DEPARTMENT OF ENGINEERING SCIENCE
NEWSLETTER

ISSUE 10: 2020
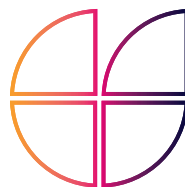
DEPARTMENT OF
**ENGINEERING
SCIENCE**
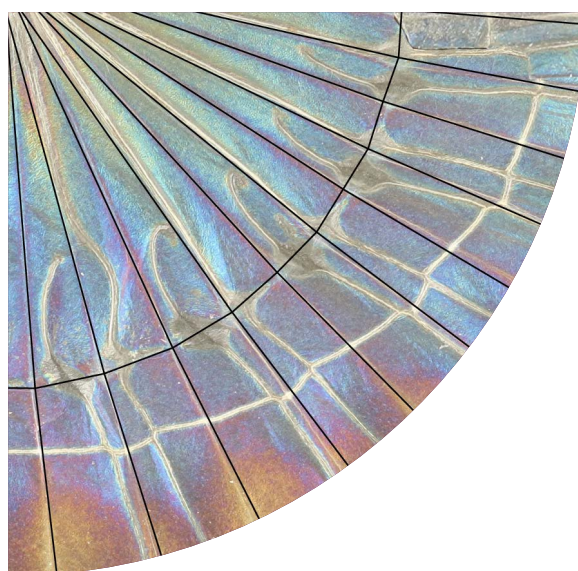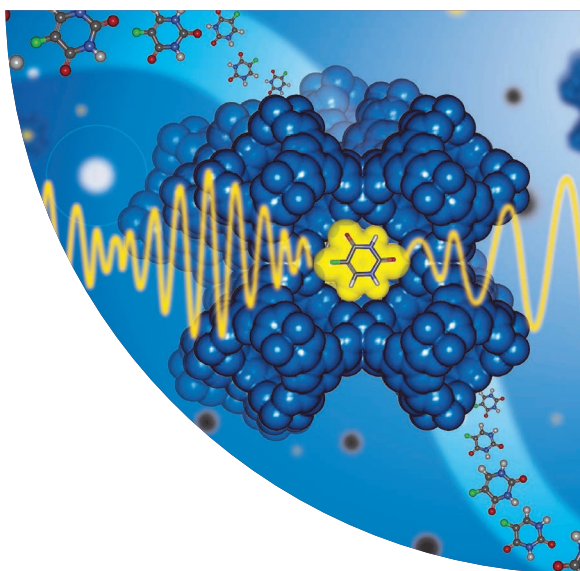
UNIVERSITY OF
OXFORD

Welcome from the Head of Department

This has been an extraordinary year for us, as I'm sure it has been for many of you.

In addition to continuing our world-leading research and teaching, the Department has had to adapt rapidly to an ever-changing environment to ensure that our staff and students are safe and can continue to work and learn. Not only that, but we responded to the novel and precise research challenges of the pandemic by contributing to government calls for technology, adapting engineering technologies in order to help COVID-19 patients, supporting the NHS, and informing decision-makers. *I am incredibly proud of all our academics, staff and students in helping us to achieve so much under extremely difficult conditions.*

From very early on in the pandemic our academics came out fighting in the race to combat the virus. Professor Mark Thompson, along with an interdisciplinary and multi-agency team, worked around the clock to develop a rapidly deployable and scalable low-cost mechanical ventilator in response to the UK government's Ventilator Challenge **(see page 03)**. The Department was proud to lend both financial and practical support to their endeavour, and with inspiring persistence and innovation they teamed with King's College London and Smith+Nephew on the development of a prototype meeting the ventilator challenge specifications in record time. Although (thankfully) not ultimately required by the UK, the ventilator is now being adapted and developed for use in low- and middle-income countries via the social enterprise spinout **OxVent**.

Other colleagues have devised specialist innovations and adapted existing technologies to respond to the unique challenges of testing, detecting and treating coronavirus patients. Professors Zhangfeng Cui and Wei Huang designed a rapid RT-LAMP test for novel coronavirus which, having gained MHRA approval, is currently being used by travellers at international airports **(see page 03)**. Professor Lionel Tarassenko's wearables technology, developed over the last decade, is now helping frontline health staff to monitor and treat patients in high dependency units and isolation rooms, as well as enabling people with medical conditions, or COVID symptoms, to self-monitor safely from home **(see page 04)**. And Professor David Clifton has developed an AI-based test which uses data from routinely acquired blood tests in Emergency departments to distinguish Covid-19 from a wide variety of other illnesses **(see page 05)**.

You can read about all of these valuable innovations in the following pages, and more about our response to the COVID pandemic on our **website**.

At the same time, my colleagues have once again won accolades for their contributions to research, published highly regarded and consequential papers, and advanced engineering discoveries which will impact on areas such as cancer detection and treatment, the efficiency and cost effectiveness of renewable energy, the use and application of nanomaterials, Beyond-5G communications, 3D printing, energy systems infrastructure, and materials with applications from photonics to sensors.

Truly the Department is contributing so much in so many research areas that I am unable to even scratch the surface here, so please do read our newsletter, look at our website and follow us on social media **@oxengsci** to hear about all our successes and impacts. I hope you are as proud to be part of this great organisation as valued Alumni, as I have been in my first 15 months as Head of Department.

Professor Ronald A. Roy

Low-cost ventilator wins E&T Innovation Award

⤷**OxVent** is a rapidly deployable and scalable low-cost mechanical ventilator specially designed for COVID-19, which has been recognised as one of the best innovations of the year by the Institute of Engineering and Technology.

The ventilator project initially emerged as a response to the shortage of ventilators caused by the pandemic, with researchers from the University of Oxford and King's College London working together in response to the UK Government's 'Ventilator Challenge'. The ventilator was shortlisted from among 5000 offers of support.

Subsequently, the exceptional team of engineers, medics and manufacturers partnered with Smith+Nephew to translate the academic prototype into a safe, reliable and manufacturable product. OxVent Ltd., the resulting joint-venture non-profit enterprise, will license the OxVent ventilator design for international deployment during the COVID-19 pandemic and beyond.

The E&T Innovation Awards (from the Institute of Engineering and Technology) recognise and celebrate the very best new innovations across the breadth of science, engineering and technology. OxVent won in the 'Small Idea, Big Impact: Global Challenge' category, beating five competing entries. OxVent fills the gap between expensive complex commercial ventilation systems and basic open-loop systems that lack sensors, feedback control or alarms. It provides the necessary level of performance for an emergency ventilator, yet with a scalable and affordable solution. OxVent aims to become the global standard of care for low cost ventilators with a fully developed product range tailored to regional needs.

Associate Professor in Engineering Science ⤷**Mark Thompson** said: "This award is fantastic recognition for the exceptional team of PhD students, engineers, medics and manufacturers who brought their energy, commitment and technical skill to fulfil a humanitarian objective in the COVID-19 pandemic. This impulse continues to drive OxVent forward as a social enterprise delivering and supporting low cost ventilator technology in low and middle income countries".✦

BREAKING NEWS: OxVent has just launched a ⤷**crowdfunding campaign**

Rapid COVID-19 Test in use at Heathrow

A rapid COVID-19 test, the brainchild of Professors ⤷**Zhanfeng Cui** and ⤷**Wei Huang**, is now available for use by departing passengers at Heathrow Airport and is also being trialled at Hong Kong International Airport.

"Our inspiration to develop this rapid test was conceived at Heathrow Airport when our team returned from ⤷**OSCAR** [the Oxford Suzhou Centre for Advanced Research] at the start of the pandemic in January of this year. We felt that rapid testing should be a must for airport screening and our entire team has been working day and night to make this development happen. I am now very pleased to see our tests are actually used at Heathrow and making an impact on safe travel", says Professor Wei Huang.

Results are produced by the rapid nucleic acid RT-LAMP test within 15-30 minutes, with positive results typically identified sooner. It detects SARS-CoV-19 with great sensitivity and specificity, with validated trials demonstrating a 96% positive agreement with 100% specificity. The test received regulatory approvals from MHRA in the UK and the CD Mark in the EU, with further global regulatory approvals in process.

The technology, under the name Oxsed RaViD Direct, was commercialised in July this year through a social venture spinout company, ⤷**Oxsed Limited**. Oxsed was recently acquired by DNAFit Life Sciences, a wholly owned entity of

Hong Kong based genetics and diagnostic health testing company Prenetics, who have set up the testing facility with Collinson at Heathrow.

Oxsed co-founder Professor Zhanfeng Cui, adds: "After months of intense work alongside Prenetics, they are undoubtedly the perfect partner to quickly roll out our rapid test at scale, and help society resume to a more normal way of living and productivity. I am very excited that Oxsed can provide a very well-validated technology to the world."✦

Patient monitoring research and COVID-19

Since the beginning of the pandemic, **↻ Professor Lionel Tarassenko** and his Biomedical Signal Processing and Machine Learning research group have been adapting technology, algorithms and apps which they had developed at the **↻ Institute of Biomedical Engineering (IBME)** over the last decade, to improve outcomes for patients infected by the SARS-CoV-2 virus, or at risk because of possible infection by the virus.

