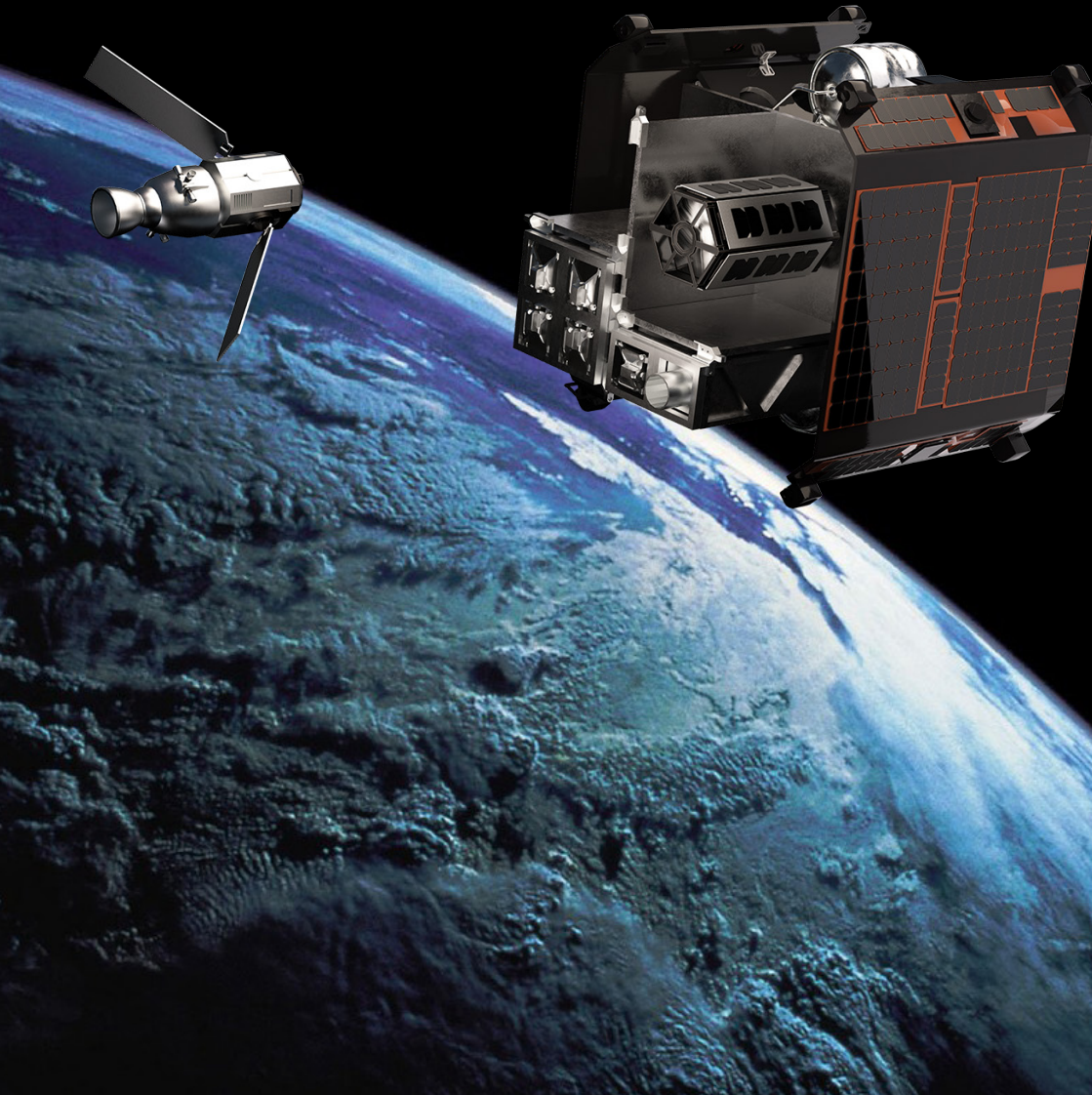




# BEYOND MISSION BOOKLET



**Mission name:** Beyond  
**Carrier name:** ION SCV Daring Diego

**Fino Mornasco, Italy, December 1, 2023** — D-Orbit, an industry leader in space logistics and orbital transportation, successfully launched its 13th commercial mission today, named Beyond, using its cutting-edge Orbital Transfer Vehicle (OTV) ION Satellite Carrier (ION).

