

# Faculty of Engineering and Technology

November 2023

## FET RESEARCH NEWSLETTER

### EXTERNAL RESEARCH GRANTS SECURED (THRESHOLD: £10K)

(LOOM) £99k allocated to LJMU, eCSOV: Electric CSOV with Methanol Range Extender, **Dr Musa Bashir** (PI), **Prof. Trung Thanh Nguyen** (PI), **Dr Sean Malkeson**, **Prof. Jin Wang** and **Prof. Zaili Yang**. LJMU is a partner of the £20M Zero Emission Vessel project funded by the Department for Transport via Innovate UK, 2023-2025.

£133K allocated to LJMU, Digital Manufacturing, **Prof. Ian Jenkinson**, **Dr Andrew Naylor** and **Prof. Trung**

**Thanh Nguyen**. LJMU is a partner in this KTP project with Beverston Engineering Ltd. Project funded by Innovate UK, 2023-2025.

(PROTECT) £30K, 'Uncertainty-Aware Artificial Intelligence for Detection of Brain and Eye Diseases', **Dr Gabriela Czanner**, **Dr Silvester Czanner**, MISTI Global Seed Funds & MIT, 2023 – 2025.

### AWARDS/PRIZES/KEYNOTE ADDRESSES (AT RECOGNISED INTERNATIONAL CONFERENCES)

(BEST) **Dr Raj Shah** delivered a keynote speech 'An Integrated Risk Management Model in Oil and Gas Pipeline Projects' at the China International Pipeline Conference (CIPE) Beijing, 11<sup>th</sup>-13<sup>th</sup> April 2023.

(LOOM) Wang, H., Jiang, Y., Wang, X., **Jenkins, M**, **Matellini, B.**, Liu, Z and **Wang. J** won the best paper award for 'The impacts of persona protective measures on the safety of pilotage operation during the Covid-19

epidemic, at the 7<sup>th</sup> International Conference on transportation Information and Safety (ICTIS 2023), Xi'an, China 4<sup>th</sup>-6<sup>th</sup> August 2023.

(RCEEE) **Emeritus Prof. Emil Levi** delivered a keynote 'A Review of Electric Vehicle Battery Charging Solutions' at the 49<sup>th</sup> Annual Conference of the IEEE Industrial Electronics Society IECON 2023, Singapore, 16<sup>th</sup> – 19<sup>th</sup> October 2023.

### RESEARCH IMPACT GENERATING ACTIVITIES

(LOOM) Colleagues from School of Engineering have used LJMU's Smart Green Journey app to promote active travel and reduce emissions. So far, colleagues have travelled actively a total distance of near 1,500km, saving over 334kg CO<sub>2</sub> in the process. Overall, in the last six months, app users who participated in active travel campaigns on the app have actively travelled over 7,500km, saving near 1.7 tonne of CO<sub>2</sub> emission.

LJMU's Smart Green Things group, led by **Prof. Trung Thanh Nguyen**, have continued assisting local authorities, schools, hospitals, and businesses in

making sustainable development decisions and understanding environmental impact using their network of sensors. Overall, the group has provided access to over 100 sensors (indoor/outdoor air quality, traffic, and weather) across the LCR.

**Prof. Trung Thanh Nguyen's** [written evidence](#) on LJMU research on active travel to the UK Parliament was published by the Parliament Committee, and many of his recommendations were [integrated into the official policy recommendations](#) by the Parliament Committee to the DfT.

## IMPORTANT ITEMS FOR POSTGRADUATE RESEARCHERS INCLUDING PHD COMPLETIONS AND RESEARCH INITIATIVES AT FET

(FET) FET have been awarded 6 VC Scholarship Awards in this year's VC PhD Scholarship Scheme 2023/24. You can find the full list of recipients [here](#). We look forward to welcoming the following FET students in February.

1. Emmanuel Anum, 'A novel sustainable brick for future homes construction (BEST) **Dr Joseph Amoako-Attah**
2. Yuhao Cao, 'Exploring the impact of automation on maritime accidents: insights from AI and big data approaches in complex navigational environments (LOOM) **Prof. Zaili Yang**
3. Chengcheng Wang, 'Overcoming the reliability challenge in energy-efficient monolayer Atomic 2D devices (RCEEE) **Prof. Wei Zhang**

4. Haoan Wang, 'Next generation smart digital roads: towards net zero highlights (BEST) **Dr Yangming Gao**
5. Delaram Yazdani, 'Utilising real-time sensor data, simulation and policy inputs to make active travel in the Liverpool City Region safer and more convenient (LOOM) **Dr Eddie Blanco Davis** (LOOM)
6. Elmehdi Belabyad, 'Future skills and workforce development in the maritime industry: An inclusive and sustainable approach' (LOOM) **Dr Robyn Pyne**

Congratulations to **Prof. Trung Thanh Nguyen** who has been awarded a Thematic Doctoral Pathway (TDP) in this year's TDP Scheme 2023/24. 'Freeport TDP' was one of two awarded by the University this year, and the faculty looks forward to welcoming the first cohort in the new year.

## EXTERNAL COLLABORATION

(ARI) ARI are part of an international team of astronomers who have carried out the biggest ever computer simulation from the Big Bang to the present day to investigate how the universe evolved. The FLAMINGO simulations calculate the evolution of all the components of the Universe, and it is hoped they will allow physicists to understand if the standard model of cosmology, used to explain the evolution of the Universe, provides an accurate description of reality. You can read more about this topic [here](#).

(BEST) Dr Raj Shah will be visiting Miyagi University, Sendai, Japan as part of the joint research collaboration between LJMU and Miyagi University. This is being supported by a travel grant from The Great British Sasakawa Foundation.

(FET) The CW 4.0 and LCR 4.0 Holistic projects are part of the LCR 4.0 suite of projects, delivering digital innovation to local industries across all sectors since

2016. There has been innovation support provided to 797 SMEs which has resulted in an increase in £197m in GVA and the creation of 3087 jobs in the local area by 2025. The programmes, part funded by the European Regional Development Fund, enabled businesses to access expertise, technology and collaboration opportunities to drive innovation and boost productivity. The LCR 4.0 projects have been acknowledged by the Financial Times as one of the top 100 digital influencers globally and has developed a digital demonstration zone to showcase the benefits of technology in real time.

(PROTECT) Dr Áine MacDermott hosted a workshop for forensic researchers and practitioners in July 2023. The workshop 'Deepfake forensics: Identifying and Combating Manipulated Digital Media' explored the growing challenge and rise of fabricated media created by AI, and the challenges for the digital forensics

domain. The event was well attended and was part of Áine's successful LJMU QR PSF project.

## NOTABLE PUBLICATIONS

(ARI) Levan, A., Gompertz, B.P., Salafia, O.S. et al. (2023) 'Heavy element production in a compact object merger observed by JWST', *Nature*, [DOI](#) You can read more about this article and **Dr Gavin Lamb's** involvement [here](#), along with some of the press coverage [here](#)

(DSRC) **Ortega-Martorell, S., Olier, I.**, Johnston, B.W. and Welters, I.D. (2023) 'Sepsis-induced coagulopathy is associated with new episodes of atrial fibrillation in patients admitted to critical care in sinus

rhythm,' *Frontiers in Medicine – Intensive Care Medicine and Anesthesiology*, Volume 10, [DOI](#)

(LOOM) **Xin, X.R., Liu, K.Z., Loughney, S., Wang, J., Li, H., Ekere, N. and Yang, Z.** (2023) 'Multi-scale collision risk estimation for maritime traffic in complex port waters', *Reliability Engineering and Safety System*, Volume 240, pp. 109457 [DOI](#)

(PROTECT) Yousefi, F. and **Kolivand, H.** (2023) 'A robust brain pattern for brain-based authentication methods using deep breath' *Computer & Security*, Volume 135, [DOI](#)

## OTHER ITEMS

(ARI) The Schools' Observatory has been awarded with the prestigious 2023 William Thomson, Lord Kelvin Medal and Prize by the Institute of Physics (IoP) for their outstanding contribution to inspiring young people and teachers to succeed in STEM journey, making the universe accessible to everyone, empowering people to know more and do more. Congratulations to the whole Schools' Observatory Team on this award.

(BEST) **Dr Ana Bras** was asked by the Institution of Civil Engineers (ICE) to comment on the net zero plans for infrastructure, skills gaps, and opportunities for the UK. You can read the full blog [here](#).

(DSRC) **Dr Ivo Siekmann** co-edited a research topic for *Frontiers in Applied Mathematics and Statistics* entitled 'Do individuals matter? Individual-based versus population-based models applied to biology and health. You can read more about this [here](#).

