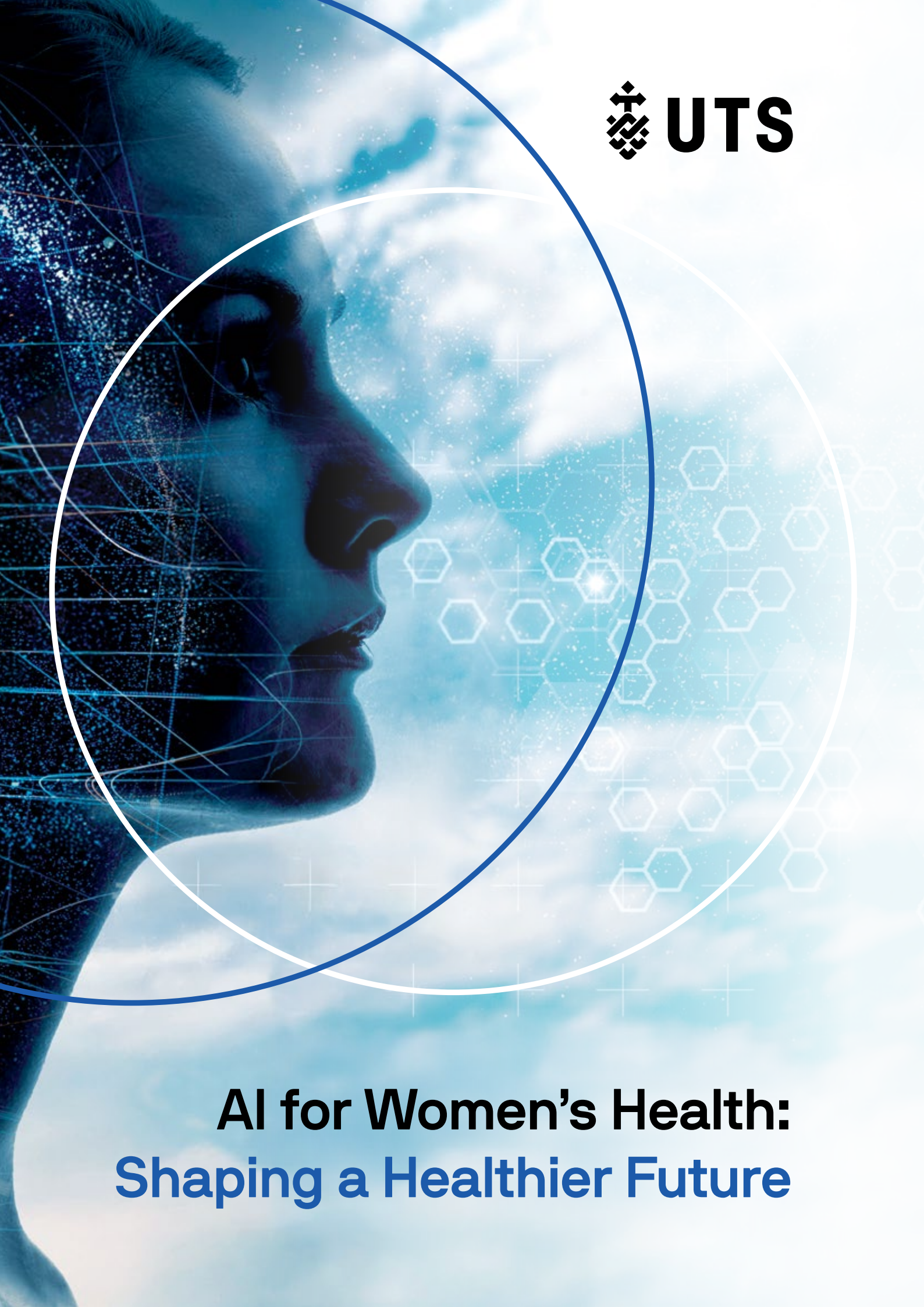


UTS

AI for Women's Health:
Shaping a Healthier Future

Our vision

WITH THE POWER OF AI, WE CAN.

