



Australian
National
University



ANU Institute for Space
INSPACE
2025–26



SPACE

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InSpace grows ANU space capacity to solve society's biggest challenges and deliver positive impact. We work in partnership with industry, government, academia, and communities to shape the Australian space ecosystem.

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Foreword



**Pro-Vice Chancellor and
InSpace Board Member**

Tim Senden

Professor Tim Senden is the new Pro Vice-Chancellor (Research Infrastructure and Entities) and the Chair of the InSpace Board.

“

InSpace exists to advance Australia’s ambitions in Space through its robust and diverse research at the ANU, which also addresses our founding legacy of solving enormous societal, technological and international challenges.

”



**Deputy Vice Chancellor
Research and Innovation**

Stuart Wyithe

Professor Stuart Wyithe is our new Deputy Vice-Chancellor (Research and Innovation).

“

Over the last year, Australia has firmly cemented its status as an indispensable global space partner. We didn't just watch history; we enabled it. Our ANU Quantum Optical Ground Station supported NASA's Artemis II Mission with lunar communications capability. InSpace was instrumental in making that a possibility and continues to drive ANU space research translation and collaboration at the university.

”



We experienced an exhilarating end of 2025 thanks to the impressive International Astronautical Congress Sydney held in October, where ANU was well represented on the Team Canberra, ACT Government stand. The energy and enthusiasm produced after several amazing weeks of international space engagement, collaboration and inspiration fuelled the opening months of 2026.

Introduction from our Director Professor Anna Moore

The ANU Quantum Optical Ground Station at Mt Stromlo made history supporting the lunar communications for the Orion spacecraft and the Artemis II mission - the first crewed space launch to the moon in over 50 years. This moment filled me with immense joy and pride. It represented InSpace's first major bet—not only on a bold idea, but on ANU people with the vision and capability to bring it to life.

The success of the Artemis II mission with the crew of Orion landing safely back on earth reaffirms Australia's commitment to supporting the next generation of lunar-nauts. We're helping ensure they can not only return to the Moon but stay connected to Earth's social fabric as they build a sustainable human presence on the lunar surface.

With the success of our work with Artemis II we have our eyes on our next role supporting the ELO2 Consortium who are building Australia's first lunar rover - "Roo-ver". This will land near the Moon's South Pole in 2030 as part of NASA's Commercial Lunar Payload Services (CLPS) initiative on the CT-4 mission. ANU is providing expertise in space testing through the ANU National Space Test Facility (NSTF) and advancing laser communications with our Quantum Optical Gr to support remote operation from Earth. Scheduled for a 2030 moon landing, the ~20kg rover is designed to collect scientific data and demonstrate technologies like optical communications.

A personal highlight in 2025 was when I was elected as a member of the International Academy of Astronautics along with my colleagues and InSpace Mission Specialists Professor Marta Yebra and Eduardo Trifoni.

ANU InSpace is continuing its mission to drive, inspire, and translate through our innovative research projects and initiatives. This hard work was recognised at the Australian Space Awards 2025 where ANU won the University of the Year accolade, spotlighting our outstanding leadership in space research, cross-industry engagement, and innovation. ANU won Research Team of the Year for Professor Francis Bennet and his team's work in optical communications in 2026.

With our mission to leverage the space research potential of the broader university, for us interdisciplinary collaboration matters. Our Mission Specialist team are drawn from traditional STEM faculties such as the College of Science & Medicine but also from the College of Asia and the Pacific and the College of Business and Economics. The Mission Specialist team has grown and we have 21 academic researchers and established relationships with experts in space-related fields across all six ANU colleges.

Our involvement along with University of Southern Queensland and Adelaide University in the \$180 million iLAUNCH initiative continues with ANU leading 13 projects to date and with \$20M+ portfolio invested. Overall, \$187M has been contracted in industry projects to produce 9 space missions. Projects span the areas of additive manufacturing, space microwearables, satellite thrust control, hypersonic detection, communications, and earth observation platforms. InSpace's work administering the University Trailblazer ANU-led iLAUNCH initiatives have been groundbreaking, with the services and innovation pushing the boundaries of how universities process commercialisation inclusively.

Our Collaborative Research Centre (CRC) ambitions continue to grow and we are now focussing on ZERO-G Manufacturing. We recognised the potential for advancing Australia's sovereign space capabilities and strengthening academic-industry collaboration by identifying a clear need for a dedicated Space CRC. This vision is grounded in the rapidly expanding access to space and the critical need to accelerate local manufacturing and technological capability. ZERO-G Manufacturing CRC will bring together a unique group of stakeholders from industry, research, government and First Nations communities to drive this acceleration.

Our InSpace board has been tremendously supportive this past year, working with us to shape our strategic journey and expansion as an institute. The ANU InSpace board members are:

- Board Chair: Sue Barrell AO FTSE, former Chief Scientist at the Bureau of Meteorology (BoM)
- Professor Ray Mahoney – Indigenous Science Research Director & Principal Research Scientist, Australian e-Health Research Centre, CSIRO
- Professor Tim Senden, Pro Vice-Chancellor, ANU Research Infrastructure and Entities
- Professor Kieran Kirk – Dean, ANU College of Science & Medicine
- Professor Helen Sullivan – Dean, ANU College of Asia & the Pacific
- The Hon Kate Lundy – Senator representing the ACT in Federal Parliament for nearly 20 years, from 1996-2015



Anna Moore receives the Royal Astronomical Society's Jackson Gwilt Medal in July 2025

We hit another milestone in June 2026 with our SmartSat OzFuel project coming to fruition. We demonstrated the development of the OzFuel payload, a space-based sensor platform that will assist in bushfire prevention, detection, mitigation and resilience. We have proven that our research into Bushfire management and prevention is a valuable asset that highlights the role of space technologies in supporting environmental sustainability and disaster resilience. We must now embrace the opportunity to develop sovereign capabilities to help support bushfire preparedness, risk reduction and early intervention. On this 80th anniversary year for ANU it is a prescient moment to see that an OzFuel payload is in reach and we will continue our efforts to fund a mission to space and deliver these critical capabilities not only for Australia but also for the rest of the world.



Left: Professor Marta Yebra, Eduardo Trifoni and Professor Anna Moore, elected to International Academy of Astronautics
Right: ANU at International Astronomical Congress Sydney 2025



New InSpace HQ

WHO WE ARE

InSpace Mission Control



InSpace Team

InSpace Mission Control is a team of dedicated professionals working to support space initiatives at ANU and develop new opportunities for cross-disciplinary collaboration with the global space industry.

Our team believes that strong diversity of thought is crucial to success and that it's invaluable for younger generations to see scientists and space industry professionals from diverse backgrounds.

The InSpace Mission Control and Mission Specialist teams celebrate multidisciplinary collaborations, representing all six ANU colleges, and multiple schools and departments under each, to aid the development of critical space and Earth initiatives.

At InSpace, we are building the next generation of capabilities to provide impact and outcomes for space research at ANU as well as in the Australian space sector and globally.

NAVIGATE

We uncover and create compelling opportunities for space innovation, connecting ANU teams with the space community.

CATALYSE

We convert space innovation and research opportunities into funded missions that lift ANU research performance and deliver translation and impact.

BUILD

We ensure our mission delivery is of a quality to mature our domestic space industry and is leveraged to drive further impact.

ADVOCATE

We are the voice of ANU space capabilities – shaping policy, stimulating funding, and inspiring diverse career choices in space.

WHAT WE DO

ANU InSpace amplifies the message that space is not just about rockets and astronauts – it's about space-based technology solutions to society's biggest challenges. How do we deal with climate change, mass migration, food and water security? How do we respond to geopolitical issues, especially in the Indo-Pacific region? Developing and translating Space technology is an integral part of the answer of how we can address these challenges.



ANU InSpace winning University of the Year 2025 at the Australian Space Awards



Astronaut and Australian of the Year Katherine Bennell Pegg visiting ANU, April 2026



InSpace Mission Specialists meeting at InSpace HQ



ANU stand at Avalon International Airshow 2025

Space Research

Space research at ANU isn't just creating game-changing innovation that will accelerate our future space industry – it's shaping and growing the next generation of Australians who will think nothing of working off-world, using space to reach their goals, and innovating to save our planet while sustainably exploring the next.

Space Technologies

ANU InSpace is here to leverage opportunities for ANU researchers to amplify Australia's space capabilities. We work to produce positive outcomes for enhancing, enabling, and engaging in space development to progress sovereign capability and increase Australian manufacturing, knowledge, and space technology.

Collaboration and Translation

Today, more than ever before, collaboration is critical for space advancements. Across ANU, researchers from a multitude of disciplines are applying their world-class expertise to space-related research. InSpace harnesses the work of these world-leading experts by making them our Mission Specialists, and our Mission Control team supports their endeavours.

The Mission Control Team creates national initiatives and generates external funding for our Flagship Missions and other space-related projects. InSpace translates space research and technology to tackle some of society's biggest challenges, building strong partnerships and commercial connections with national and international space agencies and companies. The Mission Control team advocates for research capabilities for local and remote communities, government, and defence.

MISSION SPECIALISTS

Meet the researchers from across ANU, working to support space initiatives and develop new opportunities for cross-disciplinary collaboration with the global space industry.



Associate Professor Zena Assaad

Zena Assaad is an Associate Professor in Engineering at the Australian National University. She is currently a fellow with the UN Institute for Disarmament Research (UNIDIR). She has held fellowships with the Australian Army Research Centre and Trusted Autonomous Systems. Her research explores the safety of critical and complex technologies in safety-critical domains, with a focus on systems engineering practices. She is currently focussed on topics related to autonomy and AI in military systems. Zena is a former member of the expert advisory group for the global commission on responsible AI in the military domain (GC REAIM). She is currently an Ambassador for the Responsible by Design initiative of Article 36 Legal. She also serves on the independent advisory board on Legal Reviews as a technical expert and on the World Police Summit board of trustees. She was named one of the "Top 10 Women in AI" in the Asia-Pacific by AI Magazine, she received the "Tech Stewardship Award" from Vogue Australia, she received the 2023 Women in AI Award for Defence and was named one of the "100 Brilliant women in AI Ethics" for 2023. She is also the host of the Responsible Bytes podcast.

