UTS Rapido

Mechatronics and Additive Manufacturing

Bridging the gap between academia and industry

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An industry focused, R&D innovation hub, delivering engineering and technology solutions for industry and social impact

Impact focused – solution driven

Founded in 2016, UTS Rapido delivers practical innovation that creates measurable impact.

We collaborate with industry, government, and research teams to develop targeted, technology-led solutions.

Our engineering and IT capabilities help partners turn ideas into market-ready products and services.

Michael Behrens
Principal Delivery Manager - Mechatronics

> We take ideas from concept, to validated prototype, to final solutions.

Working side by side with our partners, we combine systems thinking with rapid iteration and rigorous testing, to accelerate development, reduce risk and deliver the next stage of commercialisation.

Core R&D capabilities: Engineering & IT

Mechatronics and Additive Manufacturing

We design, test and build intelligent systems that solve technical challenges through mechanical and mechatronic engineering, supported by in-house additive manufacturing expertise.

Software Engineering

We apply analytical thinking, engineering principles, methods, tools and the latest AI software development expertise to the design, development and maintenance of bespoke software solutions.

UX and Digital Design

We create value generating digital solutions by identifying the needs of your business, its market, and the end-users, and by designing, developing and deploying innovative solutions in software and hardware.

Research Translation

We provide the engineering and digital capability to turn research into practical, scalable solutions and move beyond discovery into development, deployment and impact.

From concept, to validation, to commercialisation

Evidence-led approach that moves at industry pace

At UTS Rapido, mechatronics integrates mechanical, electrical and software systems to solve real-world problems.

Our evidence-led approach operates at industry pace, helping teams design, test and refine solutions using the most appropriate methods for the challenge.

Additive manufacturing is one of several tools we apply where it adds value, enabling optimised geometries, light-weighting and rapid iteration when traditional manufacturing methods are not fit for purpose.

Partnering to de-risk innovation

Our approach is collaborative and transparent. We meet with our partners frequently to review progress, raise issues early, and make informed decisions.

A typical engagement follows a clear workflow: requirements and feasibility, concept development, detailed design, build, testing and validation, delivery and knowledge transfer.

We keep momentum while retaining flexibility to adapt as insights emerge.

> *We went to UTS Rapido because we have limited resources and limited access to testing equipment and the high-level research we needed.*
>
> **Peter McKinnon**
> **Managing Director, OMNIA**

Hervé Harvard
Executive Director
UTS Rapido

> Our focus is on R&D and new product development. We work alongside engineering and product teams to turn complex ideas into viable, production-ready solutions, often using advanced and emerging technologies.
>
> What makes us different is the integration of mechatronics, software and UX into a single, coordinated capability. That allows us to move partners from early-stage uncertainty, to validated outcomes with a clear path to manufacture.

Mechatronics and engineering capability

- Multidisciplinary expertise across mechanical, mechatronics, electronics, embedded software, control systems, and additive manufacturing.
- Design and delivery of intelligent systems and precision-engineered products.
- Experience spanning autonomous and semi-autonomous robotics, large-format 3D printing, satellite communications, biomedical devices, Agtech and manufacturing plants.
- Development of IoT tracking solutions, material handling systems and scientific test equipment.
- End-to-end engineering delivery, from concept and system architecture through to prototyping, testing and design for manufacture.
- Laboratory and field testing to validate prototypes, de-risk products and address targeted research questions.
- Close collaboration with UTS researchers and subject-matter experts across robotics, Industry 4.0, power and RF electronics, mechanical systems and ICT.

Capabilities and specialist expertise: Mechatronics

Feasibility studies and milestone reviews

We test the premise early. Through requirements capture, preliminary analysis and proof-of-principle models, we identify constraints, cost and risk. This lets our partners proceed with confidence, or pause before committing to the next stage.

Concept development

We're able to generate multiple solution pathways, as required, and assess each against performance, cost, safety and deploy-ability. This creative engineering work finds viable alternatives when standard approaches fall short.

Prototypes and digital twins

We build to learn. From quick functional rigs, to refined prototypes, we uncover issues that models cannot. We confirm what works, and reveal what needs to change. Digital twins and prototyping shorten time to insight and can de-risk later investment.

Testing and validation

We design tests that reflect real operating conditions. Pre-compliance testing helps predict whether products will pass formal certification. Fatigue, endurance and environmental checks provide evidence for engineering decisions and stakeholder buy-in.

