Australian Government
Australian Research Council

INDUSTRY TRANSFORMATION RESEARCH HUB

Resilient and Intelligent Infrastructure Systems

in urban resources and energy sectors

TOUCHING THE SURFACE

RIIS

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Funding

We are proud to announce UNSW Sydney in collaboration with University of Melbourne, Queensland University of Technology, and Western Sydney University, have secured funding from the Australian Research Council (ARC) Industrial Transformation Research Program for 2021.

The funding is for 5 years and includes:

- $4.98m from the ARC
- $5.7m from 17 Industry Partners
- $1.3m from 4 University Partners

Additional partnership opportunities in R&D are available to expand and invest in our exciting collective research investigation program within the Hub.

To discuss your participation interest please contact our Hub Director:
Scientia Professor Nasser Khalili
n.khalili@unsw.edu.au

Industry Partners

Lindenbaum Pty Ltd

Hawk Measurement Systems

Kumul Petroleum Holdings Limited

Azure Mining Technology Pty Ltd

AAM Pty Ltd

Spatial Vision Innovations Pty Ltd

South East Water Corporation

Linke & Linke Surveys Pty Ltd

Crypses Pty Ltd

Asset Institute Limited

Mincka Engineering Pty Ltd

Roobuck Pty Ltd

Rockfield Technologies Australia Pty Ltd

Ports Australia Pty Ltd

Emerson Automation Solutions

Sycamore Civil Group Pty Ltd

FrontierSI

Geoscape Australia

Hyqualty Construction Pty Ltd

University Partners

Scientia Professor
Nasser Khalili

Professor Abbas Rajabifard
Deputy Director

RIIS aims to deliver transformational technologies to address Australia's critical infrastructure needs, through a consortium of enterprises including federal and state government agencies, industry, and leading academics from four of Australia's top universities.

Led by RIIS Hub Director Scientia Professor Nasser Khalili, (Deputy Head of the UNSW School of Civil & Environmental Engineering) and RIIS Hub Deputy Director Professor Abbas Rajabifard, (Director of University of Melbourne's Centre for Spatial Data Infrastructures and Land Administration - CSDILA) The Hub draws strength from world class engineering research expertise at UNSW Sydney, University of Melbourne, Queensland University of Technology, and Western Sydney University, as well as a wide range of experienced industry partners.

RIIS provides industry partners with opportunities to work closely leading scientists from partner research institutions to solve the current infrastructure asset challenges and life-management

The benefits of our research include improved local productivity, global competitiveness,increased urban liveability, resilience and safety of infrastructure, technological leadership, and export potential.

UNSW SYDNEY

THE UNIVERSITY OF MELBOURNE

QUT Queensland University of Technology

WESTERN SYDNEY UNIVERSITY

Vision

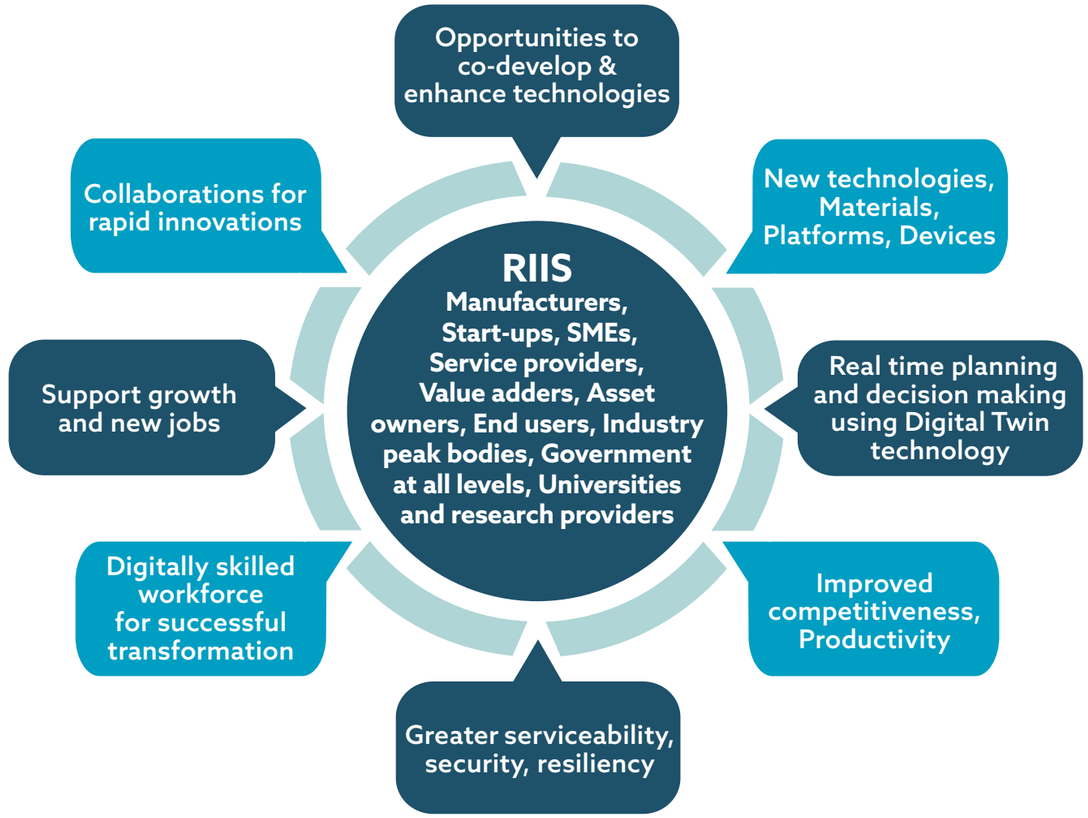
“Towards productive, connected, sustainable and smart infrastructure”