**Dr Ivan Olier** co-edited a special issue for the *BMC Medical Research Methodology* entitled 'Casual

inference' which can be viewed [here](#). He also wrote an editorial for this which can be read [here](#).

(FET) We are delighted that a number of academics from the faculty have been named among **the world's top 2% most-cited scientists in various disciplines**. The ranking method is based on standardized citation metrics and has been developed by a group of scientists led by John P.A. Ioannidis (Stanford University). The updated full dataset, which ranks the world's most cited researchers based on career-long data and, separately, for single year impact is accessible online [here](#).

We would like to congratulate the following scholars who have been named on the list.

- (ARI) **Prof. Ivan Baldry, Prof. Robert Crain, Prof. Shiho Kobayashi, Prof. Paolo Mazzali, Prof. Ian McCarthy, Dr. Daniel Perley, Prof. Maurizio Salaris and Dr. Ricardo Schiavon.**

- (BEST) **Dr. Khalid Hashim** and **Prof. Vida Maliene**.
- (LOOM) **Dr. Christos Kontovas**, **Prof. Jin Wang** and **Prof. Zaili Yang**.
- (PROTECT) **Prof. Gyu Myoung Lee**.
- (RCEEE) **Dr. Martin Jones** and **Prof. Jian Zhang**.

The list also includes 3 Emeritus Professors – **Prof. Emil Levi**, **Prof. Paulo Lisboa** and **Prof. Brian Rowe**.

**Prof. James Ren** delivered a faculty Experience Sharing Workshop on Marie Sklodowska-Curie Research and Innovation Staff Exchange (RISE) funding which was well received by all those who attended. You can see the slides from this, along with previous faculty workshops and seminars [here](#)

**Dr Martin Sharp** and LJMU hosted an Institution of Engineering and Technology (IET) event on ‘manufacturing with lasers – past, present and future’ on the 18<sup>th</sup> October which was well attended. This is the first of 3 events that will be taking place at Byrom St. over the next month. Please contact Martin for more details.

The faculty will be hosting the Annual Research and Knowledge Exchange Conference on the 18<sup>th</sup> December. The conference will be the last event celebrating the University’s bicentenary and is titled

‘200 years of Engineering and Technology: Delivering Innovative Solutions to tackle Global Challenges’. Tickets can be ordered [here](#).

(LOOM) **Dr Eddie Blanco Davis** was invited to deliver a speech at the Marine and Ocean Division of the Europe-Korea Conference on Science and Technology (EKC2023) as part of the EU-funded RETROFIT55 project. The speech was on ‘Retrofit solutions on ships to achieve 55% GHG reduction by 2030’.

**Prof. Trung Thanh Nguyen**, **Dr. Ahmed Makki**, and **Mrs. Parisa Mostafazadeh** presented LJMU’s research in air quality in the Clean Air Day event at Alder Hey Children’s Hospital. The event was attended by a wide range of audience, including NHS trusts, NHS England, Active Travel England, LCR Combined Authority, LCR Cycling and Walking Commissioner, integrated care boards, Asthma UK, Merseyside Sport, Active Cheshire, Arriva and Liverpool Green Bus route.

(PROTECT) **Dr Gabriela Czanner** and **Dr Silvester Czanner** published a university textbook together with Dr Monika Kovacova from the Slovak University of Technology entitled ‘Elements of Risk Analysis with Applications in R.’

**Dr Hoshang Kolivand** delivered an invited talk at the Rotary Science Day 2023, hosted by the Wirral City Council on 12<sup>th</sup> October 2023. He presented on ‘How AI is Revolutionizing mixed reality’ which was well received by the audience.

# Faculty of Engineering and Technology

September 2023

## FET RESEARCH NEWSLETTER

### EXTERNAL RESEARCH GRANTS SECURED (THRESHOLD: £10K)

(DSRC) £10m, Health virtual twins for the personalized management of stroke related to atrial fibrillation, **Dr Sandra Ortega-Martotell**, **Dr Ivan Olier**, EU Horizon Europe, 2023 – 2028.

(PROTECT) £1.4m allocated to LJMU (£9m total budget), Liverpool 5G HDD, **Dr Michael Mackay** (PI), **Dr Alessandro Raschella** and **Dr Max Hashem**

**Eiza**, Department of Science, Innovation and Technology, 2023-2025.

(RCEEE) £514k allocated to LJMU, Overcoming the Endurance Challenge in Energy-Efficient Atomic Memristors for AI and 6G applications, **Prof. Wei Zhang** (PI), **Prof. Jian Zhang** (Co-I), ESPRC-NSF lead Agency Scheme, 2023 – 2026.

### AWARDS/PRIZES/KEYNOTE ADDRESSES (AT RECOGNISED INTERNATIONAL CONFERENCES)

(PROTECT) **Dr Hoshang Kolivand** delivered a keynote speech entitled 'AI is changing the Future of Augmented and Virtual Reality' at the 4<sup>th</sup> International Conference on Computer Science and Communication Technology, Wuhan, China, 26<sup>th</sup>-28<sup>th</sup> July 2023.

**Dr Hoshang Kolivand** delivered a keynote speech entitled 'AI is changing the future of Augmented and Virtual Reality' at the 6<sup>th</sup> International Conference on Emerging Technologies in Computing, University of Essex, UK, 17<sup>th</sup>-18<sup>th</sup> August 2023.

### EXTERNAL COLLABORATION

(Conservation AI) **Prof. Paul Fergus** and **Dr Carl Chalmers** have passed a course with partner company Nvidia and can now certify and give industry recognized accreditation in AI, Machine Learning and Deep Learning methods to staff and students.

(FET) The UK-MUC project put on its first student conference hosted by the Universiti Malaya (UM) titled 'Intercultural Perspectives on Sustainable Development and equality in High education' between 17<sup>th</sup> – 21<sup>st</sup> July. It was attended by **Prof Jin Wang** and Dr Julia Wang and proved to be a great success with

over 80 students from both the UK and Malaysia being fully funded to attend. You can read more about the conference [here](#). If you want to find out more about the UK-MUC project there is a dedicated microsite to it on the [website](#).

(PROTECT) As the outcome of a British Council team project **Prof. Dhiya Al-Jumeily** and colleagues from LJMU are co-organising the [DaSET](#) Conference with collaborators from Malaysia and Indonesia. It is planned that this conference will continue annually to maintain sustainability in the project.

## NOTABLE PUBLICATIONS

(ARI) **Crain, R.A.** & Van de Voort, F. (2023) 'Hydrodynamical Simulations of the Galaxy Population: Enduring Successes and Outstanding Challenges', Annual Review of Astronomy and Astrophysics, Volume 61, Issue 1, pp. 473-515 [DOI](#)

(DSRC) **Ortega-Martorell, S., Olier, I.,** Hernandez, O., Restrepo-Galvis, P.D., **Bellfield, R.A.A** and Candioti, A.P (2023) 'Tracking Therapy Response in Glioblastoma using 1D Convolutional Neural Networks' Cancers, Number 15, [DOI](#)

(EEE) **Lim, C.S.,** Lee, S.S. and **Levi E.** (2023) 'Continuous-Control-Set Model Predictive Current Control of Asymmetrical Six- Phase Drives Considering System Nonidealities' IEEE Transactions

on Industrial Electronics, Volume 70, Issue 8, pp. 7615-7626 [DOI](#)

(LOOM) **Xin, X., Liu, K. Loughney, S., Wang, J., Li, H. Ekere, N. and Yang, Z.** (2023) 'Multi-scale collision risk estimation for maritime traffic in complex port waters' Reliability Engineering & safety System, Volume 240, [DOI](#)

(PROTECT) **Sweiss, M., Assi, S., Barhoumi, L., Al-Jumeily, D., Watson, M., Arnot, T. & Scott, T.** (2023) 'Qualitative and quantitative evaluation of microalgal biomass using portable attenuated total reflective-Fourier transform infrared spectroscopy and machine learning analytics' Journal of Chemical technology & Biotechnology, [DOI](#)

## OTHER ITEMS

(ARI) **Dr Robert Grand** is part of a team that have published a new paper which has discovered that magnetic fields have undoubtable played a key role in the formation of the Universe. You can read more about this discovery as well as the article itself [here](#).

**Michael Healy-Kalesh** gave an invited talk on the 4<sup>th</sup> September entitled 'Association between Recurrent Novae and Nova Super-Remnants' at the 'Golden Age of Cataclysmic Variable and Related Object -VI' workshop in Palermo.

