

YUend:

York University Space Engineering Nanosatellite Demonstration
Program

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redefine THE POSSIBLE.



YUsend Overview



- Collaborative space systems research between Regina Lee and Hugh Chesser at York University, School of Engineering
- Program Motivations
 - Undergraduate curriculum development (space engineering) and outreach
 - Technology R&D – graduate research
 - Atmospheric Science theme – collaboration with colleagues in Centre for Research in Earth and Space Science (CRESS)
- Goals of this talk – outline program and its status – see one of us after if interested in technical details/results!

Existing York Infrastructure



- York, particularly CRESS has existing facilities from which we have begun working on the necessary hardware and software elements for a series of nanosatellites



Upcoming York Infrastructure



- 4th (and a small 5th) floor of Petrie Building nearing completion
- Includes a Communications Lab for ground station, antenna mounts on 4th, 5th floor roof



YUsend Motivations – Education/Outreach



Space Engineering undergraduate curriculum

- Materials and Thermal Analysis for Space Applications (3rd year course) – SSETI SWARM, YUsend-1 thermal analysis
- Space Hardware (4th year course) – applicable hardware/software labs, assignments
- Engineering Design – 4th year capstone projects

Outreach

- Ontario Science Centre – Challenge Zone, Hotspot presentations, Cart-top displays
- York University summer camp, Speaker's Bureau

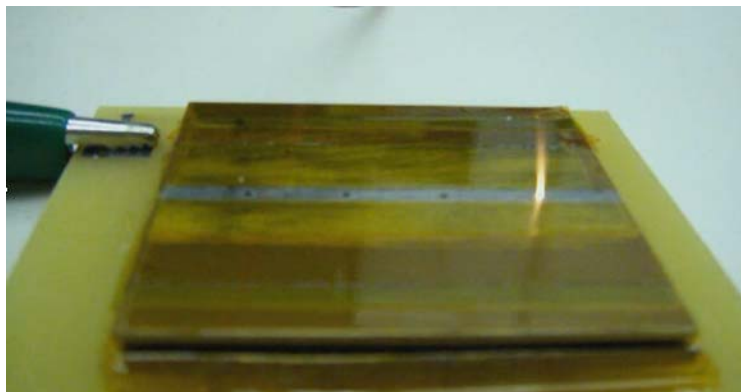
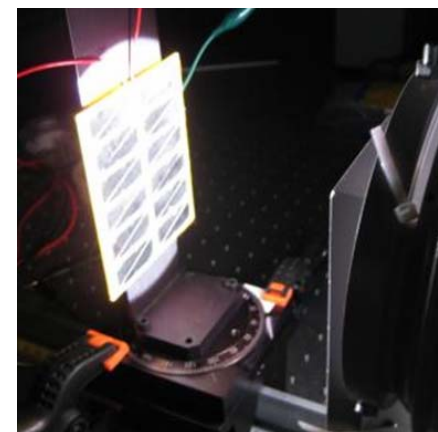
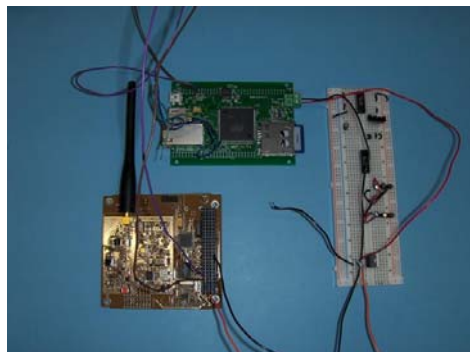


YUend Motivations – Space Engineering Research & Development



Current research areas

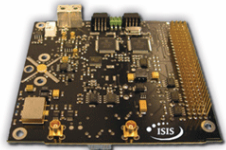
- Microthruster development
- Power systems
- Onboard computer
- Attitude control
- Geolocation of measurements
- Communications



