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Uniview

THE MAGAZINE OF THE UNIVERSITY OF WESTERN AUSTRALIA

AI — driving our future

THE UNIVERSITY OF WESTERN AUSTRALIA

Message from **the Editor**

Welcome to our Winter edition of Uniview which highlights UWA researchers who are leading the way by harnessing frontier technologies such as artificial intelligence (AI) to tackle global challenges across industries including manufacturing, mining and resources, agriculture and astrophysics.

We showcase some remarkable projects investigating the relationship between public trust and the future of autonomous technologies, as well as the importance of computers and human knowledge speaking the same digital language. In other features, we examine how machine learning models are enhancing the development of crop varieties; ways in which AI has revolutionised the speed in which we can identify and categorise stars; and the pressing need for greater regulations for privacy and data use in Australia.

I'd encourage you to read about the UWA graduate who is leading the nation's most powerful supercomputer in the Pawsey Supercomputing Research Centre, located here in WA. Pawsey supports researchers working on projects such as ocean modelling, drug design and remote after care for hospital patients.

With such rapid advancements in data and technology, naturally there are ongoing challenges and here too, our researchers are actively considering the safeguards. Read about ChatGPT and its impact on Australian schools and universities, along with 'data poisoning' and the legal ramifications from misusing AI — and where we need to intervene to ensure best-practice governance.

We hope you enjoy reading this edition.

Alison Batcheler
Editor
Associate Director, Corporate Communications

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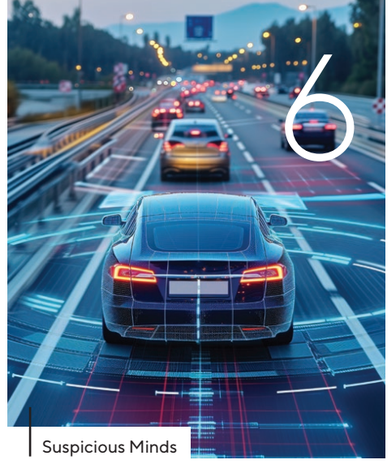
The University of Western Australia acknowledges that its campuses are situated on Noongar land, and that Noongar people remain the spiritual and cultural custodians of their land, and continue to practise their values, languages, beliefs and knowledge.



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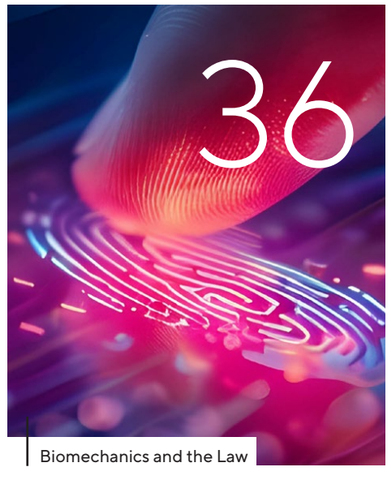

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Cover page: Tape storage at the Pawsey Supercomputing Research Centre

From the **Vice-Chancellery**

Professor Amit Chakma, Vice-Chancellor
The University of Western Australia

Future **frontiers**

According to UWA alumnus Mark Stickells, Executive Director of the Pawsey Supercomputing Research Centre, of which our University is a joint venture partner: "AI is not wisdom. It is a tool. Wisdom and insight are human qualities alone."

For more than 100 years, our students, alumni, and staff have been — as the University's motto inspires us to — seeking wisdom. Because of this, I believe we are well-equipped to work alongside artificial intelligence as it evolves.

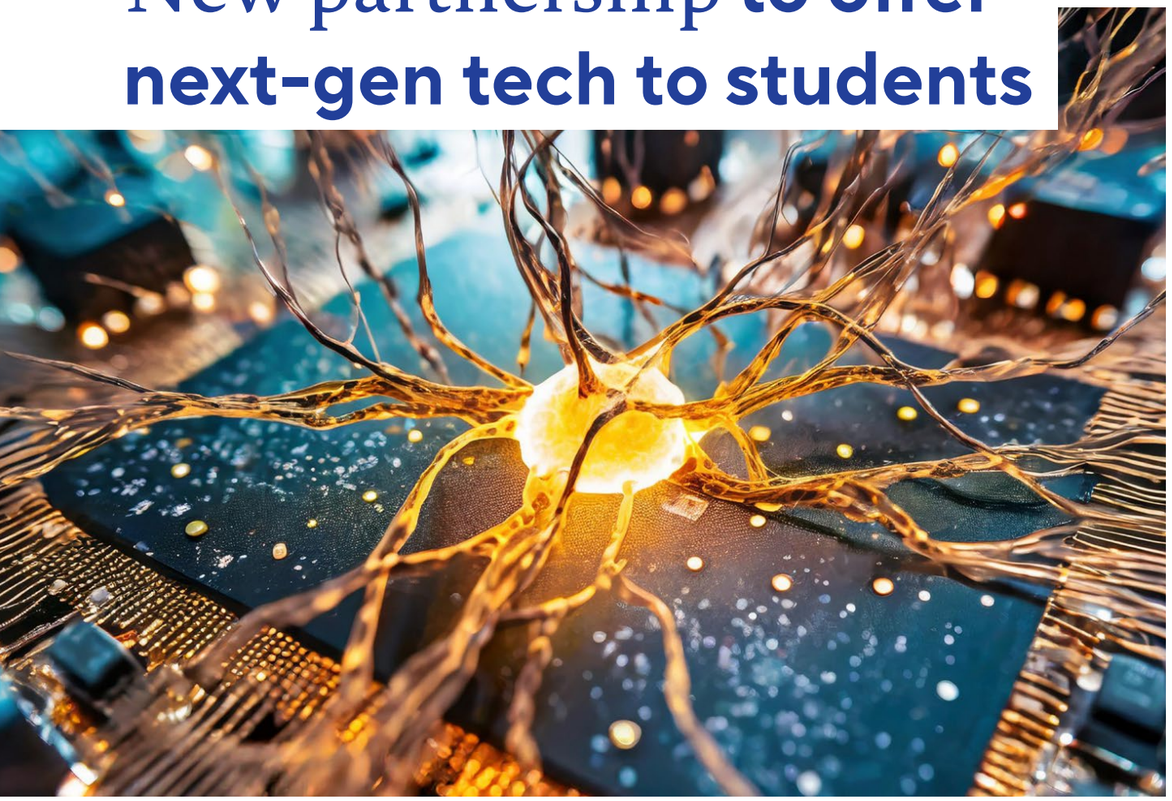
Artificial intelligence has been the subject of science fiction for hundreds of years. It wasn't until 1955 that a breakthrough came with Newell and Simon's creation of the Logic Theorist program.

With rapid advancements in AI, we are now redefining our relationship with this technology in every aspect of our work, from teaching to research. Our focus is not just on using AI but on leveraging it to create a more equitable and just society, a future we are actively shaping.

Our University researchers, spanning all disciplines, are leading the way in these endeavours. In this era, the role of wisdom is more crucial than ever. We can harness AI to write an analytical essay on Shakespeare, but should we? We can use AI to drive a car, but how do we determine acceptable risk levels? We can analyse workplace safety logs, but how should we interpret and apply the findings? These are the questions we are addressing, guided by our unwavering commitment to wisdom.

Artificial intelligence presents us with possibilities — what we make of these is up to us. ■

New partnership **to offer next-gen tech to students**



A cutting-edge collaboration with tech company BrainChip will equip students with the tools and resources they need to pioneer AI solutions.

BrainChip's University AI Accelerator Program offers platforms and mentorship to students in AI engineering programs, allowing them to gain hands-on experience with event-based technologies, enhancing their learning journey from classroom to career.

Associate Professor Rachel Cardell-Oliver, Head of Department of Computer Science & Software Engineering said that as a leading research-intensive university, UWA was recognised for resolving real-world challenges critical to the planet and people.

"Joining the AI accelerator program provides UWA students studying data and computer science with access to neuromorphic technology, a type of computing technology inspired by the structure and function of the human brain," Associate Professor Cardell-Oliver said.

"As technology continues to shape human interactions, it is crucial to provide our students with real-world experience to excel in the tech industry and prepare them for future challenges."

Associate Professor Cardell-Oliver said students would have access to BrainChip's Akida™ IP neural processor, a type of computer chip designed to work like the human brain.

"It processes information in a way that's similar to how neurons in the brain work, focusing on important events and inputs which makes it highly efficient and powerful, especially for tasks like analysing sensor data in real-time," she said.

"Akida is particularly good at conserving energy and can be used in various applications, from smart cars to industrial Internet of Things, where it excels in tasks like incremental learning and fast decision-making."

Vice-President of Ecosystems and Partnerships at BrainChip Mr Rob Telson said UWA's commitment to fostering industry partnerships aligned with the company's mission to empower future AI leaders.

He said by joining the accelerator program, UWA students would gain valuable insights into advancing AI at the device level, positioning them for success in the tech industry. ■

Rising star **Lorian launches into space internship**

Engineering and chemistry student Lorian Marshall swapped lecture theatres for lunar landings in February this year, using her skills in advanced space robotics technology as part of a six-month internship with a new multi-million-dollar space operations hub in Perth.

The final-year student was the only student intern to be selected to join the team and has been based at the world-class Australian Space Automation, Artificial Intelligence and Robotics Control Complex (SpAARC), a joint initiative by the Australian Space Agency, the WA State Government and Fugro.

The complex was established to support research, spur innovation, create jobs and further build Australia's own space industry ecosystem, and allow users to demonstrate and test remote robotic capabilities to deploy into space and other remote environments.

For 19-year-old Lorian, it has been home for six months while she worked on the landmark Trailblazer mission which is overseeing the design, development, testing, and operation of a lunar rover, an Australian contribution to the international Moon-to-Mars program.

The rover's mission will be to collect lunar soil and deliver it to a NASA processing facility on the Moon, the first step to extracting oxygen from the Moon's surface, which will be vital in supporting a sustainable human presence on the Moon, Mars and beyond.

"It's so exciting and really cool to be working on Australia's first lunar rover (Roo-ver) with the Australian Space Agency and there are some fantastic collaborations happening," Lorian said.

"I'm working with the mechanical and software sub-teams exploring potential designs for the sample manipulation system which will control the manoeuvres that collect and deposit the lunar soil or regolith. I'm also writing code that will develop tests for our flight software down the line.

"Our team has been looking at mobility systems and the software and electronics inside the rover; we're testing and running software developed by NASA. I've always been a space nerd, so it's an incredible experience."

The former John XXIII College student credited her maths teacher Peter Mazur with unlocking her love of maths.

"He must have seen something in me because he said I'll see you in the specialist maths classes when you get to senior school," Lorian said.

"It was a major confidence boost and kick-started my drive towards engineering."

"He also ran the astronomy club on Friday nights and so I'd go along with my friend Ben Linsten and we'd spend our time star-gazing.

"I was raised in science. Both my parents are in the biology field, so for me to end up a space-obsessed engineer was a bit of a shock."

Lorian's passion was further fuelled by stints at the National Youth Science Forum in Canberra and at the Binar Space Program, building a test rig for the Binar-2,3,4 CubeSats (a class of small satellites) to be launched later this year. ■

New simulator **to improve driver safety on WA roads**

A new hi-tech driving simulator will enable our researchers to investigate a range of safety issues with the aim of reducing serious crashes on our roads.

The Western Australian Centre for Road Safety Research's new advanced driving simulator, launched by Minister for Transport Rita Saffioti and Minister for Road Safety David Michael, can realistically replicate a range of driving conditions in a safe and controlled environment.

Funded by the Road Safety Commission, Main Roads WA and UWA, the simulator will provide new opportunities for researchers to study a wide range of road safety issues without the crash risk.

Associate Professor Paul Roberts, Deputy Director of UWA's Centre for Road Safety Research, said the custom-built simulator would allow researchers to test new road layouts under a range of different traffic and weather conditions.

"The simulator will also enable us to safely test driver responses to challenges such as mobile phone distractions, fatigue and the impact of drugs and alcohol," Associate Professor Roberts said.

The simulator will support collaboration between researchers, PhD and Honours students across multiple disciplines, including road safety, engineering, ophthalmology, psychology, physiology and mathematics.