This includes the use of remote monitoring apps for pregnant women with high blood pressure and at risk of pre-eclampsia, to eliminate the need for them to attend hospital clinics fortnightly for blood pressure monitoring. Instead they can use a blood pressure management system (**↻ BPm-Health**), developed in the IBME and transferred to Sensyne Health in May 2020, to self-monitor their blood pressure and communicate the results remotely to healthcare professionals. BPm-Health is now being used regularly in 9 NHS Trusts in England.

Self-monitoring technology can also be used to record COVID-19 symptoms using the Coronavirus Health Monitor app CVm-Health, also designed by Sensyne Health (where Professor Tarassenko works part-time as R&D Director). The app records a patient's symptoms and vital signs, along with pre-existing health conditions and medication, and links the data to clinicians for regular review. It is about to be deployed for the **↻ AVID-CC clinical trial** in care homes, sponsored by the Wellcome Trust. The AVID-CC Trial will investigate whether anti-TNF treatment (used for inflammatory diseases such as rheumatoid arthritis, ulcerative colitis and Crohn's disease) can reduce inflammation in COVID-19 and therefore reduce the progression of COVID-19 to more severe disease, such as respiratory failure or death, in people in community care. A modified version of the CVm-Health app is being used to track the COVID-19 symptoms and vital sign values of the participants in this trial.

CVm-Health (Education) has also been deployed in the Feasibility and Acceptability of community COVID-19 rapid Testing Strategies (FACTS) study (Chief Investigator: Professor Richard Hobbs, Head of the Primary Care Department in the University). The CVm-Health (Education) app enables Oxford University students to consent to join the FACTS study, after which they are shown how to perform lateral flow tests. The students then repeat the tests weekly and, after each test, use the app to record their test result and take a time-stamped photo of the test using the smartphone's camera. They also record in the app the results of any NHS test which they have if they become symptomatic. As of Wednesday 25th November, the study had recruited 515 students and staff: 167 from Merton and 137 from St Hilda's, followed by 55 from Jesus and 51 from

The UK government purchased 20 million lateral flow tests from Innova Tried and Tested.

Credit: Innova Tried and Tested

Lincoln, as well as 56 from the Saïd Business School (and a few students from other colleges).

In the John Radcliffe Hospital, wearable technology developed in Professor Tarassenko's research group at the IBME has been used to monitor and manage high-risk COVID-19 patients in isolation rooms since the end of March. Patients wear a chest patch and a pulse oximeter finger probe, linked via Bluetooth to an Android computer tablet by the bedside, with the heart rate, respiratory rate and oxygen saturation data being transmitted by the hospital wi-fi to a dashboard for nursing oversight outside the isolation rooms. This allows COVID-19 patients on the isolation ward to mobilise, which is particularly important for respiratory diseases. Use of the system decreases contact between the patient and nursing staff, reducing the risk of COVID-19 transmission. Since the system was deployed in late March, it has become part of normal patient monitoring practice on the designated infection ward, and it is again being used regularly during the second wave of the pandemic.

Finally, Professor Tarassenko, in collaboration with the Kadoorie Critical Care Research Centre at the John Radcliffe Hospital, has also been analysing vital-sign data from hospital patients to better understand the trajectory of the COVID-19 disease and optimise hospital management. Electronic Patient Records for 497 patients with COVID-19 were compared to data from patients with viral pneumonia, the most similar disease to COVID-19, between 2013 and 2017. The analysis showed that patients with COVID who deteriorate in hospital experience rapidly worsening respiratory failure, more rapidly than patients with viral pneumonia, but with only minor abnormalities in other vital signs. This has led to a new early warning score being proposed for COVID-19 patients. ◈

A wearable patch (to measure respiratory rate) and wrist-worn pulse oximeter (to measure pulse rate and oxygen saturation), are linked by Bluetooth to a tablet computer.

AI test rules out a COVID-19 diagnosis within one hour in Emergency Departments

Early in the pandemic, ↻ **Professor David Clifton** set out in conjunction with the Oxford University Hospitals (OUH) to develop an AI based test, CURIAL AI, using routinely-acquired blood tests, which would be highly sensitive, effectively cost-free and take place in real time.

Clinical care and safeguarding of patients and hospital staff depends on accurately knowing whether a patient has Covid-19, however most hospital-based Covid tests take 1-2 days to return a result which identifies the virus in only 60-70% of patients who actually have it. The standard blood tests patients receive on admission to hospital are usually available in one hour, and have a large number of data points that algorithms can use to distinguish Covid-19 from a wide variety of other illnesses.

When CURIAL AI was tested on data for all patients coming to OUH emergency departments in April and May, it correctly predicted patients' Covid status more than 90% of the time. The AI tool is now seen as complementary to the same-hour 'rapid tests' performed on patients, which have an imperfect false-positive and false-negative rate compared to the gold standard lab test.

Professor Clifton says, "Thanks to generous funding from the University in supporting the early-career researchers involved in this project from its early days, we have been able to quickly develop a successful AI-based test and are currently trialling this in a study in the Emergency Department of the John Radcliffe Hospital in Oxford, and partnering with University Hospitals Birmingham to expand and refine the model". ◈

↻ **Read more online**

Image: Oxford University Hospitals

Researchers create new reprogrammable synthetic cell

Researchers have created cells that can be reprogrammed to perform new tasks. Simple Cells, or 'SimCells', are an entirely new platform for synthetic biology with future applications in delivering anti-cancer drugs, as well as biomanufacturing and biosensors. SimCells are "artificial cellular machine", enabling us to freely write genetic codes to instruct novel functions of cells.

The methodology, led by project ↻ **PI Professor Wei Huang**, works by using molecular scissors to remove the native chromosome of bacteria, which can be replaced by a designed gene-circuit or even mini-genome. The cells are also engineered such that they cannot replicate, but maintain the machinery of cells to carry out complicated tasks. This offers a safe mechanism of applying biological solutions which prevents any uncontrollable spread of bacteria.

As well as the potential impact for industry, lead author Dr Catherine Fan says, "The methodology of SimCell generation and utilization established in this work contributes to the international effort of building a cell from scratch. This ambitious endeavour would help us understand the complexities of biology and investigate the origins of life and the last universal common ancestor."

↻ **Read more online**
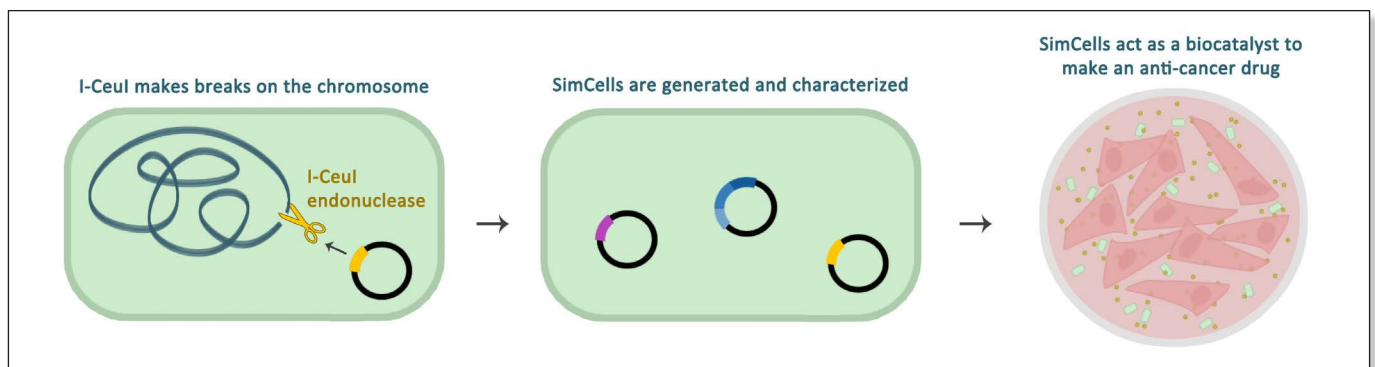
An illustration of the process of preparing SimCells to synthesize anti-cancer drugs.

PISA offshore wind turbine design project outputs highlighted in prestigious journal

Géotechnique, a leading journal in geotechnical engineering, devoted its whole November 2020 issue to the outputs of the PISA offshore wind turbine design research project. All nine papers from the project have been made available as Open Access.

The PISA (Pile–Soil Analysis) Project, an academic-industry collaboration run through the Carbon Trust's Offshore Wind Accelerator programme and led by Ørsted, focused on practical engineering design methods for soil profiles relevant to UK and European offshore wind farm sites. The academic work was led by ↻ **Professor Byron Byrne** and colleagues in the Department, working collaboratively with Imperial College London and University College Dublin. Methods devised by the PISA project have the potential to reduce steel requirements for foundations by up to 30 percent for some design conditions, realising significant cost savings. The outcomes have been rapidly translated to application by the industry partners, including by Ørsted for their Hornsea offshore wind farm.

