

Welcome to the May edition of the DSI newsletter of 2024. We are excited to share updates on some key happenings across the Digital Sciences.

The DSI Colloquium on "*Digital Transformation*" is just around the corner, offering an invaluable opportunity for us to come together and explore the latest developments in digital sciences. We have an impressive lineup of speakers and look forward to showcasing on our existing projects and fostering new conversations across the span of our activities.

In this newsletter, we share outcomes from some of our 2023 DSI pilot research projects, highlighting the innovative work being done by our academics. These projects represent our ongoing commitment to supporting impactful, multidisciplinary research that addresses key societal concerns. We also reflect on two projects in healthcare and agriculture funded by the Vonwiller foundation, that truly demonstrate multidisciplinary collaboration.

Our seminar series continues to provide a platform for knowledge sharing and engagement covering diverse topics across faculties. We aim for these sessions to not only offer valuable learning and networking opportunities but also to highlight the depth of digital research initiatives underway across our campuses. Our aim is to seed potential future collaborative opportunities by showcasing some of the outstanding work being undertaken by our academics. We encourage you to come along and join in the conversations.

We look forward to seeing many of you at our upcoming Colloquium and continuing to support work from across the University that pushes the boundaries of digital sciences research, education and engagement.

Prof. Stefan B. Williams
Director, Digital Sciences Initiative



Digital Transformation Colloquium

The Digital Sciences Initiative is hosting a **Digital Transformation Colloquium** to be held on Wednesday 29th of May 2024 in line with the strategic focus of bringing together researchers and industry partners to cross-pollinate ideas across different disciplines and explore innovative solutions in the digital space. The colloquium will focus on digital transformation in agriculture, health and

society, exploring how digital technologies can contribute to building a more sustainable and resilient future. The colloquium will feature two keynote presentations, panel discussions and talks from experts both from the University as well as industry. Lightning talks (1 min pitch) will lead into a poster session that will highlight some of the outstanding work being undertaken by our students and post-docs across the faculties and

Theme: **Digital Transformation**

Date: **Wednesday 29 May 2024**

Time: **8.30am - 3.30pm**

Registration is essential.

This colloquium promises to be a dynamic forum for sharing insights, fostering collaboration and exploring the frontiers of Digital Transformation.

If you are interested in joining the event please [contact us](#).

[Learn more](#)

Vonwiller Foundation project updates



The Vonwiller Foundation provided philanthropic support for two DSI projects in 2023 in the areas of precision agriculture and the early diagnosis of coronary artery disease. Workshops were organised with the sponsors in April-May this year to provide updates on the progress for these important projects. These projects draw on the multidisciplinary strengths of the University and are a testament to the power of collaborative research with strong engagement across faculties and institutes.

1. Precision Agriculture

The Precision Agriculture project looks at informing land management practices through the incorporation of robotics, sensors and IoT to capture targeted data on soil moisture and soil macronutrients. Data assimilating models allow this information to be combined to provide insights to growers about soil condition and to inform a 'digital twin' of farm assets. This information is constantly updated by on-farm robots and sensor data to determine optimal sample locations for the

agricultural field robot planning algorithms. The project is focused on refining these techniques and demonstrating them in real world growing conditions. Consideration is also being given to the commercial potential of the technology and its pathway to impact.

This project is led by [Prof. Salah Sukkarieh](#) from ACFR in collaboration with [Prof. Alex McBratney](#) (Director, Sydney Institute of Agriculture).

2. Bio-Heart Project

The Bio-heart project supports data analytics for Coronary Heart Disease and is led by [Prof. Gemma Figtree](#) to address one of the leading causes of premature death worldwide. Prof. Figtree's team is part of [CAD Frontiers](#), a not-for-profit company, and is working on identifying blood-based biomarkers that might herald the earliest signs of heart disease. This project is leveraging the considerable data archives collected by the CAD Frontiers team to explore how the latest developments in machine learning can help to discover novel signatures of coronary plaque. The DSI Digital health imaging team led by [Prof. Jinman Kim](#) is supporting CAD Frontiers through building multimodal algorithms that analyse CT scans and link image-based features with data extracted from the blood-based omics data. The team also includes [Prof. Stuart Grieve](#), Professor of Radiology in the Faculty of Medicine and Health and [Prof. Jean Yang](#), an applied statistician with expertise in statistical bioinformatics from the Faculty of Science, who each bring their own unique insights to addressing this important problem.

