



## **Motion-Capture-Enabled Software for Gestural Control of 3D Models**

Current state-of-the-art systems use general-purpose input devices such as a keyboard, mouse, or joystick that map to tasks in unintuitive ways. This software enables a person to control intuitively the position, size, and orientation of synthetic objects in a 3D virtual environment. It makes possible the simultaneous control of the 3D position, scale, and orientation of 3D objects using natural gestures.

Enabling the control of 3D objects using a commercial motion-capture system allows for natural mapping of the many degrees of freedom of the human body to the manipulation of the 3D objects. It reduces training time for this kind of task, and eliminates the need to create an expensive, special-purpose controller.

*This work was done by Jeffrey S. Norris, Victor Luo, Thomas M. Crockett, Khawaja S. Shams, and Mark W. Powell of Caltech; and Anthony Valderrama of MIT 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 Daniel Broderick of the California Institute of Technology at [danielb@caltech.edu](mailto:danielb@caltech.edu). Refer to NPO-47893.*

## **Orbit Software Suite**

Orbit Software Suite is used to support a variety of NASA/DM (Dependable Multiprocessor) mission planning and analysis activities on the IPS (Intrusion Prevention System) platform. The suite of Orbit software tools (Orbit Design and Orbit Dynamics) resides on IPS/Linux workstations, and is used to perform mission design and analysis tasks corresponding to trajectory/launch window, rendezvous, and proximity operations flight segments. A list of tools in Orbit Software Suite represents tool versions established during/after the Equipment Rehost-3 Project.

*This work was done by Cathy Osgood, Kevin Williams, Philip Gentry, Dana Brownfield, John Hallstrom, and Tim Stuit of United Space Alliance for Johnson Space Center. For further information, contact the JSC Innovation Partnerships Office at (281) 483-3809. MSC-24956-1*

## **CoNNeCT Baseband Processor Module Boot Code Software (BCSW)**

This software provides essential start-up and initialization routines for the CoNNeCT baseband processor module (BPM) hardware upon power-up. A command and data handling (C&DH) interface is provided via 1553 and diagnostic serial interfaces to invoke operational, reconfiguration, and test commands within the code.

The BCSW has features unique to the hardware it is responsible for managing. In this case, the CoNNeCT BPM is configured with an updated CPU (Atmel AT697 SPARC processor) and a unique set of memory and I/O peripherals that require customized software to operate. These features include configuration of new AT697 registers, interfacing to a new HouseKeeper with a flash controller interface, a new dual Xilinx configuration/scrub interface, and an updated 1553 remote terminal (RT) core.

The BCSW is intended to provide a "safe" mode for the BPM when initially powered on or when an unexpected trap occurs, causing the processor to reset. The BCSW allows the 1553 bus controller in the spacecraft or payload controller to operate the BPM over 1553 to upload code; upload Xilinx bit files; perform rudimentary tests; read, write, and copy the non-volatile flash memory; and configure the Xilinx interface. Commands also exist over 1553 to cause the CPU to jump or call a specified address to begin execution of user-supplied code. This may be in the form of a real-time operating system, test routine, or specific application code to run on the BPM.

*This work was done by Clifford K. Yamamoto, David S. Orozco, D. J. Byrne, Steven J. Allen, Adit Sahasrabudhe, and Minh Lang 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 Daniel Broderick of the California Institute of Technology at [danielb@caltech.edu](mailto:danielb@caltech.edu). Refer to NPO-47778.*

## **Trajectory Software With Upper Atmosphere Model**

The Trajectory Software Applications 6.0 for the Dec Alpha platform has an im-

plementation of the Jacchia-Lineberry Upper Atmosphere Density Model used in the Mission Control Center for International Space Station support. Previous trajectory software required an upper atmosphere to support atmosphere drag calculations in the Mission Control Center. The Functional operation will differ depending on the end-use of the module.

In general, the calling routine will use function-calling arguments to specify input to the processor. The atmosphere model will then compute and return atmospheric density at the time of interest.

*This program was written by Charles Barrett of United Space Alliance, Flight Design and Dynamics, for Johnson Space Center. For further information, contact the JSC Innovation Partnerships Office at (281) 483-3809. MSC-24250-1*

## **ALSSAT Version 6.0**

Advanced Life Support Sizing Analysis Tool (ALSSAT) at the time of this reporting has been updated to version 6.0. A previous version was described in "Tool for Sizing Analysis of the Advanced Life Support System" (MSC-23506), *NASA Tech Briefs*, Vol. 29, No. 12 (December 2005), page 43. To recapitulate: ALSSAT is a computer program for sizing and analyzing designs of environmental-control and life-support systems for spacecraft and surface habitats to be involved in exploration of Mars and the Moon. Of particular interest for analysis by ALSSAT are conceptual designs of advanced life-support (ALS) subsystems that utilize physicochemical and biological processes to recycle air and water and process human wastes to reduce the need of resource resupply.

ALSSAT is a means of investigating combinations of such subsystems' technologies featuring various alternative conceptual designs and thereby assisting in determining which combination is most cost-effective. ALSSAT version 6.0 has been improved over previous versions in several respects, including the following additions: an interface for reading sizing data from an ALS database, computational models of a redundant regenerative CO<sub>2</sub> and Moisture Removal Amine Swing Beds (CAMRAS) for CO<sub>2</sub> removal, upgrade of the Temperature & Humidity Control's Common