

# 'I, Robot?' Not Yet ...

Research seeking ways to ease our workloads

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LA CANADA FLINTRIDGE -- Although the robot-dependent society that eventually runs amok in Alex Proyas' summer blockbuster "I, Robot" is a portrayal of the year 2035, local researchers are already advancing robotic technology at a level that can at times seem like science fiction.

Moving away from the notion of robots that amount to a pile of metal boxes such as the Jetsons' maid "Rosie," robotics and artificial intelligence researchers at the **Jet Propulsion Laboratory** are working to develop robust yet flexible robots capable of helping humans.

And even though a fully capable mechanical nanny is not likely to grace store shelves any time soon, researchers at the lab are already beginning to consider which tasks robots should be used for and which they should not. And for those "robo-



A mechanical dog pushes a box in a demonstration of what Ayanna Howard at **JPL** has reprogrammed it to do. The dog can perform several different tasks.

phobes" out there, they suggest understanding the technology behind robots can help dispel worries of movie-style global takeovers by artificial beings.

Ayanna Howard, a senior robotics researcher at **JPL**, said the technology in "I, Robot" won't be feasible for at least 30 or 40 years. However, in the future "robots will be a part of life," she said. And the idea of robots completing tasks that humans find too boring or too dangerous is certainly not far-fetched.

Currently, Howard works with pre-manufactured mechanical dogs that she has reprogrammed to do simple tasks such as pushing a box in a dictated direction. Eventually, she hopes to apply what she's developed with her robotic canines to more sophisticated robots that will help astronauts build structures on the surface of the moon and distant planets.

Howard has to "look at the whole scenario and see which tasks are ideally suited for the robots and which are better suited for humans."

For example, she said, humans are well-suited for scientific analysis in space while robots could use their abilities to navigate to the areas of scientific interest. Humans can do fine manipulation such as tightening a nut onto a



**DR. YOSEPH BAR-COHEN**, a senior research scientist & group leader at the **Jet Propulsion Laboratory** on Thursday July 29, 2004 at his lab at **JPL**. Dr. Yoseph Bar-Cohen grips a robotic hand in his lab, while an android capable of changing facial expressions looks on. Yoseph Bar-Cohen issued a challenge to researchers in 1999 to develop a robotic arm moved by artificial muscles capable of beating a human arm wrestler.

bolt, while robots could be useful for lifting heavy objects. Relatively mindless activities could be accomplished by robots while astronauts complete higher level tasks, she said.

Equipping robots with the fluidity and freedom of motion coupled with the strength and durability desired of android helpers to complete the prescribed duties is a goal Yoseph Bar-Cohen works toward in his lab at **JPL**. The senior research scientist, group leader and author is a leading expert in the development of artificial muscles.

In 1999, Bar-Cohen issued a challenge to the research community to create a robotic arm that relies on the strength of artificial muscles built of plastics that respond to changes in electricity or chemical charges to defeat a human arm-wrestler.

Bar-Cohen said that when he proposed the challenge, he expected it to remain outstanding for about 20 years. But the field has progressed so rapidly that three research teams have already developed technologies to compete next March against their first arm-

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wrestling opponent. Eventually, the arms will have to defeat world champion John Brzenk to win the challenge.

The competition was Bar-Cohen's way of motivating the world's researchers in the field, known as electroactive polymers. "I don't believe it's a one-person show. We should use all our talents," Bar-Cohen said.

Within his own lab, the plastics are present in a variety of projects, including an android head created by David Hanson of the University of Texas in Dallas that is capable of changing its facial expression.

Bar-Cohen says a key to developing more useful robots will be the imi-

tation of nature in the laboratory. "We can look at nature and start copying. The possibilities are endless," he said.

He envisions robots capable of running like horses on Mars. "But this kind of thing, you can't do with rigid motors," he said. And he believes the electroactive polymers and artificial muscles may be the key to developing the kind of robots that will be able to do such goals.

As far as "I, Robot," Bar-Cohen said the director and producers have pushed the technology "way beyond what's possible ... it's going to happen slowly." However, he added, "It's good that we have people



**AYANNA HOWARD**, senior robotics researcher at **JPL**, displays two store-bought mechanical dogs she has reprogrammed in her research. She used the dogs as models for future robots she hopes will one day assist astronauts.

pushing the limits."

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