generated from the current state, i.e., the plausible future failure modes of the system as it presently stands. The scenario generator models a Potential Fault Scenario (PFS) as a black box, the input of which is a set of states tagged with priorities and the output of which is one or more potential fault scenarios tagged by a confidence factor. The results from the system are used by a model-based diagnostician to predict the future health of the monitored system.

This program was written by Mark James 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-42818.

Ground-Based Correction of Remote-Sensing Spectral Imagery

Software has been developed for an improved method of correcting for the atmospheric optical effects (primarily, effects of aerosols and water vapor) in spectral images of the surface of the Earth acquired by airborne and spaceborne remote-sensing instruments. In this method, the variables needed for the corrections are extracted from the readings of a radiometer located on the ground in the vicinity of the scene of interest. The software includes algorithms that analyze measurement data acquired from a shadow-band radiometer. These algorithms are based on a prior radiation transport software model, called MODTRAN™, that has been developed through several versions up to what are now known as MODTRAN4™ and MODTRAN5™. These components have been integrated with a user-friendly Interactive Data Language (IDL) front end and an advanced version of MODTRAN4™. Software tools for handling general data formats, performing a Langley-type calibration, and generating an output file of retrieved atmospheric parameters for use in another atmospheric-correction computer program known as "FLAASH" have also been incorporated into the present soft-ware. Concomitantly with the soft-ware described thus far, there has been developed a version of FLAASH that utilizes the retrieved atmospheric parameters to process spectral image data.

These programs were written by Steven M. Adler-Golden, Peter Rochford, Michael Matthew, and Alexander Berk of Spectral Sciences, Inc. for Stennis Space Center.

Inquiries concerning rights for the commercial use of this invention should be addressed to:

Spectral Sciences, Inc.
4 Fourth Ave.
Burlington, MA 01803
Phone No.: (781) 273-4770

Refer to SSC-00226, volume and number of this NASA Tech Briefs *issue, and the page number.*

State-Chart Autocoder

A computer program translates Unified Modeling Language (UML) representations of state charts into source code in the C, C++, and Python computing languages. ("State charts" signifies graphical descriptions of states and state transitions of a spacecraft or other complex system.) The UML representations constituting the input to this program are generated by using a UML-compliant graphical design program to draw the state charts. The generated source code is consistent with the "quantum programming" approach, which is so named because it involves discrete states and state transitions that have features in common with states and state transitions in quantum mechanics. Quantum programming enables efficient implementation of state charts, suitable for real-time embedded flight software. In addition to source code, the autocoder program generates a graphical-user-interface (GUI) program that, in turn, generates a display of state transitions in response to events triggered by the user. The GUI program is wrapped around, and can be used to exercise the state-chart behavior of, the generated source code. Once the expected state-chart behavior is confirmed, the generated source code can be augmented with a software interface to the rest of the software with which the source code is required to interact.

This program was written by Kenneth Clark, Garth Watney, Alexander Murray, and Edward Benowitz 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-41951.

Pointing History Engine for the Spitzer Space Telescope

The Pointing History Engine (PHE) is a computer program that provides mathematical transformations needed to reconstruct, from downlinked telemetry data, the attitude of the Spitzer Space Telescope (formerly known as the Space Infrared Telescope Facility) as a function of time. The PHE also serves as an example for development of similar pointing reconstruction software for future space telescopes. The transformations implemented in the PHE take account of the unique geometry of the Spitzer telescope-pointing chain, including all data on relative alignments of components, and all information available from attitude-determination instruments. The PHE makes it possible to coordinate attitude data with observational data acquired at the same time, so that any observed astronomical object can be located for future reference and re-observation. The PHE is implemented as a subroutine used in conjunction with telemetry-formatting services of the Mission Image Processing Laboratory of NASA's Jet Propulsion Laboratory to generate the Boresight Pointing History File (BPHF). The BPHF is an archival database designed to serve as Spitzer's primary astronomical reference documenting where the telescope was pointed at any time during its mission.

This program was written by David Bayard, Asif Ahmed, and Paul Brugarolas 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-43374.