



A Robotics Roadmap for Australia 2018

VISION

Robots as a tool to unlock human potential, modernise the economy, and build national health, well-being and sustainability

Robotics in Australia will maintain our living standards, help protect the environment, provide services to remote communities, reduce healthcare costs, provide safer more fulfilling jobs, prepare the next generation for the future, encourage investment and reshore jobs back to Australia.

Australia's first Robotics Roadmap is a guide to how Australia can harness the benefits of a new robot economy. Building on Australia's strengths in robot talent and technologies in niche application areas, the roadmap acts a guide to how Australia can support a vibrant robotics industry that supports automation across all sectors of the Australian economy.

1

We must develop new high-tech firms and a vibrant robotics industry in Australia if we are to maintain our standard of living

2

We can prepare the next generation for the jobs of the future by providing education and upskilling opportunities to equip all Australians with Industry 4.0 relevant skills

3

We have the opportunity to become a testbed for robotics technology by leading the world in ethical, legal and standards frameworks

4

We can build national capability in robotics by forming research and technology clusters to develop existing talents and encourage new talent, technology and businesses

5

We must develop an entrepreneurial culture to set moon shot goals and challenges and encourage VC investment in the robotics industry

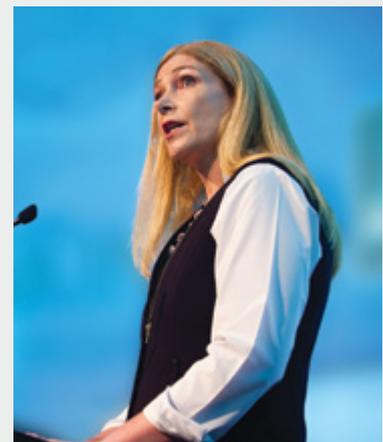


Robotic technologies are at the heart of the fourth industrial revolution (Industry 4.0) where the physical and digital worlds converge. They are also key to Australia attaining productivity growth of 2.5% a year, the level we need to maintain our living standards.

The Australian Centre for Robotic Vision has partnered with industry, researchers and government agencies across the country to develop a roadmap which describes where we are, where we want to be and the options for getting there.

Australia has a unique opportunity to take advantage of our human talents and unique environment to transition to a robot-ready economy while retraining and upskilling its workforce. This requires the collaborative, multi-sector approach outlined in this summary of A Robotics Roadmap for Australia.

This roadmap shows a pathway to the future we envision for Australia. A future where: Robots do the dull, dirty and dangerous tasks not suited to human beings; Robots solve many of the world's most pressing challenges such as war, famine, natural disasters and environmental damage; Robots help humans unlock potential and explore the furthest reaches of our universe. This is a future where a prosperous Australia embraces a robot economy and builds national health, well-being and sustainability despite the challenges of our vast and remote geography.



Dr Sue Keay
Roadmap Chair

Underpinning A Robotics Roadmap for Australia are five key principles



Jobs matter

A robotics industry will enhance economic competitiveness to create meaningful jobs and, with the right policy settings, help adapt existing ones



Time matters

The right use of robotics eliminates workplace routine, improves efficiency and allows workers to dedicate time to interesting and more fulfilling tasks



Safety is imperative

Robotics reduces the risk of workers being placed in hazardous situations



Remote communities need to be served

Automation helps provide better and more consistent services to remote areas difficult to serve



Certainty counts

Investment decisions need clarity of understanding. The roadmap offers the means to find that clarity as well as demonstrating the current and likely future state of robotics in Australia

RECOMMENDATIONS



Industry

Ensure Australia's ongoing prosperity by stimulating formation of new hi-tech firms, encouraging global tech giants to invest in Australia, and reskilling Australian workers

Encourage formation of new hi-tech firms

The venture capital sector is essential to technology investment but is small by international standards

Encourage investment by large multinationals

Quality graduates and researchers need stable employment to stay onshore

Develop skills in firms

Small- to medium-sized enterprises need help to build their capabilities to take advantage of robotics