Design for manufacture

We prepare designs for production. This includes optimising parts for additive processes, planning transitions to machining, casting or injection moulding, and producing the documentation manufacturers need to quote and build reliably at scale.

Specialist expertise

Additive manufacturing (AM) and design- for-AM; mechanical design; finite element analysis (FEA) and computational fluid dynamics (CFD); electronics and firmware development; circuit board design and assembly; hardware–software integration.

Why industry works with UTS Rapido

Specialist capability, unique facilities, transparent delivery

Organisations rarely arrive with a perfect brief. They arrive with a challenge: a manual inspection step that slows production, a concept that feels risky to scale, components that fail in harsh conditions, or an idea that needs proof before further investment.

Our role in de-risking delivery:

- Early validation to reduce technical and commercial risk
- Shortened build–test cycles to accelerate development
- Alternative engineering solutions where off-the-shelf options fall short
- Early exposure of safety and reliability issues, prior to certification
- Practical support to move from prototype to production with confidence

Partners choose UTS Rapido for the combination of specialist expertise and access to unique facilities.

Our team can draw on the extensive UTS R&D ecosystem; e.g. ProtoSpace, the Robotics Institute, TechLab, as well as in-house machining when intellectual property sensitivity requires it.

We collaborate across faculties in engineering, design and science to unlock specialist methods and instrumentation when they add value.

Above all, we work openly with partners, holding regular reviews to keep progress visible and outcomes aligned to business needs.

Additive Manufacturing

COOPERATIVE RESEARCH CENTRE

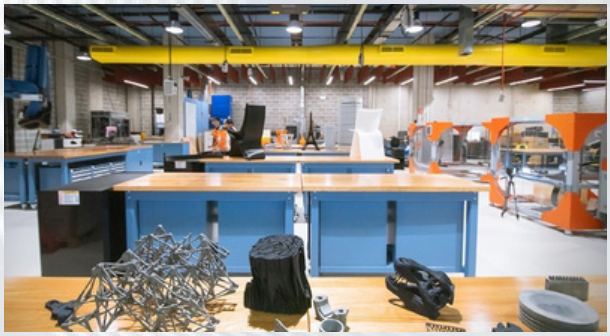
UTS is a research partner in the Additive Manufacturing Cooperative Research Centre (AMCRC) — a national, industry-led initiative bringing together universities, government and industry to accelerate the adoption and scale-up of additive manufacturing in Australia.

Through the AMCRC, industry partners can access co-funded R&D pathways, applied engineering expertise, and advanced manufacturing infrastructure to de-risk innovation, validate new technologies and progress from prototype to production.

This collaboration strengthens capability across defence, aerospace, biomedical, AgTech and transport sectors, supporting the development of production-ready additive manufacturing solutions that are technically robust, commercially viable and aligned with real operating conditions.

Access the UTS R&D ecosystem

We are part of the UTS innovation ecosystem and lead every project with our own engineering and digital expertise, drawing on UTS specialists, facilities and labs as needed.



ProtoSpace:

Your gateway to UTS's cutting-edge advanced manufacturing expertise. Located in the heart of Sydney, it's home to Australia's largest collection of additive manufacturing technologies — powering hands-on education, breakthrough innovation, and bold exploration across industries.

TechLab:

Located in Botany, Sydney, our 18,000sqm cutting-edge research facility fosters industry partnerships in engineering and IT innovation. Partners can access experts, labs, equipment, office space, and a dynamic innovator community. TechLab combines advanced infrastructure, communication labs, and data analytics to create tailored solutions.

UTS Research Centres:

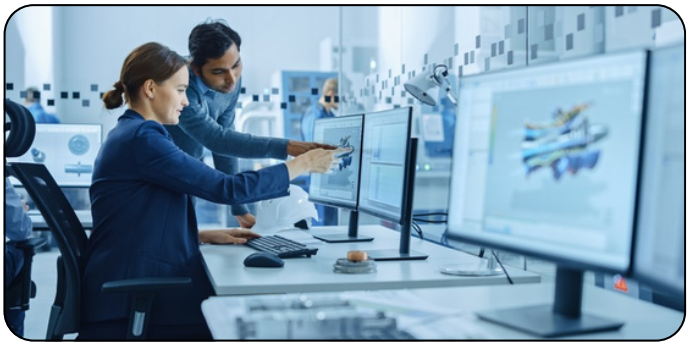
We help you access the right capabilities, facilities and labs for your project, including but not limited to the following:

- Robotics Institute
- RF and Communication Technologies (RFCT) Lab
- Global Big Data Technologies Centre
- Australian Artificial Intelligence Institute
- Data Science Institute
- Centre for Technology in Water and Wastewater
- Institute for Sustainable Futures
- Advanced Fabrication Research Lab

An integrated way of working

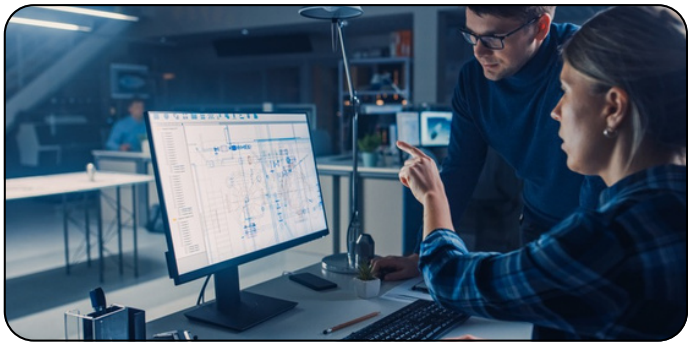
Projects run through clear milestone checks, with regular reviews and draw on other state-of-the-art facilities such as ProtoSpace, TechLab and the Robotics Institute as needed.

We align technical choices to business outcomes, use commercial frameworks that protect IP, and keep delivery accountable, and maintain momentum throughout. The result is a connected path from problem to proven solution.



Delivery pathway

- Requirements & feasibility
- Concept development
- Detailed design
- Build
- Testing & validation
- Delivery/knowledge transfer

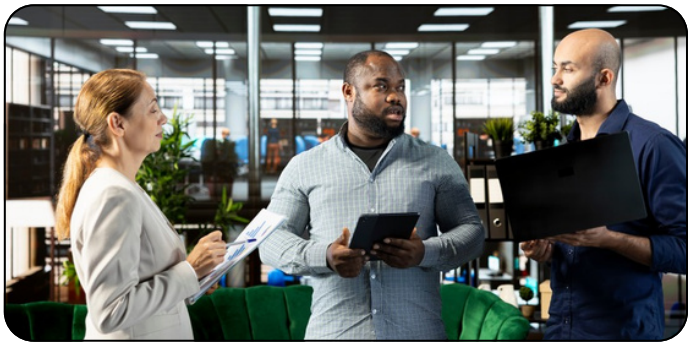


Cadence and governance

We typically meet every two to four weeks, depending on our clients' needs, and make evidence-based decisions at key milestones.

What you receive at handover

Prototypes and rigs; CAD and drawings; bills of materials; firmware and source code; test data, analysis and recommendations; and a roadmap for manufacture, compliance, or field trials.



Intellectual property

Partners typically retain ownership of the Intellectual Property (IP) generated through the projects they fund. This supports clear commercial pathways and long-term value.

Project budgets

All work is scoped and quoted upfront against the project brief, technical requirements and delivery timelines.

Engagements typically range from AUD 75,000 to AUD 500,000, and many projects leverage external or matched-funding schemes, where eligible.

Sectors we have engaged with

- AgTech and primary industries
- Advanced manufacturing
- Environmental sustainability
- Medical & Healthcare
- Mining and mineral processing
- Social impact and disability tech
- Space and Defence
- Transport and infrastructure

Case study:
A novel omni-directional conveyor sortation system

OMNIA WHEEL
MAKING MOBILITY INTUITIVE

Need:
OMNIA lacked access to advanced testing facilities, digital twin and prototyping expertise to evaluate wheel performance in sorters.

It needed to validate omni-wheel performance under variable orientations, loads and speeds to inform a viable commercial sortation system.

The goal was a commercially viable omni-directional station to effectively sort, direct and divert products on a conveyer line – reducing friction, breakdowns, downtime, energy use and costs.

Innovation:
Computer modelling: detailed simulations of wheel–package interactions at multiple contact points.

Lab tests: Measured friction, traction, and compression across combinations of weight, materials, speed and wheel orientation.

Prototype build and testing: Constructed a table with 115 omni-wheels; ran 20+ scenarios to verify simulation accuracy.

Iterative development: Model → prototype → test → refine in tight feedback loops.

