Singapore's first AI nanosatellite to be launched under $200m national space push

NTU's Satellite Research Centre executive director Lim Wee Seng briefing his team of scientists and engineers.

PHOTO: NTU SARC

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SINGAPORE – Scientists here will soon launch a small, lightweight "nanosatellite" carrying AI-powered edge computing, allowing it to analyse and prioritise information to be sent back to Earth, such as images unobscured by cloud cover.

The satellite will be tested during a one-year mission – the first of its kind for Singapore, led by the Satellite Research Centre (SaRC)

at Nanyang Technological University (NTU) – to evaluate its electronics performance and overall operational design.

Its artificial intelligence (AI) can be directed to prioritise cloud-free images or flag urgent events such as forest fires and oil spills, with only useful data relayed back to Earth.

Compact outputs sent by the AI-powered satellite – such as key coordinates, image analysis summaries and selected image snippets – may comprise just kilobytes or a few megabytes of data, compared with raw satellite imagery that can range in size from hundreds of megabytes to gigabytes.

This significantly cuts transmission time.

This could be useful in responding to time-sensitive scenarios, such as oil spills or earthquake recovery efforts in the future.

The AI project will be integrated into a 30cm by 10cm by 10cm satellite built by space technology firm Satoro Space, a Singapore-based "satellite-as-a-service" solutions company.

The sub-5kg unit will be launched into orbit at around 500km above the Earth in 2026.

The AI-powered satellite was one of three new projects announced on Feb 2 by NTU, and supported by the national Space Technology Development Programme (STDP).

The Government has earmarked over $200 million since 2022 for STDP to boost research and development and spur the growth of Singapore's space technology ecosystem.

Satellites can communicate and transmit data only when they pass over a ground station on Earth. At most, this contact window is about 10 minutes each time. Sun-synchronous orbits, which most Singapore satellites use, make a pass every 100 minutes.

SaRC executive director Lim Wee Seng said raw satellite imaging data accumulates quickly, and a small satellite may collect up to gigabytes of imagery over a day.

“Instead of sending everything back to Earth, the satellite can make decisions on board – filtering, analysing, and transmitting information, not just raw data. This dramatically reduces latency and makes space systems far more efficient.”

He added: “Intelligent satellites can decide what matters on board, ensuring precious space bandwidth is used to deliver answers, not noise.”

The mission will also test next-generation solar cells – mounted on the same satellite – in space. These perovskite solar cells are a new type of solar technology that is cheaper and easier to make than traditional solar panels, and can be printed onto flexible, lightweight materials.

Mr Lim said it will take “a few years” till the AI satellite’s cutting-edge technologies are commercialised.

Similar technologies to optimise information sent back to Earth using AI started around 2020, with the European Space Agency’s PhiSat-1 CubeSat demonstrating onboard machine-learning inference to filter cloudy imagery before sending the data to ground stations.

The second project NTU announced is a nanosatellite to be deployed in 2028 to test a new propulsion system that will allow better manoeuvring in space during a 1½-year mission.

The third is a space imaging camera, which uses three mirrors instead of lenses to deliver sharper images, that will be installed on the International Space Station in 2027 for six months.

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