Falcon 9 lifted off at **10:19 AM PT (6:19 PM UTC)** from **Space Launch Complex 4 (SLC-4E) at Vandenberg Space Force Base** in California. ION Satellite Carrier was subsequently deployed into an approximately **560-km Sun Synchronous Orbit**.

During the mission, ION will host onboard several satellites, third-party satellite deployers, and third-party payloads including, ALISIO-1, a 6U CubeSat by the Instituto de Astrofísica de Canarias (IAC) and IACTEC Space; NANO FF A and NANO FF B, two 2U CubeSats by TU Berlin; LOGSATS, a 3U CubeSat by Patriot Infovention; PONO 1, a 2U CubeSat by Privateer; Z01™ SuperTorquer, by Zenno Astronautics; RECS, a hosted payload by D-Orbit and the Space Propulsion Laboratory (SPLab) of the Politecnico di Milano; MI:1, a mission by TRL11 that will test in orbit a prototype of the company's Space Aware Edge Computer; and two 6P PocketQube satellite deployers by Alba Orbital Ltd.

Since its first commercial mission in September 2020, D-Orbit has successfully completed 12 missions.

D-Orbit's mission control team is now conducting the Launch and Early Orbit Phase (LEOP), setting the stage for the upcoming operational phase.



**A note about the name of the satellite carrier**

The name of the satellite carrier is “ION Daring Diego”, a combination of the acronym “ION”, which stands for “InOrbit NOW”, and the satellite’s first name. This format follows the naming conventions of naval vessels used in navies around the World. The name “Diego” was drawn at random from a bowl containing the names of all D-Orbit’s employees. The company will continue to follow this procedure in the future to honor the skills, energy, passion, and commitment to its people.





Name of payload: LOGSATS

Form factor: 3U

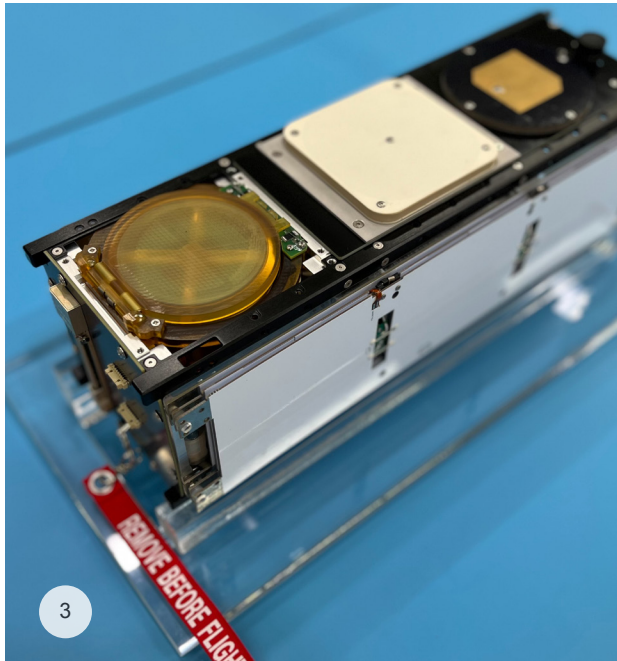
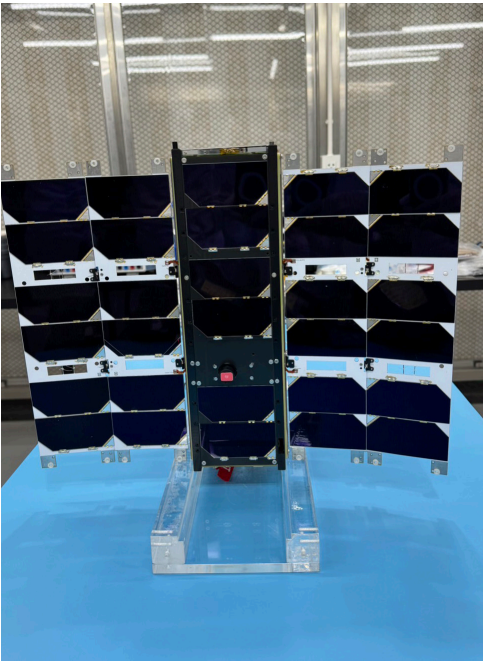
POC: Parinya Anantachaisilp  
parinya@infovention.com