The Journal issue is available ↻ **here**
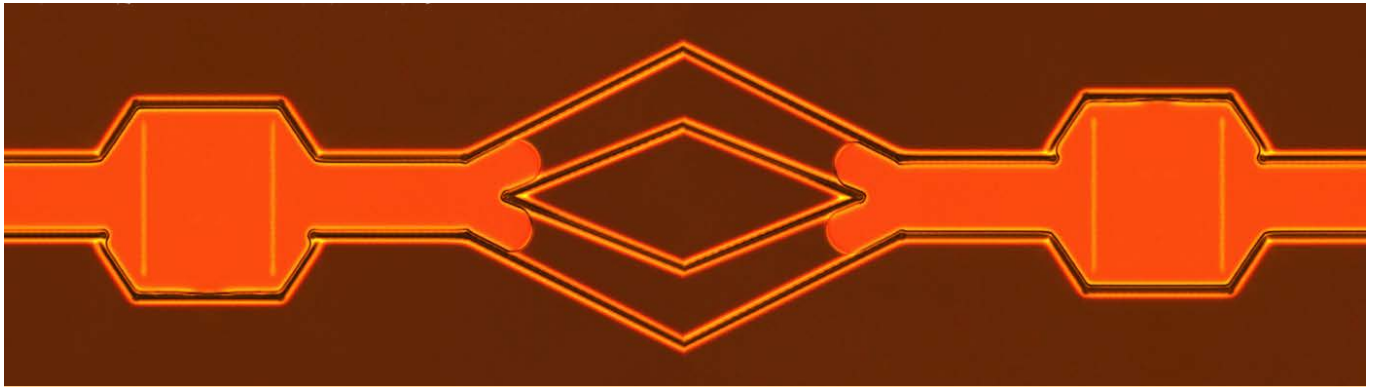
↻ **Read more online**

2.0 m diameter pile testing at Cowden in the UK
Credit: The PISA Project.

2.0 m diameter pile testing at Dunkirk in France
Credit: The PISA Project.

Guiding the topological defects of liquid crystals using lasers

In liquid crystal displays (LCDs), found in TVs, monitors and phone screens, topological defects have historically been considered a problem as they harm the performance and efficiency of the display. However, researchers are increasingly seeing defects as a useful technological and scientific tool, enabling new applications of liquid crystal materials.

A study by the 🔁 **Soft Matter Photonics** and 🔁 **Dynamic Optics and Photonics** research groups used a femtosecond laser, which emits incredibly short pulses of light, to create microscopic polymer structures inside liquid crystal devices, a process known as direct laser writing. By writing these structures in different configurations they can precisely control and stabilise defects inside the liquid crystal.

Lead author 🔁 **John Sandford O'Neill** says "Liquid crystals are truly fascinating materials with emerging applications in many areas beyond LCDs. We've shown how topological defects can
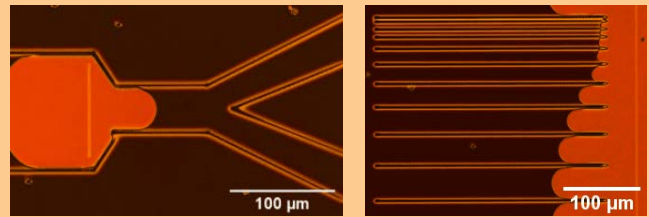
Defect confinement channels created with direct laser writing

now be controlled and engineered, opening the door to innovative new applications using defects to manipulate nanomaterials and light itself". 🟠

🔁 **Open Access paper**

🔁 **'Behind the paper' article in *Nature Research Chemistry***

🔁 **Read more online**

Terabit per second optical wireless for beyond 5G communications

A research collaboration including experts from the Department of Engineering Science and the Zepler Institute for Photonics and Nanoelectronics has demonstrated Terabit per second transmission on a fibre-wireless-fibre system.

The result shows the potential to create the ultra-high rate optical wireless links that will be required for 5G and beyond in applications such as Virtual Reality Headsets.

Researchers from the Zepler Institute and the Department of Engineering Science presented their findings recently in San Diego at OFC 2020, the world's largest optical fibre communication

conference. A more detailed work has been published in the 🔁 **IEEE Journal of Lightwave Technology**.

🔁 **Professor Dominic O'Brien**, of Oxford's 🔁 **Optical Communications Group**, says, "Users now demand access to high speed data wherever they are, and this work shows that it's possible to provide this at rates many orders of magnitude higher than systems we use today. In the future the virtual reality and similar applications will require these very high data rates, and this work shows how this might be achieved." 🟠

🔁 **Watch demonstrator video**

🔁 **Read more online**

# Design of insect-inspired fans offers wide-ranging applications

A multidisciplinary effort between engineers and evolutionary biologists from Japan and the UK has resulted in a new design method for highly compact deployable structures, based on the sophisticated folding of earwig wings. The new fan design mimics the most compact wing folding found in insects, and will offer multiple applications, from daily use articles to aerospace engineering.

"Nature has consistently been an everlasting source of inspiration," says ↻**Professor Zhong You**, co-author of the work. "Bioinspired technologies keep offering some of the most efficient and sustainable ways to meet many of the challenges of the future." 🌰

↻ **Read more online**
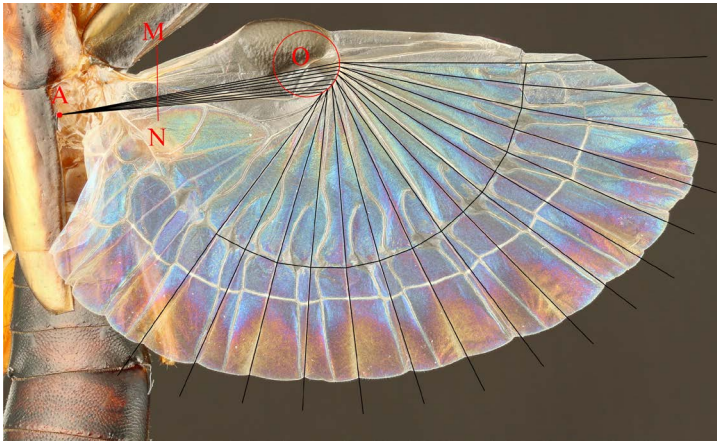
Schematic for the new design method projected onto the hind wing of an earwig (Proreus simulans)

Credit: Kazuya Soito.
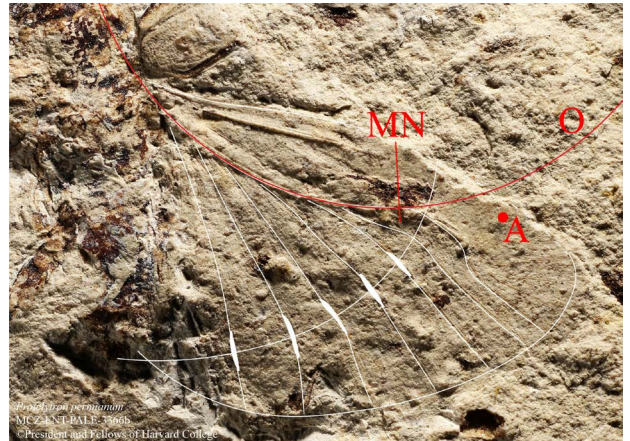
Fossil hind wing from a protelytropteran insect with wing venation highlighted.

Credit: Museum of Comparative Zoology, Harvard University ©President and Fellows of Harvard College.

The structures created when two droplets combine

Experiments carried out at the ↻**Oxford Fluid Dynamics Laboratory** led by ↻**Professor Alfonso-Castrejon Pita** have successfully captured the beautiful dynamic structures created when two droplets combine (or "coalesce") to become one, using high speed cameras. Watching frame by frame, they discovered that varying the properties of the droplets themselves and the distance between them can influence not only the structures created but the degree of mixing and where it takes place.

Controlling the mixing of chemicals is important in the field of 3D printing. 3D printers work by depositing chemicals in layers to construct a 3D part. Depending on the part it can be necessary to mix these chemicals together, causing a reaction which results in a solid 3D part. This is done one droplet at a time, and requires the specific properties of the droplets to be tailored to create the desired product. 3D printing already spans a wide range of areas including education, construction, medicine, prototypes and art. The new findings should help to extend the range and type of products that 3D printers can print. 🌰

↻ **Read the Publication:** *Surface jets and internal mixing during the coalescence of impacting and sessile droplets*

↻ **Read more online**
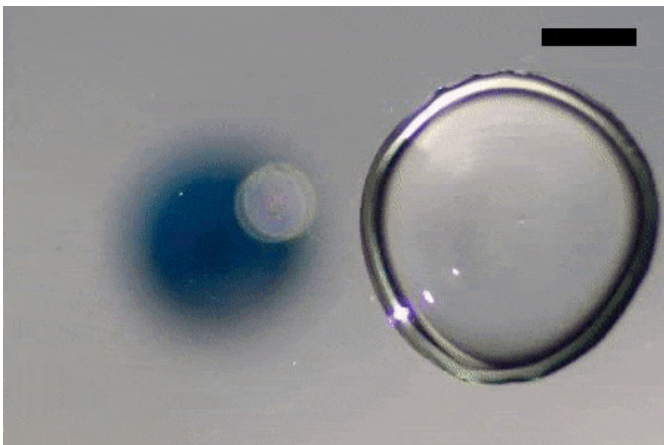
Two droplets of the same fluid combining as viewed from below. The black bar in the top right corresponds to 1mm scale.