Professor Francis Bennet

Francis Bennet is a Professor at the Research School of Astronomy and Astrophysics. Francis is an expert in adaptive optics for astronomical instrumentation, space situational awareness, and laser communications. He takes quantum communications experiments from the lab to space, enabling a global quantum encrypted communications network. This includes working on the development of a satellite to test quantum communications between space and the ground, developing capability for high speed optical communications between Earth and Lunar spacecraft, and building cutting edge adaptive optics. Francis leads the ACT Node of the Australasian Optical Ground Station Network, is a member of the Australian Space Agency's Technical Advisory Group on Advanced Communications and he led the ANU Quantum Optical Ground Station support of NASA's Artemis II Mission's lunar communications during the ten-day mission in April 2026.



Professor Sara Bice

Sara Bice is Professor, Co-Founder and Director, I2S (Institute for Infrastructure in Society) at the Crawford School of Public Policy, The Australian National University, where she serves as Special Advisor, Executive Education. She is Senior Visiting Professor, School of Public Policy and Management, Tsinghua University, Beijing. Sara is Past President, International Association for Impact Assessment, the world's leading organisation for impact assessment practitioners, researchers and clients, representing almost 7,000 members in 120 different countries. She is an award-winning author and facilitator, with recent awards including the College of Asia and the Pacific Teaching Excellence Award, ANU Vice-Chancellor's High Commendation for Education Excellence and the 2020 IAIA Outstanding Service Award for service to the profession of impact assessment. Sara is also Co-Founder and Director of ANU spin-off, Next Generation Engagement. She serves on the Certified Environmental Practitioner Scheme Advisory Board for the Social Practitioner Specialisation Certification Scheme. She is fascinated by space and keen to bring the insights, approaches and rigour of social impact assessment, community engagement and social value creation to the aerospace sector.



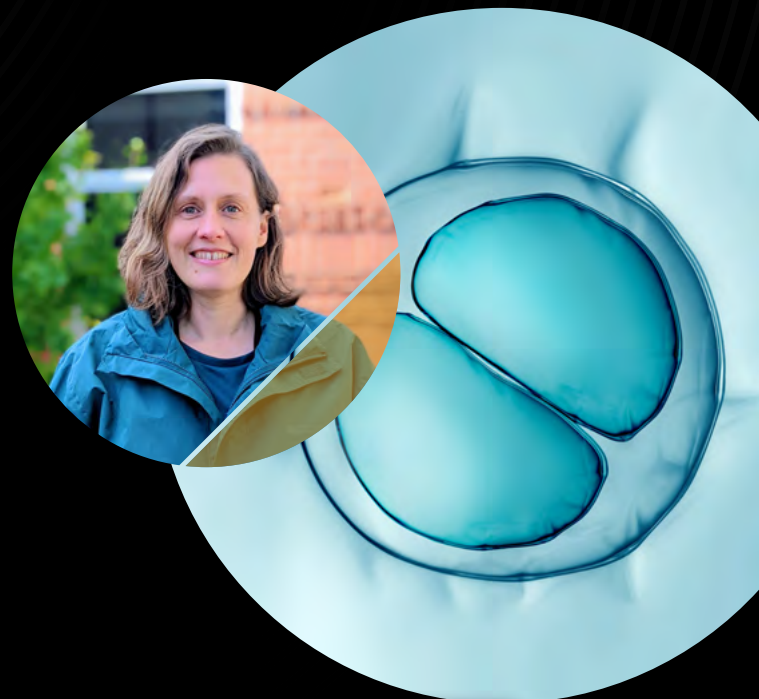
Dr Ben Bramble

Ben Bramble is a moral philosopher and Lecturer at the Fenner School of Environment and Society at ANU. His current research focuses on the ethics of AI, space, animals, and medicine. Ben is an Associate Editor of the Journal of Ethics and Social Philosophy (JESP). He was a finalist for the 2020 Vice-Chancellor's Award for Impact and Engagement for his work on pandemic ethics. He has held fellowships at Princeton University and the University of Oxford. His new book is Lunacy: Ten False Promises of the New Space Age (Princeton University Press, 2026)



Professor Caitlin Byrt

Caitlin Byrt is an ARC Industry Fellow in the Division of Plant Sciences at the Research School of Biology. Caitlin studies proteins found in cell membranes throughout many organisms. These proteins help plants to separate important metal and nutrient resources and to survive droughts as well as life in space. They can be used to harvest valuable metals and nutrients from wastewater so that these resources can be recycled. Caitlin is Co-Founder and Co-Director of Membrane Transporter Engineers, a company working on advancing the function of membrane separation technologies to enable the harvest of valuable resources from liquid wastes.





Dr George Carter

George Carter is Senior Fellow and Deputy Head of the Department of Pacific Affairs at The Australian National University (ANU). He is the Director for the ANU Pacific Institute and cluster lead on Climate Security and Indigenous and Traditional Knowledge at ANU Institute of Climate Change Energy and Disaster. His research explores the interplay of international politics and security, with climate change (diplomacy, negotiations, finance, democracy, gender and knowledge), through the influence and authority/power of Islands (Pacific states and peoples, Small Island Developing States). His work contributes to areas of climate politics, foreign policy, multilateralism, non-western and Oceanic Diplomacy, Pacific regionalism and geopolitics, indigenous knowledge and philosophy. Underpinning George's research and teaching is 'tautua' service – that it serves, and brokers opportunities for communities. He is Co-Director and founder of the Resilient and Sustainable Islands (RESI) thinktank group. George's research and teaching 'tautua' are influenced by his work experience and education in the Pacific, and grounded by his Samoan, Tuvaluan, i-Kiribati, Chinese and British heritage. He is from Samoa, and serves his community and aiga where he holds the high chief title of Salā.

Dr Christina Griffin

Christina Griffin is a human geographer and senior lecturer at the Crawford School of Public Policy at the Australian National University.

Her research expertise spans the fields of natural hazards, climate change adaptation, and rural livelihoods in the Asia-Pacific region. In 2018, she received her PhD from the Australia National University, which examined the vulnerability of small-scale farmers to volcanic hazard in Indonesia. Prior to returning to the ANU, Dr Griffin held a Fellowship with the Partnership for Australia-Indonesia Research and the University of Melbourne. In 2023, she was awarded a University of Melbourne Career Interruption Research Fellowship.

Her recent research focuses on understanding the social and environmental impacts of satellite-based Earth observation technologies, and how they can support just transformations to sustainability in the Asia-Pacific region. This work aims to raise awareness of the social and environmental costs and benefits of space technologies, and has been communicated at several space industry events, including the Asia Pacific Regional Space Forum 2024 and the Advancing Earth Observation Australia Forum 2024.





Dr Doris Grosse

Doris Grosse is a Research Fellow at the Research School of Astronomy and Astrophysics. Doris specialises in adaptive optics and the space environment. She investigates the characteristics and whereabouts of space debris to reduce its threat, making space safer and more sustainable so humans can rely on and benefit from satellites for centuries to come. She is also expanding her expertise in optical communications by working on space to ground laser communications. Doris served as a member of the World Economic Forum's Global Future Council on Space from 2018–22.

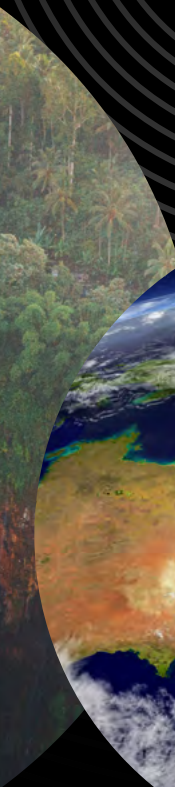
Professor Junichiro Kawaguchi

Junichiro Kawaguchi is a Professor at the School of Engineering. During his career, Junichiro has participated in several solar system exploration projects, including Japan's first planetary probes to Halley's Comet, the lunar orbiter Hiten, the Hayabasa Mission for which he was Project Manager from 1996–2011, and the Hayabasa-2 Mission for which he currently holds an Official Advisor position. Junichiro is Founder of Ikaros, the world's first Solar Sail demonstrator project, launched in 2010. He has previously been a Senior Fellow for Japan Aerospace Exploration Agency (JAXA), President of the Japan Society for Space and Astronautical Science, Fellow at the Japan Society for Space and Astronautical Science, and he has served on the Board of Trustees at the International Academy of Astronautics.



Professor Penelope King

Penelope King is a Professor at the Research School of Earth Sciences and Associate Dean of Research at the College of Science and Medicine. Penelope's research examines surface and interior processes on planetary bodies, aiming to improve our understanding of the fundamental aspects of how materials in the solar system behave. Her work creates better tools to explore our solar system and the deep Earth and to understand climate change. Penelope was elected as a Fellow to the Geochemical Society in 2023. She is a champion for diversity in STEM Industries.





Professor Hanna Kurniawati

Hanna Kurniawati is a Professor in the School of Computing and holds the SmartSat CRC Professorial Chair for System Autonomy, Intelligence & Decision-Making. She leads the Robust Decision-making and Learning Lab at the ANU and is the ANU Node Lead and Planning & Control Theme Lead for the Australian Robotics Inspection and Asset Management (ARIAM) Hub. Hanna's research spans robotics, decision-making under uncertainty, motion planning, computational geometry applications, integrated planning and learning, and reinforcement learning. Her works on scalable methods for planning under uncertainty, especially under the Partially Observable Markov Decision Process (POMDP) framework, have received multiple recognitions, including a best paper award at ICAPS'15, a finalist for the best paper award at ICRA'15, and the RSS'21 Test of Time Award. She is a keynote speaker at IROS'18 and ICRA'25. Hanna was President of the Australian Robotics and Automation Association, a Senior Editor of IEEE RA-L, the Award Chair of CoRL'22, a Program Co-Chair of ICRA'22, and is an Editor of IEEE TRO.

