ISS Solar Array Management

The International Space Station (ISS) Solar Array Management (SAM) software toolset provides the capabilities necessary to operate a spacecraft with complex solar array constraints. It monitors spacecraft telemetry and provides interpretations of solar array constraint data in an intuitive manner. The toolset provides extensive situational awareness to ensure mission success by analyzing power generation needs, array motion constraints, and structural loading situations.

The toolset is used in conjunction with AOSS (see next paragraph) to provide power to the ISS. This toolset is also used to hold data entered through the application to generate reports and to keep track of active NASA spacecraft.

AOSS Application, AOSS Web, and AOSS Database. In the application, this is the main data entry point where most of the AOSS-typical transactions occur. AOSS users and the AOSS application perform data manipulation, reporting, and changes here. The application is the main lifeline between the user and the database. The AOSS Web function allows users to use a Web browser environment to view information, print results, and transact with the results of data entered in the AOSS database. This component contains a mixture of HTML and ASP pages.

The main operation of the database is to hold data entered through the application component and to provide secure access to this information by qualified AOSS users, customers, and management. The database was developed in SQL and is held within an SQL server database environment. Using this system eliminates the need to prepare paper schedules and the time it takes to distribute them to the astronauts as well as ensuring a faster delivery of updates and schedule changes.

This work was done by Estevanico Brown of United Space Alliance for Johnson Space Center. Further information is contained in a TSP (see page 1). MSC-24425-1

Probabilistic Structural Analysis Program

NASA/NESSUS 6.2c was developed to process Global Positioning System (GPS) data, sent via telemetry from a spacecraft, to generate accurate navigation estimates of the vehicle position and velocity (state vector) using a Kalman filter. This program uses the GPS onboard receiver measurements to sequentially calculate the vehicle state vectors and provide this information to ground flight controllers. It is the first real-time ground-based shuttle navigation application using onboard sensors. The program is compact, portable, self-contained, and can run on a variety of UNIX or Linux computers.

The program has a modular object-oriented design that supports application-specific plugins such as data corruption remediation pre-processing and remote graphics display. The Kalman filter is extensible to additional sensor types or force models. The Kalman filter design is also strong against data dropouts because it uses physical models from state and covariance propagation in the absence of data.

The design of this program separates the functionalities of SPOT into six different components: SPOT GUI and SPOT database. This process allows for the addition of new functionality without interfering with existing functionality. The SPOT GUI is a graphical user interface that allows users to view and modify data entered into the database. The SPOT database is used to store data entered into the system and is accessed by the SPOT GUI.

This work was done by Shantaram S. Pai, Christos C. Chamis, Parguy L. N. Murthy, and George L. Stelfox of Glenn Research Center; David S. Rika and Ben H. Thacker of Southwest Research Institute; Vinod K. Nagpal of N& R Engineering and Subbath K. Mital of the University of Toledo. Further information is contained in a TSP (see page 1).

Inquiries concerning rights for the commercial use of this invention should be addressed to NASA Glenn Research Center, Innovative Partnerships Office, Attn: Steve Fedor, Mail Stop 4–8, 21000 Brookpark Road, Cleveland, Ohio 44135. Refer to LEW-18229-1