Two droplets of the same fluid combining as viewed from the side. From this viewpoint it is clear that the jet lies on the surface.

STFC ISIS Science Impact Award for work on lattice dynamics in Metal-Organic Frameworks

↻ **Professor Jin-Chong Tan** won the 2020 ISIS Science Impact Award for his group's work on lattice dynamics in Metal-Organic Frameworks, and how this affects the way they absorb and release gases and drug molecules.

The ISIS Impact Awards celebrate the socio-economic impact generated by those who use the ISIS Neutron and Muon research facility, based at the STFC Rutherford Appleton Laboratory in Oxfordshire.

Professor Tan leads the Department's ↻ **Multifunctional Materials & Composites Laboratory**, where his group develops porous metal-organic frameworks, multifunctional thin films, polymer membranes and bespoke nanocomposite systems targeting real-world applications.

Since 2012, the group has used neutron vibrational spectroscopy at ISIS to investigate the distortions of Metal-Organic Framework (MOF) materials that enable them to absorb and release target molecules. MOFs are open-framework materials that combine metal nodes and organic linkers to create crystalline frameworks that have unique chemical and physical properties, which cannot be achieved in purely inorganic or organic compounds. These unique properties can be altered by changing the composition of the MOF, leading to the intelligent design of different MOF systems with applications in technologies from gas separation to drug delivery, and from photonics to sensors. 🍂

↻ **Case study by ISIS on the group's work**
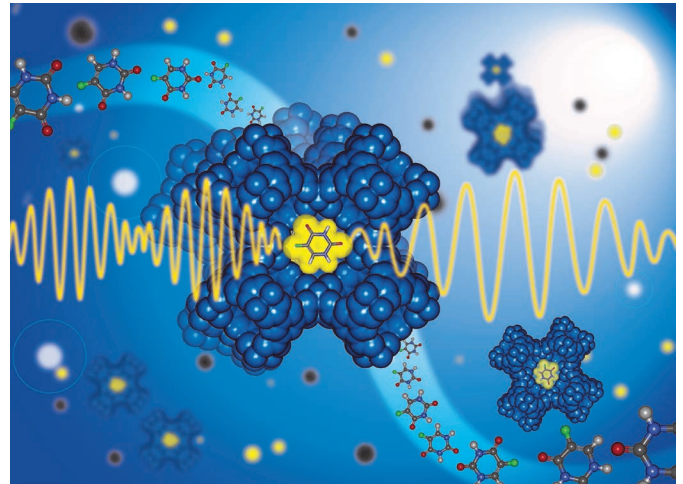
Novel application of inelastic neutron scattering to probe the dynamics of a drug-encapsulated hybrid material in the terahertz frequencies. The results from neutron spectroscopy reveal the complex guest-host interactions useful for multifunctional applications, such as molecular sensing and targeted drug delivery.

Project LEO: Redesigning the energy system at a local level

↻ **Project LEO** is an InnovateUK £40m+ multi-stakeholder consortium co-led by researchers at the Department of Engineering Science with significant collaboration from Scottish and Southern Electricity Networks (SSEN) and other commercial partners.

Operating 'locally', LEO will sync operations of the distribution network operator (DNO), SSEN, with industry partners such as EDF, Origami and Piclo, and local energy plug-in projects through the Low Carbon Hub.

Trialling local energy systems is a core element of LEO, with its partners developing complex stakeholder engagements to provide smart and fair solutions to network constraints and grid decarbonisation. Findings will inform policy at a national scale, with the replicability of activities being embedded into the project's framework. 🍂

↻ **Read more online**

Credit: Figueiredo, Low Carbon

Oxford-Man Institute of Quantitative Finance

External Outreach

We are delighted that Oxford Man Institute of Quantitative Finance (OMI) faculty, students and members have enjoyed a strong presence at the top Machine Learning conferences in 2020. Eleven full papers have been accepted for ↺ **NeurIPS** and ↺ **ICML**. Despite global circumstances, this has been a propitious year for the OMI and we are pleased that so much of our research has been showcased at such high-profile events. ⬦

Projects and Research

Many of our research projects has seen particular impact over the year. Here are some of the highlights:

Financial Sentiment Diffusion and Associated Market Movements

The recent availability of large amounts of textual data, coupled with advances in machine learning, has sparked an increase in their application in financial decision-making. In this project, we apply natural language processing techniques to understand news sentiment of around 100 of the most reported companies worldwide. Our study suggests that, in certain industrial sectors, strong media sentiment towards one company may indicate a significant change in media sentiment towards related companies measured as neighbours in a financial network constructed from news co-occurrence (illustration right). Furthermore, there exists a weak but statistically significant association between strong media sentiment and abnormal market return as well as volatility. This highlights the importance of understanding the complex relations between companies in an increasing connected global market. ⬦
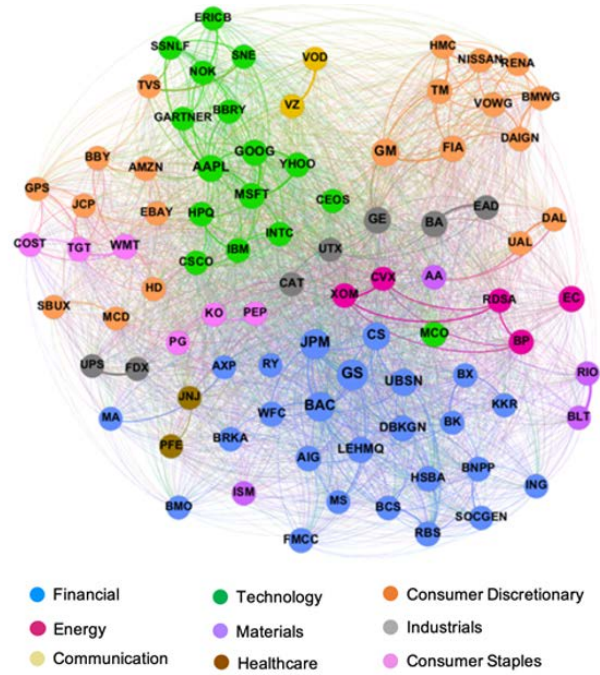

Impact of Automation in Primary Care in UK

A report, funded by independent charity The Health Foundation, and a collaboration between the Oxford Internet Institute and Engineering Science, analysed the extent to which automation technologies could be applied in general practice to aid GPs in the digital age. The report looks at how technology can be used to support general practice staff through the digitisation of administrative tasks. This unique research, published in British Medical Journal Open, is the first of its kind to model how automation technologies could be applied to general practice today. The study finds that automation would help ease pressures on staff, improve job quality and improve patient care; no single full-time role in general practice entirely replaceable by automation; and technology could play an important role in helping the sector recover from the COVID pandemic. ⬦

↺ **Read more online**

Oxford Covid-19 Impact Monitor

How Covid-19 spreads through the population and how we exit the lockdown without significant impact from further waves crucially depend on how population mobility is managed. Using fully anonymised and aggregated data collected via mobile phones, the ↺ **Oxford Covid-19 Impact Monitor** project monitors population movement to assess efficacy of implemented policies in real time, and applies machine learning to track and predict the effects of these control measures for informed decision-making. ⬦
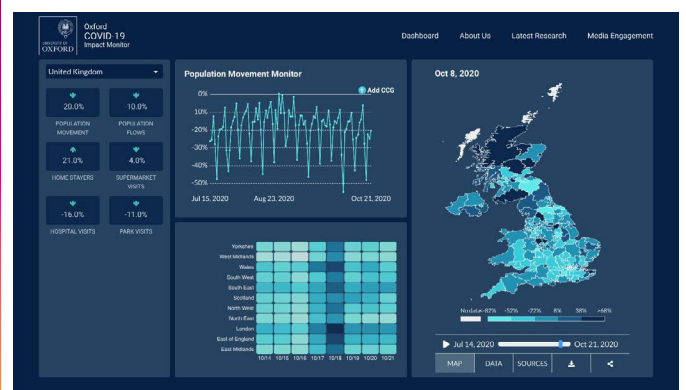
The Covid-19 Impact Monitor dashboard.

Oxford e-Research Centre

The Oxford e-Research Centre combines expertise in interdisciplinary research and digital research methods.

During a difficult and uncertain year, the Centre continued to deliver world leading research. The Centre and our staff rapidly adopted new methods of working, ensuring that research continued, allowing us to welcome new members of staff (along with 12 new DPhil Students) and, importantly, use our combined expertise to contribute to the fight against the COVID-19 pandemic.

