From 2D Images to 3D Tangible Models: Reconstruction and Visualization of Martian Rocks

Dr. Cagatay Basdogan
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A planetary rover acquires large collections of views while exploring its surrounding environment. These views can be merged together to construct a compact 3D geometric model of the environment. Such geometric models enable us to perform science analysis of Martian rocks and to generate navigation plans for the rover. The 3D reconstruction of Martian rocks from range data for visualization on Earth involves four main steps: a) acquisition of scans: depth maps are generated from stereo images, b) integration of scans: the scans are correctly positioned and oriented with respect to each other and fused to construct a global surface, c) transmission: data representing the surface model is compressed and progressively transmitted to earth, d) visualization: model is reconstructed from the transmitted data on earth and displayed to a user through a autostereoscopic visualization system and a haptic device for providing touch feedback. In this talk, Dr. Basdogan will mainly discuss the integration and visualization components of this process and our progress results.

Dr. Cagatay Basdogan is a Senior Member of the Technical Staff in the Engineering and Communications Section (366) at JPL. His research interests include computer graphics and vision, man-machine interfaces, and virtual reality systems. Before joining to JPL, he worked as a research scientist and principal investigator at the Research Laboratory of Electronics at the Massachusetts Institute of Technology (MIT). While at MIT, Basdogan developed patented algorithms for simulating 3D touch interactions in virtual environments through electro-mechanical robotic devices. He was also the lead investigator in the development of a computer-based surgical simulation and training system. At JPL, he has established the Virtual Environments Laboratory, and has initiated projects on 3D modeling and simulation, and human-machine interactions.

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