Outcome:
Commercial launch: Omni-Directional Sortation System now operational in the US, Greece, Poland; trialling with major postal, retail and engineering clients.

Market traction: Demo launches (e.g. MODEX 2020) garnered international logistics interest.

Operational wins: Lower capital outlay, reduced energy use, simpler maintenance, improved reliability.

Job creation: At least two new roles created; poised for further scale-up.

> We went to Rapido because we have limited resources and limited access to testing equipment and the high-level research we needed to do to understand the disruption potential of our wheel. They were able to do a lot of testing for us, so we got a lot of data back that enabled us to start developing a conveyor table and understand how to simulate outcomes from different configurations.

Peter McKinnon, OMNIA Managing Director

Case study:
Compliance and safety testing to improve access for people with severe disabilities

PolySpine®

Need:
PolySpine created a wearable exoskeleton to support people with limited mobility, but needed to meet strict safety and performance standards for TGA approval.

As a start-up, they lacked the specialist facilities and engineering expertise required for compliance testing and validation.

Innovation:
We designed and delivered a full validation testing program using university-grade labs and equipment.

Tests covered strength, durability, flammability, toxicity, and product lifespan.

The results led to design improvements and provided the evidence needed to move onto regulatory approval.

Outcome:
The partnership enabled PolySpine to meet stringent medical device compliance standards and confidently move into commercial production.

The device passed all required safety and performance tests, secured ARTG approval in 2021, and launched the following year.

Now listed on the NDIS and under review by the US FDA, PolySpine is enhancing mobility and inclusion for users nationwide.

The process also led to key product improvements and the creation of two new jobs.

> We came in with a list of tests. Rapido identified all the others we hadn't thought of. They were just so competent; they understood exactly what we needed to achieve.

Jasmine Sayour, Managing Director, PolySpine

Case study:
Harnessing high-voltage power for community gain

Collaboration with Professor Dylan Lu and the UTS School of Electrical and Data Engineering

Need:
By wirelessly harvesting energy from high-voltage powerlines, the team aims to convert existing grid infrastructure into a source of clean, reliable power—particularly for hard-to-reach locations where diesel generators or solar panels are currently the norm.

> This project demonstrates the potential for existing transmission infrastructure to serve a dual purpose, delivering both electricity and connectivity to regional communities.
>
> It's an exciting step towards integrating sustainable power solutions into our network.
>
> Client (anonymised)
> Energy Industry Partner

Innovation:
We explored a novel wireless energy harvesting system capable of safely extracting usable power from the magnetic field of high-voltage powerlines, eliminating the necessity for a direct physical connection.

We developed an advanced proof-of-concept prototype and secured additional funding to progress to the next stage.

Outcome:
The proof-of-concept prototype has been tested in the lab, demonstrating its ability to wirelessly harvest energy from high-voltage powerlines.

The intention is to conduct field testing with the enhanced v2 prototype, which aims to incorporate improvements in efficiency, durability, and environmental resilience.

The next stage of the project has secured seed funding under the NSW Electrification & Energy Systems Network (EESN) Seed Grant Scheme, a key initiative of the NSW Decarbonisation Innovation Hub.

Case study:
Developing a modular phenotyping system to accelerate coral resilience research

Need:
To address the impact of climate change on coral reefs, a compact coral bath device was needed to support high throughput thermal testing to assess coral resilience under thermal stress.

Innovation:
A modular, 16 coral bath system that is the next generation of phenotyping equipment, linked to fluorometry and oxygen measurement capability, to help test and characterise thermal resilience of different coral species.

Co-designed prototype with researchers, engineering a transportable, multi-taxa system that integrates sensors and software for field use.

Outcome:
Transformative capability for UTS and the Future Reefs team for high throughput coral experimentation with refined control on key abiotic parameters such as temperature and nutrients.

The system is now being used to support reef restoration research and has potential for broader global deployment.

> The Future Reefs team continues to adopt advanced technologies to better preserve and rebuild healthy reefs.
>
> This new system will transform our team's capability to do high-throughput coral experimentation with refined control on key abiotic parameters such as temperature and nutrients.
>
> Dr Emma Camp, Team Leader, Future Reefs Program
>
> *Funding: UTS Grant, Lead CI: Dr Emma Camp*

Case study:
Quokka, the first 30-qubit consumer quantum computer emulator

Quokka Quantum

EIGENSYSTEMS

> We're looking to revolutionise the way people learn about quantum computing and STEM education in general.
>
> The Quokka platform, including the device, is a tool for hands-on learning. It acts as a fault- tolerant quantum computer, unlike other quantum simulators.