The Oxford e-Research Centre led JADE consortium was awarded £5.5m for a national computer facility dedicated to Artificial Intelligence / Machine Learning and Molecular Dynamics research. ↻ **Read more online**

Along with supporting cutting-edge advancements in AI, in 2020 the JADE supercomputing facility also supported efforts in the development of vaccines and anti-viral drugs, and in understanding the molecular architecture of the COVID-19 virus. ↻ **Read more online**

The Centre contributes to the Research Data Alliance COVID-19 working group, and our FAIRsharing COVID-19 Collection collates coronavirus, clinical trial, public health and patient data, and registries. ↻ **Read more online**

Our work on RAMP VIS is supporting modelling scientists and epidemiologists in the Scottish COVID-19 Response Consortium. ↻ **Read more online**

2020 has indeed seen global adoption of ↻ **FAIRsharing**, a resource that guides researchers and stakeholders to discover, select and use data standards, repositories, and policies in their work and to make data Findable, Accessible, Interoperable and Reusable. In collaboration with European and USA infrastructure projects, the FAIR Cookbook has been developed which collates protocols for making data FAIR and provides examples as a guide to FAIRify data, putting the FAIR principles in to practice.
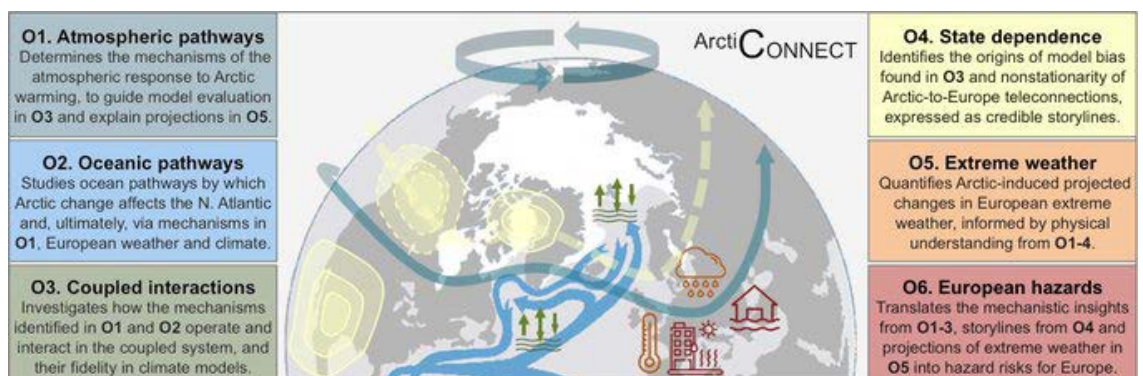
The Centre has continued to secure significant funding from a diverse group of funders, to support a wide range of projects. From ArctiCONNECT, a project that will explore the contribution of Arctic warming to projected changes in weather extremes in Europe ↻ **Read more online**; to Linked Art II, a UK-US collaborative project to model and link the data from some of the world's greatest art collections. New musical compositions have been generated by AI, in collaboration with the Alan Turing Institute and the Centre for Practice & Research in Science & Music (PRiSM).

Professor Janet Pierrehumbert was awarded the International Speech Communication Association (ISCA) Medal for Scientific Achievement 2020 at the INTERSPEECH 2020 virtual conference ↻ **Read more online**. Professor Pierrehumbert also delivered ↻ **keynote talks at INTERSPEECH** and at the 2020 ↻ **Conference on Empirical Methods in Natural Language Processing**.

In the 250th anniversary year of the composer's birth, 'Beethoven in the House' was launched. Working with the Bodleian Libraries, Paderborn University, and the Beethoven-Haus Bonn, which holds the world's most significant Beethoven collection, the project is developing digital methods to study choices made to adapt music for domestic consumption; equivalent to identifying music industry trends from the 19th-century.

The Centre has continued to host a variety of events (virtually), including a workshop for early career researchers in Brazil on extreme weather and its impacts. The annual international Digital Humanities at Oxford Summer School successfully went online and became our biggest ever digital humanities event, with 230 attendees from across the globe ↻ **Read more online**.

Finally, our MSc in Energy Systems has successfully completed its first year, with the first cohort of students achieving 13 distinctions and 8 merits. ✦

O1. Atmospheric pathways
Determines the mechanisms of the atmospheric response to Arctic warming, to guide model evaluation in O3 and explain projections in O5.

O2. Oceanic pathways
Studies ocean pathways by which Arctic change affects the N. Atlantic and, ultimately, via mechanisms in O1, European weather and climate.

O3. Coupled interactions
Investigates how the mechanisms identified in O1 and O2 operate and interact in the coupled system, and their fidelity in climate models.

ArctiCONNECT

O4. State dependence
Identifies the origins of model bias found in O3 and nonstationarity of Arctic-to-Europe teleconnections, expressed as credible storylines.

O5. Extreme weather
Quantifies Arctic-induced projected changes in European extreme weather, informed by physical understanding from O1-4.

O6. European hazards
Translates the mechanistic insights from O1-3, storylines from O4 and projections of extreme weather in O5 into hazard risks for Europe.

Schematic diagram showing elements of the ArctiCONNECT research project.

Oxford Robotics Institute

2020 has been a strange year for the Oxford Robotics Institute, but we'd like to think we've finished the year stronger than when we started. We have grown from 77 to 96 members - a full return to the building will cause a few headaches. To match that we have acquired some fantastic support in terms of some large research grants, totalling £9.3M GPB including a collaboration with Amazon Web Services and a new ⟳ **EPSRC Programme Grant**.

We are proud of the efficiency and flexibility with which we've adapted to the challenges and changes of working with robots remotely. When the first lockdown started in March, all of our on-site, in-person activity had to be stopped. This was not such a problem for our software focussed groups, developing AI and algorithms on past datasets, but did significantly affect our hardware and trials focussed teams, with many robots gathering dust within the building. Fortunately we were able to return to

(socially distanced) work on-site in August, with office space for single occupancy returning in September. This transition has seen weekly online group meetings and fortnightly Institute meetings become natural, with Friday afternoon virtual drinks replacing trips to the Royal Oak.
Despite all this, the Institute published 44 papers at a diverse set of international venues.

One research area which has sadly been affected has been our trials and external experiments. Running activities with external organisations has been difficult to plan under uncertainty; we hope 2021 brings better opportunities to take our robots to different and diverse places. From Scottish Highlands to Bath mines, 2021 looks set to mark ORI's return to the extreme environments where robots can showcase their ability to excel! ◖

A DPhil student performs an experiment with a Franka Emika Panda Arm.

Dynamic Robot Systems group bring ANYmal C to an MOD bunker facility.

FIND OUT ABOUT OUR OTHER INSTITUTES

⟳**Institute of Biomedical Engineering**

⟳**Oxford Thermofluids Institute**

Alumni Weekend 2020

Due to lockdown restrictions, the 2020 Alumni Weekend took place virtually on the afternoon of Saturday 12 September. The event focused on the latest research from the department in response to the COVID-19 pandemic.

The 33rd Jenkin Lecture was the highlight of the event and was this year given jointly by Associate Professor Mark Thompson (Oxford University), Dr Federico Formenti (Kings College London), Professor Andrew Farmery (Oxford University) and Professor Alfonso Castrejon-Pita (Oxford University) on their work on the OxVent medical device **(see page 03)**.

Preceding the main lecture three short showcase talks focused on a different area of cutting-edge research arising from the global pandemic. Topics covered included patient monitoring wearable technology **(see page 04)** and developing a rapid COVID-19 test, currently in use at Heathrow airport **(see page 03)**.

You can watch all of these talks (and past lectures) on our **YouTube channel**.

JENKIN LECTURE 2020

UNIVERSITY OF OXFORD
DEPARTMENT OF ENGINEERING SCIENCE

OxVent : Medical Device Innovation

Prof.s Mark Thompson, Andrew Farmery, Alfonso Castrejon-Pita (Oxford) and Dr Federico Formenti (King's College London) give the 33rd Jenkin Lecture

Reaching an audience of over 100 worldwide, we were able to connect with more alumni than ever due to the virtual nature of the event. Feedback from attendees was overwhelmingly positive. Whilst the event this year came with many challenges due to lockdown restrictions and remote working, its success has paved the way for future hybrid events involving live activities taking place both online and virtually.

Changes for the Society of Oxford University Engineers and the Oxford Engineering Alumni Group

The future of the SOUE and the OEA

The Society of Oxford University Engineers (SOUE) was founded in 1988 to enable former members of the Department of Engineering Science to keep in touch with each other and the department through the introduction of an annual newsletter and the Jenkin Lecture. In recent years, logistical organisation of these activities has been passed to the department. Therefore it was decided at the 2020 SOUE Annual General Meeting to pass all remaining responsibilities over to the department to continue the work with engaging alumni.

