

ABB

### THREE YEAR REPORT

## **REPORT CARD**

6



#### ARM (Advanced Robotics for Manufacturing) Hub

## hub

/hʌb/ **noun** 

1. the effective centre of an activity, region, or network.

## The ARM Hub mission is to build Australia's sovereign manufacturing capability.

We are an independent, not-for-profit that walks side-by-side with businesses on their digital transformation journeys.

Our model is unique; we offer in-house technical services to create new products and technology solutions. We have a tightly woven global network of research institutions, facilities and commercial companies. Our partners are some of the world's leading universities, offering our Members and clients access to expert knowledge on artificial intelligence, automation, robotics, and design-led manufacturing.

#### HOW WE HAVE HELPED INDUSTRY APPLY DIGITAL TECHNOLOGY



\$54M IN SECURED FUNDS

Backing industry to undertake projects that will grow and scale their business



Site visits and Industry 4.0 needs assessments conducted



\$200M

Funds delivered through manufacturing partnership programs including MMI collaborations

5500

People engaged

in-person and online events



\$173M

Submissions made for investment in projects and industry development



68 BUSINESSES

Participating in or pursuing projects with ARM Hub



New products by ARM Hub Members



STEM and design interns and graduates from TAFE and university



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#### **SECTION 1**

## TRANSFORMING INDUSTRY

VALIANT SPACE

#### ARM Hub was established to accelerate the creation and uptake of advanced manufacturing technologies.

In 2020, we set a four-year goal to raise \$47 million through commercial investment and grant funding to drive digital transformation in Australian technology and manufacturing.

As we celebrate our third year of operations, we've already surpassed our target by \$7 million.

In April 2023, we had generated \$54 million through projects and industry-led research and development, attracting public and private investment to make Australian businesses more skilled, more competitive, and secure.

Our 10-year vision is to have Australia's strength as an international centre for robotics, artificial intelligence, and design-led manufacturing shape a thriving and globally celebrated national manufacturing revival.

To achieve this, we are focused on helping businesses to innovate, prove-out, and commercialise in Australia's priority industries.

#### **INDUSTRY IMPACT**

#### Digital acceleration of technology and manufacturing in Australia

#### **RESEARCH AND DESIGN**

Innovation needs research and development.

ARM Hub has a network of world-leading researchers, academics, and commercial experts to bring high-potential concepts to life. Our university partners are QUT, the University of Queensland, Griffith University, University of the Sunshine Coast, University of Southern Queensland, and Central Queensland University. We also have strategic university partnerships in other Australian states and internationally.

#### **PROJECT DELIVERY**

We are unique.

ARM Hub has an in-house technical team of roboticists and designers as well as a commercial project management team that deliver projects on time and in budget. Our team augments researchers in the delivery of commercial project outcomes.

Four new products have been launched since 2020; Voltin officially deployed their AutoBAT, UAP launched spin-out business FARM, Verton scaled up their R-Series and launched WindMaster, and Valiant developed an in-space chemical thruster for satellites.



#### FUNDING

ARM Hub has shaped and supported numerous largescale funding bids that will bring step-change to industrv.

> We instigated, and now partner in, the \$16 million Australian Research Council's Australian Cobotics Centre, which is located at the ARM Hub. The Centre has additional nodes across Queensland, Victoria and New South Wales.

#### **NETWORKING**, PARTNERSHIPS, AND COLLABORATION

The triple helix partnership model remains the trusted foundation for growing a market; it is joining up industry, universities, and government around shared goals.

In 2019, the Oueensland Government provided funding to establish ARM Hub in concert with QUT, UAP, CSIRO and the IMCRC. This collaboration has rapidly grown and strengthened over the past three years to meet industry demand. with ongoing support from the Queensland and Australian governments, universities, and industry.

#### **SECTION 2**

## WORKING WITH AUSTRALIAN BUSINESS

#### Advanced manufacturing and robotics are rapidly growing fields in Australia.

Given Australia's small population size and remote location, we will never be as strong across a wide array of advanced industries as nations such as Germany and Japan. However, we can command our global share.

Our national focus must be on resuming our position in this landscape (we have lost ground since 1995) as it means a stronger economy, fewer supply chain vulnerabilities, and a more robust and sophisticated industrial base. By leveraging existing strengths in robotics and automation, and existing industry innovation hubs, Australia can create the critical mass of activity essential to asserting itself as advanced industrial nation.