This project represents an example of the DSI strategic focus on encouraging multidisciplinary collaboration across faculties. This project was celebrated through an engaging talk at the DSI seminar delivered by Prof. Gemma Figtree on 8 May.

The Bio-heart team is looking for PhD students to work on this exciting project. If you know anyone interested please reach out at figtree-group.admin@sydney.edu.au.



Collaboration with GE Aerospace

A DSI seed grant awarded in 2023 in collaboration with GE Aerospace supported a project entitled ***AI-aided NLP and other methodologies to automate onboarding EMS parameter mapping into the GE Aerospace data visualisation tool***. The goal of this project was to explore the potential for AI-based methods to be part of flight data parameter mapping process.

The system developed through the collaboration has achieved impressive results, confirming that the model can accurately identify data sources while reducing the amount of work for expert data analysts by a factor of 10. This has the potential to allow these experts to focus more time on challenging cases. The model also has the potential to identify human labelling errors, further improving outcomes for GE customers.

This project was designed to seed new collaboration between GE Aerospace and The University of Sydney. GE Aerospace provided data and guidance for the project, while the DSI provided funding for research assistants and also helped establish links with suitable academic staff in Aeronautical Engineering and Computer Science. The DSI team included [A/Prof. Nicholas Lawson](#) from the School of Aerospace, Mechanical and Mechatronic Engineering and [Dr. Jonathan Kummerfeld](#) and [Dr. Josiah Poon](#) from the School of Computer Science as well as two students who were employed on the project and contributed to the development new Natural Language Processing (NLP) tools.

DSI Members- Recent Achievements



IEEE Fellowship

Congratulations to the [2024 newly elevated IEEE Fellows Prof. Salah Sukkarieh](#) (School of AMME) for contributions to robotic navigation in aerial and agricultural applications. He is also the DSI mission Lead for Digital Agriculture.

[Prof. Sri Parameswaran](#) (School of Electrical and Computing Engineering) for contributions to embedded computer circuits and systems.

ARC Fellowships

[Prof. Jinman Kim](#) was awarded the [ARC Mid-Career Industry Fellowship 2024](#) for the project *Enhancing Multidisciplinary Team Meetings via AI-Enabled Data Assimilation*.

Jinman is the DSI mission lead for Digital Health Imaging.



[Dr. José-Miguel Bello y Villarino](#) from the Faculty of Law was among the seven researchers who were awarded the [ARC Early Career Research Fellowship](#) for his project on using AI to uncover corruption and provide a legal and policy roadmap for fair use of AI. The project will be conducted with NSW Independent Commission Against Corruption (ICAC).

José-Miguel will be the speaker for the June DSI Seminar, details below.



The James Martin Institute (JMI) award

Congratulations to [Prof. Kalervo Gulson](#) and team on winning the prestigious [JMI annual Policy Challenge Grants 2023](#) for their projects to inform public policy challenges of AI enabled technologies. This multidisciplinary project brings together policy makers and academics from law, data science and education.

Prof. Gulson is from the Faculty of Arts and Social Sciences and is part of the DSI leadership team. [Read more](#)



2024 Vice President of Material Australia

Congratulations to [Prof. Gwenaelle Proust](#) on being elected as the Vice President of Materials Australia!

Prof. Proust is from the School of Civil Engineering and the Deputy Director of the Sydney Manufacturing Hub. She is the lead for Advanced Manufacturing and Materials mission of DSI.



Medical drone funding

The DSI team would like to extend their congratulations to [A/Prof. Dries Verstraete](#) for his success in securing \$3.6 million over 5 years for the development of hydrogen powered eVTOL (emissions free vertical take-off and landing) drones. The project is focused on delivering a world first emissions-free medical drone capability with sufficient range to provide essential health services to rural and remote parts of Australia. Called the [Wildu Aero Project](#), the project is a partnership between the University of Sydney and [ASAC Consultancy](#) - a health advisory organisation focused on addressing health inequalities in rural and remote regions through early detection, prevention and treatment of a variety of health conditions. The drones will be designed to carry vital medical cargo and cover distances over 500km using sustainable, hydrogen and emissions free fuels and will use the latest digital technologies to optimise and monitor the airframe. [Learn more](#)

Raising the Bar, Sydney

DSI member, [Dr. Daria Anderson](#) from the School of Biomedical Engineering participated in [Raising the Bar](#) on 9 April 2024 and spoke on the topic, *New neurological disease treatments (and a wobbly cat)*.

Her research has been inspired by their cat Phineas that was born with a neurological disorder. The talk discussed therapies that use electrical interfacing with the brain and apply viruses to the nervous system.

