



# North Jutland: A Global Hub for Space Innovation



AALBORG  
UNIVERSITY

IRISgroup

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# North Jutland: A Global Hub for Space Innovation



Over the past few years, North Jutland has emerged as a global powerhouse in space technology, home to both leading companies and cutting-edge research environments.

**North Jutland is emerging as a leading European hub for space technology**, with a particular strength in micro- and nanosatellites. The region brings together cutting-edge research, innovative startups, and highly skilled talent, positioning it at the forefront of a new, but rapidly growing small satellite industry.

**The cluster builds on a strong legacy.** Decades of expertise in radio and antenna technology – rooted in North Jutland’s former telecommunications cluster – has provided a unique foundation for satellite design and communication systems today. At the same time, a series of pioneering student-led cubesat projects at Aalborg University in the 2000s laid the groundwork for the first companies, giving students hands-on experience and sparking entrepreneurial activity.

**Today**, the cluster counts around 40 high-tech companies, most of them founded by Aalborg University students and researchers. While micro- and nanosatellites remain its core strength, the ecosystem is expanding into downstream applications, such as using satellite data in maritime operations, defence, and industrial intelligence.

**With strong research environments**, close industry–university partnerships, and strategic strengths in areas such as AI, advanced network systems, antenna technology, and robotics, North Jutland is set to grow as an agile and globally competitive space hub.

## Historical foundation 18



Radio and antenna technology



Space inventions

## Key strength: Micro- and nanosatellites 6



Satellite systems



Parts



Space missions

## Downstream applications 7



Maritime communication



Defence



Tracking

## Cluster overview 4



**40 high-tech companies**

– closely related to research, education and entrepreneurship activities at Aalborg University.

## Aalborg University: Research & Innovation 12



- Radio and antenna technology
- Communication technology
- Satellites for deep space missions
- Robotics for space

## Growth in the space cluster since 2010 10

## Wireless communication 7



5G/6G



Internet-of-things (IoT)



Radio communication

88 %

No. of jobs

150 %

No. of companies

141 %

Exports

173 %

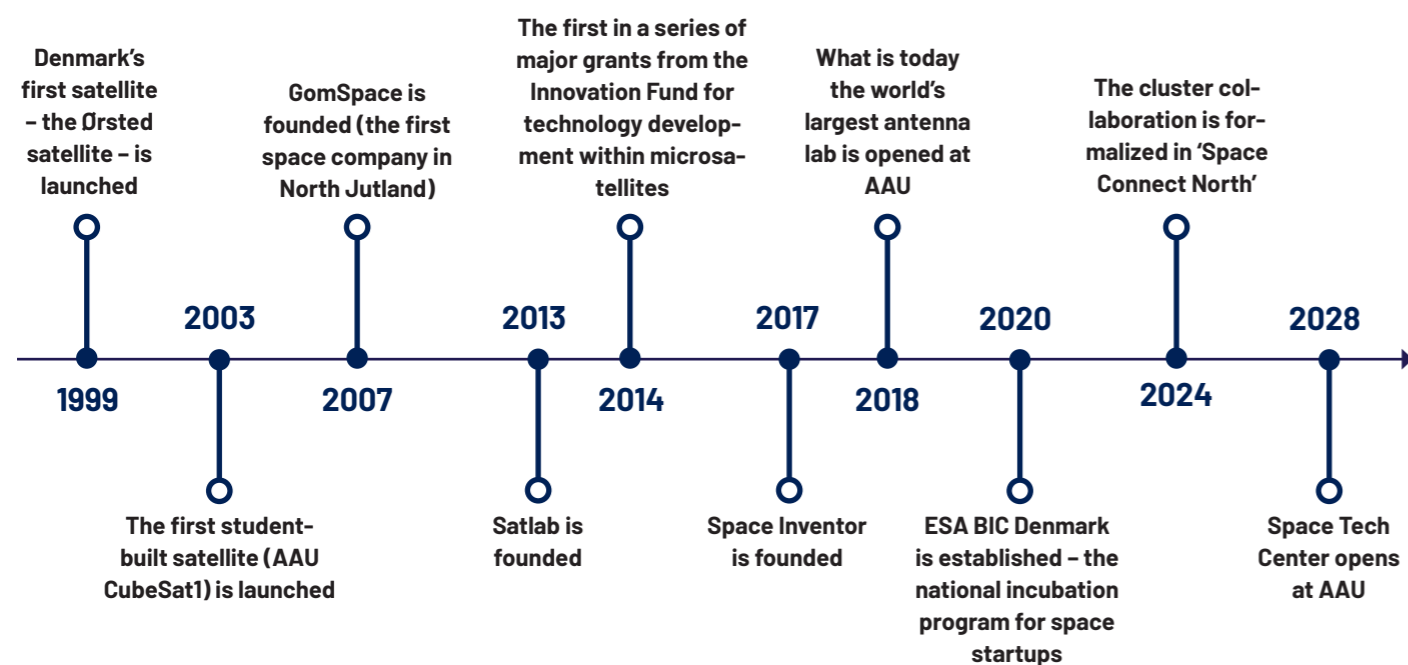
Turnover

### About the Report

This report has been prepared by IRIS Group for Aalborg University. It is based on interviews with companies and researchers at Aalborg University, as well as a special analysis conducted by Statistics Denmark, where company registration numbers (CVR) from the cluster were matched with national register data.



## Milestones in the development of the space cluster in North Jutland



The timeline highlights key milestones in the development of the North Jutland space cluster.

Space technology first emerged as a research field at Aalborg University in the early 1990s, when the university contributed to the development and launch of Denmark's first satellite, Ørsted. This milestone sparked broad interest in space technology among both researchers and students.