The satellite is set to pioneer Thailand's inaugural space-based Internet-of-Things (IoT) communications framework, alongside the nation's first aviation monitoring system. This groundbreaking initiative is designed to facilitate the implementation of an advanced smart city infrastructure, leveraging information and communication technology to optimize urban resource utilization. Concurrently, the aviation monitoring system will bolster the regulation of both manned and unmanned aerial traffic within Thailand's airspace. This endeavor represents a crucial milestone for Patriot Infovention, setting the stage for their ambitious 2027 goal of deploying a satellite constellation capable of delivering near real-time communications coverage across the entire nation.

**COMPANY PROFILE** Website: [www.infovention.com](http://www.infovention.com)

At Patriot Infovention, we breathe life into the cosmos by crafting state-of-the-art satellites that revolutionize communication, exploration, and discovery. With a blend of cutting-edge technology and visionary innovation, we're not just launching satellites – we're catapulting dreams beyond the stratosphere. Craft the future of celestial connectivity with us, one orbit at a time. Contact us to explore how our advanced LEO satellite, IoT services can transform your connectivity landscape.

Photo credits: Infovention



Name of payload: NanoFF A and NanoFF B

Form factor: 2x 2U

POC: Prof. Dr. Ing. Enrico Stoll  
e.stoll@tu-berlin.de

Jens Freymuth  
jens.freymuth@tu-berlin.de

The NanoFF (Nanosatellites in Formation Flight) project at the Technical University of Berlin, spearheaded with funding from the German Aerospace Center (DLR) by the Federal Ministry for Economic Affairs and Energy, is a trailblazer in miniaturized satellite technology. The primary mission objective is the controlled formation flight of both satellites in a helix orbit, a pioneering feat for TU Berlin, as it will be the first time satellites of such compact size from the university perform a formation flight in orbit. To realize this goal the project's core innovation lies in its highly miniaturized satellite bus platform, TUBiX-5, which integrates a propulsion system within a compact 2U frame, offering an unprecedented 1.3U payload capacity. This project is technologically highly advanced with features like the extensive, deployable solar panels, redundant GNSS receivers, three miniaturized star trackers, and four optical cameras with 39m ground pixel resolution, and over 160 km swath width and marks a significant milestone for TU Berlin. All of these achievements highlight the mission's unique blend of innovation, commercial viability, and academic excellence.

**COMPANY PROFILE** Website: [www.tu.berlin](http://www.tu.berlin)

The Chair of Space Technology at the Technical University of Berlin is a leading academic and research institution dedicated to advancing the field of aerospace engineering. It focuses on preparing the next generation of aerospace system engineers, emphasizing the design, development, and operation of small satellite missions as a key component of its educational program. The Chair's research interests include distributed space systems for applications like Earth observation and climatology, lunar exploration utilizing rovers, and the development of robotic capabilities for small satellites in orbit. The Technical University of Berlin, where the Chair of Space Technology is housed, is renowned for its strong emphasis on research and innovation, particularly in the fields of engineering and technology. This institution plays a significant role in shaping future technologies and preparing students for careers in cutting-edge fields, including space technology.

