an important tool, if properly interpreted will provide useful information that can be utilise in many ways. From changes in concentration level; to moisture content in plants; to analysis of body fluids to aid medical diagnosis. For instance early detection and monitoring of diseases such as diabetic and cancer in medicine and quality of product in food and petroleum industry.

## Escape to Erebos: An investigation of an LGBTQ underworld

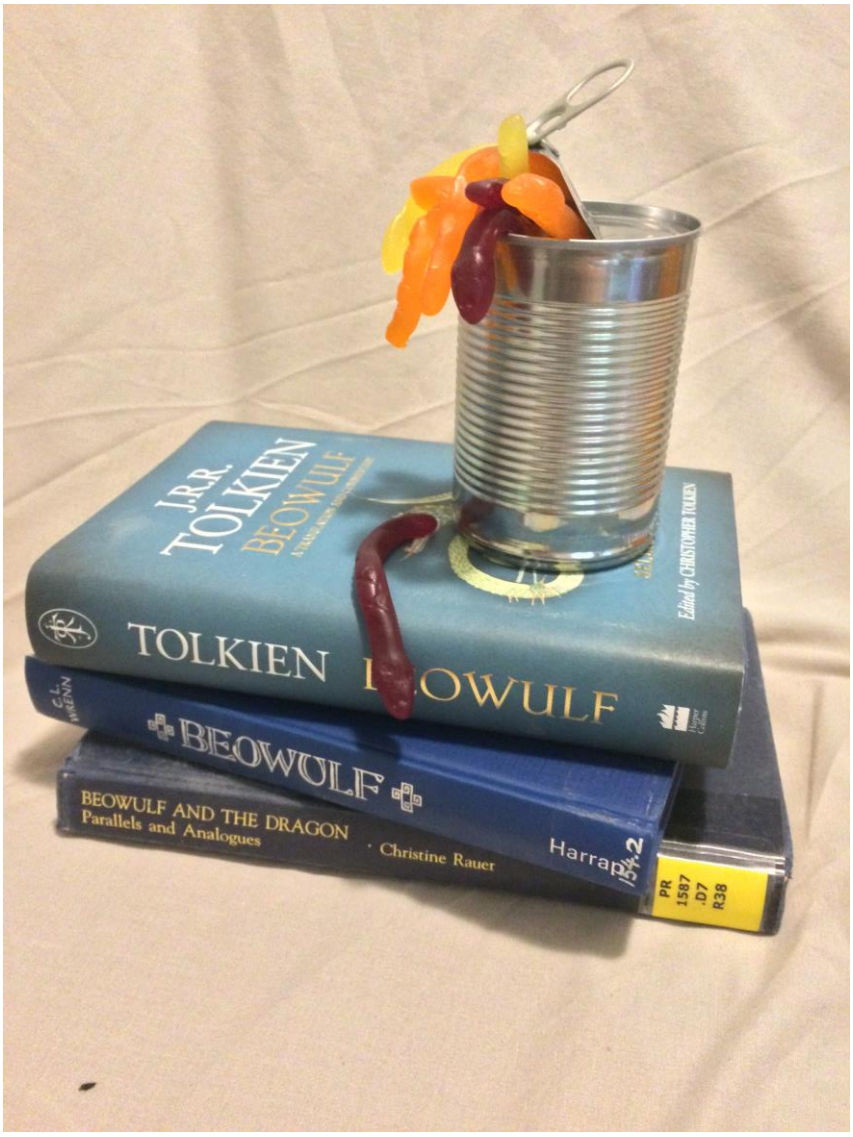
***Jennifer Steil*, Film and Creative Writing, College of Arts and Law**
@jfsteil7

I am investigating how a fictional narrative about the subterranean world of a South American queer community can make a unique contribution to underground literature. How can my novel's architecture reflect the actual and metaphorical underground? My young lesbian protagonist moves to a city high in the Andes and encounters a group of lesbian, gay, bisexual, queer, and trans people living in mining tunnels. I explore this underworld as fertile ground for identity construction and subversion of social convention, as well as somewhere western/colonial assumptions and interference are thwarted. My collage centers the girl reaching for subterranean knowledge, surrounded by representations of the underworld and voracious shadows reaching from the world above.

## See it and reach it

***Julia Wolska*, Psychology, College of Life and Environmental Sciences**

In my research, I test the interaction of the cognitive and the motor system. More specifically, I am examining how the perception of visual objects affects movements towards these objects. The image is an example of an experiment that I recently conducted. Participants had to touch the odd-colour square on the computer screen with their index finger. In one experimental condition, one of the squares was at a "forbidden location", which was specified by being crossed out. If the distractor was at the forbidden location, participants' movement towards the odd-colour square was more deviated than when none of the locations were forbidden. This gives some evidence that locations can affect movements even when they are task-irrelevant.




## Opening a can of 'wyrmas'

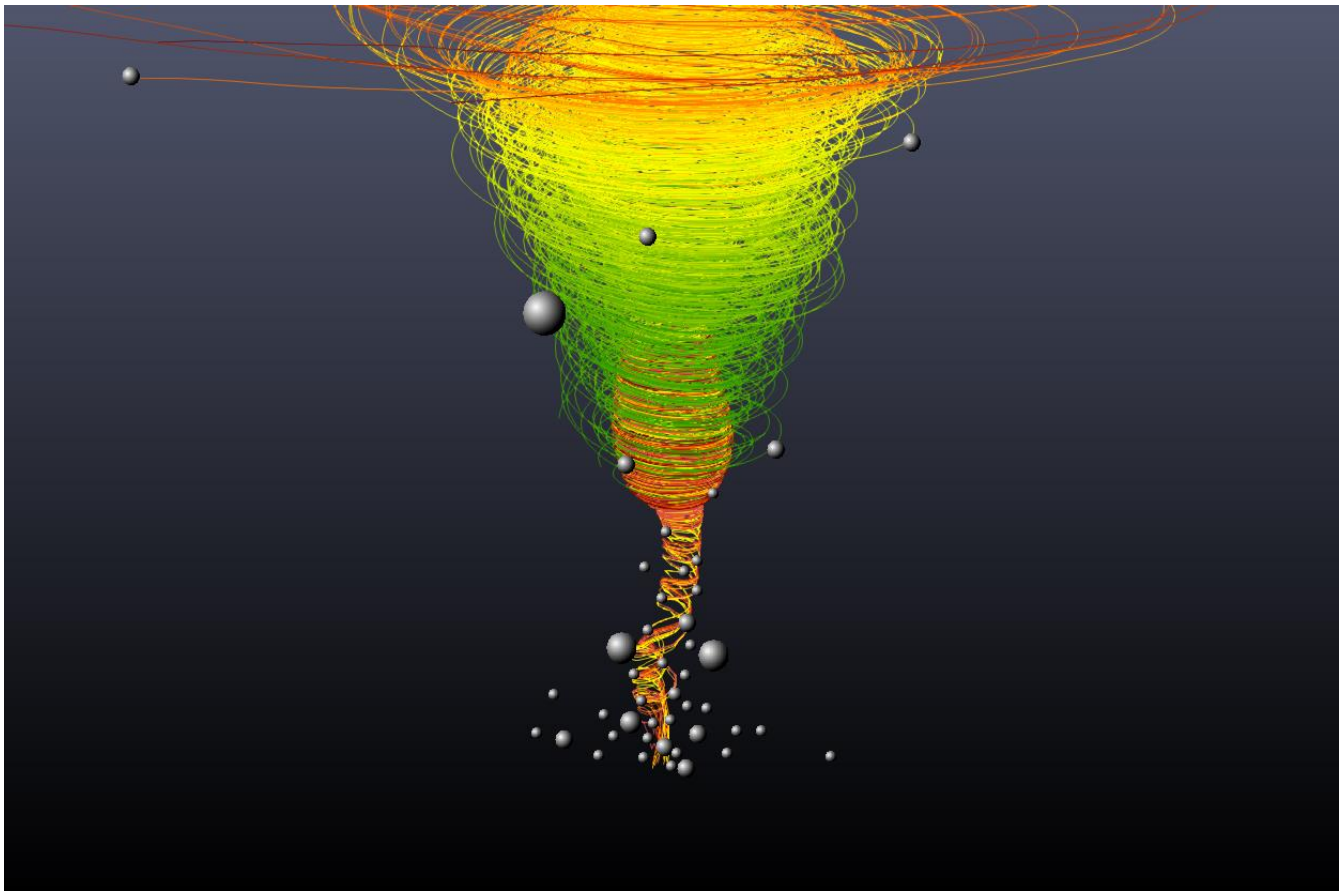
***Hannah Millard*, English Literature, College of Arts and Law**
@hkmillard

When you open a can of worms, what do you expect to find? For Anglo-Saxons, a can of wyrmas might contain earthworms, parasites, snakes, spiders, scorpions or even dragons. These are clearly not creatures we would group together today, but throughout the Anglo-Saxon literary corpus wyrmas appear as a reminder that life is never simple. Whether in the grave feeding on flesh, in Hell as eternal tormenters or as Beowulf's final enemy wyrmas are an image of death and transience. We can even see wyrmas outside of texts on grave markers or as warlike symbols of death and power on the Sutton Hoo helmet. My research aims to demonstrate the complex link between wyrmas and death in the Anglo-Saxon corpus.

