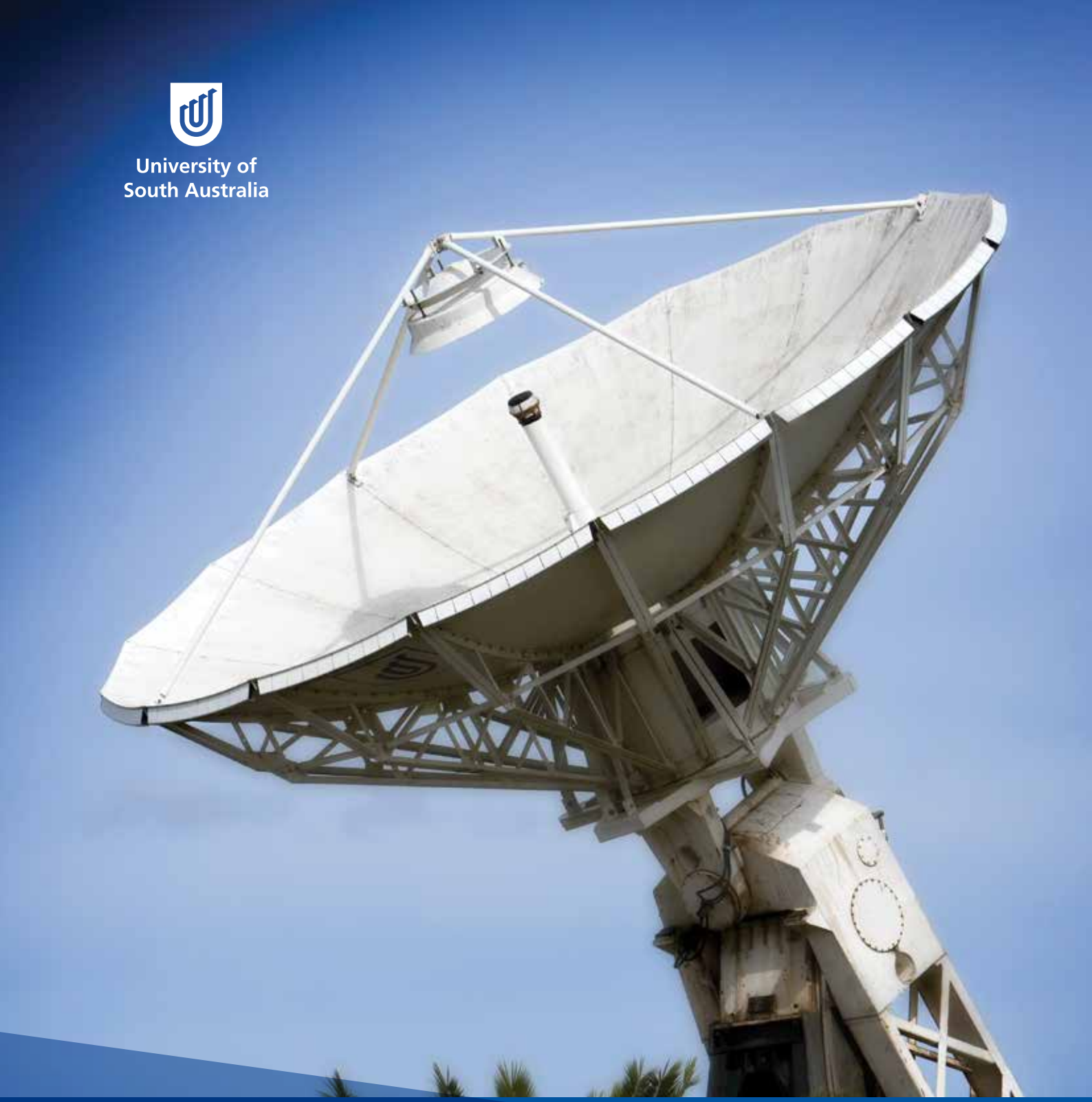
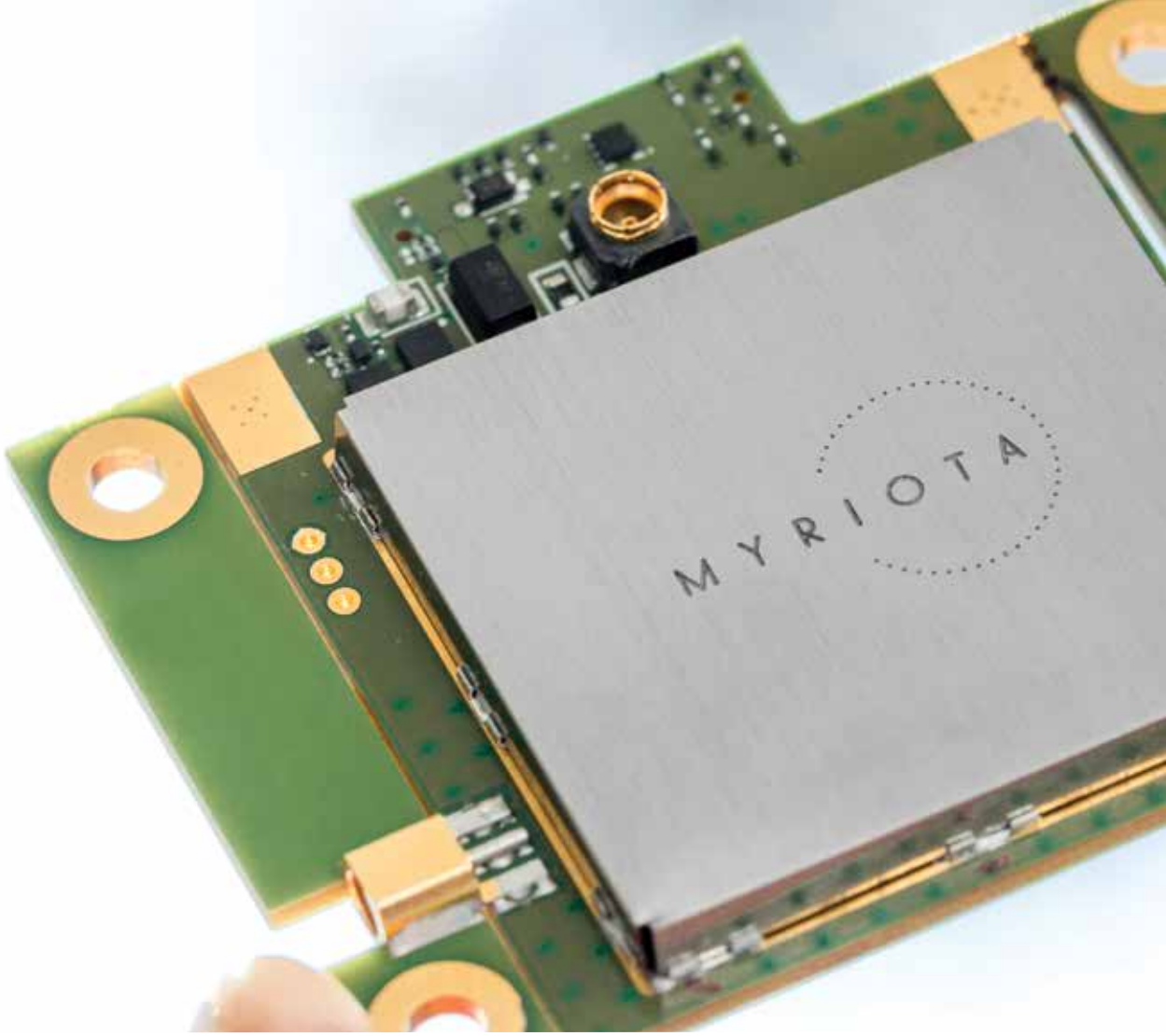
University of
South Australia