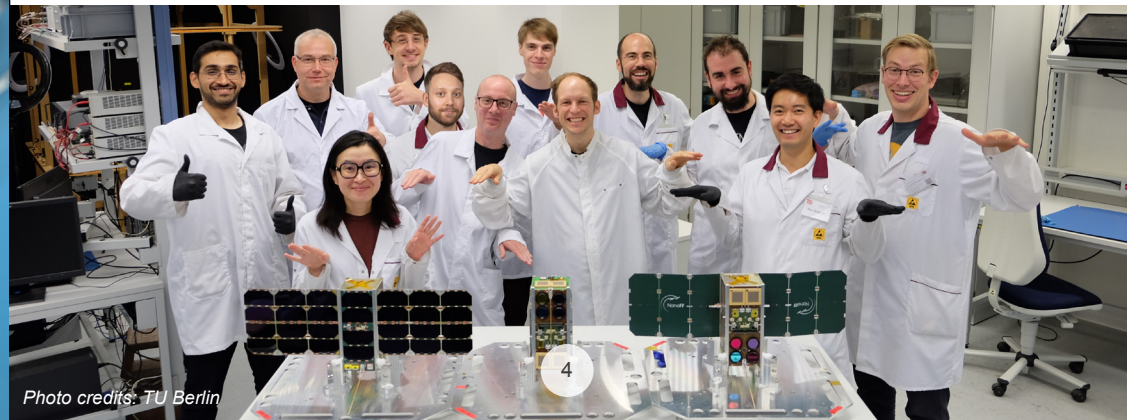


Photo credits: TU Berlin



Name of payload: ALISIO-1

Form factor: 6U

POC: IACTEC Space  
iactec.space@iac.es



ALISIO-1 is the first Canary Islands satellite for Earth Observation. Its main instrument is a DRAGO-2 (Demonstrator for Remote Analysis of Ground Observations) camera, developed by the IACTEC-Space team, which was tested on a demonstration mission at the beginning of this year in the D-Orbit's ION-SCV 007 Glorious Gratia carrier. With a resolution of 50 m per pixel and a swath of 32 km for an orbit of 500 km, DRAGO-2 is capable of obtaining high-quality multispectral images in the short-wave infrared, in two observation bands: 1.1 and 1.6 microns. It uses uncooled InGaAs sensor technology, with an average power requirement of less than 5.5 W. The camera boasts an on-board image processing unit, which allows it to compress, encrypt and even apply complex image processing algorithms, such as super-resolution, to the acquired images. The ALISIO-1 satellite will also include an optical laser communications module that will allow to send its images to any optical station on Earth at higher speed than radio communication. This instrument will also be able to emit a standard signal that allows determining and characterizing the atmospheric turbulence. The module shall operate a downlink in the C-Band (1550 nm) and receive a beacon in the L-Band (1590 nm). The experiments performed with this module will allow the verification and testing of the latest advances in adaptive optics with plenoptic wavefront sensors for optical communications, in which the IAC is actively engaged. ALISIO-1 will become a key factor in planning the prevention and actuation against natural catastrophes. It will allow the monitoring of environmental phenomena such as wildfires, desertification and excess humidity in crops, floods, oil spills in the ocean and many other effects related to climate change.

## COMPANY PROFILE - INSTITUTO DE ASTROFÍSICA DE CANARIAS

Website: [www.iac.es/en](http://www.iac.es/en)

The Instituto de Astrofísica de Canarias (IAC) is a Spanish public research organization focused on Astronomy research, outreach and technological development. It is located on the Canary Islands (Spain). It manages two of the best international observatories in the world: the Observatorio del Teide (OT) on the island of Tenerife and the Observatorio del Roque de los Muchachos (ORM) on the island of La Palma. The IAC is a public consortium composed by the General Administration of the Spanish State, the Public Administration of the Autonomous Community of the Canary Islands, the University of La Laguna (ULL) and the Consejo Superior de Investigaciones Científicas (CSIC).

