ate mathematical models of payloads. These models will be used in the SMS to train flight controllers and flight crews on payload operations.

- The Mission Operations Tool provides a streamlined and simplified way to collect the payload-operations data to support the development of mission-operations documentation.

- The Command and Data Tool is a client-server database application program to be used to collect command and telemetry data for the Cargo PC.

This program was written by Bill Askew, Matthew Barry, Gary Burrows, Mike Casey, Joe Charles, Nicholas Downing, Monika Jain, Rebecca Lopold, Roger Luty, David McDill, Scott Mermelstein, Jon Morsics, Richard Osborne, Cindy Owens, Thomas Price, Ayman Quaddumi, Jim Thompson, and Patrick Walter of United Space Alliance, LLC; Melanie Vail of Raytheon Co.; and Richard Campbell and Mark Kelly of Systems Interface Software, Ltd. for Johnson Space Center. Further information is contained in a TSP (see page 1). Title to this invention has been waived under the provisions of the National Aeronautics and Space Act (42 U.S.C. 2457(f)), to United Space Alliance, LLC. Inquiries concerning licenses for its commercial development should be addressed to:

United Space Alliance, LLC
Flight Operations
600 Gemini
Houston, TX 77058-2777

Refer to MSC-23419-1/20-1/1-1/2-1, volume and number of this NASA Tech Briefs issue, and the page number.

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**MicroPID (μPID)** is a computer program for real-time proportional + integral + derivative (PID) control of a translation stage in a Fourier-transform ultraviolet spectrometer. μPID implements a PID control loop over a position profile at sampling rate of 8 kHz (sampling period 125 μs). The software runs in a stripped-down Linux operating system on a VersaModule Eurocard (VME) computer operating in real-time priority queue using an embedded controller, a 16-bit digital-to-analog converter (D/A) board, and a laser-positioning board (LPB).

μPID consists of three main parts: (1) VME device-driver routines, (2) software that administers a custom protocol for serial communication with a control computer, and (3) a loop section that obtains the current position from an LPB-driver routine, calculates...
the ideal position from the profile, and calculates a new voltage command by use of an embedded PID routine — all within each sampling period. The voltage command is sent to the D/A board to control the stage. μPID uses special kernel headers to obtain microsecond timing resolution. Inasmuch as μPID implements a single-threaded process and all other processes are disabled, the Linux operating system acts as a soft real-time system.

This program was written by Vahag Karayan, Stanley Sander, and Richard Cageao of Caltech for NASA’s Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1). This software is available for commercial licensing. Please contact Karina Edmonds of the California Institute of Technology at (626) 395-2322. Refer to NPO-41107.

Analyzing Radio-Frequency Coverage for the ISS

Lyndon B. Johnson Space Center, Houston, Texas

The Interactive Coverage Analysis Tool (iCAT) is an interactive desktop-computer program serving to (1) support planning of coverage, and management of usage of frequencies, of current and proposed radio communication systems on and near the International Space Station (ISS) and (2) enable definition of requirements for development of future such systems. The iCAT can also be used in design trade studies for other (both outer-space and terrestrial) communication systems.

A user can enter the parameters of a communication-system link budget in a table in a worksheet. The nominal (on-axis) link values for the bit-to-noise-energy ratio, received isotropic power (RIP), carrier-to-noise ratio (C/N), power flux density (PFD), and link margin (see figure) of the system are calculated and displayed in the table. Plots of field gradients for the RIP, C/N, PFD, and link margin are constructed and displayed in an ISS coordinate system, at a specified link range, for both the forward and return link parameters, and are displayed in worksheets. The forward and reverse link antenna gain patterns are also constructed and displayed. Line-of-sight (LOS) obstructions can be both incorporated into the gradient plots and displayed on separate plots.

This program was written by Steven M. Bolen and Catherine C. Sham of Johnson Space Center. Further information is contained in a TSP (see page 1). MSC-23536

This is the type of Statistical Analysis that can be made from the output of iCAT.