

Building robots with people in mind

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In the isolated, otherworldly landscape of Utah's painted desert, NASA scientist William J. Clancey made an important breakthrough about how to create robots to assist astronauts on a future mission to Mars.

As geologists on the team explored the depths of a ravine, Clancey realized one of the most important needs of space travelers is the ability to stay in touch with home base.

"I realized we need the robots to have an antenna, so that when the astronauts are going further and further from station, they remain on a wireless network," he explained.

Clancey, a senior research scientist at the Institute for Human and Machine Cognition at the University of West Florida, has been on leave since 1998 in order to serve as chief scientist for human-centered computing at NASA Ames Research Center, Moffett Field.

In the last few years, Clancey has participated in four research expeditions at the Mars Desert Research Station — a compound created by the nonprofit Mars Society and viewed by NASA as a possible model for a human habitation on Mars.

Clancey, who has spent the past three decades developing artificial intelligence, returned from his most recent mission to the desert late last week. The computer scientist is convinced the only way to gauge the needs of NASA astronauts is to witness firsthand the needs of real-life geologists working on an actual exploration here on earth.

While earning his doctoral degree at Stanford University, Clancey developed a computer tutoring program designed to diagnose disease and interact with medical students. He was also one of the early voices in a movement during the mid-1980s calling for the humanities, such as sociology and anthropology, to be used in the development of artificial intelligence.

"We said if you understand how people work and how they think you can build tools they will actually want to use," he explained.

Colleague Maarten Sierhuis, senior scientist at the Research Institute for Advanced Computer Science/Universities Space Research Association, praised Clancey's breadth of studies in other fields such as philosophy and ethnography.



"He's one of the few researchers I would say who truly crosses the boundaries into the different fields necessary to come up with innovation," Sierhuis said.

"And he doesn't let anybody tell him what he should work on and how he should work on it. Obviously he has earned that privilege, but it is a unique gift, a quality that allows him to truly be an innovator."

Clancey explained that the robots being developed by NASA are a long ways off from "Data," the popular android character on Star Trek: The Next Generation.

NASA's machines under development consist of two laptops mounted on a machine with four wheels. One laptop is capable of receiving commands such as "move forward," or "take photograph" while the second is on a wireless network connected to the laptops worn by the astronauts on their backpacks.

While they may look more simplistic than the robots of science fiction, these mobile machines can be powerful tools for astronauts on an expedition. Clancey argued that it is important to put the robots in their proper context.

"The person who said it very clearly was (philosopher) John Dewey, who said, 'don't confuse the carpenter with his tools.'"

"This is not a robotic geologist," he said. "This is a little laboratory out in the field."

While the robots can't begin to approach the intelligence or problem solving skills of the humans, the machines can complete certain tasks that might be difficult or impossible for an astronaut on a mission.

However, Clancey is still hopeful that one day, science fiction will approach to reality.

"I still believe that we will build machines that have human-like intelligence, but it's not going to be soon," he said. "We're going to be on Mars before that."