Acknowledgment 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.

for a healthier future for all women

What if we could predict chronic disease risks earlier, detect cancer sooner, and diagnose conditions like hypertension and diabetes in time to make a difference? With the power of AI, we can.

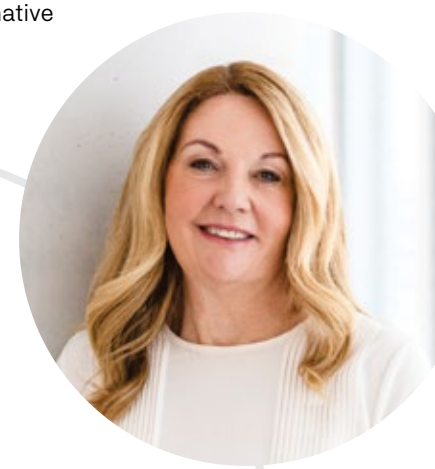
Healthy women are essential to Australia's productivity and future. The National Women's Health Strategy 2020-2030 and the National Digital Health Strategy call for innovative, data-driven solutions to meet the specific needs of women and girls. At UTS, we are leading the charge in Artificial Intelligence (AI) research, believing that AI for women's health is not just an opportunity, but a necessity.

Women experience health challenges differently from men, with a higher prevalence of conditions like anxiety, depression, osteoporosis, and cancers. In 2022, 94% of the ill health and premature deaths of Australian women were linked to reproductive and maternal conditions. Yet, the lack of data and research into female-specific diseases like endometriosis and pelvic floor disorders hinders progress in diagnosis and treatment.

The AI for Women's Health Collaborative at UTS is committed to advancing research in prevention, early intervention, and personalised treatment to reduce both the financial burden on society and improve the health and well-being of women and their families. We are bringing together experts from nursing, midwifery, allied health, data science, and AI to develop woman-centred solutions.

At UTS, our cutting-edge AI research, led by the Australian Artificial Intelligence Institute (AAII), is committed to human-centred, ethical AI that serves the public good. In collaboration with global leaders in women's health from the UTS Institute for Innovative Solutions for Health and Well-being (INSIGHT) we are leveraging our broad expertise to integrate AI into healthcare. Our vision is to enhance service delivery, improve patient outcomes, and reduce health inequities.

Join us on this journey as we shape the future of women's health to ensure every woman—regardless of background or circumstances—can benefit from the transformative potential of AI.



Professor Debra Anderson
Dean, UTS Faculty of Health

Director, Women's Wellness Research Collaborative

Distinguished Professor Jie Lu AO
Associate Dean (Research Excellence)
UTS Faculty of Engineering & Information Technology

Director, Australian Artificial Intelligence Institute

Transforming Women's Health

Artificial Intelligence (AI) has evolved from a concept to a game-changer in healthcare. In women's health, AI helps health practitioners and researchers better understand and treat conditions that affect women, offering more accurate diagnoses, personalised treatments, and better healthcare systems.

AI is already making a difference by predicting risks and detecting conditions like hypertension and diabetes early. Tools like recommender systems allow women to ask health questions and receive personalised advice, while AI helps doctors connect all patient data for a complete view, making decision-making more informed.

AI is also helping improve women's representation in clinical trials, ensuring that diverse datasets are included to increase female demographics, reduce bias and improve recruitment strategies, leading to more equitable outcomes.

The potential of AI in healthcare goes beyond improving care; it's about revolutionising the way we approach patient health. By automating routine tasks and enhancing diagnostics, AI is making healthcare more efficient and effective.

This is the era of possibility, and as AI technology continues to grow, it's important to ensure AI is developed responsibly, with regulations in place to safeguard ethical standards and help reduce health disparities.

Protein Visualiser by Matthew Barrett
UTS Data Arena

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.

