

THE ROBOTS ARE COMING

Morticia is quite the capable robot. She can scramble over the outback at about 15 kilometers per hour, climb stairs, survive a 10-meter drop onto a concrete floor and even navigate underwater. Not bad for a little critter that's less than 20 centimeters high and 65 centimeters long—about the size of a small suitcase.

Created under a U.S. Department of Defense contract by an MIT spinoff company called iRobot, Morticia is a military machine with a mission. Instead of carrying bombs, she carries eyes and ears, transmitting what she sees back over a wireless link. She is also a pioneer, showing us how robots are likely to be integrated into our jobs and our lives in the coming years.

I met two of the cofounders of iRobot, Colin Angle and Helen Greiner, more than 15 years ago when they were students working on artificial cockroaches at the MIT Robotics Lab. I wasn't impressed. So when I learned a couple of years ago that Professor Rodney Brooks had formed a company with them to commercialize the cockroach technology, I pretty much wrote the whole thing off.

But when I walked through the door of iRobot's offices in Somerville, MA, earlier this year, I realized I had made a huge mistake.

iRobot isn't about cockroaches—it's about creating the whole range of technologies that are necessary for building mobile, autonomous computers that perform valuable functions. This is hard stuff, requiring innovation in computer hardware, software, materials, mechanical design, wireless communication, artificial intelligence and more.

Consider Morticia—one of the first prototypes of what iRobot calls "Packbots." These are rugged machines that can be packed up in a box, thrown into the back of a van or a Humvee and hurled through the window of an office building where a crook is holed up with some hostages. The robot's most prominent features are two rotating flippers that can be used for added traction, climbing steep steps or even righting itself if it happens to fall upside down. There are two cameras in the front, optional infrared headlights and seven payload bays for extra batteries or instruments. iRobot designed and built the whole shebang, from the treads (a fundamentally new design) and the nylon wheels with the cyclone-shaped spokes (designed to absorb heavy impacts) to the flippers. You just can't buy this stuff off the shelf.

"In Los Angeles they have a hostage situation every three days," says Greiner, who is now iRobot's president. "Standard procedure is not to send in a police officer." That's because the officer might get shot or end up "amplifying" the situation.

Which is where robots come in. "If you can send in a non-threatening robot and establish communications," Greiner maintains, many hostage situations can be defused. The robot

can also look around and verify whether the hostages are still alive—or if they even exist. Packbots were also sent in to explore the rubble after the attacks on the World Trade Center last September, but, alas, they did not discover any survivors.

"It's a very good robot," says Martial Hebert, a professor at Carnegie Mellon University's Robotics Institute. As with other robots that iRobot has developed, the company plans to sell a version of the Packbot for robotics researchers around the world. Hebert has used an earlier version of the Packbot to develop advanced navigation algorithms.

If you're lucky, you will never encounter the business end of the Packbot. But within a year or so, you might find yourself looking eye to eye with another iRobot creation called the CoWorker. Designed to meander through an office building, the CoWorker looks like an oversized children's wagon with a long black neck and a cute little video camera on top. CoWorker is a mobile videoconferencing system that you can drive from room to room of your company's office in, say, San Francisco, while you're sitting in your house on the other side of the country.



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You log onto the computer's onboard Web server, view a picture of the room that the CoWorker is in, and then click your mouse where you want it to go. The robot charts a path, driving around obstacles and maneuvering through doors.

CoWorker is a big step forward from the teleconferencing systems that have been bopping around corporate America for many years. With today's systems, you need to ask your colleagues to meet you for a teleconference. With CoWorker, you drive the teleconferencing system into their offices—quite handy when the long-distance workmates won't answer your e-mails.

iRobot has also created a nine-meter-long robot that crawls down oil wells and performs measurements on the inside. And the company's consumer division has put the low-cost My Real Baby robot into the hands of more than 100,000 children since its release in November 2000.

What's happening here is clear: the real revolution in mobile computing isn't handheld computers; it is autonomous systems that can perform useful work. iRobot isn't the only company to see the potential here. ActivMedia Robotics in Peterborough, NH, for instance, sells a full line of robots for third-party developers and researchers; and don't forget Sony with its Aibo robotic dog.

This whole world of robots is amazing, and it's only going to get more so. To anyone who was just laid off from Cisco Systems, Nortel Networks or some other telecommunications company—get into robotics. This is the future. ■