"Our mandate is to reduce serious injury crashes, and particularly fatalities on our roads and this new facility will allow us to identify the causes of those crashes and test interventions to determine how effective they are in reducing these crashes," Associate Professor Roberts said.

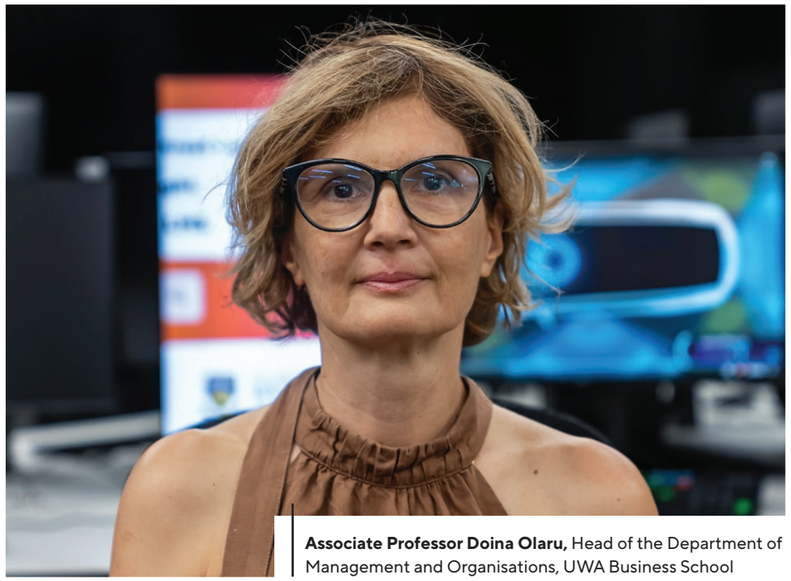
"While the facility is based here at UWA, it will also be available to private industry and anyone who is interested in doing research aimed at improving safety on our roads." ■

Suspicious minds

By Carrie Cox

Adobe Stock: Generated with AI

Driverless vehicles present new horizons for safety and accessibility, but public doubt remains an obstacle.



Associate Professor Doina Olaru, Head of the Department of Management and Organisations, UWA Business School

Of all the handbrakes slowing development of autonomous driving technology in Australia, the most significant may be a deeply human one: trust.

Research undertaken by The University of Western Australia is exploring the complex relationship between public trust and the viability of a 'smart city' future where autonomous vehicles (AV) are part of a data-driven infrastructure. It's a future that many predicted would already be here by now, or at least well on its way. Instead, Australia still sits a long way behind other countries when it comes to AV research and development.

Transport researcher and Head of the Department of Management and Organisations at UWA Business School, Associate Professor Doina Olaru, says Australians are not just suspicious about driverless vehicles themselves but also the many other essential components of an autonomous transport ecosystem.

"It's trust in the telecommunications industry to provide robust and reliable connectivity for vehicle-to-vehicle and vehicle-to-infrastructure communication, trust in the government doing the right thing in terms of legislation, regulation and safety, trust in insurance companies to develop fair and comprehensive policies that address the unique aspects of autonomous vehicles, and trust in not just one machine but the whole integrated system," Associate Professor Olaru explains.

"The true benefits of autonomous vehicle technology can only be realised when the vehicles are integrated with the real world — traffic, pedestrian, cyclists — and people worry about the reliability of communications systems, cybersecurity measures and the possibility of hacking and also whether vehicle data is being shared and analysed with the right stakeholders. It's not only about the car itself.

"One thing that we found fascinating in our research is that many people would have enough trust to ride in an (autonomous) machine without hesitation, but they would think twice if it was their loved one.

Many of our respondents were saying 'yep, I don't have a problem, I'm excited about the technology and I would like to try it, but I'm not sure I would leave my kids to be driven to school or other activities by themselves.' And because this technology is supposed to improve access for people who can't travel independently, that element of the trust issue adds another layer of complexity to the way forward."

> 'Many people would have enough trust to ride in an (autonomous) machine without hesitation, but they would think twice if it was their loved one.'

Accidents dent trust in safety

Also compounding trust, not only in Australia, are the few high-profile accidents reported in places blazing the AV trail. In San Francisco in August 2023, a fire truck abruptly stopped on its way to an emergency when a self-driving taxi didn't yield to the truck and crashed into its side. In California in November, a pedestrian was critically injured after being dragged under an autonomous vehicle for six metres. The manufacturer, General Motors' Cruise autonomous vehicle unit, immediately withdrew all 950 AV cars in its fleet to "update software".

But Associate Professor Olaru, who is also a traffic engineer and a believer in driverless technology and 'smart city' possibilities, says the evidence is already clear that AV cars are potentially much safer than those controlled by humans.

"It's easier and more sensational for the media to talk about an accident involving an autonomous vehicle than one involving a drunk driver or a person texting while driving," she says.

"What level of risk one is prepared to accept varies greatly and is a matter of personal choice. It's unlikely that there will be a threshold of risk universally accepted by everyone in society, but I think it would be unfair not to acknowledge the benefits for traffic in terms of safety that these machines can bring.

When you compare their reliable response to the same stimuli as human-driven cars, their reaction time, their ability to 'see' and perceive their surroundings in 360 degrees and sense the environment in ways that humans simply can't – this technology makes sense.

Autonomous vehicles offer a level of environmental awareness and responsiveness that human drivers simply cannot match.

"In terms of what's at stake, it's similar to performing surgery with robots and using autonomous missiles in defence systems. Each of them represents a significant shift towards trusting sophisticated technology in situations where precision, reliability and safety are key."

Acceptance through greater exposure

In cities around the world where trust in driverless vehicles is significantly higher than in Australia, the difference has been exposure to the technology through major experiments and real-world trials. While autonomous trucks, cars, buses, motorcycles and shuttles have been tested in all Australian states since 2012, the trials have been small-scale with exacting requirements and limitations.

The autonomous bus at UWA

"Our research shows that people who have had the exposure to this technology, and who have a better understanding of the capabilities and limitations, are more likely to trust it," Associate Professor Olaru says. "Trust means accepting to be vulnerable but understanding what the consequences of that vulnerability may be.

"But the possibility for this exposure and understanding in Australia is very nascent. The testing here has been very much a case of 'show-and-tell' exercises to showcase potential capabilities, but they should not be mistaken for comprehensive testing in real traffic conditions. You might have a vehicle operating in a dedicated lane at a maximum of 14kph — you can run faster than the car. It's nothing like a real-world driving situation.

"It's hard to imagine what technology can do unless you allow the chance for the technology to be gradually embedded into real traffic conditions and people can see what happens amidst the complexities and unpredictability of actual road scenarios. Trust is built through reciprocity and experience. You build it up over time."

Taking the next big leap

"It is only by moving to the next development trajectory — beyond pre-mapped routes and pre-mapped obstacles — that autonomous vehicles can begin learning from sensing and interacting with the environment," Associate Professor Olaru says.

"That's when the machines themselves are learning without any particular route or anything pre-designed; they are simply discovering their environment and reacting accordingly. It's a completely different way of using them to what we have been doing in Australia. But the field is rapidly evolving and I look forward to trials progressing towards fully dynamic and responsive systems."

Interestingly, Prime Minister Anthony Albanese said of driverless cars back in 2018: "Driverless cars are not science fiction. They are coming. Hundreds of trial vehicles are already on the road around the world, particularly in the United States and Europe, but also in Australia. With change already beckoning, governments must think hard now about what changes, if any, need to be considered with regard to regulations in areas like liability, insurance and, most importantly, public safety. In Australia, we are not doing enough to face such challenges."

> 'Trust is built through reciprocity and experience. You build it up over time.'

There may well be a chicken-and-egg situation happening in this country, with the public waiting for the government to drive change at the same time the government is waiting for public support to grow. Regardless, Associate Professor Olaru says it's not unusual for Australians to take a more risk-averse, contemplative approach to new technology.

"In terms of the readiness index for autonomous technology, Australia was ranked at 14 three years ago and I don't think we've moved at all since then," she says. "In Australia, we are more regulators rather than innovators and there is very little activity in terms of facilitating projects for effective participation.

"Other countries have mitigated distrust by investing a lot in research and development. They are spending billions, we are spending millions. And as far as governments go, it's okay to start small, but you have to continue the journey." ■

The Burden of BIG

As home to the nation's most powerful supercomputer, WA is integral to the future shaping of AI and its place in the world.

By Carrie Cox

The person in charge of Australia's most powerful public research supercomputers is an arts graduate – and his family doesn't let him forget it.

"The kids just laugh at me sometimes," muses Mark Stickells, Executive Director of the Pawsey Supercomputing Research Centre. "I'll say to them 'I went to a quantum computing meeting today' and they say 'Dad, what on earth do you know about that?'"

But Mr Stickells' arts degree, completed at UWA back in 1993, laid the foundation for a career that ultimately made him an ideal choice to take the helm at Pawsey in 2018, during what has arguably become the most revolutionary period of technological change since the launch of the internet in the 1990s.

Mark Stickells, Pawsey Supercomputing Research Centre Executive Director

Prior to taking up the role, Mr Stickells worked in multiple domains at the intersection of research and industry, serving as the inaugural Director of Innovation and Engagement at UWA and as a former director of the Energy and Minerals Institute. He has also been publicly recognised for his professional support to agricultural and environmental research and commercialisation and for his commitment to diversity and inclusion.

Perhaps most significantly, in the encroaching storm of the AI revolution, Mr Stickells is a passionate believer in the distinction between 'literacy' and 'expertise' – the need to partner science and technology with critical thought and clear communication.

It's an ideological position that well suits Pawsey's gateway position between raw computing and impactful research outcomes. Currently the centre serves more than 4,000 researchers from across Australia and overseas, working on projects as diverse as ocean modelling, drug design, remote after care for hospital patients, new energy sources and even the detection of empathy in videos using neural architecture.

New technological conundrums

"There is a moment here that we're having," Mr Stickells says, "where the advances in technology are not only unlocking great potential but also fundamentally changing the way science can be done.

"Scientists have for generations hypothesised, experimented and generated data and insights, but now digital tools and massive data sets are generating new approaches. And that's challenging a lot of established conventions across many disciplines.

"There are some scientific domains that historically haven't used computational methods in their research, but now AI is available to them and offers new tools for potentially every kind of science."

Though an optimist by nature, Mr Stickells said he was equally cautious about carte blanche approaches to the uptake of AI.

"We need to be very clear that AI is not wisdom," he says. "AI is a tool; it's parameters and data and algorithms. Wisdom and insight are human qualities alone. AI can make observations but we still need wisdom to make good decisions.

"I applaud the current efforts by the national science agency, CSIRO, to bring government and business together to build ethical frameworks and guidance around the use of AI so that ultimately we don't end up having its potentially negative aspects entrenched in the way we've seen with social media. I mean, if we could go back in time and do social media differently, I think we probably would."

The race to conserve energy

The expanded energy footprint of an AI-driven world is also a key concern for Mr Stickells and a core business focus for Pawsey. Currently Pawsey's flagship supercomputer is among the world's most energy efficient, but the drivers of consumption are quickly becoming exponential.

"ICT and supercomputing are among the biggest users of energy and infrastructure in the world, and I would argue we've reached a tipping point," Mr Stickells says.

"There are more than one million transistors for every single person on Earth, and information technology uses around eight per cent of the world's electricity. That figure is doubling every 10 years, with most of that consumption 'out of sight'. Some predictions suggest that if consumption were to stay on this trajectory, IT would use all the energy produced by the world by 2049. We don't think about this when we're using Chat GPT on our phones, but we need to.

