



**Artificial intelligence and health:**  
**A new era of possibility**

**“We have a unique and powerful capability to transform the health landscape and give our children and communities a healthier future.**

**As a leading university of technology, it is our responsibility to be custodians of AI, to ensure it is used for good, and that its benefits extend to all who need them, regardless of their situation.”**

PROF. MICHAEL BLUMENSTEIN, DEPUTY DEAN,  
RESEARCH AND INNOVATION, UTS ENGINEERING  
AND INFORMATION TECHNOLOGY



#### Acknowledgement of Country

UTS acknowledges the Gadigal people of the Eora Nation, the Boorooberongal people of the Dharug Nation, the Bidiagal people and the Gamaygal people, upon whose ancestral lands our university stands. We would also like to pay respect to the Elders both past and present, acknowledging them as the traditional custodians of knowledge for these lands.

## Our Vision:

# Artificial Intelligence for the greater good.

What if AI could simulate real-life scenarios for training purposes, like in the futuristic films we watch? Well, it already can.

At UTS, as leaders in AI research, we believe that the development and deployment of artificial intelligence (AI) in health are not just opportunities but imperatives. Our commitment is driven by a deep understanding that AI, when developed boldly and responsibly, has the potential to deliver health equity on a global scale, improving outcomes for everyone, everywhere.

UTS's cutting-edge AI research, through institutes like the Australian Artificial Intelligence Institute (AAIL), is focused on ensuring that AI is human-centered, ethical, and geared towards public good. By leveraging our expertise, we aim to lead the charge in integrating AI into healthcare in ways that enhance service delivery, improve patient outcomes, and close the health equity gap.

**Our work is not just about advancing technology; it's about ensuring that this technology is accessible, equitable, and used for the benefit of all humanity.**

We recognise the immense responsibility that comes with this power. As we continue to develop AI models that will shape the future of health, we are committed to fostering collaboration across academia,

industry, and government to ensure that these advancements are made with the highest ethical standards and a focus on societal impact. We are committed to bringing together policy makers, clinicians, innovators, philanthropists, and everyday citizens to understand how we can leverage the power of AI to make healthcare smarter, faster and more equitable globally.

We are not just shaping the future of health; we are actively working to ensure that this future is one where everyone, regardless of their background or circumstances, can benefit from the life-changing possibilities that AI offers.

We invite you to join us as we pioneer and navigate the AI revolution, working together to build a healthier, more equitable world that is fit for the future and all that it holds.



**Professor Debra Anderson**  
Dean, UTS Faculty of Health

## The AI Revolution:

Imagine a world where AI isn't just a buzzword but a transformative force in healthcare, diagnosing diseases earlier, personalising treatments, and making healthcare more accessible and efficient for everyone. This isn't a distant future—it's happening now.

Artificial intelligence (AI) has evolved remarkably from its inception, transitioning from theoretical concepts to practical applications that permeate various aspects of life.

In the health sector, AI now plays a pivotal role, with algorithms analysing complex datasets to assist in early disease detection, personalised treatment plans, and operational efficiencies within healthcare systems. Its integration has brought forth predictive analytics for patient care, automated administrative tasks, and facilitated the development of new drugs. And while AI may be perceived as outperforming humans in specific tasks, its superpower lies in its ability to enhance the human experience of healthcare, not replace it.

The economic imperative of AI in healthcare is clear: it's not just about enhancing care, it's about revolutionising it. AI has the potential to transform patient outcomes, streamline clinical processes, and create new healthcare models. By automating routine tasks, refining diagnostics, and providing actionable insights from vast amounts of data, AI can dramatically improve efficiency across the healthcare sector.

### **But as a new frontier, the rules of play and the possibilities of AI use are changing by the second.**

Perhaps the most pressing issue at hand is the regulation of AI, and ensuring that as AI technology advances, it does so within a framework that safeguards ethical standards and societal values. And that it serves to improve health inequities between populations, not exacerbate them.