Associate Professor Cori Stewart Founder and CEO. ARM Hub

#### **MESSAGE FROM THE CEO**

Australian industry is undergoing a revival. But we are only at the beginning of this journey amidst a greater global reset arising from the pandemic, geo-political instability, and the climate crisis.

The imperative for Australia is to use our natural and competitive advantages to build advanced industries like robotics, and be ready to respond to global supply chain opportunities.

The role of the ARM Hub is to provide the technical capability and networks for businesses to secure these opportunities, and prepare businesses to harness opportunities we know are on the horizon.

Making things in Australia matters today and tomorrow as it drives up our productivity levels creating better jobs in all corners of the country, and it makes our nation more secure.

The ARM Hub is a pathway and resource for finding and creating new opportunities.

#### **ARM Hub's contribution**

We are at the forefront of industrial transformation, helping to build strong local supply chains and preparing companies for successful participation in global markets.

We also attract Foreign Direct Investment companies and those seeking to start a technology or manufacturing business in Australia that get entry into our nation's innovation ecosystem.

Since our beginning in March 2020 our mission has been to accelerate industry's adoption of advanced manufacturing technologies.

In this time, we have secured over \$54 million towards innovative projects for companies: projects that digitally transform the way business is being done.

This year we will have new facilities and new programs to offer, including technology accelerators and expanded global supply chain networks.

We have been leading and supporting work that is designed to bring step-change to industry.

Some highlights include submitting a multi-million-dollar, multi-year competitive program bid to establish a new Australian Research Council (ARC) Training Centre for Digital Twins for Manufacturing, a sister Centre to our already funded and operating ARC Australian Cobotic Centre

We have shaped and supported numerous other large and medium-scale bids, and nurtured many smaller businesses to get started on their digital transformation journey.

Given Australian manufacturers represent over 95% of small to medium sized enterprises and the vast majority of these companies have less than 20 staff, it is critical we scale our existing businesses and help them achieve success and sustainability into the future.

We are also building the future workforce, having engaged over 53 university and TAFE graduates at the ARM Hub on a wide range of projects with industry. We look forward to welcoming more graduates to our team throughout the year.

#### **ARM Hub's future**

Our vision is that Australia is recognised internationally as a hub for the accelerated development of advanced manufacturing, and Australian industries and manufacturers are more globally competitive due to widespread responsible adoption of artificial intelligence, robotics and automation technologies.

There are urgent digital transformation and workforce development requirements in Australian industry, which is why we have identified priority industries relative to our capabilities in defence, energy and biomedical fields. The role of the ARM Hub is to bring new business models, collaboration platforms, technical expertise and project delivery proficiency, to the challenge of creating Australia's sovereign manufacturing capability.

#### Founder and CEO Dr Cori Stewart

Superstar of STEM -Science and Technology Australia (2023-24)

Al in Manufacturing Award – Women in Al Asia Pacific (2022)



Professional Leadership Award (2020)



#### WHAT WE DO

Our mission is to accelerate Australian industry's creation and adoption of next generation technologies, including artificial intelligence, robotics, and assistive technologies. Their success is our success.



#### Our success indicators



#### Commercial solutions

Translating business concepts and research into new products and services

#### Research and development

Brokering funding for business and bringing together industry and researchers to develop and de-risk concepts

We're partnering with ARM Hub because society and our customers are changing; there's an enormous amount of technological change occurring; and we are preparing to meet Australia's infrastructure needs as we transition to a clean energy future

> Tony Schreiber, **General Manager, Orrcon Steel**

#### CAPABILITIES



Robotics, cobotics, and industrial automation

Data science and analytics



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Artificial intelligence, and machine learning

Computer vision

Industrial design.



human-centered design, and design for manufacture

Material science, cybersecurity, and supply chain innovation

ARM Hub is an Approved **Research Institute** 

#### Clients join us at all points of their technology and manufacturing journey.

We offer three streams: industry engagement, commercial solutions, and research and development.

Our commercial solutions stream is what sets us apart. We have an in-house technical team that includes world-leading robotics and design experts that works with a business to transform its challenge into a commercial solution.

We are unique in Australia.

