

Space Activities in Australia and Efforts to Increase Collaboration



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The Advanced Instrumentation and Technology Centre



- National resource
- One-stop-shop for the Assembly, Integration and Test of precision instrumentation and small spacecraft
- Experienced personnel with significant instrumentation and space expertise
- Focus for national and international collaboration

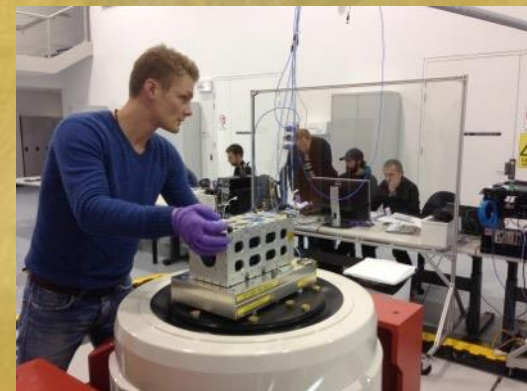
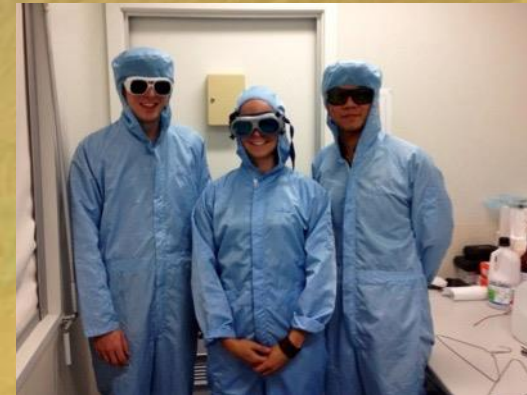
Assembly, Integration & Test Capability

- Thermal Vacuum testing
- Vibration and shock testing
- Cleanrooms
- Thermal cycling
- Electromagnetic interference testing
- Mass properties measurement
- Optical test and metrology
- Electronics design and fabrication
- Precision machining and 3D printing
- Surface process laboratory
- Plasma cleaning chamber
- Satellite Ground Station (S-band and UHF)



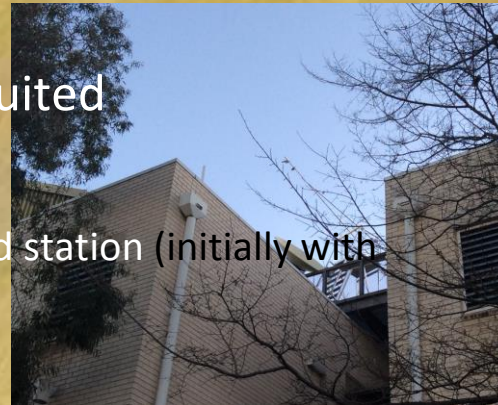
Education and Training

- Optical Design Course for Scientists and Engineers
- Vibration Test Training Course
- Satellite Integration & Test Training
- Space Short Course: Understanding Satellite Utilisation – Serving Australia from Space
- Student Internships and PhDs
- APRSAF Kibo-ABC
- UNISEC Mission Idea Contest
- STARS (Space Technology Astronomy Research Students) Program



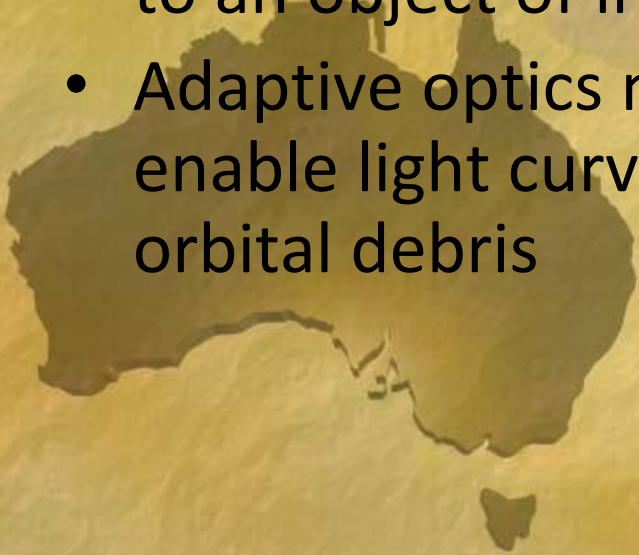
UNSW Canberra

- \$10M investment - in-orbit science & R&D
 - Planning to fly a range of cubesat missions with specific scientific objectives
 - The first is a joint one with DSTO, partly as a learning exercise
 - Engineering team has been recruited
- On-Campus Facility Development:
 - Tvac with solar sim, clean rooms, ground station (initially with S-band & UHF)
- UNISEC activities:
 - UNSW Canberra team 2nd place in MIC3 in 2014
 - UNSW Canberra participating in pre-MIC4, this time both as a mission idea developer & a resource provider
- Several R&D projects already underway with a large European space company



Falcon Telescope @ UNSW Canberra

- Now on campus – a 20" optical telescope which forms part of the Falcon Telescope Network
- This is one of > 20 such telescopes
- For observing objects in orbit
- Can task any of the other telescopes to an object of interest
- Adaptive optics modifications will enable light curve derivation for orbital debris