Professor Robert Mahony

Robert Mahony is a Professor at the School of Engineering. Rob's research interests are in non-linear control theory with applications in robotics, geometric optimisation techniques, and systems theory. Rob is developing the next generation of algorithms for PNT (Position Navigation and Timing) with applications in space, avionics, and terrestrial robotics. In 2025 he was elected as a Fellow of the Australian Academy of Science (FAA) for pioneering the "Mahony filter"—a foundational algorithm that underpins the multi-billion dollar commercial drone industry. He is a Fellow of Australian Academy of Technological Science and Engineering and a Fellow with the Institute of Electrical and Electronics Engineers.



Professor Kirk McKenzie

Kirk McKenzie is a Professor in the Centre for Gravitational Astrophysics at the Research School of Physics and Research School of Astronomy and Astrophysics, and he holds the SmartSat CRC Professorial Chair for Precision Measurement in Space. Kirk and his team are developing lasers for precise measurements that will map Earth's water to measure climate change effects, ice-cap melt, and monitoring of water basins such as the Murray-Darling. Kirk leads one of the Moon to Mars missions to develop laser measurement technology for the next Gravity Recovery and Climate Experiment (GRACE) Mission, in partnership with CEA Technologies.



Associate Professor Maria Racionero Llorente

Maria Racionero Llorente is an Associate Professor at the Research School of Economics. Maria is an expert in public economic theory, including optimal taxation theory and methods to improve gender equity in public policy. She contributes her public economics expertise to addressing issues with market decentralisation, market failures, and regulation of the space economy.

Dr Richard Poiré

Richard Poiré is Director of the ANU node of the Australian Plant Phenomics Network and a research infrastructure leader at the Research School of Biology. His work focuses on controlled-environment plant phenotyping, non-invasive imaging and data-driven approaches to understand how crops respond to environmental stresses. Richard has designed and operated high-throughput phenotyping platforms from glasshouse to field scale, led multidisciplinary teams delivering services to academia and industry, and developed machine learning tools that link hyperspectral signatures with plant performance. He oversees climate-simulation facilities that can reproduce aspects of lunar and Martian environments, enabling experiments on how plants might be monitored and managed for future space agriculture and biomanufacturing.



Dr. Karthika Prasad

Karthika Prasad is a Senior Research Fellow/ Lecturer in the Aerospace cluster at the School of Engineering, College of Systems and Society.

Her research sits at the intersection of advanced materials, space environments, and industry-driven engineering applications. She specialises in the development of polymer-based and hybrid materials designed to withstand extreme conditions, with a particular focus on atomic-oxygen-resistant coatings, bio-derived epoxy systems, graphene and metal-oxide composites, and the surface and interfacial mechanisms that govern material durability in low Earth orbit. In addition, Dr. Prasad explores plasma-based processes for surface modification and disinfection, with a strong emphasis on translating laboratory-scale materials science into practical, deployable technologies. Parallel to her space materials work, she applies these principles to both space-relevant and terrestrial agricultural systems to develop sustainable, industry-ready solutions that reduce chemical dependence and enhance operational resilience.

Karthika is a recognised voice in her field. She has been an invited speaker at several international conferences and was selected as a Top 10 Finalist at She Loves Tech Australia. She has also been listed among the Power 100 Women in Innovation in India.

Professor Sean O'Byrne

Sean O'Byrne is Professor of Aerospace Engineering at the School of Engineering, College of Systems and Society. He is a senior member of the American Institute of Aeronautics and Aerospace and Optica professional societies, an editor for the Shock Waves and Frontiers in Physics journals and is on the International Advisory Committee for the International Symposium on Rarefied Gas Dynamics. Professor O'Byrne's research interests include laser-based measurements of physical properties in chemically reacting and high-speed flows and plasmas, with a particular interest in atmospheric entry flows, low-density space applications, microscale flows and combustion. Professor O'Byrne also has an interest in instrumentation systems for non-aerospace applications such as environmental and industrial process sensors, where the nonintrusive and robust nature of his hypersonic sensors have a range of spin-off applications.



Professor Air Vice Marshal (Ret) Tracy Smart AO

Air Vice-Marshal (Retired) Tracy Smart AO is a Professor of Military and Aerospace Medicine in the School of Medicine and Psychology. Tracy is developing aerospace health educational offerings at ANU and is a co-investigator on the iLAUNCH 'Manufacturing wearable-based health solutions for space medicine' project. In 2022, Tracy was awarded the Royal Australasian College of Medical Administrators (RACMA) Distinguished Fellow Award.

Professor Paul Tregoning

Paul Tregoning is a Professor and Area Head of Climate, Ocean, and Geosciences Group at the Research School of Earth Sciences and a Fellow of the International Association of Geodesy. Paul uses Earth observation data from satellites to study how the Earth's surface changes through geophysical processes, including tectonic deformation, climate-driven variations in sea level, continental hydrology (including groundwater), and melting of polar ice sheets. Paul is a member of the NASA Gravity Recovery and Climate Experiment Follow-On (GRACE-FO) Science Team; the ANU Institute for Climate, Energy and Disaster Solutions; and the ANU Institute for Water Futures. He is also member of the Australian Space Agency's Technical Advisory Groups on Earth Observation and on Positioning, Navigation and Timing.



Associate Professor Eduardo Trifoni

Eduardo Trifoni is the Director of the Space Test Program and Head of the National Space Test Facility, the largest space testing infrastructure in Australasia. Eduardo has over 25 years of experience carrying out independent research in technology frontier fields spanning from Experimental Aerothermodynamics to Hydrogen Energy, with major breakthroughs in hypersonic and space testing, PEM fuel cells and electrolyzers. Eduardo has been instrumental in the experimental development of many space vehicles capable of operating in Low Earth Orbit and withstanding the hypersonic entry phase, including twenty-two spacecraft successfully sent into orbit in the last five years.



Professor Marta Yebra

Marta Yebra is an internationally recognised leader in remote sensing, artificial intelligence, and space technologies for bushfire prevention. She is a Professor at The Australian National University (ANU), Director of the Bushfire Research Centre of Excellence, and Mission Specialist in Earth Observation at ANU Institute for Space. Her research combines satellite observations, AI, and environmental modelling to predict where fires are most likely to ignite and become catastrophic, helping shift bushfire management from reactive response to proactive prevention. Marta co-leads the international CEOS Wildfire Pilot – Dryness and was elected a Member of the International Academy of Astronautics in recognition of her contributions to Earth observation and disaster resilience. Her work has attracted more than \$35 million in research funding, produced over 100 scientific publications, and is used by governments, emergency services, and researchers worldwide. She was named Australian Space Awards Academic of the Year 2023 and recognised among the Top 100 AI Leaders Driving Real-World Impact in 2025.



**InSpace
at ANU**

College of
Arts and Social
Sciences

College of
Science and
Medicine

College of
Systems &
Society

College of
Business and
Economics

College of Law,
Governance &
Policy

College of
Asia and
the Pacific

Photo credit: ANU Media

ANU hosts **more than \$200 million** in space-related infrastructure, providing nationally significant capabilities for research, industry collaboration, and innovation.

Working with researchers across all **six ANU colleges**, InSpace has secured **\$52 million** in research income to grow the University's space capability, through broader programs valued at more than **\$500 million** in total.



Over \$200 million of ANU space infrastructure consists of multiple facilities across the ANU Acton campus, at Mt Stromlo, and in NSW, all operated and run by a community of world-class ANU experts.

ANU Space Infrastructure



The Australian National University Institute for Space (ANU InSpace)

InSpace connects ANU space research with society's biggest challenges to deliver positive impact. We do this by shaping and growing the Australian space ecosystem in partnership with industry, government, academia, and communities.



Heavy Ion Accelerator Facility (HIAF)

The HIAF space irradiation beamline (HIAF-SIBL) enables extreme radiation testing of electronics, sensors, and solar cells destined for space. The radiation environment of space is complex and harsh. Spacecraft exposed to these conditions are vulnerable to the dramatic effects induced by single events and to gradually accumulated damage – both of which can lead to catastrophic mission failure. Ground-based testing of mitigation strategies is essential to extend mission lifetime.

HIAF offers the highest energy heavy ion space radiation testing facility in Australia and has almost 50 years of heavy ion accelerator operation and radiation experience. HIAF is a founding member of the National Space Qualification Network (NSQN).



National Space Test Facility (NSTF)

The NSTF is recognised by the industry across Australia and New Zealand as a hub for space environmental testing of prototype spacecraft. A one-stop-shop testing facility for space environment qualification, NSTF has all the capabilities and instrumentation required to provide the best mission assurance prior to launch. The NSTF provides access to unique space environmental testing capabilities such as thermal vacuum, vibration, pyroshock, electromagnetic interference/compatibility, LEO atomic oxygen interaction, and the use of a large cleanroom for assembly and integration activities.



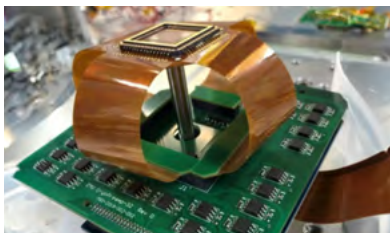
Advanced Instrumentation and Technology Centre (AITC)

The AITC is an internationally recognised Centre of Excellence established to support the development of the next generation of instruments for astronomy and space science. The AITC has extensive capabilities in telescopes and instruments for astronomy and space, software and control systems, laser guide star adaptive optics for optical communications and space situational awareness, remote sensing for astronomy, and Earth observation.



Quantum Optical Ground Station (QOGS)

The ANU QOGS consists of a telescope with an aperture of 70 cm for high performance optical and advanced space to ground communications including quantum communications. The ANU QOGS is capable of supporting missions across LEO, GEO, and lunar orbits, and is equipped with advanced instrumentation, including adaptive optics, which can mitigate the impact of atmospheric turbulence by correcting wavefront distortions.



Remote Sensing Laboratory

The ANU Remote Sensing Lab has significant capability in optical design and integration and visible, short-wave infrared and mid-wave infrared focal plane detectors. The remote sensing programs focus on a wide range of contemporary topics including water quality monitoring and land care, bushfire mitigation, agricultural analysis and mineralogical surveys, and space situational awareness for satellite and debris tracking.



