



Newcastle
University

Newcastle
Innovations

Research, education and innovation for aerospace

From Newcastle. For the world





Introduction

Newcastle University is a research-intensive university supporting aerospace capability through applied research, skills development and industrial collaboration.

Working with industry, we have developed new Aerospace Engineering degree programmes aligned to the needs of modern aerospace systems. These degrees equip graduates to support areas such as electrification of flight, advanced manufacturing, and space and digital technologies, underpinned by hands-on experience in specialist laboratories, simulation environments and autonomous systems.

Our distinctive strength in security and defence lies in understanding and strengthening societal resilience. Our 'whole of society' approach is the framework

through which Newcastle University delivers security and defence capability. It integrates research, education and partnerships across engineering, digital, health, policy and social science, enabling a coordinated response to complex national and global challenges.

We operate in complex, highly regulated environments requiring robust governance, assurance and long-term collaboration. Our work is delivered through established trusted research frameworks, enabling partners to work confidently on sensitive and strategically important challenges across defence and national security.

From developing engineers for complex aerospace and defence systems to advancing research in partnership with industry, Newcastle delivers innovation across aerospace, security and national defence.

Developing engineers for complex aerospace systems

Building capability for the next generation of aerospace systems



Newcastle University's new Aerospace Engineering programmes, developed in close collaboration with industry, are aligned to the skills and capability needs of the modern aerospace sector.

For industry partners, this provides access to a growing pipeline of engineers equipped to contribute to complex systems, platforms and supply chains across aerospace.

These programmes equip graduates with the expertise to design, develop and test complex aerospace systems, including aircraft, spacecraft and satellite

technologies. This includes work in areas such as aerodynamics, propulsion, structures, systems engineering, advanced manufacturing and digital systems, alongside emerging challenges including the electrification of flight and sustainable aerospace technologies.

Training is underpinned by hands-on experience in specialist laboratories, simulation environments and autonomous systems, ensuring graduates develop the practical and applied skills required for real-world engineering environments.



£4.3M extra investment in aerospace capability

A major new investment, enabled by £4.3 million in defence-related skills funding from the Office for Students, is expanding Newcastle's engineering education and facilities.

This will create 370 additional student places and provide access to advanced training environments including a dedicated drone arena, flight dynamics platforms, quadruped robotics and specialist composite manufacturing facilities.





Trusted innovation

Governance, assurance and confidence in complex projects and regulated environments

Newcastle University delivers research and innovation across aerospace, defence and security within complex, highly regulated environments. Our work supports programmes that require robust governance, assurance and long-term collaboration.

