this specific appointment information entered in the application to generate reports and to keep track of active NASA astronauts' whereabouts at all times.

AOSS can send or retrieve astronauts' schedule information via their individual Outlook calendars with a two-part process called PUSH and PULL. This process, along with weekly operational procedures agreed to by the users and current astronaut corps staff, delivers optimal scheduling processing performance. AOSS also provides the ability to create reports, statistics, and situation information for many NASA offices. Displays of the software are designed to be functional and familiar by using the same format design to ensure ease of use.

The software is composed of three main components — 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 Estevancio Brown of United Space Alliance for Johnson Space Center. Further information is contained in a TSP (see page 1). MSC-24384-1

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 software suite consists of several components including samCS (constraint set selector), samShadyTimers (array shadowing timers), samWin (visualization GUI), samLock (array motion constraint computation), and samJet (attitude control system configuration selector). It provides high availability and uptime for extended and continuous mission support. It is able to support two-degrees-of-freedom (DOF) array positioning and supports up to ten simultaneous constraints with intuitive 1D and 2D decision support visualizations of constraint data. Display synchronization is enabled across a networked control center and multiple methods for constraint data interpolation are supported. Use of this software toolset increases flight safety, reduces mission support effort, optimizes solar array operation for achieving mission goals, and has run for weeks at a time without issues.

The SAM toolset is currently used in ISS real-time mission operations.

This work was done by James P. Williams, Keith D. Martin, Justin R. Thomas, and Samuel Caro 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 is a general-purpose, probabilistic analysis program that computes probability of failure and probabilistic sensitivity measures of engineered systems. Because NASA/ NESSUS uses highly computationally efficient and accurate analysis techniques, probabilistic solutions can be obtained even for extremely large and complex models. Once the probabilistic response is quantified, the results can be used to support risk-informed decisions regarding reliability for safety-critical and one-of-a-kind systems, as well as for maintaining a level of quality while reducing manufacturing costs for larger-quantity products. NASA/ NESSUS has been successfully applied to a diverse range of problems in aerospace, gas turbine engines, biomechanics, pipelines, defense, weaponry, and infrastructure.

This program combines state-of-the-art probabilistic algorithms with general-purpose structural analysis and lifting methods to compute the probabilistic response and reliability of engineered structures. Uncertainties in load, material properties, geometry, boundary conditions, and initial conditions can be simulated. The structural analysis methods include non-linear finite-element methods, heat-transfer analysis, polymer/ ceramic matrix composite analysis, monolithic (conventional metallic) materials life-prediction methodologies, boundary element methods, and user-written subroutines. Several probabilistic algorithms are available such as the advanced mean value method and the adaptive importance sampling method. NASA/ NESSUS 6.2c is structured in a modular format with 15 elements.

This work was done by Shantaram S. Pai, Christos C. Chamis, Pappu L. N. Murthy, and George L. Stefko of Glenn Research Center; David S. Riha and Ben H. Thacker of Southwest Research Institute; Vinod K. Nagpal of N& R Engineering and Subodh K. Mital of the University of Toledo. FFurther 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

SPOT Program

A Spacecraft Position Optimal Tracking (SPOT) program 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 dif-