SMARTSATNEWS

ISSUE 10 - April 2020

SMARTSAT
COOPERATIVE RESEARCH CENTRE

Australian Government
Department of Industry, Science, Energy and Resources

Business Cooperative Research Centres Program

Contents

CEO Welcome

Dear Colleagues

Welcome to our newsletter. It's been a busy start to the year, and this edition comes at a time when we as a business, and a nation, are coming to terms with the impact of the circumstances surrounding COVID-19.

We have placed all the necessary measures to respond and are working hard to galvanise the SmartSat community ecosystem to support each other and to emerge from this crisis stronger and more resilient.

We are accelerating the project development and approval to ensure that our research and industry partners can keep productive and collaborative, albeit at a distance. More information on the projects can be found here.

We are delighted that we recently celebrated the official opening and launch of the SmartSat CRC and Australian Space Agency. We co-hosted a VIP Preview Event of the Lot Fourteen Space HQ, followed by the Hon. Steven Marshall's State Space Industry Dinner. To top it all off, our Prime Minister, the Hon. Scott Morrison alongside the Hon. Karen Andrews cut the ribbon and unveiled a plaque to commemorate the official opening of the SmartSat office.

I congratulate Prof. Clinton Fookes from QUT on being appointed as the SmartSat Artificial Intelligence (AI) Theme Leader. AI will be a critical component in all three research programs, and we look forward to Clinton bringing his expertise to the team. We will soon be putting out a call for a theme leader in Cyber Security to develop projects in this area.

We were delighted to see the recent announcement confirming the establishment of a SmartSat New South Wales (NSW) Node, in partnership with NSW Treasury and the Office of the NSW Chief Scientist & Engineer.

The first formal meeting of the Defence End User Advisory Board was held on 18 February. Mr Peter Rossdeutscher and Mr Mark Allison have been appointed as Chair of the Mining and Energy and Agriculture and Natural Resources Industry Advisory Board, respectively. We look forward to working with the Chairs and high calibre representatives of these advisory bodies.

I would like to thank you all again for your ongoing support and commitment to SmartSat and look forward to working with you throughout 2020; stay safe and positive!

Andy Koronios
Chief Executive Officer

"We are delighted that we recently celebrated the official opening and launch of the Smart-Sat CRC and Australian Space Agency."

Comms & Outreach

Director, Communication & Outreach - Nicola Sasanelli

Dear Colleagues,

We are excited to share our quarterly newsletter to update you on SmartSat activities and events. Our newsletter also offers an opportunity for partners to present initiatives, ideas, expertise and facilities. I encourage you to share our newsletter with your national and international colleagues who may be interested and please do not hesitate to provide your feedback.

The first three months of this year have been very hectic. We started with a joint event with the International Space University as part of the Southern Hemisphere Space Studies Program. This included the third event in our Distinguished Speaker Series with Dr. Sachi Babu and Dr Charles Norton from NASA HQ, Washington.

In February we held a bilateral workshop with Italy, following similar events with the UK and France in 2019. Private companies such as Leonardo, E-geos, Sitael, Tyvac, D-Orbit, the Italian Space Agency and a group of Italian space start-ups attended the event in Sydney. The workshop helped to promote Italian and Australian collaboration in the Space sector, provided an overview on current projects and future perspectives with a focus on environmental sustainability and management.

The Hon Scott Morrison, Prime Minister or Australia with the Hon Steven Marshall and the Minister for Industry, Science and Technology the Hon Karen Andrews.

Nicola Sasanelli, Director Communication & Outreach , Peter Woodgate, Chair SmartSat CRC Board, Andy Koronios, CEO and Peter Nickloff, Director Industry Advisory Baord with the newly opened plaque.

One of the most exciting events was the launch of the SmartSat CRC and Australian Space Agency HQ and the 9th Australian Space Forum. On 18 February, Prime Minister Scott Morrison officially opened the new Australian Space Agency and SmartSat headquarters at the Lot Fourteen innovation precinct in Adelaide. It was an historic day in the presence of the South Australian Premier, the Hon. Steven Marshall, the Minister for Industry Science and Technology, the Hon. Karen Andrews, the head of the Australian Space Agency, Dr Megan Clark, two international astronauts, Dr Andy Thomas and Dr Pam Melroy, and of course many national and international guests. The Australian Space Forum featured Mr Giorgio Saccoccia, head of the Italian Space Agency as the keynote speaker as well as a SmartSat R&D panel session facilitated by Dr Christyl Johnson, Deputy Director for Technology and Research Investments at NASA Goddard Space Flight Centre.

The goal of these initiatives was to create a rich and vibrant ecosystem from which new applied research projects emerge, which respond to specific needs of the industry and offer innovative solutions for future products and competitive systems.

"Prime Minister Scott Morrison officially opened the new Australian Space Agency and SmartSat headquarters at the Lot Fourteen innovation precinct in Adelaide."