Siding Spring Observatory (SSO)

SSO is the ANU-owned and operated premier optical astronomy observatory. Located on the edge of the Warrumbungle National Park near Coonabarabran, SSO hosts a range of telescopes from ANU and other institutions for astronomy, advanced communications, and space situational awareness.



The Australian National Fabrication Facility (ANFF) OptoFab ACT

ANFF ACT is one of eight nodes established by ANFF under the National Collaborative Research Infrastructure Strategy (NCRIS) to provide researchers and industry with access to state-of-the-art fabrication facilities to deliver precision full custom optics, coatings, chips, and systems to customer specifications. ANFF OptoFab ACT is housed at the ANU Research School of Physics, Laser Physics Centre.

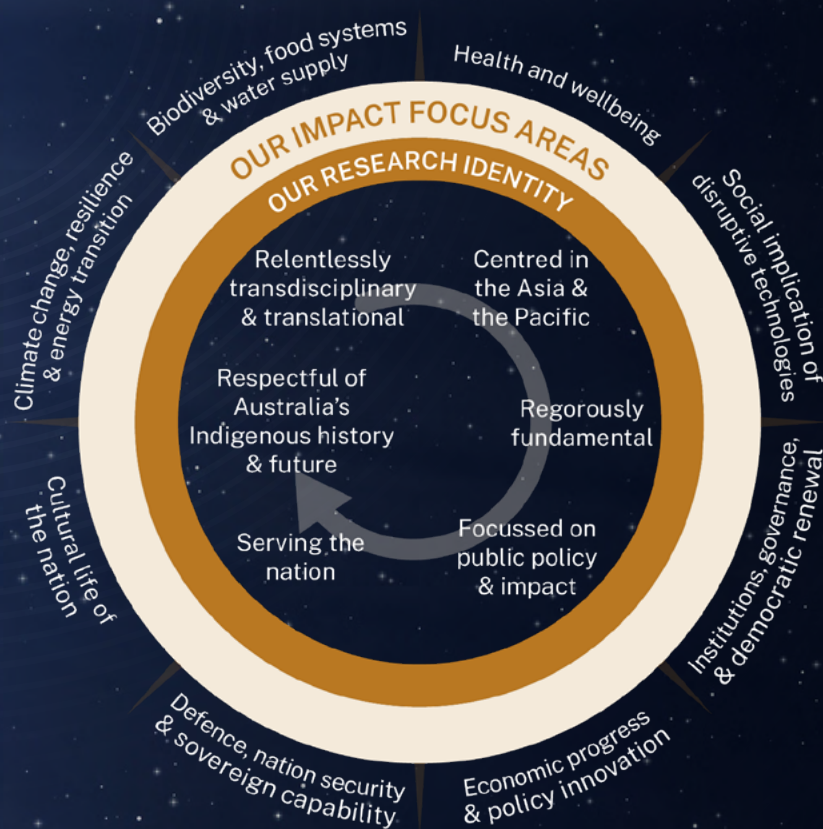




In addition to national contributions, InSpace's Flagship Missions form a critical link between the space infrastructure and researchers at ANU and the global space industry.

Flagship Missions

This model reflects the distinctive ANU research and innovation ecosystem. InSpace's Flagship Missions, Future of Communications, OzFuel-1 Satellite Payload, iLAUNCH, National Space Qualification Network (NSQN), ZERO-G Manufacturing, align with the portfolio of the Deputy Vice Chancellor (Research and Innovation) Impact Focus Areas and Research Identity.



The following pages showcase the current Flagship Missions within InSpace. They are at different stages of development and the Mission Tracker at the top of each page will detail the status:



PRE-LAUNCH



LIVE



MISSION COMPLETE

Our society is critically reliant on satellite-to-Earth communications for a range of daily activities, from navigation and weather predictions to supporting national security. Current radio frequency systems carry limited data, creating a data downlink bottleneck. Laser communications promises a technology revolution by offering data rates at least 10x faster than existing radio transmission while avoiding spectrum licensing constraints. It's also compatible with quantum communications for enhanced security. This provides a clear path to meet the growing global demand for space-to-ground communications and support the expanding satellite communications market.

Future of Communications

Australia's first Quantum Optical Ground Station

In December 2023, ANU launched the Quantum Optical Ground Station (QOGS), a first for Australia. The QOGS will be equipped with advanced instrumentation including adaptive optics and quantum technology to enable high performance and enhanced security.

ANU technology enables communication links in challenging environments for a range of mission scenarios from LEO and GEO to lunar and deep space. This will enhance system-wide resilience by augmenting existing telecommunication infrastructure.

With quantum capability built in, this ground station will also provide the underlying infrastructure to connect quantum devices and establish a quantum internet for improved computation, sensing accuracy, and provably secure communications.

The ANU Quantum Optical Ground Station is supported by funding from the ACT Government, with additional support from CSIRO, TESAT, and the ANU Institute for Space. The ANU QOGS is being upgraded with lunar and deep space communication capability with support from the Australian Space Agency Moon to Mars program.

Mission Goal: To create scalable, integrated, and quantum-compatible optical communication ground station technology to enhance telecommunications capability, security, and resilience across Australia.

ANU Team: Professor Francis Bennet, Dr Jie Zhao, Dr Michael Copeland, Dr Doris Grosse, Dr Elisa Jager, Ian Price and Associate Professor Tony Travouillon

Partners: Defence, Science and Technology Group (DSTG), University of Western Australia, University of Auckland, NASA Goddard Space Flight Center, NASA Glenn Research Center, German Aerospace Center Institute of Communications and Navigation, Optus, Leonardo UK, Liquid Instruments, Platypus R&D, SSC Australia, and Quintessence Labs

Photo credit: Carl Davies, CMD Photographics

Key Milestones and What's Next:

- ANU partnered with NASA on the Artemis II mission – which was the space agency's first crewed mission beyond Earth's orbit in more than 50 years. NASA flew an optical (laser) communications system aboard the Orion spacecraft to test the technology's operational utility to support human spaceflight operations. In support of the demonstration, the ANU Quantum Optical Ground Station (QOGS) at Mount Stromlo Observatory tracked, transmitted and received communications from Orion. This unique opportunity tested optical ground station capabilities with the potential to support future lunar-based missions for NASA. In over 15.5 hours of laser link time QOGS downlinked 43 GB of data, streaming internal and external camera views of the mission back to NASA's Mission Control Center in Houston and out to the world. The QOGS also demonstrated the successful 4k video stream from the spacecraft on April 8, 2026. On the final day of the mission, the QOGS achieved a long fault-free run at the highest possible data rate of 260 Mbps.
- Under the iLAUNCH projects "Next Generation Satellite Communications" and "Project SWIFT: SHOT Southern Hemisphere Optical Terminal", ANU and industry partner Optus are developing next-generation scalable adaptive optics to enable the next generation of communications between space and the ground, providing Australia with world-leading capabilities in advanced communications. These projects will raise the TRL of ANU IP while upskilling industry to be ready for the optical communication revolution coming to space.
- Professor Bennet and his team were awarded Research Team of the Year at the 2026 Australian Space Awards. They were recognized for their groundbreaking work on deep-space and lunar optical communications at the ANU Mt Stromlo Quantum Optical Ground Station.
- We're thrilled to be partnering with DSTG to deliver cutting-edge quantum research to enhance secure timing technologies. The uniquely Australian research project aims to create and deliver one of the most challenging components of a quantum-secured timing network, a ground-to-satellite optical quantum link. ANU will upgrade the QOGS to support uplink and downlink of quantum information over a ground-to-space quantum optical link.
- ANU is partnering with Quintessence Labs (QLabs) through the Australian Economic Accelerator to achieve quantum secure communications over a free-space optical channel. As part of this project, we're establishing a 10 km free-space testbed between Mt Stromlo and the ANU campus to prove the performance of the QLABs qOptica quantum key distribution system in this environment, raising the TRL of the combined system and providing infrastructure to continue quantum communication capability development.



QOGS team winning Research Team of the year at the Australian Space Awards 2026



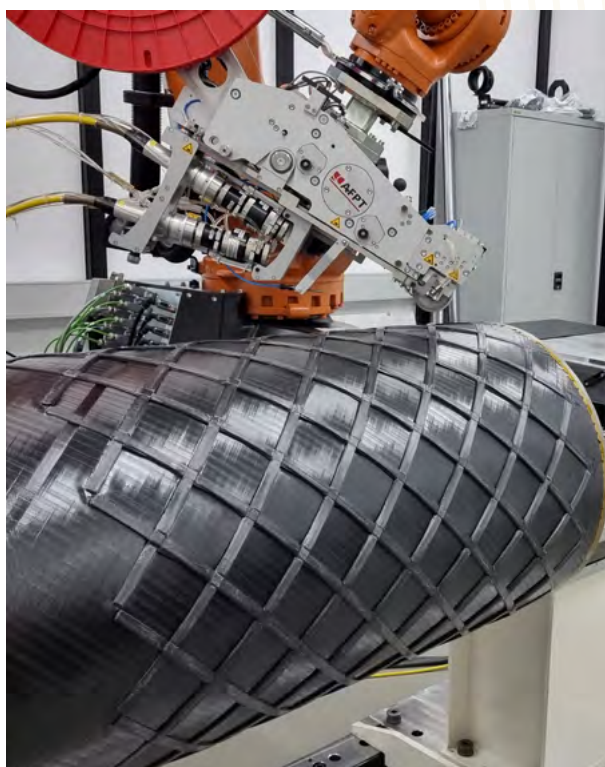


Left: iLAUNCH event at IAC Sydney 2025 ANU panel
Right: iLAUNCH event at IAC Sydney 2025



iLAUNCH Advancing Australia's Space Capabilities

The Australian Government is building new research capabilities, driving commercialisation outcomes, and investing in new industry engagement opportunities through the Department of Education's Trailblazer Universities Program. ANU InSpace, in partnership with program leader the University of Southern Queensland and the Adelaide University, and in collaboration with over twenty industry organisations, founded iLAUNCH – The Innovative Launch, Automation, Novel Materials, Communications and Hypersonics (iLAUNCH) Trailblazer. This \$180 million program will transform Australia's competitiveness by rapidly commercialising University space research through industry partnerships.