We have the capability and know-how to help Australia become a world leader by embedding and commercialising advanced robotics and design-led manufacturing research and development capabilities across various manufacturing industries.

#### INDUSTRY ENGAGEMENT

## 68 BUSINESSES

participating in or pursing projects with ARM Hub Industry engagement involves working with companies taking the first steps on their digital transformation journey.

- » Hosting advanced manufacturing business readiness workshops
- » Site visits and needs assessments
- » Technology demonstrations
- » Providing resources and training
- » Fostering networks among SMEs

#### OUR MEMBERS

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## ARM Hub memberships enable Australian businesses and research organisations to collaboratively drive transformation.

Our industry members are an integral part of our community. Memberships open the door to hours of expertise with our in-house engineering and design teams, as well as an opportunity to leverage funding and networks.

- » Bendpro
- » Central Queensland University
- » Griffith University
- » Moddex Group
- » OMRON Electronics
- » QUT
- » RIOS Intelligent Machines
- » Smart Battery Technologies

- » Smart Innovation Systems
- » The University of Queensland
- » Tuff Manufacturing
- » University of Southern Queensland
- » University of the Sunshine Coast
- » Voltin
- » Wisk Aero
- » Vaulta

#### PLATINUM MEMBER

Orrcon Steel

Orccon Steel, of the ASX-listed BlueScope, chose to work with us to pursue digital transformation across their business.

Critical to Australia's construction and manufacturing supply chains, Orrcon has committed to innovation to future-proof steel production, build capabilities, and provide development opportunities for their people to ensure a sustained and enduring business.



#### A NEXUS OF COMMERCIALISATION AND RESEARCH

#### Our teams use the latest research to find solutions for SMEs.

QUT PhD student Anthony Franze` applied his research using augmented reality (AR) in manufacturing to develop a new tool for Young Guns Container Crew.

The project team used AR throughout the development process to collaboratively design a system to double the company's productivity.

Using Microsoft HoloLens 2 headsets, they performed design reviews, ergonomic studies and simulated product integration strategies within the company's distribution centres.

The final product will potentially save millions of dollars throughout the supply chain.

The outcome resulted from ARM Hub's ability to translate new ideas and research into viable industry solutions.

#### **SUCCESS STORY** Young Guns Container Crew

Young Guns Container Crew is working with ARM Hub on a project that will deliver a multi-million gain in productivity and value-add across the supply chain.

The Indigenous-owned company came to ARM Hub to investigate how automation could improve safety, productivity, and efficiency in the supply chain.

Those initial discussions three years ago have led to the development of a new automated system for loading and unloading container ships with the potential for 25-50% savings.

#### **DIGITAL TRANSFORMATION**

Through on-site visits and design workshops, ARM Hub's technical team created a sophisticated digital model of the preferred automation.

The digital twin identified productivity savings measured in 'person hours to load a container' ranging between 25 and 50%, which is a multi-million gain in productivity as well as millions in value-added data insights across the supply chain.

It can also be AI-enabled to capture data regarding the pallets, which is valuable to Young Guns as well its clients.

The digitisation of their business has also helped to transform a typically transient workforce into a highly engaged team of 1500 professionals in Australia, New Zealand, and Canada.

#### 66

ARM Hub has the overall experience to help us achieve what we were trying to achieve. Technical expertise and research capability were important to us – the fact that you can tap into a university expert network and have the research capability

Cameron Davies, Projects & Optimisation Manager, Young Guns Container Crew

#### SUCCESS STORY () UAP

UAP Group was founded in 1993 by brothers Matthew and Daniel Tobin. Originally known as Urban Artists, the company was first located in a small welding works in Seventeen Mile Rocks, Brisbane.

Today, UAP has evolved into a global operation and is widely recognised as a leader in public art and architectural design solutions.

ARM Hub was established in collaboration with UAP to address the global pursuit of integrating advanced manufacturing and robotic innovation.

Located side-by-side in Northgate, Brisbane, both organisations encourage collaboration and co-development through a shared driveway.

Recognising the need for research commercialisation, skills diversity, and collaboration to tackle complex global issues, both UAP and ARM Hub actively engage in research and development.

UAP focuses on areas such as mass customisation, human/robot interaction, and material futures, benefiting from the wealth of knowledge gained through bespoke fabrication projects.