Now, with the OECD Declaration on Artificial Intelligence providing a globally recognised framework for AI governance, we stand at a pivotal moment in the AI revolution. Academic institutions are vital for supplying the research that underpins AI technologies. They are hubs for cutting-edge explorations into machine learning algorithms, data analysis methods, and clinical applications of AI. This framework offers a unique opportunity to develop and deploy AI technologies responsibly, ensuring they are transparent, fair, and aligned with human values.

It also reminds us of our responsibility as global leaders in AI – to harness the transformative power of AI to create innovations that not only advance technology but also enhance societal well-being, protect human rights, and promote sustainable development on a global scale.



*Protein Visualiser by Matthew Barrett  
UTS Data Arena*

### **The UTS Data Arena is a 360-degree interactive data visualisation facility set to change the way we view and interact with data.**

Viewers stand in the middle of a large cylindrical screen, four metres high and ten metres in diameter. A high-performance computer graphics system drives six 3D-stereo video projectors, edge-blended to create a seamless three-dimensional panorama. It's a powerful immersive facility which can help business, government, and research simplify complex information. Users in the Arena can surround themselves in data to observe, explore, refine, improve, discover and learn.

# The Opportunities:

In an unpredictable future, AI stands as our greatest ally in tackling emerging health challenges. From predicting and responding to pandemics to managing chronic diseases, supporting an aging population, and addressing global health inequities, AI has the potential to revolutionise the health landscape. But what impact do we want to have?

Imagine if AI could close the health equity gap across the globe.

## It can.

In the age of opportunity, it is shocking that such enormous gaps still exist between those who have, and those who have not. We see AI has a powerful tool to address health inequities by tailoring healthcare to diverse populations, ensuring that advancements are accessible to all, regardless of situation or background. Through advanced data analysis, AI can identify underserved populations, tailor healthcare interventions to specific communities, and optimise resource distribution. From regional areas through to metropolitan centres, AI-driven solutions are already making strides in improving access to care, ensuring that no one is left behind in the pursuit of health and wellbeing.

What if AI could transform every healthcare system into a model of efficiency and innovation?

## It's already possible.

Through AI, we can streamline diagnostics, treatment plans, and patient care, making healthcare more efficient and responsive to the needs of patients, while also fostering continuous innovation. Clinicians adopting AI will be ahead of the curve, using this advanced support to refine their decision-making, save time, uncover deeper insights, and improve patient outcomes, all while enhancing the quality of care they provide. By considering resource allocation and management through the lens of AI, Governments in particular could make more informed decisions about where and how resources are directed, ultimately improving patient outcomes and the overall efficiency of healthcare systems.

Picture a future where AI empowers the next generation of the health workforce to do more than ever before.

## It's happening now.

From birth to death, and everything in between, health services and systems are a constant, likely to be part of some of the biggest moments in our lives. As artificial intelligence becomes increasingly integral in healthcare, it's vital to recognise that AI is a tool meant to augment human capabilities, not replace them.

Universities train the next generation of healthcare professionals, data scientists, and AI experts, supplying talent to both the public and private sectors. AI is set to redefine healthcare roles, enhancing the capabilities of healthcare professionals by supporting decision-making, improving training, and ensuring that AI complements rather than replaces human expertise.

# Imagine. UTS can.

UTS is a public university of technology. We are, and always will be, an inclusive university, committed to research, innovation and the dissemination of knowledge of public value. We will be defined by how we support our communities to thrive, economically, socially and culturally. And measured by the success of our partners, staff and students.

UTS is a recognised global leader in Artificial Intelligence (AI). Our thought leadership and innovation extend across:

1. The creation of new AI models, tools and technology through our research and research collaborations
2. The implementation of AI in real-world applications through our innovations and partnerships with business, civil society, and government
3. The education of our students to be skilful, responsible users of AI in their studies and future employment, and
4. Our work to ensure that ethical, legal and other societal impacts are considered in the development and use of AI.