## COMPANY PROFILE - IACTEC SPACE

Website: [www.iac.es/en/projects/iactec-space](http://www.iac.es/en/projects/iactec-space)

IACTEC is a space for technological and business collaboration associated with the IAC located on the island of Tenerife (Spain). It was founded in 2017 to promote the collaboration between the public and private sectors, boosting the transfer of cutting-edge technological developments and the technological experience accumulated during more than 40 years at the IAC to various projects that include medical technology, space technology and large telescope projects. IACTEC-Space is the specific area of IACTEC focused on the design and manufacture of space instrumentation.

In its first years of operations, its main goal has been the design and production of high-performance optical payloads for small-size Earth observation satellites, with the successful development of the DRAGO-1 and DRAGO-2 space cameras and the VINIS high-resolution imager. The team is also developing IACSAT-1, a space astronomical observatory designed for the confirmation and characterization of exoplanet candidates and the study of near-Earth primitive asteroids.

Photo credits: IAC and IACTEC Space





Name of payload: RECS

Type of payload: Refueling system

POC: Giuseppe Coco  
comms@dorbit.space

Simone La Luna  
simone.laluna@dorbit.space

RECS is a hosted payload by D-Orbit and the Space Propulsion Laboratory (SPLab) of the Politecnico di Milano that aims at better understanding the behavior of nitrous oxide (N<sub>2</sub>O), a propellant already used in D-Orbit's propulsion system, and its performance during refueling. This is the final PhD project of Simone La Luna, now Head of Propulsion and Thermal Engineering at D-Orbit, which focuses on in-orbit refueling and green propellants; the payload, with a mass of around 10 kg, comprises two tanks (one full and one empty) with a valve designed to facilitate the transfer of N<sub>2</sub>O from the full tank to the empty one, aiming to simulate the process of in-orbit refueling between two satellites. Pressure, temperature and fluid flow will be measured by the payloads' sensors during this entire process. The payload aims to experimentally verify mass flow and boiling models and in-orbit nitrous oxide refueling tests.

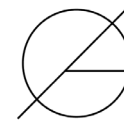
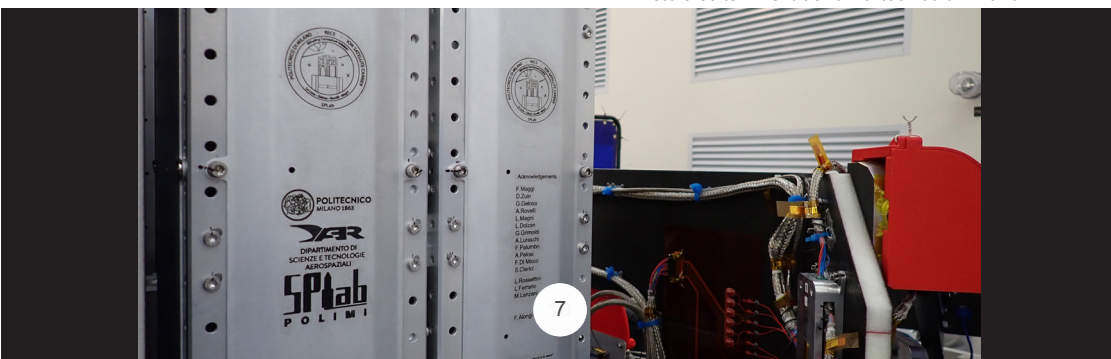
**COMPANY PROFILE - D-ORBIT** Website: [www.dorbit.space](http://www.dorbit.space)

D-Orbit is a market leader in the space logistics and transportation services industry with a track record of space-proven services, technologies, and successful missions. D-Orbit's roadmap includes becoming a relevant player in the in-orbit servicing market, which is forecasted to become one of the largest, growing markets within the space sector. D-Orbit has offices in Italy, Portugal, the UK, and the US.