Research

Chief Research Officer – Dr Nick Stacy

The SmartSat fast start using the Expression of Interests (EOIs) submitted in September 2019 is almost complete. We appreciate the effort all SmartSat partners put into these submissions which have formed the basis of a successful initial research and development program. To date, 9 projects have been approved and several more are under consideration for the next Board meeting. Several workshops will also be held to coordinate project ideas from EOIs aligned with specific themes. We anticipate most of the key opportunities from the initial EOIs will have progressed to projects by September this year or will have been wrapped into coordinated research and development efforts. An example of this is the appointment of an Artificial Intelligence (AI) theme coordinator, Professor Clinton Fookes to lead the AI effort across the three research programs. Clinton is the Professor for Vision and Signal Processing in the School of Electrical Engineering and Computer Science at the Queensland University of Technology. I would like to congratulate Clinton and welcome him to the team. We will also be looking to appoint a Cyber Security Theme Leader to coordinate research activities in this area.

The research program is transitioning to a more strategic approach using a road map for specific technologies, integration of effort into high priority capabilities and better engagement with industry partners to understand their technology needs and commercial opportunities. We are seeking a balance of end user pull of technology by industry and end users with technology push from the research community. This will ensure that SmartSat is focused on known commercial gaps and opportunities whilst also seeking to generate new industry opportunities with leap ahead technologies.

SmartSat will seek flexible approaches to progress the research program during the COVID-19 pandemic with the associated requirements for limited working in common spaces and the need for many to work from home. We would appreciate feedback on how to maintain the research program momentum during this difficult period.

Education & Training College

Dr Ady James, Co-Chair

Since the last newsletter we have had one more meeting of the Education College, on 25 February.

We are pleased to inform that we are in the process of funding the first five scholarships to national and international candidates who will operate in the three research programs considered to be high priority for SmartSat. The five PhD students will be awarded for research activities at our universities with our industry partners as supervisors.

Secondly, the expression of interest for the Skills Scoping Project was tabled and approved, so this will be going out in the very near future. The results from this will provide us with data to enable the development of the roadmap to allow us to meet our KPIs in terms of skills training and professional development. The next item was a discussion focussed around diversity and inclusion.

Finally, Dr Sarah Baker from the Department of Education and Child Development (DECD), has provided feedback on the successful schools placement program, where 27 year 11 and year 12 students, from 19 different schools, experienced 3 days engaging with the space industry and academia at the end of 2019. This program was delivered by the Advanced Technology Program (ATP) from within DECD and supported by the South Australian Space Industry Centre. It is hoped that the SmartSat CRC can help support this initiative in 2020, and, through the nodes in other states and territories, roll this initiative out across the nation. The Advanced Technology Program is also leading the Education, Training & Careers Working Group for the Academy of Science's National Committee for Space & Radio Science – Development of Australia's next decadal plan for Space Science. Currently we are scoping the current space centered school and tertiary education activities and needs, STEM engagement and training activities and needs for industry and agencies. If you have any suggestions, you may like to complete their survey. If you have any queries, please contact Dr Baker directly at sarah.baker@sa.gov.au.

Aurora Start-Up Cluster

A New Investigation into Growth, and the Impact of Covid-19 – Dr Tim Prsons

Space start-ups are a key mechanism to harness disruptive innovation for sector growth, which is why the CRC has established the SmartSat Aurora Space Star-tup Cluster company, to give our more than 45 space start-up partners support to grow and become globally competitive. This has become even more important with impacts from the global Covid-19 epidemic starting to be felt across the whole sector. To understand how SmartSat Aurora can best support its members - and especially to help them survive the impact of Covid-19 - the CRC is embarking on a quick-turnaround investigation to develop strategies and recommended actions. Consisting of qualitative interviews and quantitative surveys, the resulting report due in May will investigate the unique barriers space start-ups need to overcome to gain customers locally and globally, and what the immediate and potential lasting impact of Covid-19 will be. Consultations with SmartSat Aurora start-up, CRC partner and broader sector players will start immediately.

Industry

SmartSat CRC Industry End User Advisory Boards – Peter Kerr

The First Defence and National Security End-User Advisory Board Meeting was held on the Tuesday 18 February in Adelaide. This coincided with a big week of space events in South Australia which many Advisory Board members were able to participate in. The Defence and National Security End-User Advisory Board is comprised of five representatives from Defence and National Security agencies, five from industry, one academic representative and four members of the SmartSat Executive team. The main discussion was on the development of a Defence and National Security sector plan which aims to guide SmartSat participants in the development of research project proposals that are strongly aligned to end-user needs, in this case the defence and national security sector. It was agreed that the Terms of Reference needs further work to more broadly balance defence and national security interests. The CEO and Research Director also provided briefings on the establishment of the CRC and the initial group of approved projects. There was strong support from the Advisory Board for the research roadmap and the value of this forum to help shape the program of research in order to deliver maximum impact to Australia's national security and resilience.