RIIS is an industry and ARC funded research and innovation hub for smart infrastructure. It engages with industry, government, and the community to develop and implement science-based policy and integrated practical solutions to the current and future challenges facing Australia’s urban resources and energy infrastructure.

Aim

RIIS will deliver transformational technologies to address Australia's critical infrastructure needs. It will integrate advances in sensor technology, connectivity, data analytics, machine learning, robotics, smart materials, and reliable models to deliver resilient and adaptive infrastructure systems in urban, energy and resource sectors - sectors critical to Australia's prosperity and well-being.

The Hub will provide opportunities for industry and university partners to develop, co-design, develop, and enhance technologies suitable for safe and sustainable operations, further enhancing the resilience and intelligent capability of existing and new infrastructure, transportation networks, distribution systems, minerals and energy sectors, and other hard infrastructure.

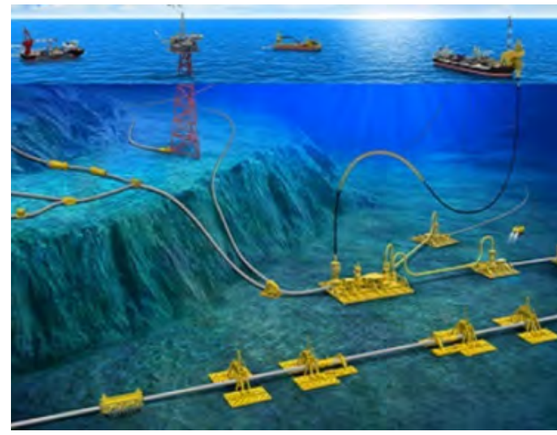


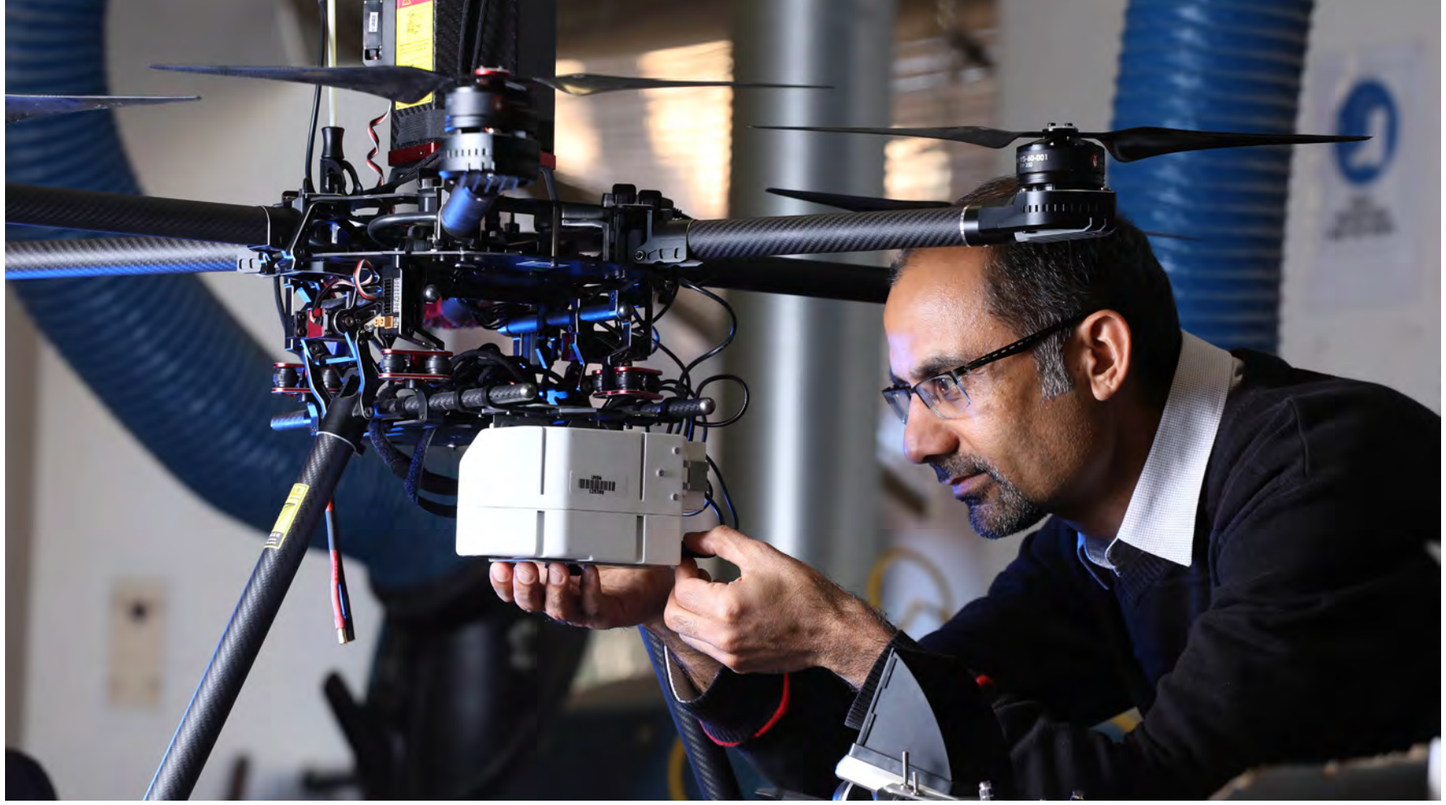
With demand for new infrastructure in all sectors for our growing population, combined with impacts of climate change and aging infrastructure, there is an increasing need for new technologies to predict infrastructure rehabilitation and renewal needs, pre-empt failure and prolong life as well as new systems to deliver sustainable, resilient, and cost-effective infrastructure.

