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John Bluck
NASA Ames Research Center, Moffett Field, Calif.
Phone: (650) 604-5026 / 9000
E-mail: jbluck@mail.arc.nasa.gov

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NASA Testing Prototype Software for Future Spaceflight

Software that astronauts could use during spaceflight and in future moon habitats is being tested by NASA in a Utah desert April 23 to May 7, 2006.

The research is taking place in Utah's southeast desert, at the Mars Society's Mars Desert Research Station near Hanksville, where scientists are field-testing a computer network to monitor space power systems. The network uses the same kind of intelligent software that also may assist astronauts to conduct planetary exploration with robotic systems.

"We will experiment with sensors and software that will help us manage a generator and batteries that provide power to a habitat, while we are living and working inside (of it)," said Bill Clancey of NASA Ames Research Center, Moffett Field, Calif., the project's principal investigator.

Nine scientists and engineers from NASA Ames are taking part in the experiments with the software and hardware systems. The Mars Desert Research Station will simulate a spaceship in flight or a habitat on the moon.

During the field exercise, the researchers' objective is to test software 'agents' that will assist astronauts by monitoring an electrical power system and sounding alarms that indicate problems. The agents also will provide procedural advice when problems occur. The system could keep track of astronaut locations, timelines and important tasks. Researchers will trigger some simulated problems to learn how the computer systems help or hinder the crew's response.

"By using the systems we are developing in the habitat, we are both testing our ideas and validating our assumptions about what kinds of tools people really need," Clancey said.

"A total systems perspective – developing our software in a setting analogous to where it will be used – provides direct experience and new insights about how people and automated systems can be designed to fit together," Clancey added.

Team members will use prototype tools, including a wireless computer network, and voice-commanded mission control communication services that partly automate the role of capsule communicator (CAPCOM) personnel, who monitor and advise astronauts like they did during the Apollo missions to the moon in the late 1960s and early 1970s.

Scientists are making audio and video recordings of the activities using the Crew-Activity Analyzer system developed under a Small Business Innovation Research Program grant to Foster-Miller, Inc., Waltham, Mass. It will synchronize audio and video recordings with records of the crewmembers' locations in the habitat.

From analysis of the recordings and other data, investigators can evaluate the prototype power system monitoring software and develop requirements for computer systems to interact with people.

"Human-systems interaction is one of the focus areas for exploration research," said David Korsmeyer, chief of the Intelligent Systems Division at NASA Ames. "Ames participates in several space autonomy, health management and advanced software projects that can increase future exploration spacecraft capabilities," Korsmeyer explained.

The Spacecraft Autonomy Project is a component of the Exploration Technology Development Program within NASA's Exploration Systems Mission Directorate, and funds mobile agents research. The project is developing a computer language, simulation environment and operational network for modeling and simulating how software 'agents,' people, tools and facilities interact in practical settings.

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NASA Official: Brian Dunbar
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