

ESA

Automation & Robotics Laboratory

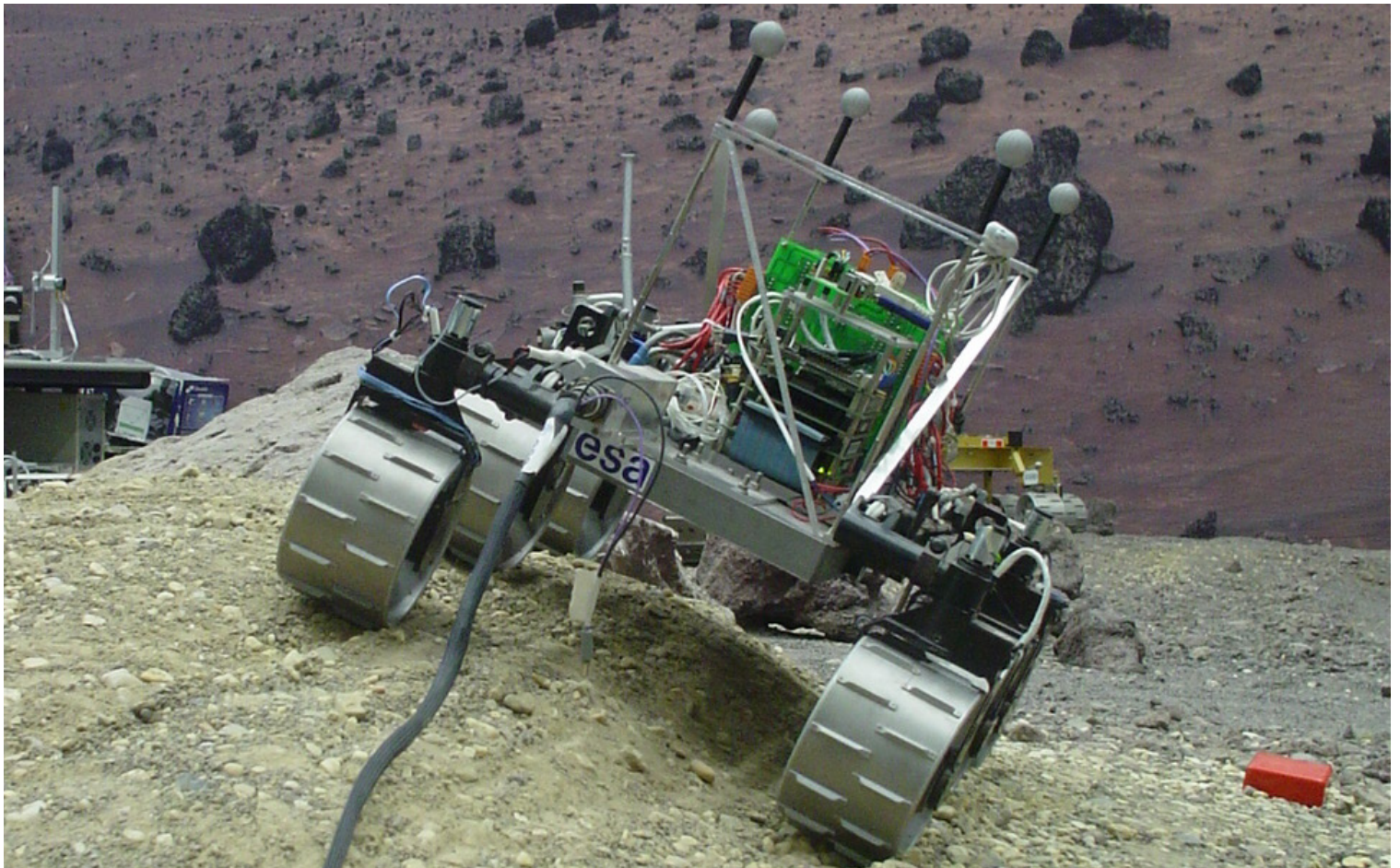
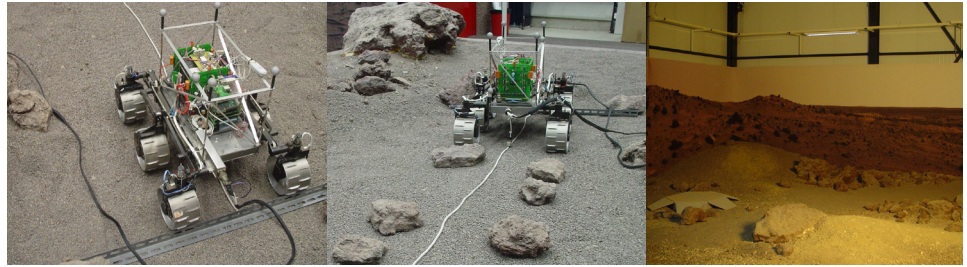


Image courtesy of ESA - Automation and Robotics Laboratory.

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[Pantelis Poulakis, Robotic Systems Engineer, ESA ARL.](#)

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The European Space Agency was established in 1975 and is an intergovernmental organisation dedicated to space research, technology and exploration. Its Automation & Robotics Laboratory (ARL) is currently conducting tests, which will enable them to accurately programme the movements of autonomous robots for planetary exploration, such as Mars and Moon rovers.

Pantelis Poulakis, a robotics systems engineer at the ESA ARL said: "The rovers are either tele-operated or they execute autonomous navigation algorithms onboard. The latter is necessary for a Mars

mission scenario due to the long time it takes for signals to travel between Earth and Mars and the limited availability of communication windows."

Being able to accurately predict the movement of the rover in space is extremely important to the ESA ARL. It required a motion tracking system that can give instantaneous feedback and provide an excellent quality of data. The ESA ARL is now working with an eight camera Vicon motion capture system to track the movements of the rovers aimed for planetary surface exploration.

The Vicon-based system is installed in an 80m2 planetary terrain simulation ground called the Planetary Utilisation Testbed (PUTB), which mimics some tricky planetary surfaces such as boulder fields, sandy dunes and gravel patches.

The Vicon system allows the ARL to test algorithms and make alterations to the programme, which is vital in the planning for the next Mars mission in 2018.

"In order to 'know' its position on the surface of the planet and to close the loop with the navigation algorithms, the rovers are equipped with a set of sensors called a 'localisation' scheme," Poulakis explained. "It's a continuous learning curve for us. The Vicon system tracks the rover's navigation trajectories, thus providing an external localisation reference. We then analyse that data, in order to validate the navigation algorithms and test our onboard localisation scheme. In a nutshell, we're narrowing the difference between how we expect the rover to move and what it actually does."

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