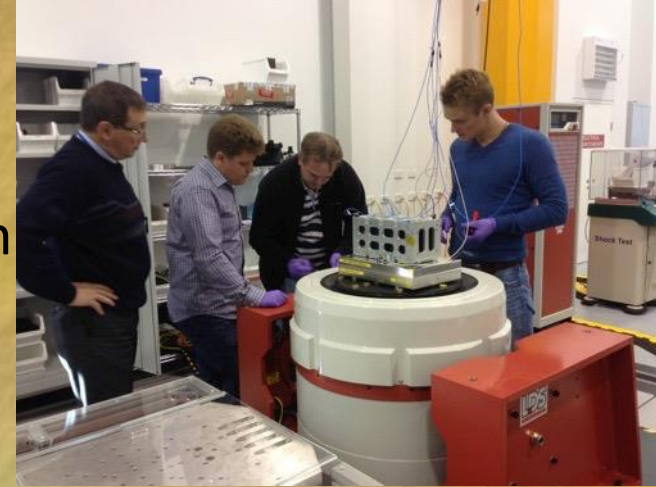


Education and Training @ UNSW Canberra

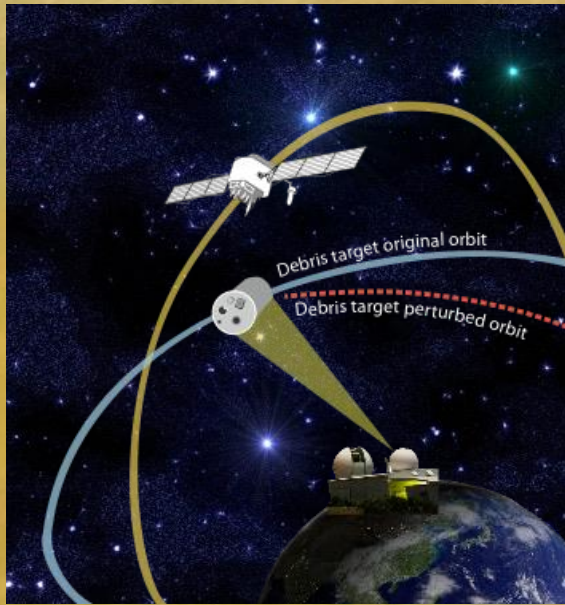
- Masters of Space Engineering & Masters of Space Operations
 - Face to face & online (distance) enrolment available
- Unisec Mission Idea Contest participation (MIC3 - 2nd place & pre-MIC4)
- Postgraduate research ⑨ current topics:
 - Fluidic Thrust Vectoring for spacecraft attitude control
 - Martian surface thermal control
 - Formation Flying
 - Code development for improved orbit prediction
 - Deployable Cubesat Radiator development
 - Heating concept for improved ground-based re-entry simulation

Australian CubeSat activities

- QB50
 - University of Sydney
 - University of NSW
 - University of Adelaide / University of South Australia
- Defence Science and Technology Organisation (DSTO)
 - Buccaneer satellite
- Astronomy
 - Australian Space Eye (ANU, Macquarie University, AAO, UNSW, University of Sydney, University of Queensland, Swinburne University of Technology, University of Western Sydney, Cal Poly and Tyvak)
- Space Situational Awareness
 - UNSW
- Supporting Development of Nanosatellite Environmental Test Standards
 - ISO/CD/19683 Design qualification and acceptance tests of small-scale satellite and units seeking low-cost and fast delivery - **passed**
 - ISO/TC20/SC14 Space systems and operations - **under development**



Space Environment Management CRC



Partners

- EOS Space Systems
- Lockheed Martin (USA)
- Optus
- ANU
- RMIT University
- NASA Ames Research Center
- National Institute of Information and Communications Technology (Japan)

Research Programs

- Program 1: **Tracking**
- Program 2: **Orbits**
- Program 3: **Collisions**
- Program 4: **Manoeuvre**



BLUESat Off-World Robotics Group

The BLUESat Off-World Robotics Group, part of UNSW's BLUESat (Basic Low-Earth Orbit UNSW Experimental Satellite) group, provides undergraduate students with the opportunity to develop robotic systems for extra-terrestrial exploration.

In August 2015 the BLUESat team of 4 undergraduate students from UNSW successfully tested their prototype off-world rover during the Arkaroola Mars Robot Challenge Expedition run by the Mars Society Australia. An undergraduate student team from the Indian Institute of Technology Bombay also attended the Expedition.



Sabre Astronautics

- Predictive Groundstation Project “PIGI”
 - Model satellite performance
 - Diagnostics
 - Ergonomic Command Construction
- CubeSat Deorbit System
 - DragEN tether deployer
 - EDTSuite interactive software package for designing electrodynamic tethers for CubeSat missions
- Compact Microgravity Liquid Storage



Efforts Toward Increasing Collaboration & Establishing UNISEC Global in Australia

- Promoting collaboration between Australian universities
- Working with existing professional and student groups
 - Australian Youth Aerospace Association (AYAA)
 - American Institute of Aeronautics and Astronautics (AIAA)
- Expanding collaboration between existing international organisations (UNISEC, IAF, APRSAF, etc)
- Hosting IAC 2017 in Adelaide
- Hosting 2018 Nanosatellite Conference in Canberra
- Establishing student design projects
- Currently discussing the establishment of a UNISEC chapter



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