INSTITUTE FOR TELECOMMUNICATIONS RESEARCH (ITR)

The ITR is one of Australia's most significant research centres in the area of wireless telecommunications.



SUCCESS STORIES

The GSN Project

The GSN Project was formed by Australian and International partners including Canadian satellite company COM DEV, Sage Automation, CSIRO, DST Group and the Institute of Marine Science, and was co-funded under the Commonwealth's Australian Space Research Program.

The technology allows earth-based sensors to communicate with satellites in a more efficient manner. Developed from scratch over a short period of time, it can also derive efficiencies by using low-earth orbit satellites rather than the more expensive geostationary satellites.

Awarded Technology of the Year in 2013 by the International Wireless Innovation Forum, the project attracted international investors to form the spin-off company Myriota.

Myriota Pty Ltd

Myriota aims to revolutionise machine-to-machine (M2M) communications across a range of industries. Formed from the ITR's research, it was launched in November 2015.

Myriota uses small, low cost transmitters to send small packets of data direct to a constellation of low earth orbit nano-satellites providing affordable Internet of Things (IoT) connectivity without the need for ground based infrastructure. Myriota's patented communications system exploits the advancements in silicon chip and nano-satellite technology, to enable low cost direct-to-orbit IoT connectivity on a massive scale.

Industry analysts have estimated that global M2M revenue will grow to $1.2 trillion by 2022.

DSpace

DSpace successfully created a multi-user decoding and turbo coding technology for the mobile satellite industry across areas of defence, intelligence and emergency services.

Within three years of formation, DSpace in partnership with the ITR, designed and created the world's first commercial turbo decoder.

The decoder became a key component in new generation mobile satellite systems from Inmarsat. This was a major breakthrough, effectively doubling the data throughput of power limited user terminals and paved the way for widespread adoption of similar technology in satellite and terrestrial radio standards.

Cohda Wireless

Cohda Wireless, a spin-off company originating from the ITR, is a world leader in vehicular communications hardware. Their hardware is licensed by General Motors and is set to revolutionise car travel of the future. Researchers at the ITR are working directly with engineers at Cohda Wireless to build radar imaging algorithms into Cohda's existing communications hardware.

Potential applications for the technology include video security, advanced passenger information systems, advertising and wireless internet connection on public transport, as well as real-time video links for emergency response vehicles.