**Rob Crain** and a small international team were recently awarded 34 orbits of Hubble Space Telescope Time to examine the gaseous environments of galaxies.

Work Experience Week (WEx Week) organised by the School's Observation team took place week commencing 10<sup>th</sup> July. There were approximately 20 A-Level students from all over the UK onsite, finding out what life is like as a professional astrophysicist. The week culminated in poster presentations and was received extremely well by the students in attendance.

**Andrea Font, Jamie Salcido and Jonah Conley** represented the School at Daresbury Open Week 10<sup>th</sup>-12<sup>th</sup> July. The stall proved to be very popular within the exhibition with hundreds of people experience the VR gear and learning about black holes, dark matter and more. You can read more about this [here](#).

**Shiho Kobayashi** has joined the Bell Burnell Graduate Scholarship Fund Panel; it is an innovative fund set-up by leading physicist Prof. Dame Jocelyn Bell Burnell and the Institute of Physics to encourage greater diversity in physics by assisting PhD students from underrepresented groups.

(BEST) LJMU hosted a three-day workshop to discuss the ongoing 'Industry Academia Co-operation for Sustainable Built Environment Ecosystem' project. The event included site visits, industry-led discussions and hand on experience of digital technologies adopted in higher education pedagogy. You can read more about the event [here](#).

(EEE) **Dr Karl Jones** was quoted in the Guardian in relation to an article on Deepfake Audio. You can read the article and learn more about this topic [here](#)

(FET) The University Research and Knowledge Exchange Conference will be hosted by FET this year. The date has been confirmed as **Monday 18<sup>th</sup> December 2023** and is titled '200 years of Engineering & Technology: Delivering Innovative Solutions to tackle global challenges', please make sure to save this date. More details about the Conference will be circulated in due course. This conference will tie-in with the ongoing LJMU bicentenary celebrations.

We would like to congratulate our colleagues in the faculty who have been successfully promoted to Reader or Professor in the 2023 round of the LJMU Professorship and Readership Conferment Panel. The full list is as follows:

Promotion to Professorship

- **Dr Jun Ren**
- **Dr Monower Sadique**

Promotion to Readership

- **Dr Frederic Bezombes**
- **Dr Ivan Olier-Caparoso**
- **Dr Magomed Muradov**
- **Dr Michael Mackay**
- **Dr Michaela Gkantou**
- **Dr Sandra Ortega-Martorell**

- **Dr Sebastian Kamann**

(LOOM) **Dr Dimitrios Parakevadakis** chaired the Maritime and Logistics sessions at this year's CILT Research Network Conference which took place at Herriott-Watt University, Edinburgh between the 6<sup>th</sup> and 8<sup>th</sup> September. Several PhD students also attend and presented their work during the Conference.

**Dr Christos Kontovas** attended the United Nations International Maritime Organisation (IMO) Summit in London and was part of a panel discussing climate change and environmental protection.

**Dr Christos Kontovas** and **Dr Robyn Pyne** led a study on illegal fees for recruiting employees in the maritime industry. The report formed part of a discussion at the Global Forum for Responsible Recruitment. You can read more about their findings [here](#).

(PROTECT) On the 11<sup>th</sup> September 2023, FET welcomed the 3rd Cohort of visitors from collaborative partners in India, to the 3-day immersive programme between FET and UpGrad. The visitors enjoyed a wide range of exciting and engaging activities, concluding in a closing presentation and graduation ceremony.

**Prof. Dhiya Al-Jumeily** was invited to be a speaker on the Science, Technology and Research Honours panel organised by the Cabinet office and government office for science on the 12<sup>th</sup> September at the University of Manchester.

# Faculty of Engineering and Technology

July 2023

## FET RESEARCH NEWSLETTER

### EXTERNAL RESEARCH GRANTS SECURED (THRESHOLD: £10K)

(DSRC) €370k allocated to LJMU (€6m total budget), 'ARISTOTELES' applying artificial intelligence to define clinical trajectories for personalized prediction and early detection of comorbidity and multimorbidity patterns in patients with atrial fibrillation, **Dr. Ivan Olier-Caparroso** (PI), **Dr. Sandra Ortega Martorell**. European Commission: Horizon Europe, 2023-2028.

(MEMARC) €128k allocated to LJMU, ice-Link 'Integration of Advanced Experiments, Computation and Data for Innovation in Freeze Casting and

Advanced Porous Structures', **Prof. James Ren** (PI). European Commission: Horizon Europe, MSCA Staff Exchange, 2023-2028.

€101k allocated to LJMU, SynAM 'Integration of Advanced Experiments, Imaging and Computation for Synergistic Structure-Performance Design of Powders and Materials in Additive Manufacturing', **Prof. James Ren** (PI). European Commission: Horizon Europe, MSCA Staff Exchange, 2023-2028.

### AWARDS/PRIZES/KEYNOTE ADDRESSES (AT RECOGNISED INTERNATIONAL CONFERENCES)

(PROTECT) **Dr. Hoshang Kolivand** delivered a keynote speech 'Current and Future Challenges of AI and Mixed Reality' at the 3<sup>rd</sup> International Conference on Big Data Analysis and Computer Science (BDACS 2023), 16-18<sup>th</sup> June 2023 in Hangzhou, China. **Dr. Kolivand** also delivered an invited lecture entitled 'AI and Visualization in Augmented and Virtual reality' for

PhD students at Politecnico de Milano, Italy, 30<sup>th</sup> May 2023.

**Prof. Dhiya Al-Jumeily** delivered a keynote speech for the University of Management Technology, Pakistan regarding the use of AI in pharmacy. They discussed future collaborations in AI and Pharmacy.

### IMPORTANT ITEMS FOR POSTGRADUATE RESEARCHERS INCLUDING PHD COMPLETIONS AND RESEARCH INITIATIVES AT FET

(FET) The Faculty hosted their annual Postgraduate Research Conference on the 24<sup>th</sup> May 2023. The event was a return to a fully face-to-face event for the first time since 2019 and was very well received by those in attendance. We would like to thank all the PGRs who contributed to the day, and congratulate the following student who were winners:

Best Paper

- Third Place – **Bethan Williams** (ARI) 'Formation of stars and clusters in the extreme environment of the Galactic Centre'
- Second Place – **Sarah McDonald** (ARI) 'Red Supergiants in M31: The Humphreys-Davidson limit at high metallicity'
- First Place – **Stephen Molyneux** (ARI) 'Spectroscopic confirmation of a gravitationally



lensed Lyman-break galaxy at  $z[C II]= 6.827$  using NOEMA'

#### Best Photo

- Third Place – **Jacob Wise** (ARI) 'Giving Icarus a run for his money: A highly luminous Tidal Disruptive Event of a star by a supermassive black hole in a distant gallery'
- Second Place – **Stevie King** (ARI) 'The structure of the star-forming factories in Central Molecular Zone!'
- First Place – **Ryan Roberts** (ARI) 'The Sky is the limit...but not for AI'

#### Best Poster

- Third Place – **Xuri Xin** (ENR) 'Maritime traffic partitioning for intelligent transportation surveillance in complex waters'
- Second Place – **Mohamed Hamoud** (ENR) 'A multi-criteria decision-making framework for energy management of a hybrid solar-wind-hydrogen power plant'
- First Place – **Elena Balakina** (ARI) 'Hunting for a massive black hole in the core of the Globular cluster 47 Tucane'

#### Best Pitch Presentation

- Third Place – **Tutku Kolcu** (ARI) 'Tracing gas inflows to the nucleus of galaxies'
- Joint First Place – **Jessa Mae Canas** (ENR) 'Computational and Finite Element Analysis of Reverse Total Shoulder Replacement'
- Joint First Place - **Ryan Bellfield** (CSM) 'Running into issues: development of

unsupervised machine learning models with applications in athlete's heart research'

#### People's Choice

- Best Photo – **Andrea Sante** (ARI) 'Galactic Archaeology through the AI Lens'
- Best Poster – **Ban Al Hasani** (CBE) 'Geospatial approach techniques for rainwater harvesting suitable sites selection for sustainable agriculture use'
- Pitch Presentation Session 1 – **Jessa Mae Canas** (ENR) 'Computational and Finite Element Analysis of Reverse Total Shoulder Replacement'
- Pitch Presentation Session 2 - **David Law** (ARI) 'A reinforcement learning-based scheduling system for the New Robotic Telescope'
- Pitch Presentation Session 3 – **Tutku Kolcu** (ARI) 'Tracing gas inflows to the nucleus of galaxies'

#### Best PhD Thesis 2023

There were 3 winners in this category:

- **Daniel Horta Darrington** (ARI) – 'Unveiling the mass assembly history of the milky way from its stellar halo'
- **Fares Yousefi** (CSM) – 'A new biometric authentication method using brain signals'
- **Shatha Gareeb** (CSM) – 'Machine learning model for education levelling in multicultural countries using UAE as a case study'

You can read more about the event [here](#).