Future meetings will be held prior to the Research Investment Committee meeting and SmartSat Board meeting to allow input from this group to have maximum impact and provide strong guidance on SmartSat research activities. The next meeting is expected to occur in late July or early August.

"The Defence and National Security End-User Advisory Board is comprised of five representatives from Defence and National Security agencies, five from industry, one academic representative and four members of the SmartSat Executive team."

Events

SmartSat CRC Distinguished Speakers

Dr Charles Norton and Dr. Sachi Babu from NASA HQ Washington, DC,

The third Distinguished Speaker Event was held on Saturday 1 February in a joint initiative with the International Space University and the Southern Hemisphere Space Studies Program, with Dr Sachi Babu and Dr Charles Norton from NASA HQ in Washington and Dr Sarah Pearce, Deputy Director of Astronomy and Space Science CSIRO. It was followed by a panel discussion facilitated by Professor Andy Koronios, CEO, focussing on the importance of satellite technologies in bushfires.

The expert panel also included Ms Katherine Bennell of the Australian Space Agency, Adjunct Prof. David Bruce, University of South Australia and Dr John Nairn from the Australian Bureau of Meteorology. The panel discussed the potential use of satellite technologies in anticipating and combating bushfires and potential solutions that could be soon available.

The event was opened by the Premier of South Australia, the Hon Steven Marshall MP. As part of a stimulating and wide-ranging discussion, the panel of Australian and international experts suggested a range of short and medium-term initiatives aimed at improving the usefulness of satellite data in anticipating the spread and impact of bushfires.

Topics discussed included:

- Satellite sensors to enable the detection of bushfire smoke at the earliest stages of an outbreak;

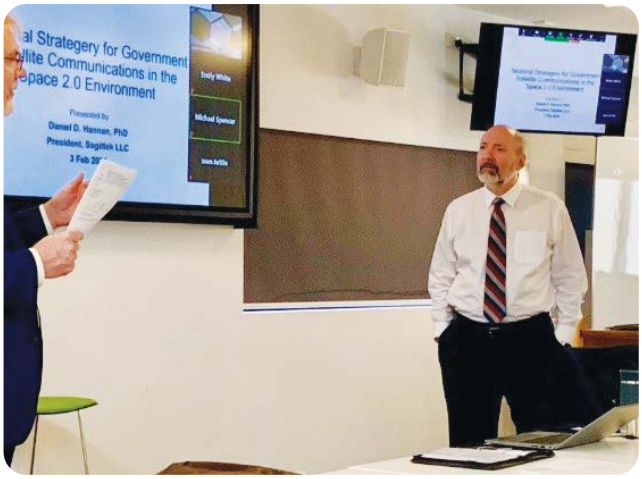
- Networks of low-cost sensor devices to monitor in near real-time the spread and intensity of fires;

The expert panel was chaired by Prof. Andy Koronios and included Prof David Bruce, Dr John Nairn, Dr Charles Norton, Dr Sachi Babu, and Dr Sarah Pearce.

- Converting satellite data to information that would help emergency services to make split-second operational decisions;

- The public health implications of exposure to bushfire smoke (including the little discussed high casualty rate from smoke inhalation).

Dr Daniel Hannan, President, Sagittek LLC



On 3 February in Canberra, Dr Dan Hannan gave a presentation on a "Notional Strategy for Government Satellite Communications in the Space 2.0 Environment".

The focus of the lecture was how emerging space technology might create new opportunities and threats for government satellite communications users. Dr Hannan provided an interesting historical perspective on Space 1.0, an era during which technology development was driven by national governments, largely in response to strategic competition.

Space 2.0 concepts started emerging in the early 2000's, a period coincident with the deployment of the first tranche of constellations of non-government communications satellites. This period has been characterised so far by reduced cost of access to space and increasing commercially driven technology development. This "democratisation" of access to space has driven the emergence of a plethora of threat vectors that undermines mission assurance of all space based and space derived services.

In terms of future opportunity for novel technology, Dr Hannan stated that the USA Department of Defence is moving to re-think technology development and acquisition in space. The newly established Space Development Agency (SDA) is seeking to "disrupt" traditional approaches to military space and the U.S. Government Accountability Office has recently reviewed current practise. The SDA is exploring novel space architectures including an increasing role for smaller satellites in low earth orbit.