**COMPANY PROFILE - POLITECNICO DI MILANO** Website: [www.polimi.it](http://www.polimi.it)

Founded in 1863, today Politecnico di Milano is the largest scientific-technological university in Italy. The University has always focused on the quality and innovation of its teaching and research, developing a fruitful relationship with business and productive world by means of experimental research and technological transfer. The laboratory participating in the project is the Space Propulsion Lab (SPLab-POLIMI) which belongs to the Department of Aerospace Science and Technology. SPLab takes an active part in scientific and educational programs both at a national and international level cooperating with leading universities and scientific centers in the USA and Europe.

Photo credits: D-Orbit and Politecnico di Milano



**Zenno  
Astronautics**

Name of payload: Z01™ SuperTorquer

Type of payload: Attitude determination and control system (ADCS)

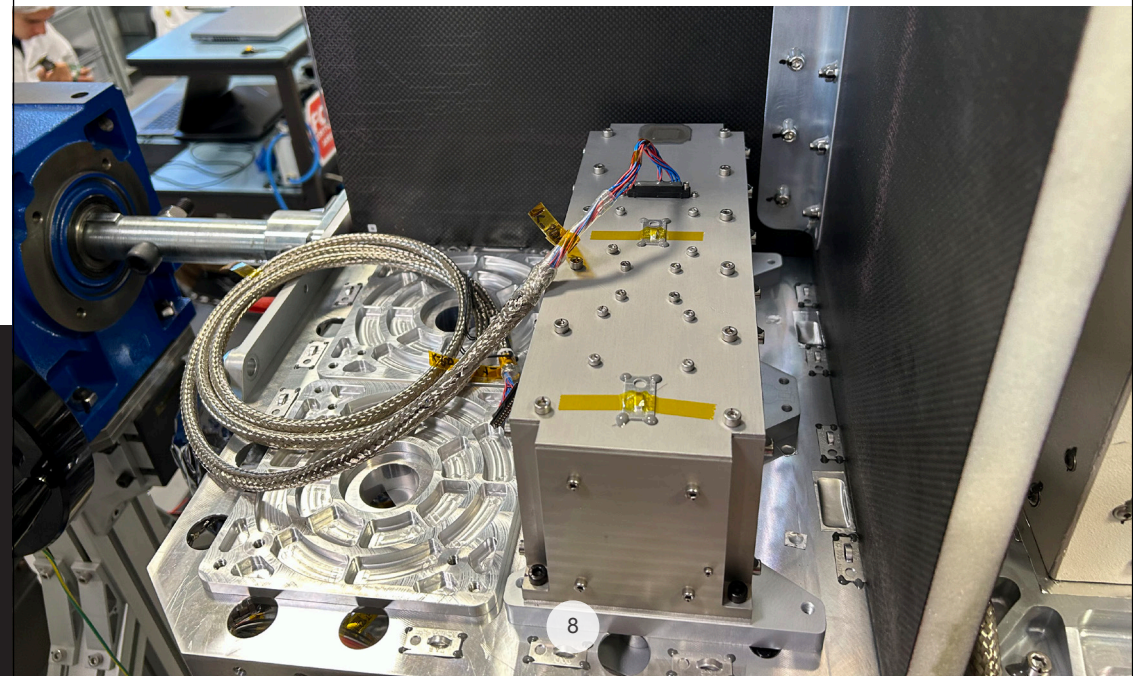
POC: Erica Lloyd  
e.lloyd@zenno.space

The Z01 SuperTorquer will demonstrate the effective operation of the world's first high-temperature superconducting electromagnets in space. Built on Zenno's proprietary superconducting magnet technology, the Z01 enables fully autonomous and fuel-free satellite positioning and is designed to control the attitude of a spacecraft by aligning it to the Earth's magnetic field, this is a world-first. The Z01 single and 3-axis dipole systems offer significantly lower size, weight, and power cost benefits plus significantly extended the range of operations into higher orbits when compared with the traditional technology they replace.