Chris Ferrie
Associate Professor, Centre for Quantum Software and Information (QSI)

Funding: UTS Grant, Lead CI: A. Prof Chris Ferrie

Need:
UTS researchers needed a working prototype to demonstrate how quantum computing could be made accessible to non-specialists.

UTS Rapido was engaged to translate early-stage research into a functional, manufacturable device that could support learning, experimentation and future commercialisation.

Innovation:
Translated a complex quantum emulator onto a Raspberry Pi, built a mobile onboarding app, developed a cloud-based quantum circuit builder, and designed an elegant aluminium enclosure.

Worked with UTS researchers to develop the early Quokka prototype, combining multi-disciplinary R&D expertise.

This multi-disciplinary approach helped transform advanced research into a consumer-ready quantum product, used to learn and experiment with quantum coding.

The Quokka is an affordable, fit-in-the-hand personal quantum computer emulator that can run programming languages written for quantum computing and return results.

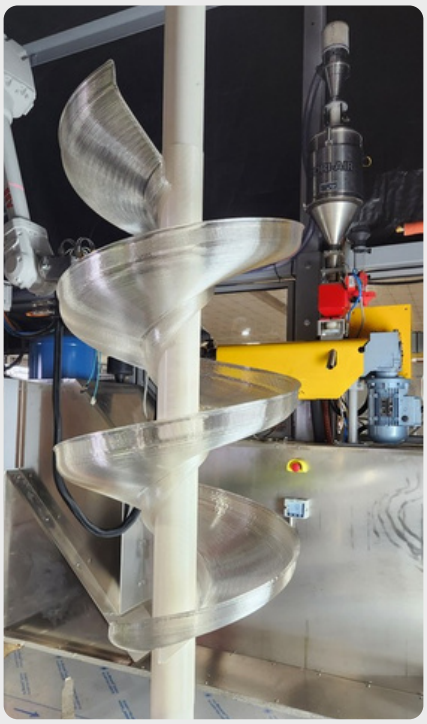
Outcome:
Translated early quantum research into a testable, real-world product. Brought together mechatronics, software and UX teams to deliver integrated R&D.

Accelerated the transition from lab-based research to functional prototype. Enabled testing, iteration and demonstration through small-batch manufacturing of a commercially viable proof of concept.

Contributed to the successful launch of Quokka, the first 30-qubit consumer quantum computer emulator.

Case study:
Transforming mineral separation with 3D printing solutions

Mineral Technologies
A Downer Company



Need:
A bespoke 3D printer for the production of gravity spiral mineral separators, that avoids the need for prototype tooling (moulds) first.

Innovation:
Additive manufacturing and Industry 4.0 technologies enable customised spirals for specific ore bodies, to enhance mineral separation performance, to be 3D printed onsite.

We built a bespoke 3D printing prototype with the capability to custom-print gravity spirals of up to 3 metres tall.

We leveraged non-planar 3D printing to achieve this with a bespoke machine configuration paired with a purpose-built custom slicing algorithm optimised for the creation of the target parts.

Outcome:
The result is Sidewinder, a bespoke 3D printer prototype capable of faster production of customised spiral prototypes for different target ore bodies, with minimal post-processing requirements.

Sidewinder offers the potential to reduce the time and cost required to develop new spirals, accelerating Mineral Technologies' time to market.

Case study:
Revolutionising orthotic care through cutting-edge 3D-printed devices and digital workflows

Need:
AbilityMade is an Australian for-purpose organisation who needed a comfortable ankle-foot orthoses (AFOs) solution, with faster production and a less traumatic process for recently arriving refugees with disabilities.

Innovation:
We designed and created a plaster-free, digitally enabled approach to AFO sizing and manufacture, replacing traditional casting with 3D printing to deliver custom orthoses in a bio-compatible material.

Outcome:
We drastically reduced production times – from 4 weeks to 28 hours, enabling a valuable community solution to be rolled out quickly.

This breakthrough approach improved mobility and well-being, empowering refugee children with physical disabilities to walk with ease and confidence.