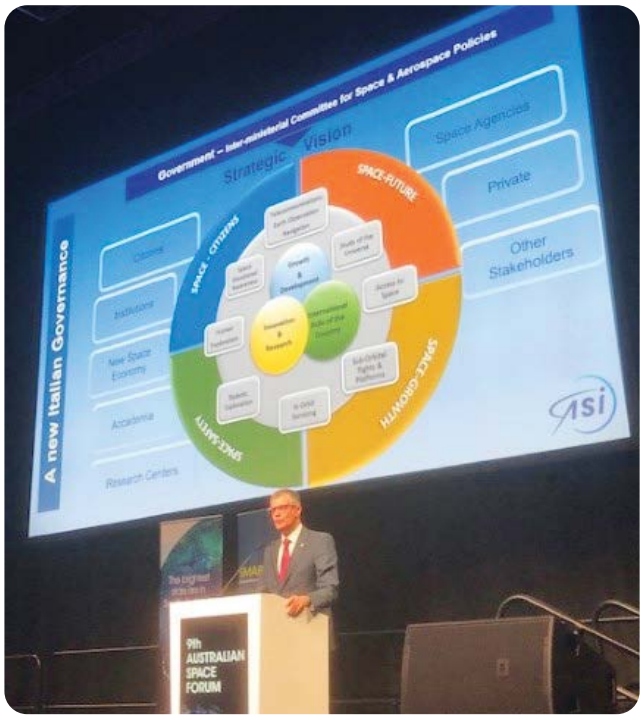
There are research opportunities for organisations such as SmartSat CRC to better understand how constellations of satellites might be employed to increase resilience without driving up cost and complexity and how users might access hybrid delivery models offering tailored services in

varying orbit. There are growing risks to satellite operators from space environment and access to enablers such as spectrum. Research into technologies and techniques to understand and mitigate these risks, e.g. cognitive radios and networks, may lead to new industry opportunities for both government and non-government customers.

Mr. Giorgio Saccoccia, Head of the Italian Space Agency

The Head of the Italian Space Agency, Mr Giorgio Saccoccia was invited to Sydney on 13 February as SmartSat's 5th Distinguished Speaker and also as keynote speaker at the Australian Space Forum.

In his presentation, Mr Saccoccia explained that the Italian Space ecosystem consists of 250 companies, 80% of which are SMEs, with a high percentage of small companies and many Universities and research organisations. He added that space involves not only science and research but is also a value generator for private companies. Space today is an important vector of growth and economic opportunity in Italy.



His strategic vision is that the national space ecosystem will be based on the following three pillars: Growth & Development; Innovation and Research; and the international role of the country. Around these three areas of policy there are the following thematic sectors: Telecommunications, Earth Observation and Navigation; Space Situational Awareness; Human Exploration; Robotic Exploration; In-Orbit Servicing; Sub-Orbital Flights &Platforms; Access to Space; and the Study of the Universe. His societal challenges are Space for Citizens, growth, the future and safety.

The Italian Space Agency also led a delegation of a dozen Italian companies that had the opportunity to participate in many meetings with Australian companies, research centres and universities during their visits to Sydney and Adelaide. Furthermore, the Australian Space Agency and the Italian Space Agency signed a cooperation agreement on space research. Italy also donated 30 kg of free payload that will enable the Australian Space Agency to send scientific research projects to the International Space Station (ISS) with the next Italian mission.

Australian Space Forum

The 9th Australian Space Forum was the largest yet with:

- Over 1100 registrations
- Over 4,500 unique event page views
- Attendance and participation of numerous, high profile national and state government representatives and space leaders.
- 40 exhibitors and 9 event sponsors
- Live streamed sessions that have been viewed over 260 times.

There was a dedicated SmartSat panel 'Leap frogging R&D to help build Australia's Space Industry', facilitated by Dr Christyl Johnson.

Key themes were:

- Building the infrastructure of Australia through international partnerships, such as NASA
- A strategic roadmap to achieve the 2030 Australian Government commitment of 20000 additional jobs and triple the size of the space economy to a $12 billion contribution to GDP.
- Earth observations along with space observations that will have an impact on building the Australian space presence
- The future of high-speed optical comms when conditions are right.

Dr Peter Woodgate, SmartSat Chair, Mr Craig Smith, CEO Electro Optic Systems, Dr Kimberley Clayfield, leader of the CSIRO Space Technology Future Science Platform (Space FSP), Mr Massimo Comparini, CEO E-Geos Telespazio, Professor Andy Koronios, SmartSat CEO and Dr Christyl Johnson at the podium.

Around 100 Students and teachers attended the event giving them the opportunity to learn about current and future careers within the space industry and discuss the pathways and subjects needed to get there. Over 120 conversations occurred between students and space industry partners.

NASA Godard Workshops

Dr Christyl Johnson's visit was an important opportunity to organise several collaboration workshops with NASA Goddard. During these events, expertise and capabilities were shared amongst SmartSat members, as well as future strategies and technological maps for potential international cooperation. These events identified key areas where Australia can lead joint international initiatives, activities and projects with North America and Europe. A particular emphasis was placed on satellite communications and Earth observation with specific applications such as land monitoring and space exploration.

