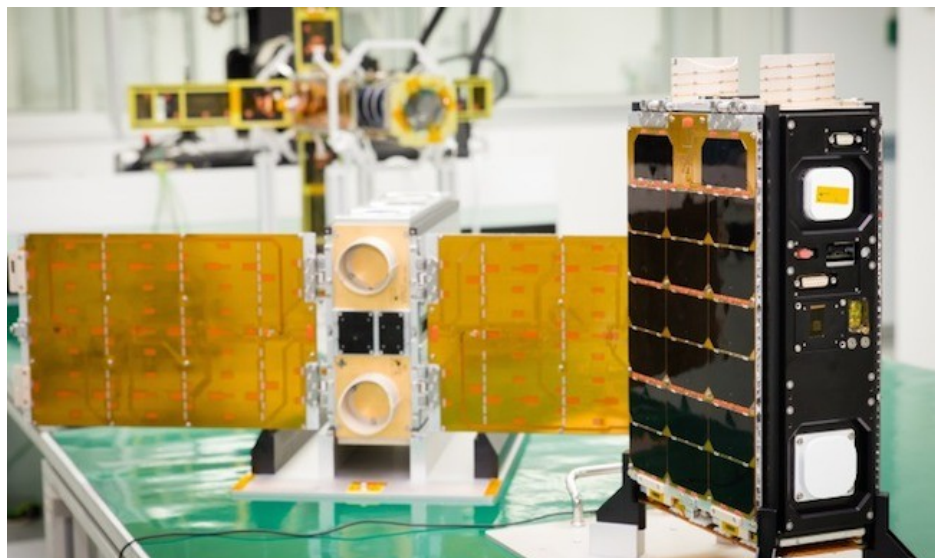


Singapore Universities Launch Satellites

Nanyang Technological University and the National University of Singapore have each launched two satellites from India's Satish Dhawan Space Centre.

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AsianScientist (Dec. 22, 2015) - Four satellites were launched by Nanyang Technological University (NTU) and the National University of Singapore (NUS) from the Satish Dhawan Space Centre in Andhra Pradesh, India, on Wednesday, 16 December 2015, in an operation that launched six Singapore satellites.

Two satellites were designed and built by students, researchers and faculty from NUS, in a first for the university. NTU launched a climate monitoring and navigation satellite, and the university's first satellite with a commercial payload, becoming NTU's fifth and sixth satellites launched since 2011.

The Singapore satellites were deployed by the polar satellite launch vehicle of the Indian Space Research Organisation into a near-equatorial orbit.

NUS's *Galassia*, a two-kilogram nanosatellite, was developed by students and researchers from the Faculty of Engineering; Centre for Remote Imaging, Sensing & Processing (CRISP); and Centre for Quantum Technologies (CQT).

Galassia will carry two payloads. The first is a quantum science payload developed and flown in a satellite for the first time by CQT. It will test out a quantum-based communication concept using Small Photon-Entangling Quantum System (SPEQS). The second is a Total Electron Content (TEC) electronic payload designed by NUS Engineering students. This will measure the total number of electrons above Singapore in the ionosphere, knowledge of which can be used to improve GPS navigation as well as radio communication.

Kent Ridge 1, a 77.2-kilogramme microsatellite, was developed jointly by the Department of Electrical and Computer Engineering and CRISP, together with partners including Berlin Space Technologies, Nanyang Polytechnic and ST Electronics (Satcom and Sensors Systems) Private Limited.

Kent Ridge 1 is a hyper-spectral imaging micro-satellite designed to conduct scientific experimentation and analysis of Earth's surface characteristics. With the capability to break down color into its constituent components, this satellite is able to collect information on what is happening to the planet when sunlight is decomposed into its constituent wavelengths. This is useful for detecting changes in soil, vegetation, volcanoes, water temperatures and fire.

Professor Chua Kee Chaing, Dean of the NUS Faculty of Engineering, said, "The successful deployment of NUS' first two satellites is a proud moment for all of us. The joint launch of six Singapore satellites into space is also a great celebration of Singapore's Golden Jubilee, marking the significant progress of Singapore's nascent space industry."

Professor Goh Cher Hiang, Project Director of the NUS Satellite Program at the NUS Faculty of Engineering, said, “The *Galassia* project brings together students from various engineering disciplines to apply what they have learnt in a real-life setting, and challenges them to innovate and push boundaries.”