RESEARCH, ENGAGEMENT AND COLLABORATION

It's our mission to conduct world class fundamental research, partnered with industry, to deliver leading edge technologies in a vibrant research education environment.

The ITR maintains strong links with industry in the satellite communication segment. We are breaking the bottlenecks of downlinks for earth observation satellite missions through the ARC Linkage Project partnered with Thales Alenia Space.

We're improving satellite-based Search and Rescue systems. We're designing communication payloads for small, inexpensive CubeSats (QB50), and developing ground station receivers through the ARC Linkage Project partnered by Honeywell Global Tracking.

FUNDAMENTAL RESEARCH AREAS

Signal processing

The ITR's signal processing expertise includes theoretical development and analysis of algorithms, practical implementation on microprocessors and field programmable gate arrays. Our expertise feeds directly into applied research areas in satellite communication and joint communication and radar.

Information theory

The ITR has made significant contributions to information theory and communications topics, which includes network coding, information inequalities, distributed data storage, information-theoretic security, coding for channels, networks and sources, wireless and optical communications. Our research has attracted support from numerous (national and international) funded agencies and industries including the Australian Research Council (ARC), Defence Science and Technology Group (DST Group) and the Japan Society for the Promotion of Science (JSPS).

APPLIED RESEARCH AREAS

Satellite communications

The ITR's research aims to increase the reliability, spectral efficiency and flexibility of satellite communications with a focus on multiuser systems.

The ITR played a key role in the CRC for Satellite Systems, which designed and launched 'FedSat'. This 58kg satellite was a technology demonstrator. The communications experiment was the largest payload and the only one wholly designed and built in Australia.

The ITR took leadership of the $12 million Global Sensor Network (GSN) Project under the Australian Space Research Program. We developed new satellite-based wireless sensor networks, which demonstrate new data collection technology vital for industry, the defence sector, environmental agencies and national security organisations.

Optical communications

We work with Free Space Optical (FSO) techniques which offer excellent potential for Gigabit communications within aerospace and terrestrial applications. The ITR is testing novel signal processing and coding methods to dramatically improve the performance of FSO communications.

Visible Light Communication (VLC)

With our expertise, we seek to use visible light to transmit information which offers both illumination and communications. VLC is a green technology and its maximum usable bandwidth is approximately 390 THz. Since only positive real signals can be transmitted, many techniques applicable to radio-frequency systems cannot be used in VLC.

Communications and radar

We have ongoing collaborations with passive radar experts at DST Group. Together we develop novel algorithms and hardware for joint communications and radar imaging. This includes algorithms for research and demonstrations using real-world data from the DST Group receiver facility at Edinburgh and various trials (land and maritime).

Distributed data storage

Data storage is becoming increasingly critical in modern IT infrastructure, especially in the era of Big Data. Leveraging our expertise in information theory and network coding, we aim to develop next generation data storage systems, which are cost-efficient, robust, secure and resilient to eavesdropping and tampering by malicious adversaries.

INFRASTRUCTURE

Transitioning theoretical results to practical applications is central to the success of our projects. The ITR's satellite-tracking dish, operational ground station, and expert technical staff are a unique combination amongst Australian universities.

The ITR's infrastructure and expert teams create the perfect environment to conduct specialty communication projects and testing As SA's number one university for Engineering research*, the ITR is well-placed amongst a supportive, positive, ambitious and industryfocused Environment.

The Institute houses many industry standard and bespoke software and hardware development tools as well as laboratory test equipment. In addition, we constantly update our rapid prototyping capabilities through a facility dedicated to taking research concepts quickly to proof of concept.

OUR FACILITIES

Satellite Ground Station
One of only a few available in the southern hemisphere. The ITR operates multiple satellite facilities. Our Satellite Ground Station facilities are available for both research purposes, as well as commercial use by industry. Currently this includes VHF, UHF, L-band, S-band and X-band (all steerable). We have the ability to provide fixed C and Ku-band links.

Software Defined Radio Laboratory
Our Software Defined Radio (SDR) facility was developed for physical layer and cross-layer experimentation and research. A key focus is rapid model-based design and development.

The laboratory has a range of state-of-the-art SDR platforms and associated development tools including a number of Ettus USRP SDRs.

Free Space Optical Test Range
The ITR hosts a 12km free space optical test range between the Institute and the Adelaide Hills. This range is used to measure the optical channel and to test optical communication systems.

For further information please contact us.

*The only university in SA to have all of its assessed engineering research rated well-above world standard. 2015 Excellence in Research for Australia (ERA)

OUR EXPERTISE

Working in partnership, we adopt multidisciplinary approaches to evolve research and theory into product. Our researchers deliver real benefits to society across key areas including:

- Satellite communications
- Optical and visible light communications
- Flexible radios and networks
- High speed data communications and storage.

Our research spans a broad segment of the development spectrum, from foundational mathematics and signal processing to hardware, software and firmware development, successful product licensing and spin-off companies.

A distinctive feature of our Institute is that we work in close partnership with industry, government, defence and international research partners.

CONTACT US

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Information correct at time of printing August 2017.
CRICOS Provider No. 00121B

University of South Australia