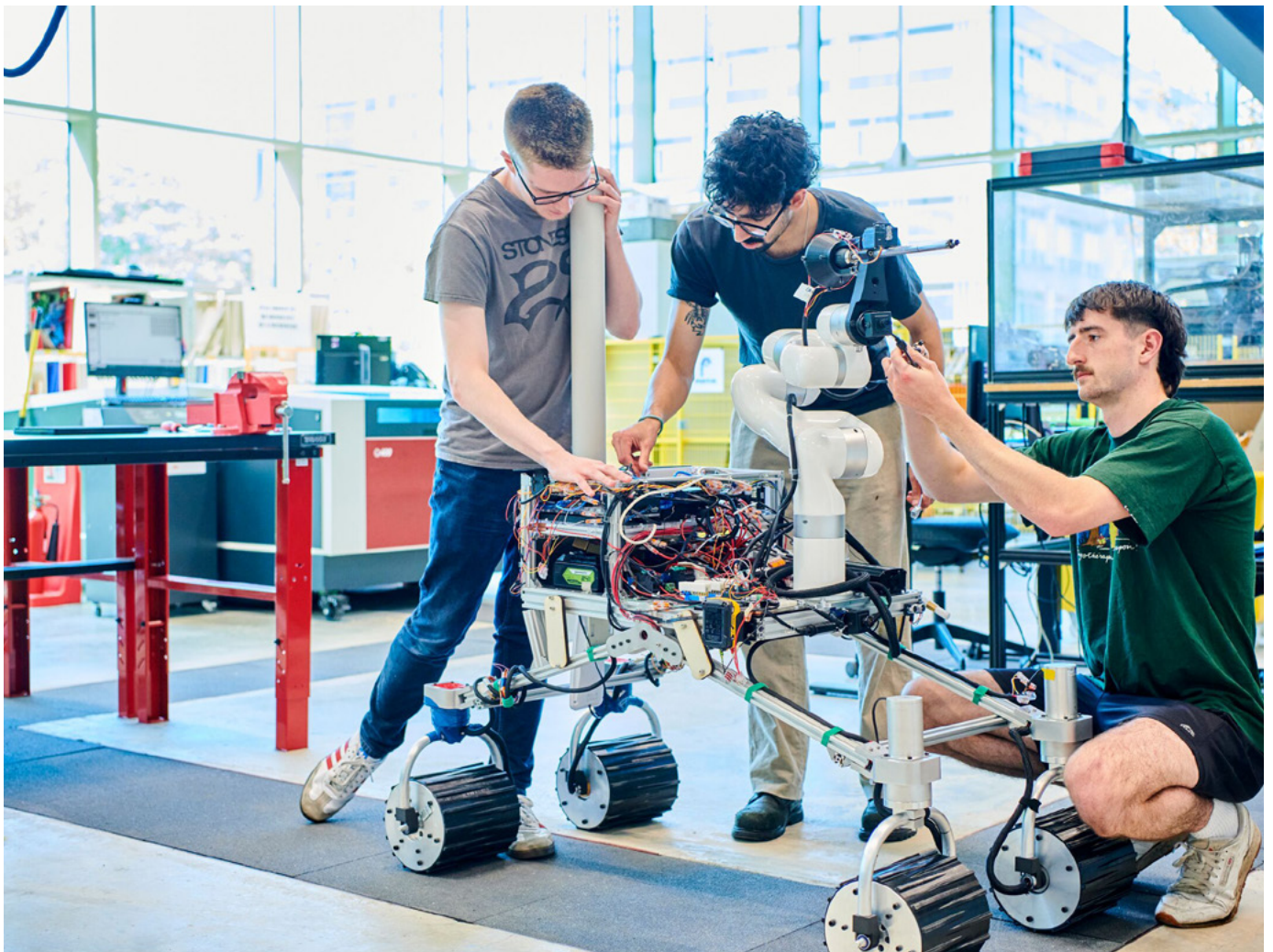
We operate within established trusted research frameworks, enabling partners to work confidently on sensitive and strategically important challenges across defence and national security.

For government and industry partners, our approach provides assurance that projects can be delivered safely, at scale and in alignment with the National Security Strategy.



Recent government partners include:

- Ministry of Defence
- Royal Air Force
- The Defence Science and Technology Laboratory (DSTL)
- Government Communications Headquarters (GCHQ)
- Atomic Energy Authority
- Department for Business, Energy and Industrial Strategy
- Home Office
- UK Space Agency
- UK Health Security Agency



Security at home

Building resilient systems, infrastructure and communities

Newcastle University supports national security and resilience across the systems that underpin modern society including cyber security, energy, infrastructure, public health and food security.

We work with government, industry and communities to strengthen preparedness for complex and evolving threats — from cyber and technology-enabled disruption to climate-driven pressures on critical systems.

Our work focuses on securing and adapting the systems that underpin modern society, including:

- **critical infrastructure and built environment systems**
- **energy generation, storage and resilient network integration**
- **cyber security and secure digital systems**
- **public health, population resilience and antimicrobial resistance**
- **food systems, agriculture and supply chain resilience**
- **community resilience, public safety and crisis response**







Strength abroad

Global partnerships
for collective security



Newcastle University works with international partners across aerospace, defence and security to support global stability, resilience and capability. Through research, innovation and education, we contribute to programmes that address complex and interconnected challenges across technology, infrastructure and society.

Our work brings together engineering, data, policy and social science to support defence and security priorities internationally, from aerospace systems and secure communications to resilient infrastructure and digital security.

We provide strategic insight into shifting geopolitical dynamics, emerging risks and contested environments, supporting organisations operating across international defence, infrastructure and security landscapes.

Through collaboration with governments, industry and international networks, we contribute to capacity building, knowledge exchange and long-term resilience in regions affected by conflict, instability and environmental pressures.

Our work includes partnerships supporting infrastructure rebuilding and engineering capability in Ukraine, alongside research into:

- aerospace and space systems in international defence contexts
- geopolitics, defence policy and global security
- resilient infrastructure and climate adaptation
- digital security, communications and disinformation
- human security, health systems and crisis response
- heritage and cultural asset protection and preservation



Sovereign capabilities

Engineering, technology and infrastructure for aerospace and defence

Newcastle University contributes to the UK's sovereign capability through advanced science, engineering and technology, developed in partnership with industry and government.