Case study:
Innovating mobility - Tremor-Responsive Wheelchair Control

Need:
Individuals with movement disorders, such as those caused by traumatic brain injuries, often experience severe tremors that make it difficult and unsafe to operate standard power wheelchairs.

Involuntary movements can trigger unintended joystick inputs, raising safety concerns and reducing user independence.

Existing solutions failed to address these specific needs, so a new approach was needed.

Innovation:
A magnetic joystick toggle that detaches upon detecting excessive tremor-induced force, instantly halting the wheelchair to prevent unintended movement and improve user safety.

Developed through a user-centred process with input from people with lived experience of tremors, the design allows users to quickly reattach the toggle and restore functionality without compromising safety or independence.

Outcome:
The development of a novel wheelchair joystick toggle system that enhances independence for individuals experiencing severe tremors.

The new toggle system improves safety and control by stabilising input and stopping the wheelchair when tremors are detected. This has significantly reduced wheelchair damage and enabled users to navigate their environments with greater confidence and autonomy.

This design also shows potential for application across a broader range of movement disorders.

> After decades of working alongside skilled therapists and technicians to try and identify a better, safer way to drive her wheelchair, Kyle was ready for change.
>
> We worked with Kyle and UTS Rapido to bring together the best from engineering and disability to create that positive change.

Samantha Frain
Executive Director
Northcott Innovation

From concept to impact: Research translation to application

Our role is to extend research with the technical and engineering expertise needed to translate concepts into usable, scalable technology.

We combine advanced AI, software development, mechanical and mechatronic engineering, digital and design expertise into advanced stage research.

Broad mechatronics capabilities

- Feasibility studies and milestone assessments
- Concept development and option evaluation
- Prototyping, from low to high fidelity
- Product and pre-compliance testing
- Design validation and material selection

Specialist expertise

- Additive manufacturing and design for AM
- Electronics, firmware and embedded control
- Circuit board design and assembly
- Finite element analysis and computational fluid dynamics
- Hardware–software integration
- Hydraulics and heavy machinery

Problems we solve

- De-risk new product ideas before scale-up
- Enable faster prototyping for precision components
- Simplify or automate complex processes
- Expose weaknesses before certification
- Transition prototypes to production-ready designs

Technology Readiness Levels

UTS Rapido primarily supports mid to high Technology Readiness Levels (TRL), typically TRL 4 to TRL 8.

We work with researchers and industry partners to translate proven ideas into pilot-ready, testable and deployable solutions, moving beyond lab validation into real-world application.

Our teams support prototype development, system integration, validation in relevant environments, and preparation for clinical trials, market entry or licensing. We focus on building technologies that are ready for use, not just theory.

Early stages:

- TRL 1–3: Research and theoretical work, often lab-based.

Development stages:

- TRL 4–6: Proof of concept and prototype development in simulated, or real environments.

Deployment stages:

- TRL 7–9: Demonstration, validation and full-scale implementation in operational settings.

Technology readiness level (TRL) scale

Early stages (TRLs 1-3)		Development stages (TRLs 4-6)		Deployment stages (TRLs 7-9)
Basic technology research	Concept research	Problem/ solution fit	Business model scaling	Wide commercial adoption

Mechatronics at UTS Rapido: built to deliver impact

Interested in collaborating on your next innovation project?

UTS Rapido works as an extension of your innovation team, combining mechatronics, additive manufacturing, software and UX to progress ideas through milestone reviews. We build and test what matters, then hand over prototypes, data and production-ready artefacts so you can proceed with confidence.

Partners with industry

- Projects range from end-to-end solutions, to smaller projects to fill expertise gaps
- We collaborate and apply research findings within world-class facilities
- Professional level, innovative R&D solutions for a range of industry problems
- Industry expertise covering the full breadth from AgTech to Biomedical & Health, to Manufacturing and Mining, to Retail, Technology and Transport
- Partners typically retain ownership of the Intellectual Property (IP) generated through the projects they fund

Rapido Social Impact

- We help purposeful partners expand their impact to help solve societal problems
- We develop engineering and technology-based solutions on a low-bono basis

Whether you're a start-up, an SME, a corporation or a Not For Profit – UTS Rapido can help you access world leading technological expertise and facilities to develop cutting edge products and services.

CONTACT US

Ready to discuss a project, partnership or find out more about our R&D expertise, labs and facilities?
Get in touch: rapido@uts.edu.au / rapido.uts.edu.au

UTS Rapido

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