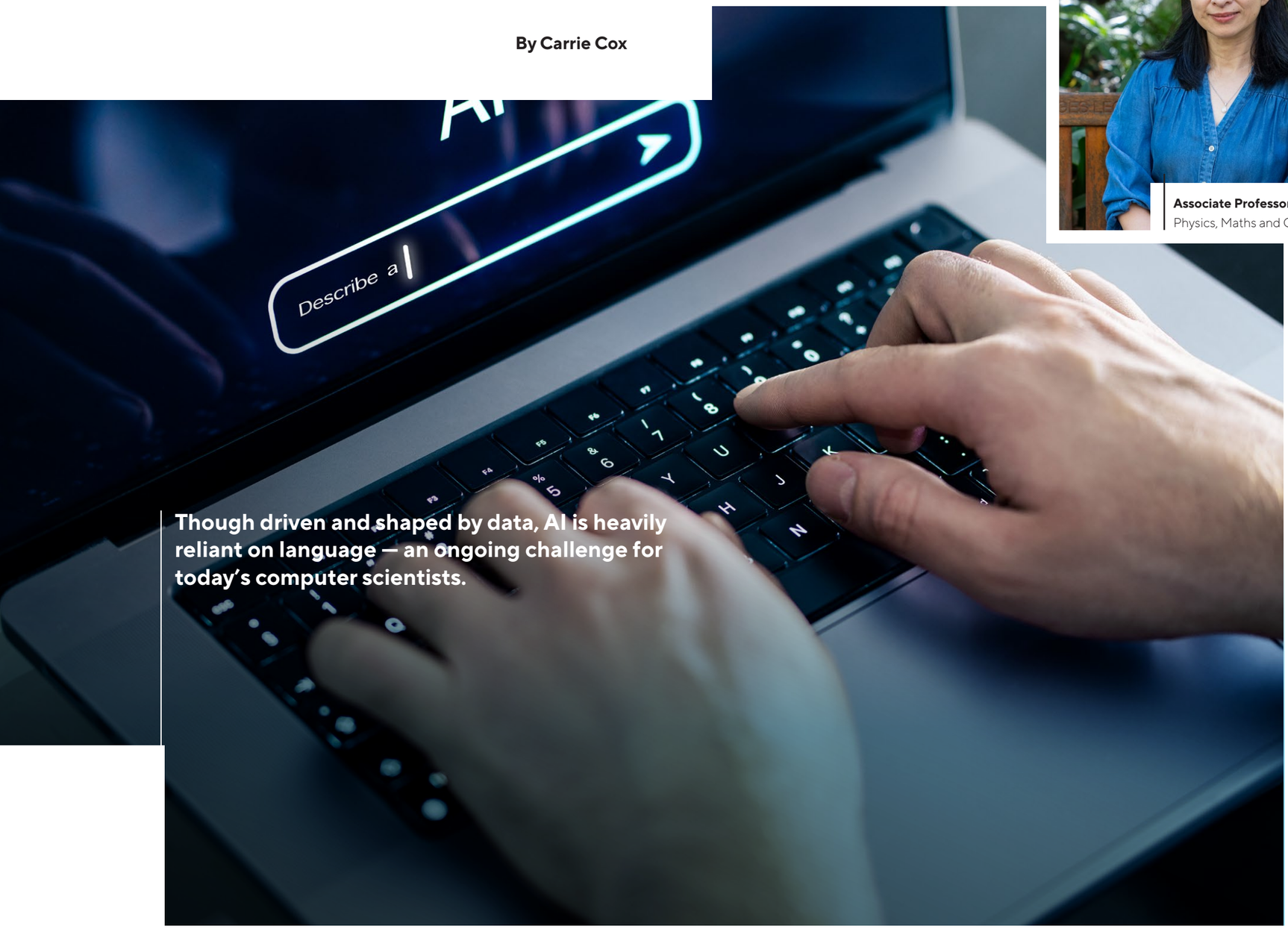
"For sustainable supercomputing to be possible, our community must pool its resources and learn from each other. We need to focus on sustainable energy, design and engineering, as well as optimised use." ■

The Pawsey Supercomputing Research Centre is a joint-venture between CSIRO, the National Science Agency, Curtin University, Murdoch University and UWA, and funded by the Federal and State Governments. Mark Stickells was awarded a Member of the Order of Australia in 2024 for his service to science and the community.

FEATURE

THE WORDS INSIDE THE NUMBERS

By Carrie Cox



Though driven and shaped by data, AI is heavily reliant on language — an ongoing challenge for today's computer scientists.

Associate Professor Wei Liu, School of Physics, Maths and Computing

‘The other day my husband and I were watching ducks burying their heads into the water with their rear-ends up and my husband said ‘There must be a word for that’. I described the action for ChatGPT and it immediately told me the duck’s action was called a ‘dabble’. Isn’t that terrific?’

For all its reliance on systems and technology, artificial intelligence would simply collapse without the scaffolding of human knowledge: what we know informs what we don’t know and what we might ultimately benefit by knowing.

Given that the vast majority of human knowledge is captured in text — our reports, diaries, observations, conversations and literature — the development of what is known as ‘natural language processing’ has been critical to the early evolution of AI. Without it, the value of AI and the big data it feeds upon would be significantly diminished. There’d be lots of ‘artificial’, not so much ‘intelligence’.

Natural language processing — essentially, the AI field that centres on the interaction between computers and humans through language — is a field of learning that has become a specialty for Wei Liu, an Associate Professor within UWA’s School of Physics, Maths and Computing. She heads up the University’s Natural and Technical Language Processing Group, an award-winning research team that collaborates with other computer scientists around the world, while also delivering real-world data solutions for WA industry.

Recent projects have included work with the Geological Survey of Western Australia to produce ‘knowledge graphs’ based on geological publications to better understand the mineralisation processes of critical minerals and ultimately improve exploration prospecting.

Another project, in partnership with a Perth-based environmental consultancy, combined large datasets to streamline green assets management and evaluation for mining rehabilitation and environmental applications to city councils. And another used data supplied by the Department of Mines, Industry Regulation and Safety to deep-analyse safety logs and better understand how workplace injuries could be prevented.

"AI can do these sorts of analysis so much faster and more accurately than human eyes," Associate Professor Liu says. "We're helping organisations make data-driven decisions and data can often deliver you simple insights that humans overlook.

"What's particularly exciting is that this information not only helps people better understand what is happening within their organisation but also what might happen down the track. In the case of safety, for example, that means using data-driven insights to prevent future injury."

Much of Associate Professor's Liu's expertise addresses the challenge of 'interoperability' within big data analysis. This is essentially the ability of different data sources — for example, social media logs, sensors, databases and various types of software — to speak the same digital language. Without interoperability, sense can't truly be made and any data analysis will be inherently flawed.

"This remains a challenging problem in data analysis," Associate Professor Liu explains. "Knowledge is always captured with specificity and the choice of technical language facilitates communication.

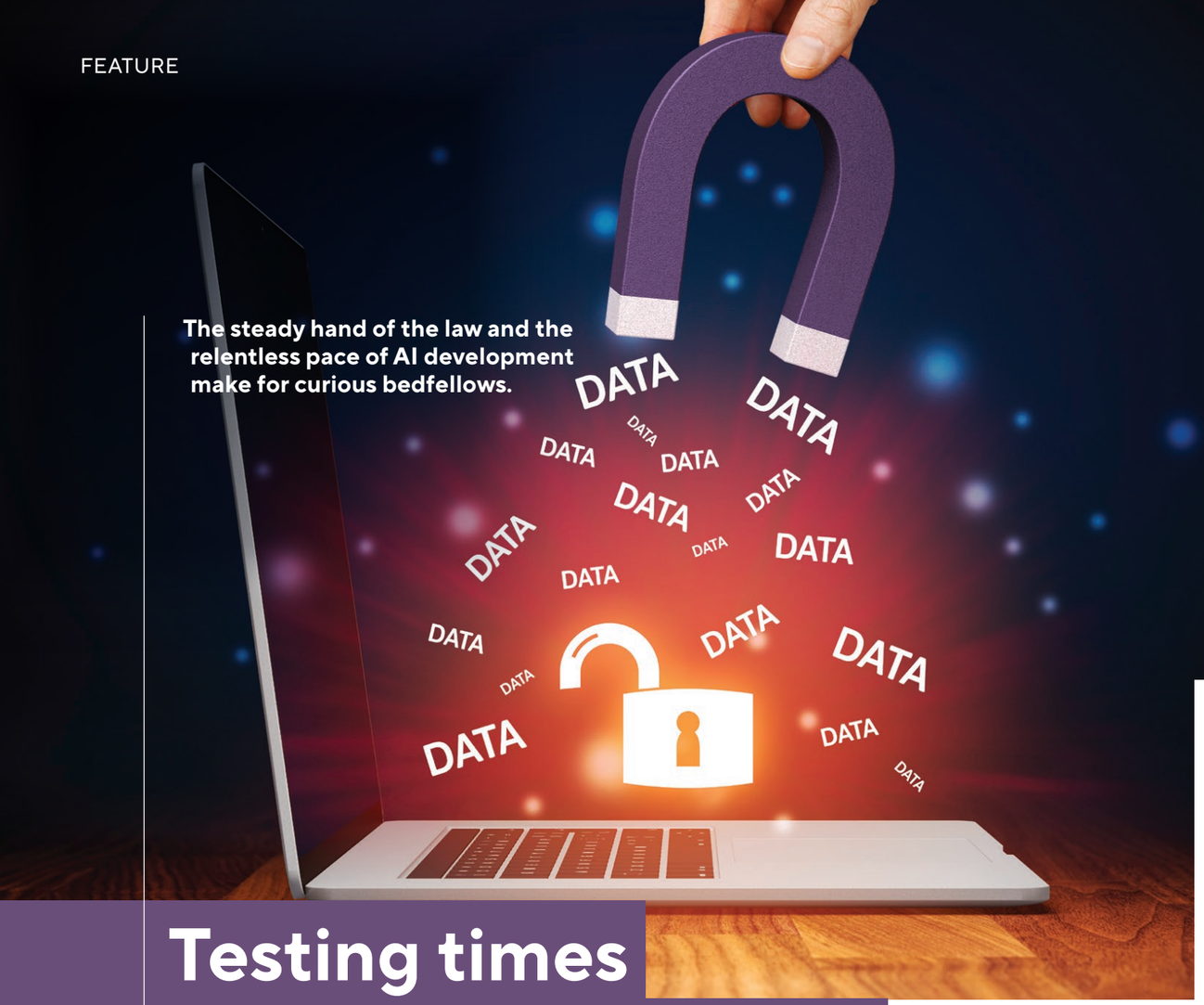
"My early research ventured into a bottom-up approach to the development of ontologies (explicit representations of knowledge and language) where I would talk to individual companies to understand their specific naming system and then use the equivalent of a crawler to extract commonalities and build up a more universal language that enables collaborative sharing.

"Numerical data is easy to capture but text-based AI is much harder – how do you predict things from sentences? Yet human knowledge is about 80-90 per cent captured in text, so the real-world applications of natural language processing are many. Basically, when you're talking about any knowledge-intensive industry or economy, you're talking about text."

Breakthroughs in 'deep learning' (computerised learning inspired by the workings of the human brain) just over a decade ago have super-charged Associate Professor's Liu's research and produced everyday AI applications like ChatGPT. But knowing how the sausage is made hasn't diminished her own delight in the AI wonders now at our disposal.

"I find it all very exciting," Associate Professor Liu says. "The other day my husband and I were watching ducks burying their heads into the water with their rear-ends up and my husband said 'There must be a word for that'. I described the action for ChatGPT and it immediately told me the duck's action was called a 'dabble'. Isn't that terrific?

"I know many people have concerns about AI and there are some big philosophical questions around it, but I am optimistic that it will ultimately lead to positive growth — it is already saving lives — because civilisation wants to progress and because we are in charge. We are still the ones driving." ■



The steady hand of the law and the relentless pace of AI development make for curious bedfellows.

Testing times for legal systems

By Carrie Cox

The breakneck pace of AI development is an unprecedented test for legal systems, but better proactive data protection and governance must be central to any regulatory response.

That's the advice of Marco Rizzi, an Associate Professor from UWA Law School and an expert in risk regulation and the law's intersection with technology.

Associate Professor Rizzi said the recent review of the *Privacy Act 1988* by the Attorney-General's Department was a welcome first step in bringing Australia up to speed in the area of data protection.

"AI feeds off data and if the way that data is regulated is frankly antiquated, then you're immediately on the back foot when it comes to governing AI," he says. "Privacy and data protection are the bedrock on which you can build governance mechanisms, but Australia has been lagging in this area."

> Privacy and data governance are the bedrocks on which you can develop further protections, but Australia has been lagging in this area.