## The astronaut's family

***Chloe Alexander*, Social Policy, College of Social Sciences**
@chloealexander0

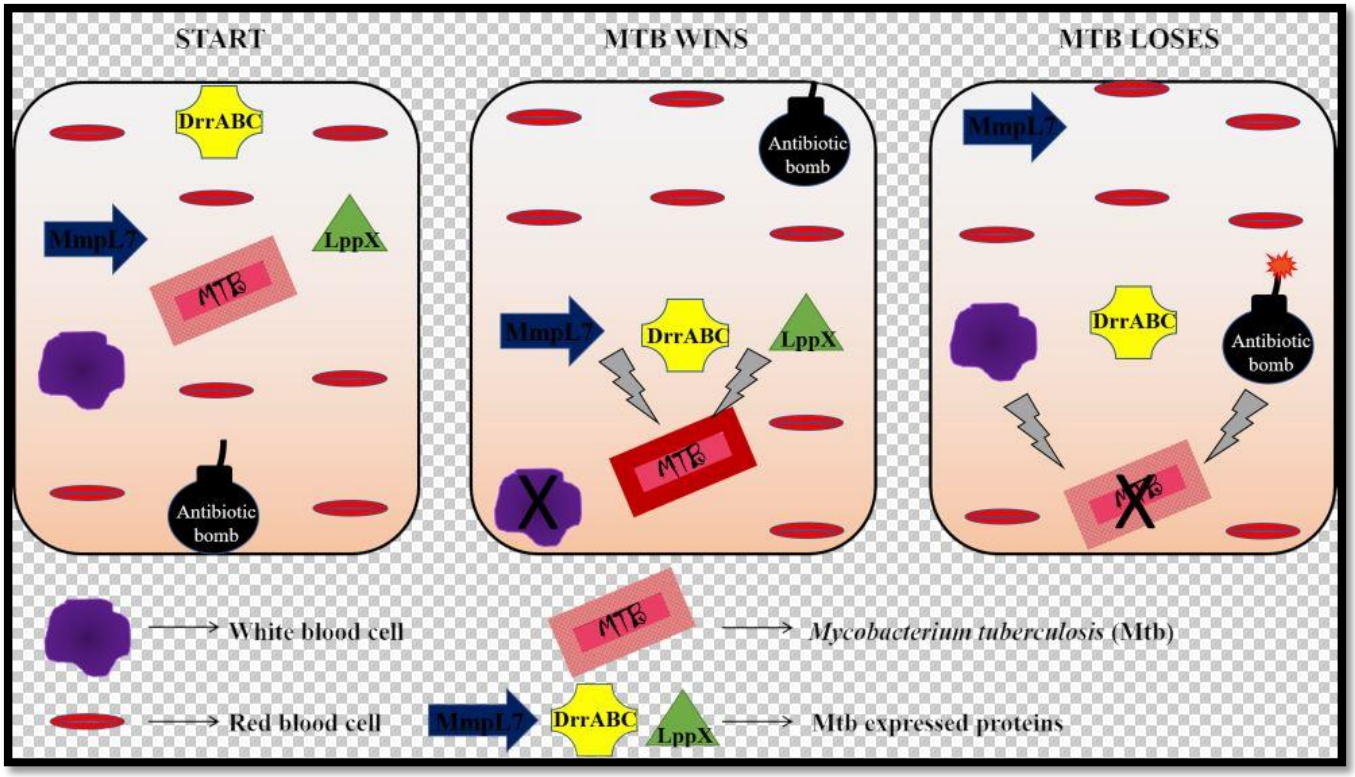
I am researching the ways that families care for each other, by spending times with families that include a young carer. Care takes place across the space and time of the home. Imagining the families as astronauts, I asked them to draw how they would live in space. Sapphire* drew herself with her two siblings and her two parents. They hold hands, wearing their space suits, looking back at us with the solar system behind them. She writes that they would be a united as a 'no fights family'. Like many of the materials from my research, I arrange the images around me on a rug, as part of my preparations to share the family's stories. *a pseudonym



## Flying debris in tornadoes

***Shuan Ryan Huo*, Civil Engineering, College of Engineering and Physical Sciences**

Flying debris is possibly one of the primary causes of damage for buildings in strong wind events such as tornadoes and typhoon. Objects such as car components, utility poles, roof gravels, shattered windows, tree branches or signboards had been considered as a debris source in the environment. These components are sometimes well fixed, but can still be picked up by strong winds, particularly tornadoes. To understand more about the potential damages flying debris may have, tornadoes are recreated in laboratory experiments while debris are added into the wind field in order to study the characteristic and fight trajectory.




## Ready, steady, let's play Mtb crush!

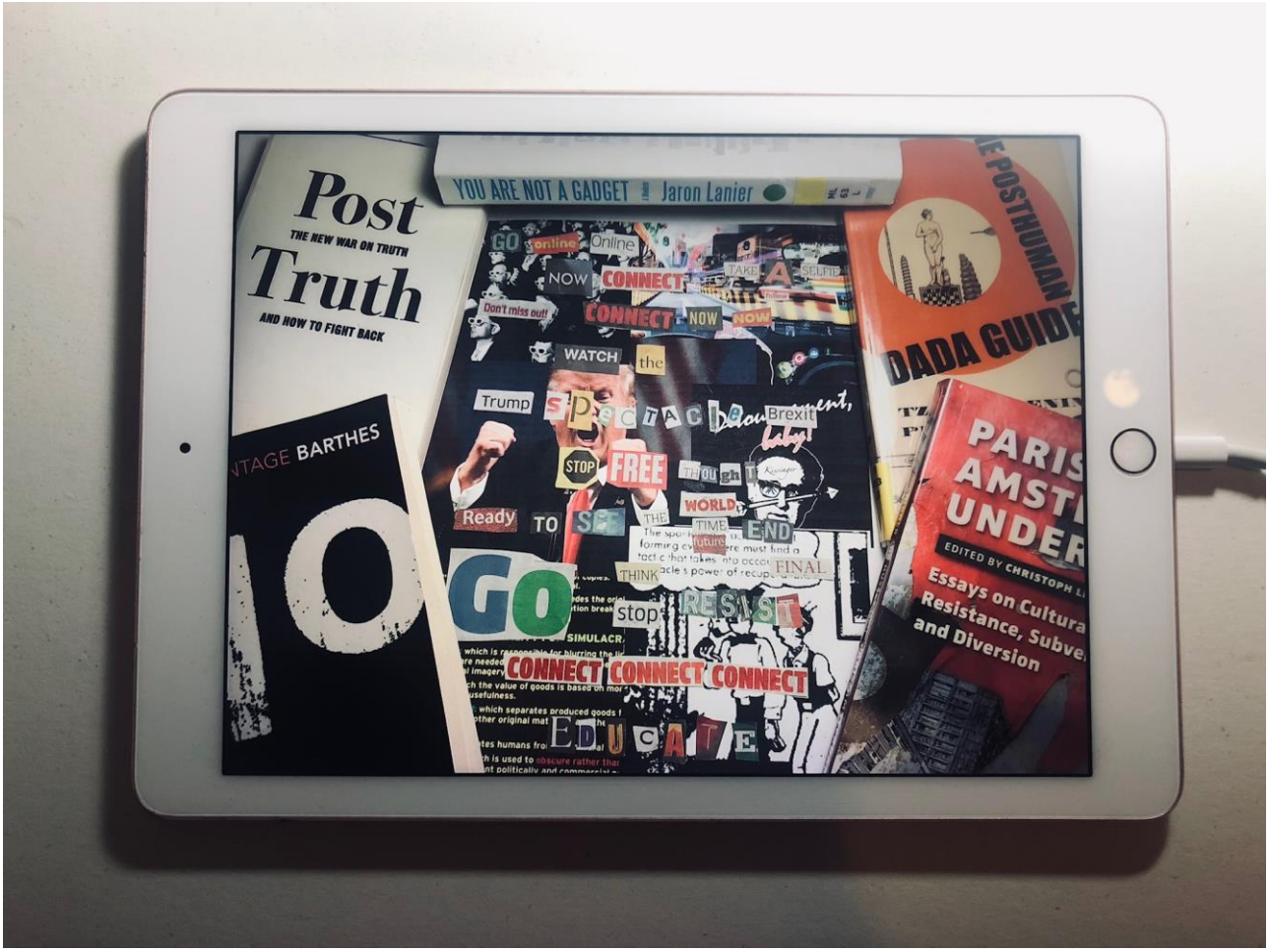
***Nabiela Moolla*, Biosciences, College of Life and Environmental Sciences**

Mycobacterium tuberculosis (Mtb) is the bacterium that causes tuberculosis (TB), a disease that remains prevalent in our modern world. To improve the current TB treatment, my research focuses on how three proteins: MmpL7, DrrABC and LppX protect and allow survival of Mtb in the human host. The image shows these proteins when aligned, transport a lipid that make the outside layer of Mtb (indicated by the solid red outline) impermeable to damage from the human immune system and antibiotic treatment. When these proteins are not matched then Mtb is vulnerable to the human immune system and antibiotic treatment. By solving how these proteins work together we can shed some light into understanding other complex survival mechanisms of Mtb.

## Strange Movement of Light in Materials

***Chris Oliver*, Physics and Astronomy,**
**College of Engineering and Physical Sciences**
@chroli_alpha

My research involves applying ideas that were partly developed at Birmingham around 40 years ago in new ways. It was discovered that electrons in solids such as graphene can exist in exotic states of matter that are very different to the familiar solids, liquids and gases. These are so-called topological phases of matter. Now, we are working on applying these ideas to systems of photons, particles of light. Photons can be made to move in strange ways in optical materials at low temperatures. This photograph of an old filament bulb is intended to illustrate light moving in unusual paths.




## Turn on, Connect, Opt Out

***Ren Warom*, English, Drama and American and Canadian Studies, College of Arts and Law**
@RenWarom

Framed within an iPad to represent ubiquitous technology, this Dadaist poem begins by urging us to connect, follow, forget; to focus on trivia. It represents the spectacle surrounding us, the online echo chambers and filter bubbles dividing the world, dividing us into tribes, suspicious of 'outsiders'. Enabling those who do not have our best interests at heart to decide our direction. Taking the Trump phenomenon as an unintended breaking of that spectacle, sparking unprecedented worldwide resistance movements, my research seeks to understand how we might begin to combat this gradual degradation of our rights and our attention as technology moves inexorably forward, making our spectacle ever more immersive and impossible to distinguish from reality.