The second edition of the FET PGR Newsletter has just been published and can be viewed [here](#).

## INTRODUCTION TO NEWLY APPOINTED RESEARCH ACTIVE MEMBERS

(BEST) **Dr. Yangming Gao** has joined LJMU as a Senior Lecturer in Highway Engineering. Prior to that, he was a Marie Curie Research Fellow in the Faculty of Civil Engineering & Geosciences at Delft University of Technology. He received his PhD degree in Civil

Engineering from Aston University in March 2020. **Dr. Gao's** research interests include 1) Mechanics of Asphalt Materials, 2) Multiscale and Multiphysics Modelling, 3) Climate Resilient, Low Carbon and Bio-Based Pavement Materials, and 4) Intelligent Transport

Infrastructure and Materials. He has an internationally recognised track record of publications (over 30 peer-reviewed journal papers). **Dr. Gao** now serves as a Young Academic Editor for the Journal of Traffic and Transportation Engineering (English Edition) and a Guest Editor of MDPI Journal of Materials. He also serves on the technical committee of RILEM and is an active member on Transportation Research Board (TRB), Academy of Pavement Science and Engineering (APSE), and International Society for Asphalt Pavements (ISAP). **Dr. Gao** is a recipient of TRC 2021 Best Paper Award, 2020 Marie Skłodowska-Curie Actions (MSCA) Individual Fellowships, 2020 Chinese

Government Award for Outstanding Self-financed Students Abroad and 2019 ARMOURERS & BRASIERERS' Prize.

(ARI) **Dr. Chloe Miossec** has joined the NRT project as Instrument Scientist. **Dr. Miossec** recently completed her PhD at the University of Liverpool and will initially be focusing on the optical and mechanical prototyping of the telescope wave front sensor. Also joining NRT as a Visiting Research Fellow is **Dr. Richard Ashley** who will also work on instrumentation, bringing his experience from the Isaac Newton Group telescopes and Google to the project.

## EXTERNAL COLLABORATION

(PROTECT) **Dr. Wasiq Khan** has initiated a working relationship with Naimuri Ltd. This has led to external funding generation (£7k to LJMU so far) along with external bid developments. LJMU also participated in

a recent Tech, Academia and Government (TAG) event, more information on the event can be found [here](#).

## OTHER ITEMS

(ARI) **Prof. Steve Longmore** and **Dr. Jonny Henshaw** were part of the Scientific Organising Committee for an international meeting in Granada (Spain), 24-28<sup>th</sup> April, on the Galactic Centre: <https://www.granadacongresos.com/gcw2023>. The meeting was attended by over 100 scientists from all over the world and the keynote speaker of the meeting was the recent Nobel Prize Winner, Prof. Reinhard Genzel, who gave a talk on his Nobel Prize winning Galactic Centre research.

The ARI's Liverpool Telescope played a key role in the discovery of supernova SN2023ixf, among the brightest cosmic explosions to be seen by astronomers in several decades. The robotic facility obtained the first spectrum of this source, launching a worldwide follow-up campaign by both professional and amateur groups. The telescope has observed the evolving explosion every available night since then, serving the data to the public community (LT news item [here](#)). The campaign is being led by ARI staff member **Dr. Daniel Perley** and PhD students **K-Ryan Hinds** and **Jacob Wise**.

Former PhD student, Dr. Danny Horta, has been awarded the Best 2022 PhD Thesis Prize by the International Astronomical Union, Division J Galaxies and Cosmology. This is a very prestigious prize. Further information can be found [here](#).

(BEST) **Prof. Patryk Kot** has showcased the sensor platform for moisture detection as a part of cultural heritage preservation during 2 masterclasses, (1) as a part of European Archaeology Days at Royal Castle, Warsaw delivered to the Ministry of Culture and National Heritage and National Heritage Institution broadcasted on national TV and radio, and (2) delivered to archeologists, conservators, and engineers across the Royal Castle Warsaw.

As WG2 co-leader of Cost Action CA 20109 (Modular Energy Islands for sustainability and resilience (Modenerlands)). **Dr. Michaela Gkantou** chaired a session of modular offshore floating energy islands during the strategic workshop of the action that took place at the University of Luxembourg on 15 – 16<sup>th</sup> May 2023.

(DSRC) **Emeritus Professor Paulo Lisboa** has headlined a panel discussion on Explainable AI at this year's largest neural network conference, IJCNN which took place in Brisbane, Australia, during 18<sup>th</sup> -23<sup>th</sup> June 2023. Other panelists include Professor Stephen Grossberg, a well-known founder of neural network research, and Professor Alfredo Vellido who is a former doctoral graduate from LJMU. **Emeritus Professor Lisboa** also received €15,000 to fund the coding of a new, fully transparent machine learning method that can be applied to tabular data. This will open any black box classifier by representing it as a glass box model without loss of performance. Applications include banking, insurance and medical decision support. The funding is from a co-author of a paper on survival prediction using explainable artificial intelligence in heart transplantation, Dr. Johan Nilsson from the Department of Thoracic and Vascular Surgery, Skane University Hospital, Lund, Sweden.

(FET) The Faculty welcomed Kevin Daffey, Vice-President of Governmental Engineering at Rolls Royce to LJMU on the 5<sup>th</sup> June 2023. He met with several Academics to discuss their research and then delivered a Faculty Research Seminar on 'Maritime Technology Trends' which was extremely well received. The slides from this seminar can be found [here](#).

Following the recent call for QR PSF Applications, URKEC have now confirmed the funding recommendations for this year's awards. FET have received 3 of the 11 funded projects as below:

- QR Policy Support Fund - £10,000 awarded to **Dr. Iacopo Carnacina** and **Dr. Monower Sadique** (BEST) for their project 'Plastic in construction – the new asbestos? Policy driver for new practices for plastic reduction in the construction industry.'
- QR Policy Support Fund - £3,328 awarded to **Dr. David Evans, Prof. Ian Jenkinson** (LOOM), Dr. Kostas Kiriakoulakis and Dr. Sarah Percival for their project 'Geographic Information System (GIS) based manufacturing Productivity Growth Tool'
- Participatory Research Fund - £10,000 awarded to **Dr. Christaline Wijekoon** and **Dr. Michael Farragher** (BEST) for their project 'self-empowerment through Open Source Construction in Uganda.'

(LOOM) Several members of staff were invited to attend the commemorative dinner for the 80<sup>th</sup> Anniversary of the Battle of the Atlantic, which included an address by First Sea Lord Admiral Sir Ben Key KCB CBE.

(PROTECT) On the 12<sup>th</sup> June 2023, FET welcomed the 2<sup>nd</sup> Cohort of visitors from collaborative partners in India, to the 3 day immersive programme between FET and upGrad. The visitors enjoyed a wide range of exciting and engaging activities, from presentations from Conservation AI to navigating an RNLI rescue boat around the River Mersey in the Maritime Simulator, concluding in a closing presentation.

# Faculty of Engineering and Technology

May 2023

## FET RESEARCH NEWSLETTER

### EXTERNAL RESEARCH GRANTS SECURED (THRESHOLD: £10K)

(BEST) £169k allocated to LJMU, Luminescent porphyrin Metal-organic frameworks as oxygen consumption reporters for bacteria-induced repair of concrete microcracks (LUMINOSA) **Dr. Ana Armada Bras** (Co-I) Dr. Francesca Giuntini (PI) (SCS) European Union Marie Skłodowska-Curie Action (MSCA) Postdoctoral Fellowship 2023-2025.

£12k allocated to LJMU, Collaborative study on adaptive building skins for achieving net-zero operational carbon emissions, **Dr. Hu Du** (PI). International Exchanges Cost Share Programme, Royal Society, 2023-2025.

(GERI) £12k allocated to LJMU, In-process machining surface quality monitoring and control with

digital twin approach, **Prof. Xun Chen** (PI), **Dr. Tahsin Opoz** and **Dr. Juan Ahuir Torres**. International Exchange Cost Share Programme, Royal Society, 2023-2025.

(LOOM) £12k added to LJMU, Adapting to Risks Posed by Climate Change on Port Clusters: Insights for the Cases of the UK and China, **Dr. Chia-Hsun Chang** (PI), **Prof. Jin Wang**, **Dr. Christos Kontovas**. International Exchanges Cost Share Programme, Royal Society 2023-2025.