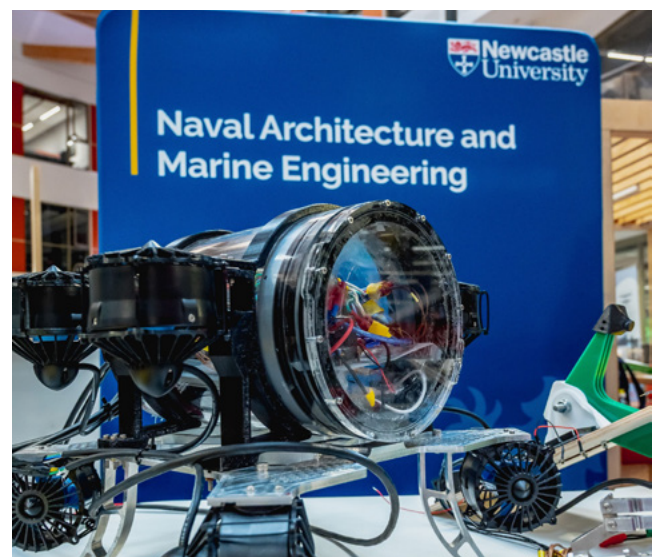
Our work supports long-term national capability across aerospace, defence, manufacturing and digital systems, helping to strengthen the UK's industrial base and technological advantage.



Core capabilities

We bring together expertise across:

- aerospace systems and propulsion including electrification of flight, propulsion technologies and integrated platform design
- digital, AI and autonomous systems spanning cyber security, edge AI, data analytics and autonomous platforms
- advanced materials and manufacturing including composites, lightweight structures and digitally enabled production systems
- sensing, communications and geospatial intelligence from satellite systems and Earth observation to secure communications and radar technologies



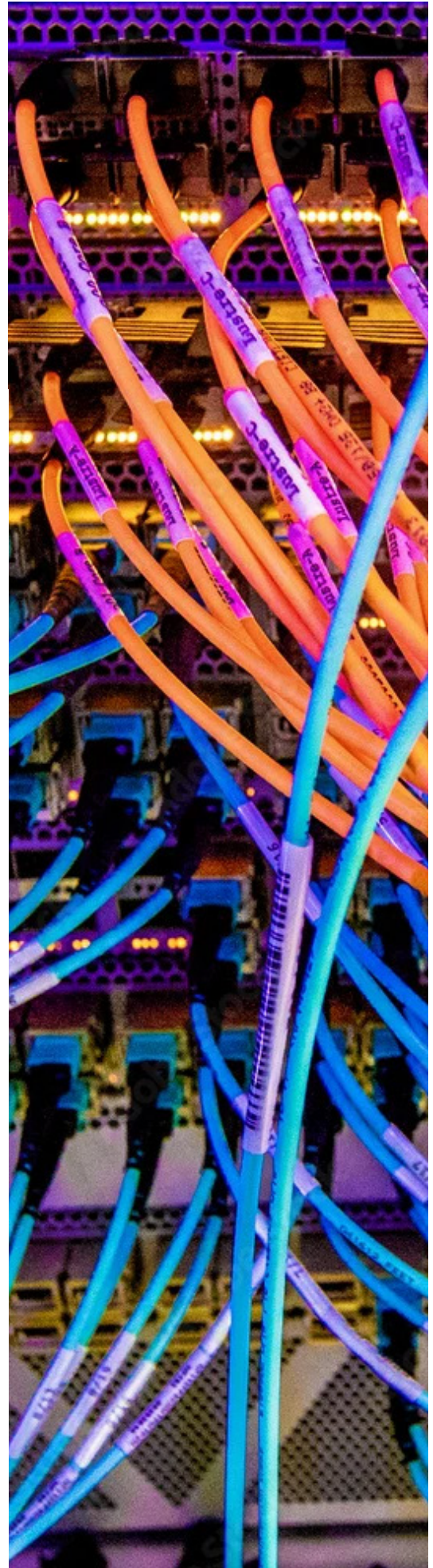


Facilities and applied research environments

Our capabilities are underpinned by nationally significant facilities and testing environments, including:

- **National Edge AI Hub**, developing low latency, deployable AI systems for security critical environments
- **National Gear Metrology Laboratory**, supporting high precision manufacturing across aerospace and defence sectors
- **Tyne Subsea hyperbaric facility**, enabling testing of subsea and autonomous systems under real operational conditions
- **Emmerson Cavitation Tunnel**, supporting propulsion, hydrodynamics and advanced engineering research
- **National Innovation Centre for Data**, working with industry and government on defence-relevant analytics and digital capability

These facilities enable testing, validation and deployment of technologies in real-world conditions, supporting partners across aerospace, defence and national infrastructure.