## Are hand gestures universal?

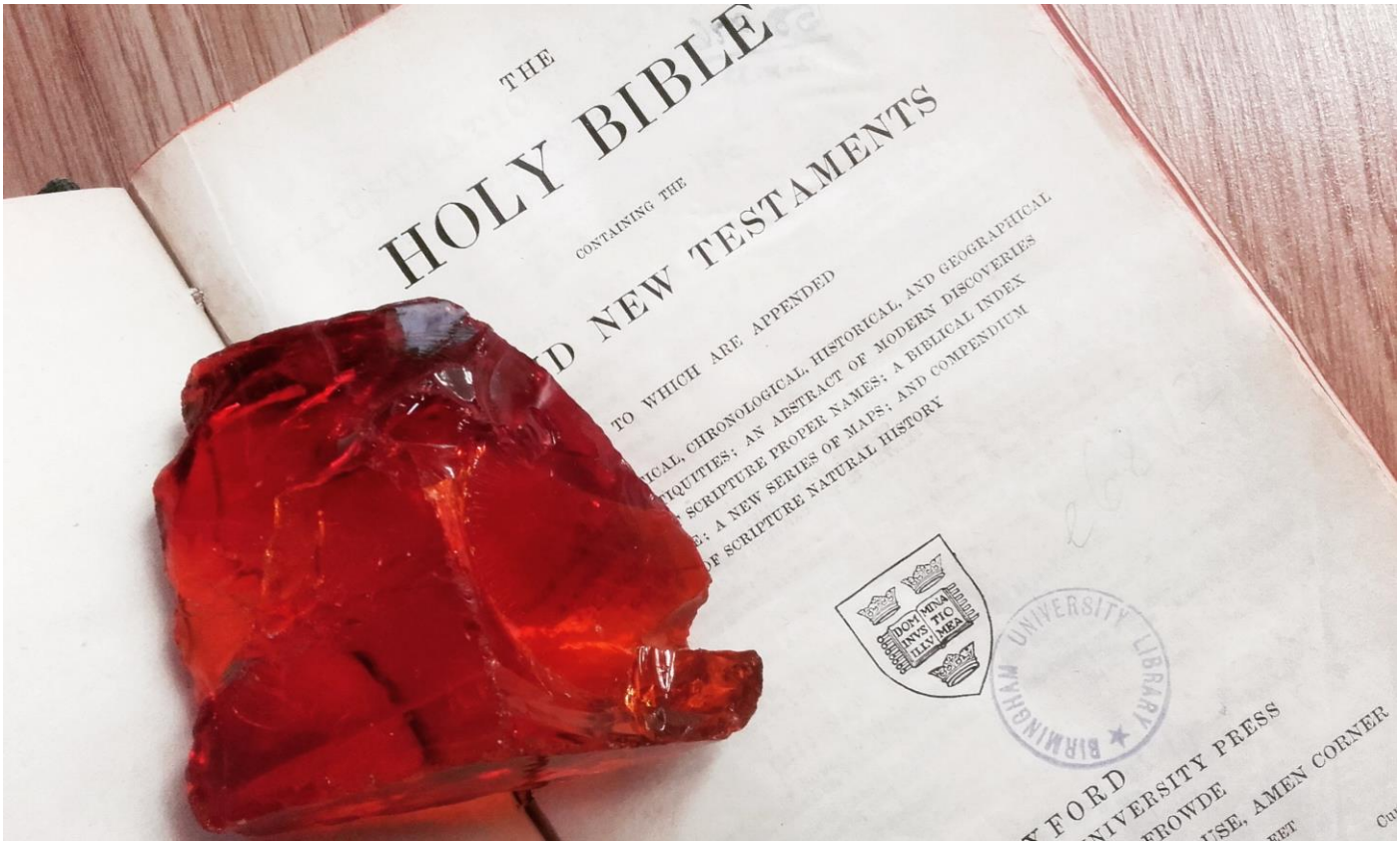
***Paulina Poplawska*, English, Drama and American and Canadian Studies, College of Arts and Law**
@P_Poplawska

The five common hand gestures in this picture may seem innocent, but they could get you in trouble in some parts of the world. Where do gestures even come from? Does our culture define the gestures we use? Is it the language we speak? Hand gestures are said to most often occur during the speech. There are many ways in which the language we speak and the gestures we use are both connected. But how does the language we speak itself influence our gestures? In my research, I am looking at how co-speech gestures can vary between speakers of Polish and English considering the lexical and syntactic differences of these languages.


## Dyslexics are Different

***Hadeel AL-Dawsari*, Computer Science,**
**College of Engineering and Physical Sciences**

Dyslexia is a universal reading difficulty. We can find it in all countries: Arabian, European, Chinese, etc. But, just as we know that each individual is different, so, dyslexic individuals have different symptoms too. They face different problems while reading: some of them may not understand what is written at all, while others may mix up or neglect letters while reading a word or even miss whole words. So, we need to provide each dyslexic individual with the appropriate learning intervention to improve their reading. This will also improve other aspects of their difficulties: such as spelling, comprehension, self-esteem, etc.




## The Foundations of Alchemy

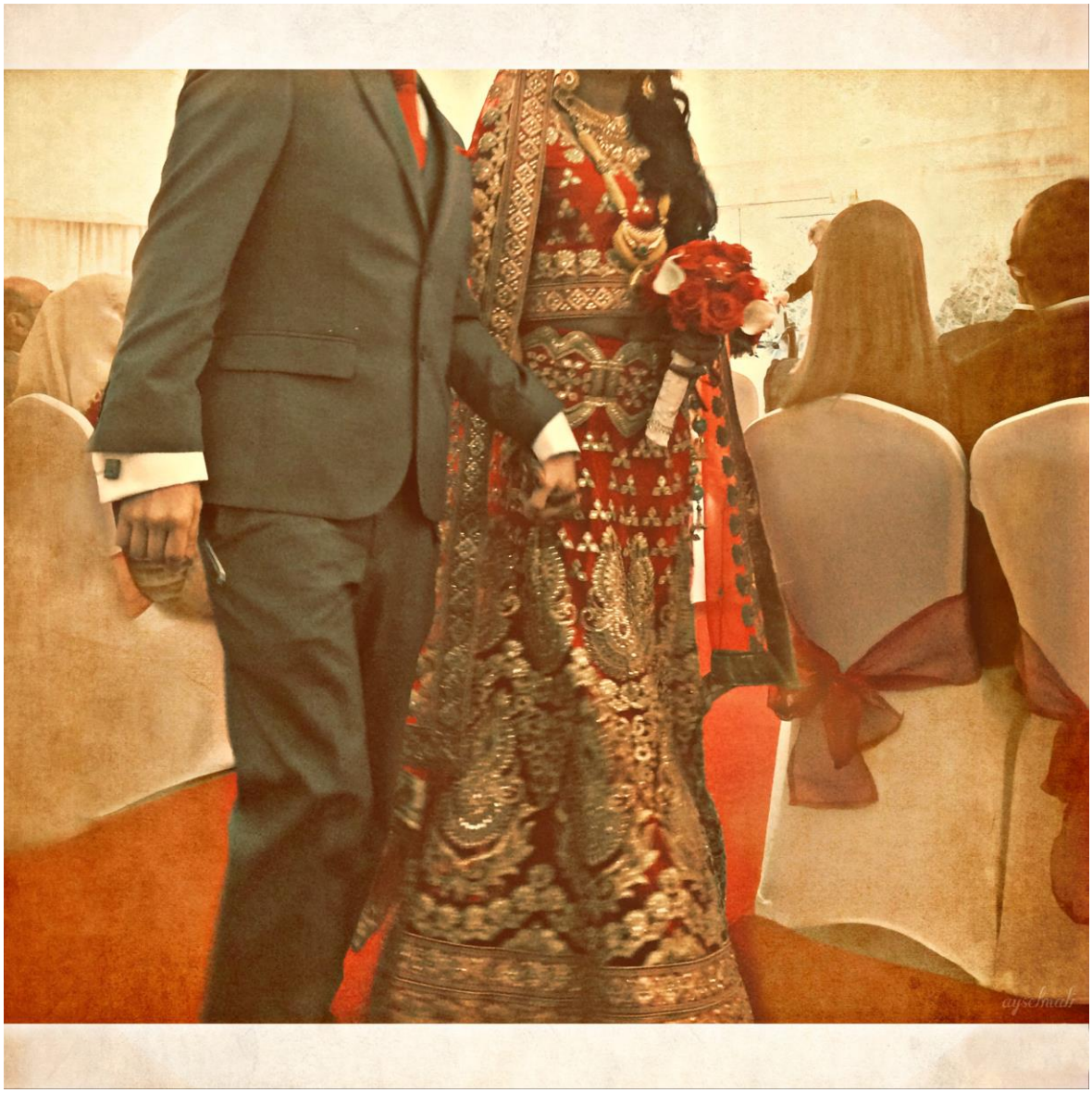
***Zoe Screti*, History, College of Arts and Law**
@ZoeScreti

Alchemy has been presented in traditional historiography as an occult practise which was conducted covertly in direct opposition with the church. However, my research explores the interplay between the Reformation and alchemy, suggesting that religion was not only an integral part of alchemy but also that the tempestuous state of religious affairs in sixteenth-century England had a direct impact on the ways in which alchemy was practiced and perceived. This image depicts a philosopher's stone, the alchemist's goal, resting upon the Bible and represents the foundational role of Christianity in sixteenth-century alchemy.

## A Race Against Time

***Richard Kendall*, History and Cultures, College of Arts and Law**
@rkendall25

This image of a child happily go-karting in front of the Statue of Lenin in Smolensk, Russia was an immediately powerful image, and as an Ancient Historian, it spoke to me of the ways people can relate to, refute and reuse the ruins of their past. It shows that, for all the great monuments and buildings that empires construct, these ultimately will only serve to be backdrops to their citizens' lives: a grandiose set for the quotidian. Moreover, it begs the question: if but two generations after the brutality of the Soviet regime was brought to an end a scene like this can take place, how long in antiquity was it before the great building projects of tyrants like Nero and Domitian became sites for similar such disrespect by their formerly loyal subjects?



## ‘Till Faith Do Us Part’

***Ayse Elmali*, Theology and Religion, College of Arts and Law**

Bride and groom walking down the aisle as husband and wife, after the wedding ceremony is complete. The image was taken in a Bangladeshi - British Wedding Ceremony in London. Although many Muslim women have married outside their religion, and a number of Muslim women are increasingly entering into these unions, the majority of work has neglected to consider them for some reason. In this respect, my research project focuses on Muslim women’s interfaith marriages with a particular focus on Muslim communities in the UK. In the research, I investigate intermarried Muslim women's experiences before and after getting married, and how religious differences affect their experiences of marriage.

## 'Voyages': networks of modernism expressed through the career of Mary Swanzy HRHA (1882-1978)

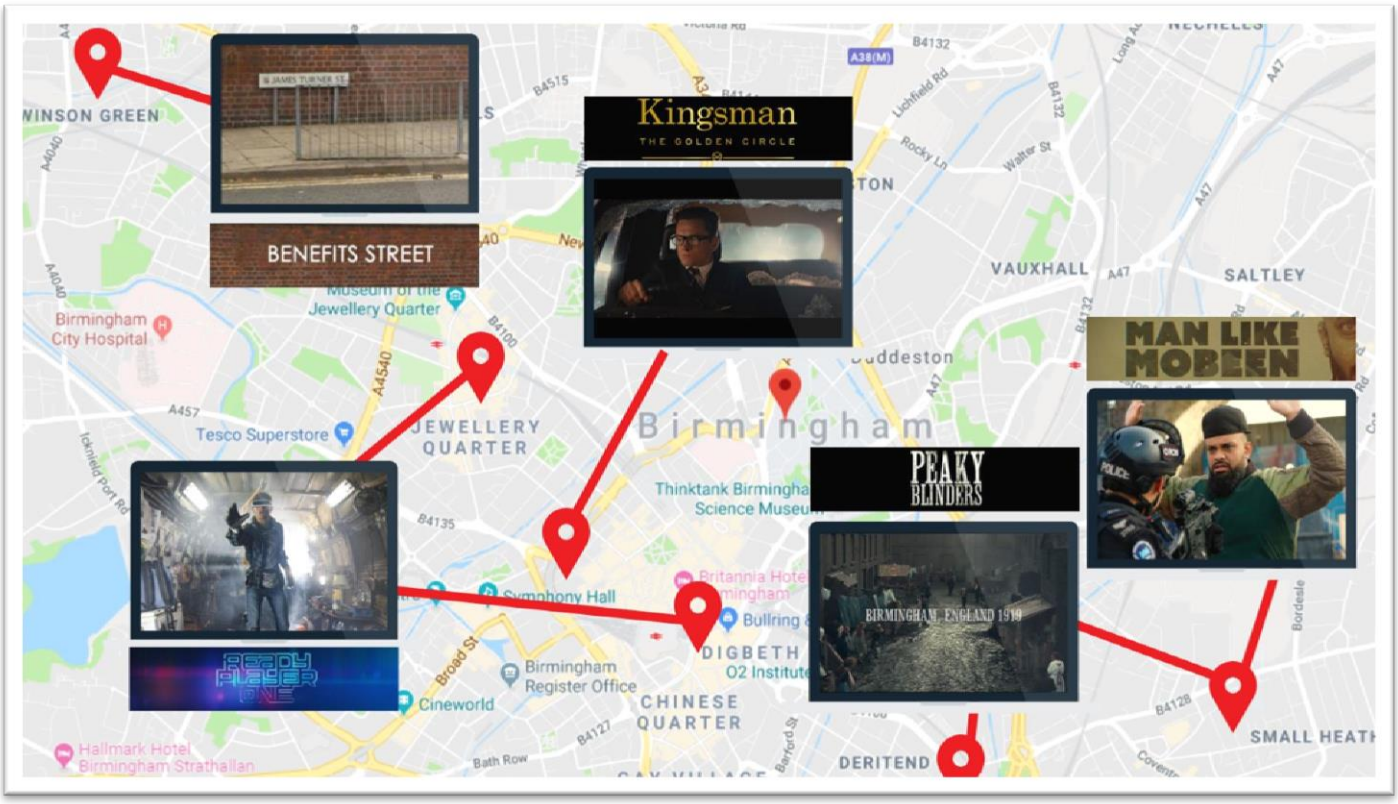
***Cai Lyons*, Languages, Culture, Art History, and Music, College of Arts and Law**
@CaiLyons