We would like to thank everyone who has been involved in the Society in some way over the past 32 years.

We have a lot of ideas about the future of alumni activity at Engineering Science. To guide the development of any new and existing activities, the department will be setting up an external advisory panel made up of members of the OEA community. Whilst we are in the transitional stage of this process, we welcome suggestions from all OEA members about the future for the department and OEA activities.

Over the course of the next year there will be several opportunities to have your say, so please keep checking your mailbox for these! Alternatively, if you would like to find out more about the new advisory panel or want to send us your ideas directly, get in touch with us at **alumni@eng.ox.ac.uk**.

Visit the alumni website

Save the dates – Alumni events in 2021

Meeting Minds Global Event – 12-17 April

Lubbock Lecture (virtual event) – 17 June – with Dr Arun Majumdar, Stanford University

Alumni Weekend 2021 – 18 September

If you would like be sent invitations to our alumni events, including the Alumni Weekend and Jenkin Lecture, **opt-in** for the Engineering Science events emails here or **contact us directly**.

Alumni profile: Professor John Fox

Professor John Fox, who retired from the Department of Engineering Science in 2017, has been involved in a pathfinder study of AI to rapidly formalise COVID-19 guidelines into an executable model of decision making and care pathways. This will be an invaluable resource for clinicians, researchers and healthcare providers to develop point of care products and services which embody best clinical practice across the COVID-19 patient journey. It is believed to be the first use of knowledge engineering methods for disseminating best practice in COVID-19 care.
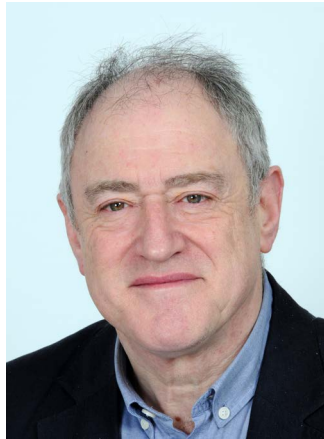
This work follows on from the OpenClinical. net project, a service for disseminating clinical guidelines in executable form to improve quality of care which was developed during Professor Fox's time at Oxford. Traditionally, medical research is published in high quality journals and the knowledge produced is disseminated to healthcare professionals via clinical practice guidelines (CPGs). Although a vital way of disseminating up-to-date recommendations for safe clinical practice, CPGs take time to read and absorb, are difficult to keep up to date, and only provide general guidance rather than patient-specific recommendations.

↻ **OpenClinical.net** is a web-based knowledge-sharing platform which uses an AI language called PRO*forma* and knowledge engineering techniques to capture human expertise in decision-making and care planning, give patient-specific recommendations and empower healthcare professionals to author, share, critique, trial and revise models of best practice. The PRO*forma* models which give these patient-specific recommendations have been validated in a wide range of clinical settings and specialities, with many successful trials published in high impact peer-reviewed journals.

Now the PRO*forma* guideline modelling language and OpenClinical.net platform have been used to create a data model for care of COVID-19 patients, together with executable models of rules, decisions and plans that interpret patient data and give personalised care advice. They have been proved to be an effective combination for rapidly creating the COVID-19 model.

Professor Fox explains, "The Pathfinder 1 project was a successful demonstration of the power of established AI methods to help respond quickly to the COVID-19 pandemic and future similar emergencies. It also demonstrated a novel AI *design pattern* for rapidly developing sophisticated AI products and services in healthcare and potentially many other fields".

↻ **A report** of the work, 'Rapid translation of clinical guidelines into executable knowledge: A case study of COVID-19 and online demonstration', was published in the *Learning Health Systems* journal, with an on-line demonstration of deployed on ↻ **OpenClinical.net** in June 2020. The Pathfinder 2 project is consolidating the work to date and developing an advanced application which can support patient assessment, clinical decision making and management of care throughout the patient journey "from home to hospital to home". ◆

Screenshot of OpenClinical.net platform showing diagnostic workup for an individual patient based on their COVID score.

Keep in touch with other Oxford Alumni

My Oxford Network is a free service enabling you to connect with other Oxford graduates, reconnect with old classmates, give back to current students by offering to act as a mentor, post your news and events, and expand your professional network. Only Oxford alumni can join. There are already around 1,200 Engineering Alumni registered. Visit ↻ **My Oxford Network** to find out more.

Outreach during a pandemic

Due to the COVID-19 pandemic, we unfortunately had no choice but to adapt or postpone some of our Access activity this year. However we were able to provide online opportunities for school students wanting to find out about studying Engineering at Oxford, including outreach events and a bespoke **Virtual Open Day website**.

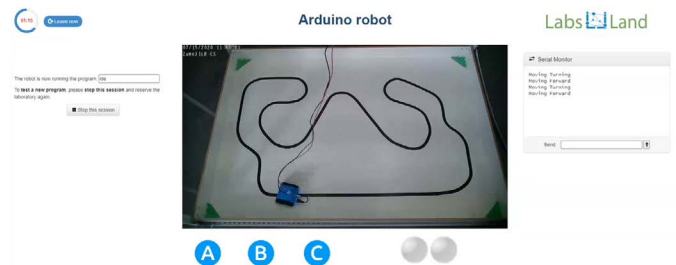Student ambassadors and researchers at an Open Day presentation demonstrating motion capture technology.

UNIQ Summer School moves online

The UNIQ Summer School, which aims to attract students from state schools or colleges with strong academic potential, is usually residential, but in 2020 we managed to move the programme online and deliver it virtually to 55 state school students in years 12 and 13.

The students took part in a variety of live and pre-recorded sessions on Microsoft Teams, using the chat function and online forum to interact with the speakers, student ambassadors and each other.

Engineering Science Access & Alumni Officer Libby McGowan says, "The UNIQ programme offers a brilliant opportunity for students to find out what university life is like, studying a subject not usually taught at schools, so I am pleased that we have been able to still provide this in the current circumstances".

The academic content included sessions on mathematical modelling, bridge building and live coding. The students even got to do a 'virtual field trip', visiting the Rebellion Games Studio for a tour of their operations. Students also took part in admissions sessions at the end of every day to help them prepare for their applications to university, with interview workshops and tips from student ambassadors who have recently been through the process themselves.

Teaching and Design Engineer Izzi Mear led a live coding workshop during UNIQ 2020 in which participants connected to various robots around the world and programmed them to do functions including moving forward, backwards, turning and following a line.
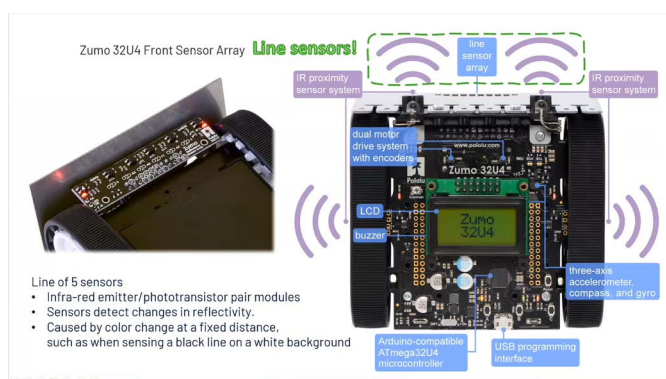

Following this year's event, one participant commented that the lectures were "a great way of getting a more detailed insight into the way engineering is approached at university", adding "being able to see where engineering can take you by the lecturers telling us their experience and the Rebellion Games Studio tour has further increased my affinity for engineering". Another said "The admissions sessions were really helpful and they really helped boost my confidence in applying. Before UNIQ I was scared to apply but all the tips helped me".

The virtual nature of the course this year may even have had some benefits for students and attracted those who wouldn't ordinarily be able to participate in a residential course. "I enjoyed the flexibility for my schedule, as it allowed me to gain both the benefits of UNIQ and not fall behind on my classwork and revision", said one attendee.

At the start of the week 38% of students said they were definitely going to apply to do engineering at university. After following the programme, this increased to 76%, with a further 17% saying they were considering it as an option.

Libby adds, "I always enjoy our residential programmes and seeing how the students engage with a new subject and living like an undergraduate for a week. This year it has been especially good to see how the students have adapted to the unusual situation to make the most of the programme."

Read more online

International Women in Engineering Day Q&A sessions

International Women in Engineering Day (or InWED) is a day when we celebrate our female students, researchers and academics and reach out to the next generation of engineers. This year, on 23 June 2020, the activities took place virtually. We hosted 3 talks with Q&A sessions aimed at different school years, with a total of 80 students in attendance.

Our first session for years 6 and 7 featured DPhil students Lis Pickles and Emma Bluemke and Postdoctoral researcher Dr Joana Pinto. Joana and Lis gave short presentations on their fields of study, before all three answered questions from our live audience.

Associate member of Faculty and Deputy Course Director of the MSc in Energy Systems ↻**Dr Sarah Sparrow** works in Information Engineering and was our main speaker for years 8-11. Dr Sparrow uses citizen science to help develop reliable early warning systems for extreme weather.

