



University of
South Australia

Australian Research
Centre for Interactive
and Virtual Environments



**A world leader in augmented
and virtual reality technologies**

A world leader in augmented and virtual reality technologies.

The University of South Australia's Australian Research Centre for Interactive and Virtual Environments is a unique alignment of computer science, art and design, brought together to transform industry and society and solve contemporary challenges.

We are a focal point for interdisciplinary augmented and virtual reality (AR and VR) research at UniSA. Our globally renowned researchers are leaders in AR and VR technologies, including wearable computing, human-computer interactions (HCI), 3D visualisations and telepresence.

We partner with industry, government and the community; in healthcare, defence, manufacturing, internet-of-things, and interactive art and design. Our impact is global - working with industry partners from around the world that including Google, Saab, Amazon, and Siemens.

Through our research in collaboration with our partners, we are leading the application of the next wave of AR and VR technology.

UniSA's Australian Research Centre for Interactive and Virtual Environments transforms human-centred design through Australia's Future Submarine Program.

ABOVE WORLD-CLASS RESEARCH IN INTERACTIVE AND VIRTUAL ENVIRONMENTS

Results in 2018 Excellence in Research for Australia (ERA) - Artificial Intelligence and Image Processing

100% OF OUR RESEARCH RATED AT OR ABOVE WORLD-CLASS

2018 Excellence in Research for Australia (ERA), 4-digit Fields of Research

NO.1 IN AUSTRALIA FOR RESEARCH IMPACT AND ENGAGEMENT

2018 ARC Engagement and Impact Assessment (EI), Combined Impact - Approach to Impact and Engagement on Assessed Fields



Double Agent at MOD. Professor Simon Biggs' Double Agent exhibition used an evolutionary process of deep learning to explore the relationship between technological and human evolution.

Our research

INDUSTRIAL APPLICATION & IMMERSIVE TECHNOLOGIES

We develop immersive technologies to solve challenges specific to industry. Our innovative solutions are designed to enhance both the performance and experience of individuals and groups in the workplace.

TRANSFORMATIVE HUMAN-CENTRED DESIGN & INTERACTION

Our researchers explore the interaction of humans and technology through the window of design. Considering elements such as; function, usability, social significance and aesthetics, we've transformed the development of new products and services focussed on ensuring their healthy adoption.

Undertaking research in wearable computers such as electronic devices embedded into textiles and clothing, for next generation E-Suits.

ENHANCING MEDICAL HEALTH & WELLBEING

We innovate the application of augmented, virtual and mixed reality technologies to enhance the delivery of medical and health related services.

Focussing on how technology can be applied to improve the wellbeing of individuals through enhancing existing therapies, developing new therapies and creating environments that improve an individual's health and wellbeing.

DIGITAL, SOCIETAL, URBAN & CREATIVE CULTURES

Our researchers investigate the application of computational and simulation systems in architecture, construction, and urban and regional planning. We also investigate the role of immersive technologies in the conservation of cultural heritage.



BAE Systems Australia, Senior Systems and Data Architect, Dr Ana Kuusk with Dr Wolfgang Mayer and Dr Andrew Cunningham

Our impact

As a research centre at the University of South Australia – Australia's University of Enterprise - our culture is enterprising. Our work with industry, government and the community, redefines the use of immersive technologies and provides solutions that make an impact today.



Associate Professor Ross Smith's research investigates how medical treatment can be enhanced with mixed reality technologies.

Delivering 'smarts' to the Hunter Class Frigate Program

In partnership with BAE, ASC Shipbuilding and Australia's Innovative Manufacturing Cooperative Research Centre (IMCRC), the Australian Centre for Interactive and Virtual Environments has commenced a project to innovate the Hunter Class Frigate Program by harnessing data visualisation to improve shipyard planning and problem-solving capacity.

A first-of-its-kind digital environment of the entire ship design and construction process will be created to improve productivity, quality and safety outcomes in Australia's naval shipbuilding industry. Our research will focus on how narrative visualisation and big data processing can deliver, reshape and refine the highly complex manufacturing environment. The outcomes will be extended beyond the Hunter program, assisting critical local supply chains and future projects across the manufacturing landscape.

CADwalk is a life-size interactive projection technology that provides improved understanding of architectural and construction plans, collaboratively developed between UniSA and CADwalk Global Group.



Designing Australia's future submarines

In any high-pressure environment, hundreds of factors can influence whether an outcome will be positive or negative. It may be the smallest thing that can add a few seconds to a critical response – from the position of a console or a screen – and in the high-pressure and confined workspace of a submarine control room, those few seconds count.