Associate Professor Marco Rizzi, UWA Law School

Associate Professor Rizzi says the issue of consent — the agreement given by an individual for the collection and processing of personal information — has been largely stepped around for a long time.

"We give up this consent every day, every time we use the Internet. We click 'okay' — we just want to get to the thing and move on. Because what's the alternative?

"That's been a massive problem for a very long time and it's important not to overstate what individual consent can do in these situations."

In the European Union, the General Data Protection Regulation — a legal framework still considered successful in its fifth year of enactment— provides a number of ways that individuals can better exercise data consent, including a default acceptance of minimal permissions with the option to add on more.

Associate Professor Rizzi believes this opt-in approach has merit but still places too much regulatory expectation on individuals.

"Personally, I think we need more regulation about what type of data collection is permitted at a top level because putting the burden on individuals is essentially ignoring the problem and it has been an ineffective way of regulating data collection and sharing," he says.

The EU is also set to introduce the *AI Act*, the world's first comprehensive law governing artificial intelligence. Part of its charter is to impose risk rankings on different types of AI systems and applications.

Associate Professor Rizzi says while the appetite for overarching governance over AI is growing — in Australia there have been calls for appointing an independent AI Commissioner, much like a Therapeutic Goods Administration — such action is not a cure-all.

"There are certainly merits to having overarching rules and independent bodies that oversee the application of AI, especially when it comes to use by the government, but we also need to look more broadly at our regulatory regimes across the board and upskill them," he says. "We need sector-specific solutions as well as overarching legislation and principles."

As pressing as the need for legislation to keep pace with AI development is the potential for AI to reshape some legal processes, particularly cumbersome and low-skill activities, but Associate Professor Rizzi advocates a cautious approach to any procedural change.

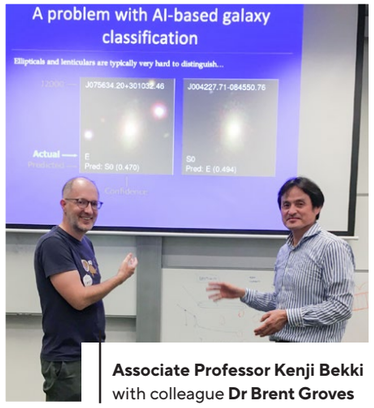
"There is a lot of hype around what AI can do but then there is the reality that we're not as advanced as we seem to think, and the risk then is to trust AI with too much," he says. "In sentencing, for example, it is increasingly common for judges in North America and even in some parts of Australia to use AI models for advice on proper sentencing and the risk of reoffending — I think that is potentially very risky if you don't know how that model has been trained.

"We have this idea about removing biases in the law, particularly when it comes to judgment, but the fact is there are no 'clean' datasets. AI is always trained on human behaviours, ideas and data.

"Giving (legal decision-making) over to a machine might cut costs and speed things up, but is cost-effectiveness a value that should override others? I personally don't think so." ■

Sky full of stars

AI is delivering astronomers a much deeper understanding of the vastness and complexity of the universe.



Associate Professor Kenji Bekki with colleague **Dr Brent Groves**

By Carrie Cox

As a 10-year-old living in the Japanese countryside, Kenji Bekki became smitten with the beauty of the night sky and vowed to spend his life fully understanding it.

Little could the young boy have imagined the tools he would one day have at his disposal.

Now an astrophysicist within the International Centre for Radio Astronomy Research (ICRAR) at UWA, Professor Bekki's 25-year career has been largely shaped by the onset of AI and the revolution it has brought to astronomical research.

While he has long been focused on the nature of galaxy formation, Professor Bekki is now able to use AI to identify and categorise galaxies and stars more than 10,000 times faster than was previously possible. For stargazers like himself, AI has been a game-changer, a super-charging of humanity's attempts to fathom the vastness and wonders of the universe.

"It has completely revolutionised the speed at which we can do things in astronomy," Professor Bekki says. "AI is basically doing what humans did before, but much, much faster. Now we can easily classify 10,000 galaxies in a week, no problem. But there are tens of billions of galaxies, so that's where AI really comes in to play.

"And we need to do things even faster still because in the next 10-20 years, huge telescopes like the Square Kilometre Array will be generating huge amounts of data for processing and analysis."

Indicatively, the new Vera Rubin Observatory in Chile is set to generate 0.5 exabytes of data over the next 10 years — about 50,000 times the amount of information held within the US Library of Congress.

In 2017 Professor Bekki launched a new research program within ICRAR known as 'AIverse'. Among its ambitions were the aim to speed up classification of astronomical objects such as galaxies and star clusters, as well as to use deep learning to test academic theories in a simulated universe.

AIverse continues to generate novel research, including a recent project by one of Professor Kenji's PhD students, Mitchell Cavanagh, that created an entirely new and unique architecture to classify galaxies into their various categories — essential to understanding why they form differently in certain environments.

"Since the 1930s, we've been trying to understand why the galactic morphology is so diverse," Professor Bekki says. "We need to understand how galaxies form in different environments and why the environment is so important to the shaping of galaxies. AI helps us to much better understand their formation and composition."

AI also enables testing across different times in history, across billions of years of galaxy evolution, which was also far less doable in a pre-AI world.

"Galaxy shapes evolve over time, so in order to understand a galaxy's morphology, we need to go back a long way," Professor Bekki explains. "Now we can do this."

Closer to home, he keeps a close eye on activity within the Milky Way, which continues to produce a new star about once a year.

"Why is star formation still ongoing in the Milky Way but not in other galaxies?" he asks. "This is something we want to understand. Stars produce so many elements that are essential for life: carbon, hydrogen, phosphorous and others. Many people don't realise that. Star formation is very important for life and we need to understand what's really going on."

Professor Bekki is also using supercomputer analysis to investigate the formation of globular clusters – densely packed collections of stars bound together by gravity. The Milky Way has 150 known globular clusters, the biggest being Omega Centauri, which contains about 10 million stars.

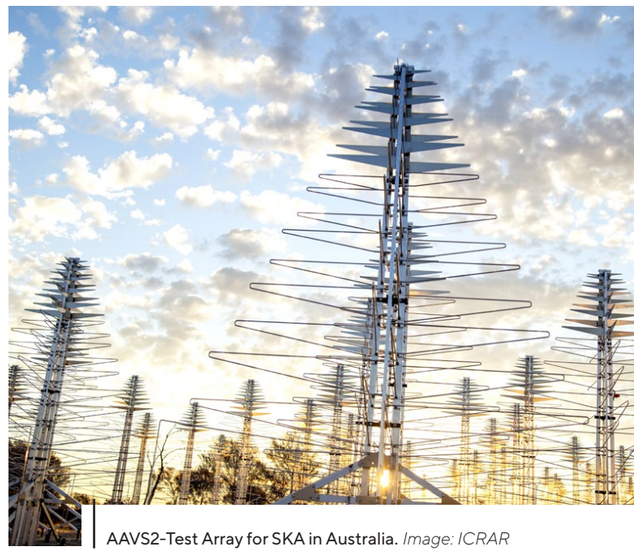
"No-one knows why they form," Professor Bekki says. "In the Milky Way, they existed before the galaxy itself formed. So the key questions for research are why are they so compact and why are they so old? We only know they survive because they are so dense.

"Without AI, it's very difficult to find our galaxy's small star clusters within a large dataset, particularly if it's looser. AI can find the less obvious and smaller ones even within huge amounts of stars."

Telescopes and datasets aside, Professor Bekki says he still likes to look up at the night sky and simply appreciate its wonder. "I think deeply about astronomy when I'm looking up at the stars," he says. ■

> "AI is basically doing what humans did before, but much, much faster. Now we can easily classify 10,000 galaxies in a week, no problem. But there are tens of billions of galaxies, so that's where AI really comes in to play."

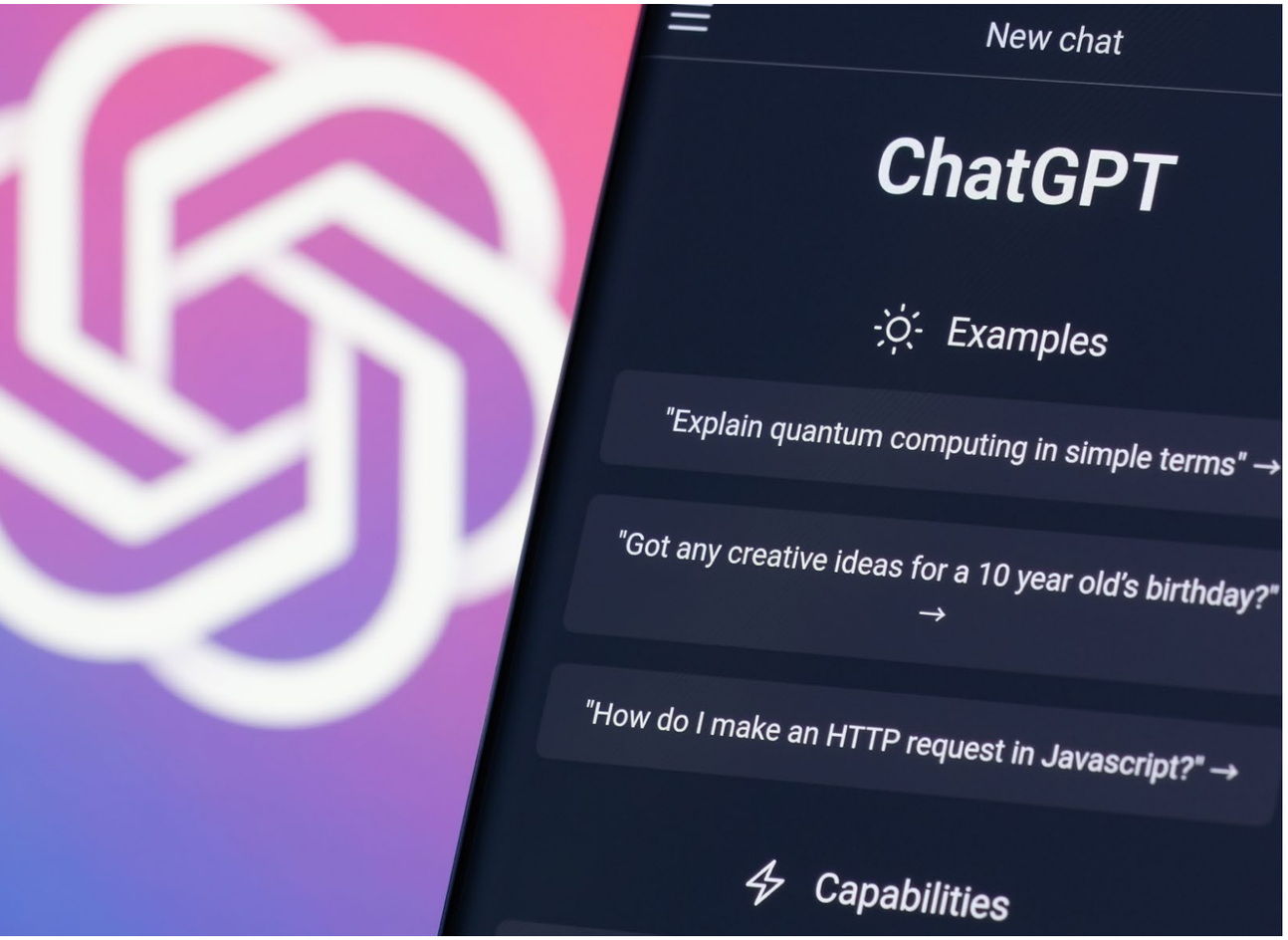
Associate Professor Kenji Bekki, International Centre for Radio Astronomy Research (ICRAR)



AAVS2-Test Array for SKA in Australia. *Image: ICRAR*

ChatGPT, *the new* ‘disruptor’

Guy Curtis is an Associate Professor in Applied Psychology at the School of Psychological Science. He researches applied psychology with a particular focus on individual differences in academic integrity and leadership.



‘ Artificial intelligence (AI) has been seen as a new problem in higher education because it appears as though students can easily use it to cheat on many traditional forms of assessment. ’

Associate Professor Guy Curtis,
School of Psychological Science

When ChatGPT launched in November 2022 universities around the world scrambled to understand what this technology meant for educational assessment. The very rapid conclusion that many people came to was that this new technology could be used for cheating.

