

TU Sat Launcher

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PURPOSE:

The TU Sat Program envisions a new era of miniature satellites that will perform numerous tasks. As Indiana's first satellite, TU Sat 1 is a working prototype of an e-mail and data communication satellite that will provide low-cost communication access to isolated areas of the world.

The "TU Sat Launcher" has been created to offer timely updates on the progress of the TU Sat 1 Program. A new issue will occur several times a year.

Pointing Upward

Problem: How do you track a moving target 400 miles away? Solution: Create a pair of highly directional antennas and mount them to a dual axis rotor. The latest addition to the TU Sat 1 base station is a pair of helical antennas with the capability to send and receive 2 m, 70 cm, and 900 Mhz transmission signals. The antennas have been in design and fabrication since the beginning of the project. They utilize a number of lightweight features, including PVC piping, standard wiring, and an aluminum reflector. The rotor is computer driven and will use information from NORAD to track the satellite across the full sky.

David Voss, Jacob Oehrig, Brent Gerig, and Noel Schutt prepared the antennas and tuned each frequency to maximize signal power. A hydraulic basket provided by the Maintenance Department lifted David, Brent, and the antennas to a 25 foot perch.

Recent graduate Brent said he was not afraid about the high maneuvers. "I enjoy being up high. The basket would sway when ever we moved but it was fun. It is great to finally see all of our work come to a finish above ground."

The helical antennas will receive diagnostic updates, issue command sequences, and possibly receive email data. An additional 12 foot dish may be added to the base station to receive 2.4 Ghz signals and conduct radio astronomy.



Lifting a pair of helical antennas.

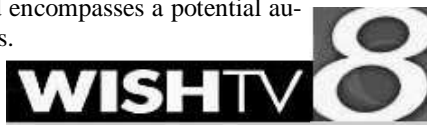
High Altitude Science

Not only are the nine students working this summer busy creating a mini-communications satellite, they are also creating a mini-science lab. TU Sat 1 will carry three data collection instruments to analyze the earth-space environment.

A magnetometer microchip only 1/8 inch wide will measure the strength of the earth's magnetic fields. This data will be matched to information collected by a langmuir plasma probe. The plasma probe is a metal sphere connected to an array of amplifiers based on a design Taylor created for an earlier NASA mission. The probe can detect small variations in the amount of charged particles in orbit. Finally, the gravity gradient tether will double as both an electric field and very low frequency radio wave detector. It may be possible to use the tether to raise or lower the altitude of the satellite through electromagnetic interactions.

Wishing on a Star

On May 14th, the TU Sat 1 Program was visited by Leslie Olsen and a cameraman from CBS Indy Channel 8, also known as Wish TV. The news correspondent spent more than an hour interviewing team members. A full-length story about the satellite appeared later that day during the 5 o'clock news with a brief news story at 11 o'clock. Leslie focused on the potential for TU Sat 1 as a communication system for missionaries and others in developing nations. The Indianapolis channel covers all of central Indiana and encompasses a potential audience of several million viewers.



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Large Donations Keep Program Flying

Three bursts of momentum came during the Spring. First, the Indiana Space Grant Consortium (INSGC) awarded Taylor University a \$25,000 grant for the TU Sat 1 Program. The INSGC is a NASA funded organization that provides research grants through a competitive process in which consortium member schools submit proposals for review. Taylor University received the largest grant possible.



Second, a private donor gave \$25,000 to the program, bringing total monetary donations to \$35,000. Financial contributions are truly an important blessing to our efforts. Without this funding, the program would not have been able to maintain operations at full capacity this summer.



Third, the Taylor University Computing and System Sciences Department has also become a major supporter of TU Sat 1. Several CSS professors and students are offering their skills and talent on the extensive computer programming required to make the satellite functional.



Donations of labor, talents, materials, and finances have been the foundation of this innovative research program over the past 1 1/2 years. Because of these recent monetary donations, a significant amount of the launch costs have been covered and funding is available to carry the program through the summer. We trust God will provide additional funding to continue the program into the fall, cover any unexpected costs, and allow us to create portable ground stations.



Thank you for all of your support.