# PRoVisG

## Planetary Robotics Vision Ground Processing

### A CLOSER LOOK AT MARS

*A picture is worth a thousand words, and a photo from another planet might even be worth a few more. The project PRoVisG aims at making the most out of robotic probes that explore Mars and other planets, by improving the processing and representation of visual data they send back.*

For a probe on another planet, **time is of the essence** since its operational life is often short. The harsh environment, extreme temperatures and pressures, dust and radiation threaten to damage the hardware and compromise the mission at any moment. Given the difficulty and cost of getting to other planets, obtaining **a high return on investment is crucial**. Accelerating the processing and improving the representation of visual data from such missions, the project PRoVisG aims at giving mission operators and scientists a better three-dimensional (3D) understanding of these new worlds, and showing all of us what it looks like to be there.

In order to maximize the use of a robotic probe during its limited lifetime, scientists immediately have to be provided the best achievable visual quality of 3D data products, and mission controllers need to minimize the time spent for planning the next activities. PRoVisG will facilitate this, developing technology for the **rapid processing and effective representation of visual data** by improving Planetary Robotic Vision Ground Processing facilities. Its ambition is to collect a tool set and integrate a versatile and flexible processing chain which can be easily adapted to the various tasks. Thereby, mission controllers and sci-

entists on the ground profit from **improved situational awareness**, enabling them to identify targets of interest and send the next commands with minimum delay.

PRoVisG brings together major EU and US research institutions and stakeholders involved in space robotic vision and navigation to develop a unified approach for robotic vision ground processing. One main result will be a **web-based Geographic Information System (GIS)**, facilitating the comprehensive processing of visual data and the visualization of the context, history, vision data and products of robotic planetary missions. Prototypes of rovers and airborne probes will be used in terrestrial field test campaigns to demonstrate visual processing ability going beyond that currently available with the Mars Exploration Rovers and currently envisaged ESA missions.

As a further benefit, the effective representation of planetary surface imagery will be useful for scientific research, education, and also for increased public awareness regarding space science and exploration.



GERHARD **PAAR**
IS PROJECT COORDINATOR

### QUESTIONS & ANSWERS

**What do you want to achieve with this project?**
PRoVisG will build a unified European framework for Planetary Robotic Vision Ground Processing. State-of-art 3D computer vision will exploit the images gathered during past, present and future robotic space missions to the Planets for a significant enhancement of their scientific, technological and educational outcomes.

**Why is this project important for Europe?**
PRoVisG will demonstrate the potential of European industry and academia for high-level processing of image products from planetary surfaces. In this way Europe gains independence and reputation as a competitive partner for international research and exploration missions to the Planets.

**How does your work benefit European citizens?**
PRoVisG will conduct robotic field tests in Mars-like terrain. European scientists and engineers can provide exciting insights into what we can expect to see when Europe lands on the Moon or other planets and what such a system is capable of dealing with in natural non-vegetated terrain.



ExoMars Rover.
Source: © PRoVisG

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### LIST OF PARTNERS

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- Aberystwyth University (AU), United Kingdom
- Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany
- České vysoké učení technické v Praze (CTU), Czech Republic
- SciSys UK Ltd (SciSys), United Kingdom
- Astrium Ltd (EADS), United Kingdom
- Technische Universität Berlin (TUB), Germany
- University College London (UCL), United Kingdom
- The Ohio State University (OSU), United States
- University of Surrey (UNIS), United Kingdom
- Centre Suisse d'Electronique et de Microtechnique SA - Recherche et Developpement (CSEM), Switzerland
- Centre national d'études spatiales (CNES), France

### COORDINATOR

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### PROJECT INFORMATION

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