Discussions regarding potential projects that will adapt existing emergency beacon technologies into a form of miniaturised satellite radio, connected into a national incident data management system that will deliver a complete, real-time picture of disaster zones and ensure reliable communication for individuals and communities in danger were also had.

Awards

Adj. Professor Michael Davis AO - Space Industry Association of Australia (SIAA) Lifetime Membership

At the 9th Australian Space Forum, Adjunct Professor Michael Davis AO was awarded the Space Industry Association of Australia (SIAA) Lifetime Membership for long standing and valued service to the SIAA and the broader Australian space industry. In particular, he was recognised for his 20 years as a Board member of the SIAA, highlighted by 5 years as Chair; his stewardship of the SIAA as it transitioned from an association to an Incorporated Company; his Chairmanship of the 68th International Astronautical Congress' Local Organising Committee and his significant contributions, in many roles, across the Australian space community.

He proposed Adelaide as the host city for the International Astronautical Congress which was held in 2017, and chaired the Congress Local Organising Committee for that event. He was a leading advocate for the establishment of the Australian Space Agency, an Australian Government decision announced at the Congress.

He also played a key role in organising several International Space University programs and courses including the Southern Hemisphere Space Studies Program which is held annually in Adelaide.

In 2019 he was honoured with an appointment as an Officer of the Order of Australia for 'distinguished service to the space industry as an advocate, and to science education'. We extend our heartfelt congratulations to Michael who is also a non-Executive Director on the SmartSat CRC Board.

Professor Russell Boyce - American Institute of Aeronautics and Astronautics (AIAA) Class of 2020

Congratulations to Professor Russell Boyce for selection to the American Institute of Aeronautics and Astronautics (AIAA) Class of 2020 Fellows and Honorary Fellows. Honorary Fellow is the highest distinction conferred by AIAA and recognises preeminent individuals who have had long and highly contributory careers in aerospace and who embody the highest possible standards in aeronautics and astronautics. Professor Boyce's bio can be found here.

Dr Paddy Neumann - AIAA 2020 Lawrence Sperry Award

The team at Neumann Space is proud to let you know that our very own Founder and Chief Scientist, Dr Patrick "Paddy" Neumann has been awarded the coveted 2020 Lawrence Sperry Award by the prestigious American Institute of Aeronautics and Astronautics (AIAA). As per the AIAA citation, Dr Neumann is receiving this award "for continued development of miniature electric spacecraft propulsion systems and ceaseless advocacy for the development of Australian space capabilities".

Awarded annually since 1936, the Lawrence Sperry Award is presented for a notable contribution made by a young person, age 35 or under, to the advancement of aeronautics or astronautics. This award honours Lawrence B. Sperry, pioneer aviator and inventor, who died in 1923 in a forced landing while attempting a flight across the English Channel.

The award will be presented to Dr Neumann during the annual AIAA Aerospace Spotlight Awards Gala.

Future Events

71st International Astronautical Congress IAC

Date: 12-16th October 2020
Location: Dubai World Trade Centre UAE

https://iac2020.org/about

10th Space Forum

Date: December 2020

More information in the next newsletter.

Projects

AquaWatch Australia - Australia's solution to the global GEO AquaWatch initiative

The AquaWatch Australia Mission will develop a comprehensive, national monitoring system, combining existing systems and agencies with new Australian satellite capabilities that can provide precise, decision-ready information on the quality of water across Australia's inland waterways, reservoirs, and coastal environments and its variations over time.

We invite Australia's space communities to contribute to this national initiative, that will build on existing water quality monitoring programs by State, Commonwealth government agencies and industry groups. The products and services will complement those already provided by Government and industry.

In the next six years, CSIRO and SmartSat CRC intend to lead a team of national and international agencies, users, industries, space agencies and researchers, to build the next generation of linked satellite and ground measurement data streams, products and services, enabling regular monitoring of the extent (area) and quality (suspended sediments, transparency, algal pigments & blooms, depth, seagrasses) of above-ground freshwater, estuarine and coastal water resources.

We are establishing the partnership in 2020 and are open to collaboration in Australia, both with existing water monitoring and management agencies, as well as providers of satellite and ground services. We have identified the following main steps:

· 2020-2021: Phase 0 – Community and User Consultation, Mission analysis / Phase A – Mission feasibility

· 2021-2026: Design, build and launch of ground and satellite systems and community engagement.

AquaWatch Australia would be a world-first "fresh- to coastal" water quality monitoring mission with a global footprint, that will collaborate and contribute to www.geoaquawatch.org

Metal and Mining Sector Technological needs

Damiano Fratatonio an M.Sc in Management student from Bocconi University, Milan, Italy carried out a ground-breaking report on the metal and mining sector technological needs in the global sector.

