

# AUSTRALIAN TECHNOLOGY NETWORK OF UNIVERSITIES



## University of South Australia

The University of South Australia (UniSA) is Australia's University of Enterprise; engaged with the world and responsive to its needs. With more than 33,000 students, the university is South Australia's largest.

Since its foundation in 1991, UniSA has earned a reputation for innovation, adaptability and smart planning. Our ethos has always been to make a difference in the wider world by contributing to local, national and global communities through our research and innovation and through the education of quality graduates ready to make their mark.





# Pandemic drone

## Monitoring the health of the crowd from a bird's eye view

- **Cutting-edge imaging and sensor technology finds new applications for non-invasive public health monitoring**
- **University-industry collaboration provides practical solutions for living safely post-pandemic**
- **Local health impacts and global export potential**

A pandemic drone to remotely monitor and detect people with infectious respiratory conditions is being developed by the University of South Australia (UniSA) in partnership with award-winning Canadian drone technology company, Draganfly Inc. The drone will be fitted with a specialised sensor and computer vision system that can monitor fever, heart and respiratory rates, as well as detect people sneezing and coughing in crowds, work places, airports, cruise ships, aged care homes and other places where groups of people may work or congregate.

The UniSA team led by Defence Chair of Sensor Systems, Professor Javaan Chahl, achieved global recognition in 2017 when it demonstrated image processing algorithms that could extract a human's heart rate from drone footage. The research team has since proved that heart and breathing rates can be measured with high accuracy within 5-10 metres of people using drones, and at distances of up to 50 metres with fixed cameras.

The technology was originally envisaged for use in war zones and natural disasters as well as remotely monitoring heart rates of premature babies in incubators. Having successfully developed algorithms that can interpret human actions such as coughing and sneezing, they technology is proving a viable screening tool for infection monitoring and control during the COVID-19 pandemic.

Common privacy and security concerns about mass surveillance have been addressed up front. While the technology takes biometric readings, it does not use facial recognition. Other leading industry partners are involved to ensure that cyber and data security measures are robust in a global setting.



# Future Industries Institute

## Tackling industry challenges through collaboration

- **Deep university-industry collaboration delivers breakthrough technologies to solve diverse challenges for recycling, manufacturing and mining sector partners**
- **Leveraging industry-centric research to build sovereign capabilities that strengthen the local manufacturing sector**
- **Nimble researchers adapt cutting-edge coating technologies to address pandemic priorities**

As the nation prepares for a post-pandemic economy, UniSA's Future Industries Institute (FII) is leveraging its deep industry connections to build a sustainable local manufacturing sector to help stimulate employment and economic growth. At the same time, it is harnessing its partnerships to tackle global problems and reduce reliance on international supply chains.

FII has a multifaceted research relationship with the Detmold Group, a leading manufacturer of sustainable packaging products which employs 3000 staff across 17 countries. The FII and Detmold collaborated to tackle the global waste scourge of disposable coffee cups, with 16 billion thrown away each year. Detmold sought an alternative to plastic lined disposable cups, which cannot be recycled. FII's thin film coating experts have analysed next-generation linings that can be readily removed, so that established recycling processes can be maintained. Applications across other Detmold products are now being explored with support from FII's Future Industries Accelerator program, which consisted of a \$7.5 million investment from the South Australian Government to support SA based companies.

Another highly valued FII industry partner is LaserBond. Together with Boart Longyear, the partners have just wrapped up a project aimed at tackling the \$30 billion problem of wear and tear on drilling components in the mining industry. Using FII's unique tribology capabilities, combined with actual drilling trials, they have rapidly

developed new protective coatings that extend the life of drilling and cutting components for use in the mining and agricultural sectors. Parts are currently undergoing long-term testing in the tough Pilbara region.

LaserBond is also collaborating with FII on the development of an economical process for applying copper coatings on frequently touched surfaces such as door handles and handrails. Copper is well known for its anti-viral and anti-microbial properties and research has shown that coronaviruses live for approximately 4 hours on copper, compared to 72 hours on stainless steel and plastic surfaces. However, wire arc spraying of copper or copper alloys is significantly cheaper, overcoming the cost barrier of bulk copper parts.

The pandemic has placed a spotlight on Australia's reliance upon global supply chains and equally highlights opportunities to leverage industry-focused research to build a more resilient future.