Building on the university's strong Problem Based Learning tradition, a student programme was created where engineering students designed, built, and launched nanosatellites. These projects laid the foundation for the first satellite companies in the region. Supported by the Innovation Fund Denmark, they went on to develop world-leading microsattellite systems.

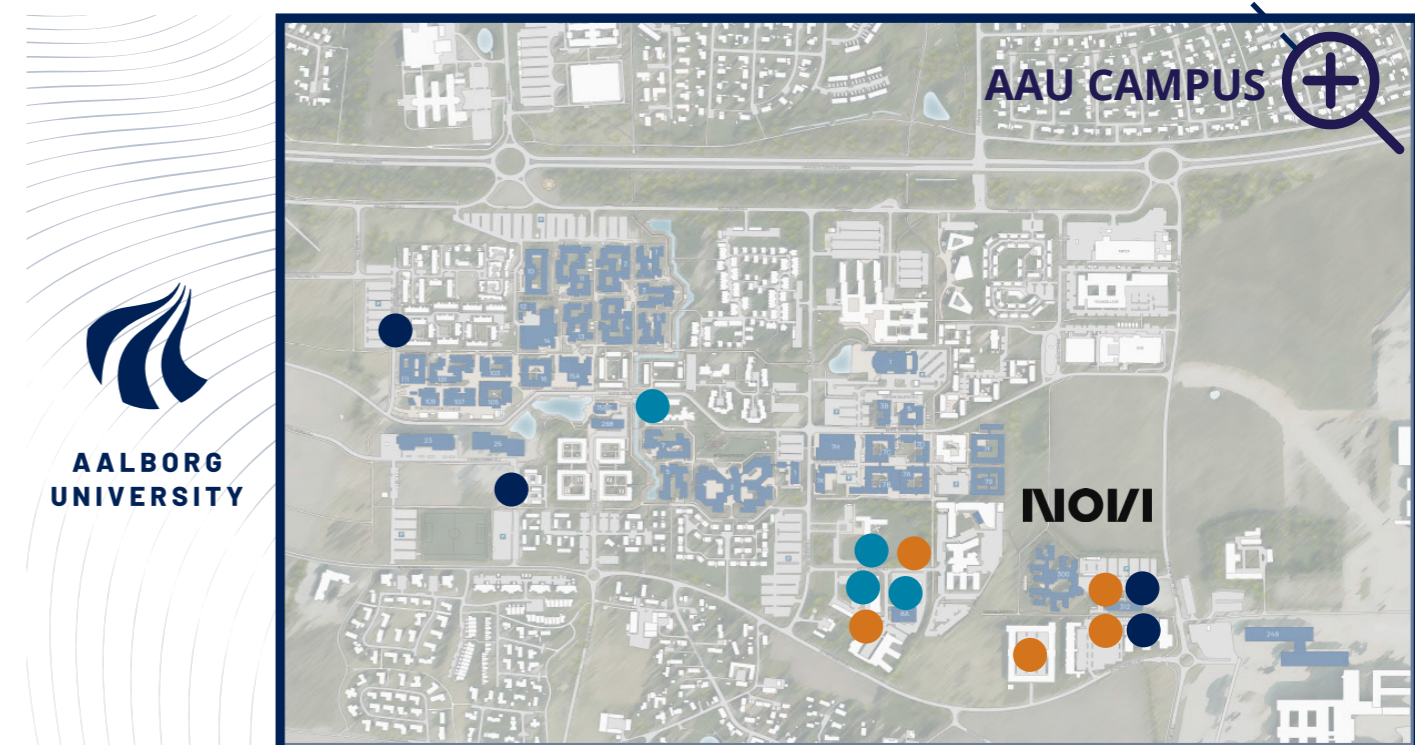
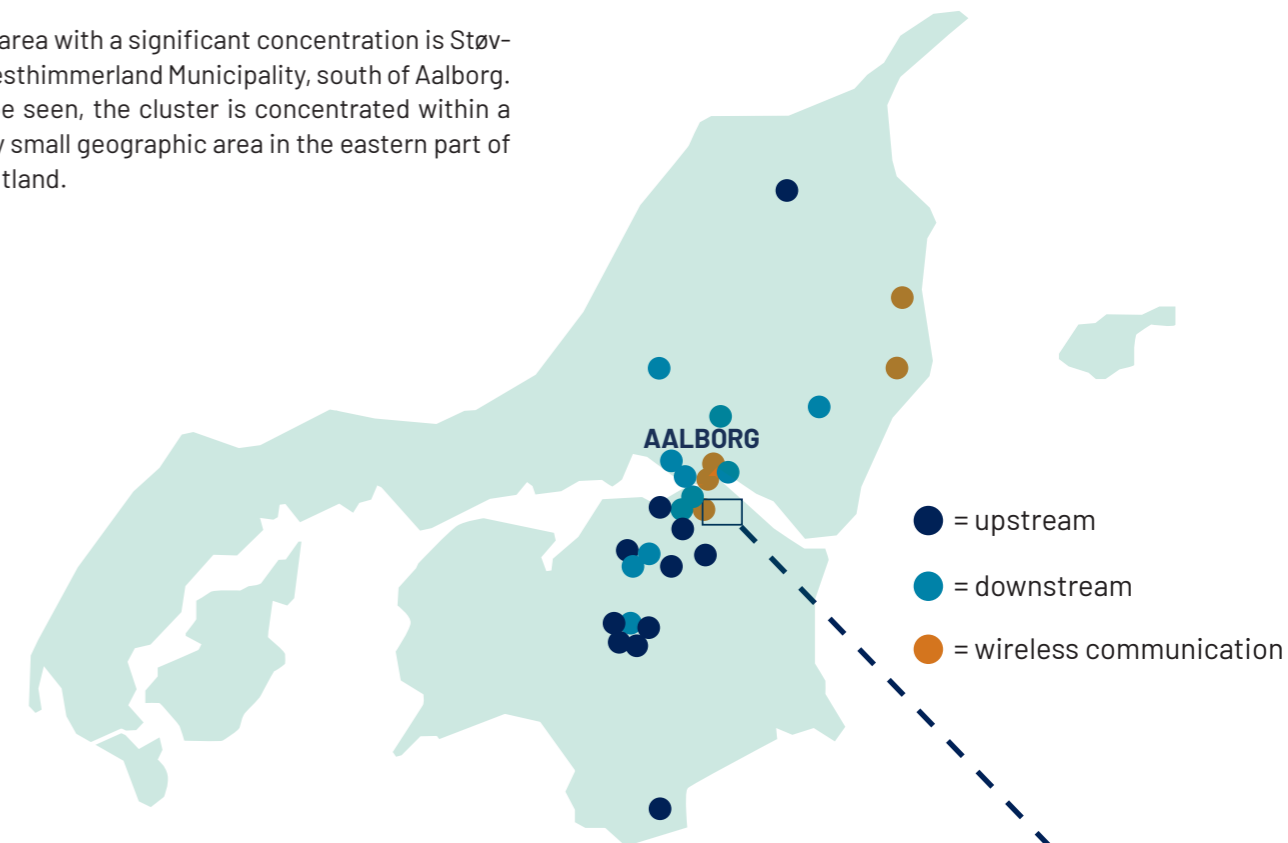
Over the years, Aalborg University has continuously strengthened its research, development, and testing facilities. A milestone was the opening of the world's largest antenna measurement laboratory in 2018.