Mary Swanzy was an Irish artist who travelled extensively, from Belarus to Samoa, and exhibited in Dublin, London, Paris, Santa Barbara and Honolulu. My image traces these voyages, showing visually her exposure to the modern art of the early twentieth century and her entanglement in the knowledge production, cultural exchange, and artistic practices of these movements. My research aims to look at the networks of modernism and its transnational movements, with the social dimension of the exhibition the expression of these networks. At the centre of my research is the question, what does Swanzy, as a woman, and her participation in male-dominated pan-European modern art movements, demonstrate in a broader (international) and narrower (Irish national) sense.

## General Grant

***Diletta Pegoraro*, Business School, College of Social Sciences**
@dilepeg

Firms establish their production site in the most advantageous place. The positive outcome depends on industrial policy, workers capabilities, education system, and level of infrastructure. My research focus is exploring what a mature industrial region in advanced economies can offer to a company that wants to relocate its production site there. In this picture, General Grant is the third-largest tree in the world, by volume. It would take about twenty people holding hands to make a complete circle around the base. This majestic characteristic is possible thanks to the perfect mix of elements in the soil. Finding that mix of elements is my goal for revitalising a mature industrial region and make firms thrive like the General Grant tree.




## Birmingham: a (gritty) location chameleon?

***Jemma Saunders*, Film and Creative Writing, College of Arts and Law**
@JemSaunders1

This collage illustrates and situates several of Birmingham's representations in film and television from the last five years. Layering stills over a city map emphasises how imagery can both create and confuse a viewer's sense of spatial and temporal place. Sometimes contemporary Birmingham plays itself (Man Like Mobeen, Benefits Street); sometimes it masquerades as another city (London in the Kingsman 2 car chase, futuristic Ohio in Ready Player One); and sometimes it's ostensibly Birmingham on screen, but the location seen is somewhere else entirely: the opening sequence of Peaky Blinders was filmed in Liverpool. What makes Birmingham a filmic 'location chameleon', and under what narrative conditions, in both documentary and drama, does it play itself?

## Future light?

***Marie Rowley-Brooke*, Philosophy, Theology and Religion, College of Arts and Law**

Lighting a candle is a profoundly spiritual act performed by humans worldwide. In this photo, taken in St Mary's Anglican Cathedral, Limerick, Ireland, the human has been 'replaced' by a cyborg. A cyborg (CYBernetic ORGanism) is a technological modification or extension of a human through the addition of artificial components. Many of us know about cyborgs through space, military, and medical developments, but probably most of all through imaginative explorations in Sci-fi films. My research in cyborg theology investigates how Christians, remembering the Biblical injunction to 'welcome the alien', might include and affirm cyborgs as a natural development from the Genesis creation story, and, therefore, like humans, created in God's image.


## Provide a Loving Home to a Vulnerable Child

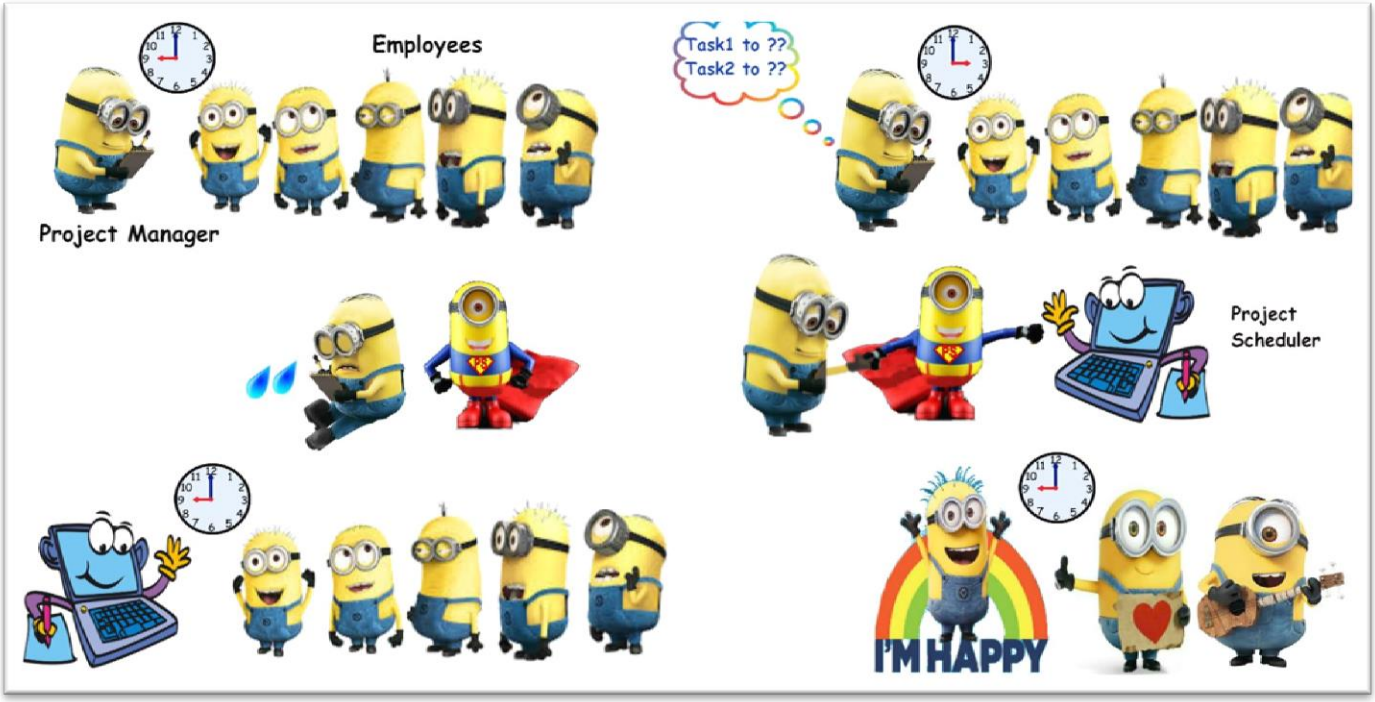
***Nahid Khan*, Theology and Religion, College of Arts and Law**
@NahidkhanUK

In 2016, 70,440 children were in local authority's care in the UK from all backgrounds, at any one time, nearly 4000 children in care homes awaiting to find a new home. A large number of children are from a Muslim background and there is a serious shortage of Muslim Adopters. This led to various campaigns to recruit carers. Due to lack of knowledge, many Muslim people believe adoption is prohibited in Islam, depriving Muslim children from basic rights. A loving family home can meet their cultural, ethnic, religious and linguist needs/rights; saving the cost for meeting these needs. This study focuses on compatibility of Islamic and civil law on adoption; recommends correct framework on adoption in Islam. Also, a rebuttal to Controversies by scholars.

## The science is boundless

***Fatemeh Ghaderiardakani*, Biosciences, College of Life and Environmental Sciences**

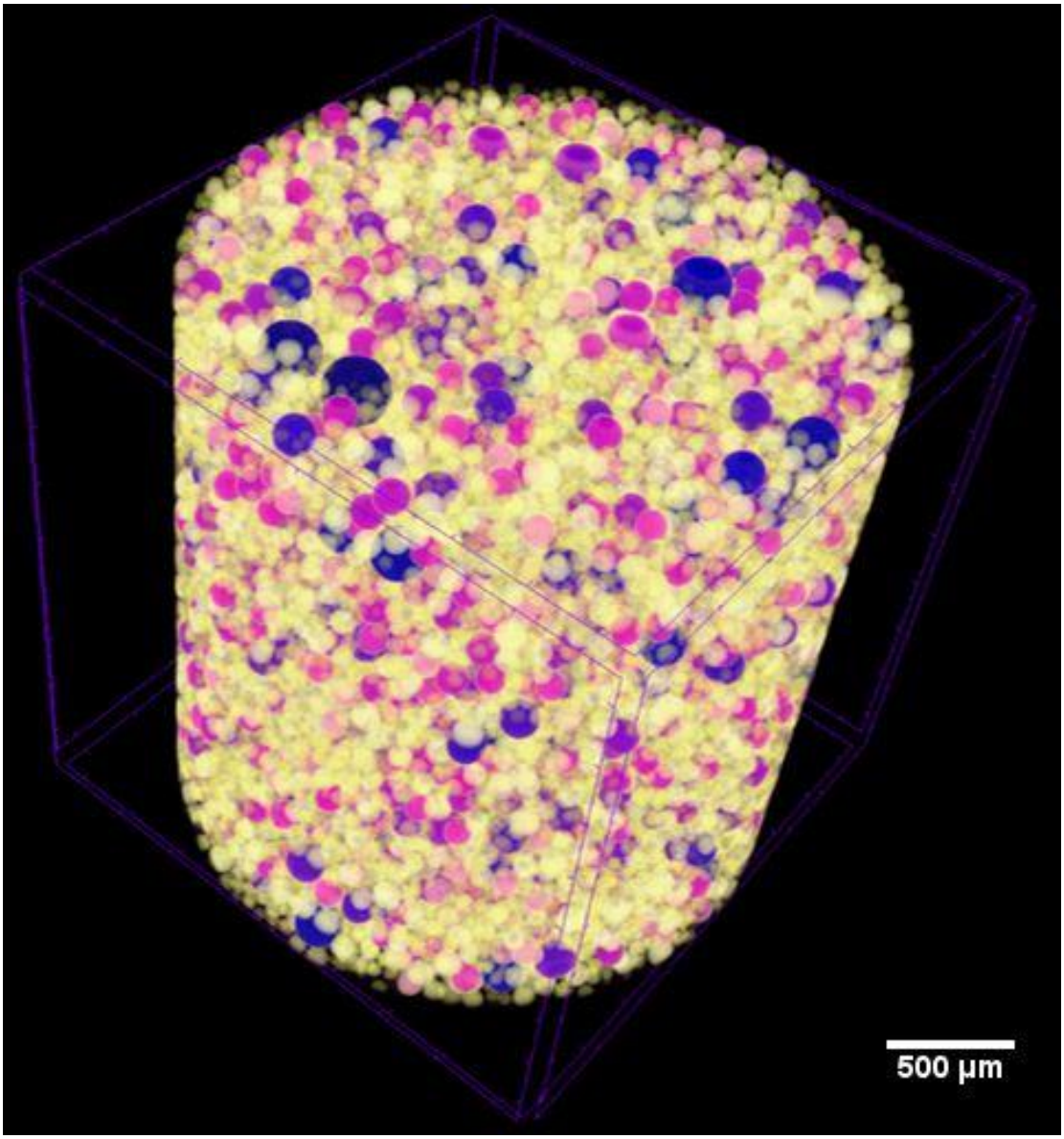
Macroalgae are plant-like organisms which live in coastal areas across the globe. They became a source of high-value, sustainable biomass in the food, feed, chemical and pharmaceutical products. My research focuses on the green macroalgae, Ulva spp. and its associated bacteria that promote growth and morphological development. I feel this image sums up my work, as it depicts what I hope to achieve - using science in a very usual life. These dried Ulva have been produced by me during my scientific-exchange visit at a seaweed producing company in Portugal and used for a traditional dish in an Iranian local guesthouse. The science does not cherish any territory or political situations and would pass through all borders all over the world.




