

SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – Part 1 (3A)

Author: Mr. Róbert Marc
Czech Technical University In Prague (CTU), Switzerland, rob_marc2003@yahoo.com

Mr. Luc Joudrier
European Space Agency (ESA), The Netherlands, Luc.Joudrier@esa.int
Mr. Tomas Pajdla
Czech Technical University In Prague (CTU), Czech Republic, pajdla@cmp.felk.cvut.cz

SENSITIVITY ANALYSIS OF VIRTUAL TERRAIN ACCURACY FOR VISION-BASED
ALGORITHMS**Abstract**

A number of 3D virtual environments are available to develop vision-based robotic capabilities. They have the advantage of repeatability at low cost compared to real testing. However, they still suffer from a lack of realism and credibility for validation and verification, especially when considering the immense variety of terrain types. This work explores the existing void in this direction. The paper focuses on the creation of a virtual environment as accurately as possible by projecting texture onto a DEM (Digital Elevation Map). With the help of a small terrain with RIEGL laser scanner and an accurate positioning system called VICON, we will compare the real environment and the virtual environment at the same locations. Ultimately, we will characterize the differences in feature selection from the main known feature (e.g. Harris, SURF, and SWIFT) depending on the level of details of the virtual terrain. This work should lead to creation of a highly realistic virtual database of the possible terrains which can be found on Mars for the purpose of vision-based control algorithms verification.