The wider ecosystem has also matured. One milestone was the participation in ESA BIC Denmark, which supports space-related startups with business development and access to networks. Another was the creation of Space Connect North, a dedicated cluster organisation bringing together companies and researchers to foster innovation, collaboration, and attraction of talents and investments.

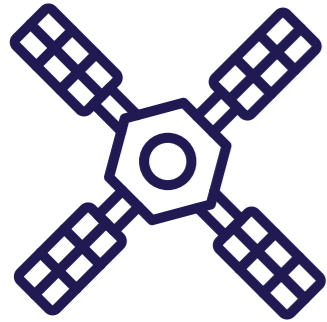
## The North Jutland Space Cluster

The North Jutland space and wireless communication cluster brings together around 40 high-tech companies, most of which maintain close ties to Aalborg University and are located in its immediate vicinity. 13 of these companies are based in NOVI Science and Business Park, situated on the university campus.

Another area with a significant concentration is Støvring in Vesthimmerland Municipality, south of Aalborg. As can be seen, the cluster is concentrated within a relatively small geographic area in the eastern part of North Jutland.



## Strengths and focus areas



### MICROSATELLITES – NORTH JUTLAND AS A GLOBAL POWERHOUSE

Nano- and microsatellites, weighing between 1 and 100 kilograms, are the defining strengths of the North Jutland space cluster. The region holds a unique international position, as the very first commercial microsatellites were built here. Since then, the local cluster has developed specialised expertise both in delivering complete satellite systems and in designing and producing advanced subsystems and parts for satellites.

Over the past 15 years, companies from North Jutland have contributed to around 1,000 microsatellites launched worldwide – a remarkable track record that underlines the depth of experience and reliability present in the cluster. These solutions are used across Earth observation, monitoring of ships and airplanes, intersatellite communications, navigation, defence and security, and are recognised globally for their high quality and robustness.

Today, approximately 450 full-time equivalents in North Jutland are engaged in this part of the space cluster. This concentrated knowledge base provides the foundation for continued innovation and growth, and it positions the region as a global hub for next-generation satellite technology.

Across the cluster, companies are world leaders in several key technology domains, including antenna systems, intersatellite communication, and power-efficient solutions for small satellites. These strengths are deeply rooted in the close collaboration and strong partnerships that characterise the North Jutland space ecosystem. Together, regional actors have attracted substantial funding for large-scale research and innovation projects, resulting in technological breakthroughs with significant commercial impact.

#### Key projects in the development of the North Jutland space cluster

##### SOFT 1 (2014–2016):

*Aalborg University and GomSpace collaborated on developing a compact radio platform designed to deliver multiple satellite functions – including GPS reception, reliable data transmission, and aircraft tracking. By integrating several functions into one module, the system requires significantly less space than traditional radio systems and can therefore be embedded in very small satellites.*

##### MARS (2018–2022):

*In partnership with GomSpace and PRI-DANA, Aalborg University developed miniature antennas and advanced radio communication technology for use in microsatellites. The project focused on improving data transmission from satellites through reconfigurable antennas that can be programmed to operate at different frequencies and directions depending on the satellite's position.*

##### MARIOT (2020–2023):

*Together with Sternula, GateHouse, Space Inventor, and Satlab, Aalborg University developed a new satellite and antenna system enabling communication between satellites and ships. The system has led to the launch of satellites that support maritime surveillance in the Arctic region—helping optimise shipping routes and significantly reducing sailing distances.*

**All projects were funded by Innovation Fund Denmark.**



### DOWNSTREAM SERVICES – A FAST-GROWING SEGMENT

Downstream services are becoming an increasingly important part of the North Jutland space industry. A diverse mix of companies are using satellite data to deliver commercial services across areas such as global communications, defence and security, maritime communication, safety, and sports technology.

Among the largest players are Gatehouse Satcom recognised for advanced satellite communications solutions; Trackunit, a global leader in satellite-based fleet and equipment tracking; MyDefence, which develops satellite-enabled security solutions; and Turf Tank, a frontrunner in autonomous sports field marking using GPS technology. Alongside these established actors, a growing number of startups originating from Aalborg University are contributing to the development of new data-driven services and strengthening the innovation dynamics of the cluster.