Partnering with Lockheed Martin Australia, our researchers are assisting in the design and development of control room layouts and the physical ergonomics of Australia's future attack-class submarines. As a partner to Australia's Future Submarine Program, our state-of-the-art design processes are designed to optimise human behaviour and performance in such high-stress environments.

Through the application of our VR technology and spatially aware projection techniques onto physical models, we have innovated the design, development and communication process to create realistic user experiences. The project ensures that new combat systems and equipment integrated into future submarines, complement the needs of the crew and the Royal Australian Navy for the next 40 years.

Transforming manufacturing

In collaboration with Jumbo Vision International (JVI), the Australian Research Centre for Interactive and Virtual Environments, has developed and commercialised smart manufacturing technologies. This partnership leveraged our researchers unique capabilities in AR visualisation of large system design and JVI's expertise in the design and delivery of audio-visual solutions and command/control rooms.

Current design processes for manufactured high-end instrumented facilities, such as command centres and control panels, are flawed; the traditional process requires significant time, significant associated costs and can still result in a sub-optimal client experience. Our researchers, led by Professor Bruce Thomas, developed VR simulations that provide fly-through animations and guided tours, as well as AR solutions that offer the ability to physically walk around and touch objects; allowing for the modification of a design concept in real time. This AR technology can significantly assist a client's appreciation of the design and the effects of any changes; resulting in a better, more efficient and cost-effective end result.

"I have over a decade of positive project history with UniSA's Professor Bruce Thomas, and now the Australian Research Centre for Interactive and Virtual Environments. A highlight of this fruitful relationship has been a five-year research & development project, supported by the Innovative Manufacturing CRC (IMCRC)."

Gerhard Kimenkowski, Founder, CADwalk Global Pty Ltd

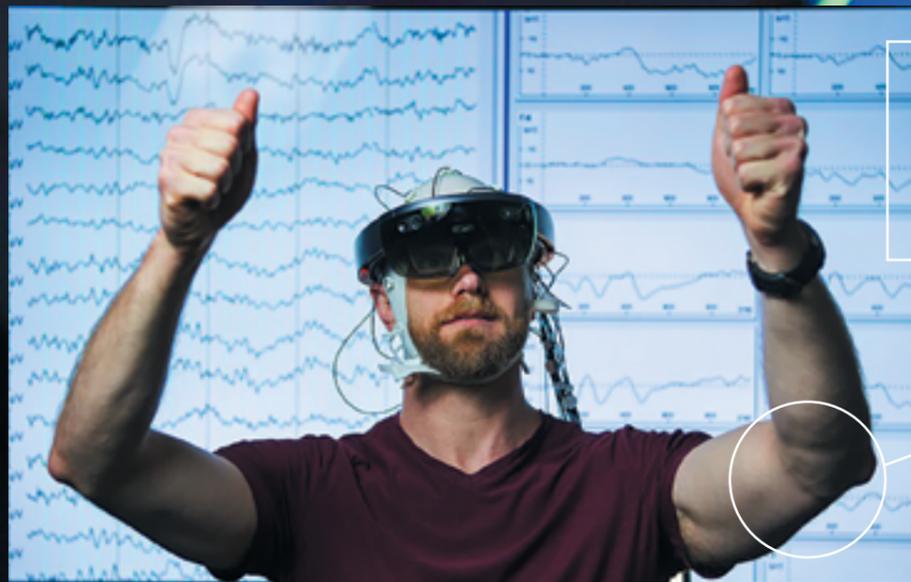


In partnership with Lockheed Martin Australia, we have developed a control room concept design, experienced with VR for enhanced design development and user review.

Enhancing human performance

In partnership with Saab, the Australian Centre for Interactive and Virtual Environments, has investigated the use of AR to create a 3D holographic training environment to improve human performance. This technology was designed to enable users to learn faster, with greater retention, and more attention to detail.

The project used well established cognitive and AR paradigms such as electroencephalogram (EEG) brain test responses, including event-related potential (ERP) and time frequency analyses. EEG recordings allowed the measurement of early perceptive brain responses, providing information about how AR affects the early stages of neural information processing. ERPs provided a neurobiological interpretation of exerted mental effort as opposed to common subjective measures in current AR research.



Real-time EEG monitoring allows for rapid real-time adjustment of virtual training to maximise training effectiveness.

“Saab Australia has enjoyed a productive relationship with the Australian Research Centre for Interactive and Virtual Environments at UniSA over several years. As Saab continues to build advanced AR/VR solutions for its defence and civil security customers, we will continue to seek further opportunities, and we recognise the world-leading skills and knowledge that they bring to collaborative projects.”

