NASA News

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NOTE TO EDITORS AND NEWS DIRECTORS: You are invited to Utah's Southeast Desert near Hanksville, on Thursday, May 6, from 10 a.m. to 3 p.m. MDT to cover a field test of a planetary 'robot' and 'remote agent' software that researchers, playing the role of astronauts, will use. Reporters will be able to interview NASA researchers about computer 'mobile agents' with artificial intelligence that some day may communicate between human teams, Earth and Mars. The field test area is about a 20-minute drive from Hanksville and about four hours from Salt Lake City at the Mars Society's Mars Desert Research Station. Detailed driving directions can be found at the end of this release. If interested in attending, please telephone John Bluck at 650/604-5026 by 3 p.m. PDT, Tuesday, May 4, to RSVP.

NASA CONTINUES COMPUTER 'MOBILE AGENTS' AND ROBOT TESTS IN UTAH

NASA scientists today resumed testing 'mobile agent' software that someday may help astronauts on Mars talk with mission control on Earth. The tests are taking place in Utah's Southeast Desert in a NASA field operation that began this week and continues through May 9. A windstorm had halted outside activities yesterday.

Playing the role of astronauts, researchers carry 'smart' laptop computers that talk with a prototype robot during the tests. The laptops are loaded with 'mobile agent' software that scientists say will improve communications between human planetary explorers, robots and mission support on Earth.

Scientists said the robot traveled a total distance of 1,162 meters (3,835 feet) on Tuesday, April 27, a new distance record for the Boudreaux robot, and a rare event for mobile autonomous robots working in such extreme environments. Researchers also reported that the robot ran for almost six and three-quarters hours, a new endurance record for the rover.

But by Wednesday, April 28, a windstorm developed, preventing outside work. "This was just as well, as our main activity was to finish assembling and testing the computerized backpacks, including all the fittings for cables and fans," said Bill Clancey, principal investigator for the mobile agent software project based at NASA Ames Research Center, Moffett Field, Calif.

"Our main objective is to test the mobile agent system while people and a robotic assistant conduct real exploration in the desert," Clancey said. "During Apollo missions to the moon, astronauts continuously talked with mission control in Houston. But during our test, each person is carrying a laptop computer in a backpack. These computers include 'personal agent' software that can literally speak with the human 'explorers,'" Clancey explained.

'Mobile agent' software comes in several types, including 'personal agent' software -- software to which people can speak -- and 'com' software that links software and hardware devices. NASA Ames researcher Maarten Sierhuis will manage the mobile agent-robot test that will include at least 20 other researchers. The team, including the computerized mobile agents, the researchers and the robot, are conducting the test near Hanksville, Utah.

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NASA Glenn Research Center, Cleveland, provided the satellite communications link from the Utah site to the NASA Research & Education Network (NREN) located at Glenn. During the field trip, 'astronaut explorers' are using the mobile agent system to conduct real science. "They will be looking for geological evidence of past water in the desert. In the area, there also are many fossils from the Jurassic Period," Clancey said.

"The key thing is that the explorer will talk with the computer mobile agent software about science observations being made," Clancey said. "There are three specifics that the explorer relays to the agent – the name of the location, which sample bag the explorer is using to collect samples, and a narration of contents of the bag and the geologic context."

The helper robot, 'Boudreaux,' taking part in the test, also called the 'Extravehicular Activity (EVA) Robotic Assistant,' will follow along with human explorers. Developed at NASA Johnson Space Center, Houston, the robotic assistant responds to voice commands. The astronaut speaks through a microphone to his or her personal agent software, which relays commands to the robot's personal agent software. This software activates computer programs that direct the robot to follow astronauts, take photographs or carry samples.

During future planetary exploration, data will be relayed by personal agent software to others on the science team, both on the planet's surface and back on Earth, according to Clancey. Information will be stored in a database in a Mars or planetary human habitat. The personal agent software will send this data via e-mail to the Earth-bound science team. The software also automatically will transmit images taken by the astronauts to their planetary habitat and to Earth.

"In Utah we also are testing planning and communications software, as well as procedures, by having the 'astronauts' communicate with science teams located at several universities," Clancey said. "By sharing data as soon as possible, and sending a video of the crew's planning session for the next day's work, we hope to learn how the Mars crew and scientists on Earth can best work together."

The computer that astronaut-explorers will carry will include a global positioning system device. The agents will stamp the collected data with time and location. "The astronaut explorers can tell the agents what activity they are going to do next," Clancey said. "The astronauts will choose activities from a menu of potential planned subjects."

The chosen activity sets up expectations for the personal agent software describing where the explorer should be and how long the activity should continue. If the astronaut deviates from the plan or the planned location, or stays too long, the personal agent software will verbally warn the astronaut. At the same time, the computer agent also will send e-mail to the support team on Earth and to another computer agent in the habitat, which will announce on the habitat's loudspeaker that there is a possible problem.

During a mission, the astronaut explorers will wear biosensors, which will detect and transmit human vital signs to his or her personal agent software. If vital signs are not normal, the agent will send e-mail to Earth, "and a loudspeaker will blare warning information in the habitat," Clancey said.

Additional participants in the mobile agents test include:

- NASA Research & Education Network (NREN) www.nren.nasa.gov/
- Michael Cauley, David Pleva, Mark Seibert , NASA Glenn Research Center , Cleveland, Ohio
- Jeff Graham, Kimberly Tyree-Schillcutt, Nathan Howard, Robert Hirsh and the EVA Robotic Assistant, also known as 'Boudreaux,' NASA Johnson Space Center, Houston
- Abigail Semple and Brent Garry, State University New York at Buffalo (SUNY)
- The Remote Science Team: Shannon Rupert, from Mira Costa College, San Diego, Calif.; Stacy Sklar, University of Arizona; Melisa Farley, Kyle Frederick, Brett Burkett, Shannon Kobs, Nadine Calis, Amy Webb (SUNY Buffalo) Simon Buckingham-Shum, Michelle Bachler, Al Selvin, Knowledge Media Institute, Open University, Milton-Keynes, United Kingdom; Danius Michaelides, Kevin Page, Intelligence, Agents, Media Group; Univ. of Southampton, United Kingdom; Dan Berrios, Ian Sturken, David Hall, and Rich Keller, ScienceOrganizer Group; Code IC, NASA Ames

A schedule for the field test (subject to change) is on the Internet at:
http://ical.mac.com/msierhuis/FieldTestSchedule

NASA's Office of Exploration Systems funds the mobile agent project research. Publication-size images are available at: http://amesnews.arc.nasa.gov/releases/2004/mobile_agents/mobile_agents.html

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Detailed driving directions: From Salt Lake City, take I-80 east for a short distance to I-15 south. Pass Provo, and then take Highway 6 east. Follow Highway 6 to Green River. Then take Highway 70 west a short distance to Highway 24 to Hanksville. To travel to MDRS from the junction of highways 24 and 95 in Hanksville, take 24 west for 3.8 miles, following the river. At the top of the wash there is a dirt road on the right. Look for a wooden post with a stop sign. If you are going downhill and have gone four miles, you've missed the dirt road. You will know you have the correct dirt road if it immediately turns toward the right, doubles back toward the way you have come, goes over a rise and cattle guard and heads steeply down into a plain. Follow the road about 2.5 miles. Slow down for all washes. After about 2.5 miles, a Mars 'habitat' is located over your left shoulder behind a low set of hills (not visible from the direction you are driving). You may see tracks going off the dirt road. If you miss the habitat, turn around after 3 miles, and it will be obvious (now on your right) as you approach it.