The study was performed under an internship program jointly sponsored by SmartSat and the Bocconi University.

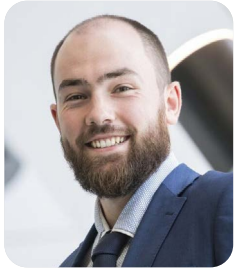
The report states that according to Standard & Poors (2019), metal and mining is ranked (along with oil & gas) as high-risk industry sectors from a social and environmental point of view. The increase of social and financial market concerns about climate change, natural disasters, worker and community rights, together with increasing site remoteness and shifts in customer demand, are pushing mining companies toward a phase of profound change that will force them to compete on the basis of developing key resources able to guarantee the sustainable development of their business, minimising environmental and social impacts, and improving financial returns.

The study further found that the international mining sector is increasingly in need of new technologies that will foster innovation in all phases of mining exploration and operations. Satellites will be crucial for enabling the development and delivery of services to the mining sector involving, among other technologies, the Internet of Things (IoT), Artificial Intelligence (AI), Augmented/Virtual Reality (AR/VR), and Big Data applications.

Damiano's report also focuses on the benefits obtainable by mining companies through collaboration in the development of technologies and services with the space industry. A set of ten satellite-enabled activities that could be currently or foreseeably implemented by mining companies in order to address the identified challenges are suggested. All these activities would involve the employment of Earth Observation, Satellite Communication and GNSS technologies individually or in combination. The report can be found here https://smartsatcrc.com/publications/

From our neighbours

As some of you may be aware, we have neighbours using hot desks from time to time in our SmartSat Head office at Lot Fourteen. We will introduce them to you over the next couple of newsletters.



Dr Joseph O'Leary, Postdoctoral Research Fellow, EOS Space Systems Pty Ltd

Joseph is a member of the Astrodynamics Group and is currently working on high performance mathematical techniques to determine the location of near-Earth objects. Prior to this, Dr O'Leary attended the University of South Australia where he completed his doctorate in solar system applications of general relativity. EOS Space Systems is a world leader in the design and manufacture of sensors and systems for space domain awareness. For more than 35 years, the Australian company has been directing energy beams to near-Earth objects for applications including tracking, object characterisation and optical communications.

"EOS Space Systems is a world leader in the design and manufacture of sensors and systems for space domain awareness."

Hello from our CSIRO office mates!

As many of you are aware, CSIRO is currently about a quarter of the open plan office on level 3 McEwin with the SmartSat CRC. Thus far the largest group of CSIRO staff who have graced the building came for the Space Agency opening recently, and paused from the party to grin for this mugshot.

While most of the staff in the photo are based interstate, I'll draw your attention to a few of us who are based in Adelaide and you may see on a more regular basis. At the far right the unshaven bloke is myself, in the middle in the black and white dress is Sarah Mortellaro, and finally second to the left end in the print dress is Flora Kerblat.

I lead a new effort by CSIRO to build remote sensing satellite instruments for Earth Observation, which is establishing a new research and testing lab in Adelaide. Sarah works on business development and does a lot of work as liaison between CSIRO and the SA government. Flora works in the CSIRO Centre for Earth Observation, which is leading our efforts in satellite monitoring of water quality and bushfire risk.

While the Covid-19 now has the majority of CSIRO staff working from home, we're looking forward to having a growing presence in Lot 14 once things return to normal!

Dr Stephen Gensemer, Senior Research Scientist

From our partners

Reach for the stars: Space Engineering at the University of Sydney - Dr Xiaofeng Wu

With the federal government's investment in an Australian Space Agency, and global efforts for humankind to reach Mars and make a return to the Moon, there has never been a better time for Australian students to aim for the stars.

It was in 2001 that the university launched its undergraduate Space Engineering degree with a focus on Space System Engineering. It was the first of its kind in Australia, aiming at producing graduates who will be the future leaders in aerospace, defence and related high-technology and research industries. With an ATAR cut-off of 99, the program continues to attract the best and brightest students from Australia and internationally. In the past six months, enrolments have increased by more than 100%. Key areas of study include orbital mechanics, satellite communication, satellite design, ground station infrastructure, space avionics and space robotics.

Our students are also enormously engaged in the discipline well beyond the classroom or lab: in 2019, our student rocketry team was announced as the winner in the Spaceport America Cup intercollegiate rocketry competition, having competed in the 10,000 ft commercial off-the-shelf category.

Through our academic team's research, and industrial and government partnerships, the University of Sydney is actively engaged in national and international space activities. We are a member of the international QB50 consortium, and in 2017, our i-INSPIRE 2 CubeSat was launched to the International Space Station and successfully deployed in orbit.

In the same year, a consortium of researchers from the University of Sydney, the University of New South Wales and Macquarie University secured $4.6 million in funding from the Australian Research Council to build a training centre for CubeSats, UAVs and their applications.