Working with the Royal Air Force

Delivering innovation within live operational environments

Newcastle University worked with the Royal Air Force to deliver innovation within live operational defence environments, supporting capability, infrastructure and long-term resilience.

At RAF Leeming, we partnered with the RAF to establish a first-of-its-kind innovation hub embedded within an operational airbase. The ViTAL living lab enabled new technologies to be developed, tested and evaluated without compromising operational readiness.

The programme demonstrated how universities and defence partners can safely develop and test new technologies within secure and highly regulated environments. Delivered across multiple leadership teams and operational stakeholders, it required trusted collaboration, specialist approvals and continuity over time.

Led by Professor Oliver Heidrich (pictured right) this work has contributed to international research outputs and was recognised in the MoD Sanctuary Awards programme.

Working with engineers, researchers and defence stakeholders, we co-created a 'living lab' to explore:

- decarbonised power and heat systems
- hydrogen and low-carbon transport technologies
- carbon accounting and lifecycle infrastructure modelling
- sustainable energy and resilience planning





**Watch the ViTAL
explainer video.**



Partner with Newcastle Innovations

Connecting research, skills and innovation

Newcastle Innovations connects your organisation with Newcastle University's research, facilities, expertise and talent to support collaborative innovation and capability development across aerospace, defence and advanced engineering.

We work with partners regionally, nationally and internationally to translate research and education into applied technologies, specialist skills and real-world deployment.

How we work with partners

We offer flexible routes to collaboration, including:

- collaborative research and strategic partnerships
- contract R&D, consultancy and technical advisory
- access to specialist facilities and testing environments
- talent pipelines and workforce development
- commercialisation, spin-outs and innovation funding

Working together in practice

Our partnerships bring together academics, engineers, researchers and industry teams to address complex technical and operational challenges, from AI and advanced manufacturing to energy systems, data analytics and next-generation materials.

We support organisations to accelerate development, reduce barriers to adoption and deliver long-term impact.



Defence Universities Alliance

Newcastle University is a founding member of the Defence Universities Alliance (DUA). Launched in July 2026, the alliance brings together UK universities to work with the Ministry of Defence (MOD), the UK Armed Forces, the Office of the Chief Scientific Advisor for National Security and the wider security sector to address national security challenges, advance research and innovation, and strengthen skills and career opportunities across the sector.

Working with leading aerospace and defence organisations

- Airbus
- Babcock
- BAE Systems
- GKN Aerospace
- Leonardo UK
- QinetiQ
- Rolls-Royce
- Thales
- Kongsberg Gruppen

Get in touch

To discuss potential collaboration, contact: innovations@newcastle.ac.uk

Looking to the future

Newcastle University is expanding its support for aerospace, defence and national security through coordinated investment in people, facilities, education and strategic partnerships.

We have formalised leadership for defence and security activity across engineering, computing, data science, medicine and policy.

Our approach reflects a 'whole of society' model, bringing together technical, operational and societal expertise to address increasingly complex national security challenges.

This work is supported through Newcastle University Centres of Research Excellence spanning cyber security, AI and data science, energy and food systems.

In the near future, we plan to launch a complementary Centre of Research Excellence in Defence and Security.

We are expanding capability in aerospace engineering and AI through new facilities, academic recruitment and growth in education programmes supporting the wider defence industrial sector.

If you would like to discuss how we can work together, contact:
innovations@newcastle.ac.uk







ncl.ac.uk



innovations@newcastle.ac.uk



Newcastle Innovations



Newcastle University exists for the public benefit to advance education, learning and research. Our objective is to build on this core purpose and, in doing so, provide new knowledge and creative solutions that make a positive impact. We aim to work collaboratively with our many external partners to shape brighter futures, grow the economy, and champion social justice.

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