It’s important, however, to consider what we really mean by “cheating” and what the objective of educational assessment is anyway. If we take a concrete example of the kind of things people were worried about, it might look something like this: A student is set an assignment where the topic is to “Write an essay on the theme of death in Shakespeare’s play Hamlet”. ChatGPT would allow a student to enter the essay topic and produce a substantial amount of text that the student could put their name to and submit as if it was their own work.

Stepping back from this example, we can ask the very reasonable question: What is the purpose of this essay as an educational assessment? The purpose of the assessment would be to understand whether a student had met learning outcomes that they were supposed to meet in their studies. These learning outcomes could include research skills, critical thinking, clear academic writing and communication, and knowledge of the subject matter.

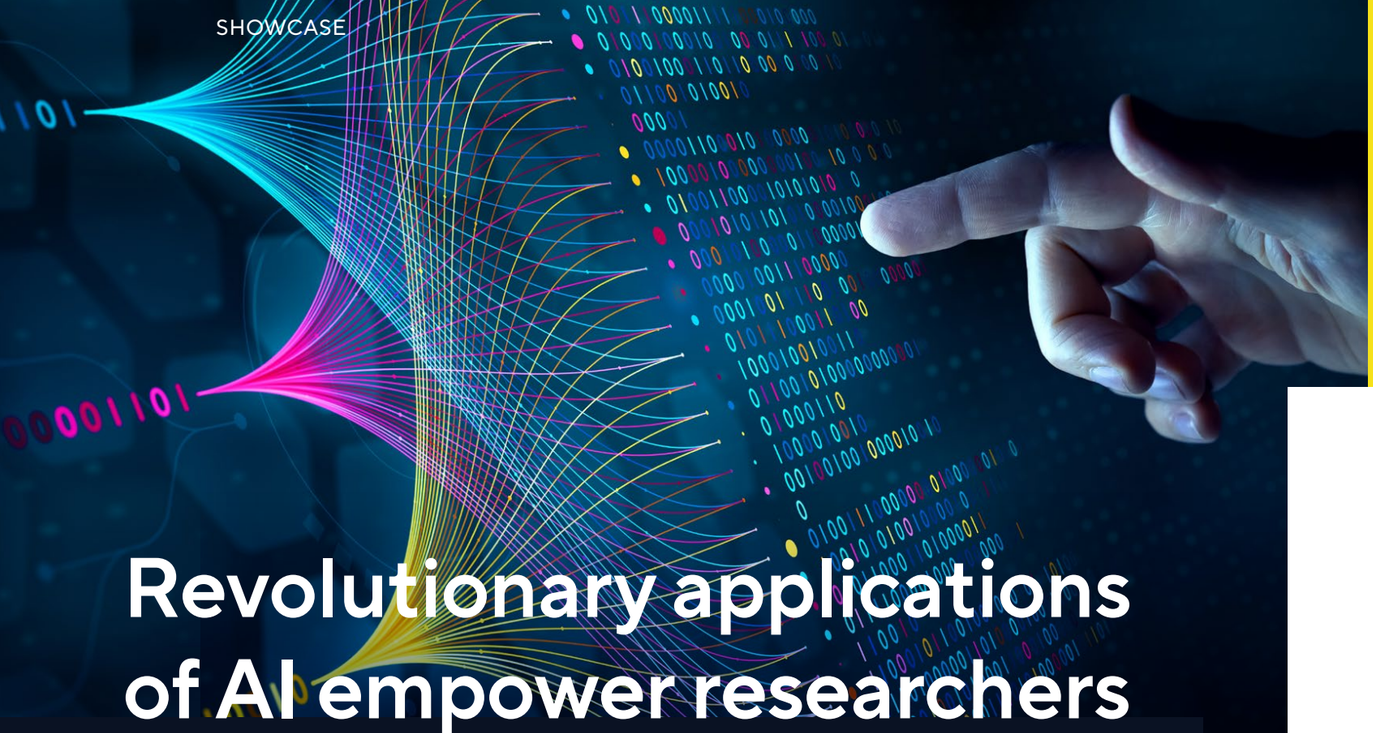
A critical point that educators must keep in mind is that for any educational assessment to meet its intended purpose it has to be “valid”. By valid, what we mean is that an assessment should measure what it is supposed to measure. Validity of assessment is a concept that is regularly discussed in psychology (does an IQ test *really* measure intelligence?) But, validity is not so often talked about in the context of educational assessment.

If a student uses ChatGPT to answer their Hamlet essay question, ultimately what we’re really worried about is that the assignment is no longer *validly* testing whether the student has met intended learning outcomes of their course. Cheating, essentially, is not doing an assessment in the way that it was supposed to be done, and taking a shortcut of some kind that undermines the *validity* of the assessment.

Artificial intelligence (AI) has been seen as a new problem in higher education because it appears as though students can easily use it to cheat on many traditional forms of assessment. However, most of the problems that have been associated with AI and academic assessment have been known or foreseen for several years. For example, researchers have known for over a decade about the challenge of students using computer-powered paraphrasing to attempt to evade plagiarism detection via text-matching software. And, authors of the book *Cheating Academic Integrity,* which was published eight months before the release of ChatGPT, speculated about the impending threat to assessment validity posed by AI.

Unlike copying from existing sources and colluding with other students, material produced by ChatGPT may be impossible to detect with text-matching software. But, this too is not really a new challenge to the validity of educational assessment. For many years we have known that students can submit freshly written work produced by other people, even family and friends, where detecting such outsourcing is difficult. And yet, we have ways to do this.

In good news, UWA was quick to respond to the challenge of ChatGPT use in educational assessment; updating our Academic Integrity policy with clear guidance for students as to its acceptable use at the start of 2023. Nonetheless, educators will need to continue to think carefully about whether the assessments they set their students continue to be valid in a world where AI exists. The Tertiary Education Quality and Standards Agency has released some excellent guidelines to help educators continue to validly assess students’ learning in a post-ChatGPT world. Still, significant time, effort, and thought will be needed to ensure that educational assessment remains valid in the future. ■



Revolutionary applications of AI empower researchers to create real-world impact

Unlocking insights from diverse data for real-world solutions

Dr Qiaoyun Xie, School of Engineering

Julianne Sparke, Industry Engagement Manager

Mr Jake Kendrick, PhD Candidate

By Carrie Cox

Dr Qiaoyun Xie is a purist reformed. Not so long ago, the geospatial scientist and lecturer from UWA's School of Engineering hardly saw the value of sullying her plant research with something as non-traditional as artificial intelligence.

Today, though, she's harnessing AI to go beyond academic theory: analysing vast amounts of satellite imagery of the world's vegetation hotspots to accurately monitor the daily impacts of climate change.

"A few years ago, I actively repelled the idea," Dr Xie says. "I was a believer in traditional plant biology and physiology theory — and I still am — but I thought that traditional theory had to be the main, if not only, way to study these things.

"But by the time I graduated with my PhD, everything had shifted and I could see how powerful AI could be in my field. It's literally been a game-changer for my research. I think that AI really helps in complex areas like climate change where it basically bypasses the assumptions we scientists make when we set up equations and instead draws analysis and questions from the data itself."

Dr Xie's research uses satellite imagery, or what she describes as her 'eyes in the sky', along with field measurements, to track the dynamics of ecosystems. She looks at vegetation colour, seasonal change, leaf growth, ground coverage and plant interactions with climate to capture evidence of variability — information that, on a scale enabled by AI, can help predict the future impacts of climate change and inform mitigation strategies.

Since moving to UWA from The University of Technology Sydney in May last year, Dr Xie has been working with the WA Department of Biodiversity, Conservation and Attractions to study drought and heat resilience in the State's jarrah forests, as well as partnering with the WA Agricultural Research Collaboration to monitor the impact of climate change on our extensive rangelands. She says the opportunity for meaningful industry engagement was a major part of the appeal of moving to UWA.

"I don't want to just publish papers," Dr Xie says. "I want my findings and conclusions to be used by decision-makers because the issues at stake are compelling. The (climate) changes are happening and they're happening faster than we think, so we need to move now to adapt to those changes."

Another UWA academic using AI to produce research with impact is Jake Kendrick. Currently completing his PhD in Medical Physics at UWA, Mr Kendrick's ongoing project is centred on the development of an automated segmentation framework for metastatic prostate lesions.

"In a nutshell, I trained an AI model to analyse hundreds of PET scans (an imaging test used to diagnose where disease exists in the body) and automatically identify where the disease sites were," he explains. "For a radiologist to do the same, to look at those scans individually and physically circle disease sites, would take a very, very long time. The model I developed was capable of doing that fully automatically without any radiologist intervention and I was able to show that tumour volume was actually prognostic for overall survival."

Mr Kendrick's research, which was published in the *European Journal of Nuclear Medicine and Molecular Imaging*, will now be extended and refined to ultimately develop a fully validated AI model suitable for clinical practice.

"I believe we'll see that in the next two years. My goal is that the model will be available to everyone via open-source software", he says. That will mean we can turbo-charge the analysis of these images because everyone will be able to segment those scans and that makes it much easier to conduct research to identify which features are predictive of patient response.

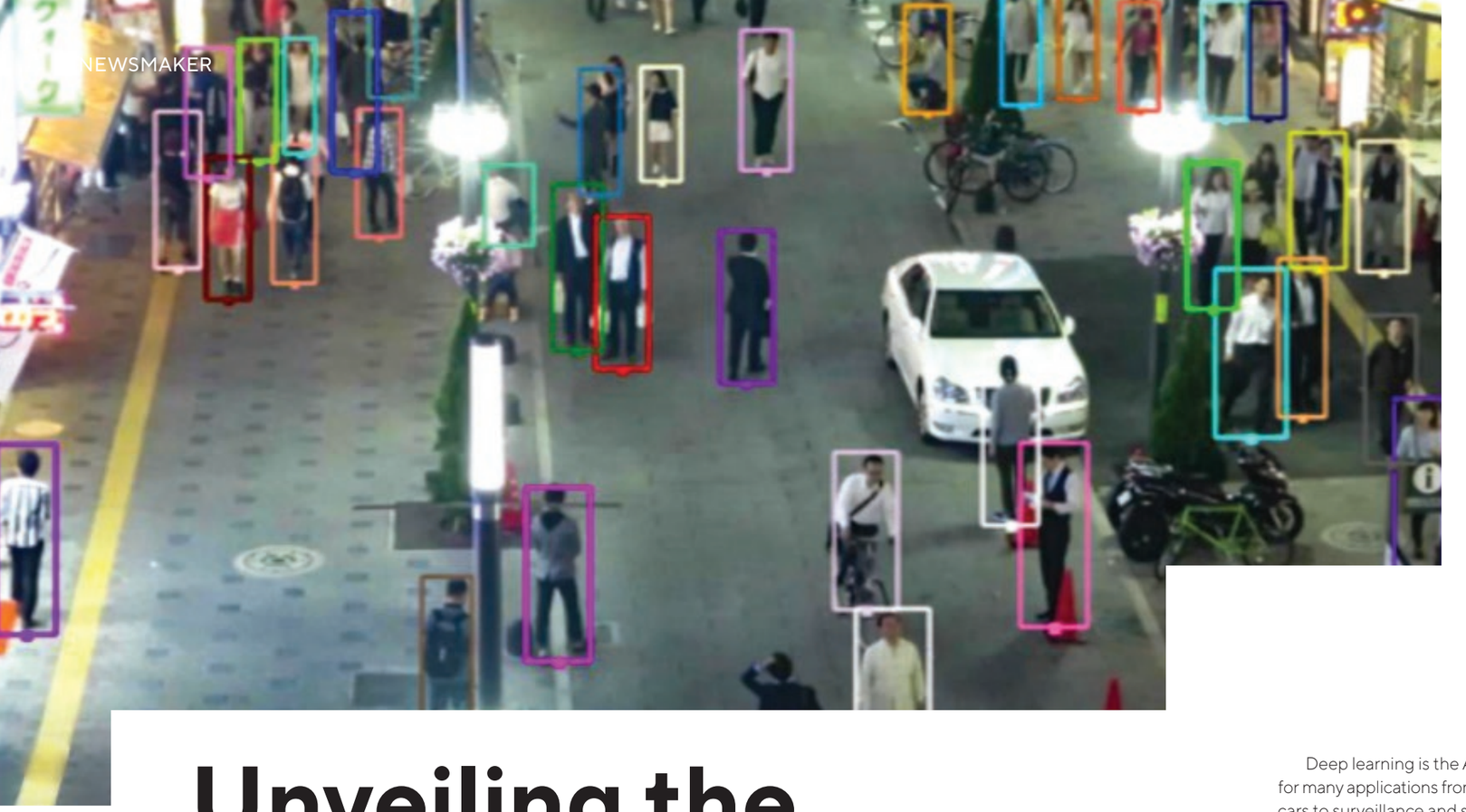
"Overall, what we want to do is be able to predict whether people are going to respond to certain treatments in advance and therefore provide them with the optimal treatment pathways because once prostate cancer spreads to other parts of the body, the five-year survival rates are very poor. We want to give people the best chance of survival."