In 2015, UAP underwent a transformative experience when they accepted a commission from the renowned architect, Frank Gehry.

Gehry, known for embracing computational design, had developed a reputation for designing intricate, custom structures that resembled sculptures rather than traditional constructions.

UAP faced a significant challenge presented by Gehry: creating a stainless-steel staircase that resembled a crumpled paper bag, with each crumple meticulously replicated.

Initially, UAP's foundry team followed the traditional approach of panel beating, where precise models were prepared for metal shaping.

Scans were then sent to Gehry for comparison with his computational models. While not financially prohibitive, this process proved to be tedious. The complexity of the project prompted UAP's founders, Matt and Dan, to embark on a digital transformation journey, seeking to integrate artificial intelligence and robotics into their business.

They found an ideal partner in the Centre for Robotics at QUT, which understood their needs and suggested that robotic vision was essential for automating certain aspects of UAP's workflow, particularly milling and grinding.

Building on this initial interaction, UAP, QUT, and RMIT collaborated to secure funding from the IMCRC. This funding enabled them to explore automation processes and teach robots to visually perceive objects and perform precise tasks on them.

As a result, robotic processes are now extensively used throughout UAP's workshop floor.





UAP's journey with ARM Hub and QUT has led to significant business outcomes:

- » UAP has 125 staff in Australia, which is a 52% increase since the company began its Industry 4.0 journey
- » Increased Australian sales by 148%
- » Launched a digital spinout company, FARM Architectural
- » Increased global sales by 89%
- » UAP projects engaged with industry 4.0 capabilities grew from 5% of 80%
- » 2022 sales saw only a small percentage imported from global workshops.

#### New offices:

» New offices opened in Chengdu, China; Riyadh, Saudi Arabia; Los Angeles, USA; the Sydney and Melbourne offices have been expanded.

#### **COMMERCIAL SOLUTIONS**



#### SUCCESS STORY () Voltin



Voltin has developed a world-leading artificial-enabled building façade inspection system.

AutoBAT2.0 is a tethered robotic drone technology that captures visual and thermographic data to accurately scan a façade, identifying the location and nature of critical defects.

ARM Hub has worked with Voltin to evolve its AutoBAT technology from prototype to commercial production model and investigate robotic tooling for the manufacturing of the AutoBAT 2.0.

The prototype was tested with a view for improvements and to maximise the data captured. This allowed Voltin to use the augmentation of the company's artificial intelligence to produce data-as-a-service business models.

Since their launch at ARM Hub in 2020, the company has forecast extraordinary growth, launched a new product to market, received three international standards certifications, and employed seven new staff.

Voltin was also the winner of ARM Hub's inaugural SPRINTS AI Accelerator Program in late 2022. They received support from ARM Hub, which included access to our world-leading robotic and data science researchers, designers, and engineers.

In 2023, Voltin received \$100,000 from the Advance Queensland Ignite Ideas fund to further their marketing in locations, including New Zealand and the Asia Pacific.

Before we can get a product to market, we need to do a design for manufacture process and manage the large amounts of data we extract with AI algorithms – this is where ARM Hub's expertise and networks have been critical to our development and success

Sara Richardson, CEO, Leakster Commercial Solutions



#### **RESEARCH AND DEVELOPMENT**

# \$254M

#### PREPARING FOR TRANSFORMATION

### Our aim is to find smarter solutions to business challenges using advanced robotics, design, and other assisted technologies.

In recent months, we have provided support for three Cooperative Research Councils (CRC). CRCs are industry-led collaborations between industry, researchers and end users.

- Mega CRC: The Mega CRC involves upskilling Queensland's manufacturers in readiness for the Olympics in 2032.
- 2 Augmented Ability CRC: The Augment Ability CRC aims to conduct industry led research to fast-track and adapt emerging technologies to preserve, prolong and enhance human function.
- 3 Solutions for Manufacturing Advanced Regenerative Therapies (SMART) CRC: The vision for the SMART CRC is to accelerate the applications and adoption of regenerative therapies in Australia.

We also led a bid for a new Australian Research Council Training Centre for Digital Twins in Manufacturing. The Centre will drive transformation in workforce capability, new technology and appetite for Australian manufacturers to deploy digital twins. This project has four universities and numerous industry partners.