**“From midwives and neo-natal care, through to children and adolescents to older age and end-of-life care, we need to aim for education and research that is transformative, excellent and world-class. We can't do everything, but what we can do should be the best.”**

PROF. DEBRA ANDERSON, DEAN, UTS FACULTY OF HEALTH



# Why UTS?

We are a global leader in AI, and a university for the public good. Our ambition to lead with excellence, is only matched by our commitment to equity and access.



## #1 INSTITUTION IN AUSTRALIA FOR AI

The Australian's Research Awards 2023 and 2024



## 3RD OF 142 UNIVERSITIES WORLDWIDE FOR AI

U.S. News Best Global Universities Subject Rankings 2022



## 10TH IN THE WORLD 1ST IN AUSTRALIA

For AI research in the AI Research Index 2021



## THE AUSTRALIAN ARTIFICIAL INTELLIGENCE INSTITUTE (AAIL) at UTS is the

largest artificial intelligence research hub in Australia.



## AAIL HAS PUBLISHED OVER 1300 PAPERS,

with over 500 of these in high reputational international journals.

## Our Capabilities

- **Medical Biotechnology:** including applications of AI in biotechnology for health purposes, such as in diagnostics or treatment.
- **Medical Physiology:** AI can be used in physiological research to understand body functions, which can lead to improved health outcomes.
- **Oncology and Carcinogenesis:** AI is increasingly used in cancer research to predict disease progression and response to treatment.
- **Pharmacology and Pharmaceutical Sciences:** AI helps in drug discovery and in predicting drug interactions and side effects.
- **Reproductive Medicine:** AI applications in reproductive health can assist in fertility treatments and prenatal diagnostics.
- **Artificial Intelligence and Image Processing:** This includes areas like machine learning, computer vision, and pattern recognition, which are fundamental to developing AI applications in health.
- **Computer Vision and Multimedia Computation:** Relevant for medical imaging and diagnostics.
- **Public Health and Health Services:** This includes health informatics and the use of AI to improve public health services.

## Institute Spotlight

# Australian Artificial Intelligence Institute

As the biggest artificial intelligence institute in Australia, AAIL has a team of world class researchers undertaking programs in major fronts of artificial intelligence.

### AAIL currently has:

- 35 Staff
- 8 Postdocs
- 200+ PhD students

### Since 2017, we have received:

- 34 Australian Research Council (ARC) projects
- 60 industry projects

Research collaborations occur with universities, government departments, and industry groups through joint research centres, joint PhD supervision, research projects and commercial contracts.

### Our research labs:

- Computational Intelligence & Brain Computer Interface
- Biomedical Data Science
- Decision Systems & E-Service Intelligence
- Large-scale Network Analytics Recognition,
- Learning & Reasoning
- Intelligent Drones
- Data Sciences & Knowledge Discovery
- Intelligent Computing & Systems

### Leadership

- Dist. Prof. Jie Lu AO (Director)
- Dist. Professor CT Lin (Co-Director)
- Professor Ying Zhang (Research Director)



### OUR VISION

To achieve excellence and innovation in sustainable and comprehensible artificial intelligence by developing powerful theoretical foundations, innovative technologies and application systems and by leading knowledge advancement which translates into significant social and economic impacts.

**“What AAIL and the university community can provide, is top and innovative research that can translate to industry, to augment what they do, and in fact, to bring things that are not just off the shelf but something that is new to world.”**

DIST. PROF. JIE LU AO  
DIRECTOR, AAIL

# Our AI Centres and Institutes

UTS has developed significant AI models that have been adopted in clinical settings and notable research publications and boasts world leading advanced AI research labs and partnerships with health institutions. Our work in AI is cross disciplinary and collaborative.

In addition to the Australian Artificial Intelligence Institute (AAIL) our leading centres and institutes include:

## The Human Centred AI Lab (HCAI Lab)

is part of Data Science Institute under the Faculty of Engineering and IT. The research lab focuses on exploring the links between human and AI to make AI visible, explainable, trustworthy and transparent. The aim is to develop innovative ethical AI for humanity's productivity improvement, wellbeing enhancement, environmental sustainability achievement and effective partnership with AI.