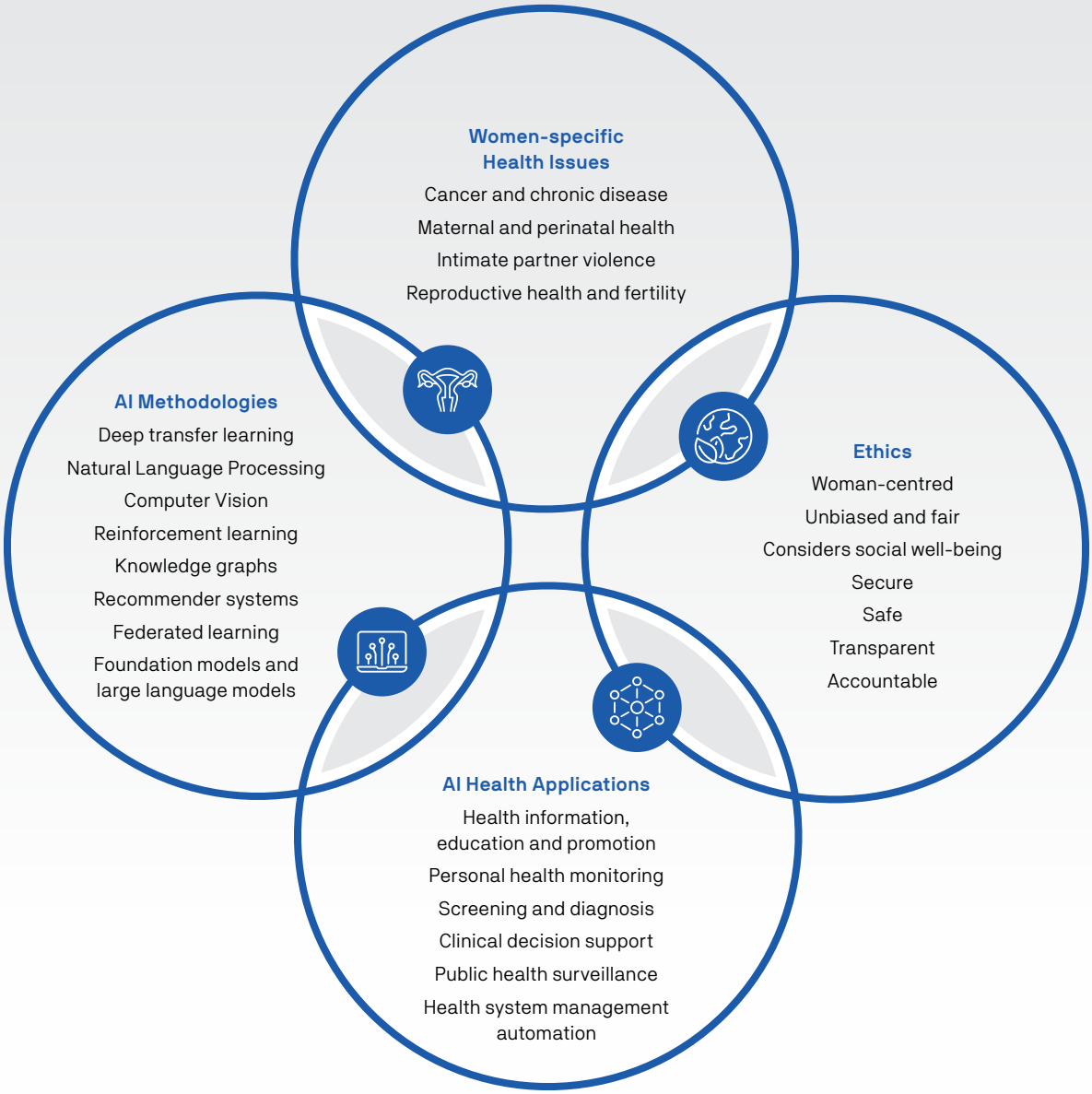
Viewers stand in the middle of a large cylindrical screen, four metres high and ten metres in diameter. A high-performance computer graphics system drives six 3D-stereo video projectors, edge-blended to create a seamless three-dimensional panorama. It's a powerful immersive facility which can help business,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

AI for Women's Health Framework

The AI for Women's Health Collaborative at UTS follows a thoughtful, comprehensive framework designed to address women-specific health challenges.