In 2021, ARM Hub contributed to the establishment of the new Australian Research Council Centre for Collaborative Robotics in Advanced Manufacturing (Australian Cobotics Centre). The Centre is a collaboration between QUT, University of Technology Sydney, Swinburne University of Technology, and the Technical University of Dortmund. We are hosting the first translation project with partner InfraBuild to help improve the safety of steel product handling.

#### MODERN MANUFACTURING

#### SUCESS

ARM Hub will be supporting three major projects to receive funding under the Modern Manufacturing Initiative.

The Australian Space Manufacturing Network, led by Gilmour Space, was awarded a \$52m Modern Manufacturing Initiative Collaboration grant to develop sovereign space capabilities in Australia.

ARM Hub will establish and run a commonuser facility as part of the Space Manufacturing Network.

Turbine Sunshine Coast received more than \$40m to support a food and beverage manufacturing precinct.

This project will see a number of Australian manufacturers work together to support over 50 small and medium enterprises. They will collaborate, scale-up and become more competitive.

It will feature a research and development and industry-embedded training centre, as well as implementation of industry 4.0 technologies. This will help the sector become more competitive and create skilled jobs.

> ARM Hub will be assisting through data science fellowships helping to digitise SMEs and start-ups in the food and beverage industry.

#### SUCCESS STORY Leakster

Leakster is helping to solve the global water crisis by using artificial intelligence to detect and pin-point pipeline leaks, ensuring more efficient asset management solutions.



With one in four people to be affected by water stress and severe water shortages by 2050, ARM Hub is proud to be supporting an innovative Australian business that is looking to protect our most valuable commodity.

Founder Sara Richardson was one of two winners of the ARM Hub Sprint Accelerator competition in 2021 with this technical challenge.

The Accelerator provided more than six months access to artificial intelligence expertise, including a data science project team to help test and trial the complex solution.

When he announced the winner, ARM Hub Digital Advisor. Evan Shellshear said he was not certain that an AI solution for

Leakster's challenge was possible, "but if it is, it is a game-changing solution of alobal significance."

After successfully closing a pre-seed funding round in January 2023, Leakster is in the process of finessing the technology, with a view to scaling and offering it to the wider market.

Plans are in the works to conduct a permanent trial with an Australian water utility provider over the coming six months, with the goal to prevent the amount of water that is wasted.

If it can be achieved, the benefits will be numerous and will include everything from cheaper water bills for customers, to saving millions and millions of litres of additional water that could be crucial during environmental disasters like drouaht.

#### SUCCESS STORY (Valiant

#### Superstar start-up Valiant Space began its journey at the ARM Hub facility in Northgate, Brisbane in 2020.

Three years on, the company saw a component from their new rocket thruster blast into orbit for testing onboard a SpaceX mission at the Kennedy Space Center in Cape Canaveral. Florida.

The testing was to determine if it would be used in future orbital missions.

This year has also seen the company prepare to integrate the technology into a propulsion system for their first customer.

The equipment is Australia's first inspace chemical thruster for satellites made with non-toxic propellants. They are 3D printed and almost entirely Australian-made.

It is mounted on the spacecraft to provide the main propulsion system for the satellite and enables companies to perform fast-acting orbit raising and collision-avoidance manoeuvres.

The Valiant team identified a gap in the market for space propulsion options that use non-toxic propellants.

The thruster runs on nitrous oxide and propane, which gives a comparable performance to the toxic options, but without the need for high-cost handling infrastructure.

The solutions will save money at every step of the mission lifecycle, by leveraging a simplified design, rapid manufacturing methods and low-cost propellants.

With assistance from ARM Hub. Valiant Space secured \$750,000 funding from the Australian Government's Moon to Mars Initiative supply chain grant.

#### **SUCCESS STORY** () Robotics Harvesting Bananas



#### Advancements in artifice intelligence could lead to robots picking fruit.

ARM Hub, Hort Innovation, and the Australian Banana Growers Council have jointly investigated the possible of automating banana de-handing.

Previous attempts led to damage to the fruit from spinning blades.

However, the advent of computer vision can help robots adapt to natural variation, allowing the system to identify appropriate cutting locations.

The research project found that computer vision, machine learning and robotic handling methods provide promising opportunities for the development of a viable de-handing solution.