The field is today estimated to employ around 500 FTEs in North Jutland. Its competitive edge rests on two key foundations: first, world-class research and educational competences in communication, networking, and software technologies; and second, the presence of leading upstream companies with in-depth expertise in communication protocols, frequency ranges, data infrastructures, etc.

Thus, a strong advantage for downstream companies in North Jutland is their close proximity to upstream businesses and cutting-edge satellite research. Being a part of coherent space ecosystem means that new services can be developed with a deep understanding of the underlying technologies and standards that shape the possibilities of satellite-based applications.

### WIRELESS COMMUNICATION – A RESEARCH-BASED INDUSTRIAL STRONGHOLD

The cluster also includes a substantial number of companies working with wireless communication technologies that are still not directly space-related but build on many of the same competencies and technical foundations. These companies develop and deliver solutions used in areas such as mobile and broadband networks, Internet of Things (IoT), industrial automation, defence communication, and offshore solutions.

Key companies include Nokia Denmark, Samsung Research Center Denmark, Wirtek, Xtel Wireless, DMT Online, Keysight Technologies, and Rohde & Schwarz Technology Center. Collectively, they represent a broad span of activities – from design and testing of radio and antenna systems to embedded software development, and network optimisation. Many of these companies conduct research into the utilisation of 5G technologies, as well as advanced sensor solutions, tracking systems, and data communication platforms for industrial applications.

Close ties with Aalborg University play a key role in this environment. The university's strong research in wireless communication, 5G, and network systems has long served as a source of knowledge, talent, and collaboration for regional companies. As satellites are expected to play an increasingly important role in future communication systems, it is anticipated that many of these companies will grow both technologically and commercially into the space cluster.





## GomSpace – a first mover in the small satellite industry

**GomSpace** is one of the pioneers of the global micro- and nano satellite industry and a flagship of the North Jutland space cluster. The company was founded in 2007 by three graduates from Aalborg University, who had earlier taken part in building and launching the university's first cubesat in the early 2000s. What began as a spinout from student projects has since evolved into a world-leading enterprise with 220 employees, including 150 in Denmark.

The business is built on three pillars: delivering products such as battery packs, power systems, and radios for satellites; designing and operating complete satellite solutions for operators, including applications in maritime and aviation surveillance; and contributing to exploratory projects with ESA, for example space missions mapping asteroids to understand their composition and threat to Earth should they impact.

Since its listing on the Stockholm Stock Exchange in 2016, GomSpace has strengthened its international presence and today counts customers in more than 60 countries.

GomSpace's success rests on unique North Jutland expertise. Early on, the company recruited talent from the region's former mobile telecoms cluster, bringing deep knowledge of antennas and radio technologies. This strength has been reinforced through close collaboration with Aalborg University, which hosts worldclass research in antennas, radio systems, and software. Together, GomSpace, AAU and other companies in the cluster have advanced the global state of the art in small satellite technology, supported by numerous research and innovation projects, including pioneering efforts of demonstrating surveillance of and communication to aircrafts crossing oceanic areas from space.

Recent years have brought strong growth, driven in particular by the increasing interest of national governments in using space for both civilian and military purposes – a clear sign of the sector's dual-use character. Looking ahead, GomSpace expects continued collaboration with Aalborg University to play a key role in three areas: cybersecurity for more resilient and secure satellite systems; advanced radiocommunication to transmit more data through smaller antennas; and energy efficiency, improving how satellites convert solar energy into radio signals.

**To date**, GomSpace has contributed to 400–500 satellite missions worldwide, including the development of approximately 75 complete satellite systems – a track record that underlines the company's role as one of the most influential players in the global small satellite industry.



## Sternula – a leading downstream company within satellite communication to ships

**Sternula** is Denmark's first commercial satellite operator and a pioneer in secure maritime communication. The company develops mobile network systems and data services that enable ships to receive critical information far beyond the reach of internet connections. Its business builds on new international requirements for the AIS system – the global standard for ship tracking – which now must be able to exchange richer data with authorities. As a consequence, AIS is evolving to draw on satellite links, delivering navigation warnings, weather forecasts, and secure digital identification. This transformation is a game changer for global shipping.

The company combines upstream and downstream activities: purchasing and operating satellites, while delivering communication systems to vessels, coast guards, weather agencies, and private providers of maritime data such as route optimisation. Customers include the Danish Maritime Authority, Nigeria's maritime authorities, and pilot projects in Japan, Korea, and Australia.

Sternula's technological foundation was laid in an Innovation Fund Denmark project carried out in collaboration with Aalborg University and companies from North Jutland's space cluster.

Looking ahead, the company's long term aim is to establish a constellation of 60 satellites, ensuring ships anywhere on Earth can receive vital data within minutes. This ambition is expected to generate revenues exceeding DKK 1 billion over the next decade and position Sternula as a global leader in maritime satellite communication. The ambitions for the near future are to expand satellite-based monitoring in the Arctic and strengthen capabilities such as constellation management of satellite systems, inter-satellite communication, and enhanced data security.

**Founded in 2019** by two industry experts with backgrounds in wireless communication, Sternula is an international enterprise with approximately ten full-time employees. The team spans seven nationalities and includes five engineers educated at Aalborg University.



# A fast growing cluster

In 2023, the North Jutland space and wireless communication cluster employed around 1,150 people (full-time equivalents) and generated a turnover of DKK 3.1 billion, of which 42% came from exports.