## Minion (red heart image) Scheduler

***Natasha Nigar*, Computer Science, College of Engineering and Physical Sciences**
@natasha_nigar

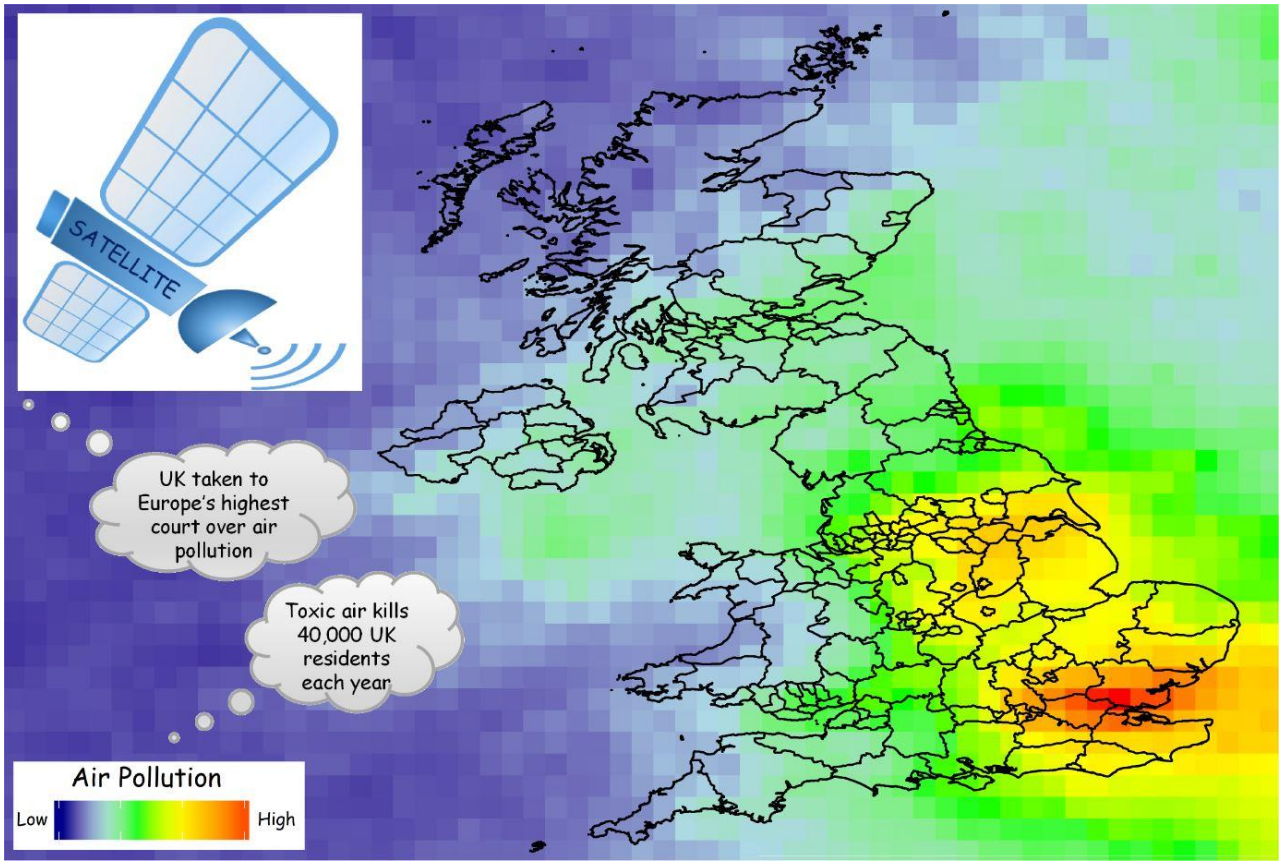
Software project scheduling, under uncertain and dynamic environments, is one of the most important challenges in software engineering field. Software project manager can't assign tasks to employees in an efficient manner within budget and time. Therefore, this work formulates software project scheduling problem as an optimization problem. In this regard, a project scheduler has been developed with four objectives as project duration, robustness, cost, and stability who assign tasks to employees efficiently. Experimental results confirm the suitability of proposed approach for software project scheduling problem.




## Air bubbles in an aerated product

***Saifullah Jabarkhyl*, Chemical Engineering,**
**College of Engineering and Physical Sciences**

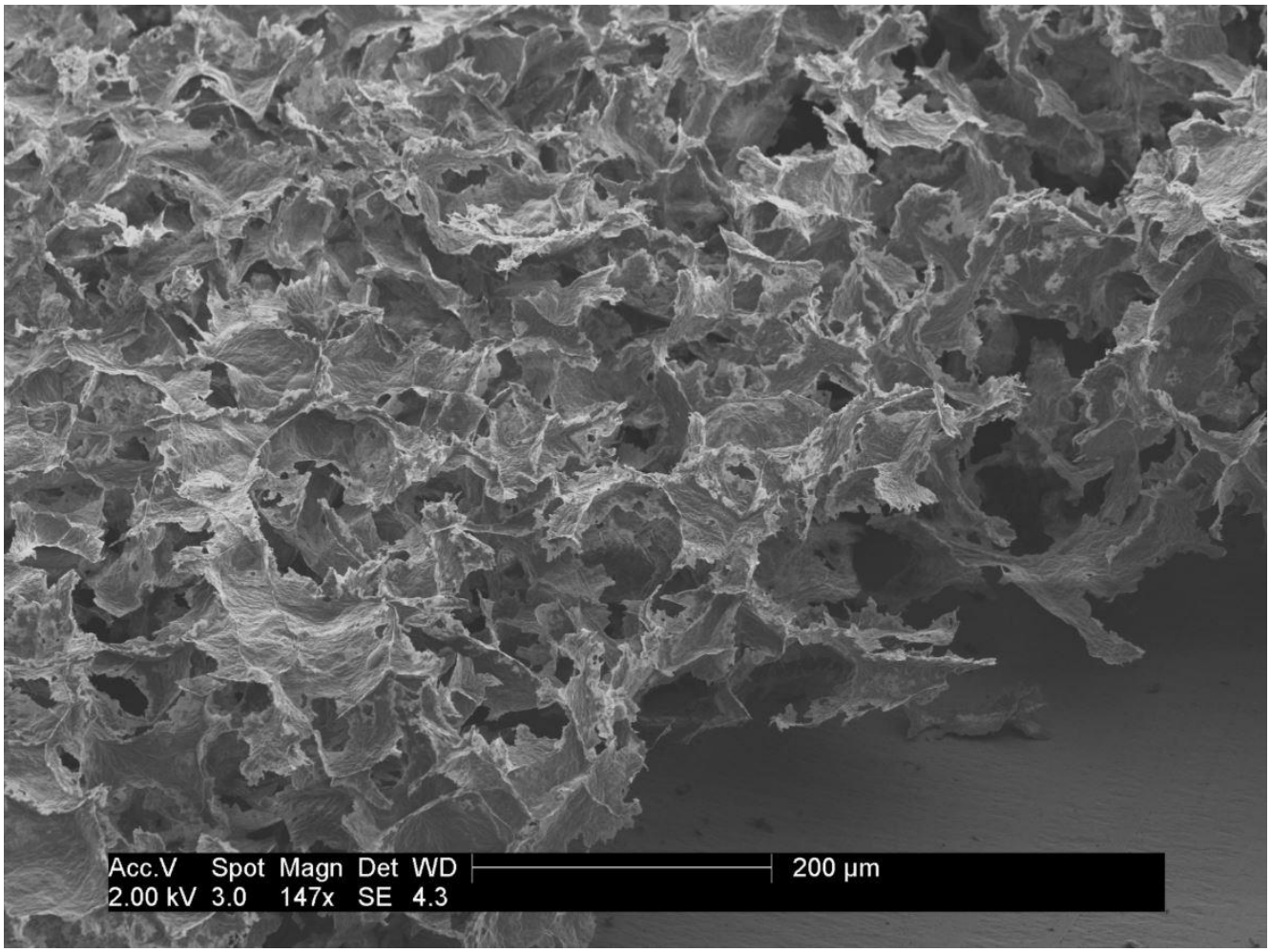
Did you know that aerated products such as ice cream or mousse contain up to 50% by volume of air in the form of bubbles? Honestly, neither did I! Currently, aeration is a common practice among food manufacturers due to increasing demand from consumers for innovative aerated products which possess lower calories and cost while exhibiting improved quality and taste. The aim of my project is to tailor the microstructure of aerated products since it is crucial to its physical, textural and sensory properties. One way of achieving this is by controlling the bubble size and size distribution. The above is an image of an aerated product obtained using an X-ray micro-computed tomography technique.




