New Equipment Will Help Examine Robot-human Interactions, Complex Robot Tasks

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MERCED - Real robotics isn't like an old sci-fi movie where robots are out to take humans' jobs and run the world.

Instead, say the scientists who will use newly funded robotics equipment at the University of California, Merced, the humanoid robots that will be developed in the next 20 years will serve as helpers for people. They may step in on jobs that are too dangerous for human hands, like defusing bombs, or too tedious for our taste, like washing the nightly dinner dishes.

But the science of robotics needs to take some big steps to create the machines that can both manage those kinds of tasks and interact effectively with people. That's where the new UC Merced robotics equipment - funded with a new $476,500 grant from the National Science Foundation's Major Research Instrumentation program - will come in.

"This is a significant boost for our Computer Science and Engineering program and will have strong positive impact for our both our teaching and research programs," said Dean Jeff Wright of the UC Merced School of Engineering. "Professor Carpin and his colleagues are developing a facility that is truly unique and innovative among top Engineering programs in the country; our current and future students will be the real beneficiaries of this vision."

A team of five investigators in computer science and cognitive science at UC Merced are now ordering the equipment - a humanoid robot that will run on its own, as well as advanced, three-fingered robotic arms that they will connect with a torso and head to be built on by UC Merced graduate students. The NSF funds will also be used for state-of-the art motion capture cameras, which will allow mapping motions from people to the robots. The team expects the equipment to arrive around the beginning of 2009.

"With these two systems, we can study a wide range of problems in robotics," said Professor Stefano Carpin, the robotics expert who led UC Merced's team to a second-place finish in the worldwide RoboCup virtual rescue robot competition last summer. "The small humanoid robot will be ideal for studying human-robot interactions, and the arm-torso-head assemblage will help us investigate complex tasks, gestures and hand-vision coordination."

Such a broad array of tasks requires a talented team of researchers. Professors Marcelo Kallmann, a computer motion specialist; Teenie Matlock, a cognitive scientist specializing in language and embodied cognition; Shawn Newsam, who studies computer vision; and David Noelle, a cognitive neuroscientist, are also principal investigators on the new grant. With distribution of expertise through these fields in engineering and cognitive science, they are poised for deeply interdisciplinary research in robotics.

The team is now in the process of finding the right spot for the equipment at UC Merced. Fortunately, their space needs - always a consideration on this rapidly growing campus - are modest, especially in view of the potential for discovery using the new equipment.

The humanoid robot measures up at about two and a half feet tall - "more the size of a monkey than a human," Carpin said. Its small size may seem cute and friendly to people, but the real advantage is that smaller is cheaper - not to mention easier to store.

The robotic arms in the lab are expected to be under high demand. Carpin noted that a lab at Stanford, housing only one arm of the same type as the two he is ordering for UC Merced, is busy with researchers around the clock.

Made by Barrett Technology in Massachusetts, the arm has three fingers compared with only two on most others. Carpin said it is the most advanced device of its type available.

"This will help us attract and retain students and faculty," he said.

Student involvement will be an important piece of the new robotics lab, as it is for most research occurring at UC Merced. Grad students built the head that will top the arm assembly, and many grad students will use the new lab. Carpin said the next step will be bringing in undergraduates - possibly through another NSF program for which he will be applying in the spring - to program software simulations that will allow pre-testing of different protocols before researchers try them on the actual lab equipment.

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