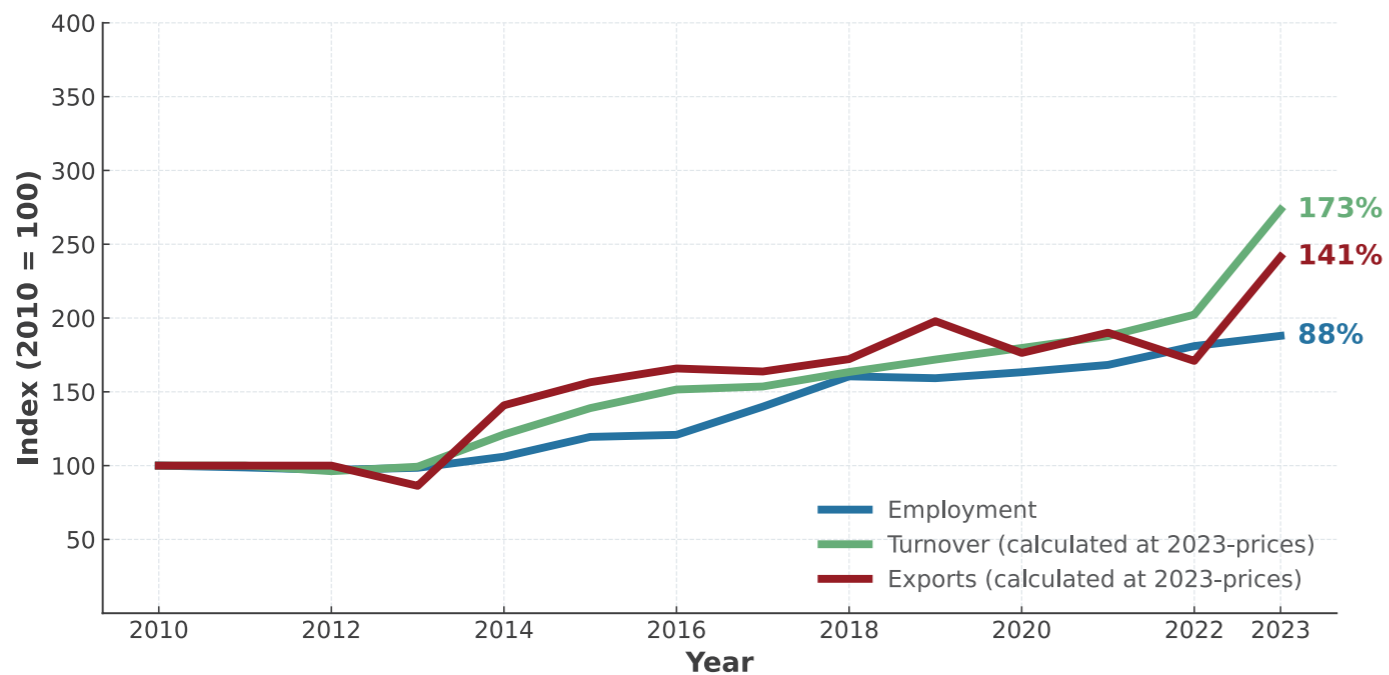
The cluster is extremely knowledge-intensive: more than half of the workforce holds a postgraduate degree. This also reflects the fact that it is still a young cluster, where many activities are closely tied to research and development.

Since 2010, employment has grown from 615 to 1,156 full-time equivalents – an increase of 88%. Turnover and exports have risen even more sharply, as shown in the figure.

## The North Jutland Space Cluster



## Growth in the cluster 2010-23



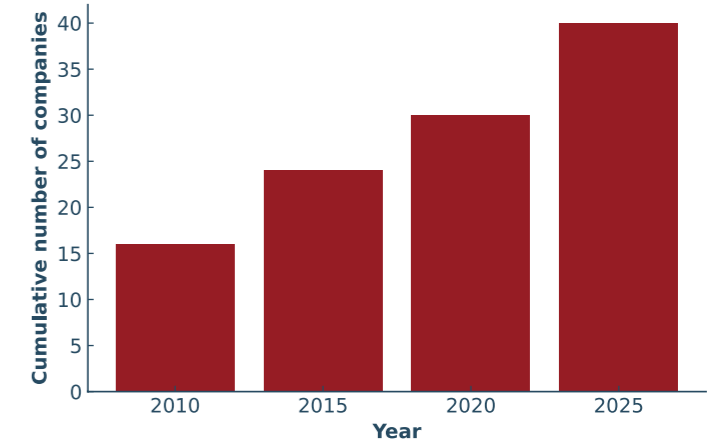
Source: IRIS Group based on data from Statistics Denmark

The North Jutland space cluster brings together established companies, scaleups, and a growing number of startups. In just 15 years, the number of companies has grown with 150%, reflecting the cluster’s dynamism and the many ideas for new technologies and ventures emerging from research and education at Aalborg University.

Over the past five years, many new companies have been founded, and growth is expected to continue at a similar pace. Aalborg University is actively involved in initiatives such as the national ESA BIC Denmark programme, a successful incubator and accelerator for new space companies. Since 2020, 11 North Jutland companies have participated in the programme.

The cluster includes a number of “anchor companies” that drive innovation and development across the cluster through collaborative projects and other forms of knowledge transfer. While headquartered in North Jutland (except Rohde & Schwarz), these companies also employ a substantial number of people at locations outside the region.