## Satellites help Monitor the Air you breathe!

***Karn Vohra*, Geography, Earth and Environmental Sciences,**
**College of Life and Environmental Sciences**
@kohra_thefog

Air pollution has adverse effects on human health worldwide. Every year almost 40,000 premature deaths take place in UK attributed to air pollution. Recently, UK was taken to Europe's high court for illegal levels of air pollution. Surface measurements are sparse and inconsistent. On the other hand, instruments on-board satellites measure air pollutants and provide a global coverage of air quality. The image shows the mean air pollution levels for 2017 as observed from space. Vehicular emissions are a major source of these high levels and London emerges as a hot spot. Long-term record of these satellite observations can help us monitor trends in city-wide air quality and evaluate the efficacy of mitigation measures recently adopted in near real time.




## Small Components Making Great Materials

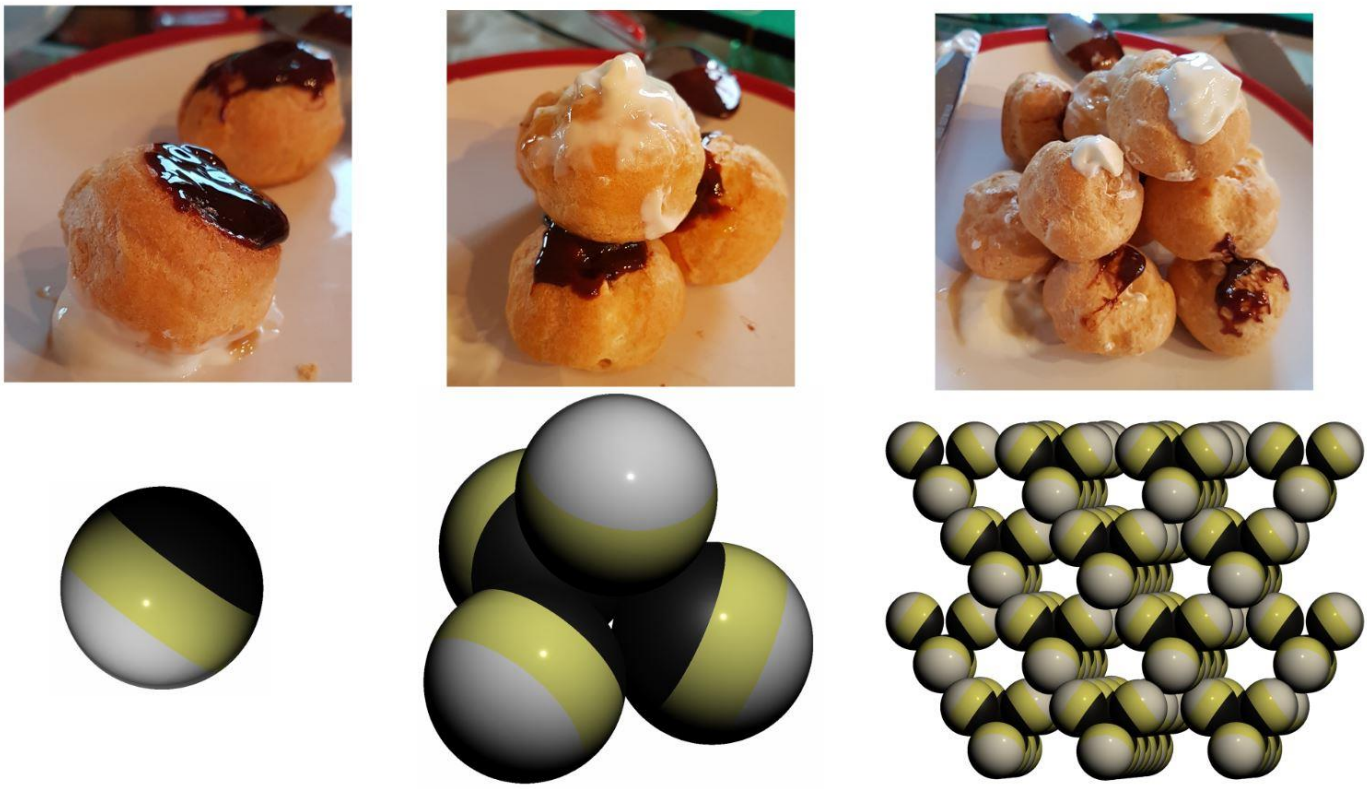
***Paolo Passaretti*, Chemical Engineering,**
**College of Engineering and Physical Sciences**

This image was acquired with a Scanning Electron Microscope (SEM) and it shows the microporous structure of a novel carbon-based composite material, obtained by the self-assembly of two extraordinary nano-components such as graphene and the filamentous virus M13. This material was designed to show high performances and environmental sustainability for applications in the fields of energy and environmental sciences, in particular for the production of high performing batteries, sensors, filters and absorbers. Nature is the greatest source of inspiration for future technologies since most of them are already working somewhere, waiting to be found.

## David Jones: The Painter-Poet

***Hannah Comer*, English Literature, College of Arts and Law**
@HannahComer93

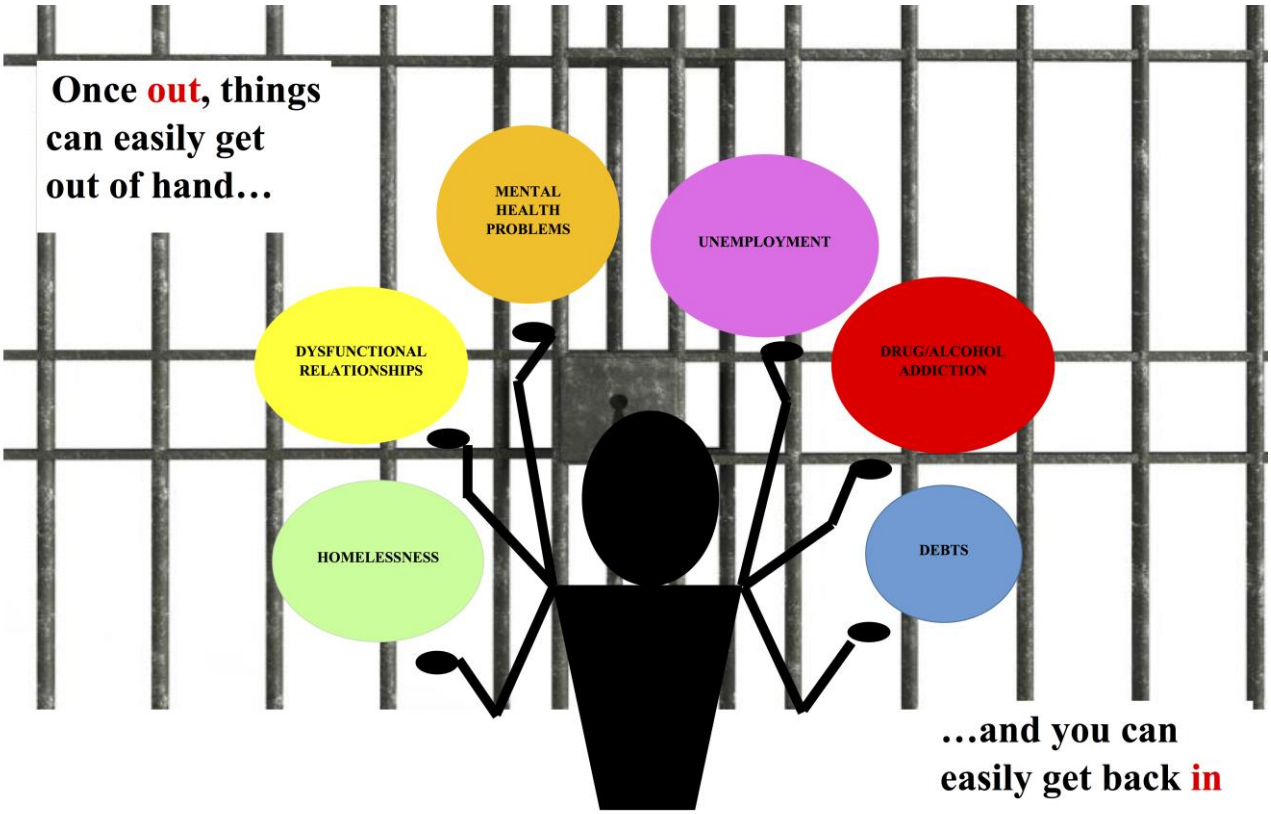
The photograph is an image of an artwork inspired by my current research about the Modernist painter and poet David Jones. My thesis explores the Pre-Raphaelite legacy in Modernism and for my current research I am looking at how Jones engaged with this legacy, with figures such as William Morris and Edward Burne-Jones, particularly through their shared interest in Arthurian legends and inspiration from nature. I have painted the image in watercolour and it includes a portrait of Jones, florals and a depiction of Arthurian knights. The way in which the florals are painted were inspired by Jones's own style of painting and the depiction of the knights by Medieval manuscripts and the tapestries by Morris & Co.



## Nanoparticles so good, you could eat them...

***James Shaw*, Chemistry, College of Engineering and Physical Sciences**

From the Elizabethan era of stacking cannonballs safely on ships to the more modern issue of designing giant but stable profiterole towers, the packing of spheres has interested scientists, engineers (and chefs!) for centuries. Our research investigates the structures found when we make patches on spherical nanoparticles attractive. By changing the strength of attraction/stickiness and sizes of the patches, we can design particles to stack into crystals with interesting optical and mechanical properties. The top row shows profiteroles with chocolate and cream patches, where chocolate is stickier than cream and so forms stronger connections. In the bottom row we show our computer simulations of gold nanoparticles with patches and a crystal structure formed.

