avoidance and global route planning are applied to the global map. The resulting path is used to derive steering commands sent to the motor controllers.

The software (training set selection, classifier training, and image classification) runs in real time at about 3 Hz on a 2-GHz processor, and the type of "image appearance features" is user-configurable. Basic RGB (red-green-blue) features, or their powers, or separable textures or within-patch color histograms can be used in any combination. All of these methods run in real time. The software can work in two modes: purely on-line or by using a fixed, previously-learned classifier. To learn the classifier, a cumulative-training mode is built in which training data across an entire run accumulates, learns a model at the end of the run, and saves the model to a reusable configuration file. The cumulative training mode can run alongside the online classification mode. One of two classification modes can be used: A linear discriminant (LDA)-based method, or a linear support vector machine (SVM) classifier.

This work was done by Michael Turmon, Benyang Tang, Andrew Howard, and Max Bajracharya of Caltech for NASA's Jet Propulsion Laboratory.

This software is available for commercial licensing. Please contact Daniel Broderick of the California Institute of Technology at danielb@caltech.edu. Refer to NPO-45146.

Browser-Based Application for Telemetry Monitoring of Robotic Assets

NASA's Jet Propulsion Laboratory, Pasadena, California

AEGSE Virtuoso Charting is an application that enables animated, real-time charting of telemetry streams of data from a rover. These automatically scaled charts are completely interactive, and allow users to choose the variables that they want to monitor. The charts can process data from streams with many variables. This application allows for the simultaneous viewing of up to four individually configured charts on a small touch-screen laptop.

The charting application has been tested and found to be extremely robust during long operations. It was left running overnight, with incoming telemetry at 100 Hz, and it did not experience any signs of lost functionality or memory leaks. This robustness is critical for an application that will be used to support vital tests for the Mars Science Laboratory rover.

The charting component also provides an interactive interface that allows the engineers to decide how many charts they want on their screen, and which attributes should be plotted on each chart. The application is optimized to make the charts on display take up as much of the available space as possible to maximize the use of the screen real estate. Engineers are also able to plot multiple attributes on the same chart, which enables them to observe the correlation between various attributes.

This work was done by Kelly S. Breed, Mark W. Powell, Khawaja S. Shams, and Richard D. Petras of Caltech for NASA's Jet Propulsion Laboratory. For more information, contact iaoffice@jpl.nasa.gov.

This software is available for commercial licensing. Please contact Daniel Broderick of the California Institute of Technology at danielb@caltech.edu. Refer to NPO-46348.