RIIS will leverage a suite of innovative and integrated technologies to monitor, model and improve our urban infrastructure, transport, water, resource, and energy management in order to achieve economic, sustainable and low-carbon development.

Context

Critical surface and subsurface infrastructure and physical assets such as buildings, roads, bridges, rail lines, tunnels, utilities, processing plants, refineries as well as resource industries form the backbone of Australia's productivity. Yet, according to the Australian Infrastructure Audit (2015) most infrastructure used in 2030 will be in a substandard state of repair, well below par with other OECD nations.





Research and Innovation Themes

The RIIS has the potential to transform advanced manufacturing, service and infrastructure engineering in Australia focussing on five main themes:

THEME 1 Sensing, intelligent and adaptive systems

- Robust, low energy sensors and actuators
- Ubiquitous positioning, sensing & communications
- Internet of Things (IoT) & sensing platforms
- Signal processing, network and sensing optimization

THEME 2 Data collection, security and integration

- Robotics, satellite, UAV, autonomous systems for data collection
- Big data management storage & transmission
- Data security, robustness and reliability

THEME 3 Modelling, simulations and prognostics

- Predictive modelling simulation & performance assessment
- Physics-informed artificial intelligence machine learning & explanation
- Real-time analytics – adaptive decisions

THEME 4 Infrastructure health monitoring and predictive maintenance

- Degradation quantification & failure prediction
- Risk & safety
- Service life assessment
- Remedial & renewal technologies

THEME 5 Spatial data, Digital Twins and decision support

- Integration & structuring of data & prognosis
- Digital twins & decision support
- Visualisation, virtual reality & interactive guidance systems
- Adaptive, intelligent & resilient design

Deliverables

RIIS will engage with industry, government, and the community to unlock scientific roadblocks, deliver foundational skills for industry professionals and researchers, and translate research and development into real-world commercial opportunities.

Deliver the next generation of sustainable technologies for design, real-time performance analysis and life-management of Australia's critical infrastructure in urban, energy and resources sectors.

Solve current industry challenges and translate research and development into commercial opportunities.

Design novel and powerful health-monitoring technologies including non-destructive, non-contact dynamic diagnostic systems for asset protection

Enable creating a collaborative environment for government, industry, and academia to testbed the innovative ideas and support the government for a data-driven and evidence-based decisions and strategies

Develop Australia's next generation of fully validated robust, commercially viable, digital technologies for design and delivery of the nation's hard infrastructure to achieve competitiveness in domestic and export markets.

Leverage technologies in IoT and robotics, autonomous systems, big data, and high-level computing to build fit-for-purpose mobility platforms to cope with tasks in structured and unstructured environments, particularly assets located in remote regions

Train a cohort of highly competent and motivated young professionals through research and development programs carried out in partnership with participants from all sectors of the infrastructure industry

Assist in creating a cohesive innovative technical skills supply chain to address the future technological requirements of the industry, with improved planning, decision making and safe operations and resiliency

Disseminate discoveries and advances in technology and facilitate adoption through effective engagement with the engineering partner organisations, peak bodies, businesses, stakeholders and broader engineering and scientific communities.

For further information or opportunities to join this research hub
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