

## Off the Beat

# RUN, ROBOT, RUN

"Everyone should buy his own robot."

—Karel Capek, "R.U.R.," 1921

"He's obedient, docile and great with kids," said the salesman, ignoring my quizzical look. "He doesn't shed any hair or need to be housebroken."

But I couldn't imagine warming up to a trim package of brightly colored plastic and metal. And the care and feeding of a personal robot wasn't likely to be a simple matter. Back in the early days of personal computers, I recalled that proud owners, while trying to think of something useful to do with their new electronic toys, had to contend with balky circuits, bug-ridden programs and unintelligible instruction manuals.

Now we're in the early days of personal robots. More than two dozen companies manufacture them, but most of these machines are little more than toys. They're useful for starting conversations, attracting customers or learning about robots, but they are not yet effective servants, tutors or security guards. Some are merely computers or stereos on wheels. Even the best robots, neatly packaged amalgams of clever industrial technology, are still rather primitive and expensive. They have trouble climbing stairs and opening windows, and they understand only the simplest commands.

Nevertheless, robots of one kind or another were stepping, rolling or crawling everywhere at last month's Consumer Electronics Show held in Las Vegas. It was hard to escape their beady, brightly blinking "eyes," their modulated, metallic chatter and their goofy, glowing grins.

Hubot, manufactured by Hubotics, Inc., in Carlsbad, Calif., and billed as the "ultimate intelligent appliance of the '80s," is one example of off-the-shelf industrial technology packaged to appeal to the upscale consumer. With its television-screen face, *de rigueur* flashing lights and a computer keyboard that pulls out from its stomach, Hubot is designed both to compute and to entertain. Built on a triangular base for stability and to fit discreetly into a corner when it isn't whirring along at a foot per second, the unit will eventually include an optional vacuum cleaner. Nevertheless, at \$3,500, Hubot, even as a walking, talking burglar alarm and wake-up service, isn't a bargain.

Another approach is to focus on one particular talent. Hearoid, put together by TTC of Carson, Calif., contains a voice recognition computer first used in some high-tech telephones. After a training session, this midget robot can understand 12

spoken commands. The robot also features a built-in cassette tape deck, which it can stop and start on command. At one-tenth the price, Hearoid is cheaper than Hubot, but it also does far less. When I pointed out some of the robot's shortcomings, one TTC official asked, "How much technology are you willing to pay for?"

One of the old timers is Hero I. The Heath Co. of Benton Harbor, Mich., has produced about 10,000 of these boxy robots, half of them in kit form. Hero I's new cousin, Hero Jr., comes not only assembled but also with a built-in personality. When bored, it can go to sleep or mutter in Roblish, a random agglomeration of word segments, until it "thinks" of something to do. Unless directed, the robot normally wanders about randomly. A bump into a wall elicits a "Who put that here?" from the somewhat absent-minded machine. A series of plug-in cartridges extend Hero Jr.'s repertoire of songs, routines, phrases and games.

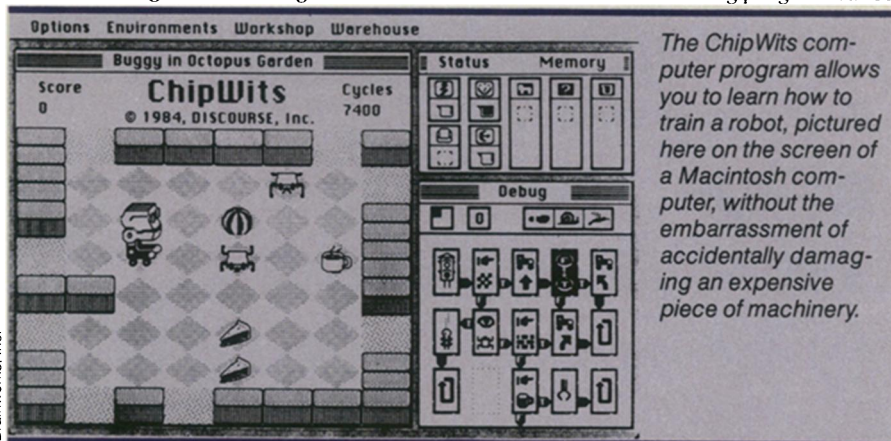
Despite Hero's success, part of the current excitement in the home robot market is that no single robot design dominates

incorporate new technology. Still, there has been progress. Less than five years ago, almost all commercially available robots were little more than mechanical arms used in factories.

High-technology companies also can't resist tinkering with robot designs just to show off their expertise, sometimes at great expense. Japan's Sumitomo Electric Co., for example, has developed a mechanical musician that sight-reads music with its video camera head while banging the keys and treading the pedals of a standard electric organ. A Hitachi robot maps its surroundings and compares them to its own map so that it can navigate around obstacles. Toshiba's Amooty clammers up and down stairs.

Denning Mobile Robotics, Inc., of Woburn, Mass., however, is serious about its sentry robot, which may cost about \$40,000 when it's ready next summer. This 300-pound wonder incorporates a sophisticated self-navigation system that would allow it to patrol warehouses and prisons or to wash floors in supermarkets and airports.

With such costly hardware wandering about, there's a risk of unintentionally ordering a robot to go over a cliff or into a brick wall. The computer software company Brainworks, Inc., has the answer in the form of an entertaining program called



The ChipWits computer program allows you to learn how to train a robot, pictured here on the screen of a Macintosh computer, without the embarrassment of accidentally damaging an expensive piece of machinery.

the field. Many manufacturers are making sure that the inner workings of their robots are open so that anyone can make changes or improvements. This flexibility is one lesson that robot makers have learned from the personal computer industry. Such modular robots evolve and grow with the step-by-step progress of their masters. As their owners learn more, the robots get smarter.

Some market surveys estimate that the manufacture and sale of personal robots may be a \$2 billion industry by 1990. However, sales now total only about \$50 million a year, and robot manufacturers face very high development costs. Because of a shortage of capital, some companies can't even afford to build all of the robots for which they have taken orders, let alone to

ChipWits. The user learns to program a video robot to cope with a variety of hazards thrown up on the screen of a Macintosh computer. Any simulated collisions are easily corrected, and the screen robot goes on to further adventures.

Most home robots are now marketed as teaching aids—to show what larger, more sophisticated industrial robots can do. Rather than fulfilling the dream of owning a cheap, mechanical servant, they demonstrate that the appetite for new gadgets, no matter how primitive, never seems to be satiated. But at the Consumer Electronics Show, the biggest attraction was no robot. An actor who out-roboted the robots got away with flirtations that normally only Robert Redford could have managed.

—Ivars Peterson