### AWARDS/PRIZES/KEYNOTE ADDRESSES (AT RECOGNISED INTERNATIONAL CONFERENCES)

(PROTECT) **Dr. Hoshang Kolivand** delivered a keynote speech entitled 'Future Challenges of AI and Mixed Reality' at the First International Conference on Smart Systems, Soft Computing, and Applied Mathematics at Azad University of Iran, Ashtian on the 5<sup>th</sup> March 2023

**Dr. Hoshang Kolivand** delivered a keynote talk on 'Challenges of AI and Mixed Reality' at the International Conference on Artificial Intelligence and Knowledge Discovery in Concurrent Engineering, at St. Josephs Institute of Technology India and International Institute of Concurrent Engineering, Tustin on the 6<sup>th</sup> January .

### IMPORTANT ITEMS FOR POSTGRADUATE RESEARCHERS INCLUDING PHD COMPLETIONS AND RESEARCH INITIATIVES AT FET

(FET) The Faculty hosted a PGR Spring Welcome Event on the 29<sup>th</sup> March 2023 which was well attended. This was to celebrate the launch of the new quarterly [FET PGR newsletter](#) which has had a lot of engagement and has been positively received by the researchers.

The Faculty will be holding their annual Faculty Research Day on Wednesday 24<sup>th</sup> May 2023. This year

will be a return to a fully face-to-face event with PGRs presenting a photo, poster, paper, or oral presentation. Colleagues are encouraged to save the date, with the event taking place in the Adaptive Learning Zone. The online galleries for the [posters](#) and [photos](#) are now available to view, with the top 10 from each being printed and available to view in person on the day.

## EXTERNAL COLLABORATION

(BEST) **Dr. Ana Armada Bras** has been named as a Policy Fellow within the Institution of Civil Engineers (ICE), the UK's leading source of expertise in Civil Engineering. More information and an interview with **Dr. Bras** and ICE can be found [here](#).

(FET) LJMU has recently [celebrated](#) the first anniversary of the UK Malaysia University Consortium with a UK-MUC Celebratory Event and EXCEL Workshop at the High Commission of Malaysia in London on Monday 27<sup>th</sup> March 2023. If you are

interested in the work going on in the Consortium more information can be found [here](#).

(RCEEE) **Dr. Karl Jones** as part of the Applied Forensic Technology Research Group have become members of ACE (Accelerated Capability Environment) which has Home Office capability within the Homeland Security Group.

## INTRODUCTION TO NEWLY APPOINTED RESEARCH ACTIVE MEMBERS

(ARI) **Dr. Rob Grand** started at the ARI on the 1<sup>st</sup> March 2023. **Dr. Grand** completed his PhD at MSSL (UCL) before taking up a postdoctoral position at the HITS Centre in Heidelberg. He then moved to MPA, Garching as an Independent Research Fellow and as of 2021 was a Severo-Ochoa Advanced Fellow at the IAC in Spain. He comes to the ARI on a prestigious STFC Ernest Rutherford Fellowship and as a new member of

the academic staff. **Dr. Grand** is an expert in cosmological simulations of the near-field universe, working on topics including dwarf galaxies, the formation of the stellar halo, the dynamics of bars, and the expected signal from annihilating dark matter.

## NOTABLE PUBLICATIONS

(BEST) **Gkantou, M., Georgantzia, E., Kadhim, A., Kamaris, G.S., Sadique, M.** (2023) 'Geopolymer Concrete-filled Aluminum Alloy Tubular Cross-Sections', Structures, Volume 51, pp. 528-543, [DOI](#) You can read more about this research [here](#).

(EEE) **Tok, K.H, Zhang, Brown, J., Ji, Z., Zhang, W. and Marsland, J.S** (2023) 'Characterizing and Modelling RTN under real circuit bias conditions', IEEE Transactions on Electron Devices, Volume 70, Issue 5, pp. 2424-2430. [DOI](#).

(LOOM) **Park, C., Kontovas, C., Yang, Z., and Chang, C.H.** (2023) A BN driven FMEA approach to access maritime cybersecurity risks. Ocean & Coastal Management, Volume 235, p. 106480 [DOI](#).

(MEMARC) He, Y., Liu, J., Shao, W., Rao, L., Zhang, S., **Ren, X.**, Yang, Q. (2023) 'First-principles investigation on interface bonding properties between Fe<sub>3</sub>Cr<sub>3</sub>YC<sub>3</sub> and  $\gamma$ -Fe', Materials Letters, Volume 336, [DOI](#).

(PROTECT) **Hoshang, K.**, Kayode, A., Akintoye, S.A. and Rahim M.S. (2023) 'Improved methods for finger vein identification using composite Media-Wiener filter and hierarchical centroid features extraction', Multimedia Tools and Applications pp.1-32 [DOI](#)

## OTHER ITEMS

(ARI) There is a new ranking of scientists and departments on research.com. ARI places in the [top 10](#) in the UK, beating many strong Russell Group departments, including the University of Liverpool.

**Prof. Andy Newsam** gave the first [Roscoe Lecture](#) of the Bicentenary year to several hundred members of the public at St. Georges Hall on Wednesday 22<sup>nd</sup> March. His lecture was entitled ‘A Universe for All’ and the full lecture is available to watch [online](#).

The New Robotics Telescope showcase took place on Wednesday 22<sup>nd</sup> March from 1-4pm in the Adaptive Learning Zone. The project team gave lightning talks covering a variety of subjects ranging from astronomy, systems engineering, automation and control, software, and mechanical and civil engineering. These talks led to a range of interesting discussions and potential future collaborations with colleagues in FET. For those unable to attend or interested in learning more about the project please contact **Dr. Helen Jermak** who can provide more information.

**Prof. Ian McCarthy** delivered his inaugural Professional Lecture, entitled ‘The Universe inside a Computer’, on Wednesday 15<sup>th</sup> March which was well received by those who attended.

**Dr. Sebastian Kamann** gave an invited seminar, entitled ‘Stellar Clusters as the Nurseries of Black Holes’ at McGill University in Montreal on Tuesday 28<sup>th</sup> March.

(BEST) LJMU hosted the 59<sup>th</sup> Annual Construction International Conference from the 2<sup>nd</sup> – 5<sup>th</sup> April. The conference was held outside of the USA for only the second time and LJMU was chosen due to the reputation of the School of Civil Engineering and Built Environment. Formal feedback from the ASC highlighted that the event at LJMU had the second highest number of registrations in the history of the

event and has been recognized by the Board as a huge success. More information about the conference can be found on the [website](#).

(BEST/LOOM) **Dr. Monower Sadique** and **Dr. Musa Bashir** presented the latest Experience Sharing Workshop on the Wednesday 20<sup>th</sup> March 2023. The workshop was titled ‘Submitting Innovate UK Proposals (led by University or partner company)’ and was well received by colleagues in attendance. Slides from the workshop along with the previous workshops and seminars can be found [online](#).

(DSRC) **Emeritus Professor Paulo Lisboa** delivered his Faculty Research Seminar on Thursday 30<sup>th</sup> March 2023 in the James Parsons Upper lecture theatre. The title of the seminar was ‘Glass-Box Models’ and it discussed the importance of model transparency in real-world applications, outlining a taxonomy of explainable and interpretable models.

(FET) The Faculty will be hosting the next University Research and Knowledge Exchange Conference 2023, and a date has now been confirmed for Monday 18<sup>th</sup> December. Colleagues are encouraged to save the date, with further details to be circulated in due course.

(RCEEE) **Dr Barry Gomm** has joined the Technical Program Committee for the IEEE IAS Globcon series of conferences.

**Dr. Karl Jones** chaired the International Conference on Intelligent Systems and New Applications held at LJMU, 28<sup>th</sup> – 30<sup>th</sup> April 2023 (<https://icisna.org/>). The conference provided opportunities for different areas in the field to exchange new ideas and application experiences, establish business and research relations and to find global partners for future collaborations.

# Faculty of Engineering and Technology

March 2023

## FET RESEARCH NEWSLETTER

### EXTERNAL RESEARCH GRANTS SECURED (THRESHOLD: £10K)

(BEST) £53k allocated to LJMU, A collaborative capacity building network for training and research for rails and seaports infrastructure industry development aligned with SDGs, **Dr. Ana Armada Bras** (PI), **Prof. Mike Riley**, **Prof. Trung Thanh Nguyen**, **Dr Michaela Gkantou**, **Dr. Kurannen Baaki** and Prof. Rosalind Jones. British Council UK Malaysia Catalyst, 2022-2023.

