

Two NTU satellites complete first space missions

They were launched in December last year to test S'pore-made satellite technologies

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Two satellites built by Nanyang Technological University (NTU) and launched in December have completed their first space missions to test a variety of new Singapore-made satellite technologies. NTU now has six satellites in orbit.

NTU provost Freddy Boey said: "With this track record, we can now offer our satellite-building expertise to Singapore companies that are hoping to develop innovative space products for the global market."

One of the satellites, the 123kg Velox-CI tropical climate satellite, funded by the Economic Development Board, tested highly accurate navigation systems and made climate measurements.

The other satellite, the Velox-II weighing a petite 12kg, evaluated technologies customised for small satellite systems, including radiation-resistant hardware.

Although "nanosatellites", such as the Velox-II, have a shorter lifespan in space than larger ones owing to limited solar and battery power, they are cheaper and faster to bring into the market, said Associate Professor Low Kay Soon, director of NTU's Satellite Research Centre. In fact, he added, "velox" is the Latin word for "quick".

Among the technologies tested in space was the world's first on-demand communication system. It allows a satellite on the other side of earth, beyond the line of sight of its ground station, to maintain communications at all times by relaying the signal via a second satellite in a higher orbit that is "visible" to both.



Prof Low showing the flight paths of the six NTU satellites currently in orbit to research fellow Lee Guo Xiong. PHOTO: NANYANG TECHNOLOGICAL UNIVERSITY

This technology may one day help disaster relief agencies get crucial satellite images in real time, instead of having to wait for the satellite to come within range, said Prof Low.

The technology was developed by Singapore company Addvalue Innovation, with the help of Global Positioning System (GPS) technology developed by NTU that allows a satellite to accurately determine its position within a minute.

In order for satellites to communicate effectively, they must know not only their position, but also which way to point their antenna.

Software was tested on the Velox-CI to enable the satellite to determine its orientation to an accuracy of about 0.0003 of a degree by analysing images of stars around it.

As well as testing satellite navigation systems, Velox-CI took measurements of the atmosphere for studying space weather and earth's climate.

One of them used the technique of radio occultation, whereby data on temperature, humidity and atmospheric pressure can be obtained by measuring the bending

of GPS signals as they pass through the atmosphere.

Prof Low said collaborations are in the works with the National Environment Agency and Singapore Land Authority on projects to study long-term climate trends and accurately measure land movement using the new technologies.

NTU's seventh satellite, Aoba Velox-III, will be launched later this year, in partnership with the Kyushu Institute of Technology in Japan.

Prof Low said: "Our next challenge is to design future satellites that can carry advanced custom-built payloads."

Like the world's first artificial satellite - Sputnik - launched in 1957, Velox-II reports back to earth regularly.

Every minute, the satellite transmits a radio signal in Morse code, containing its name and vital signs such as battery level and solar panel temperature. This signal can be received by any amateur radio operator in the line of sight of the satellite.