



3D Surface Reconstruction, Mapping, and Visualization

**A Special Track of the
12th International Symposium on Visual Computing (ISVC'16)**

<http://www.isvc.net>

December 12-14, 2016, Las Vegas, Nevada, USA

Scope:

Machine perception of three dimensional surfaces and interactive three dimensional visualization are active research fields with many applications in human computer interaction, autonomous navigation, and surveillance. Recently, these fields are receiving increased attention in geoscience and planetary exploration applications. In particular, in orbital imaging applications, advances in 3D computer vision are revolutionizing planetary mapping by automating traditional time-consuming, manually intensive data processing techniques. In addition, for remote planetary surface operations, automated multi-view 3D terrain reconstruction techniques are enabling increased robotic probe autonomy, and when combined with interactive 3D visualization, provide ground controllers and scientists with greatly enhanced situational awareness and site understanding – essential to overcoming the challenges presented by deep space communications with Earth (lengthy round-trip radio signal delays, limited bandwidth, and limited communication windows).

Advances in computer vision and visualization are poised to unlock the full potential of the terabytes of raw imagery that are being collected by orbital and landed robotic probes. As space agencies direct their attention toward human exploration beyond low-Earth orbit, planetary mapping and modeling will play a pivotal role in mission design, training, landing site selection, and planetary probe navigation. On Earth, with the increased concern over climate change, accurately tracking and modeling the changing shape of ice sheets and glaciers will provide vital data for analysis and modeling. Automated terrain reconstruction and mapping are enabling technologies for rapid turnaround high-quality Earth surface models, and novel interactive 3D visualizations have the potential to provide new insights into how the Earth's dynamic surface affects climate and vice versa.

The purpose of this track is to advance the current state of the art in 3D surface reconstruction, mapping, and visualization and its wide range of applications, with an emphasis on terrestrial surface understanding and planetary exploration.

Topics:

The topics of interest include, but are not limited to, the following areas:

- Multi-view surface reconstruction from calibrated and uncalibrated imagers
- Interactive 3D visualization of large-scale multi-resolution surface datasets
- Bundle adjustment
- Robust estimation methods
- Photoclinometry and photometric stereo reconstruction
- Statistical methods for 3D vision
- Camera calibration
- Hardware implementations
- Testing and validation of systems
- Applications relevant to geoscience and planetary exploration, including:
 - Automated Digital Elevation Model (DEM) generation, and automated geodetic control of geographic and planetary datasets
 - Landing site characterization and selection
 - Onboard obstacle avoidance and navigation for autonomous robot operation
 - Remote site reconstruction and simulation for robotic operations planning

Paper Submission Procedure:

Papers submitted to ISVC 2015 Special Track must not have been previously published and must not be currently under consideration for publication elsewhere. Manuscripts should be submitted in camera-ready format and should not exceed **12 pages**, including figures and tables (see <http://www.isvc.net> for details). All papers accepted will appear in the symposium proceedings which will be published by **Springer-Verlag** in the **Lecture Notes in Computer Science (LNCS)** series.



Important Dates:

Paper submissions	August 20, 2016
Notification of acceptance	September 25, 2016
Final camera ready paper	October 21, 2016
Advance Registration	October 21, 2016
ISVC16 Symposium	December 12-14, 2016

Organizers:

Ara V. Nefian, Carnegie Mellon University/ NASA Ames Research Center, Moffett Field, CA, USA, ara.nefian@sv.cmu.edu

Edwards Laurence, NASA Ames Research Center, Moffett Field, CA, USA, Laurence.J.Edwards@nasa.gov

Andres Huertas, NASA Jet Propulsion Lab, Pasadena, CA, USA, andres.huertas@jpl.nasa.gov