YUsend-1 Overview – Tech Demo



Amateur/GENSO transceiver



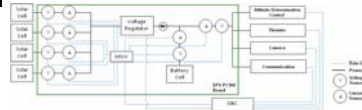
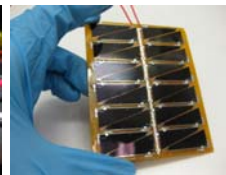
Onboard Computer



Power Distribution Unit

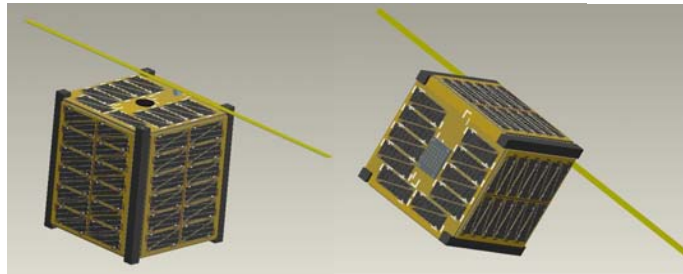


Solar Panel

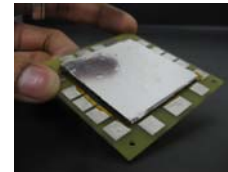


UHF Antenna

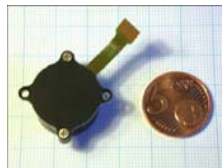
High rate transceiver



μ -thruster



Attitude Control System



YUsend-2 - Atmospheric Science from Nanosatellites



Atmospheric Science of interest

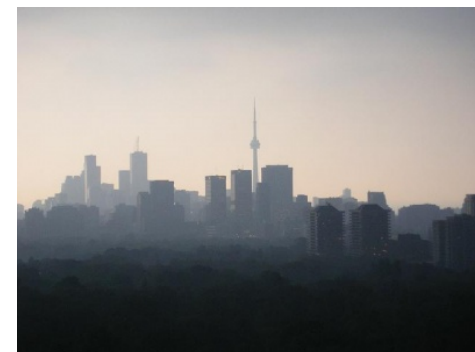
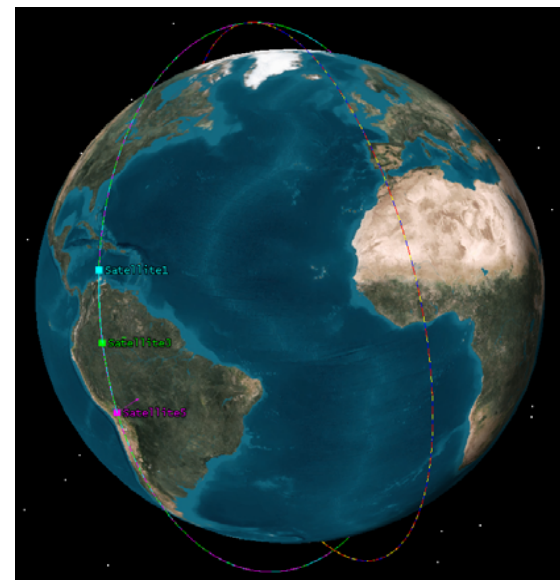
- Constituent studies – H₂O, CO₂, CH₄
- Air glow for earthquake detection
- Applications to Climate, air quality models

Several miniaturized instrument prototypes being developed

- Exploring trade between size and throughput
- Deriving systems requirements for mass, size, pointing, knowledge and accuracy, position knowledge

Technology Developments for bus, instrument identified

Atmospheric Nanosatellite Platform in progress



Final Remarks



The YUend program is progressing well

- capitalizing on existing CRESS infrastructure we have been able to begin designing, selecting and prototyping needed nanosatellite components
- expansion of facilities when completed this year will allow us to do this better and in particular expand our ground systems work.

We think nanosatellites are an excellent way to:

- Motivate students to learn through hands-on work (experiential education)
- Build lab and facility capacity
- Collaborate with other researchers and student groups

Based on our assessment, a customized platform is necessary to accommodate small payloads of use for atmospheric science

Sponsors, Partners, Collaborators



Siemens PLM Software