## Number of companies in the cluster 2010-25



## Anchor companies in the North Jutland space cluster (examples)

	Segment	Key business areas	No. of employees (2025)
<b>GOMSPACE</b>	Upstream	Empowers nations with space capabilities through advanced mini-, micro & nano-satellite solutions that transform technology into strategic digital infrastructure.	220
<b>SPACE INVENTOR</b>	Upstream	Develops microsatellites, satellite components & subsystems, space missions, equipment for satellite connectivity & security	100
<b>Gatehouse Satcom</b>	Downstream	Space-proven software for satellite communications and 5G Non-Terrestrial Networks – enabling connectivity, interoperability, and testing across satellite and terrestrial systems.	60
<b>Trackunit</b>	Downstream	Telematics/IoT/ asset & equipment tracking, fleet management, sensor-based services for industries & logistics using satellite or network data	400
<b>RTX</b>	Wireless communication	Develops wireless communication solutions for professional audio, health-care, and industrial applications.	200
<b>ROHDE &amp; SCHWARZ</b>	Wireless communication	Research and development within wireless communication, radio systems, and test and measurement equipment.	62

Note: No. of employees includes employment in departments outside North Jutland



## From Radio Technology to Robotics – AAU's Role in Space Innovation



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The success of North Jutland's space cluster is built on the foundation of a uniquely strong research and education environment at the **Department of Electronic Systems, Aalborg University** – one of the leading centres of its kind in Europe.

The department conducts research and runs educational programmes across all areas that are central to the development of microsattellites and the utilisation of satellite data. These include radio and antenna technology, automation, AI, software, network and communication systems, as well as process control.

In addition, the department has established specialised research groups and attracted major grants in fields expected to be crucial for the future of satellite systems. This includes cybersecurity, which is becoming a decisive competitive factor as satellites take on an increasing role in national security, communications, and dual-use applications.

Another emerging strength is robotics in space, where Aalborg University is a research first-mover. Future applications range from supporting advanced space missions to ensuring the reliability and durability of satellites through robotic systems capable of repair and maintenance.

Research at Aalborg University today also extends to space missions targeting the Moon, asteroids, and the observation of planets in other solar systems. These activities may evolve into a new business area for the North Jutland space cluster, as the ambition is to deploy Danish-designed satellites and components in such missions.

The following section highlights some of the university's distinctive research strengths in relation to space technology.

## Radio and Antenna Technology

Radio communication and antenna technology have been a cornerstone of research at Aalborg University for decades. In the 1990s, the university set out to play a central role in the development of North Jutland's telecommunications cluster, investing heavily in research on integrated antennas, small radio systems, reliable electronics, and low-power battery solutions. These capabilities later proved to be critical for the development of micro- and nanosatellites, which require precisely the same types of components and technologies.

Today, research within the university's antenna technology division addresses the demands placed on satellites by the current geopolitical context and the growing need to safeguard data and communication. Key focus areas include steerable antennas, which can direct signals to a specific location on Earth; robust communication signals, resistant to jamming or interference by foreign powers; and the integration of artificial intelligence in satellites to improve the ability to interpret and filter signals, ensuring that the right data is transmitted.

The division also operates world-class facilities for testing antennas and radio connections. Local space companies make frequent use of its three antenna laboratories to validate new satellites and signal systems before launch. Often, new antenna systems are developed through close collaboration: based on company requirements, Aalborg University supports innovative solutions demonstrated by simulation and mock-up development, which can then be taken further into production.

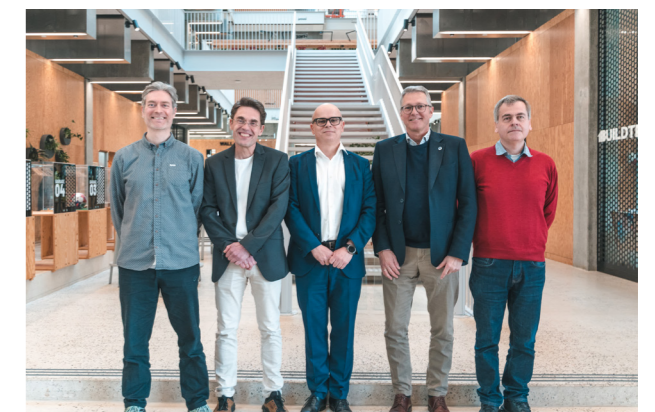
A flagship facility is the world's largest antenna measurement laboratory, inaugurated at Aalborg University in 2018. Housing equipment worth €10 million, it enables the precise measurement of signals over long distances from satellites, airplanes, or drones without interference from ground reflections – a capability unmatched by conventional outdoor testing.

## Communication technology

Communication technology has for decades been a strong research and educational field at Aalborg University. At the Department of Electronic Systems, research is focused on communication and networking in wireless systems, with particular emphasis on satellite communication and non-terrestrial networks – communication infrastructures that are not limited to ground-based antennas.

Within satellite communication, researchers are exploring how satellite networks can be integrated with 5G networks and the emerging 6G technology. A major research theme at the department is intelligence from space – that is, how satellites can be equipped with increased computing power and AI capabilities. Such intelligent communication from orbit may, in the future, support applications such as maritime route planning, air traffic management, and the coordination of complex operations, including large-scale wildfire response. Another key area of focus is the development of technologies that enable secure and robust communication between IoT systems and satellites, for example between IoT devices deployed on ships and orbiting platforms.

In 2025, the university received a grant of DKK 60 million from the Danish National Research Foundation to establish a Centre of Excellence for classical communication in the quantum era (CLASSIQUE). An important part of the research in this centre will be the role of satellites in the future quantum internet.



*A team led by Professor Petar Popovski (centre) received a DKK 60 million grant in 2025 for a Centre of Excellence, which will conduct research on how wireless communication and satellites can support quantum technology.*

## Satellites for Deep Space Missions

While research and industry collaboration at Aalborg University has so far focused primarily on satellite technologies aimed at observing Earth, future projects will increasingly look outward into deep space.

The Department of Electronic Systems' division for automation and control has launched close research partnerships with the University of Copenhagen, Aarhus University, and the Technical University of Denmark on projects that will pave the way for Danish-built satellites to take part in ambitious space missions.

At the centre is the Máni mission, which, if realised, will become Denmark's first lunar mission. The aim is to map the Moon's surface with unprecedented detail using a Danish-built satellite equipped with advanced camera technology and image analysis systems.