The project involved in-depth research across five farms in North Oueensland.

COLLABORATIONS

# \$173M

### IN THE PIPELINE

ARM Hub is working with cobotics and automation to change the face of industry in Australia.

We are also working with defence primes as the nation looks to strengthen its supply chains. We are excited about the future of defence and the opportunities it represents for Australian SMEs.

Australian

#### **PARTNERSHIP** Australian Cobotics Centre



Cobotics Centre

The Australian Cobotics Centre (ACC) is an Australian Research Council Industrial Transformation Training Centre.

The ACC is co-located at ARM Hub, who is one of its industry partners. ACC Director Professor Jonathan Roberts is also the Technical Director at ARM Hub.

The ACC research is focused on the implementation of collaborative robotics (cobotics) to create a safer, more efficient, and globally competitive manufacturing sector.

The industry partners include B&R Enclosures, Cook Medical – Australia, InfraBuild, IR4, and Weld Australia. The university partners are QUT, Swinburne University of Technology, University of Technology Sydney, and the Technical University of Dortmund.

#### ACC PROJECTS

**InfraBuild:** the project is to research and develop a high-speed sensing and control system that is capable of identifying steel bars and coils and work safely within relative proximity of their operators.

**Cook Medical:** the project provides insights on how cobotic systems could help the soldering and inspection of barbs attached to wires when manufacturing stent grafts.

**B&R Enclosures:** the project highlights an experimental workflow that allows the team to quickly capture workspaces for digital twin creation and human-centred research to identify opportunities and limitations for experimental cobot system design.

Weld Australia: showcasing the benefits of cobotic welding to the company's members which included using the Soldamatic to show the accuracy and capability of cobotic welding.

#### **OUR UNIVERSITY PARTNERS**

We have a tightly woven network of research institutions, facilities, and commercial companies across Australia. Our partners are some of the world's leading universities, offering our Members and clients access to expert knowledge on artificial intelligence, robotics, and industrial design.















#### SUCCESS STORY Southern Green Gas

Pioneering company Southern Green Gas has found a home for its innovation at ARM Hub.

The company is removing carbon dioxide from the air. It was founded by Rohan Gillespie in 2018, after he identified a gap in the energy processes and technology that was being used to cultivate the use of carbon in a positive light.

The company has developed Direct Air Capture (DAC) technologies that capture CO<sub>2</sub> from the atmosphere and make it available for subsequent sequestration, or as a component in several sustainable production pathways. This includes being transformed into renewable fuels.

Its success attracted a \$1.5 million investment from former Australian Chief Scientist Dr Alan Finkel AC, who will provide counsel on policy and commercialisation of its technology.

ARM Hub is playing an integral role in the scaling and growth of Southern Green Gas, as it looks to commercialise its product for companies the world over to use.

#### SECTION 3

## OVER THE HORIZON

We are focused on advancing priority industry capabilities







DEFENCE

BIOMEDICAL

ENERGY

DIGITAL

#### WHAT'S COMING

Over the coming months, we are rolling out new programs

TECHNOLOGY ACCELERATORS



GLOBAL SUPPLY CHAIN PROGRAMS

TALENT PIPELINE PROGRAMS



#### **EXECUTIVE TEAM**



Dr Cori Stewart, CEO Jesuadian, Chief Operating



Samuel

Officer

**Richard Willis**,

Commercial

Manager





Angela Reed,

Director Marketing

and Memberships



Kevin Hernan,

Director Defence







Dr Patrick Silvey, Ann-Maree Principal Advisor Willett, Principal Advisor



We have an extensive network of experts in the fields of artificial intelligence, robotics, design, and other technologies critical to advanced manufacturing.

Visit armhub.com.au



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Professor Jonathan Roberts, Professor in Robotics, Faculty of Engineering, Australian Cobotics Centre Director, ARM Hub Technical Director



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Associate Professor Glenda Caldwell, Academic Lead Research, Faculty of Engineering, QUT



Dr Muge Belek Fialho Teixeria Senior Lecturer, Faculty of Engineering, QUT





Peter Kujala Senior Mechatronics Engineer, ARM Services, ARM Hub Hub

**Dr Troy Cordie** Senior Mechatronics **Engineer & Project** 

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