

# Startups successfully deployed a compact, fuel-efficient satellite engine in space

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(LR) George-Cristian Potrivitu, Co-founder and Chief Technology Officer of Aliena, a candidate for the NTU PhD, and Co-founder and CEO of Aliena, Energy Institute @NTU (ERI @ N) .. Credit: Aliena

Aliena, a technology spin-off from Nanyang Technological University (NTU Singapore) in Singapore, today deployed a nanosatellite with a fuel-efficient engine in space. The nanosatellite was transmitted from the SpaceX Falcon 9 Transporter-3 mission launched from Cape Canaveral Air Force Station, Florida, USA.

The Hall effect thruster, the engine of the satellite, is a type of ion thruster in which ions from the propellant are accelerated by an electric field, and was invented and developed by Aliena. Compared to current satellite engines of that type, new engines consume very little power for their operation.

Thrusters are very important for satellites because they need to make occasional thrust launches to keep them in orbit. Otherwise, the thruster will re-enter the Earth's atmosphere and end the mission. This is due to the resistance or drag from the thin atmosphere they encounter.

Historically, most satellites weighed thousands of kilograms and were huge satellites several stories high. However, over the last two decades, the popularity of small satellites has grown, and small, lightweight, fuel-efficient engines have been developed to maintain satellite functionality. Sky..

Compared to current Hall thrusters, which require about 1,000 watts to keep large satellites in orbit and are not suitable for small spacecraft, Aliena's engine operates nanosatellite with less than 10 watts of power. Can be maintained. The entire propulsion system fits in a 10 cm x 10 cm x 10 cm cube, weighs less than two cartons, and is significantly lighter than traditional compatible systems.

Often referred to as the fourth state of matter, plasma and its physical properties play an important role in Aliena's engine. The launch of the NTU uses plasma propulsion to allow small satellites to move through space with forces from just a few micronewtons. This is comparable to the amount of force an ant uses to move forward a few steps.

Dr. Marc Lim Jiang Wei, Co-Founder and Chief Executive Officer of Aliena and Deputy Principal Researcher at the Energy Institute @ NTU (ERI @ N), said: To meet the growing demand for mobility in outer space via plasma engines. Once an early market, the number of space technology companies incorporated to take advantage of the cost-effectiveness of small satellites and access to space has skyrocketed. Develop unique constellations that impact on-ground and off-ground businesses. "

George Christian Potribitu, Co-Founder and Chief Technology Officer of Aliena, also holds a PhD in NTU. Candidates said, "Aliena is focused on developing state-of-the-art plasma-based satellite propulsion systems. This mission is a crucial miles for Singapore's rapidly emerging civilian space ecosystem from the early stages. It definitely shows the stone. It proves that our system works well in the space of satellites. This is important to keep expanding our customer base. We are the precedent for small spacecraft. By providing no mobility, we want to enable their new operations and promote

new business opportunities in space, enabling them to carry out their most challenging missions. ”

### **Empowering satellites for the next frontier of space exploration**

Aliena Thruster also features other innovations that make the system more durable and allow the system to be instantly ignited without the need for external heating to warm up.

Aliena’s engine is an electric plasma propulsion system that is fuel efficient compared to non-electric systems and requires a smaller, lighter battery and fewer solar panels than existing thrusters on the market.



3D image rendering of a satellite with an Aliena engine in Earth’s orbit.

Credit: Aliena

As a result of fuel efficiency, satellites with Aliena engines will carry less fuel for their missions, giving them more flexibility to operate in space.

When satellites need to be grouped in order to function as a system, it is important to provide the ability to minimize satellite movement for purposes such as constellation formation. Also, in addition to in-orbit maintenance and services, space, such as the 2013 movie “Gravity,” in which the actress Sandra Bullock’s character had to use cold gas thrusters to serve the Hubble universe. It is also useful for other complex operations in. telescope.

Dr. Lim hopes that the successful launch of a nanosatellite equipped with a new engine will enable new operations for small satellites while reducing power consumption and improve satellite capacity utilization. I am doing it. ”

Following this mission, Aliena will deploy a microsatellite-class engine (MUSIC) on a larger satellite platform in 2023 for the ORB-12 Strider mission in orbital space engineering.

Since then, Aliena has secured individual orders from private customers and has attracted interest from other companies regarding the use of engines in satellites.

David Toh, CEO of NTUitive, said: We accelerate the commercialization process through support in areas such as intellectual property and office space on how university research can be translated and quickly brought to market through our funding and support programs. And help grow entrepreneurs and pair them with the technology most suitable for their business. "

Aliena was founded in 2018 after the founders Dr. Lim and Potrivitu met while holding a PhD at the NTU's Space Propulsion Center. The company was funded by NTU's innovation and enterprise company NTUitive in 2019, and the technology was incorporated into the testbed at the NTU Satellite Research Center (SaRC).

Aliena first demonstrated the principles behind the mode of operation of the engine in SaRC. The team was provided access to the SaRC facility to assemble the prototype. It was also the place where the engine first showed a successful test launch. This is a milestone that the Aliena team has helped Aliena pave the way for closing the first oversubscribed funding round.

Aliena, a spin-off from NTU, was also supported through NTUitive's flagship Strategic Research and Innovation Fund (SRIF). This fund is engine From that prototype.

NTU's first foray into space began over 20 years ago. The first project was the communication payload codenamed Merlion, launched in 1999, but the main satellite body was developed by the University of Sally.

Since then, NTU has built nine satellites and sent them into Earth's orbit. X-SAT is NTU's microsatellite, built in collaboration with the Defense Sciences Organization, and was the first locally built in Singapore. Hygiene It was launched into space in 2011.

Mothball pushes satellite into space

Provided by

Nanyang Technological University

**Quote:** Startup is a compact, fuel-efficient satellite engine acquired from <https://phys.org/news/2022-01-startup-successfully-deploys-compact-fuel-efficient-on-january-14-2022>. Deploys successfully (January 14, 2022). html

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