Carried out under the auspices of the European Space Agency (ESA), the mission will provide valuable knowledge to support future lunar landings and extended missions.

In parallel, Aalborg University is engaged in projects to design satellites capable of looking beyond our solar system in search of stars and exoplanets.

North Jutland's upstream companies are expected to play a central role as partners and suppliers in these projects. Beyond creating new business opportunities, their involvement will also strengthen competencies in areas such as camera systems, telescopes, and spectrograph technology – as well as satellite component design for the extreme conditions of outer space.



## Robotics for Space

Robotics is a well-established Danish strength – both in research and industry. Yet the use of robots in space remains a largely unexplored field, where Aalborg University has emerged as a global first mover.

At the Department of Electronic Systems, the research group “Advanced Robotics and AI” develops robotic solutions for extreme environments such as space, clean-room conditions, and dual-use applications in areas without communication or GPS signals. The group designs the mechanical and electrical systems, as well as the software and artificial intelligence, that enable robots to operate autonomously. Much of the research focuses on robots for planetary tasks on the Moon and Mars, as well as systems that can function in microgravity – for example, robots capable of satellite maintenance to extend operational lifetimes.

The group works in close collaboration with the European Space Agency (ESA) in both research and education programmes. A current focus is on robotic systems that can navigate, excavate, and extract materials on the Moon. Here, the group is participating in a challenge programme where winners secure ESA contracts to prepare robotic systems for lunar missions.

The Advanced Robotics and AI group also aims to encourage the Danish space industry to embrace deep space as a future business area. North Jutland companies, with expertise in computing, cooling, antennas, and communication systems, are expected to play a key role in enabling the technologies required for upcoming lunar missions.

## Tess Space

### – Bringing Research into Practice

To ensure that research translates into real-world applications, Associate Professor Simon Bøgh, head of the Advanced Robotics and AI group, founded the spinout Tess Space together with PhD fellow Anton Bjørndahl Mortensen. The company focuses on developing intelligent mobile robotics for both space exploration and defence-related logistics, such as delivering equipment and medical supplies to the frontline. Tess Space has already developed a guidance and navigation system for existing unmanned ground vehicles (UGVs) that enables them to operate in areas without internet, radio signals, or GPS connectivity.

Looking ahead, the ambition is to collaborate with space companies to develop fully autonomous robotic systems capable of operating in outer space such as the Moon and Mars.



# Aalborg University holds a strong position in space research

Aalborg University is one of Europe’s leading universities in research within space and wireless communication.

The table below shows the top 15 out of a total of 179 universities in the EU that offer educational programmes in engineering. As shown, Aalborg University ranks sixth among European engineering universities in terms of the number of scientific articles published since 2020.

Aalborg University also ranks highly in terms of scientific quality. Among the 295 scientific articles published between 2020 and 2025, approximately 100 are among the 10% most cited globally within their respective fields. As shown in the last column of the table, only three universities have a higher share of highly cited articles. This reflects the strong international recognition and impact of Aalborg University’s research.

## Space and wireless communication research 2020-2025 – Top 15 among European engineering universities

UNIVERSITY	COUNTRY	NO. OF ARTICLES	SHARE OF ARTICLES AMONG THE 10% MOST CITED
Delft University of Technology	Netherlands	498	26.9%
KTH Royal Institute of Technology	Sweden	475	31.6%
Polytechnic University of Milan	Italy	474	29.5%
CentraleSupélec	France	453	40.4%
Technical University of Munich	Germany	379	23.0%
<b>Aalborg University</b>	<b>Denmark</b>	<b>295</b>	<b>31.5%</b>
Polytechnic University of Turin	Italy	288	19.4%
Chalmers University of Technology	Sweden	263	28.9%
Swiss Federal Institute of Technology Zurich	Switzerland	233	36.9%
University of Luxembourg	Luxembourg	228	43.4%
Aalto University	Finland	227	28.2%
Technical University of Madrid	Spain	201	12.4%
Eindhoven University of Technology	Netherlands	193	20.2%
Technical University of Berlin	Germany	188	27.7%
University of Stuttgart	Germany	187	28.9%

Source: IRIS Group based on data from Scival

Note: The list is based on 26 journals within space, communication, and automation and control, where research on space-related topics is typically published.

# Key actors in the space ecosystem

The North Jutland ecosystem brings together a range of actors collaborating to establish a global hub for research, innovation, and entrepreneurship in space and wireless communication. The main actors are listed below.

ACTOR 	DESCRIPTION / ROLE 	CONTACT INFORMATION 
	Newly established cluster organisation bringing together companies, researchers and the regional investment promotion agency to accelerate innovation, recruitment, investments and partnerships with companies outside the cluster.	<a href="https://spaceconnectnorth.com">https://spaceconnectnorth.com</a> <a href="mailto:info@spaceconnectnorth.com">info@spaceconnectnorth.com</a>
 Space Tech Center	A new centre for space technology at Aalborg University, bringing together research and education in the field, and featuring state-of-the-art laboratories and facilities for research, innovation, and testing of space technology. Opens in 2028.	<b>Head of Department,</b> <b>Professor Mads Græsbøll Christensen</b> Department of Electronic Systems <a href="mailto:mgc@es.aau.dk">mgc@es.aau.dk</a>
	European Space Agency’s Danish business incubation centre supporting early-stage space startups through funding, mentoring and network activities. Regional unit located at Aalborg University.	<a href="https://space.aau.dk/innovation">https://space.aau.dk/innovation</a> <a href="mailto:space@adm.aau.dk">space@adm.aau.dk</a>
	A leading science park located on the university campus hosting several space-related companies. Provides office facilities, business support and access to research networks, making it a central meeting point for technology-based entrepreneurship in the region.	<a href="https://novi.dk">https://novi.dk</a> <a href="mailto:novi@novi.dk">novi@novi.dk</a>
	A centre of expertise in space technology and serves as a certification body for the European Space Agency (ESA). It provides both training and testing in space technology and is part of AMU-Nordjylland.	<a href="https://hytekaalborg.dk">https://hytekaalborg.dk</a>
	Invest in Aalborg aims to attract both investment and talent to the region, with a focus on seven key sectors, including the space industry and the connectivity sector.	<a href="https://investinaalborg.dk">https://investinaalborg.dk</a>



## The history of the cluster



### From Telecommunications to Space Technology

**North Jutland's space cluster** is distinguished by its ability to design technologies for small satellites that transmit data at high speed – and by companies that develop advanced systems to receive and apply satellite data for maritime operations, defence, and other fields. This dual capability is rooted in the region's long tradition within wireless communication.