The research carried out by Dr Xie and Mr Kendrick has been supported by the UWA Data Institute, which was established two years ago to help transform data science research.

Industry Engagement Manager Julianne Sparke says the Institute is rapidly transforming the data science landscape in WA and providing industry and government with clearer pathways to tap into UWA's data science expertise.

"We're creating fresh opportunities to address real-world challenges in transforming a vast volume of diverse types of data into meaningful knowledge," Ms Sparke says. "It's about making data 'talk' so that it can help solve problems." ■

The UWA Data Institute's Foundation Sponsors are BCG X and IMDEX Limited.



Unveiling the power of AI

By Rosanna Marchesani

Artificial intelligence is embedded in our daily lives. When we use social media, or our smartphones, our self-driving vehicles, healthcare and search engines, we use the power of AI. All these technologies have made our lives easier and are constantly evolving.

Professor Ajmal Mian, at the UWA School of Physics, Maths and Computing is known internationally for his research in 3D computer vision, AI and machine learning. He and his team remain at the forefront of discovering novel algorithms, better model learning and training techniques, and collaborating with multiple disciplines to find innovative solutions to meet their needs. Their algorithms are published on GitHub, an open-source software development platform which allows users to apply the research to their own field and gives the team freedom to be creative in their discoveries.

Professor Mian is a strong advocate for leading the AI boom and for the establishment of an AI centre in Australia to grow our postgraduate talent as well as attract great minds from elsewhere.

Image Source: github.com.shijieS/SST

Professor Ajmal Mian, UWA School of Physics, Maths and Computing

Deep learning is the AI workhorse for many applications from self-driving cars to surveillance and security. It uses artificial neural networks to help computers learn to identify objects and perform complex tasks quickly and more efficiently than a human.

Within deep learning (and deep fakes), adversarial perturbation, or 'noise' that can't be seen by humans, makes it vulnerable to malicious attacks that can manipulate data or embed viruses to gain control over the AI system. In 2022, Professor Mian and his team began work on a project to defend AI against deception attacks.

The Australian Research Council project, and associated projects funded by the US Department of Defense examine the security of AI systems for defence applications by addressing its vulnerabilities to attacks. The aims are to detect attacks, identify the source, estimate the attackers' capabilities, and cleanse the model, making them more robust and trustworthy. The team will provide a trained model that will be able to identify how much bias there is and any backdoor activity, providing surety to companies who would otherwise not have the resources to train their own models to detect malicious attacks and backdoor activity.

The team has also used that research to better understand the process of generating deep fakes and to advocate that systems must be developed responsibly and without harmful bias. Their backdoor attack on text-to-image generative models framework embedded models with backdoors, inflicting them with bias, to make them generate fake content which would manipulate user sentiments towards a product, with alarming realism. The next step is to train their models to better detect such bias and defend models and users.

Professor Mian's 3D facial analysis research in 2004 formed the basis of his future research to overcome the limitations around illumination, poses and subjects wearing makeup and created a fast and accurate way to identify individuals. By 2009, he was able to accurately differentiate between expression deformations and interpersonal disparities and hence recognise faces under any facial expression.

From 2015 to 2019 the team collaborated with the Telethon Kids Institute and UWA's School of Psychological Science to use AI to identify autism in children. The project was supported by the National Health and Medical Research Council and data from the multi-generational Raine Study. Their novel findings included: children with autism have asymmetry and more facial masculinity; their parents have higher facial asymmetry; facial sex characteristics can be measured; and facial masculinity in adulthood is highly correlated with higher testosterone levels in the umbilical cord at birth. They provided the first direct evidence of a link between prenatal testosterone exposure and human facial structure and brought clinicians closer to early diagnosis and treatment for autism.

They expanded their work in 2023 to investigate movement and gesture patterns specific to autism, which could hold significant potential for advancing our understanding of autism-related behaviours. ■

Transforming data INTO KNOWLEDGE

By Doug MacLaurin

As artificial intelligence and machine learning tools become more ingrained in our everyday lives, the team at the UWA Data Institute is working to understand how the tools we increasingly rely upon to inform our decisions actually work.

Researchers are investigating and developing the use of deep learning and other data science innovations to transform data into knowledge that can be used to solve real world problems — from engineering and resource challenges, to modelling the spread of disease, to predicting and assessing mental health risks.

Professor Michael Small said it was critical to understanding the process of these neural networks — firstly by remembering that, unlike the name suggests, AI applications are not "intelligent" entities that supplant our own critical reasoning.

"Many of these neural networks are extensions of machine learning, mathematical modelling, data fitting, statistics, techniques that we do understand," he said.

"Where these algorithm learnings become more complicated is when the amount of data going into the models is so vast — as is the volume of computation involved — that it's not clear what part of the data is being used to make a prediction, or exactly how it's making that prediction," Professor Small said.

That's why one area where deep learning models have achieved the most accurate results is in geoscience and resources where much of the measurable data is rock solid. As the CSIRO-UWA Chair of Complex Systems, Professor Small has been working with CSIRO Mineral Resources in developing such algorithms.

"If you extract a geological core from the ground, you can look at that, you can analyse it, do spectrographic tests on it to quantify aspects of it," Professor Small said.

"The predictions based on these samples are much better understood because they're quantifying patterns and structure in complex but concrete data sets."

But Professor Small and his team have also yielded positive results when the variables being factored into the equation include human beings and their behaviour.

One long-term project at Perth Clinic has been collecting data from a large population over time via patient surveys.

Early versions of the algorithm developed from the data with the use of deep learning are being used at nurses' stations to provide a helpful indicator about when a patient might be at greater risk of self-harm.

"It's an example of the potential of these artificial neural networks to take in an enormous amount of data and identify patterns that can be used to improve — or even save — lives," he said.

But it's the AI tools the public are most familiar with that are arguably the most problematic when it comes to understanding how they use information to reach conclusions. Generative programs such as chatbots use data largely trawled from the internet — which is as much a source of misinformation, disinformation and bias, as it is verifiable facts.

It's just one reason that it's crucial to verify the results of generative tools and not to let the machine do all of the thinking.

Among many examples highlighting the risks are two recent incidents in the US and Canada, where lawyers used ChatGPT for legal research without verifying its results. In both incidents the chatbot provided cases to cite in court as precedents — it was soon discovered it produced cases that never existed.

Professor Michael Small, UWA Data Institute Director

Rather than such mishaps serving as examples of why the tools should be avoided, feared or considered "cheating", Professor Small said they demonstrate the need to use the programs carefully and responsibly.

Addressing concerns about the widespread use of generative programs like chatbots at universities, he raises the comparison between how they are used in higher education to the way a calculator was used to replace the slide rule.

Generative programs such as chatbots use data largely trawled from the internet — which is as much a source of misinformation, disinformation and bias, as it is verifiable facts.

"There's a generation of educators who said these calculators were evil and cheating, and no one's going to know how to use a proper slide rule," Professor Small said.

"Well, I'm a professor of mathematics and I don't know how to use a slide rule — the tool has become obsolete."

But, as he points out, you can't do all of mathematics with a calculator.

"In the same way, a chatbot can help you formulate sentences or find information or spark ideas making it a great tool for getting over a writer's block, but it's not going to write the next great novel for you — at least, not yet," he said. ■

Model solution to food security

Drone image of field experiment
Credit *Roberto Lujan Rocha*

Monica Furaste Danilevicz, former Forrest Research Foundation scholar

By Annelies Gartner

Driven by a desire to ensure good quality, healthy food reaches people's tables Dr Monica Danilevicz is supporting farmers and crop breeders to make better-informed decisions.

"I deeply care about the food we eat; it is important to me to have access to abundant grains and veggies, and I am also concerned about climate change and its impact on food security," Dr Danilevicz says.

Dr Danilevicz is a plant biologist and data scientist from Brazil who is interested in precision agriculture, machine learning and crops.

Throughout her PhD and now as postdoctoral researcher, she explores the use of machine learning models to analyse plant images collected by drones and ground vehicles to optimise the development of crop varieties.

"There are multiple factors that influence crop performance in the field, from the genetic make-up of the individual plant to environmental factors during development," she says.

"I work with deep learning models, which is a part of AI, to integrate various datasets including images, weather, crop management and genomic variation data for crop prediction.

"The use of multiple datasets provides more detailed modelling which helps to better understand the conditions plants will be subjected to."

The results from the research provide insights for crop breeders about which varieties are going to perform better under the studied conditions, supporting the identification of climate-resilient crop varieties and can increase food security globally.

In addition, the models can guide decision-making in farms, ensuring efficient use of limited resources such as fertilisers and pesticides and potentially lead to a decrease in the final cost of producing food.

"One of our projects in collaboration with the Australian Herbicide Resistance Initiative in UWA focused on weed detection; enabling farmers to geolocate weeds growing in the field for targeted management," she explains.

"This allowed farmers to treat just regions with weed infestation instead of spraying herbicides across the entire area, so farmers can protect the crop yield while reducing herbicide usage in the field.

"We want to be able to offer farmers healthier and cheaper solutions to manage their crops."

Dr Danilevicz, a former Forrest Research Foundation scholar, plans to stay in Australia and focus on agricultural-based crops to continue to help plant breeders and farmers future-proof the production of healthy food. ■

From the Warden of Convocation

Key Dates

Spring Ordinary Meeting
Thursday 12 September

Convocation Elections
Voting opens Friday 1 November

As this issue of Uniview focuses on artificial intelligence, I asked Chat GPT to write me 50 words on what is wrong with AI. This is the result.

'Issues with AI include biased algorithms, leading to unfair decisions, lack of transparency in complex models, potential job displacement due to automation, and concerns about privacy and data security. Ethical dilemmas, unintended consequences, and the risk of misuse highlight the need for responsible AI development and regulation to address these challenges.'

The term 'Luddite' tends to be used to describe those who dislike or fear new technology, such as AI. As an historian, I'm well aware that such fears are not new.

During the sweeping industrialisation of late 18th and 19th century Britain, weavers and textile workers, whose skills were under threat, broke the new mechanised looms and frames that could be operated by cheaper unskilled workers. They called themselves 'Luddites' after Ned Ludd, supposedly a young apprentice who wrecked a textile machine. Their protests were met by ruthless government suppression and the name became apocryphal.

Many skills became obsolete, unemployment grew, thousands were forced into grim poorhouses or moved to cities to find work. Rapid urbanisation meant that workers were crammed into ramshackle and unsanitary housing. The new factory jobs were unregulated and often dangerous. Long hours and low pay were the norm.

Industry polluted the environment. Rapid urbanisation led to the spread of disease.

There were also aesthetic consequences. In Britain, the Romantic movement in poetry emerged. It championed the past, critiqued the breakdown of human relationships, and idealised nature. William Blake's familiar poem contrasted 'the dark satanic mills of industry' with England's 'green and pleasant land'.

The Arts and Crafts movement emerged. Led by designer and political activist William Morris, it was inspired by mediaeval art and the natural environment. Its influence on design and architecture was profound. Even today its influence can be seen in the plant-based designs of Liberty fabrics and even in the 1930s single-storey California bungalows of Nedlands with their low horizontal profile, prominent front porch and wide overhanging eaves. A design intended to replicate the 'honest craftsmanship' of the past.