Dennis Medlow, R&D & University Engagement Manager, Saab Australia

Helping solve international crime

Imagine a system that could assemble thousands of pieces of evidence from a criminal case into a single, cohesive digital view, making it dramatically easier for investigators and prosecutors to convict criminals.

Partnering with the Australian Federal Police (AFP), Defence Science and Technology (DST) and Genix Ventures, researchers at UniSA's Australian Centre for Interactive and Virtual Environments have developed a game changing technology called narrative visualisation, to simplify the handling of large international criminal cases.



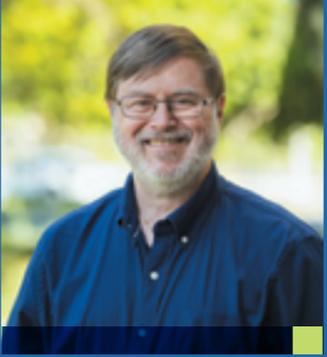
Exploring 3D scans of crime scenes and associated data in VR, allows judges, jurors, and investigators to immerse themselves in the scene of a crime and pull together individual pieces of the crime's narrative.



PhD students Sahar Soltani and Pan Liao at the immersive Hyve-3D collaborative design facility in the Building and Urban Informatics Group at UniSA City West.

Global leaders

Our people are world leaders in AR and VR technologies.



Professor Bruce Thomas
Director

With more than 20 years' experience in AR and VR, Professor Bruce Thomas is focussed on connecting the Australian Research Centre for Interactive and Virtual Environment's world-class research with industry and end-users. Founding UniSA's Wearable Computer Lab, now an essential part of the Centre, Professor Thomas' personal passion for research has always been inspired by the need to solve real-world challenges.

He is one of the world's leading scholars in the field of VR and his work on interdisciplinary and collaborative research embeds an entrepreneurial research culture supporting greater engagement with industry.



Professor Mark Billinghamurst
Deputy Director

An expert in Human-Computer Interface (HCI) technology, Professor Mark Billinghamurst is a leader in his field.

Professor Billinghamurst is a Professor of Human Computer Interaction at UniSA as well as the Director of the Empathic Computing Laboratory, a collaboration between UniSA and the University of Auckland.

Professor Billinghamurst's research includes innovative computer interfaces that explore how virtual and real worlds can be merged using AR and VR to improve face-to-face and remote collaboration.

With his vast understanding and expertise in the field, he continues to discover new ways that seamlessly blend the real and digital worlds.



Professor Ning Gu
Deputy Director

A leading researcher in the field of architecture, Professor Ning Gu's work has been supported by an array of prestigious funding schemes including an Australian Research Council (ARC) Discovery Project Grant.

Professor Gu focuses on the application and impact of interactive and virtual environments in the field of built environment and design. With his research spanning wide areas of architectural computing and design, Professor Gu plays an active role in fostering the interdisciplinary collaboration between science and engineering, and art and design.

Partnering for success

We know how to combine our research expertise and facilities in unique and custom ways to ensure the outcomes we deliver are focused on the needs of our partners. We invite you to reach out and explore the opportunities for your organisation by partnering with us.

LEVERAGE OUR EXPERTS

Talk with us about a variety of industry engagement and partnership options, that are designed to help organisations stay ahead of their competition. In partnering with us, you will have access to world-leading researchers whose knowledge of current and emerging technologies offer valuable insights into product development roadmaps. Collaborate with us on research and development projects that aim to solve challenging technical problems and create leading new products and services that can be commercialised. To partner with us contact one of our research leaders or email IVECentre@unisa.edu.au

HOST NEW TALENT

Explore the opportunity for your organisation to access the expertise of a research degree student. Develop a research project in collaboration with UniSA and you can gain a fresh perspective into your project or business needs. Research degree students can work on a custom project, providing your organisation with the advantage of integrating research knowledge in current and emerging technologies within your organisation.

SOME OF OUR PARTNERS

We partner with many companies worldwide and we look forward to discussing how we can partner with you.





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Make an enquiry: IVECentre@unisa.edu.au

Information correct at time of printing June 2021

CRICOS Provider No. 00121B

Printed on Australian made paper.



Acknowledgement of Country

UniSA respects the Kurna, Boandik and Bangarla peoples spiritual relationship with their country.

Artist: *Ngupulya Pumani*

Find out more about the University's commitment to reconciliation at unisa.edu.au/RAP