The following year an international collaborative CubeSat project between the University of Sydney and York University was funded by the Canadian Space Agency to observe snow and ice coverage of the Earth.

The University of Sydney is also core member for the SmartSat CRC, where our team of researchers are providing expertise in high speed satellite communication, satellite systems and artificial intelligence.

In our recent SmartSat CRC project, we aim to develop advanced software defined radio based next generation high-speed satellite communication systems, in collaboration with UNSW and Macquarie University, as well as our industry partners; Airbus, Goonhilly, Optus and Thales.

The University of Sydney Rocketry Team's competition rocket Silvereye soared to a maximum altitude of 10,027 feet and placed first in its division at the Spaceport America Cup held annually in New Mexico. Photo by Allen Chan.

Deakin / Airbus

Deakin signs key step with Airbus to lift-off collaboration. Two of SmartSat CRC's Core Partners, Deakin University and Airbus, have signed a Memorandum of Understanding (MoU), paving the way for future research collaborations. Projects will include investigations in areas such as robotics, materials, motion simulators, artificial intelligence and batteries.

Pro Vice-Chancellor for Defence Technologies Professor Saeid Nahavandi said the agreement was a key step towards the two organisations working together on mutually beneficial science and technology projects. This is a very exciting time for Deakin University to be fully engaged with Airbus, one of the world's leading aerospace companies.

The media release can be found here.

Seated LtoR: Prof Iain Martin, Vice Chancellor Deakin Uni, Andrew Mathewson – Managing Director Australia Pacific, Head of Country Aus & NZ Airbus Australia Pacific. **Rear LtoR:** Graeme Breen – Vice President Strategic Relations, Airbus Australia Pacific. Peter Harris - Vice President Strategy, Sales & Marketing Airbus Australia Pacific. Alfred Deakin Professor Julie Owens, Deputy Vice-Chancellor, Research, Alfred Deakin Professor Saeid Nahavandi Pro Vice-Chancellor Defence, Deakin University

Sintelix "Researcher's Friend" - empowering your SmartSat research

Sintelix proudly announces a strategic partnership with SmartSat CRC, launching Sintelix's "Researcher's Friend", a Text and Open Source Analytics solution, developed to empower space industry research.

SmartSat CRC members will enjoy FREE access to the "Researcher's Friend" platform.

Sintelix "Researcher's Friend" can:

- Harvest vast bodies of work from the web on research topics
- Alert users of new information on research topics as these are released
- Find patterns in research documentation
- Investigate publications, influencers and influences
- Support assessment of research of new hires
- Understand patterns in human observations
- Perform research smarter and faster with improved targeting, rapidly build intelligence

"It is a delight for our local South Australian company to develop and offer SmartSat CRC tools that will accelerate and enhance the research process to further Australian and International Space innovation" announces **Dr Daniel McMichael,** CEO Sintelix**.**

Sintelix is a world-leading supplier of analytical software for unstructured data including Open Source Intelligence gathering.

The company is headquartered in Adelaide, Australia and supplies software to the Australian, US, UK, Paraguay and Finnish Governments.

Sintelix services the Law Enforcement and Intelligence communities with growing markets in anti-corruption and white-collar crime investigations, drug use in sports and education/research.

To register your interest, click here or contact Michael Puckridge at michaelp@sintelix.com or

+61 (0) 450 884 993

Nova Systems launch the new Nova IGS Network

In South Australia, the company's new Nova IGS Network is providing space ground connectivity for smallsat operators, with the site now being used by international clients including Tyvak USA and RBC USA. Nova is also in talks with an Italian-based space company wanting to expand its presence in Australia. Based on a 21 hectare site in Peterborough in South Australia's mid-north, the site is used to track LEO satellites through customer's own terminals and Nova has plans to attract further European companies over upcoming years. The company is also planning to use the site as a ground station test bed for emerging Space 2.0 technologies and to support future defence projects. Peterborough provides the vital ground segment element in order to allow satellite operators to downlink/download their data.

Nova was recently awarded one of four industry leads in the Major Service Provider consortium providing integrated support contracts to the Australia Defence Force over the next 10 years.

The company has taken early steps globally to adopt new practices around COVID-19 in relation to infection control and is proactively undertaking business modelling to assess its potential financial impact. Read the full article here.

DLR FIREBIRD and LTU

The German Aerospace Center (DLR) Institute for Optical Sensor Systems (DLR-OS) and La Trobe University (LTU) Engineering Department have been cooperating for 6 years on utilising the DLR FIREBIRD constellation of research satellites for the detection and monitoring of bushfires in the Australasian region.

In February 2020 a three day workshop took place in Melbourne between the DLR-OS and LTU Engineering that involved the preliminary design of a constellation of significantly smaller satellite bus systems, in comparison to the existing FIREBIRD TET-1 and BIROS satellites, for providing near real time imagery of bushfires. This included both ground and space segments communications operations.