**COMPANY PROFILE** Website: [www.zenno.space](http://www.zenno.space)

Zenno Astronautics Limited is a New Zealand, Europe and US-based company pioneering the future of sustainable and safe spacecraft operations utilising a range of superconducting magnet applications. Zenno enables fully autonomous and fuel-free satellite positioning and precision interactions between satellites. Zenno is creating multiple applications of superconductivity in space including radiation shielding, plasma control, close proximity operations and beyond for the benefit of the entire space sector.

Photo credits: Zenno



# TRL11



Name of mission: MI:1

Type of payload: Edge computing platform

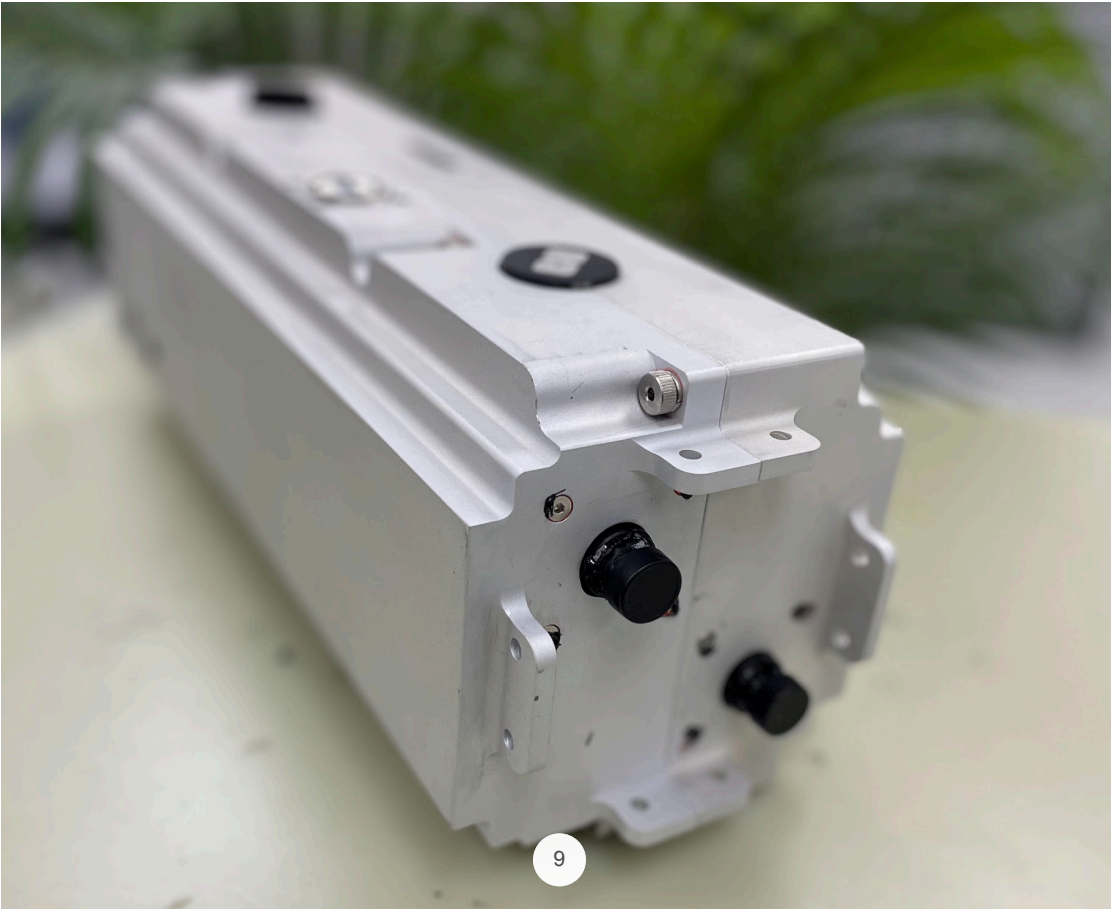
POC: Nicolaas Verheem  
nicol@trl11.com

The MI:1 mission will test in orbit a prototype of the company's Space Aware Edge Computer.