The last session, for students of years 12 and 13, featured ↻**Associate Professor Barbara Rossi** talking about her work as a structural engineer.

Two of these inspirational talks are available to watch in full here and on our ↻**YouTube channel.**🔶

Taking Public Engagement with Research online

Last year as part of our Public Engagement with Research (PER) programme, the Department took part in the IF Oxford Science Festival, with great feedback from the researchers who participated and the people who visited their stands at the Westgate shopping centre in Oxford. For 2020, we had to think laterally to provide an engaging experience online.

We held two sessions as part of the Festival's 'Living Library', where members of the audience got the chance to borrow a real researcher for a small-group conversation, in two different areas of engineering: medical, and the environment.

In the medical session, ↻**Professor Robin Cleveland** and DPhils Elisabeth Pickles and Miren Tamayo Elizalde unpacked their biomedical engineering research for about 15 Festival-goers. Elisabeth, who focuses on MRI imaging of the liver, said of the event, "it was great to talk to interested members of the public in an informal style". Miren showed how ultrasound could be used to treat neurological diseases and Professor Robin Cleveland described its use in shock wave lithotripsy (breaking kidney stones using shock waves), high-intensity focused ultrasound to destroy tumours, and the combination of electromagnetic and acoustic waves for imaging in the body.

DPhil Flora Charbonnier and Dr Chiara Falsetti took part in the Environment session. Flora Charbonnier researches peer-to-peer trading in local electricity markets, and used the opportunity to talk to the general public about trading solar in neighbourhoods. Dr Falsetti develops new concepts for cooling systems for aircraft engines in order to improve their efficiency and reduce fuel consumption. Dr Falsetti commented, "Meeting people was interesting, not only for the curiosity they showed, but also for the motivation we received from them. The people I talked to thanked me for my work and this is an extra motivation for researchers!"

The Living Library format was well suited to meet the Department's PER objective of informing and inspiring the public, and found that for an online event, the small groups and conversational style worked well. The virtual format did present some challenges that face-to-face interactions at a Science Festival don't, such as when the audience chose not to have their cameras turned on. We'll take the lessons learnt forward to help develop future digital and hybrid events. 🔶

Equality and Diversity activities in the Department of Engineering Science

Professor Janet Pierrehumbert is the new Head of Equality and Diversity and ED&I Committee lead for the department, working collaboratively across professional, academic and research staff to oversee key projects which include the Athena SWAN resubmission due in April 2022, the relaunch of Women in Engineering, and the implementation of a new mentoring programme for researchers.

The Department has implemented a series of snap surveys, planned to run three times a year, to gather feedback from staff on their experiences of homeworking, ongoing Covid-19 communication, and the return to labs and offices during Covid-19. They also cover wellbeing and mental health, and the future of more hybrid working so that the department can determine the most equitable way of managing workflows and supporting staff in an uncertain world. This feedback will help the department to ensure that staff are equipped to work from home and can continue to work flexibly.

New intranet resources have been developed to assist professional, academic and research staff with their own personal learning and development options, and to make promoting and accessing opportunities easier. There is a page dedicated to best practice around Personal Development Reviews, which the Department relaunched in July 2020 to encourage more conversations around actively planning learning and career development.

A significant investment has been made in training Departmental Harassment Advisors, with 12 staff now able to support colleagues in a non-judgemental and confidential way, and enable the voiding of any concerns. Advisors have opportunities for regular additional training which includes developing listening and counselling skills, assertiveness skills training, and a general monthly Talk and Support programme so that skills are continually refreshed, and best practice shared.

Formative ED&I plans for 2021 include the roll out of a Mental Health for England First Aid Champion cohort, broadening the skills and awareness available across the department to support colleagues with conversations and signposting around mental health, more work on PDRs and scoping learning plans, and the development of an 'Active Bystander' awareness programme.

MPLS Equality, Diversity and Inclusion Fellows 2020-21

Equality, Diversity and Inclusion (ED&I) Fellows will work alongside the Divisional ED&I team and Steering Group to help inform and implement a new 2020-2023 action plan. They will sit on and actively contribute to departmental ED&I Committees and receive an honorarium of £1000 for their own personal and professional development. 10 Fellows have been selected this year to help advance ED&I work within the MPLS Division, with one representative from each Department, which will allow all departmental ED&I committees the chance to draw on each other's experiences.

Engineering Science's representative is Teaching and Design Engineer Dr Izzi Floyd Mear. They say, "Working closely with ED&I Fellows from each MPLS departments will be a great way to push forward new ED&I initiatives. Being able to learn about what has worked well in other MPLS Departments will be an asset in accelerating systemic changes".

St Hugh's CDF to help promote women in Engineering

Dr Amanda Smyth started a Career Development Fellowship (CDF) in October 2020 at St Hugh's College, and was appointed Engineering Science Departmental Lecturer.

Amanda's Career Development Fellowship also includes responsibility for promoting Women in Engineering through events with the college and University and outreach activities with schools and the wider community.

Previously she worked as a research associate in the Whittle Laboratory at Cambridge University. Her research area at Oxford is in unsteady fluid dynamics, with a particular focus on 3D effects. She is working on modelling and mitigation of unsteady hydrodynamic loading on tidal turbines, through the development of 3D modelling tools, and identification of passive design parameters that reduce the risk of premature fatigue failures or catastrophic overloading. Her other research interest include unsteady gust-aerofoil interaction, and the high-efficiency propulsive swimming motion of marine animals. Amanda primarily uses a combination of high- and low-order numerical simulation to carry out her research, as well as analytical modelling.

Department partners AFBE-UK

A key Access objective for the Department is to attract more students from under-represented groups, such as from BME backgrounds, to study engineering at Oxford. The Department is therefore delighted to partner with AFBE-UK, the Association for Black and Minority Ethnic Engineers, as part of our efforts towards increasing accessibility and improving inclusion for BME engineers.

The partnership allows the university's engineering science students and staff members to access many of AFBE-UK's networking events and opportunities to volunteer on numerous outreach activities. In addition, there are opportunities to receive mentoring or serve as role models to students considering engineering as a career.

By connecting AFBE-UK's extensive network of student and professional engineers with the Engineering Science Department's academic engineering expertise, the partnership represents a positive step in continuing to better understand the barriers to inclusion BME engineering students face when applying to and undertaking engineering courses. ◕

↳ **Read more online**

Participants at the residential UNIQ Summer School in 2019.
Credit: William Parry, Wadham College.

Some of the awards our students have won this year:

Stratasys Extreme Redesign Challenge Award

DPhil student Daniel Fahy, supervised by ↻ **Professor Peter Ireland**, won first place in Stratasys' 2020 Extreme Redesign Challenge Awards, in the 'Art, Jewelry and Architecture' category, winning a $2,500 scholarship, a free Stratasys FDM 3D Printer for a year and a printout of his winning design.

Daniel leveraged his extensive knowledge of engineering and past experiences with 3D printing to recreate a fond childhood memory – a Hoberman Sphere – from scratch, within just a few weeks.

The Hoberman Sphere designed by Daniel Fahy

Hat trick of awards for DPhil student

DPhil student Selena Milanovic, supervised by ↻ **Professor Stephen Payne** won several awards this year. In June her multidisciplinary team won Most Innovative Idea at the World Economic Forum Global Shapers Oxford community hackathon for their "Wommie platform" concept, linking vulnerable individuals with volunteers in the area who could offer safe temporary accommodation. In August she won the Medtronic lightning round competition, which aimed to encourage clear scientific communication between researchers and a general audience. Selena pitched her DPhil in 3 slides and in under 3 minutes. Finally she was recipient of Best Poster Award at the Virtual Physiological Human conference, which had over 650 attendees. Her poster highlighted the role of ineffective metabolic signalling in the development of brain degenerative diseases.
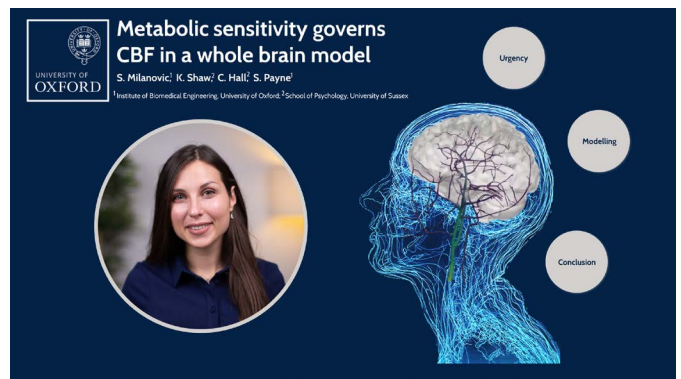
DPhil students working in AI awarded funding to further their research

Students from Professor David Clifton's ↻ **Computational Health Informatics Group** working on AI for low and middle income countries (LMICs) have been awarded fellowships and funding to continue their work. Heloise Greef was appointed a prestigious Junior Research Fellowship at Linacre College and a trio of grants in AI for patient monitoring in LMICs, from the UK Global Challenges Research Fund, the Balliol Interdisciplinary Institute and the PITCH-IN initiative.