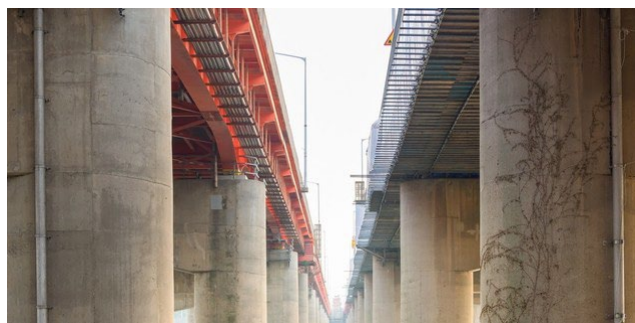


DSI Research Pilot projects in the media

Smart Sensors for Bridge Defects

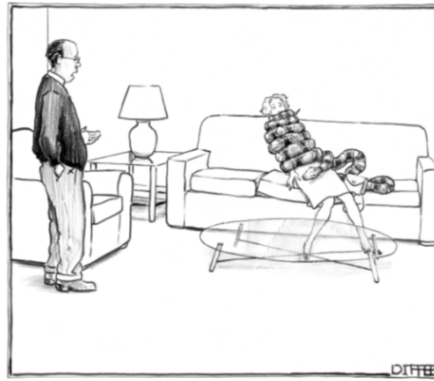
In the real world, it is challenging to monitor the structural deterioration of concrete structures like bridges. Detection of defects allows early, efficient and cost-effective interventions.

[Dr. Ali Hadigheh](#) and his team from the School of Civil Engineering are working on digitalising corrosion monitoring using optical sensors, machine learning and digital twin models. Dr. Hadigheh was interviewed by [news.com.au](#) on Smart sensors for bridge defects.



DSI member Dr. Ali Hadigheh is a Senior Lecturer and ARC DECRA Fellow in the School of Civil Engineering. This work is done in collaboration with Transport for NSW (TfNSW) and partly supported by the 2023 DSI Pilot Project Funding. The digital twin (DT) model developed as part of his pilot project funding also served as a teaching resource in the course '*CIVL5277 Structural Rehabilitation and Timber Design*,' benefiting over 60 undergraduate and postgraduate students at USyd. In collaboration with other universities, there are plans to grant access to the use of this Digital Twin (DT) model for students in other universities across the country.

AI and Comedy



Original caption: "To be fair, Martha, you started it."
AI assisted caption: "How many times have I told you not to eat on the sofa?"
Caption without the tool: "I suppose I'm cooking then."

(Cartoon credit: Matthew Diffee, The New Yorker, ©Condé Nast)



Original caption: "It's not just that he walks upright and uses complex tools. He also makes me laugh."
AI assisted caption: "Sorry, I've gone vegan."
Caption without the tool: "Moving in wasn't quite what she'd expected."

(Cartoon credit: Mick Stevens, The New Yorker, ©Condé Nast)

[Dr. Anusha Withana](#) and team have used AI-assisted applications to write captions for cartoons and help non-native speakers understand humour in a new language. He was interviewed by [ABC](#) and the work featured in the [Australian Financial Review](#).

DSI member Anusha is an ARC DECRA Fellow and Senior Lecturer in the School of Computer Science. This project was supported by the Digital Sciences Initiative through the 2023 DSI Pilot Research Funding.



Regulations for Cryptocurrencies

Our researchers have been working on understanding the regulatory environments around cryptocurrencies. Policy responses to Central Bank Digital Currencies and Cryptocurrencies by 68 Central Banks operating in different countries and Global Institutions (e.g., Basel, IMF, World Bank) were collected and analysed. Various blockchain and cryptographic protocols for regulation, compliance, privacy preservation, and some new

decentralised finance applications were designed and developed.

This project is a collaboration between [Dr. Qiang Tang](#) - School of Computer Science, Faculty of Engineering and [A/Prof. Danny Gozman](#) and [Prof. Daniel Schlagwein](#) from USyd Business School. The project received media interest including a range of interviews on this interesting topic. Dr. Qiang Tang was interviewed by

- SBS on "[The Money Show](#)" discussing cybersecurity issues.
- ABC News on the [Central Bank Digital Currencies](#).
- ABC News on the [Binance Case](#)

Prof. Daniel Schlagwein was interviewed by

- Australian Financial Review. ['What the Eff?'](#)
- ABC (web): [Bitcoin miners are celebrating again but how long will this latest boom last?](#)
- The Australian: [ASIC loses key crypto case in court.](#)
- The Business (TV): [Meet the bitcoin miners racing to crack codes as the cryptocurrency surges.](#)

The project also helped develop some relevant privacy preserving cryptocurrency content for '[COMP5617 Empirical Security Analysis and Engineering](#)', which will be further refined and integrated.