**COMPANY PROFILE** Website: [www.trl11.com](http://www.trl11.com)

TRL11, Inc. designs and manufactures state-of-the-art full motion video solutions and the supporting subsystems for aerospace applications. Headquartered in Irvine, CA, the company was started in 2022 and launched the first prototypes to orbit in less than a year. The name TRL11 is meant to imply taking the first step toward the next chapter of space exploration.

Photo credits: TRL11



PRIVATEER



Name of payload: Pono 1

Type of payload: Edge computing platform

POC: Beau Holder  
beau@privateer.com

Pono 1 is a compact edge computing, storage, machine learning, and data transmission system built to be available to satellite operators as a hosted payload. Consisting of a high-speed SDR comms package, flight computer, and high-performance NVIDIA Orin-based GPU cluster, it will offer powerful on-orbit compute capabilities, radiation and thermal mitigation, and telemetry tracking. It is designed for significantly upgraded precision in asset tracking and prediction, with retroreflectors attached to the hardware's exterior providing ultra-high accuracy orbit determination. Pono 1's integration will enable operators to perform AI tasking, image processing, and collision risk assessment and avoidance, while generating additional revenue through their data streams' integration into Privateer's developer marketplace.

**COMPANY PROFILE** Website: [www.privateer.com](http://www.privateer.com)

Maui-based Privateer was co-founded in 2021 by tech and space veteran Alex Fielding, Silicon Valley titan Steve Wozniak, and renowned astrodynamist Dr. Moriba Jah to serve as the decision intelligence platform and data engine for sustainable space economy growth. Combining hardware and software capabilities 'for space' with APIs and microservices that fuel opportunities for data users and developers 'from space,' the company's mission aims to not only drive progress on Earth, but preserve and expand space's potential for future generations.

Photo credits: Privateer





Name of payload: AlbaPod 6P PocketQube satellite deployers

Type of payload: Deployers and PocketQubes

POC: Caius Reza  
caius.reza@albaorbital.com

Albapods are satellite deployers specifically designed by Alba Orbital for PocketQube satellites, supporting various formats from 1p to 3p. Onboard this mission, the AlbaPods are hosting the following PocketQube satellites:

**UNICORN-2L, UNICORN-2M and UNICORN-2N** are part of Alba Orbital's flagship Earth Observation pico-satellite constellation dedicated to monitoring artificial light at night (ALAN) across the globe. The 3P PocketQube satellites will provide high resolution imagery of the Earth at night, enabling tracking of applications such as light pollution, urbanization, greenhouse gas emissions and energy usage from space.

**MDQubesat-1**, by Miota Space, is a proof of concept for IoT communications through picosatellites in LEO. It has UHF communications, stabilization through magnetorquers, seven 3J solar cells and two Li-Po batteries. Its main purpose is to test the satellite platform for its use in future missions.

**COMPANY PROFILE** Website: [www.albaorbital.com](http://www.albaorbital.com)

Founded in 2012, Alba Orbital from Glasgow, Scotland, is the world's leading PocketQube satellite manufacturer and launch broker. To date, Alba launch has successfully deployed 25 PocketQube satellites into orbit including the Unicorn-2 platform. Unicorn-2 is the world's most capable Picosat by specification. Alba also offers ground station services via their Albaconnect platform enabling an end-to-end service to newspace users and operators. Alba has over 20 customers on 3 continents.

Photo credits: Alba Orbital