Key issues such as cancer and chronic disease, maternal health, intimate partner violence, and fertility guide our approach in selecting the most suitable AI methodologies.

These methods power AI-driven solutions in diagnostics, treatment planning, and preventive care, improving women's health outcomes. Ethics is at the core of our work, ensuring that each stage of the process—from identifying health issues to applying AI methods—remains fair, transparent, and aligned with the unique needs of women. This continuous feedback loop ensures ongoing improvements in both technology and care.



The opportunity for Women's Health

Our mission is to leverage the power of Artificial Intelligence (AI) to address some of the most pressing health challenges faced by women today. Our focus is grounded in the latest research and statistics that highlight the unique health risks women encounter.

In 2022, a staggering 94% of ill health and premature deaths among women in Australia were linked to reproductive and maternal conditions. Breast cancer remains the second most diagnosed cancer in Australia and the leading cancer among women, with over 21,000 new diagnoses annually. Tragically, nine Australians lose their lives to this disease every day. Additionally, perinatal depression and anxiety impact 15% of Australian women, costing the nation over $7.3 billion each year.

Women also face a disproportionate burden of intimate partner violence (IPV), with 1 in 4 women at risk of developing severe physical and mental health challenges as a result. Despite being more likely to seek healthcare, women often experience gender-based discrimination, leading to delays in receiving care, medicines, reproductive services, and, in some cases, misdiagnosis.

Our Focus Areas for Women's Health:

We are committed to addressing these critical issues through AI-driven insights and solutions. Our collaborative work will concentrate on four key areas:

1. **Cancer and Chronic Disease**
2. **Maternal and Perinatal Health**
3. **Intimate Partner Violence (IPV)**
4. **Reproductive Health and Fertility**

By utilising AI, we aim to better understand the connections between these health challenges, considering both biological and social factors that influence women's health and wellbeing.

Together, we can create a future where women receive the care and support they deserve, free from discrimination, and with faster, more accurate access to treatments and solutions.

> **What AAII 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 the world.**
>
> DIST. PROF. JIE LU AO
> DIRECTOR, AAII

Women's health has often been overlooked, but the transformative power of AI offers the chance to break free from traditional limitations. This is not just a scientific endeavour—it's a societal call to action. We must harness innovation to deliver personalised, equitable care and ensure that women's health is empowered through precision and innovation.

PROF. ANGELA DAWSON,
FACULTY OF HEALTH UTS

Cancer and Chronic disease

AI is revolutionising the detection and treatment of chronic conditions such as reproductive cancers, cardiovascular disease, diabetes, and arthritis. With advanced imaging and biomarker analysis, AI helps detect these chronic conditions early and accurately. By using genetic and molecular data, AI tailors personalised treatments, including targeted drug therapies. For example, AI can match a breast cancer patient with the right medication based on predictive data about drug responses. Additionally, AI can predict long-term cancer and chronic disease risks, ensuring timely screenings and better treatment outcomes.

Maternal and Perinatal Health

AI can predict risks like gestational diabetes, preterm birth, and postpartum complications, improving maternity care. Virtual monitoring and wearable devices alert clinicians to vital changes in real-time, while AI analyses health records and ultrasound images to spot potential problems early. These tools help ensure safe pregnancies by enabling quicker interventions and more personalised care.

Intimate Partner Violence (IPV)

Many women don't disclose IPV due to fear or stigma. AI helps identify signs of IPV in health records, allowing for tailored care and necessary safety plans. AI-powered apps can analyse conversations to help women recognise abusive patterns and provide support in seeking help from health services, all while maintaining privacy and security.

