



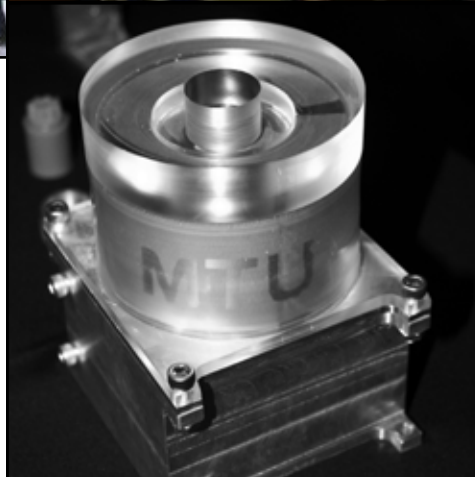
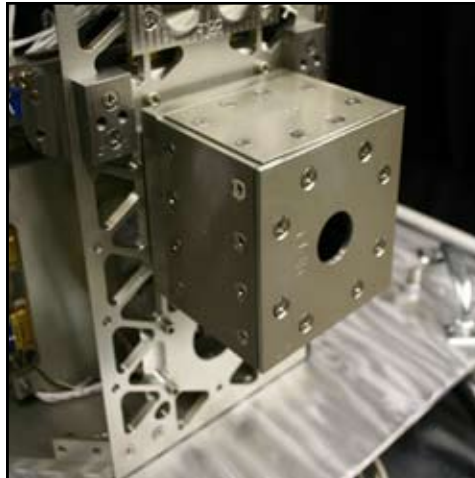
Oculus Progress

The Oculus project is a satellite designed to further U.S. Space Situational Awareness (SSA) initiatives by demonstrating space-to-space imaging, as well as providing imaging opportunities for U.S. optical and RAVEN-class telescopes. These objectives are met through the use of 3-axis stabilization via reaction wheels and magnetic torquers in addition to two imagers utilizing object-tracking software.

The Michigan Tech Aerospace Enterprise's Nanosatellite Team recently traveled to Albuquerque, New Mexico to compete in the Final Competition Review (FCR) for the Air Force Office of Scientific Research (AFOSR) that was sponsored University Nanosatellite Program. Students journeyed back to Michigan Tech well before the spring semester began to perform the final integration of the Oculus. By competitions end, the Oculus was recognized for its accomplishments by various judges from the Air Force, NASA, and industry and was awarded third place out of the eleven universities that participated.



In addition, the Oculus program received the award for the best K-12 educational research program. The outreach program for Oculus included the organization of rocket launch events with nearby schools as well as presentations to students across the state, informing them of the satellite project and how to become involved in the scientific field. All together, Michigan Tech presented to over 750 K-12 students.



Students at Michigan Tech put in a valiant effort in the weeks leading up to the FCR. A few dedicated students never left Houghton over Thanksgiving or Christmas break, opting to machine reaction wheels and test imagers instead; several other Oculus workers returned to Tech after the 1st of the year to help finish the vehicle. It was truly a team effort and could have not been accomplished without the dedication of students and supporters.