Education

Equip all Australians with Industry 4.0 relevant skills

Build national capacity

More focus on education and better gender balance will build a skilled workforce

Develop micro-credentials and vocational education in robotics

Addition of micro-credentials to university programs offers Australia a chance to leapfrog other nations



Government

Lead the region in catalysing robotics activity by setting ethical, legal, regulatory and standards frameworks, adopting robotics in government services

Develop ethical, legal and regulatory frameworks

Clear rules will build trust and create certainty for industry

Create support infrastructure for robots

New network technologies and adequate bandwidth are essential to encourage robot use

Collect information on robotics and robotics-related companies in Australia

Robotic activity is subsumed by the industries they serve but a full picture will guide national policy

Develop policies to upskill and retrain and support skilled migration

Building Australia's talent base helps build our capacity

Establish robotics test beds

Our land mass and low population density makes us the ideal location to trial technologies

Develop appropriate standards

More and more robots will work in public, unconstrained environments so safety is essential



R&D

Develop clusters of robotics activity, encourage VC investment, develop pathways to commercialisation and encourage application of the social sciences

Form robotics technology clusters

Hothouses for new ideas can bring together researchers, technologists and investors

Develop appropriate funding framework for robotics technologies

Funding needs to be more accessible for new and existing firms to embrace robotics

Develop robotics-related industry knowledge priorities

Prioritise R&D funding to make best use of existing strengths and avoid duplication

Encourage inter-disciplinary research and develop social licence for robotics

Technology and social science collaboration will create robots that will be accepted and adopted



Culture

Support an entrepreneurial culture around Australia's niche robotics capability and harness the nation's imagination through aspirational goals solving Australian challenges

Develop national robotics strategy

Collaboration will help develop standards and to co-ordinate activity

Improve awareness of benefits of robotics

Encourage narratives which show the success stories of robotics - safety, efficiency, reshoring

Develop research priorities and challenges

The staging of technology challenges will spark creativity and imagination and solve real problems

THE FUTURE NEEDS



Resources

Better safety, higher productivity, more economical remote and small-scale extraction



Manufacturing

Augmenting human workforce, reducing safety risks and boosting productivity



Healthcare

Better services to remote communities, reduced hazard from lifting and better performance of repetitive tasks



Distribution services

Lower transportation costs to benefit suppliers and consumers

Social services

Better surveillance for law enforcement and support for teachers, doctors and nurses

Producer services

Concierge and advisory services to support banks, restaurants and retailers

Personal services

More help with household chores

Utilities

Unmanned operations to maintain and oversee community infrastructure

Construction

Reduce injury rates and improve efficiency by undertaking repetitive tasks



Defence

Multiply the effect of Australia's human defence force



Infrastructure

Maintain reliability of community services



Agriculture

Supplement workforce, optimising yields and building sustainability

Environment

Vision-enabled robots can collect data for exploration, protection and remediation

Space

Launch our own satellites to collect data. Lead the world in remote resource extraction

Robotics in Australia

Australia was the first country in the world to automate its ports.



Australian companies are using robots in manufacturing to reshore jobs back to Australia.



Australian minesites already deploy self-driving haulage vehicles that transport tonnes of material each day.



Australian scientists are developing flying and underwater robots to protect the Great Barrier Reef

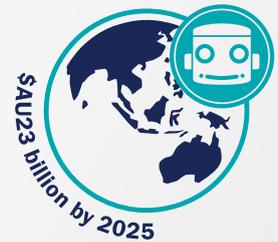
Australia won the Amazon Robotics Challenge in 2017, demonstrating our strength in robotic vision applied to logistics.



Australian group CanberraUAV are major contributors to the ArduPilot autopilot system used in UAVs all over the world.

The Opportunity:

\$AU23 billion global market for robotics and autonomous systems by 2025.



The Australian robotics industry is diverse, with more than 1,100 companies. We conservatively estimate that these companies benefit the Australian economy by employing almost 50,000 people and generating revenue of \$12 billion.



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