## The Human Technology Institute (HTI)

is building a future that applies human values to new technology. HTI provides independent expert advice, policy development, tools, training, and data science solutions to support human-centred technology. HTI exists for a clear public benefit: it brings together the best of academia, industry, government, and civil society to demonstrate how human values, including human rights, can and should be imbued in emerging technologies.

## INSIGHT: The Digital, Virtual and AI in Health Collaborative.

The UTS Research Institute for Innovative Solutions for Well-being and Health (INSIGHT) is transforming health outcomes in our community by improving clinical care pathways, driving responsive health policy, informing sustainable models of health care and joined-up health systems, and building the health care and health research workforce of the future.

As part of this, *The Digital, Virtual and AI in Health Collaborative* brings together experts from multiple disciplines to drive innovation in the development and implementation of digital health technologies. It combines UTS' technological excellence with a person-centred approach to health and wellbeing to create digital and virtual solutions that are effective, accessible and context relevant and that can contribute to sustainable models of future health care.

This collaboration focuses on harnessing digital, virtual, and artificial intelligence (AI) technologies to improve healthcare outcomes, applying a social justice and equity lens to ensure new technologies help to close the current health outcome gaps rather than exacerbate inequities in access and/or outcomes.

Our work also prepares future healthcare workforce with the skills needed to adapt to the digital future and apply AI in ethical and safe ways.

# Our people are the future.

AI is transforming healthcare, from improving chronic disease management to accelerating drug discovery and creating personalised health assistants. With ongoing investment in AI infrastructure, large-scale applications in healthcare are becoming a reality.

With the aid of AI-powered automation tools, chronic patients and aging people will receive timely and affordable health care, pharmaceutical companies will accelerate the discovery of new treatments for various diseases, and individuals of all ages will benefit from personalised virtual health care.

At UTS, world-class researchers are at the forefront of these innovations. This spotlight highlights two of our leading experts, part of a vast network of hundreds of researchers across various disciplines, who are pushing the boundaries of AI in collaboration with others to improve health outcomes and revolutionise patient care globally.



**Distinguished Professor Jie Lu AO**

Dist. Professor Jie Lu is a globally recognised leader in artificial intelligence, known for her pioneering work in computational intelligence, including fuzzy transfer learning and data-driven decision support systems. An IEEE Fellow and Australian Laureate Fellow, Prof. Jie Lu has published six books and 500 papers, and her research has had a profound impact on both academia and industry, particularly in sectors like healthcare, transportation, and telecommunications. Her work continues to shape the future of AI, making significant contributions to both the scientific community and society at large.



**Associate Professor Guodong Long**

Dr Long is a powerhouse in the field of artificial intelligence, leading groundbreaking research at UTS. An expert in federated learning - an advanced AI technique that ensures data privacy while delivering personalised intelligence - Dr Long's work has been widely recognised, with his research being published in top-tier AI conferences like NeurIPS and ICML. His papers have garnered over 6,373 citations in just one year (2023). Under his leadership, the Foundation Model and Federated Learning research group is driving innovations that have real-world impact, particularly in critical areas like healthcare, IoT, and social media. His work has attracted over \$4 million in industry investment, underscoring the tangible benefits his research brings to society.

As the General Co-Chair for the upcoming ACM Web Conference in Sydney and General Co-Chair for the Australasian Joint Conference on AI, both in 2025, and as an assessor for the Australian Research Council, Dr. Long is actively involved in shaping the future of AI.

# We're making history, by imagining a better future.

**“Why does one child with cancer survive, when another might not? That’s the core of our work. We aim to make complex genomic information accessible, to remove irrelevant information, leaving the relevant information to help the clinician. The end result will be patients receiving highly individualised therapy and care.”**

PROFESSOR  
DAN CATCHPOOLE

## Making big data accessible to help kids with cancer.

Every year across Australia over 950 young people under the age of 18 are diagnosed with some form of cancer, the deadliest childhood disease. One problem that researchers are grappling with is the question of why patients with similar diagnoses can respond differently to the same treatments.