Reproductive Health and Fertility

AI plays a crucial role in reproductive health, including fertility and hormonal balance. By analysing clinical and genetic data, AI can diagnose conditions like endometriosis and predict the impact of hormone imbalances. It helps improve assisted reproductive technologies, ensuring successful pregnancies or hormonal contraceptives that complement a woman's individual needs. Additionally, AI-powered chatbots educate women on reproductive health, assist with fertility tracking, and provide access to healthcare services.

Our Strategic Approach to Transforming Women's Health

We are committed to revolutionising women's health through innovative AI solutions. By applying cutting-edge technologies like machine learning, natural language processing, and computer vision, we aim to improve diagnosis, treatment, and overall well-being for women. Our approach focuses on personalised care, early intervention, and long-term health management, ensuring that every woman can benefit from AI-driven advancements in healthcare.

1 Improving Predictions and Accuracy

Transfer learning can extract valuable insights from large medical imaging datasets, helping research in areas of women's health that have historically lacked sufficient data. When paired with deep learning, which can detect complex patterns in diverse data—like hormone variations during menstrual cycles and imaging results—these techniques significantly improve the accuracy of predictions related to ovulation and fertility. Deep transfer learning models are becoming more robust, offering exciting possibilities for addressing underexplored aspects of women's health.

2 Enhancing Personalised Care with NLP

Natural Language Processing (NLP) can analyse women's electronic health records and medical histories, providing personalised advice for key life stages like fertility and menopause. In mental health consultations, NLP can detect subtle language patterns that indicate shifts from mild postpartum blues to severe depression, enabling timely and targeted interventions.

3 Advancing Diagnostics with Computer Vision

Computer vision enables accurate analysis of medical images, helping detect conditions like breast cancer, cervical cancer, and pregnancy-related complications earlier. By learning from large imaging datasets, AI identifies subtle patterns that may be missed by the human eye, improving diagnostic accuracy and consistency. Computer vision, combined with genetics, is also driving new research areas like radiogenetics, offering exciting possibilities for more precise breast cancer treatments.

4 Personalised Treatment with Reinforcement Learning

Reinforcement learning can optimise treatment plans for chronic conditions like endometriosis by continuously adapting to real-time patient data. By adjusting medications based on evolving clinical indicators, this AI approach ensures interventions stay aligned with each patient's unique health journey, transforming long-term care management.

5 Connecting Data with Knowledge Graphs

Knowledge graphs provide a powerful way to integrate diverse data in women's health, from imaging and clinical notes to physiological and genomic information. By linking these different data sources, knowledge graphs enable comprehensive analyses that uncover complex relationships, helping to create more targeted and personalised health interventions.

6 Personalising Care with Recommender Systems

Recommender systems provide personalised healthcare and lifestyle suggestions for women. When combined with large language models (LLMs) and multimodal AI, they can process diverse data sources—such as visual and language information—helping to tailor care. Advanced techniques like concept drift detection allow these systems to adapt to individual patient needs and population variations, improving care by personalising medical records, patient education, symptom monitoring, and long-term health management.

7 Protecting Privacy with Federated Learning

Federated learning is an innovative approach that enables large-scale machine learning while preserving privacy. In women's health, where data is highly sensitive, federated learning trains AI models locally on protected datasets, sharing only model parameters—not raw data—thereby minimising privacy risks. Its decentralised structure ensures strong cybersecurity and data protection, making it ideal for collaborative healthcare applications. The emerging concept of federated intelligence will further enhance collaboration within national healthcare systems, enabling secure, large-scale data sharing.

8 Leveraging Foundation Models

Foundation models are a powerful AI approach that learns from vast datasets to capture broad knowledge. Built on the Transformer neural architecture, these models can adapt to a wide range of tasks. In healthcare, foundation models have been used to uncover hidden relationships in medical records, offering versatile solutions for women's health. By fine-tuning these models, we can create specialised applications, like a large language model (LLM) tailored for women's health. Integrating healthcare records into multi-modal models will further expand their impact across various data types, enhancing care and interactions.