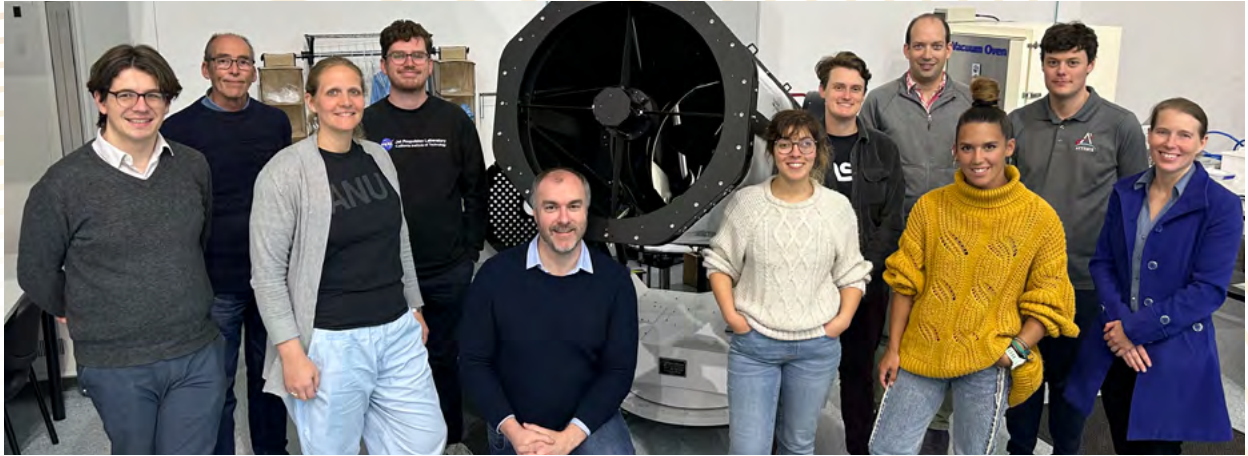


Additive manufacture of a structurally-efficient gridded carbon-fibre/PEEK rocket body using laser-AFP
(Photo credit: New Frontier Technologies)

The efforts of iLAUNCH directly enhance Australia's burgeoning space industry. Through this federal program, iLAUNCH will receive \$50 million of investment over four years, alongside a further \$130 million from universities (the University of Southern Queensland, The Australian National University, and the Adelaide University), industry partners, and CSIRO. The net economic benefit of the \$180 million investment is expected to be \$3.6 billion by 2040.

The investment in industry research, commercialisation, and manufacturing is a commitment to Australia's burgeoning space industry, which will grow our commercially viable civil rockets, rocket test and launch facilities, rapid satellite manufacturing communication technologies, and integrated sensing systems. Ultimately this will prepare Australia for successful and sustainable space mission success.

The program's comprehensive training, education, and outreach programs will help to produce the next generation of industry professionals. Its commercialisation branch will translate research outcomes into commercially viable products, simultaneously developing Australia's sovereign capability in space and creating an industry which can deliver products onto the international market.



ANU Optical Communications Team

iLAUNCH ANU-led projects

A multi-sensor detector platform for Earth Observation

ANU Lead: Professor Rob Sharp

Industry Partners: Leonardo UK, Spiral Blue, Zendir

Carbon-fibre additive manufacturing for products for space; rocket body structures

ANU Lead: Professor Patrick Kluth

Industry Partner: New Frontier Technologies

Carbon-fibre additive manufacturing for products for space; develop and manufacture protective nanomaterial coatings for satellite structures

ANU Lead: Professor Patrick Kluth

Industry Partner: New Frontier Technologies

Development and manufacture wearable-based health solutions for space medicine

ANU Lead: Dr Aaron Trantor

Industry Partners: Liquid Instruments, Aspen Medical, Saber Astronautics

Innovative vectored thrust control system for enhanced manoeuvrability of small satellites

ANU Lead: Dr Mahdi Davoodianidalik

Industry Partners: Boswell Technologies, Azista BST

Manufacturing a space transport and logistics platform

ANU Lead: Associate Professor Eduardo Trifoni

Industry Partner: Space Machines Company

Next Generation Satellite Communications

ANU Lead: Professor Francis Bennet

Industry Partners: Optus, Leonardo UK

Produce advanced AI/ML-enabled space surveillance mission for hypersonic missile defence by building a mission concept and payload prototype Phase A1

ANU Lead: Dr Joice Mathew

Industry Partners: Northrop Grumman Australia, Spiral Blue, the Adelaide University, the University of Southern Queensland

Satellite identification from the ground using optical beacons

ANU Lead: Associate Professor Tony Travouillon

Industry Partners: HEO Robotics, ANT61

Software defined radio for satellite communications

ANU Lead: Professor Nan Yang

Industry Partner: Inovor Technologies

Space health micro-wearables in Astronaut Mission

ANU Lead: Dr Aaron Trantor

Industry Partners: Axiom Space, Aqacia

Project SWIFT: Advanced Signal Processing Techniques for Satellite Systems

ANU Lead: Professor Nan Yang

Industry Partners: Optus, Teledynamics

Project SWIFT: SHOT Southern Hemisphere Optical Terminal

ANU Lead: Professor Francis Bennet

Industry Partner: Optus

ANU InSpace is delivering state of the art space technology for the world, whilst working with multidisciplinary ANU teams and catalysing ground-breaking space manufacturing projects with industry. This will see up to \$20 million in research income brought into the university.

For the latest iLAUNCH project news and updates, please visit the InSpace website at inspace.anu.edu.au/missions/ilaunch and learn more at unisq.edu.au/research/ilaunch





“

The scope of our iLAUNCH projects is impressive and highlights the breadth of our space capabilities at ANU. The impact of the space manufacturing and technology projects we have catalysed with industry and academic partners will accelerate the space sector development in Australia. Excitingly, we have seen companies spin-in to the space sector to partner with us on projects, showing the opportunities and new markets space research can provide. ”

– Professor Anna Moore, Director of ANU InSpace

iLAUNCH ANU Case Studies

Innovative vectored thrust control system for enhanced manoeuvrability of small satellites

The Bogong Thruster 2 is a next-generation cold-gas propulsion system designed to provide precise and efficient manoeuvring for CubeSats and other small satellites. Building on the successful demonstration of the original Bogong thruster, Bogong 2 uses solid naphthalene as a propellant, which sublimates directly into gas when heated, eliminating the need for bulky high-pressure storage tanks.

This ANU-led iLAUNCH Trailblazer program, in collaboration with industry partners Boswell Technologies and Azista BST. A key innovation of the project is the integration of a deformable structure that enables thrust vectoring by precisely changing the orientation of the thruster. Rather than using heavy mechanical gimbals or multiple fixed thrusters, the deformable structure undergoes controlled elastic deformation to redirect the thrust vector with high accuracy while maintaining a compact, lightweight, and low-power design. Integrated with Azista Industries' Attitude Determination and Control System (ADCS), this technology significantly enhances satellite attitude control, manoeuvrability, and pointing precision for applications including Earth observation, secure communications, and optical payload alignment.

The project will culminate in an in-orbit CubeSat demonstration, validating Australia's first vectored-thrust technology for small satellites and showcasing a home-grown innovation with the potential to establish new standards for small satellite propulsion and control.



Satellite identification from the ground using optical beacons



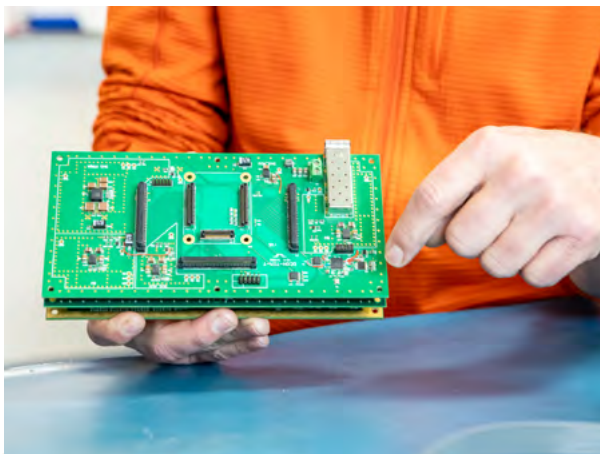
Satellite Identification from the Ground Using Optical Beacons, is an iLAUNCH project developing a practical “licence plate” system for satellites. The technology combines a near-infrared LED beacon mounted on a satellite, ANU’s DREAMS ground-based telescope, ANT61’s Beacon M platform and HEO’s in-orbit Non-Earth Imaging network. Together, these capabilities will enable satellites deployed through congested rideshare missions to be detected, tracked and positively identified.

The project is a strong university–industry collaboration led by the Australian National University, with HEO Robotics and ANT61 contributing commercial space hardware, imaging services and operational expertise. It integrates university research infrastructure with established industry products and networks, reducing the need for new infrastructure and supporting rapid, cost-effective deployment.

Commercially, the infrared beacon when add-on to ANT61’s beacon products, bundled with HEO’s satellite imaging will allow for space asset verification services. Potential customers include satellite operators, launch providers, governments, defence and intelligence agencies requiring improved space-domain awareness, asset verification and early-orbit monitoring.



A multi sensor detector platform for Earth Observation



Rosella is a modular, detector control platform developed for small satellite applications with high-performance analogue CMOS sensors. Developed at the ANU Research School of Astronomy and Astrophysics, Rosella originated from world-leading astronomical instrumentation, where detecting the faintest signals demands sensor electronics delivering the highest fidelity signal. This ANU-led iLAUNCH Trailblazer program, in collaboration with industry partners Leonardo, Spiral Blue, and Zendir (previously Nominal Systems), addresses a fundamental limitation in high-performance imaging systems, where readout electronics, rather than the detector itself, can determine the overall system noise and hence sensitivity.