£169k allocated to LJMU, Alternative Biomineralisation for Concrete without cement (ABC), **Dr. Ana Armada Bras** (PI), Dr. Francesca Giuntini (SCS). European Union Marie Sklodowska-Curie Action (MSCA) Postdoctoral Fellowship, 2023-2025.

£122k allocated to LJMU, Geoblocks – Developing a Cement-free Novel Geopolymer Concrete for Breakwaters through using waste generated from cathode ray tube recycling facility, **Dr. Monower Sadique**, **Dr. Iacopo Carnacina**. Innovate UK, 2023-2024.

£35k allocated to LJMU, Clay free, cement free and calcination free Brick (GeoBrick) & Block, **Dr. Monower Sadique**, **Dr. Iacopo Carnacina**. Innovate UK, 2023-2024.

£10k allocated to LJMU, Developing an Implementation Framework for Stair Falls Interventions, **Dr. Emma Mulliner** (PI), Dr. Thomas O'Brien (SCS). Newcastle University, ART of Healthy Ageing, Pump Prime Grant, 2023.

(LOOM) £568k allocated to LJMU, Retrofittable Propulsion System for Electric Vessels with Hydrogen Range Extender, **Dr. Musa Bashir** (PI), **Dr. Hiren Kotadia**, **Prof. Jin Wang**, **Prof. Zaili Yang** and **Prof. Nduka Ekere**. Innovate UK, 2023-2025.

£182k allocated to LJMU, Development of a Fully Intelligent Maintenance Framework for Prognostic Health Management of Floating Offshore Wind Turbines, **Dr. Musa Bashir** (PI), **Prof. Jin Wang**, **Prof. Nduka Ekere** and **Dr. Sean Loughney**. European Union Marie Sklodowska-Curie Action (MSCA) Postdoctoral Fellowship, 2023-2025.

### AWARDS/PRIZES/KEYNOTE ADDRESSES (AT RECOGNISED INTERNATIONAL CONFERENCES)

(BEST) **Dr. Michaela Gkantou** delivered a keynote lecture on “Buckling behaviour of aluminium alloy columns” in the Tianjin University Mini Symposium on 13<sup>th</sup> December 2022.

(LOOM) **Dr. Musa Bashir** delivered a keynote address “Supporting the Growth of the Offshore ‘Green Energy’ Sector”, Inaugural Veteran for Green Energy Forum, 23<sup>rd</sup> February 2023, Liverpool. The

presentation attracted more than 100 attendees including Commodore Phil Waterhouse, Naval Commander Northern England; David McGinley, CEO Cammell Laird Shiprepairers and Shipbuilders Ltd & Atlantic and Peninsula Marine Services; Daniel McGrail, CEO RenewableUK; the Mayor of Liverpool, Roy Gladden; and Mark Knowles, Head of Energy, and Industry at the Liverpool City Region Combined Authority.

## IMPORTANT ITEMS FOR POSTGRADUATE RESEARCHERS INCLUDING PHD COMPLETIONS AND RESEARCH INITIATIVES AT FET

(FET) The Faculty is pleased to welcome two new PGR reps to the society; Molly Hawker and Rachel Ren will be joining current rep David Hitchmough in this role. To coincide with this the faculty will be launching a quarterly PGR newsletter which will highlight the research and achievements of the current students.

The Faculty will be holding their annual Faculty Research Day on the 24<sup>th</sup> May 2023. This year will be a return to a fully face-to-face event with PGRs presenting a photo, poster, paper, or oral presentation depending on where they are up to in the PGR journey. Colleagues are encouraged to save the date, with further details to be circulated in due course.

### EXTERNAL COLLABORATION

(BEST) **Dr. Anupa Manewa** was awarded £39k from the British Council's Industry Academia collaborative grant under the Going Global Partnership call. This 10-month long project (Industry Academia Co-operation for Sustainable Ecosystem) is in collaboration with the BNCA College of Architecture for Women, Pune, India and several industry partners, will commence in January 2023. The project aims at establishing new ties between UK and India by developing innovative

teaching practices for built environment HE and further enhances student/staff exchange opportunities for LJMU and the Indian HEIs.

(PROTECT) **Dr Wasiq Khan** delivered a keynote speech on 'Applied AI in National Security' at a TAG event, Salford. This resulted in a paid consultancy role on a funded project by ACE Framework.

### INTRODUCTION TO NEWLY APPOINTED RESEARCH ACTIVE MEMBERS

(ARI) **Dr. Gavin Lamb** started working at the ARI on 11<sup>th</sup> January 2023 and was previously a PhD student here before taking up a postdoctoral position at the University of Leicester. Dr. Lamb returns to the ARI on a very prestigious Royal Society Dorothy Hodgkin

Fellowship and as a new member of the academic staff. Dr. Lamb is an expert in the modelling of relativistic jets (e.g., associated with GRBs) and is also interested in the EM signatures of gravitational wave sources.

### NOTABLE PUBLICATIONS

(ARI) **Healy-Kalesh, M., Darnley, M.**, et al. (2023) 'On the Observability of Recurrent Nova Super-Remnants', *MNRAS*, pp. 1-20, [DOI](#).

(EEE) Joksimovic, M.G., **Levi, E.**, Vukosavic. S.N., (2023) 'Near-Complete Suppression of Harmonic Currents in SPMSMs Caused by Back EMF and Dead Time', *IEEE Trans. on Industrial Electronics*, vol. 70, no. 5, pp. 4472-4484, [DOI](#).

(MEMARC) **Malkeson, S.P.**, Alshaaili, S., Chakraborty, N. (2023) 'Numerical investigation of steady state laminar natural convection of power-law

fluids in side-cooled trapezoidal enclosures heated from the bottom', *Numerical Heat Transfer, Part A: Applications*, [DOI](#).

(PROTECT) **Alatrany, A.S., Khan, W., Hussain, A.J., Mustafina, J. and Al-Jumeily, D.**, (2023) 'Transfer Learning for Classification of Alzheimer's Disease Based on Genome Wide Data', *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, pp. 1-12, [DOI](#).



## OTHER ITEMS

(ARI) **Dr. Renske Smit** delivered the joint Munich Astrophysics Colloquium to the European Southern Observatory (ESO), the Max Plank Institute for Astrophysics (MPA), and the Max Plank Institute for Extragalactic Astronomy (MPE) on 26<sup>th</sup> January 2023. There are only 10 per year and the combined audience is usually well over 100, so being invited to deliver this colloquium is noteworthy.

The Lorentz Centre in Leiden has recently approved a proposal from **Prof. Rob Crain** and 3 international collaborators, to hold a week-long symposium there in September 2023, focused on future developments in cosmological simulations.

**Prof. Rob Crain** has accepted the position of Chair for the STFC DiRAC HPC Facility's Astronomy and Cosmology Panel (there is also a particle physics panel). He will take up the position from October 2023, although work will begin over the summer.

An NRT expo event will take place on Wednesday, 22<sup>nd</sup> March 2023, 1-4pm, in the ALZ in Byrom Street. The event will be an opportunity for FET colleagues and students to learn more about the New Robotic Telescope project, with lightning talks from the science and engineering team members, and some demos of the work in progress. Everyone is welcome to come for the full 3 hours or drop in at a time that suits them. More information will be shared closer to the time.

**Prof. Ian McCarthy's** Inaugural Professorial Lecture will take place on the 15<sup>th</sup> March 2023. The title of the talk is 'The Universe inside a Computer.' and tickets can be booked [here](#).

(BEST) **Prof. Hassan Al Nageim** has been part of a successful bid with Liverpool City Council. They have been awarded £4m by the Department of Transport after successfully pitching an innovate idea to improve the carbon footprint of how it designs and resurfaces

its roads. The award was recently mentioned on the [website](#) and has garnered local media attention.

**Dr Ana Bras** has been invited to join the Institution of Civil Engineers (ICE) to help on the development of guidelines for the design and construction of net-zero infrastructure.

**Dr. Michaela Gkantou** was awarded the Best Award in Engineering at the 'She STEMS Symposium 2022' organised by Greek Women in STEM in Athens on 17<sup>th</sup>-18<sup>th</sup> December 2022.

(DSRC) **Dr Ivan Olier-Caparroso** and **Dr Sandra Ortega-Martorell** have developed a major new global free expression index, called the 'Index Index'. It was officially launched on the 25<sup>th</sup> January 2023 and has garnered attention on various news outlets. The index uses innovative machine learning techniques to map the free expression landscape across the globe, giving a view of the state of free expression across academic, digital and press freedoms. The index can be accessed [here](#).