“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

Why UTS?

We are a global leader in AI and women's health 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 (AAII)

at UTS is the largest artificial intelligence research hub in Australia

AAII Has published over 1300 papers,

with over 500 of these in high reputational international journals

#13 the 2024 Research Impact Ranking

In the top 20 ARWU 2024 Nursing

Our AI Centres and Institutes

Shaping healthier futures through research, collaboration, and innovation.

UTS delivers world-leading AI research through cross-disciplinary collaboration, developing significant models adopted in clinical settings and featured in notable publications. Our advanced AI research labs partner with health institutions to create real-world impact. Beyond our Australian Artificial Intelligence Institute (AAII), we feature:

Human Centred AI Lab (HCAI Lab)

Part of the Data Science Institute under the Faculty of Engineering and IT, the HCAI Lab explores the crucial links between humans and AI. We focus on making AI visible, explainable, trustworthy and transparent, developing ethical AI solutions that enhance productivity and wellbeing while promoting environmental sustainability and effective human-AI partnerships.

Human Technology Institute (HTI)

Building a future that applies human values to new technology, HTI provides independent expert advice, policy development, tools, training, and specialised data science solutions. We exist for clear public benefit—bringing together the best of academia, industry, government, and civil society to demonstrate how human values and rights can be embedded in emerging technologies.

INSIGHT: The Digital, Virtual and AI in Health Collaborative

This innovative collaborative brings together experts from multiple disciplines to drive development and implementation of digital health technologies. We combine UTS' technological excellence with person-centred healthcare approaches to create solutions that are:

- Effective and accessible in real-world contexts
- Designed to address healthcare inequities rather than exacerbate them
- Developed with a social justice lens to close health outcome gaps
- Focused on preparing healthcare professionals with essential digital skills

Our work contributes to sustainable models of future healthcare while ensuring new technologies are applied ethically and safely across diverse communities.

INSIGHT: Women and Children's Health Research Collaborative

Our Women and Children's Health Research Collaborative brings together leading experts dedicated to improving health outcomes for women, children and families across Australia.

Our research directly influences policy and practice by:

- Building evidence that strengthens family health systems
- Improving healthcare access for vulnerable populations
- Enhancing workforce capabilities and practices
- Advancing outcomes for Indigenous women, children and adolescents

Through world-class research, innovative teaching, and strong industry partnerships, we're developing tomorrow's healthcare leaders while making a tangible difference today.

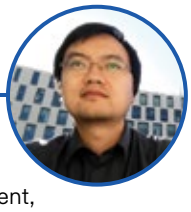
Our people are the future

At UTS, world-class researchers are at the forefront of AI and Women's Health research.

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.

Professor Debra Anderson

Professor Debra Anderson is a distinguished international scholar and visionary leader in women's health research, with over 30 years of experience spanning nursing, exercise science, and academic leadership.

Currently Dean of the Faculty of Health at the University of Technology Sydney, she is renowned for her holistic approach to health that emphasises the interconnection of physical and mental wellbeing.

As Founding Director of the Women's Wellness Research Collaborative and DAWN Complete Health and Wellbeing, Professor Anderson has built a global network of researchers across six countries, focusing on transformative research that influences policy and clinical practice.

Her collaborative work includes the Australian Longitudinal Women's Health Study and the InterLACE Study, partnering with scholars from six nations including Harvard, and leading institutions across Europe and North America. This research provides insights into relationships between reproductive stages and chronic disease development.

Her extensive international credentials include a Visiting Professor at King's College London. With a distinguished reputation built through extensive publications, keynote presentations, and leadership roles, including board memberships in international health organisations, Professor Anderson continues to drive innovative research aimed at improving health outcomes across the lifespan.