# FireFlight

## Commercialisation support enables local fire mapping technology to reach the world

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- **Game-changing fire-mapping system provides fire intelligence in real time**
  - **Business incubator program accelerates an entrepreneur's path to market**
  - **Advancing local fire management and global export potential**
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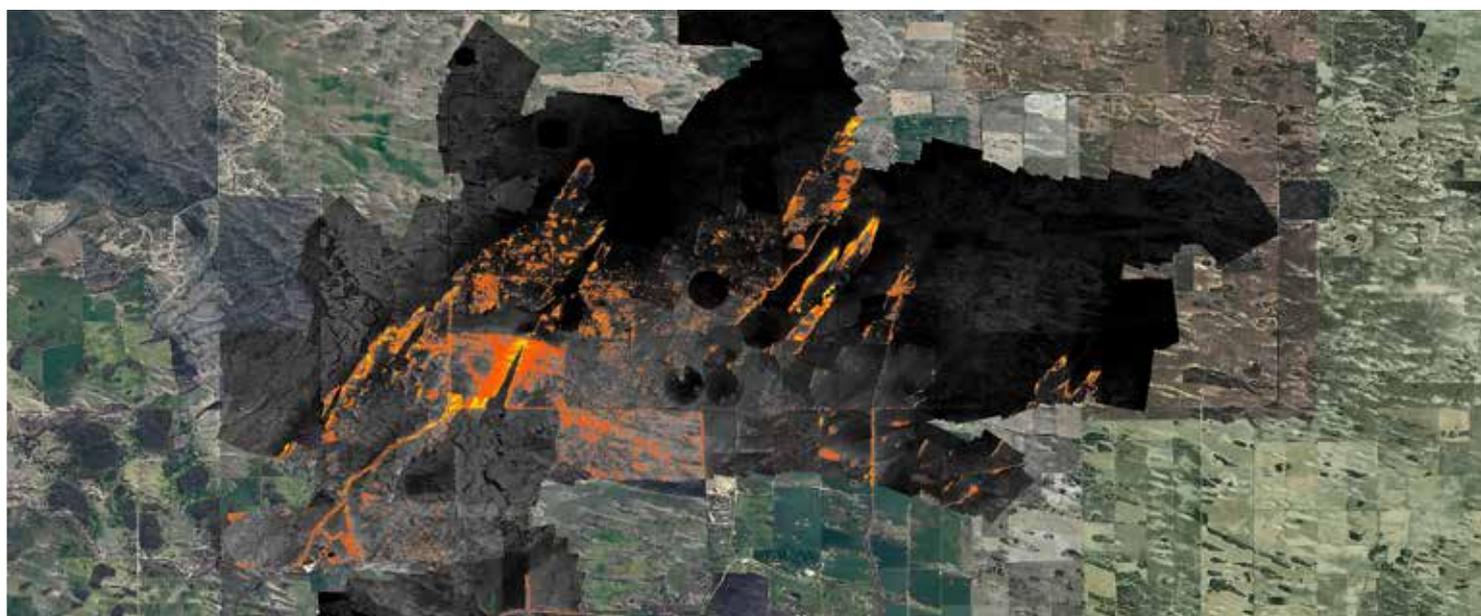
FireFlight is an airborne fire mapping system that provides real-time fire maps, and post-fire hotspot maps to fire managers, fire agencies and other relevant stakeholders. In January 2020 FireFlight mapping was used during the Kangaroo Island fires to help the relief and recovery teams from the Australian army and other fire agencies to plan and execute their operations.

FireFlight's aerial mapping system was deployed in a single-engine Piper aircraft flown over the fires at 3000m. Using specialist thermal imaging cameras, high-precision GPS and advanced data processing software, FireFlight's fire mapping system provided real-time maps of wildfires as well as details of post-fire hotspots, underpinning a strategic and efficient plan to fight the fires and aid recovery.

Founder and CEO of FireFlight, Dr Paul Dare, himself a volunteer firefighter, pilot and aerial imaging specialist, began developing the fire mapping technology 15 years ago. He credits the Venture Catalyst Space program at UniSA's Innovation & Collaboration Centre (ICC) with enabling him to commercialise it.

The tailored six-month incubator program gave FireFlight access to funding, training and workshops, one-on-one mentorship, a modern co-working space and cutting-edge world class technical resources and tools. FireFlight's collaboration with the ICC is a prime example of the role universities play in rapidly accelerating exceptional ideas or projects onto the world stage to solve complex global problems.

The FireFlight system is now achieving its global potential. The systems are shipped from Australia and operated by local pilots in fire danger regions worldwide. Cheap to deploy, it is provided to end users as a service, leaving these emergency responders to focus on fighting fires, while FireFlight operators provide real-time fire intelligence. This is more cost effective than the traditional use of large aircraft assets and world demand is growing in line with increasingly intense wildfires across the globe.



# Mental health and suicide prevention

## Research-led transformations to practice and policy

- **Deep expertise delivers holistic advances to treating and mitigating mental ill-health across the social spectrum**
- **Mental health research translates to policy reforms for real-world impacts**
- **Future mental health workforce equipped with evidence-based skills and knowledge**

In Australia, mental ill-health and suicide exact an immeasurable human toll, diminishing the happiness and potential of individuals, their families and communities, while at a macro level undermining the nation's prosperity, equating to a cost of \$500 million per day.

It is an evolving challenge that crosses all demographics and is amplified by rapid changes in technology, social conventions, family structures and workplaces.

UniSA's Mental Health and Suicide Prevention Research Group (MHSPRG), led by nursing academic Professor Nicholas Procter, has for decades undertaken research inspired by the real experiences of people living with mental distress, the needs of their carers, and health professionals.

Committed to finding new ways to support recovery with dignity, their findings and insights are shared through publications, clinical practice and input to public policy at a state and national level. They also teach undergraduate and postgraduate programs, equipping students and health professionals with the latest evidence-based skills and knowledge.

Recent examples demonstrate the powerful impact of this approach and build on long-standing partnerships with people with a lived experience of mental health challenges, government and non-government agencies, including SA Health and the Office of the Chief Psychiatrist. In 2017 Professor Procter was a Chief Investigator in the highly publicised Chief Psychiatrist's review of the Oakden Older Person's Mental Health Facility. 'The Oakden Report' found widespread clinical and governance failures, resulted in referrals to health authorities and police and laid the foundation for the Royal Commission into Aged Care Quality and Safety, which is currently underway.

The MHSPRG also has a long-standing program of work in the area of mental health and suicide prevention across a broad social spectrum, including emergency responders, asylum seekers, trauma survivors and in correctional settings. This has contributed to significant changes in suicide prevention education and government policy development. This includes evaluation of the suicide prevention networks introduced under the South Australian Suicide Prevention Plan 2017-21, and public guidelines for responsible reporting of suicide in the media and its portrayal on screens.