(GERI) After the success of the previous event **Dr. Martin Sharp** and IET held a talk on the 25<sup>th</sup> January 2023 at LJMU. The speaker Mark Auty discussed '21<sup>st</sup> Century Laboratory Automation' which was well received by the audience.

(LOOM) £5k allocated to LJMU, The Impact of Industry 4.0 Port Technologies on Port Resilience, **Dr. Chia-Hsun Chang**. International Association of Maritime Universities, 2023.

(MEMARC) A project between the Advanced Manufacturing Centre (University of Malaya) and MEMARC (**Prof. James Ren**) on Friction stir welding with nanomaterials additive for industrial applications" under the Distinguished International Associates programme was successfully selected by the Royal Academy of Engineering UK.

# Faculty of Engineering and Technology

January 2023

## FET RESEARCH NEWSLETTER

### EXTERNAL RESEARCH GRANTS SECURED (THRESHOLD: £10K)

(BEST) £15k allocated to LJMU, Optimising Mechanical Properties of 3D Printed Concrete for Prefabrication Construction, **Dr. Michaela Gkantou**. Royal Society, 2023-2024.

£32k allocated to LJMU, Accelerated Knowledge Transfer in Partnership with Zenova Group Ltd., **Dr. Monower Sadique, Dr. Joseph Amoako-Attah, Dr.**

**Neale Davies** and **Dr. Ali Shubbar**. Innovate UK, 2022-2023.

(LOOM) \$29k allocated to LJMU, Evaluating Skill Requirements for Maritime Autonomous Surface Ships, **Dr Chia-Hsun Chang** (PI), **Dr Christos Kontovas**, and **Dr Robyn Pyne**. LJMU as the Lead Partner for the grant of \$60k funded by International Association of Maritime Universities, 2023-2024.

### AWARDS/PRIZES/KEYNOTE ADDRESSES (AT RECOGNISED INTERNATIONAL CONFERENCES)

(GERI) **Dr. Juan Ahuir-Torres** has won an Excellent Paper Award, for his publication entitled 'Study of the Normal Force and Velocity Influence on the Fused Silica Scratching Mechanisms with  $\alpha$ -Alumina Grit at Atomic Scale via Reaxff Reactive Molecular Dynamic Simulations' as part of the 24<sup>th</sup> International Symposium on Advances in Abrasive Technology, 10<sup>th</sup>-11<sup>th</sup> December 2022.

**Dr. Andre Batako** delivered a keynote lecture at the Summer International School of Engineering and Management, Zhengzhou University, China. **Dr. Batako** also delivered a lecture as Visiting Fellow at Wroclaw University of Science and Technology, Poland. Dr. Batako also acted as honorary observer at a PhD Viva Examination and an honorary exam invigilator at the Witelon Collegium State University.

(LOOM) **Dr. Eddie Blanco-Davis** delivered a keynote lecture, 'The usage of e-fuels in different transport modes, and their significance as a sustainable alternative', at the 8<sup>th</sup> International Engineering, Science and

Technology Conference (IESTEC), 19<sup>th</sup>-21<sup>st</sup> October 2022, Panama City, Panama.

**Prof. Zaili Yang** delivered two speeches, the opening keynote 'Climate mitigation and adaptation in transportation' at the 2022 International Joint Conference on Civil and Marine Engineering, 23<sup>rd</sup>-25<sup>th</sup> December 2022, and a plenary talk 'Climate Risk Analysis in Transport: Uncertainty Modelling' on the World Transport Convention Logistics Forum, 1<sup>st</sup> December, 2022.

(RCEEE) **Prof. Emil Levi** delivered an invited keynote address, 'Charging infrastructure and the charging options for electric vehicles', [5<sup>th</sup> International Conference on Smart Energy Systems and Technologies \(SEST 2022\)](#), Eindhoven, Netherlands, 5<sup>th</sup>-7<sup>th</sup> September 2022.

### IMPORTANT ITEMS FOR POSTGRADUATE RESEARCHERS INCLUDING PHD COMPLETIONS AND RESEARCH INITIATIVES AT FET

FET have been awarded 7 PhD Scholarships in this years' Bicentenary VC PhD Scholarship Scheme 2022/23. Many congratulations are offered to all successful applicants. PhD candidates will be joining the Faculty in the coming months.

- 1) Reham Alwash 'Development and Assessment of an Innovative Adsorbent from the byproducts of Power Production Towards Maximum Phosphates Adsorption from Water', **Dr. Manolia Andredaki** (BEST).
- 2) Massoud Mohsendokft, 'Dynamic Risk Assessment of Autonomous Ships using an Integrated Safety and Security Analysis Approach', **Prof. Zaili Yang** (LOOM).
- 3) Guosheng Wang, 'Brain-inspired Green Artificial Intelligence with Low Power and

Imperfect Memristors', **Prof. Wei Zhang** (RCEEE).

- 4) Zifei Xu, 'Intelligent Framework for Realtime Structural Health Management and Prognostics of Floating Offshore Wind Turbines', **Dr. Musa Bashir** (LOOM).
- 5) Davood Mohammadi, 'Optimising the Planning and Operations of Mixed-fleets of e-vans and e-bikes, with an Application to Healthcare and Logistics Delivery in the Liverpool City Region', **Prof. Trung Thanh Nguyen** (LOOM).
- 6) Peiman Sepahvand, 'Investigation of Offshore Wind Turbine Performance Considering the Aeroelastic Effects', **Dr. Ava Shahrokhi** (MEMARC).
- 7) Parisa Mostafazadeh, 'Liquefied Natural Gas (LNG) Portfolio Optimisation', **Dr. Ben Matellini** (LOOM).

## RESEARCH IMPACT GENERATING ACTIVITIES

(ARI) **Sebastian Kamann** and a collaborator from the European Southern Observatory (ESO), Julia Bodensteiner, have recently received notification that their proposal to organise a conference called 'Two in a million - binaries in star clusters' will be supported by ESO. The rationale behind the conference is that on the one hand, binary stars have a massive impact on the evolution of star clusters, while on the other hand, certain types of binary stars are only observed in clusters. However, the current census of binary systems in star clusters is still very incomplete. They will be bringing together two astronomical communities (binary experts and star cluster experts), to discuss how to advance the field. The 5-day conference should be held at the ESO headquarters in Garching (Germany), in Autumn 2023, and will host 100-150 international scientists.

(LOOM) In collaboration with the Liverpool Royal Hospital and NHS Cheshire and Merseyside, **Prof. Trung Thanh Nguyen**, Mrs. Diane Fitch and **Mr. Venky Yalagala** have successfully installed three sensors (traffic, outdoor air quality, indoor air quality) in and outside Liverpool Royal Hospital. These sensors

will feed real-time data to LJMU/LOOM Smart Green Dashboard sensor platform, allowing us to understand the impact of traffic and air pollution on patients, visitors and staff in the hospital, paving ways for better hospital operations and a potential low-traffic neighborhood. The Team have also been working with Sefton Council in a joint air quality monitoring co-location study to determine how accurate lower cost air pollution sensors are, compared to Sefton's own DEFRA approved air quality station. The work has provided input for Sefton Council to make an informed decision on air quality monitoring in their various projects, e.g. School Streets. The work was reported in the 2022 Air Quality Annual Status Report by the Council.

**Prof. Nguyen**, Mrs. Fitch, and **Mr. Nathan Horne** have started a collaboration with Voi to potentially integrate information about Voi e-bicycles into their Smart Green Journey app, which is part of LCR's Metro Mayor Active Travel campaign. If successful, this integration will make it easier for app users to access a network of e-bikes available in the region.

## NOTABLE PUBLICATIONS

(ARI) González-Torà, G., Wittkowski, M., **Davies, B.**, Plez, B., and Kravchenko, K. (2022) ‘The effect of winds on atmospheric layers of red supergiants. I. Modelling for interferometric observations’, *Astronomy and Astrophysics*, pp. 1-13, [DOI](#).

(GERI) Li, Q., Yuan, S., Gao, X., Zhang, Z., Chen, B., Li, Z., **Batako, A. D.L.** (2023) ‘Surface and Subsurface Formation Mechanism of SiCp/Al Composites Under Ultrasonic Scratching’. *Ceramics International*, Vol. 49, Issue 1, pp. 817-833, [DOI](#).

(LOOM) Lin C., **Yang, Z.** and **Chang, C.H.** (2022) ‘Facilitating Adoption of Virtual Communities through Emotional Connection in the Global

Logistics Industry’, *International Journal of Logistics: Research and Applications*, pp. 1-19 [DOI](#).

