NVIDIA�s Virtual Space Expedition

By NVIDIA, JCSI Group<mark>Get daily Product Design industry top stories and headlines - Sign up now!</mark>   Tuesday, March 01, 2011

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NVIDIA technology delivers real-time, virtual reality for the interplanetary expedition crew of "Mars-500".

The international virtual space expedition, �Mars-500,� composed of 6 cosmonauts and astronauts from Russia, the European Union, and China, started on June 3, 2010, and has just reached a new milestone this month (February 2011).

Last June, the state research center of the Institute of the Medical and Biological Problems of RAS (IMPB) started a 520-day international experiment, simulating a manned flight to Mars.

The main aims of the project are to study medical, biological, psychological, technical, and organizational aspects of an actual, planned long-run interplanetary expedition, as well as train the crew.

ADVERTISEMENT   To achieve these goals, NVIDIA Quadro professional graphics solutions, with their massively parallel processing capabilities, have become an important component of modeling and displaying the virtual reality of the flight to the �red planet.�

The landing portion of the virtual expedition, which started 240 days after the flight began last June, is one of the key aspects of the project. When the expedition reached the near-Mars orbit on February 12th, three crewmen moved to the take-off and landing suite, where they carried out the landing to the Mars surface, and will be conducting research studies on the planet the rest of this month.

Helping with the project is JCSI Group, Russia�s largest provider of broadcast automation, computer graphics and digital movie services, which also develops and deploys real-time, 3D visualization technologies, virtual reality and industrial design.

In order to fulfill take off and landing, and model the cosmonauts� and astronauts� activity on the Mars surface, JCSI created a 3D, interactive, 10x10 km virtual model of the Red planet�s surface, equipping one of the modules of the terrestrial experimental suite with a virtual reality modeling system.

Virtual_Mars_Surface_2

This powerful system utilizes a professional workstation equipped with a pair of NVIDIA Quadro professional graphics processing units (GPUs), which render real-time complex interactive graphics scenes on two 26�, high-resolution monitors (running at 1920�1200).

Depending on the application these monitors display control panels of moving objects, including: the takeoff and landing suite; automatic and manned Mars-rovers; 3D animated models of spacemen, and more.

In addition, the display also shows information on the external environment, which reflects the main features of the Mars landscape�low natural illumination, dust storms and other atmospheric phenomena unique to Mars.

�NVIDIA�s Quadro professional graphics were chosen to solve the complex problems of real-time processing and visualization of the 3D environment,� says Evgeny Chernyakov, CEO of JCSI.

�The model we created is intended to simultaneously render complex landscapes, various special effects (dust storms, meteorite showers)

and correctly manage moving objects like the Mars-rovers. Chernyakov concludes, �Such problems can be solved only with a top visualization solution, such as NVIDIA Quadro. We achieved great results, pushing the limits of visualization.�

In addition to utilizing NVIDIA Quadro pro graphics, the workstation is connected to a full-color helmet display system with a �head attitude position sensor,� which lets the user feel like he�s inside a spacesuit.

Various interactive tasks are done with two multifunctional joysticks, including: choosing required tools, selecting soil samples, and placing scientific instruments on the field.

The cosmonauts and astronauts in orbit also took part in the project�s Mars landing with NVIDIA 3D Vision stereoscopic viewing technology. A part of the content prepared for the 3D virtual reality model was copied to their notebook PCs. This is useful in providing high quality, 3D stereoscopic images to deliver the required level of psychophysiological stress as part of the research study.

For more information visit www.nvidia.com.