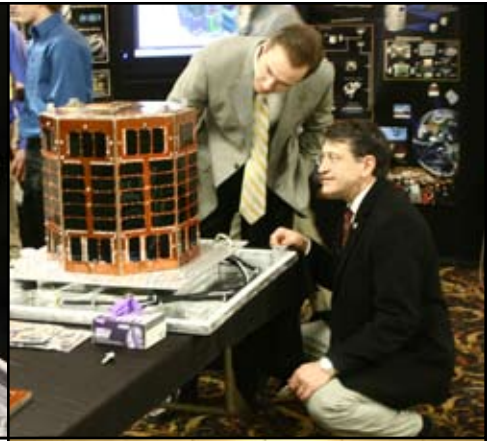
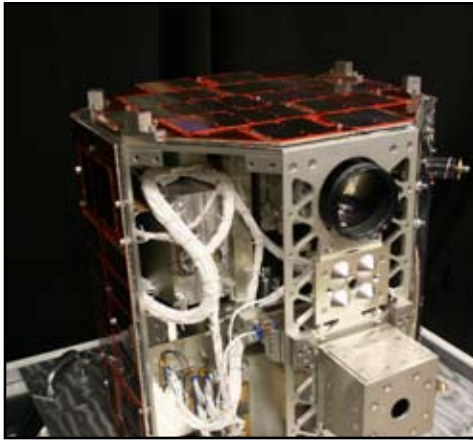
In the depths of the mechanical engineering building those three weeks in January, one could always find over a dozen students burning the midnight oil in the aerospace lab. Our program entered an accelerated development phase in January and in three weeks managed to have the satellite alofted, assembled, wired, integrated, and tested for functionality. Further, during that time, students performed vibration testing on the reaction wheel, fabricated the solar cells, and constructed the multi-layer insulation for the Oculus. When assembled, it was a true masterpiece.

Despite hours of hard work leading up to the competition, the MTU team would not rest until it was time for the curtain to rise. With the vehicle assembled and integrated, work began practicing advanced demonstrations of hardware and software in our makeshift hotel laboratory. Tools and computers from the aerospace lab at MTU found their use in New Mexico. With work continuing up to the final deadline, the Oculus vehicle was able to demonstrate both functional flight hardware and software operation for demonstrations to judges.

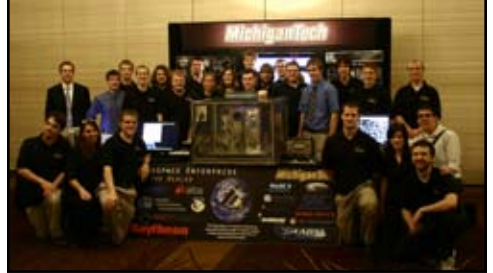
Future Plans

With the conclusion of Nanosat-5, the Michigan Tech team has moved on to the 6th iteration of the University Nanosatellite Program. Our team is looking to return to Albuquerque in January of 2011 with a more fully developed and environment-tested Oculus, with additional capabilities.

Over the next two years, work on the existing Oculus vehicle will continue. Software for imager drivers and system-level tasks will be brought to completion and extensive thermal vacuum and vibration testing will be conducted at Michigan Tech. The Oculus will also be outfitted to better serve as an imaging target for the AFOSR-sponsored Attitude and Shape Recognition (ASR) Program.



The Oculus will be expanded to include a new module between the bottom panel and lightband separation device. This space can be used to provide deployables, unique shapes, and materials of interest for space aging for the ASR Program.



How You Can Help

The Michigan Tech team would like to acknowledge our sponsors for their contribution to our project. The Air Force truly gives our students a challenge in building a nanosatellite in only two years with a budget of \$110,000. Contributions from industry sponsors, whether in the form of financial support, hardware, or technical advising, are vital to the success of our program.

With the Oculus program continuing to advanced stages of development and testing, new forms of support will be needed. One current need is the construction of a clean room for satellite fabrication, testing, and storage. Such a facility is beyond the current nanosatellite budget at an approximate cost of \$20,000.

Specifically we would like to thank the following for their contributions.

Raytheon: Princeton Acton EMCCD Imager (NFOV)

SAIC: Micro space camera (WFOV)

ABSL: Space-rated Li-ion batteries

Integrity Applications Inc: Systems engineering guidance and financial support

AGI: licenses to STK

Wind River: license to VxWorks

Connect Tech Inc: FPGA and OSCI (serial expansion) board

Tyco Electronics and Amp Netconnect: space-rated D-sub connectors

Dunmore Corporation: Multi Layer Insulation sold at cost

SIP: computer support

Altia: provided GUI for STK-Matlab interface

C&R Technologies: License for Thermal Desktop

AeroPhysics: Monetary support

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