(PROTECT) **Kolivand, H.**, Hamid, A.A.B.A., Asadianfam, S., Rahim, M.S.M. (2022) ‘A functional enhancement on scarred fingerprint using sigmoid filtering’. *Neural Computing and Applications*, Vol 37, pp.19973-19994, [DOI](#).

(RCEEE) Gu, M., Wang, Z., **Dordevic, O.** (2022) ‘Analysis and Reduction of Current and Voltage Ripple in DC-Link for Analysis and Reduction of Current and Voltage Ripple in DC-Link for Three-Level NPC Inverter-Fed Dual Three-Phase Motor Drives’. *IEEE Transactions on Power Electronics*, Vol. 37, pp. 1-13, [DOI](#).

## OTHER ITEMS

(ARI/PROTECT) A flagship LJMU project is among a select few in the UK showcased in a new [Institute of Physics report](#). Among the select case studies it tells the story of Conservation AI, a REF Impact project run by **Dr. Carl Chalmers**, **Prof. Paul Fergus**, **Prof. Steve Longmore** and Prof. Serge Wich.

£6k allocated to LJMU, Industry Academia Co-Operation for a Sustainable Built Environment Ecosystem, **Dr. Anupa Manewa**. British Council, 2022-2023.

(FET) The Research and Knowledge Exchange Conference took place on the 7<sup>th</sup> December 2022, hosted by the Faculty of Health under the over-arching theme of ‘Navigating Pandemic Times’. Faculty Research and Knowledge Exchange Committee would like to offer their sincerest congratulations to the following VC Award Winners who were presented by Vice Chancellor, Prof. Mark Power during the conference:

- 1) VC’s Award for Excellence in Knowledge Exchange: **Anthony Walker**, Strategic Manager, School of Engineering, who heads up LCR 4.0 which has had a gross impact of more than £80m in the economy.
- 2) VC’s Award for Excellence in Postgraduate Research Supervision: **Dr. Ben Matellini** (LOOM). Senior Industrial Lecturer, School of Engineering for outstanding supervision of postgraduate researchers.

- 3) VC’s Award for Excellence ‘Rising Star’: **Dr. Sean Loughney** (LOOM). Lecturer in Maritime Management, School of Engineering for his work in maritime decarbonisation and publication of a plethora of papers, book chapters and conference presentations.

(FET) The Professional Lecture Series commenced in November 2022 where **Prof. Trung Thanh Nguyen** (LOOM) delivered his inaugural lecture titled [‘Back to Nature: Nature Inspired Optimisation in Maritime, Transportation and Engineering’](#). LJMU’s Inaugural Lecture series provides a platform to showcase and celebrate the University’s new professors. Each lecture represents a significant milestone in an academic’s career and is an opportunity for each Professor to present an overview of their academic contributions so far and their future plans, while also introducing their work to a wider audience. The next lecture in the series will be delivered by **Prof. Ian McCarthy** (ARI) in March 2023.

(FET) The following FET colleagues have been awarded the QR Policy Support Fund allocation in the 2022 round of funding:

- 1) (BEST) **Dr. Volkan Ezcan**, **Dr. Damian Fearon**. ‘A UK Prioritised strategic framework for offsite construction’, £9,290.
- 2) (DSRC) **Dr. Sandra Ortega-Martorell**, **Dr. Ivan Olier-Caparroso**, Prof. Ian Jones and Prof. Gregory Lip. ‘DECIPHER: Derivation of the

Clinical Phenotypes of Atrial Fibrillation using Artificial Intelligence’, £9,937.20.

- 3) (LOOM) **Prof. Trung Thanh Nguyen**, Mrs. Diane Fitch. ‘Smart Green Things for a clean air and climate-resilient NHS’, £9,999.29.
- 4) (PROTECT) **Dr. Gabriela Czanner, Dr. Athanasios Zolotas, Dr. Silvester Czanner**, Dr. Grahame Smith. ‘Retina in health and disease: A study to explore the experience of optometrists, clinicians and patients when detecting disease Glaucoma’, £10,000.
- 5) (PROTECT) **Dr. Áine Mac Dermott**, Mr. Howard Heath, DI James Milligan and Merseyside Police Digital Forensic Unit (DFU). ‘Deepfake Forensics: a feasibility study and analysis on deepfake impact and challenges for the digital forensics field’, £10,000.

Funded by the Participatory Research Fund:

1. (MEMARC & LOOM) **Dr. Christian Matthews**, Dr. Philip Davies, Dr. Catherine Bourke. ‘UK Maritime Heritage Sector Decarbonisation Strategy – SS Daniel Adamson’, £9,993.

The following have been awarded the FET Pump Prime Awards for 22/23:

- 1) **Dr. Alan Bury** (PI), **Abdul Khalique** (LOOM) and **Dr. Karl Jones** (RCEEE), £4,568.
- 2) **Dr. Andre Batako** (PI), **Dr. Tahsin Opoz**, **Dr. Juan Ahuir Torres**, (GERI) **Dr. Xiaoxiao Liu**, **Dr. Ariyan Ashkanfar**, **Dr. Hiren Kotadia** (MEMARC), £4,695.
- 3) **Dr. Chia-Hsun Chang** (PI), **Dr. Robyn Pyne** (LOOM), **Dr. Sorren Hanvey** (PROTECT), £5,000.
- 4) **Dr. Elon Correa** (PI) (PROTECT), **Dr. Princy Johnson** (RCEEE), £4,930.
- 5) **Dr. Fariba Sharifan** (PI), **Prof. Dhiya Al-Jumeily** (PROTECT), Dr. Sulaf Assi (SCS), £5,000.
- 6) **Dr. George Nikitas** (PI), **Dr. Michaela Gkantou**, **Dr. Maria Ferentinou** (BEST), £5,000.
- 7) **Dr. Hiren Kotadia** (MEMARC), £4,890.
- 8) **Dr. Hu Du** (PI), **Dr. Laurence Brady**, **Dr. Badr Abdullah** (BEST), £5,000.

- 9) **Dr. James Baker** (PI), **Dr. Ivan Olier-Caparroso**, **Dr. Sandra Ortega-Martorell** (DSRC), **Dr. Iacopo Carnacina** (BEST), £5,000.
- 10) **Dr. Layth Kraidi** (PI), **Dr. Omar Aldhaibani** (BEST), £5,000.
- 11) **Dr. Manolia Andreadaki** (BEST), £4,435.
- 12) **Dr. Maria Ferentinou** (PI), **Dr. Ana Armada Bras**, **Dr. Iacopo Carnacina**, **Dr. Michaela Gkantou**, **Dr. George Nikitas** (BEST), £5,000.
- 13) **Dr. Omar Aldhaibani** (PI), **Dr. Layth Kraidi** (BEST), £5,000.
- 14) **Dr. Omoleye Ojuri** (PI), **Dr. Ana Armada Bras**, **Dr. Vida Maliene** (BEST, Dr. Colm Bowe (SCS), Dr. Grahame Smith (Health), £2,300.
- 15) **Dr. Pelumi Ojuri** (PI), **Dr. Ana Armada Bras**, **Dr. Maria Ferentinou**, **Dr. Michaela Gkantou**, **Dr. George Kamaris**, **Dr. George Nikitas** (BEST), £5,000.
- 16) **Dr. Sean Loughney** (PI) (LOOM), **Dr. Karl Jones** (RCEEE), £3,000.
- 17) **Dr. Tina Marolt-Cebasek** (PI), **Dr. Zelong Yu**, **Dr. Magomed Muradov**, **Prof. Patryk Kot** (BEST), £5,000.
- 18) **Dr. Yun Sheng** (PI), **Prof. Abdennour El-Rhalibi** (PROTECT), £4,220.
- 19) **Dr. Zelong Yu** (PI), **Dr. Monower Sadique** (BEST), £4,500.

(FET) The Clean Growth UK project team led by **Anthony Seasman**, **Sharlene Whittle** and **Dr. Neale Davies** have created a [2-minute animation](#) to raise awareness, inspire action and generate interest in all things relating to the climate crisis for the Liverpool City Region.

(GERI) **Dr. Andre Batako** was invited by the Secretary General of the Commonwealth her Honorable Patricia Scotland and the President of Togo to attend the inauguration event of the Republic of Togo becoming a member of the Commonwealth. **Dr. Batako** is Guest Editor for the Journal of Material MDPI (IF 3.67) and chaired a session at the Manufacturing Conference in Poznan, 2022.

**Prof. Xun Chen** has recently been elected as the Chairman of the International Committee for Abrasive Technology.