Heloise Greef

Rhodes scholar Alexey Youssef has been awarded RAEng 'Frontiers of Development' funding to support his work on AI for medicine in LMICs. He will work with collaborators from the University of Colombo in Sri Lanka and from the World Health Organisation in Syria to improve the existing open-source Electronic Health Records solutions, aiming to build national EHR frameworks that will enable the effective utilisation of healthcare data for research, innovation and public health purposes across Low and Middle Income Countries.

Alexey Youssef

DPhil student wins award for ureteroscopy research

DPhil Soumya Gupta, supervised by ↻ **Dr Sharib Ali** and ↻ **Professor Jens Rittscher**, was runner-up in the Image-Guided Procedures, Robotic Interventions and Modeling Young Scientist Award at the SPIE Medical Imaging Conference 2020, which took place in Houston, United States. Soumya has developed a novel illumination-invariant optical-flow based segmentation technique which leverages the motion fields between multiple frames to reduce the effect of blur, deformations, occlusions and debris. She has introduced a multi-frame based dense optical flow estimation in a primal-dual optimization framework, embedded with a data-term based on normalized correlation transform descriptors that makes the method robust to illumination changes and dynamic background.

Soumya Gupta

## Royal Commission of 1851 Industrial Fellowships

DPhil candidates Maral Bayaraa and Tom Waddell have been awarded Industrial Fellowships from the Royal Commission for the Exhibition of 1851, which aims to encourage profitable innovation and creativity in British Industry.

Maral Bayaraa is working towards a DPhil in "Satellite-enabled early warning system for geotechnical structures", supervised by ↻ **Dr Brian Sheil**. She is developing a system that combines satellite data with artificial intelligence to warn authorities when large scale physical structures, such as dams, are on the brink of collapse.

Tom Waddell, supervised by Professor Sir Michael Brady in the Department of Oncology and ↻ **Dr Ana Namburete**, is developing a computational model of type 2 diabetes to help predict patient outcomes and devise personalised medical interventions.

Maral Bayaraa
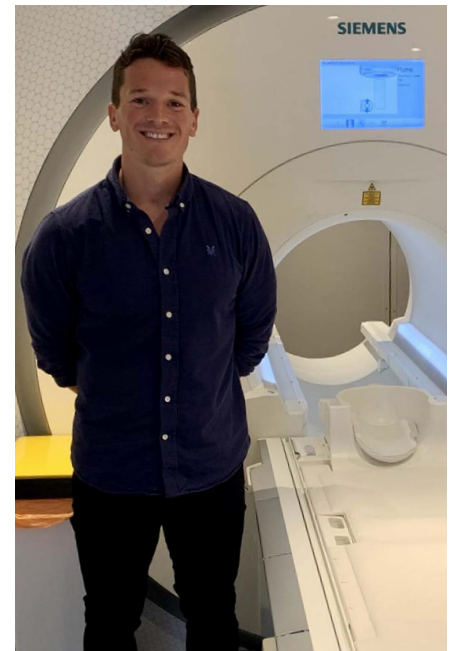
Tom Waddell

Oxford Engineers awarded Amelia Earhart Fellowship two years running

DPhil candidate Suria Subiah was awarded the Zonta International Amelia Earhart Fellowship. The US$10,000 Fellowship is awarded annually to up to 30 women pursuing doctoral degrees in aerospace engineering and space sciences. Another Engineering Science DPhil, Hannah Rana (Space Cryogenics group), was awarded the Fellowship in 2019.

Suria's research area is hypersonic flows, under the supervision of ↻ **Professor Matthew McGilvray** and Dr Luke Doherty at the Oxford Thermofluids Institute. She is working on the EPSRC funded programme 'Transpiration Cooling for Gas Turbines and Hypersonic Vehicles'.

Suria Subiah

4th year undergraduate poster competition winners

The 4th Year Project Exhibition & Competition, which has been running since 2001, offers final year students the opportunity to present a poster on their work to representatives from industry, alumni and researchers/academics in the Department of Engineering Science.

In 2020, we received 64 poster entries and supporting summaries, which were read and assessed by our guest judges alongside the Director of Fourth Year Studies, ⟲**Professor Vicente Grau Colomer**.

This year's judges were Sarah Witt (Sony Ltd), Chris Clay (Small Modular Reactors Rolls Royce) and Alex Nairac (Ecrin Investments Ltd).

Overall Best Poster: Kirsty Gouck
Metallic Resource Recovery from Industrial Wastewater by Polymer-Surfactant Complexation and Flocculation

Most Impactful Poster: Dylan Rubini
A Novel Turbomachine: The Technological Revolution Towards Clean and Sustainable Hydrocarbon Cracking

Most Innovative Poster: Hassan Daginawalla
Phase Retrieval Algorithms for Direct Laser Writing of Holograms in Liquid Crystals

Most Comprehensive Poster: Eliza Argyropoulos
Poster title: Design, Build and Control of a Novel Fluidically Actuated Drone

Most Enterprising Poster: Callum Coghlan
Fluid Forensics of Fossils

Highly Commended
Eight posters were highly commended:

Biomedical: Subregion Analysis of Tumour Physiology from Medical Images - *Sebastian Elliott*

Civil: Parametric Analysis of Bridge Response to Tunnelling - *Ruth Faherty*

Chemical: Enhanced Mineral Weathering for Capturing Atmospheric Carbon Dioxide - *Henry Williams*

Electrical: The Design, Build and Testing of a Battery Pack for an IMechE Formula Student Racing Car - *Jack Bruford*

Energy: Hybrid-Electric Aircraft: Optimal Design and Control of Hybrid Propulsion Systems - *Francis Judd*

Information: Tracking Motion in the Wild - *Charig Yang*

Mechanical: Micromechanics of Meniscal Tissue - *Francesca Murphy*

Thermofluids: Optimisation of Cavity Collapse in the context of Nuclear Fusion - *Mila Fitzgerald*

Kirsty Gouck, winner of the Overall Best Poster prize

Academic Awards

Professor Eleanor Stride awarded OBE for services to Engineering
↻ **Read more online**

Professor Richard Stone elected Royal Academy of Engineering Fellow
↻ **Read more online**

Professor Manolis Chatzis is 'Outstanding Reviewer' for Journal of Engineering Mechanics
↻ **Read more online**

Dr Marko Bacic awarded RAEng Silver Medal for outstanding contribution to UK engineering
↻ **Read more online**

Dr Tingting Zhu listed as one of best research articles published in 2019 by Yearbook of Medical Informatics
↻ **Read more online**

Professor Janet Pierrehumbert wins the ISCA Medal for Scientific Achievement 2020
↻ **Read more online**

Professor Alexander M. Korsunsky elected Fellow of the Institute of Physics
↻ **Read more online**

Professor Lionel Tarassenko awarded Global Challenges Research Fund
↻ **Read more online**

Professor Nick Hankins elected to Fellowship of the IChemE
↻ **Read more online**

UKRI Future Leaders Fellowship to enable pioneering ground-based testing of space travel
↻ **Read more online**

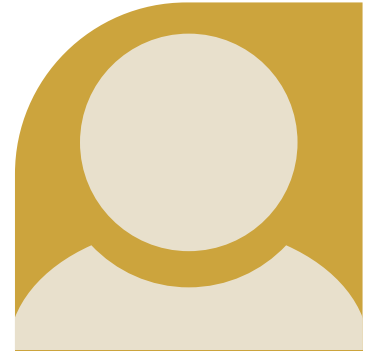# Engineering Science tutors receive awards for Excellence in Teaching

Gold Awards

Associate Professor Paul Goulart

Associate Professor Kostas Margellos

Professor Ekaterina Shamonina

Silver Awards

Associate Professor Laurence Brassart

Professor David Murray

Professor David Wallom

Bronze Awards

Professor Pawan Mudigonda

Associate Professor Nick Hawes

Dr Brian Sheil

Honourable Mentions: Associate Professor Perla Maiolino

Professor Zhong You

Teaching and Design Engineer Dr Izzi Mear

New academics in 2020

New Associate Professors ↻ **Read more online**

Noa Zilberman

James Kwan

Harrison Steel

Orestis Adamidis
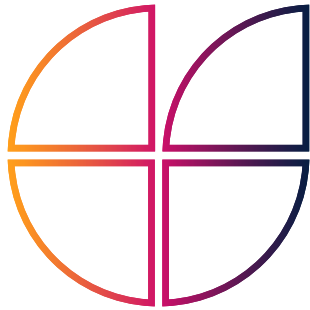
New Departmental Lecturers ↻ **Read more online**

Dr Amanda Smyth

Dr Suchandrima Das

DEPARTMENT OF
ENGINEERING
SCIENCE

UNIVERSITY OF
OXFORD

DEPARTMENT OF ENGINEERING SCIENCE

NEWSLETTER

TELL US WHAT YOU THINK!