

known pedigree, which greatly reduces duplication of effort and the potential for error. The use of the software spans all phases of the space system lifecycle, from the study of future concepts to operations and anomaly analysis. It allows SOAP software to correctly position and orient all of the principal bodies of the

Solar System within a single simulation session along with multiple spacecraft trajectories and the orientation of mission payloads. In addition to the 3D visualization, the user can define numeric variables and x - y plots to quantitatively assess metrics of interest.

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This software is available for commercial licensing. Please contact Karina Edmonds of the California Institute of Technology at (626) 395-2322. Refer to NPO-45057.

Facilitating Analysis of Multiple Partial Data Streams

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Robotic Operations Automation: Mechanisms, Imaging, Navigation report Generation (ROAMING) is a set of computer programs that facilitates and accelerates both tactical and strategic analysis of time-sampled data — especially the disparate and often incomplete streams of Mars Explorer Rover (MER) telemetry data described in the immediately preceding article. As used here, “tactical” refers to the activities over a relatively short time (one Martian day in the original MER application) and “strategic” refers to a longer time (the entire multi-year MER missions in the original application).

Prior to installation, ROAMING must be configured with the types of data of interest, and parsers must be modified to understand the format of the input data (many example parsers are provided, including for general CSV files). Thereafter, new data from multiple disparate sources are automatically resampled into a single common annotated spreadsheet stored in a readable space-separated format, and these data can be processed or plotted at any time scale. Such processing or plotting makes it possible to study not only the details of a particular activity spanning only a few seconds,

[e.g., vehicle tilt as in Figure 1(a), motor current, numbers of images] that, heretofore could be found only in thousands of separate files.

ROAMING also supports automatic annotation of both images and graphs. In the MER application, labels given to terrain features by rover scientists and engineers are automatically plotted in all received images based on their associated camera models (see Figure 2), times measured in seconds are mapped to Mars local time, and command names or arbitrary time-labeled events can be used to label engineering plots, as in Figure 1(b).

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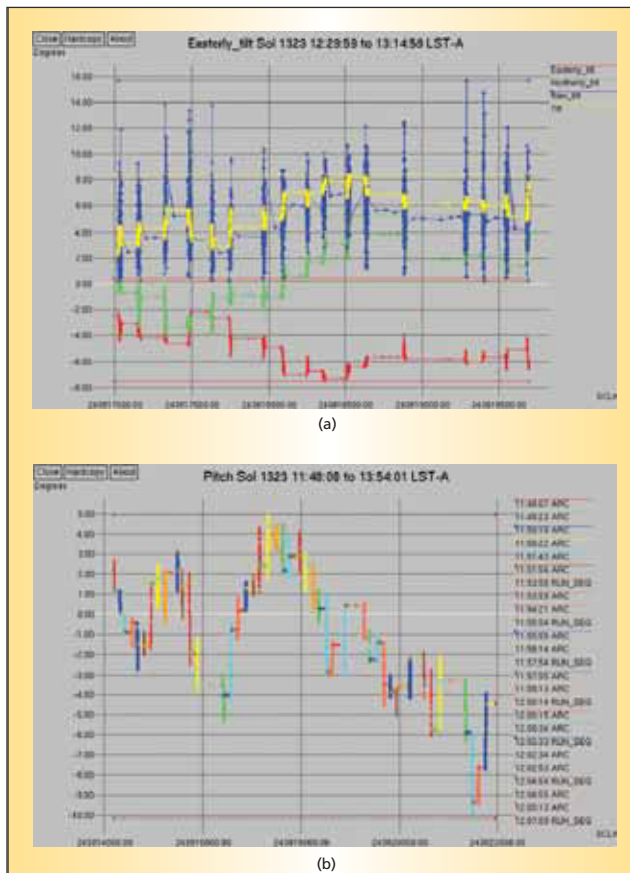


Figure 1. Plots may include (a) multiple fields or (b) event-based color coding, and support interactive zooming.

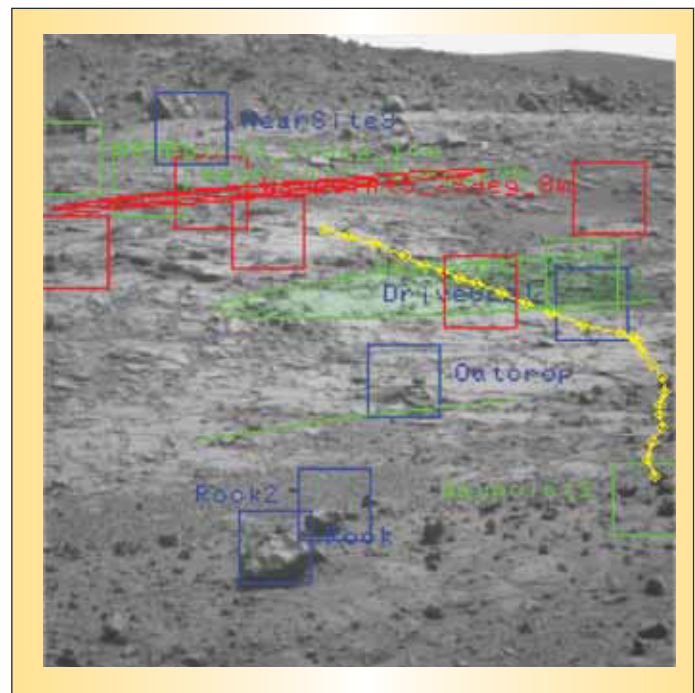


Figure 2. Images are automatically annotated with detailed drive information.