Rosella is detector-agnostic and highly configurable, making it compatible with a wide range of high-performance optical/infrared CMOS-based architectures. Rosella provides software configurable timing control, stabilised bias references and high-speed video processing and transmission boards. This enables the platform to be rapidly tailored to specific mission requirements while delivering ultra-low-noise performance for weak input signals. Where relevant, these mission profiles can be reconfigured on-the-fly to tune multi-role sensor platforms to optimise performance for independent use cases (e.g., modified ground resolution, improved hyperspectral channel resolution). These capabilities underpin applications in Earth observation, environmental monitoring, astronomy, defence and space situational awareness.

Rosella has successfully demonstrated its core capabilities through a laboratory prototype and is now progressing to a compact Engineering Model for thermal and vacuum (i.e., the space environment) testing. The board-level architecture enables rapid development, testing and optimisation of individual subsystems, reducing integration risk and accelerating deployment. This next stage delivers enhanced performance while strengthening Australia’s sovereign capability in advanced space technologies and high-value sensor systems.

The first use case customer for Rosella deployment is the OzFuel bushfire hazard reduction program, which recently delivered the payload lab prototype for subsequent environmental testing, in partnership with the SmartSat CRC, ACT government, KiwiStar Optics, and New Frontier Technologies.

OzFuel-1 Satellite Payload

A Fire Resilient Australia



Bushfires have always been part of Australia's landscape. However, catastrophic bushfires are increasingly threatening communities, livelihoods, and critical infrastructure. Between climate variability and a rise in extreme weather events, it's clear Australia faces a future of living with more intense and unpredictable bushfires. It's vital that we work together across communities, industries, and governments to strengthen our resilience and ensure a safer environment for all.

The Australian National University (ANU) and its partners have developed the OzFuel-1 satellite payload to provide landscape flammability risk data at a continental scale to support effective planning, preparation, and response.

OzFuel-1 is the first in a series of innovative spaceborne sensors designed to measure vegetation traits linked to flammability, including water content and chemical composition, enabling improved monitoring of bushfire risk from space. Data from OzFuel-1 will help us not only to understand how much vegetation fuel is present, but also how dry and flammable it is, and the risk it poses to neighbouring communities and critical infrastructure. This information will give fire managers the intelligence they need for proactive action before dangerous conditions develop into disasters.

Once in orbit, OzFuel-1 will deliver nationally significant Earth observation capability developed within Australia, strengthening the country's sovereign space industry. The project is creating lasting partnerships between the ANU and local industry, building the technical workforce and commercial relationships needed to sustain a growing domestic space sector.

The team driving the OzFuel Project combines world class expertise in remote sensing of bushfires, sensor development, and optics, drawing on advanced instrumentation technologies from astronomy and key industry partnerships in space systems technology.

Mission Goal: To develop, test, and deploy a satellite payload capable of measuring vegetation traits linked to flammability, enabling improved monitoring of bushfire risk and supporting fire management and emergency response operations across Australia.

ANU Team: Professor Marta Yebra, Professor Rob Sharp, Dr Joice Mathew, Dr Israel Vaughn and Dr Nicolas Younes.

Partners: SmartSat CRC, KiwiStar and EOS Space Systems, Zendir, Spiral Blue, Leonardo UK, New Frontier Technologies.

Key Milestones and What's Next:

- The OzFuel-1 optical chain was successfully integrated with the SAPHIRA eAPD detector within a modified cryostat, with the cryostat window serving as the final optical element. Multispectral filters and the detector focal plane were assembled and operated at 80K, demonstrating stable cryogenic operation of the instrument subsystem.
- Initial system testing has been completed using a ground-based astronomy control solution, enabling early functional validation of the instrument. In parallel, the space-ready Rosella detector control electronics system is being developed under the iLAUNCH Trailblazer program. A laboratory prototype of Rosella has been demonstrated, with the system on track to achieve Technology Readiness Level 7 (TRL 7) by the end of 2026, representing a significant step toward application-ready operational capability.
- The opto-mechanical assembly of the OzFuel-1 laboratory prototype has been completed, incorporating optical components delivered by EOS (KiwiStar). Optical performance verification has confirmed that key system-level performance requirements are being met. Radiometric demonstration of the laboratory prototype has also been completed. Space environmental testing of the prototype hardware, incorporating the SAPHIRA-Rosella focal plane system, is planned later this year in the thermo-vacuum chamber at the ANU National Space Test Facility.
- ANU has commissioned two zero coefficients of thermal expansion carbon composite telescope structure tubes from New Frontier Technologies (NFT), procured under a leveraged ARC CRC-P arrangement. These components are critical for maintaining optical alignment under varying thermal conditions. The OzFuel optical elements have been integrated with the NFT tube and tested in ambient conditions, with cryo-vacuum testing at ANU scheduled to verify thermal stability.
- An end-to-end image simulator has been used to model what OzFuel-1 would observe from space, de-risking data products, preparing the processing pipeline ahead of launch, and building confidence among potential end users and partners. Simulations using synthetic scenes across multiple land cover types demonstrated that OzFuel-1 can reliably distinguish high-flammability vegetation from low-flammability vegetation.
- Building on the simulator results, the team has proposed three flammability data products to support bushfire management: normalised difference indices derived from OzFuel-1's spectral bands, relating to equivalent water thickness, dry matter content, and nitrogen content. These simulations help verify the sensor design and the data product for the mission.



Dr Joice Mathew demonstrating the OzFuel sensor at SmartSat CRC demonstration event.



Indigenous Pathways to Earth Observation team, Marta Yebra and Adrian



OzFuel team with the ACT Government and SmartSat CRC representatives on demonstration day.

Australian Centre for Space Governance (ACSG)

Enhancing sustainable space policy



ANU InSpace supported the establishment of the Australian Centre for Space Governance (ACSG), bringing together leading experts from six universities across Australia. With expertise in space law, governance and policy, science and technology, security, property, history, ethics, and political and social sciences, ACSG's team of researchers work collaboratively on the most pressing governance challenges facing the space sector today.



Dr Cassandra Steer (second from right) at the UN-hosted Space4Women Expert Meeting in Washington DC, November 2023

The ACSG's six partner universities are The Australian National University, Flinders University, RMIT, Adelaide University, UNSW Canberra, and Western Sydney University.

Chaired by Dr. Cassandra Steer, the ACSG advocates for Australia's interests in space in the 21st century and advances the agenda for responsible space governance. Their workshops and executive education for mid- and senior-level public servants have led to increased trusted relationships with federal government departments, allowing for improved understanding on how space capabilities contribute to Australia's national interests and priorities and directly contributing to positive national outcomes for the space sector.

The ACSG is the first of its kind in Australia, purpose-built to positively contribute to the nation's space industry and potential for global space technology impacts. The ACSG is shaping a national narrative about the importance of space capabilities as critical infrastructure that serves our national interests and priorities.

The ACSG strives to depoliticise debates around space investment and provide a foundation for sustainable policy decisions at the federal and state levels. Focusing on societal benefits of space technologies and data, we aim to inform both decision-makers and the public, and advocate for Australia's ability to contribute to space technology developments with partner nations.

MISSION GOAL:

To serve the nation's space law and governance needs for government, industry, and community stakeholders by providing space law and governance education and training and producing interdisciplinary research to solve national and global space governance challenges.

ANU TEAM:

Dr Cassandra Steer, Associate Professor Maria Racionero Llorente, Dr Elise Stephenson, Dr Zena Assaad, National Security College

PARTNERS:

The Australian National University, Flinders University, Home Affairs, RMIT, Adelaide University, UNSW Canberra, Western Sydney University, Geoscience Australia, Department of Defence





Dr Cassandra Steer and Aleks Deejay (far right), together with several core members of the ACSG at the 'Space Technologies as Critical Infrastructure for National Priorities' workshop for government.

Key Milestones and What's Next:

- In 2024, the ACSG hosted some closed door workshops for federal government participants, to discuss how space-based data and capabilities are critical infrastructure in support of Australia's national needs.
- In 2024, we produced several important publications, all of which can be found on our website spacegovcentre.org
- In terms of our advisory work, we made submissions to two parliamentary standing committees, on Defence and space, and on the launch sector. And we made public and confidential submissions on the Security of Critical Infrastructure Act, the Technology Safeguards Agreement, and the Australian Space Agency's sustainability policy. We have been invited as experts to contribute to discussions on these and a range of other space-related policies.
- We also began a three year Workshops on the Regulation of Space Activities and Technologies (WRegSAT), co-sponsored by UNSW Canberra and the international law firm Gilbert & Tobin.
- An exciting move in our public engagement was the launch of our 'Space Matters' podcast, which includes interviews with members of the ACSG, and experts from across Australia and the world.
- As of 2025, the ACSG has become a registered not-for-profit, having launched successfully after two years of support from ANU InSpace. We are expanding our regional reach, and are now the Australasian Centre for Space Governance. We look forward to new endeavours nationally and in the region, in collaboration with a range of partners.



Over 2025-2026 InSpace has been leading the bid development for the ZERO-G Manufacturing Cooperative Research Centre (CRC). If funded the ZERO-G Manufacturing CRC will drive the acceleration of access to space innovation by leveraging space through unifying projects that increase sovereign space manufacturing and support space capability infrastructure.

ZERO-G

Manufacturing CRC Bid

Mission

ZERO-G Manufacturing CRC is a pioneering \$100 million, 10-year initiative aimed at accelerating the development of a sustainable, multi-billion dollar space-enabled manufacturing economy in Australia.

By leveraging routine access to and return from space, the CRC seeks to position Australia as a global leader in sustainable space-based innovation and advanced manufacturing.

The Cooperative Research Centres (CRC) grant is a Government Flagship Program, established in 1990, to foster collaboration between industry, academia and government; drive innovation and address complex challenges. CRC grants provide funding for long-term collaborative research programs that will help solve major problems or issues facing industry. CRCs are funded for up to 10 years and are awarded to consortiums through competitive, merit-based funding rounds. By focusing on end-user engagement, CRCs close the gap between research and industry uptake by translating research into practical commercial applications.