Big challenges need big ambitions. For the past two decades Professors Paul Kennedy and Dan Catchpoole from The School of Computer Science, Faculty of Engineering and been engaging with The Children’s Cancer Research Unit, Kids Research at The Children’s Hospital at Westmead to utilise machine learning and data analytics to manage, measure and compare complex genomic data derived from tumour specimens donated by cancer patients to the hospital’s Tumour biobank.

The complex human genome underpins the biological mechanisms of a patient’s cancer. So far the Tumour Bank has collected 30,000 samples from 3000 patients across 50 types of cancers since its inception in 1998. Kennedy and Catchpoole’s team has begun testing the genomic data from these samples, mostly from childhood acute lymphoblastic leukaemia and rhabdomyosarcoma.

They work on simplifying complex data, condensing over 80,000 pieces of information into more manageable insights. This approach allows for identifying patterns and relationships between patients, aiding in predicting the likelihood of relapse and helping clinicians make more informed decisions about treatment with a breadth and accuracy that has not been previously possible.

*Collaborators: The Children’s Hospital at Westmead, Western Sydney University, UTS Animal Logic Academy, Samurai Punk, Sony Foundation and Tour de Cure*



## Transforming IVF with AI: A Breakthrough in Male Infertility Treatment

UTS has partnered with leading IVF clinics and tech experts to develop a groundbreaking AI tool that could change the future of male infertility treatment. This innovative AI technology analyses sperm samples with remarkable accuracy, selecting the healthiest sperm for use in IVF procedures. Early trials have shown a significant increase in successful fertilisation rates, offering new hope to couples struggling with infertility.

Our researchers have created an AI tool, SpermSearch, that rapidly and accurately identifies viable sperm in men with severe infertility, significantly outperforming traditional manual methods. It offers new hope for men with non-obstructive azoospermia (NOA), the most severe form of infertility. The AI’s speed and precision in detecting sperm improve the chances of successful Intracytoplasmic Sperm Injection (ICSI) treatment by minimising the stress on sperm and reducing the time embryologists spend on the task. The study underscores a technological leap in fertility treatments, providing a promising avenue for couples struggling to conceive, with further research planned to validate these findings in clinical trials.

By integrating AI into IVF, UTS is not just improving the chances of conception but also reducing the emotional and financial burden on families. This project represents a major step forward in reproductive health, with the potential to make IVF more effective and accessible worldwide. With this AI tool, the dream of starting a family is becoming a reality for many who once faced impossible odds.

## Free stuttering care for everyone, regardless of where they’re located in the world.

Imagine a world where millions of people who stutter no longer struggle with verbal communication—that critical aspect of daily life. The Australian Stuttering Research Centre (led by Professor Mark Onslow) is making this a reality through a bold five-year project, backed by a \$6.5 million grant from the National Health and Medical Research Council. By creating a complex, free online treatment platform, they are bringing life-changing therapy to 156 million people worldwide. This initiative harnesses cutting-edge digital tools to deliver personalised, accessible care that was once limited to in-person sessions, offering the potential for global, immediate early intervention, and even prevention of stuttering.

Through this project, the Centre aims to build an international digital network ensuring that effective treatments reach everyone, regardless of their location or resources. This groundbreaking work not only improves lives but also sets a new standard in global healthcare for stuttering.

Communication is fundamental to life. Your support could pioneer global access to stuttering treatment. Talk to us today about how together, we can harness our world-leading research to develop digital platforms that deliver effective speech therapy to anyone, anywhere.

# AI is changing the world. Now, you can too.

What if AI could decode the complexities of rare diseases in days instead of years? It's within reach. Artificial Intelligence is no longer just a concept of the future—it's transforming industries, reshaping economies, and revolutionising healthcare right now. This is your opportunity to be part of this transformation. Explore the key projects that are paving the way for a smarter, healthier tomorrow. These are the most potent, ready to scale opportunities for investment.