The story stretches back to the years before Aalborg University was established. The company SP Radio was a leading force in navigation equipment for ships and played a key role in inspiring the university to build strong research environments in radiocommunication, antenna technology, and mobile systems. This research base laid the foundation for the emergence of a thriving telecommunications cluster. In the 1990s and early 2000s, North Jutland became a hub for companies such as Motorola, Intel, Samsung, and Nokia, all of which established R&D functions in the region.

One milestone came with the development of one of the world's first GSM (2G) phones, created through a joint venture between local firms Dancall and Cetelco in close collaboration with Aalborg University. At the same time, Flextronics established mobile phone electronics production in Pandrup.

Despite this momentum, the regional industry could not sustain global competitiveness against giants such as Nokia and Ericsson. International companies gradually relocated activities out of North Jutland, and when Motorola closed its large R&D division in Aalborg in 2009, the telecom cluster was declared "dead".

Yet the legacy of this cluster was far from lost. A number of high-tech companies within wireless communication remained, increasingly shifting their focus toward satellite data applications. Nokia and Samsung also kept R&D units located near Aalborg University's campus. More importantly, the decline of the telecommunications industry freed up a pool of highly skilled engineers with deep expertise in integrated antennas, energy-efficient electronics, and radio technologies – precisely the capabilities needed to power the next wave of innovation: micro- and nanosatellites.

Compared to traditional satellites, these small satellites – CubeSats – could be built and launched at a fraction of the cost. This opened the door for researchers and former students to establish new companies without the need for massive capital investment. In this way, North Jutland transformed its industrial downturn into the raw material for a new and globally competitive space cluster.



### Ørsted Satellite, Student Projects and Space Facilities at Aalborg University

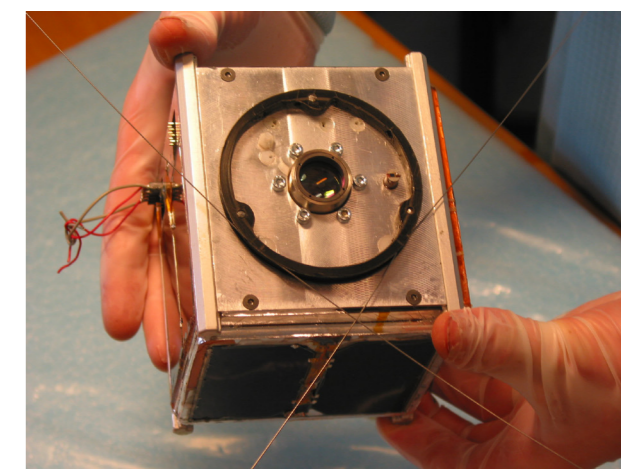
**Space technology** became a research field at Aalborg University's Department of Electronic Systems in the early 1990s, when the university, together with the Technical University of Denmark, the Danish Meteorological Institute and Terma, took part in developing Denmark's first satellite – the Ørsted Satellite. The project sparked great interest in space among both researchers and students at Aalborg University.

Around the same time, a group of researchers and students began following new developments in the US within so-called CubeSats – nanosatellites that are extremely lightweight and far less costly to build than traditional satellites. Inspired by the university's Problem-Based Learning philosophy, a student programme was launched where participants worked in teams to design and construct their own satellites. Each group was responsible for specific subsystems and components, mirroring the complexity of a real space mission.

The first student-built CubeSat – AAU CUBESAT1 – was completed in less than two years and became part of the very first CubeSat launch in 2003. Its mission was to demonstrate that a nanosatellite could capture images of Earth with an onboard camera, and it successfully achieved this goal. Since then, Aalborg University has launched AAUSAT2, AAUSAT3, AAUSAT4 and AAUSAT5. Students have also contributed to payloads on other satellites, as well as experiments on parabolic flights and stratospheric balloon missions.

In parallel with these projects, Aalborg University established dedicated laboratories and testing facilities for space technology. These facilities became the breeding ground for several of the region's most successful companies, including GomSpace, Space Inventor and Satlab, all of which developed their space components at the university before moving into the commercial sphere.

Equally important, Aalborg University has continuously supplied the engineering talent that underpins the growth of the regional space cluster. The development of satellites and satellite-based applications demands a broad range of competencies – from radio and antenna technology to automation, software, process control and network systems. All of these disciplines are central to the university's engineering programmes.



## AAU CUBESAT1

*AAU CUBESAT1 was a small 1U CubeSat, measuring about 10 × 10 × 10 cm and weighing 1 kg. Its mission was to test technology and take images of the Earth, especially over Denmark. The satellite was launched on 30 June 2003 from Plesetsk, Russia, aboard a Rokot rocket.*

*AAU CUBESAT1 operated for around two and a half months, until its battery became too weak. Although its signals were weak and only limited data could be received, the mission was a success. It demonstrated that students could design, build, and launch a CubeSat, and it laid the foundation for future AAUSAT satellites and student-led space activities.*

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