ZERO-G Manufacturing CRC aims to ensure that the industry is central to the collaborative model by bringing together researchers and the government. It focuses on promoting space sustainability by enhancing both existing and new technological capabilities, as well as workforce development within the Australian space industry.

Why Manufacture in Space Now and Why Australia?

Manufacturing in space is no longer a distant possibility—it's a present-day opportunity. Microgravity environments, such as those aboard the International Space Station, have proven to enable the creation of novel materials and products that are difficult or impossible to produce on Earth. For example, gravity-free conditions allow for more stable crystal growth, unlocking breakthroughs in pharmaceuticals, semiconductors, and optical technologies.

At the same time, the cost of accessing space has dropped significantly, thanks to innovations in launch systems and the rise of commercial space providers. These developments have opened the door to scalable, economically viable space-based manufacturing.

Australia is uniquely positioned to lead this transformation. With strong capabilities in advanced manufacturing, a rapidly growing space sector, and geographic advantages for launch and re-entry.

It is of utmost importance to ZERO-G Manufacturing CRC to embed industry-driven policy and governance frameworks along with First Nations knowledge and voices into all efforts from the start to grow a sustainable returns economy at scale.

Australia's world-class innovative research and technology community is poised to deliver robust and internationally relevant, space-based capabilities that provide for our collective security, enhance the technology landscape and positively impact the Australian economy.

Meet the members of the board driving the CRC Bid

ZERO-G Manufacturing CRC bid is spearheaded by the bid CEO Professor Anna Moore Director of ANU InSpace: "ZERO-G Manufacturing CRC is poised to empower Australian industries—including life sciences, healthcare, and semiconductor design and intellectual property—by facilitating affordable access to microgravity manufacturing and ensuring safe returns."

The CRC bid Chair is Daniel Joinbee, Managing Director of Gungahdjil Aerospace: "This ZERO-G

Manufacturing CRC will be the catalyst that helps Australia not just participate in the new space economy but lead it in key areas where we hold natural competitive advantages. We're not just creating technology—we're building a space ecosystem that benefits all Australians while respecting our connection to Country and sky."

Bid Board Secretary and Bid COO is InSpace's Associate Director, Program Delivery and Operations Mohammad Rifaee Tarmadi.



ZERO-G Manufacturing CRC bid is currently developing five thematic project areas

ACCELERATE COMMERCIALISATION PIPELINES

By expanding and maturing a pipeline of product business cases, ZERO-G Manufacturing CRC lays the foundation for a thriving space-enabled economy.

Targeting adjacent sectors such as pharmaceuticals, life sciences, optical technologies, and Defence ensures broad market relevance and cross-sectoral innovation, driving economic diversification and resilience.

ADVANCE MANUFACTURING INNOVATION

Developing novel manufacturing platforms and technologies directly supports the creation of high-value, export-ready products.

These innovations will enable Australia to compete globally in emerging space and terrestrial markets, reinforcing ZERO-G Manufacturing CRC's goal of building a robust, future-facing manufacturing sector.



ENABLE SAFE & SUSTAINABLE RE-ENTRY

Routine and reliable return from space is a critical enabler of space-based manufacturing.

By investing in advanced simulation, detection, and recovery technologies, ZERO-G Manufacturing CRC ensures that Australia can safely retrieve manufactured goods and scientific payloads, unlocking commercial viability and operational scalability.

FOSTER SOCIAL LICENCE & INCLUSION

Building trust and engagement—especially with First Nations communities—is essential for long-term sustainability and national support.

Inclusive participation ensures that the benefits of the space economy are widely shared, aligning with ZERO-G Manufacturing CRC's commitment to ethical innovation and social responsibility. technologies across adjacent sectors.

DEVELOP FUTURE TALENT

A skilled workforce is the backbone of any advanced industry. ZERO-G Manufacturing CRC's education and workforce development program ensures that Australia has the talent pipeline needed to deliver on its research agenda and sustain growth in the space-enabled manufacturing sector for decades to come.

To join the bid or get more information on partnership opportunities please email space.crcbid@anu.edu.au and check out the website: zerogcrc.com.au



Space Gravity

Global Water Security

Accelerating the development of innovative new gravity sensing technologies for Earth Observation and geodetic applications, the Space Gravity Mission is developing next-generation laser interferometry and inertial sensor payloads.

Making precise measurement of Earth's gravitational field and how it changes over time can give us crucial information for earth observation, climate change, and navigation.

As we've learned from recent droughts and floods, water management is critical in Australia and globally. Measuring the changes in Earth's gravity over time allows us to map Earth's water movement to measure climate change effects such as variations in sea level, ice-cap melt, and monitoring of water basins such as the Murray-Darling. We will be able to better predict and mitigate floods, providing support to the agricultural industry as it adapts to climate change, and the planning of new cities will be possible with precision data to support water management.

We are bringing together capabilities in developing new laser systems for precision measurement along with expertise in Earth observation data analysis and utilisation to provide key information on water resources in the different components of the hydrological cycle.

The team is also developing new quantum sensors for measuring gravitational fields and magnetic fields, with applications in underground structure mapping and navigation on Earth and in space.

MISSION GOAL:

To develop new types of gravity sensors using quantum technologies, advancing data analysis for Australia's water management and climate monitoring, and continue Australian collaboration in the GRACE missions.

ANU TEAM:

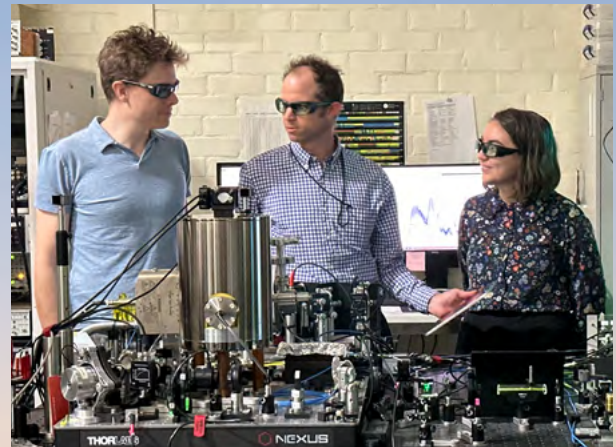
Professor Paul Tregoning, Professor Kirk McKenzie

PARTNERS:

Advanced Navigation, CEA Technologies, NASA/JPL

Key Milestones and What's Next:

- ANU and industry partner CEA Technologies were awarded \$6.2 million from the Australian Space Agency's Moon to Mars program to produce laser stabilization technology for next generation gravity sensing missions. This partnership continues with the Australian Space Agency's Moon to Mars program to produce laser stabilization technology for next generation gravity sensing missions. The team passed the Critical Design Review in February 2025 opening the path for flight builds. The team completed an Engineering Model Delivery review and is moving forward with further testing.
- The ANU team is working on next generation laser technologies for alternate mission constellations.
- Ongoing analysis of GRACE Follow-On data as it becomes available.
- Assimilation of GRACE-FO and other satellite data (ICESat-2, SWOT) to assess changes in Australia's water resources.
- SmartSat CRC funding (\$500K) received for the development of groundwater modelling capability, incorporating total water storage change from space gravity and surface water height estimates from SWOT.

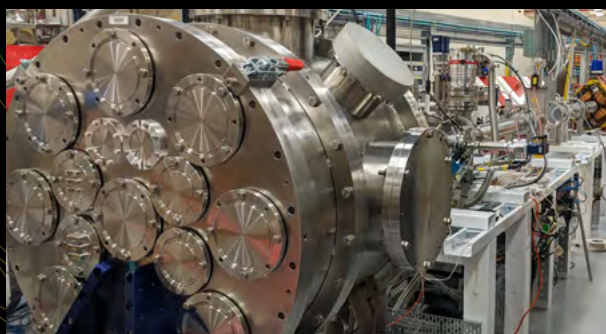


ANU researchers are developing inter-spacecraft laser instruments for next generation Earth Observation Missions. Dr. Andrew Wade, Professor Kirk McKenzie, and PhD Candidate Emily Rees are part of the ANU Centre for Gravitational Astrophysics.

In mid-2021, the NSQN was inaugurated, supported by a \$2.5 million grant from the Australian Space Agency's Space Infrastructure Fund. This initiative has enabled space qualification infrastructure nationwide, worth \$1 billion, bolstering the prospects for the success of future space missions.



Saber Astronautics Responsive Space Operations Centre



The Australian National University's Heavy Ion Accelerator Facility Space Irradiation Beamline (HIAF-SIBL)

NSQN

The NSQN emerged from a collective ambition to establish a premier, sovereign space qualification service, aimed at bolstering the Australian Space Manufacturing Industry. This initiative was brought to life through the collaboration of six foundational partners: The Australian National University (InSpace, HIA, and NSTF), the Australian Nuclear Science and Technology Organisation (ANSTO), Steritech, the University of Wollongong Australia (Centre for Medical Radiation Physics), Saber Astronautics, and Nova Systems. This united effort underscores a commitment to an Australian-led and -managed space testing landscape.

The cornerstone of preparing Australian enterprises for space endeavours is ensuring the utmost reliability of their products, critical for the success of missions in harsh space environments. The NSQN is poised to offer over \$1 billion in space qualification infrastructure, providing accessible, cost-effective testing solutions to expedite the design and deployment of space missions.

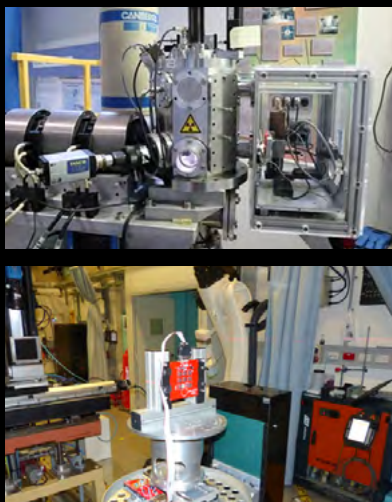
National Space Qualification Network (NSQN)

Enabling Australian Space Manufacturing

A standout feature of the NSQN is its cutting-edge radiation testing capabilities, unique to the region, positioning Australia at the forefront of global space manufacturing and enhancing the international competitiveness of Australian space technology. Through the NSQN, businesses can significantly elevate their space mission assurance and success, leveraging local expertise, thorough testing, and qualification processes.