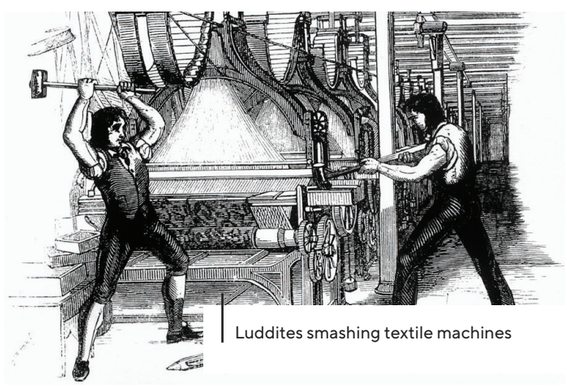
In more recent times we have seen campaigns against technological change — from the 'Ban the Bomb' protests of the 1950s to the rallies for Nuclear Disarmament of the 1970s and 80s. We have seen the rise of the internet with its boundless opportunities as well as the misuse of its democratic promise. And now we face artificial intelligence.

A March issue of the online bulletin, *Ed/Tech*, referenced Cory Doctorow in his 2024 Marshall McLuhan Lecture, describing him as a thought leader in tech/futurism/society. An award-winning science fiction novelist, holding honorary doctorates from several universities, he explained how platforms on the internet decay.

It's a three-stage process: First, platforms are good to their users; then they abuse their users to make things better for their business customers; finally, they abuse those business customers to claw back all the value for themselves. Then, they die.'

Worth thinking about as we increasingly engage in AI through its various platforms. ■

Emeritus Professor Jenny Gregory AM FRHS



Luddites smashing textile machines

MEET PROFESSOR MAYOWA BABALOLA:

UWA's new Stan Perron Chair in Business Ethics

Through the generosity of The Stan Perron Charitable Foundation, UWA has welcomed a new academic Chair in the burgeoning field of business ethics. Professor Mayowa Babalola joins UWA with a passion for cultivating a new generation of ethically informed leaders and creating a community where ethical considerations are ingrained in the fabric of organisational and societal lives.

First things first: what is 'business ethics'?

Business ethics encompasses the moral principles and standards that guide behaviour in the world of business. It's about doing the right thing even when it is not the easiest path — ensuring that businesses' actions benefit stakeholders and the broader society.

The creation of my role at UWA was made possible by the generous support of The Stan Perron Charitable Foundation, honouring Founder Stan Perron AC, who was renowned for his unwavering commitment to ethical business practices. My position will spearhead further academic exploration and practical guidance in business ethics in Australia. It underscores the growing recognition of ethical business conduct as a cornerstone of sustainable success. It also reflects UWA's commitment to producing graduates who not only excel in business but also in integrity, high ethical standards, and social responsibility.

What drew you to this area?

Having taught and worked with business leaders in different parts of the world, including Africa, Asia, Europe, the Middle East, and here in Australia, what I enjoy most is the opportunity to influence and support future and current business leaders by integrating ethical considerations into their decision-making processes. It's gratifying to see theory and practice converge, resulting in tangible improvements in organisational ethics.

Business ethics represents the convergence of my interests in human behaviour, organisational effectiveness, and societal well-being. I have witnessed the lives of individuals and their families ruined by self-serving leaders and 'wicked' organisations. So, in a world where business decisions have far-reaching consequences, promoting ethical behaviour ensures a fair, transparent, and accountable corporate landscape.

My aim is to establish UWA as a beacon of ethical leadership, underpinned by research and education that resonates globally.

Why is business ethics important?

According to a 2020 report by Deloitte, the economic benefit to Australia of improving ethical behaviour to world-leading standards was estimated at a $45 billion increase in GDP. This suggests that we can achieve and be more as a society if we improve ethical behaviour. Yet, reports of ethical scandals in many companies continue to hit the news. Fortunately, 'conscious capitalism' is growing, increasing pressure on businesses to be more ethical and reinforcing that profitability and responsibility are not mutually exclusive but can be synergistic.

To achieve greater heights in Australia and the rest of the world, we all need to work together to improve ethics. For example, the rise in digitalisation and the advent of AI offer new opportunities, yet pose unique ethical challenges — from privacy breaches to trust issues and decision-making biases. The challenge lies in developing AI that upholds ethical standards while mitigating risks such as job displacement and the over-reliance of humans on AI. With the proper mechanisms, AI could enhance decision-making processes, transparency, and efficiency, ultimately leading to more equitable outcomes and fostering innovation that aligns with societal values.

Ultimately, business ethics is not just about preventing unethical practices; it's about championing a culture where doing the right thing is the norm. With this kind of culture, everything will run smoothly in our community. ■

RenAIssance or ruin?

Alumni have their say on AI

The remarkable ascendancy of AI in recent years has opened a Pandora's box of seemingly limitless potential while dazzling us with impossibly intricate 'artwork' and thousands of instantly generated words. However, accompanying the excitement and hype is a growing chorus of anxious voices warning of the potential risk posed by this technology. With so much visibility, it feels like everyone has an opinion about AI. To help clear things up, we asked alumni who work directly with AI for their views on whether AI should be celebrated or feared.

Associate Professor Cara MacNish (BE (Hons) '88) has been teaching and researching AI for 37 years. She completed a PhD in AI from Cambridge before returning to teach at UWA.

Greg Hardwich (EMBA '10) is co-founder and director at Augment Technologies, a Perth-based start-up utilising AI for more efficient, lucrative and safer open pit mining.

Adam Geoghegan (BEc, BCom '13) is a director at Immersia, a company that has developed a mental well-being chatbot called Buddi that utilises AI to deliver personalised mental health support.

Dr Joanne Jakovich (BEnvDes '01) is CEO and Founder of Humanacy, an early-stage startup building AI-driven conversational puppets to help children build essential human skills.

"Fears around AI are well-founded, however it is not so much the technology that is the issue, as the way it is used. The opportunities for AI to have a positive impact are practically endless. For example, we are looking at using AI to monitor imaging of the nerve layers in the eye for progression of systemic illnesses. This has the promise of making personalised medical care more widely available. AI can be used in dangerous and remote situations, for unpleasant tasks or to save lives on the roads. There are however many ways in which AI can be misused and we are already seeing large language models (think ChatGPT) used as decision systems, rather than for (unreliable) information provision. We have a tendency to mistake the veneer of competence for 'intelligence'. And ultimately AI systems optimise - they don't have a heart and soul."

Associate Professor Cara MacNish

"AI as a technology should be viewed as a co-worker that boosts workforce ability and capability rather than a replacement for humans. There is no substitute for the latter, however there is always room to improve application of human knowledge with the assistance of technologies such as AI."

Greg Hardwich

"AI is poised to revolutionise education and careers, offering personalised learning experiences and instant feedback to students. It will also assist educators in tasks like grading and lesson planning, freeing up time for more personalised interactions. In careers, AI will automate repetitive tasks, allowing workers to focus on higher-level, creative work. It will also create new job opportunities in AI development, data analysis, and more. However, this transformation will require continuous upskilling to adapt to the evolving job market."

Adam Geoghegan

"Most predictions for AI are consistently outstripped and the 'future' is often closer than we think. An immense opportunity for AI lies in the potential to create equity for all humans. To prepare kids today to leverage AI as a force for good in their future, we need to equip teachers and schools to nurture the distinct strengths of humanity – ethical decision making, empathy, fairness, intuition, inclusion and citizenship – and empower kids to deploy these strengths in collaborating with AI. Regardless of the unknowns of AI, a society shaped by ethics and courage will ensure a future where all people can flourish."

Dr Joanne Jakovich

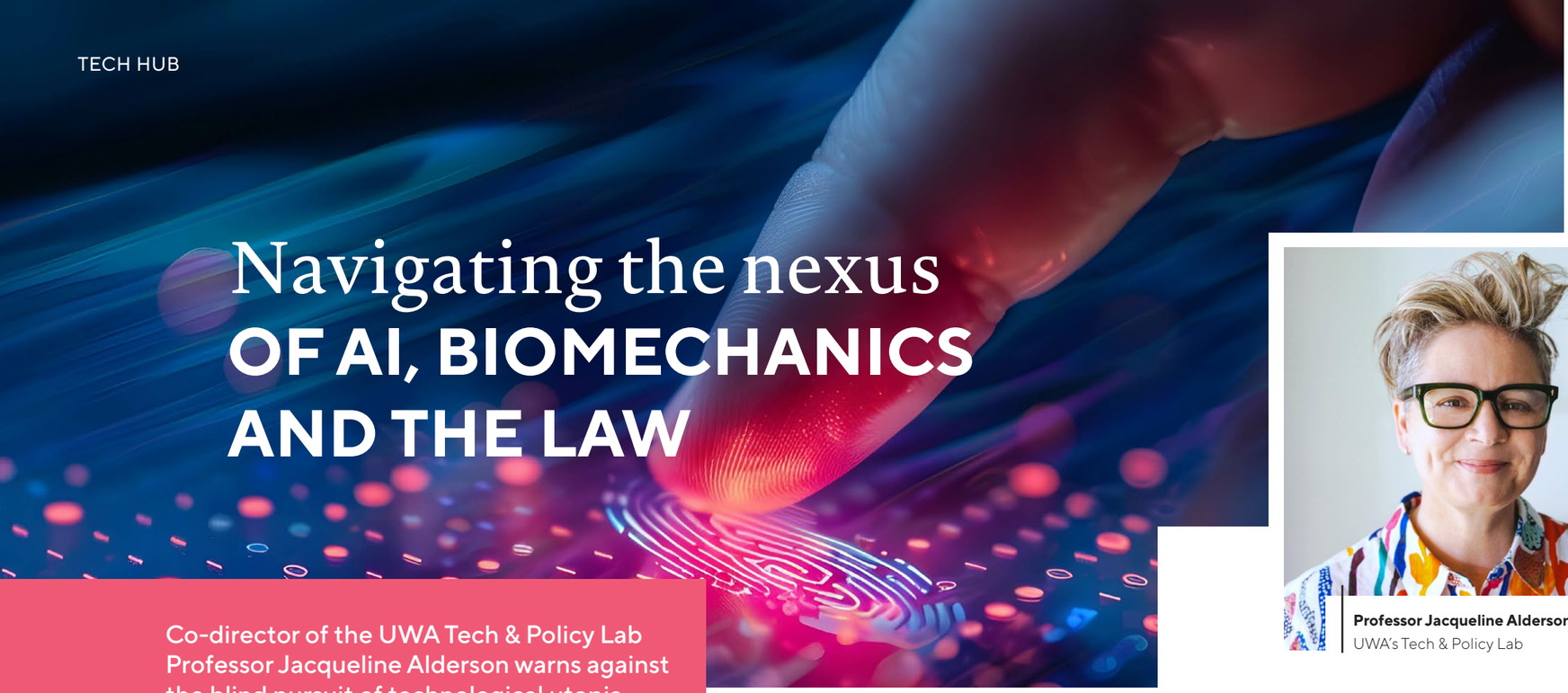
For the final word on the topic, it seems only right to ask the popular AI 'chatbot' Chat GPT what it thinks about the future and implications of AI.

"Overall, while the potential of AI is exciting, it is important to approach its development and deployment with caution, ensuring that it is used responsibly and ethically."

Have an AI opinion you want to share with the UWA alumni community?

Scan the QR code and let us know!

uwa.au/8534gw



Navigating the nexus OF AI, BIOMECHANICS AND THE LAW

Co-director of the UWA Tech & Policy Lab Professor Jacqueline Alderson warns against the blind pursuit of technological utopia

By Liz McGrath

Professor Jacqueline Alderson, co-founder of UWA's Tech & Policy Lab

Imagine a world where artificial intelligence, extended reality and bioengineering have advanced so far, we may be able to upload our entire brain to a computer.

Or enhance our bodies so much so that we're no longer 'fully human' in a physical sense. Or one where a virtual world is so intricately crafted that distinguishing it from actual reality becomes impossible.