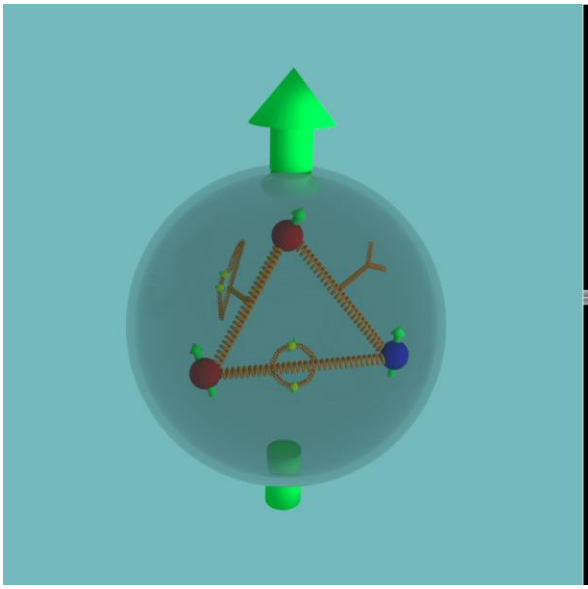


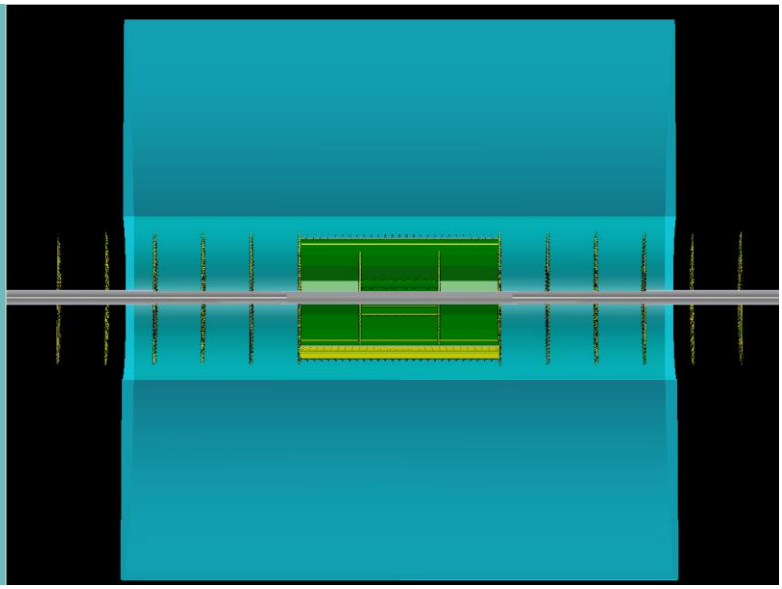

## SUPPORTING (EX) OFFENDERS WITH COMPLEX NEEDS

### Supporting (ex) offenders with complex needs

***Bibiane Manga Atangana*, Applied Health Research,**
**College of Medical and Dental Sciences**

(Ex)Offenders face series of nested problems that hinder their separation from crime. Those are complex issues such as mental health, addiction, homelessness, unemployment. Voluntary organisations would often focus on tackling these issues, to help (ex)offenders stay out of trouble. However, with the latest government changes around offender management, most organisations lost their sources of funding. My research aims to provide relevant information on how supporting organisations and offenders cope with and adjust to the new reforms. "It's like juggling balls, working with the offender. You have to keep all these balls in the air. When one of them falls, so the housing falls, you're likely to drop the rest because it's all interlinked."-Research Participant

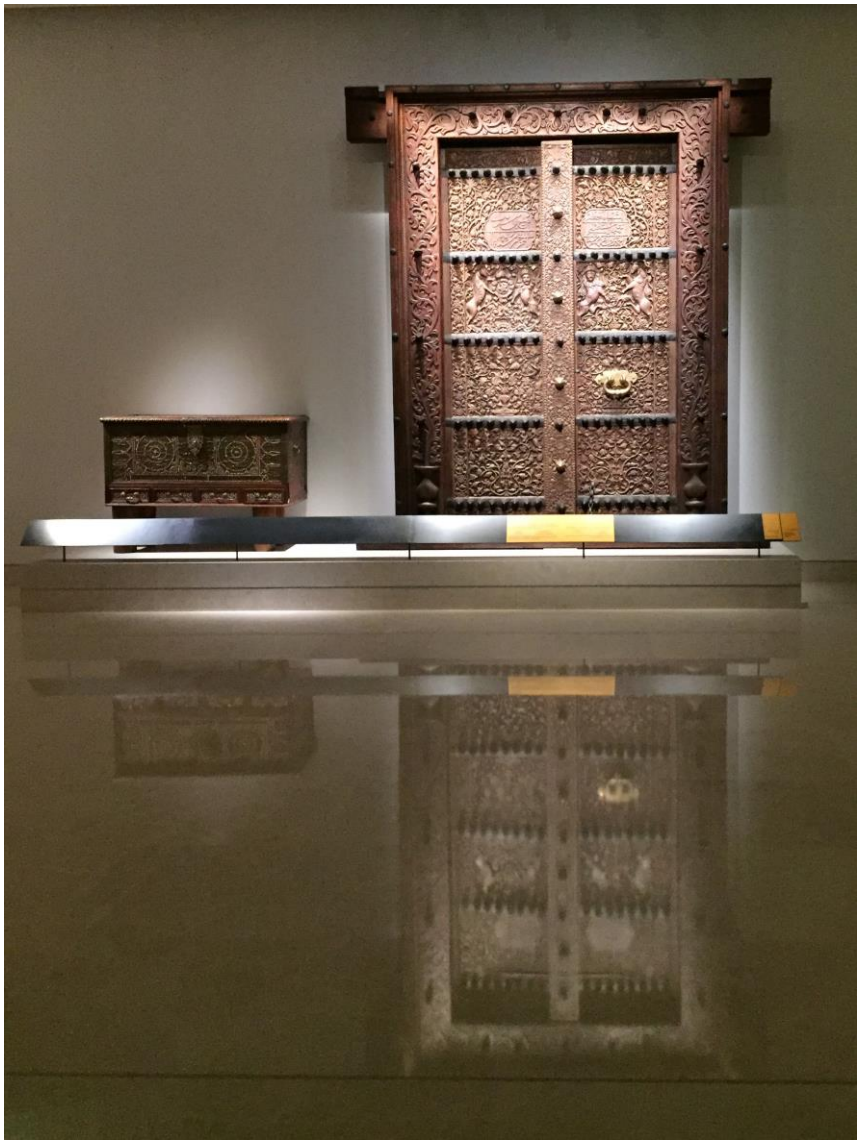




## Investigating the inner life of the proton

***Håkan Wennlöf*, Physics and Astronomy, College of Engineering and Physical Sciences**

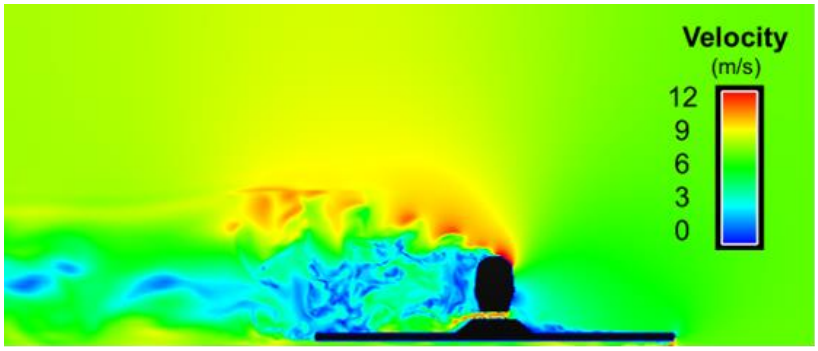
A century ago, the proton was considered one of the smallest constituents of all matter. Now we know that the proton has its own internal structure, but what does it look like? How do the smallest elements of the universe behave, and why? Answers to those questions will be sought with the electron-ion collider (EIC), which will be built in the near future. This image shows a rendition of what the proton inside may look like, and a simulation of the detector with which to find out more. My research aims to develop the innermost part of this detector, to optimise its performance. This involves tests of microchip sensors as well as full detector simulations.

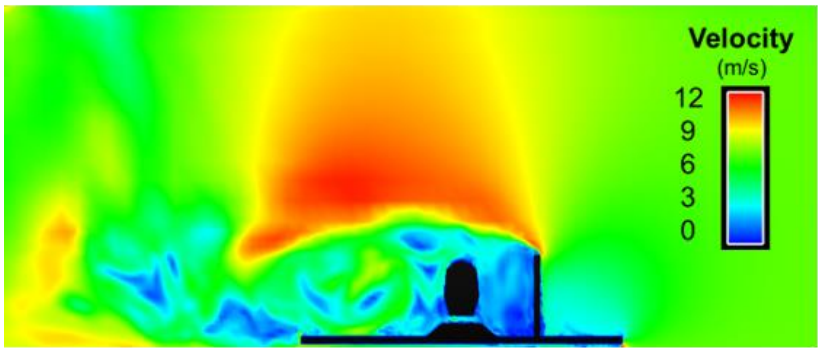


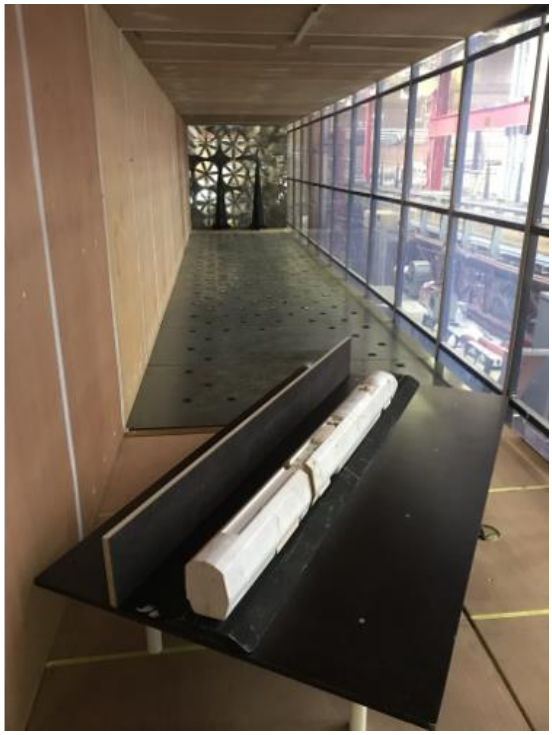
## The reflections in the museums

***Arooj Al Raee*, Ironbridge International Institute of Cultural Heritage, College of Arts and Law**

The large chest box makes you wonder about the treasures – in this case, representing the valuables of the museums. The huge door symbolizing an invitation to a journey through past to present towards the future. The overall composition with the mirrored reflection gives a holistic undertone signifying that the meaning is made in the resonance of things! This picture is taken at the National Museum (Oman) and highlights the inescapable coexistence of the real and its reflection. The beautifully carved door and wooden chest box artistry displaying the traditional craftsmanship, cosmopolitan ties and the past glory, is a symbolic fit to my research examining the role of museums through collections and architecture in the expression of national identity.



## Surviving the train ride

***Syeda Anam Hashmi*, Civil Engineering, College of Engineering and Physical Sciences**

The stability of high-speed trains under crosswinds has become a major issue of concern in recent years. Strong winds can cause accidents such as derailment or overturning of trains. One possible solution to this problem is the introduction of windbreak walls adjacent to the windward side of the train. This current research models the aerodynamic flow around scaled trains with and without windbreak walls by the use of experimental and numerical methods. As shown in the image, a windbreak wall can help in maximally reducing the negative effects of crosswinds. Different designs are employed in this research to determine the best possible shape of a windbreak wall which can provide significant shielding effects leading to smoother and safer train rides.

