



## **News Release**

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### **NTU gearing up for two new satellites**

*Space-proven technology adopted from NTU's earlier satellites*

Nanyang Technological University (NTU) is building two new satellites that will be launched into space next year - Singapore's first climate satellite and an experimental communication satellite.

The two new satellites will be adopting some of the technologies that have been successfully tested in NTU's VELOX-P11, a pico-sized satellite built by its undergraduates which marks its one-year anniversary this week, and its bigger brother VELOX-I launched in June.

The two NTU space satellites have flown more than a combined 7,600 times around Earth. NTU's first satellite, X-SAT which was also Singapore's first satellite, was launched in 2011.

The VELOX-P11 and VELOX-I tested a variety of new satellite components built by NTU students and research staffs. These include a new radiation-resistant image sensor; a mechanism to control the orientation of the satellites; a new satellite communication system; and a fast response Global Positioning Satellite (GPS) module.

Given the successful testing of these made-in-NTU components some 650 kilometres above the Earth, the University will be using some of these space-proven technologies in the next two NTU satellites which will be ready for launch in the fourth quarter of 2015.

Associate Professor Low Kay Soon, Director of NTU's Satellite Research Centre, said that "having two more satellites completing in-orbit experiments in the harsh environment of space is no mean feat."

"The success of the NTU satellites validates the expertise of our satellite engineers, giving us the confidence to integrate our new knowledge into building more advanced satellites, which will help Singapore in its quest to establish a space industry," Prof Low added.

## **Experimental communication satellite**

The new **VELOX-II** will be carrying experimental satellite-based communication hardware developed by Addvalue Innovation Pte Ltd, a subsidiary of Singapore Exchange mainboard listed Addvalue Technologies Ltd.

This unique payload carried by the 12 kilogramme satellite built by NTU is collaboration between NTU and Addvalue. If proven successful in space, the payload will allow the VELOX-II to send data back to the NTU ground station from anywhere even if the satellite is not flying above Singapore, as is presently the case.

## **Climate satellite**

The **VELOX-CI** is a 130-kilogramme satellite about the size of a mini fridge that is funded by Singapore's Economic Development Board. It will be used for to study tropical climates.

Through the use of a special technique known as radio occultation and advanced algorithms, VELOX-CI will be able to obtain weather data such as the upper atmospheric temperature, humidity and pressure, which are useful for long term climate studies.

Radio occultation makes use of the radio signals transmitted from the GPS satellites 20,000km above the Earth. Using specially-designed GPS receivers, VELOX-CI can detect these signals for a short duration, even if there is no line of sight due to the bending of these signals by the atmosphere.

## **Successful trial of new ground station technology**

The success of VELOX-P11 and VELOX-I satellites also showed the commercial viability of NTU's satellite ground station technology.

The ground station had successfully tracked and communicated with the two satellites via Ultra high frequency (UHF) and Very high frequency (VHF) for the past one year.

"UHF/VHF are not easy channels to track as they have a lot of interference from other types of radio communication and the weather," Prof Low said. "However, for small satellites like nano or pico-sized satellites, they are a perfect fit as they have low power requirements and it is relatively easy to apply for a license for the use of the amateur radio frequency band."

As a complete UHF/VHF satellite ground station solution is not commonly available in the market, Prof Low said that with further refinements such as auto-tracking of

satellites and better software interface, the technology can be commercialised in future.

The success of NTU's satellites and ground station are important contributions to the University's research efforts in Innovation Asia, which aims to produce research that is beneficial for Singapore and beyond. It is one of NTU's Five Peaks of Excellence – interdisciplinary research areas which the university aims to make a global mark in. The other four peaks include Sustainable Earth, Future Healthcare, New Media, and the East-West knowledge hub.

Besides ground-breaking research, NTU has had remarkable success translating its research into innovative applications. Ranked 39 globally by higher education information provider Quacquarelli Symonds, NTU is also ranked No. 1 in the world for industry income and innovation by Times Higher Education, and ranked 42nd globally for its scientific research amongst 20,000 institutions worldwide in the new Nature Index released earlier this month.

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***About Nanyang Technological University***

A research-intensive public university, Nanyang Technological University (NTU) has 33,500 undergraduate and postgraduate students in the colleges of Engineering, Business, Science, Humanities, Arts, & Social Sciences, and its Interdisciplinary Graduate School. It has a new medical school, the Lee Kong Chian School of Medicine, set up jointly with Imperial College London.

NTU is also home to world-class autonomous institutes – the National Institute of Education, S Rajaratnam School of International Studies, Earth Observatory of Singapore, and Singapore Centre on Environmental Life Sciences Engineering – and various leading research centres such as the Nanyang Environment & Water Research Institute (NEWRI), Energy Research Institute @ NTU (ERI@N) and the Institute on Asian Consumer Insight (ACI).

A fast-growing university with an international outlook, NTU is putting its global stamp on Five Peaks of Excellence: Sustainable Earth, Future Healthcare, New Media, New Silk Road, and Innovation Asia.

Besides the main Yunnan Garden campus, NTU also has a satellite campus in Singapore's science and tech hub, one-north, and a third campus in Novena, Singapore's medical district.

For more information, visit [www.ntu.edu.sg](http://www.ntu.edu.sg)