

the maneuver design. MAS can also generate presentation materials, initiate electronic command request forms, and archive all data products for future reference.

This program was written by Hal Uffelmann, Troy Goodson, Michael Pellegrin, Lynn Stavert, Thomas Burk, David Beach, Joel Signorelli, Jeremy Jones, Yungsun Hahn, Ahlam Attiyah, and Jeannette Illsley of Caltech for NASA's Jet Propulsion Laboratory.

This software is available for commercial licensing. Please contact Karina Edmonds of the California Institute of Technology at (626) 395-2322. Refer to NPO-42137.

Event Driven Messaging With Role-Based Subscriptions

Event Driven Messaging with Role-Based Subscriptions (EDM-RBS) is a framework integrated into the Service Management Database (SMDB) to allow for role-based and subscription-based delivery of synchronous and asynchronous messages over JMS (Java Messaging Service), SMTP (Simple Mail Transfer Protocol), or SMS (Short Messaging Service). This allows for 24/7 operation with users in all parts of the world. The software classifies messages by triggering data type, application source, owner of data triggering event (mission), classification, sub-classification and various other secondary classifying tags. Messages are routed to applications or users based on subscription rules using a combination of the above message attributes.

This program provides a framework for identifying connected users and their applications for targeted delivery of messages over JMS to the client appli-

cations the user is logged into. EDM-RBS provides the ability to send notifications over e-mail or pager rather than having to rely on a live human to do it. It is implemented as an Oracle application that uses Oracle relational database management system intrinsic functions. It is configurable to use Oracle AQ JMS API or an external JMS provider for messaging. It fully integrates into the event-logging framework of SMDB (Subnet Management Database).

EDM-RBS is currently integrated into the SMDB component of the Service Preparation Subsystem of the DSN (Deep Space Network). Users worldwide rely on this service for notification confirming acceptance or denial of submitted products in support of mission tracking activities. DSN operations rely on this service for asynchronous notifications of problems needing human intervention. This innovation is a core service supporting the concept of lights-out operations and operations with human intervention by exception, a plan to improve the level of service while reducing operations costs.

This work was done by Tung Bui, Bach Bui, Shantanu Malhotra, Fannie Chen, Rachel Kim, Christopher Allen, Ivy Luong, George Chang, and Silvino Zendejas of Caltech and Syed Sadaqathulla of Raytheon for NASA's Jet Propulsion Laboratory.

In accordance with Public Law 96-517, the contractor has elected to retain title to this invention. Inquiries concerning rights for its commercial use should be addressed to:

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Refer to NPO-45015, volume and number of this NASA Tech Briefs issue, and the page number.

Estimating Relative Positions of Outer-Space Structures

A computer program estimates the relative position and orientation of two structures from measurements, made by use of electronic cameras and laser range finders on one structure, of distances and angular positions of fiducial objects on the other structure. The program was written specifically for use in determining errors in the alignment of large structures deployed in outer space from a space shuttle.

The program is based partly on equations for transformations among the various coordinate systems involved in the measurements and on equations that account for errors in the transformation operators. It computes a least-squares estimate of the relative position and orientation. Sequential least-squares estimates, acquired at a measurement rate of 4 Hz, are averaged by passing them through a fourth-order Butterworth filter. The program is executed in a computer aboard the space shuttle, and its position and orientation estimates are displayed to astronauts on a graphical user interface.

This program was written by Harry Balian, William Breckenridge, and Paul Brugarolas of Caltech for NASA's Jet Propulsion Laboratory.

This software is available for commercial licensing. Please contact Karina Edmonds of the California Institute of Technology at (626) 395-2322. Refer to NPO-45071.