Other updates



US Defence Visit

[Prof. Dan Corbett](#) led a visit with colleagues across the Digital Sciences Initiative and Faculty of Engineering including [Prof. Stefan Williams](#) (Director, DSI), [Dr Kanchana Thilakarathna](#) (Senior Lecturer Distributed Computing) and [Bruce McLean](#) (Chief Engineer, Sydney Manufacturing Hub (SMH)) to showcase the capabilities and capacity of research expertise and labs/infrastructure available across the University of Sydney. The intent is to boost collaboration, innovation, and collective

capability between the University of Sydney, its partners in Australia and trilaterally between UK and USA to help support the strategic priorities outlined in the National Defence Strategy. The university has existing partnerships across USA but is seeking to formalise, strengthen existing partnerships, and establish new links of strategic importance. The team met with agencies of the U.S. Defence Department, including the Army DEVCOM, ARLIS and DARPA, as well as key prime defence companies and potential collaborators that has led to a number of follow up discussions with teams across the DSI, SMH, Australian Centre for Robotics, Sydney Nano, Faculty of Science, Faculty of Arts and Social Sciences, Faculty of Medicine and Health, and The University of Sydney Business School in future collaborative opportunities.

The Australian Rocketry and Propulsion Training Network

The University of Sydney with its partners, UQ, Monash University and RMIT was very excited to launch the [Australian Rocketry and Propulsion Training Network \(ARPTN\)](#) at the beginning of April. The network aims to shape tomorrow's workforce in defence and space through nationwide collaboration between university and industry partnerships. The network includes industry members from the space and defence sectors, vocational, professional and tertiary providers, and key peak industry and government bodies to establish a world class training and education ecosystem in Australia. [Learn more](#)



Feedback on Adopting AI

DSI organised a small workshop with >20 attendees from across the university, aimed at providing valuable feedback to the **Select Committee on Adopting Artificial Intelligence**. With its diverse membership and multidisciplinary approach, DSI is uniquely positioned to bring together experts in AI from different perspectives across Engineering, Science, Business, Social Sciences, Law, Medicine and Health to provide valuable insights and recommendations on the risks and adoption of AI.



DSI remains committed to supporting initiatives that promote responsible and ethical AI adoption. The team will be arranging a Digital Transformation workshop in the near future, if you are interested in contributing to meaningful discussions on Digital Transformation policy and governance, please contact us.

DSI supported Vacation Research Internship (VRI) projects

Our Engineering Vacation Research Internship Program offers engineering, computer science and project management students to work on research projects alongside respected and accomplished key researchers at the University of Sydney. It is designed to provide valuable research experience and is open to those students interested in pursuing a research career at a university or in industry. DSI supported 6 VRI projects over the 2023 -2024 summer break.

Student Name	Project name	Supervisors
Chun Kit Li	<i>Cross-modal medical image generation</i>	Prof. Jinman Kim
Andrea Bosia	<i>Reconstructing Natural Image from Brain Activity</i>	Dr. Jinglei Lv, Prof. Zhiyong Wang, Prof. Fernando Calamante
James Douglas	<i>AI and NLP: Healthcare</i>	Dr. Jonathan K. Kummerfeld
Shuchang Ye	<i>Cross-modal medical image generation</i>	Prof. Jinman Kim
Xiao Ming Zhu	<i>Read the mind with simultaneous EEG-fMRI.</i>	Dr. Jinglei Lv, A/Prof. Mayuresh Korgaonkar, Prof. Fernando Calamante
Yue Wang	<i>Predictive Gesture Classification in Virtual Reality (VR)</i>	Dr. Anusha Withana

The VRI students kicked off their summer program with a spotlight on DSI presented by director Prof. Stefan Williams. Subsequent events organised for the students in 2024 featured talks by DSI members Dr. Clément Canonne and Prof. Gwenaëlle Proust.