## What do you see as your legacy in the AI revolution?

### Build on a gold star reputation with the establishment of an AI and Health Conjoint Chair:

Great revolutions need bold leaders, which is why we are establishing a donor-named Conjoint Chair in AI and Health to drive and enhance the cutting-edge research and partnerships that are transforming the AI and health landscape. As a globally leading technology institution, we not only have a responsibility to lead with integrity, but to drive high impact collaborations that offer the greatest benefit to society as a whole. This role sits at the nexus of research and impact, and offers an unparalleled opportunity to drive transformation.

### Empower the next generation of health leaders:

By investing in PhD Scholarships, you're directly contributing to groundbreaking research and the development of future experts who will drive advancements in AI. This is your opportunity to play a pivotal role in shaping the future of artificial intelligence and its application in solving real-world challenges.

### Unlock new insights in cohort studies, improving health outcomes for all:

Understanding what helps people live healthy, fulfilling lives starts with the data we collect from birth. Cohort studies collect the direct voices of children and their families to tell us "what works" rather than just telling us what is going wrong - a hugely advantageous benefit over population or administrative data sets. By coordinating multiple cohort studies, we can gather richer, more comprehensive insights into how different factors—like family, community, and society—impact wellbeing.

The Better Together Cohort Study AI Project will apply innovative AI methodologies to build a rich global resource to enable rapid, context relevant insights to emerge to help close the gaps in wellbeing that have persisted for decades. It will also allow researchers to explore what truly works to promote health across different populations, leading to better, more informed strategies that help individuals and communities thrive.



### Preeclampsia Diagnostic Advancement: Point of Care Platform

Preeclampsia is a leading cause of maternal and foetal death and morbidity in pregnancy, with no current cure in sight and limited monitoring strategies. We are developing a state-of-the-art diagnostic tool for early and reliable detection of preeclampsia, aimed at significantly reducing maternal and foetal mortality, especially in remote areas. The proposed technology can provide results in 15 minutes with high sensitivity, promising a revolution in antenatal care globally.

### Drive the Future of Allied Health with Digital Twin Technology:

Support the development of cutting-edge AI-powered digital twins that are revolutionising allied health services. The AI-Empowered Digital Twin (DT) Lab at UTS is creating virtual replicas of patients to simulate, predict, and enhance treatment outcomes. By investing in this innovative technology, you'll be advancing healthcare solutions that personalise care, improve patient outcomes, and streamline allied health services, making a real impact on the future of healthcare.

### Prevent the Next Global Pandemic: Precision Virus Detection

This research project aims to develop an innovative rapid antigen test capable of distinguishing viruses at the variant level. If successful, this new antigen test will significantly enhance pandemic preparedness and response, enabling faster, more accurate public health interventions, supporting next generation of infectious disease control.

### Advance mRNA Vaccine Research for a Healthier Future:

Join our consortium to address otitis media—chronic middle ear infections disproportionately affecting children, leading to scarred eardrums, significant hearing loss, and often deafness before school age. For Aboriginal and Torres Strait Islander children in particular, this adds to existing health challenges. Otitis media, a polymicrobial disease, also drives antibiotic resistance (AMR) due to excessive antibiotic use. Together with our partners, we are developing an AI-designed mRNA vaccine targeting multiple pathogens (most vaccines only target one), offering a unique solution to prevent these life-altering infections.





# With Your Support

Imagine if AI could predict heart attacks before they happen? It can. And there's so much more we can do together.

When you partner with UTS, you empower possibility. Your support plays a critical role in bringing vital solutions to life and scaling those that are ready for their greater purpose, solutions that impact all of us.

UTS is a world-leading university of technology, a standout in the research and application of AI. We are not only committed to generating opportunities that ensure this knowledge and learning extends throughout the community, both locally and internationally, we see it as our responsibility, and privilege.

If you share this vision, and excitement about the possibilities of the AI revolution, we welcome you. This is the beginning of a conversation that can change lives and revolutionise the health and social systems that support you and your family, for generations to come. Artificial Intelligence is the future, and the future is here.

**If you'd like to learn more about how UTS can support your vision for a better world, get in touch.**

**Jo Degney-Hartley**

Campaign Director

UTS Advancement

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