Virtual Crater

Virtual Simulation and Demonstration Environment

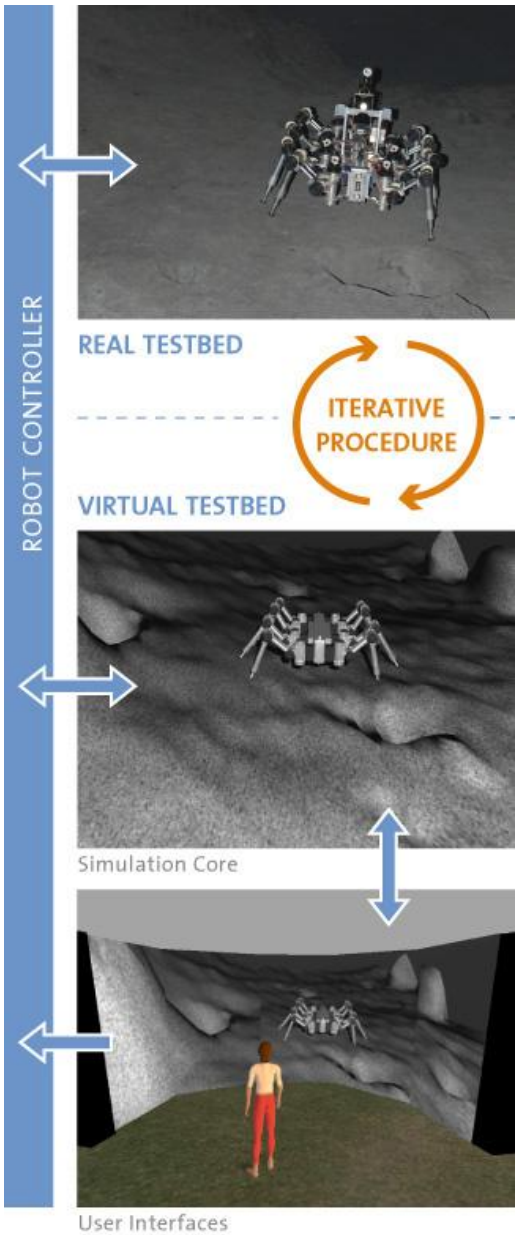

Fig. 1: The real and virtual testbeds

Development of a Virtual Simulation and Demonstration Environment for Planetary Exploration with Focus on Extraterrestrial Craters

The goal of the “Virtual Crater” project is to develop a virtual test environment (virtual testbed) where it is possible to program, test, and optimize robot systems in a realistically simulated lunar crater in a cost-effective way.

An important aspect in this project is the comparison between the planned virtual testbed and the real lunar test environment (real testbed) that is to be built at the DFKI within the LUNARES project. This project is developed in cooperation with the Dortmunder Initiative zur rechnerintegrierten Fertigung (RIF) e.V.

The “Virtual Crater” is a comprehensive simulation environment that makes it possible to program and test missions of lunar surface exploration and to demonstrate new concepts. In order to make this testbed behave as close to reality as possible, various parameters and processes need to be precisely identified and turned into versatile simulation components. In order to do this, a comprehensive set of physical experiments will be performed and compared to the analogous simulated experiments, so-called reference experiments. The simulation can then in turn – and in combination with specialized optimization tools – be used as an elaborate basis to perform optimizations of the hardware, scenario setup, and evaluation of contingency cases.

Figure 1 shows the real and virtual testbeds; in particular, it shows the integration of the robot controller in the real and virtual testbeds. One important goal in this work is to develop a method where a robot controller can run in the virtual testbed as well as in the real testbed without any readjustments so that the virtual robot can be programmed and controlled the same way as the real one.

In addition, it allows the users to immerse themselves completely in the virtual world as the “Virtual Crater” simulation system will be applied to projection-based visualization systems (CAVE System) as well as normal PCs.

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