DSI Seminar Series



The first event for the DSI kickstarted in February 2024 with the seminar entitled ***Machine Learning with Noisy Labels*** by [A/Prof. Tongliang Liu](#) who is an Associate Professor with the School of Computer Science and The Director of Sydney AI Centre at the University of Sydney. A/Prof. Liu was recently named in the list of [Top 10: Future AI Leaders](#) by the AI Magazine. This was followed by [Dr. Clément Canonne's](#) talk ***(Differential) Privacy: What, Why, How, and When?*** in March. He is a Lecturer in the School of Computer Science.

The April seminar was presented by [Prof. Terry Flew](#) on ***Time for Trust? Scale and relationality in understanding trust relations between people, technologies and institutions***. Prof. Flew is an ARC Laureate Fellow and Professor of Digital Communications from FASS, here at The University of Sydney. Prof. Flew has recently launched the [International Digital Policy Observatory \(IDPO\)](#), world's first comprehensive, open-source and freely accessible database to track global policies and regulations around misinformation.

The most recent seminar in May was by [Prof. Gemma Figtree's](#) on ***Unravelling missing secrets of coronary artery disease with large scale clinical, advanced imaging, and "omics" data***. She is a Professor in Medicine and Chair of the Cardiovascular Initiative at the University of Sydney, and an Interventional Cardiologist at Royal North Shore Hospital. This project is supported by the DSI through the Vonwiller Foundation philanthropic donation.

Our seminars are now held at the Sydney Knowledge Hub on a monthly basis. Keep updated with all our future events [here](#).

We are seeking expressions of interest from researchers to talk about their exciting research. If your work is related to Digital Sciences and Technology or has an impact in this field, we would like to hear from you. If you would like to present your research in this series or subscribe to the email list, please contact the [DSI Team](#).

Upcoming seminar

Wednesday 19 June 2024

12:00pm-1:00pm

Rm 277, Sydney Knowledge Hub, University of Sydney

Keeping up with the Joneses - an insight into the comparative dynamics of the regulation of AI presented by [Dr. José-Miguel Bello Villarino](#), Faculty of Law and the Sydney Southeast Asia Centre.

No registration required.

Save the date

29 May: [DSI Digital Transformation Colloquium](#) - This one day event will focus on digital transformation in agriculture, health and society, exploring how digital technologies can contribute to building a more sustainable and resilient future.

28-29 May: [Australian Space Summit and Exhibition](#) - The two-day event will feature two main stages, hosting over 70 speakers who will engage with an audience of more than 1,000 passionate space enthusiasts.

6 June: [DIN Industry Forum Event](#) - Sydney: Defence Innovation Network invites the Defence, industry and science community to the Industry Forum focused on Composite and Hybrid Structural Materials for Advanced Propellers.

4 July: [AgriFutures Australia: National Renewables in Agriculture Conference and Expo 2024](#) - This event brings together farmers, agriculture and energy consultants, peak bodies and Government representatives to share stories of on-farm renewables, their business case and discuss what's driving the transformation of energy use in agriculture.

24-25 July: [17th Australian Space Forum, Adelaide](#) - Supported by the Australian Space Agency and the South Australian Space Industry Centre, the Forum provides the perfect opportunity to stimulate ideas, share information about emerging technologies and network with influential space sector leaders and the broader community.

24-26 July: [Indian Ocean Defence & Security 2024](#) - Perth: The conference and international industry exhibition will highlight challenges and opportunities for international engagement, and discuss how industry may support diplomacy, defence and security policy in the region.

10-18 August: [National Science Week 2024](#) - In-person and online events, virtual tours, DIY science and more

14-15 August: [TECHSPO- Sydney](#) - This is a two-day technology expo where business, Tech and Innovation collide.

Funding opportunities

[Industry Growth Program](#) - The program provides an Advisory Service for startups and small and medium enterprises (SMEs) undertaking innovative commercialisation and/or growth projects that are within the priority areas of the Australian Government's National Reconstruction Fund (NRF) and help build Australia's manufacturing capability for the future.

[Global Science & Technology Diplomacy Fund](#) - Grants from AUD \$100,000 to \$1,000,000 to support collaboration on key areas of science and technology with priority partners across the Asia-Pacific Region. EOI due 31 May 2024.

[Defence Innovation Network - Strategic Projects](#) - Designed to enable rapid development and delivery of prototypes within 12-18 months. The developed technology has both Defence and commercial applications. \$500k per project. Topics have been announced.

[Contact us](#) if you are interested in applying.

Engage with the DSI team

Learn more about how we can help you to engage with key external stakeholders by [contacting our friendly team](#). If you would like to be added to our seminar series email list or to find out more about any of the above DSI funding opportunities, please [register your interest](#).