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, Banyang 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.