**ACIT: THE UPGRADES AND THE BETA TEST.** Michael Gerszewski, Department of Space Studies, University of North Dakota, Grand Forks, ND 58202-9008, mgerszew@cs.und.edu.

**Introduction:** The development of an Internet controllable observatory has been high on the priority list for the Department of Space Studies Distance Masters Program, SPACE.EDU [1], for several years. After many years of planning, the design and building of the facility began in 1997.

Over the past four years, the ACIT project [2] has begun to come to fruition, primarily funded by the North Dakota Space Grant Program. The control interface is in the process of being upgraded, new equipment is being purchased, and Space Studies Distance students have tested the system during the Spring 2000 Beta Test of the system.

**Control Interface Upgrade:** The original control interface included a screen share program, VNC [3]. Although VNC has many redeeming qualities, it is far too slow to be used as a permanent solution to real-time control of an observatory. The speed issue is characterized by VNC transmitting interactive images of the computer's desktop. While VNC is faster than most of its counterparts, it is still too slow for near instant response. Also the ability to interact with the desktop creates a large security hole that cannot be avoided without using a different method.

The new control interface is less graphics-intensive, utilizing Java technologies, and applications that can be called from that Java application/applet. The Java server, on the observatory computer, makes calls to software such as Astronomer's Control Panel, and PinPoint, from DC3 Dreams Software [4], and Maxim DL/CCD, from Diffraction Limited [5]. This design allows the control of what the user sees, and allows users with a slower connection the same relative speed as users with a faster connection.

This design also provides for scalability, the possibility to add other telescopes to the system. Since a set of protocols has been established, all the new telescope systems would have to do is follow those protocols for outside communication. This protocol is completely independent of system control at the observatory. This scalability was an issue for the design of the first generation of the system, and has been elegantly handled.

**New Equipment:** In order to increase the research capabilities of ACIT, new equipment has been and is in the process of being purchased and tested. Research grade filters, a motorized crayford style focuser, upgrades to software, and software to use adaptive optics have been purchased.

The Research grade filters, Johnson UBVRI filters, were purchased to facilitate more accurate photometry and the motorized crayford focuser was purchased to make up for an intrinsic flaw in many large Schmidt-Cassegrains, mirror flop. Mirror flop is a condition that affects the telescope during slewing. When slewing from one section of the sky to another, the telescope mirror, the focusing mechanism, shifts slightly which throws the system out of focus. The motorized crayford focuser, a JMI NGF-S [6] allows the mirror to be locked down, while still allowing the telescope to focus without moving the mirror.

The adaptive optics system was purchased several years ago, but never used. There was no software available to take advantage of the Santa Barbara Instruments Group (SBIG) AO-7 [7]. We have recently found out that Maxim DL/CCD has that option. This will be tested sometime this winter.

**Spring 2000 Beta Test:** During the Spring semester of 2000, The Space Studies Distance Masters Program offered an Observational Astronomy course through SPACE.EDU. This course was designed to instruct students on the operation of telescopes and the research that can be done. The beta test of ACIT allowed bugs to be worked out of the system, and helped with the identification of problems that might occur.

The test involved thirty students and an average of six two-hour observing sessions per night. Over the semester, 95% of all time slots were filled. Some student projects included Kevin Martin's Astrometry of a Comet, and another students Mosaic of the Virgo Cluster. Much of the semester was focused on "Pretty Pictures," but at that time ACIT still needed work to become truly "Research Ready."

**Future Research:** Many of the current research goals parallel the original goals of the project. These goals include imaging visible comets brighter than 19$^{th}$ magnitude, observing Near Earth Asteroids (NEA), and searching for new Atens. The goal of creating a worldwide network of such telescope systems is much closer to becoming a reality because of the redesign of the control interface. We will also be conducting a more thorough test of the system during summer and fall 2002.

**References:** [1] www.space.edu. [2] Wood, C. et al. (1999) *LPS XXX*, 1839.
[3] www.uk.research.att.com/vnc. [4] www.dc3.com.
[5] www.cyanogen.com. [6] www.jimsmobile.com [7] www.sbig.com.