Professor Angela Dawson

Professor Angela Dawson is a distinguished researcher with 25 years of experience in public health, specialising in maternal and reproductive health services for priority populations in Australia and low-middle income countries.

As a NHMRC Translational Research Fellow and recipient of the Sax Prize for Research Impact, she has pioneered groundbreaking work in understanding and addressing complex healthcare challenges. Her research spans critical areas including female genital mutilation (FGM), developing innovative clinical interaction tools and professional education models, healthcare for refugees and Indigenous communities, and support services in humanitarian emergencies.

With over 100 peer-reviewed publications and leadership roles such as co-chair of the Australasian Sexual and Reproductive Health Alliance and Fellow of the Public Health Association of Australia, Professor Dawson continues to drive transformative research. Currently, she leads NHMRC-funded research on refugee health across generations, focusing on developing comprehensive healthcare strategies for marginalised communities and advancing cultural competence in medical practice.

Professor Sally Inglis

Professor Sally Inglis is a Heart Foundation Future Leader Fellow and internationally recognised expert in nurse-led and virtual cardiovascular care models. As an influential researcher, she holds executive roles with the Cardiac Society of Australia and New Zealand (CSANZ) and NSW Cardiovascular Research Network.

A champion for diversity and inclusion in research, Professor Inglis leads key initiatives including the "Cardiovascular Nursing and Climate Change: A Call to Action" publication. During the pandemic, she authored multiple position statements on telehealth adaptation for cardiovascular care.

Her Heart Foundation-supported research program at UTS focuses on digital health to improve cardiovascular care access. As lead author of six Cochrane Reviews examining cardiovascular digital health, her work has informed telehealth implementation globally and influenced healthcare policy. Her research, published in prestigious journals including the British Medical Journal, has garnered over 5,800 citations.

Professor Inglis brings extensive experience in epidemiology and cohort analysis, having completed an NHMRC/Heart Foundation Fellowship at the University of Glasgow's British Heart Foundation Centre of Research Excellence.

Professor Daniel Catchpoole

Professor Daniel Catchpoole is an expert with over 20 years of experience in childhood cancer research, tissue pathology, genomics, and cell biology. Currently working in the School of Computer Science and Biomedical Data Science Lab at the Australian Artificial Intelligence Institute, he previously spent 17 years developing collaborative research projects.

His work combines data analytics and artificial intelligence with molecular cancer research to improve cancer treatment pathways—transformational research that has received significant funding from the Cancer Institute of NSW and Sony Foundation.

Since 2001, Professor Catchpoole has focused on translational research through gene expression profiling of paediatric tumours, particularly acute lymphoblastic leukemia and neuroblastoma. His current research develops systems biology approaches for cancer assessment, including data mining and visualisation of complex multidimensional biomedical data.

As founding member and first President of The Australasian Biospecimens Network Association, Professor Catchpoole brings extensive experience in translational research frameworks, biobank management, genomic dataset generation, and computational analysis. His leadership has been recognised across disciplines, contributing to committees at local, state, and national levels.

Shaping a better future for Women's Health with AI

The future of women's health is full of promise, driven by the transformative potential of AI. Our approach focuses on personalised care, early intervention, and long-term health management, ensuring that every woman can benefit from AI-driven advancements in healthcare. At UTS, we're committed to leading this change, ensuring that women's health is empowered through precision and innovative care.

Join us in making this vision a reality.

Whether you're a researcher, healthcare professional, or advocate, we invite you to be part of this transformative journey. Together, we can create a healthier future for all women.

Professor Debra Anderson
Dean, UTS Faculty of Health
Director, Women's Wellness Research Collaborative

Distinguished Professor Jie Lu AO
Associate Dean (Research Excellence)
UTS Faculty of Engineering & Information Technology
Director, Australian Artificial Intelligence Institute

UTS

Faculty of Health - University of Technology Sydney
PO Box 123, Broadway NSW 2007

For more information on Women's Health at UTS, email FOH_Dean@uts.edu.au

uts.edu.au/about/faculties/health