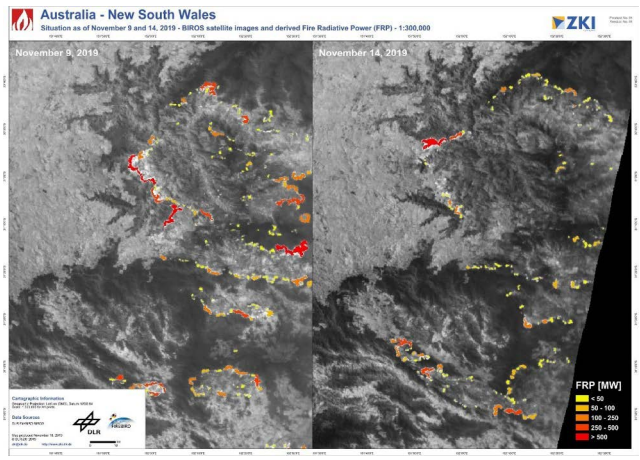
Dr Peter Moar from LTU Department of Engineering has worked with the DLR-OS for 15 years on their FIREBIRD microsatellite missions. RMIT University has also been involved in this ongoing partnership through Prof. Simon Jones and Associate Professor Karin Reinke from the Department of Geospatial Science.

LTU Engineering recently provided mission critical capability towards the DLR DESIS hyperspectral instrument for the ISS. The DESIS mission was a space 2.0 commercial and research Public Private Partnership between the DLR and Teledyne Brown Engineering in the US. More information can be found here.

FIREBIRD is an earth observation mission with the primary goal of monitoring fires from space. It involves the detection and measurement of so-called high-temperature events and the provision of remote sensing science data for research at DLR and for external partners.

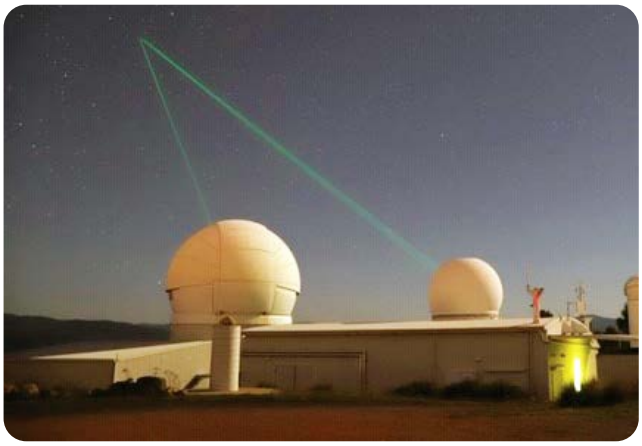
Video: Meeting DESIS, Hyperspectral Imager on the International Space Station's MUSES

Image courtesy DLR - fires in NSW during the current fire season



Aussies helping to solve the global space traffic management problem

EOS Mt Stromlo, ACT Tracking Site, 2 Dome Lasin



EOS Learmonth WA tracking site

Keeping operational satellites free from collision and interference hazards is a major global challenge. Currently each country is free to develop their own strategy and tracking system to monitor active and inactive space objects.

Australia has a real opportunity to become a world leader in space environment management and be the first to market with a much-needed, comprehensive space traffic management (STM) system.

Australia's geographic location in the Southern Hemisphere and strategic longitudes as well as large land mass allowing a distributed network are ideal for space situational awareness (SSA), plus many of the components that are integral to a STM system already exist, developed by Canberra-based, Australian company, Electro Optic Systems (EOS).

SSA has been part of EOS' DNA for over 35 years. They provide space debris and satellite management solutions with design, manufacture and installation of specialised observatories for optical and laser tracking.

Their tracking and characterisation of space objects is unsurpassed. EOS can determine a space object's position with an absolute accuracy selectable from a few millimetres to 1m, depending on application. No other operational space technology offers this accuracy. Their laser trackers have been externally validated for tracking objects as small as 6mm in size at a 350km range, 5cm at a 1,000km range, and 30cm at a 35,000km range. This level of sensitivity addresses over 90% of all collision risk to operational spacecraft and provides reliable and actionable information about collision risk.

EOS sensors can readily track all orbit heights and regimes from LEO through to GEO and beyond, something very few companies are able to do. The company is also currently fielding a new type of laser system that can deliver enough laser power to move certain types of space debris to new orbits to avoid collisions. The system will not damage or fragment the debris, it will apply harmless radiation pressure to move the debris over many seconds of engagement.

The EOS sensor network is in operation now, tested and validated to international standards and ready to support Australia's contribution to solving the global space traffic management problem.

Australia has a real opportunity to become a world leader in space environment management and be the first to market with a much-needed, comprehensive space traffic management (STM) system.

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