## Road Safety or Maintenance: Where Should We Spend Our Money?

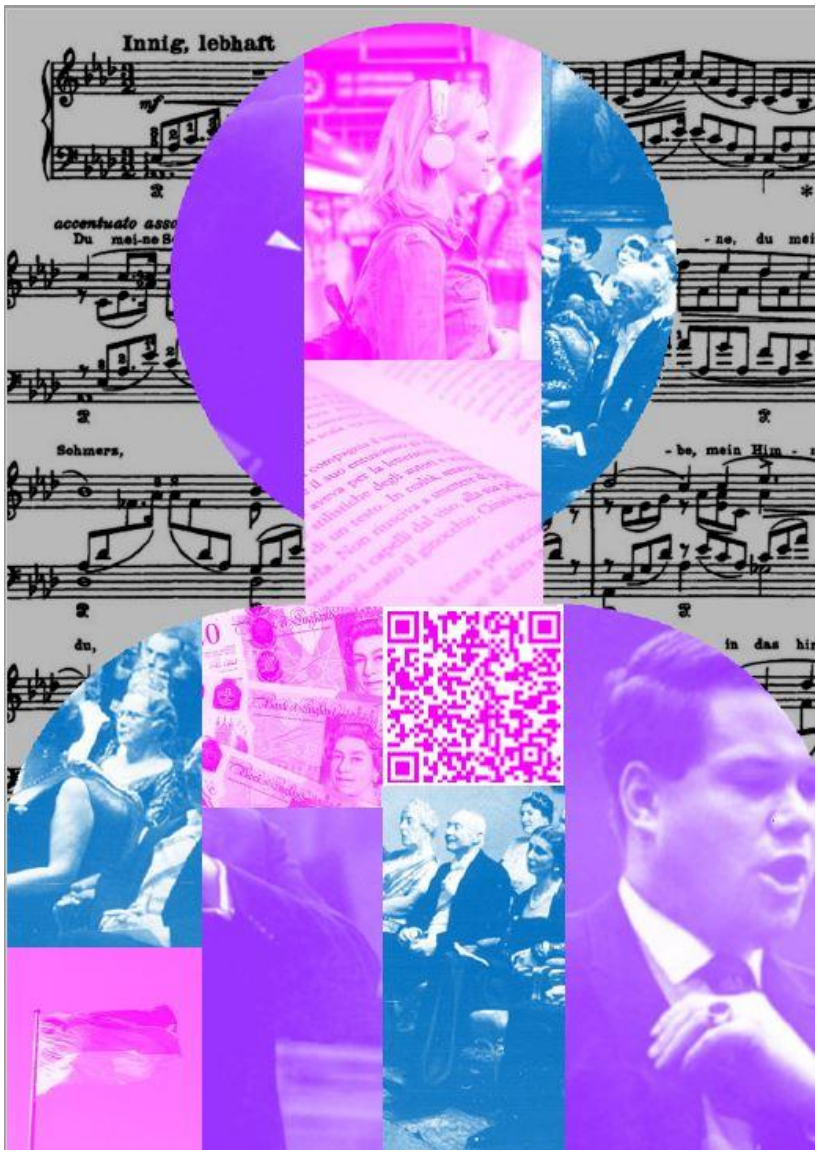
***Azwan Azmi*, Civil Engineering, College of Engineering and Physical Sciences**

Road safety and road maintenance are important aspects of road assets management. Implementation of road safety countermeasures will increase the value of the asset. Implementation of road maintenance works will increase the safety rating of the asset. The road safety and maintenance programme need to be integrated in order to optimise the limited road assets management fund. This image depicts the outcome of an integrated road safety and road maintenance programme. It has been taken at an ancient Roman ruin in Italy which has been established around 6th to 7th century B.C. The road safety countermeasures and road maintenance works were implemented in such a high standard by protecting the vulnerable road users and preserving the road assets.


## Infection Prevention: A Commitment For All

***Catherine Dunlop*, Metabolism and Systems Research,**
**College of Medical and Dental Sciences**
@DunlopCatherine

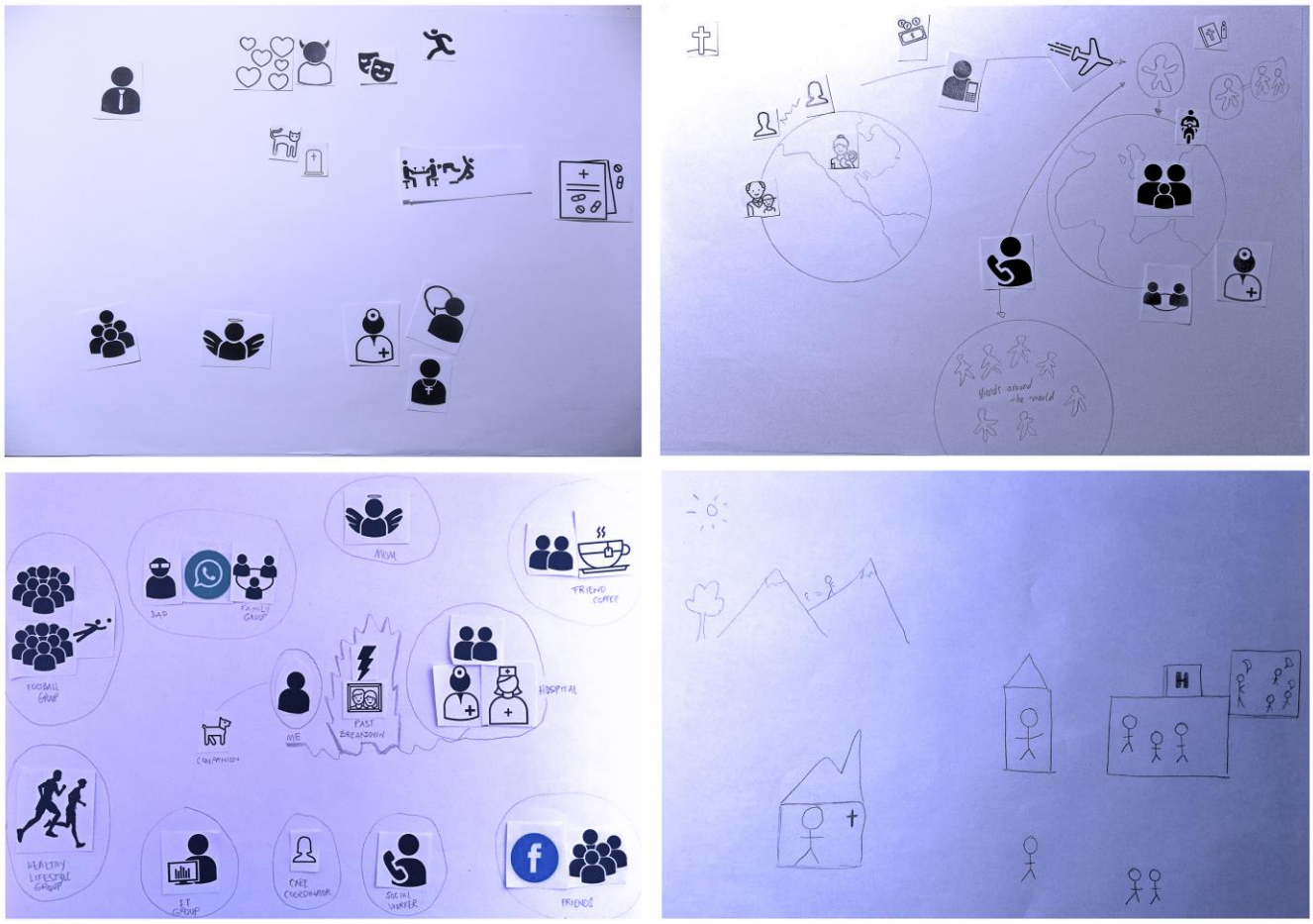
If pregnant and postpartum women around the world can be protected from simple infections when visiting health facilities, lives will be saved. One of the major tenants of infection prevention is, simply, good hand hygiene. Here in Malawi, in the health facilities where we work, running water is often not available for several hours of the day. This makes hand washing a real challenge. Staff are committed to caring for patients, but their working environment does not allow them to meet the standards they aspire to. Our research is reviewing the implementation of low tech, sustainable and locally produced solutions to improve adherence to WHO recommendations for hand hygiene that can be used despite water shortages.




## Songs Without Borders

***Stewart Campbell*, Languages, Cultures, Art History and Music, College of Arts and Law**
@stew_campbell

My research examines art song (poems set to classical music and sung in foreign languages) and how they are created and experienced today. This deconstruction juxtaposes several photographs including that of the famous singer Dietrich Fischer Dieskau and a traditional audience. It demonstrates how we as individuals construct meaning in our experiences with music in a multiplicity of ways, including: the sounds of music itself (try the QR code); the meaning of lyrics and poetic texts; identity conveyed by music and language; economic and cultural capital that facilitates engagement; and how everyday life shapes our meaning making. In that sense these are songs without borders, and we are individual authors of our own experiences with them.




## Psychosis Recovery Mapped

***Laura Moreno Galindo*, Psychology,**
**College of Life and Environmental Sciences**
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The photo comprises four recreated relational maps that participants with experiences of psychosis produced in collaboration with the researcher. My study is a service evaluation of Peer Support Programmes across a NHS Trust. It constitutes an exploration of the personal meaning and experience of social support and its contributions to recovery from psychological distress. These images illustrate the themes identified in this project: recovery experienced as a transformative process, relationships contribution to an expansion of social support, the need to be and feel consistently close to the right people, relationships supporting a meaningful purpose in life and helping with understanding and coping by shaping how people view themselves and the world.

## Tough on Crime, Tough on the Causes of Crime

***Alex Pritchard-Jones*, History and Cultures, College of Arts and Law**

In the 1990s and 2000s the Labour government transformed the landscape of criminal justice in favour of the state, despite several of their senior members being from the liberal professions and traditions. At the same time, the government bought human rights home, by enshrining the European Convention of Human Rights into British law. As a practising barrister and historian of the Labour Party, my research will look into the rhetoric and reality of the changes that took place in this era to try to explain how the Labour Party made and then implemented its justice policy, testing existing methods to explain the Party's change and potentially proposing a new method.

## Revealing the complexity of quitting smoking

***Carol J Sanders*, Clinical Sciences, College of Medical and Dental Sciences**

This image illustrates the complexity of stopping smoking. It depicts the juxtaposition of glamour and medicalisation of smoking and stopping. Central is the real world of smoking cessation (SC) undermined by pervasive effects of addiction. Medical evidence demonstrates that smokers wanting to quit will be more successful if they use one of the proven forms of SC pharmacotherapy. In contrast, smokers instead attempt to quit on their own and hold conflicting beliefs about what pharmacotherapy can achieve and highly depend on their willpower. Adherence to SC medications impacts their effectiveness; currently adherence is poor (taking inadequate doses or stopping use prematurely) undermining quit attempt success. To achieve a smoke free Britain by 2030 SC medication adherence needs to be improved.

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For more information about the Images of Research competition, please contact Dr. Eren Bilgen (f.erenbilgen@bham.ac.uk)

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