For Professor of Biomechanics and co-founder of UWA's Tech & Policy Lab Jacqueline Alderson, currently based at Stanford University on a Fulbright-AmCham Professional Alliance Scholarship, the perils lurking beneath the surface of all that innovation are troubling.

"Since joining the Tech & Policy Lab in 2020 I've become much more aware and concerned about the power dynamics that influence and shape the relationship humans have with technology," she says.

"Not just the way we use tech now, but how we want to use it in the future and what we sincerely want to believe it will do for us, even when history and evidence indicates otherwise."

One of the pivotal concepts Professor Alderson researches is the 'digital twin' – virtual human replicas based on real data such as genetic makeup and even our external idiosyncratic features.

While advocating the potential benefits in fields such as personalised medicine, the biomechanist raises a red flag over the domination of digital twin research by tech giants like Meta, Google, Apple, and Amazon.

"We seem to be obsessed with the desire for technology to be good, bringing wonderful benefits and saving humanity," she warns.

"Yet the moment you start asking questions – whether it be about accuracy or validity, or raise any data governance or privacy or justice concerns, you're immediately labelled as a Luddite or tech sceptic, who is holding back innovation.

"That narrative needs to change because it's pointless and dangerous to not be challenging tech development at the front end.

"We know that surveillance, facial recognition and other policing and security technologies are dramatically biased and dangerous, for example. Similarly, we saw the devastating human impact of terrible data modelling in the Robodebt case."

Winner of the prestigious 2024 Geoffrey Dyson Award of the International Society of Biomechanics in Sports, Professor Alderson cautions the exponential rise in digital and web-based technologies has dramatically outpaced critical societal conversations and safeguards.

"Constant new tech releases leave behind questions of privatisation and access, not to mention the protection of human dignity, autonomy and privacy, which are limping behind technological developments, if even considered at all," she says.

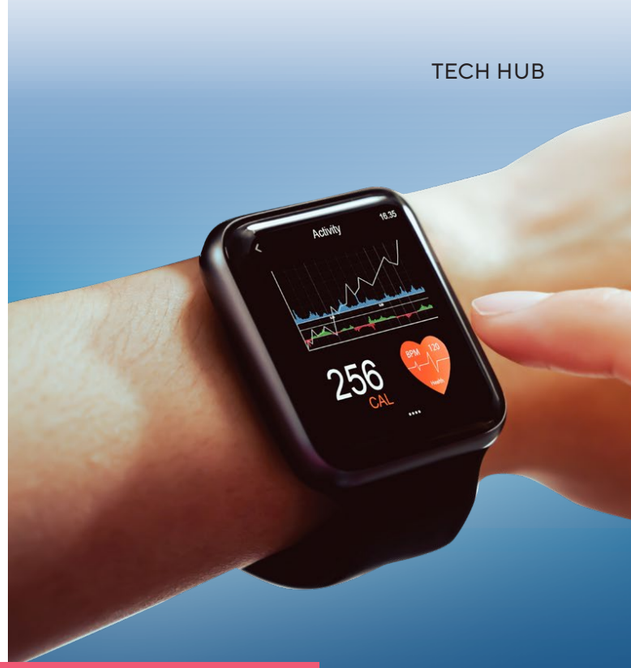
What policymakers, scientists, and society at large should be doing, is interrogating and responding to society-level challenges, she adds.

"First, does the tech have the capacity to be harmful – to me, but especially to others? Is it useful and is the information I am receiving from it reliable?

"Is information being generated valuable to entities with commercial or nefarious interests, and what are the consequences of them having that information today, or at a future date?

"Crucially, these questions shouldn't start and end with each of us. Like speed limits or food and building safety, regulation sets expectations to protect us all." ■

Founded and led by Associate Professor Julia Powles and Professor Alderson, the UWA Tech & Policy Lab is an interdisciplinary research centre focused on civic accountability in the tech ecosystem.



CASE STUDY

Fitness wearables

Health and fitness wearable technologies, increasingly used in clinical, employment and insurance contexts, are one example of private firms monopolising data access and potentially commercialising predictive knowledge, Professor Alderson says.

"These wearables are only valid on a very particular slice of the population – not the super fit or the very unfit, or those with darker skin tones," she explains.

"The tech giant Apple has collected a wealth of personal health data through its Apple Watches, with analysts suggesting the company will soon use this information to inform the establishment of a health insurance company.

"So now that information that you use just to track your heart rate on a walk or track your weight and sleeping habits – could be used to determine your health premium.

"If you think you're safe because you don't have a watch – well that's the power of statistical models, you'll now get lumped with the 'averaged' data from your demographic.

"And if you're unlucky enough to land in a demographic that consistently has deficit data recorded, then there's not much you can do.

"Except perhaps, buy a watch. But that's the rub: fighting bad data with more data simply feeds the beast. That's why we need regulation: it's the only way out of a one way street."

In the **frame**

Connected: our alumni, staff and students snapped at UWA events this year.
Stay in touch or update your details at:
alumni-update@uwa.edu.au

The Honourable Robert French AC, CitWA, welcoming **Professor Warren Harding AM,** and other distinguished guests

2023 WA Australian of the Year, **Professor Samar Aoun**, with **Associate Professor Dr Rosanna Capolingua AM** and **Professor Anna Nowak**, UWA Deputy Vice-Chancellor (Research)

CHANCELLOR'S ALUMNI RECOGNITION RECEPTION

UWA Chancellor, The Honourable Robert French AC, welcomed 80 distinguished guests at a private reception, celebrating UWA graduates and friends who have recently received notable awards or honours.

Among attendees were two Australians of the Year, 26 recipients of the Order of Australia awards, and a Public Service Medallist, along with several of Chancellor's Medallists, Honorary Doctorate recipients and prominent members of UWA's community.

COMPLETION OF **FORREST PRECINCT CELEBRATION**

INTERNATIONAL **ALUMNI REUNION 50s 60s 70s**

AUSTRALIAN AWARDS SCHOLARSHIP RECEPTION WITH LORD MAYOR BASIL ZEMPILAS

Image credit: City of Perth/Lord Mayor

YOUNG ALUMNI GET CAREER CONNECTED

GRADUATION HIGHLIGHTS

UWA CRICKET CLUB AWARD INAUGURAL KEVIN O'KEEFE SCHOLARSHIP DURING RECONCILIATION ROUND

The University of Western Australia Cricket Club (UWACC) launched its inaugural Kevin O'Keefe Scholarship in February this year, as part of WA Premier Cricket's Reconciliation Round.

The scholarship is designed to help young Aboriginal students with their tertiary studies at UWA while being actively involved in the UWA cricket club (UWACC). Congratulations to the assistant coach Alex Stewart on becoming the inaugural recipient of the Kevin O'Keefe scholarship.

Mr Stewart is a member of the Turbunna clan of the Palawa people of Ben Lomond in Tasmania and hopes to set an example for young players to follow. Mr Stewart is currently studying a Master of Education at UWA after completing a Bachelor of Sports Science at Edith Cowan University. He has played cricket at Premier League clubs in Tasmania, NSW and WA and will play and coach for the UWA cricket club.

The scholarship acknowledges the legacy of UWA alumnus Kevin O'Keefe. Mr O'Keefe played for the UWA cricket club in the 1960s, winning the Le Couteur Medal as club champion in 1968-1969 while studying at UWA. O'Keefe, a Yued Noongar man, is acknowledged as UWA's first Aboriginal graduate after finishing his education degree in 1969.

Mr O'Keefe was the first member of his family to go to university and hopes the scholarship will assist in breaking barriers and providing young Aboriginal people the opportunity to study and engage in sport.

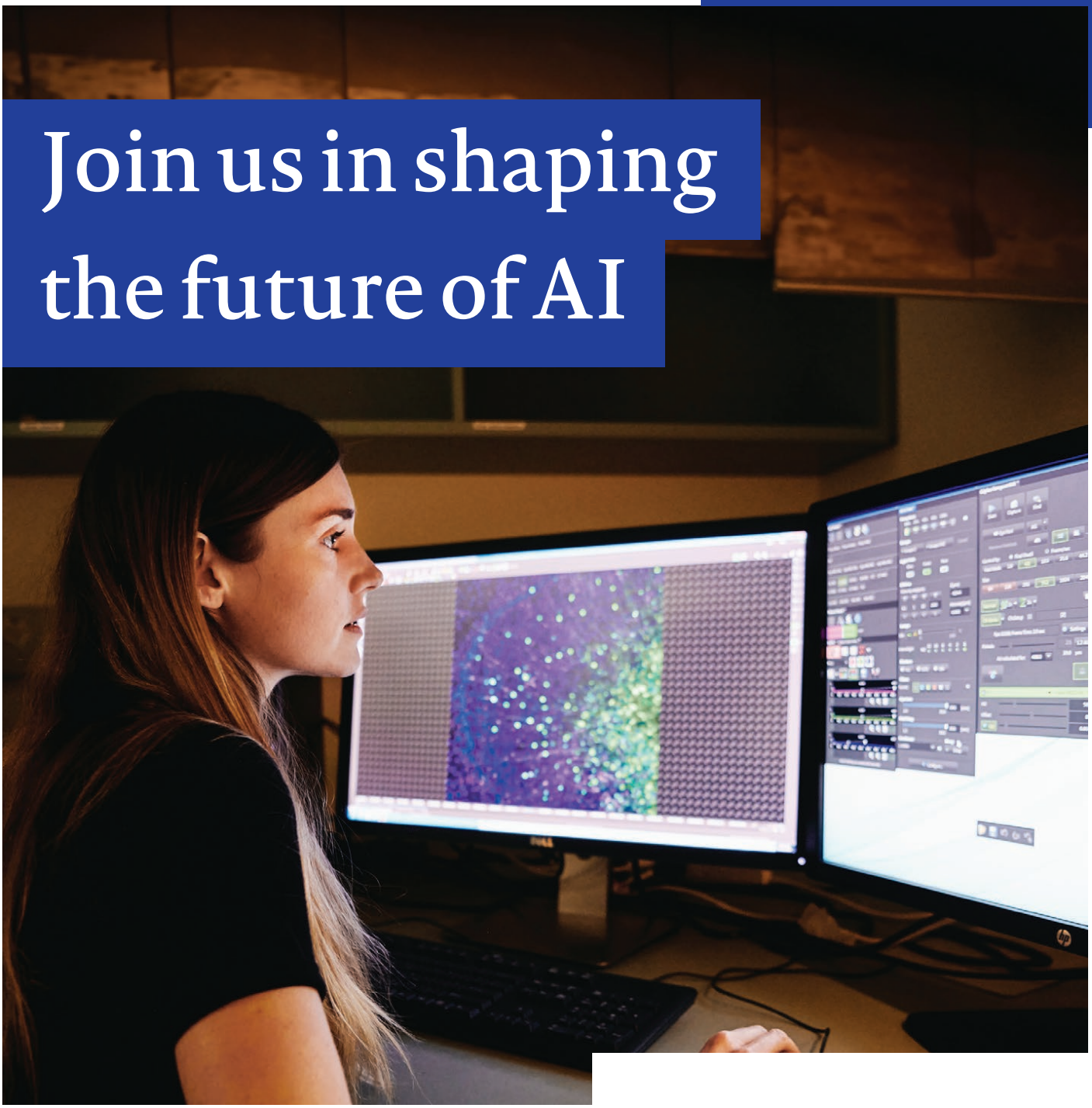
"It's my great hope that the scholarship becomes a pathway for young indigenous cricketers to become a part of the wonderful community that we present here at UWACC," Mr O'Keefe said.

"The quality of this scholarship is that it will enable Aboriginal students not just to have a light at the end of the tunnel, but an opportunity to go through and help them with their studies."

As part of the launch of the scholarship, the UWACC also unveiled its newly created training shirt that incorporates Indigenous artwork designed by UWA alumnus and Aboriginal artist Aaron "Jungari" Sutton.

The launch highlights the club's commitment to Reconciliation and to showcase the importance of Indigenous culture and connection to country.

Join us in shaping the future of AI



Ignite your curiosity and seek a transformative career by studying Artificial Intelligence at UWA.

You'll learn the necessary tools and techniques to develop and understand AI systems to make a significant contribution to communities, organisations, and the global economy.

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