NTU’s 123-kg climate monitoring and navigation satellite, VELOX-CI, is a micro-satellite about the size of a mini fridge. It will spend the next three years orbiting Earth to study Asia’s tropical climate and to test a new navigation system. The satellite uses a special technique known as radio occultation and advanced algorithms to obtain weather data such as the upper atmospheric temperature, humidity and pressure, which are useful for long term climate studies.

The smaller 12-kg VELOX-II is carrying an experimental ‘communication-on-demand’ technology that will be tested over one year.

Also launched was Singapore’s first commercial earth observation satellite TeLEOS-1, built by ST Electronics (Satellite Systems) Pte Ltd, a joint venture between ST Electronics (Satcom & Sensor Systems) Pte Ltd, NTU and DSO National Laboratories.

Associate Professor Low Kay Soon, Director of NTU’s Satellite Research Centre, said: “What makes us so unique is that we have the capability to complete the design and development of satellites in different classes – from micro-satellites (20-150kg) to nano (1-20kg) and pico satellites (less than 1kg).”

The main mission of VELOX-II is to test an innovative data relay technology developed by Addvalue Innovation Pte Ltd. The traditional modes of communication via radio signals requires a line of sight, which means the satellite can only link to NTU when it flies near Singapore. However, VELOX-II carries a space-qualified data relay terminal, a key component of Addvalue’s Inter-Satellite Data Relay System keeps VELOX-II in contact with NTU at anytime and anywhere in space. The satellite also contains a fast GPS tracking algorithm developed by NTU that determines the VELOX-II position accurately within a minute.

VELOX-II is also testing out a new radiation-resistant hardware designed at NTU. The new hardware aims to protect the critical data stored in the memory of the satellite, which may be subject to various energetic particles found in space caused by solar flares and cosmic rays. These energetic particles could cause some memory loss in satellites, causing errors that would lead to a mission failure.

Assistant Professor Chen Shoushun, who co-led the design of the new radiation-hardened integrated circuit, said it can detect and correct small errors in the satellite’s memory, making it more robust.

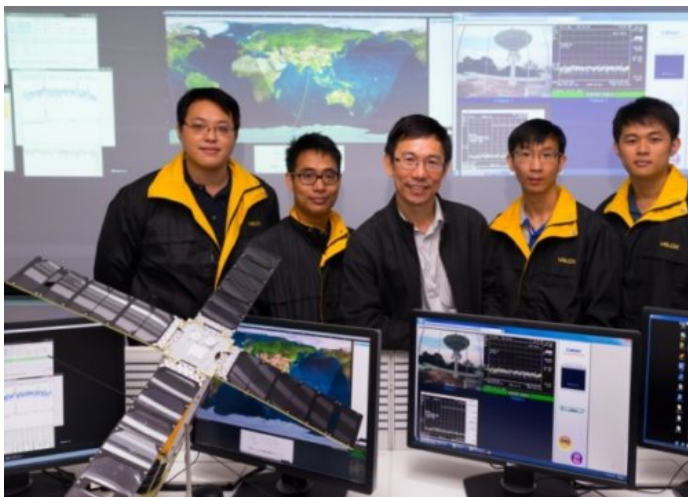
“Our design features a much higher resistance to radiation compared to conventional electronics, and can provide a robust and reliable performance over a wide temperature range. Once we prove our technology in space, we can then apply it to many other mission-critical systems.”

Source: [Nanyang Technological University](#) and [National University of Singapore](#).

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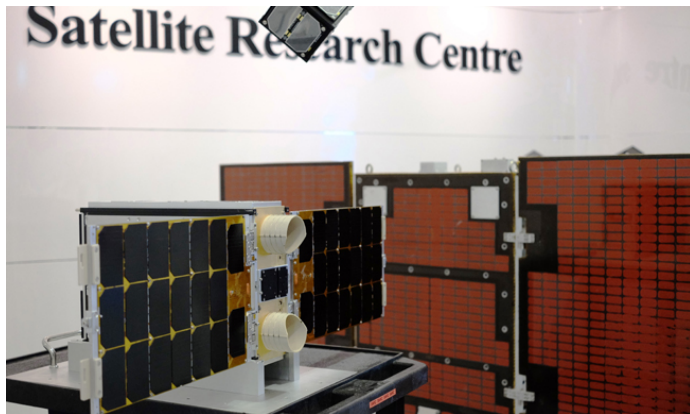
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India Launches SCATSAT-1 Satellite

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