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Robots have feelings, too

on 29 November 2000, 22:00

by [Niall McKay](#)

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Rodney Brooks, director of the Massachusetts Institute of Technology's Artificial Intelligence Lab, believes that the killer application for robots is remote presence -- in battle, in policing, on the playground, and even in the home and office.

During my recent visit to MIT in Boston, the Australian-born robotics guru demonstrated why developing human-like emotional, sensory, and response systems is necessary for robots to become as pervasive as the PC.

"In battle, you can't have the commander hacking away in C++," says Mr. Brooks. "He has to be able to tell the robot, 'Go down the hill, take a look, and tell me what's going on.'" In turn, the robot has to be able to demonstrate that it has understood the command; a nod of its robotic head would suffice. In a sense, then, the robot's artificial intelligence is really a very sophisticated user interface.

"Obviously, you don't want humanoid robots in battle situations," says Mr. Brooks. "But we are exploring the extreme here, and from that we'll pull back to the real application."

That is why the Defense Advanced Research Projects Agency, or DARPA, has pumped millions into the development of [Kismet](#), a big-eyed robot built on 11 PCs and four 64-bit parallel processing units.

"We made Kismet's eyes big because we wanted people to treat it like a child," says Mr. Brooks. "That way, it has a better chance of understanding them."

TOYING WITH IDEAS

A pared-down version of the artificial intelligence technology that drives Kismet also drives My Real Baby, a robotic doll developed by Hasbro (NYSE : HAS) and the Boston-based iRobot, where Mr. Brooks is the chairman and chief technology officer.

"We [iRobot] understand that the toy market is not really a money spinner," says Mr. Brooks. "But developing toys has a real benefit to growing a market." It will get the public used to interacting with robots, drive down manufacturing and component costs, and help foster the development of the technology. Mr. Brooks likens it to the production of ping-pong computer games in the early 1980s.

"They didn't really do much by today's standards, but they helped get the public used to computers and drove down production costs," he says.

Once production costs come down, then robots may be ready for prime time -- providing both consumers and industry with a way to project themselves into different locations. For example, if you've got a repairperson coming to fix your heating system, you could boot up your Web browser and have your personal robot answer the door. Its on-board audio-visual system would let you answer questions and keep an eye on things while your boiler is repaired.

"Now, I am not promising anything here," points out Mr. Brooks, "but in the not-too-distant future, the repairperson could project himself into your computer and repair your boiler from his or her office."

MILITARY APPLICATIONS

Likewise, the military and police have a need for remote presence. "If somebody is in a house with a gun, you want the officer to be able to throw a small robot through the window to see what's going on," he says.

However, perhaps before robots become as pervasive as PCs, they need to become a little better at interacting with humans. Here, MIT is really blazing a trail. Kismet's artificial intelligence software drives a sensory system made up of cameras, sensors, and microphones that can track people or objects as they cross a room.

The sensory system, together with its software emotional drive system, enables it to interact with and react to humans in a meaningful way. For example, when somebody gets too close to the robot, its cameras can't process his or her image. So, using a trick from psychology called "social amplification," the robot will pull back its head quickly, and the person will react to this by pulling back his or her head.

Kismet's system architecture is composed of several systems: perception, attention, motivation, behavior, and motor. Each behavior is weighted according to the sensory data that the robot picks up. Its "emotions" are based on simple appraisals of the advantage or disadvantage of a stimulus. The robot has a positive emotional

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