The NSQN's efforts are supported by the Australian Space Agency's Space Infrastructure Fund and the ACT Government, reflecting a strong commitment to advancing Australian space capabilities.

For more information visit nsqn.org



Top left: Heavy Ion Irradiation Facilities at ANSTO
 Bottom left: X-ray Facilities at the Australian Synchrotron
 Top right: Dr Joice Mathew and Head of the NSTF Eduardo Trifoni

Mission Goal:

To harness Australia's space testing and qualification prowess, propelling the growth of the Australian New Space Market and the commercialisation of space testing services.

Key Milestones and What's Next:

- NSQN has space-qualified many payloads and satellites. Of note, in August 2023, the University of Melbourne, in collaboration with Inovor Technologies, Neumann Space, and Nova Systems, concluded the final space environmental testing of the SplRIT satellite at the NSTF and launched successfully in December 2023. Space Machines Company conducted space environmental testing of their Optimus spacecraft at the NSTF, which successfully launched in March 2024.
- The ANU Heavy Ion Accelerator Facility (HIAF) and Singapore-based Zero-Error Systems (ZES) secured funding through the Australian Government's Global Science and Technology Diplomacy Fund (GSTDF). The project supports the commercialisation of radiation testing services at the ANU Space Irradiation Beamline (SIBL), enhancing Australia's capabilities in evaluating and validating radiation effects testing of semiconductor devices. It includes joint development of heavy-ion test protocols, testing of the ZES microchips, and international promotion of HIAF-SIBL as a unique regional asset. This milestone advances the NSQN strategic goal of enabling globally competitive electronics testing services, strengthening Australia-Singapore ties in this space and advancing manufacturing sectors.
- The partnership between the Australian National University's Heavy Ion Accelerator Facility and Zero Error Systems, supported under the Global Science and Technology Diplomacy Fund – Strategic Element, has reached a key milestone, with testing now successfully underway using Zero Error Systems' proprietary chips to advance radiation assurance for space-ready semiconductor technologies.
- The future for the NSQN is promising, especially considering the Australian space sector's expected annual growth rate of 7.1% over the next five years. With the Australian Space Agency's goal to triple the space economy's size by 2030, NSQN's role in providing high-quality space qualification services will be crucial for the industry's development and international competitiveness.
- ANU formalised a strategic alliance with Deloitte Space to support commercial uptake and long-term sustainability of NSQN – Australia's space qualification infrastructure. The agreement enables co-design of industry engagement strategies, commercialisation pathways, and business model innovation for the NSQN. Deloitte's involvement brings national and international visibility, access to industry networks, and investment advisory capabilities, positioning NSQN as a key enabler in the broader space ecosystem. This partnership is instrumental in advancing the CRC bid, which is focused on space sustainability and reinforces the NSQN mission to deliver trusted, end-to-end qualification services.
- NSQN held a dedicated exhibitor booth at the International Astronautical Congress (IAC) 2025 in Sydney, providing a high-visibility platform to showcase Australia's national space qualification infrastructure to a global audience. This initiative will highlight capabilities across NSQN nodes, promote case studies of flight-proven hardware tested at NSQN sites, and facilitate engagement with international space agencies, prime contractors, and startups. The booth also served as a venue to promote NSQN's role in advancing sovereign space capabilities and supporting export readiness.

As Associate Director, Strategic Projects at InSpace, I manage the Strategic Projects Team and oversee a holistic pipeline of opportunities from initial ideation through to funded missions. In the seven years I have been here, I have relished the opportunity to work on dynamic projects with inspiring people.



Associate Director, Strategic Projects

Dr Kate Ferguson

My team and I curate and catalyse space research projects that are translated into technical or manufacturing initiatives that bring about impactful results and mission success in collaboration with industry and government.

The Strategic Projects Team delivers across InSpace's four strategic pillars:

Navigate

We uncover and create compelling opportunities for space innovation by connecting ANU capabilities with external stakeholders in industry, government, and communities across Australia and internationally.

Catalyse

We convert space innovation and research opportunities into funded missions, including our nationally significant Flagship Missions that deliver translation and impact.

Build

We engage with funded projects through their delivery, ensuring outcomes are leveraged to drive further impact and new opportunities.

Advocate

We promote ANU space capabilities, highlighting the importance of space technology on our everyday lives, shaping policy, stimulating funding, and inspiring diverse career choices in space.



ANU InSpace Strategic Projects Team: Ewelina Przybyszewski, Natasha Disha, Dr Kate Ferguson, and Anupam Kumar Pilli

We continue to mobilise space research under the current InSpace themes of Space and Sustainability, Space for Asia and the Pacific, and Space Manufacturing.

InSpace highlights

- InSpace was thrilled to support the ANU Quantum Optical Ground Station as it made history supporting lunar optical communications for the Artemis II mission. This immense success highlighted the importance of the InSpace Strategic Projects team working early and closely with our academic leads. The ANU involvement in this mission was driven over 6 years with support for business case and proposal development, engagement and commercialisation. We now look to leverage this demonstrated capability to position ANU and Australia to support future mission operations.
- InSpace's team supported applications securing funding across two Australian Economic Accelerator Ignite Round 2 projects. The first is developing a vacuum ultraviolet radiation source for applications such as electrostatic removal of lunar and Martian dust from spacesuits and equipment, surface sterilisation, and support for off-Earth agriculture. The second is building and testing an engineering prototype of an inter-satellite ranging system to progress it to meet space mission requirements.
- In 2026, we ramped up our engagement with adjacent sectors such as pharmaceuticals, life sciences and biologics to scope and accelerate opportunities benefiting from manufacturing in a low gravity environment. There are fantastic opportunities such as enhanced cancer treatments, tissue engineering and personalised medicine, which are building our capacity for the ZERO-G Manufacturing CRC.
- ANU is proud to be part of the ELO2 consortium building Roo-ver, Australia's first lunar rover, which will travel to the Moon later this decade. The Roo-ver Mission is part of the Australian Space Agency's Moon to Mars Trailblazer Initiative, which aims to accelerate the growth of Australia's space industry and showcase the best of Australian innovation, ideas and technology to the world. ANU is excited to leverage our space environment and radiation testing and advanced communications capabilities to contribute to this landmark mission. In July 2026, the Heavy Ion Accelerator Facility conducted radiation testing of electronic components for Roo-ver.



Associate Director, Operations
and Program Delivery

Mohammad Tarmadi

Executive Officer

Ulrike Proske

As the Associate Director for Program Delivery and Operations, I am responsible for ANU-wide program delivery relating to the iLAUNCH Trailblazer, SmartSat Cooperative Research Centre, and our ZERO-G Manufacturing Cooperative Research Centre Bid. Driving major funded projects through the program delivery process allows us to safeguard outcomes that are leveraged to catalyse further impact and new opportunities.

Working alongside Executive Officer Dr Ulrike Proske, our Program Delivery and Operations Team is also responsible for ensuring the smooth operations of our Innovation Institute; and we support our Advisory Board in the various aspects of their strategic advisory and advocacy work. These efforts provide concrete outcomes that contribute to the driving of our Innovation Institute's key performance indicators.

Our ANU Innovation Institute is a key member of the group led by our Pro Vice-Chancellor for Research Infrastructure and Entities. We sit within the Portfolio of our Deputy Vice-Chancellor for Research and Innovation. This positioning provides us with a strong platform to engage in interdisciplinary work across the various parts of our University.

Beyond the ANU, the Institute for Space is an active and valuable partner for federal and state governments. Our Innovation Institute also bridges national and international industry partners with each other and with space agencies around the World. We are building on being a trusted partner with the Asia-Pacific region and are a contributor to the space technologies that are making a difference to the most pressing issues of the 21st Century. These outcomes are achieved by the close synergies between our Innovation Institute's Strategic Projects, Marketing and Communications, and Program Delivery and Operations teams. We are also bolstered immeasurably by the robust and incisive support that has been provided to us by our advocates, partners and enablers across the years. It is this set of strong working relationships, underpinned by our strong culture, that has won us multiple awards that recognise our role both within the ANU and the Australian space sector.



Marketing and Communications Manager **Krysia Derecki**

IAC Sydney 2025 was a highlight event for the InSpace team. We led the ANU representation at the congress on the ACT Government Team Canberra Stand with partners the Research School of Astronomy and Astrophysics, The Bushfire Research Centre of Excellence and New Frontier Technologies. In March 2025 Inspace marcomms team led the ANU presence the at Avalon International Airshow and and Australian International Aerospace and Defence Exposition 2025 and that proved a collegial stand embracing the talent from many ANU schools, colleges and entities and engaging with the national and international community on our research translation and educational offerings.



Krysia Derecki & Kate Greenfield, Adelaide University at iLAUNCH IAC 2025 Sydney

Media coverage of Artemis II and the ANU involvement was robust with the media monitoring service, Stream, picking up 298 media clips across TV, radio, print and online, reaching a potential audience of 23,819,729 and a total audience of 44,093,983. This level of media coverage is equivalent to \$1,784,664 in advertising revenue.

Our social media presence on LinkedIn is dynamic and our reach engages with over 5,500 followers! We launch several campaigns a year to highlight the work of our researchers, projects, initiatives and team's achievements.

ANU InSpace hosts a dynamic range of meetings, events, workshops and conferences. We network and engage with hundreds of people involved in the space sector from academia, industry and government.

ANU InSpace was awarded University of the Year at the Australian Space Awards 2025.



Press Conference at the ANU QOGS for NASA's Artemis II Mission



Professor Francis Bennet and Astronaut and Australian of the Year Katherine Bennell Pegg

NSTF Team and Space Machines Company Team preparing the Optimus Platform spacecraft for the experimental activities in space conditions in the Wombat XL. Photo credit: Cristy Roberts



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