SOFTWARE

ROBO-SOFTWARE REPORTS FOR DUTY

Powerful new programs automate routine—and complex—tasks

Robots have long captured man's imagination as tireless, eternally loyal servants. But even today, with many factories having gone robotic, few people have ever seen a true robot, much less owned one that they could boss around.

All that may change now, as a new kind of robot starts prowling the digital highways and byways of cyberspace. It's what computer scientists call an "agent"—a kind of software program that's powerful and autonomous enough to do what all good robots should: help the harried humans by carrying out tedious, time-consuming, and complex tasks. Software agents just now emerging from the research labs can scan data banks by the dozen, schedule meetings, tidy up electronic in-boxes, and handle a growing list of clerical jobs. In the next couple of years, experts predict, agents will be available from all the major software companies and quite a few startups as well.

SUPERHIGHWAY SURFERS. At Hewlett-Packard Co., an agent supplied by Edify Corp. is already helping automate a quarterly wage-review process that covers approximately 13,000 salespeople. Edify's software, running on a PC, performs essentially the same tasks that a team of 20 administrators has been doing by hand. First, the agent program dials into the HP personnel system and gets a list of who works for each of 1,200 sales managers nationwide. The agent then electronically mails each manager a list for his verification. It collects any changes by e-mail and enters them back into the personnel system—exactly as if a human were working at a terminal.
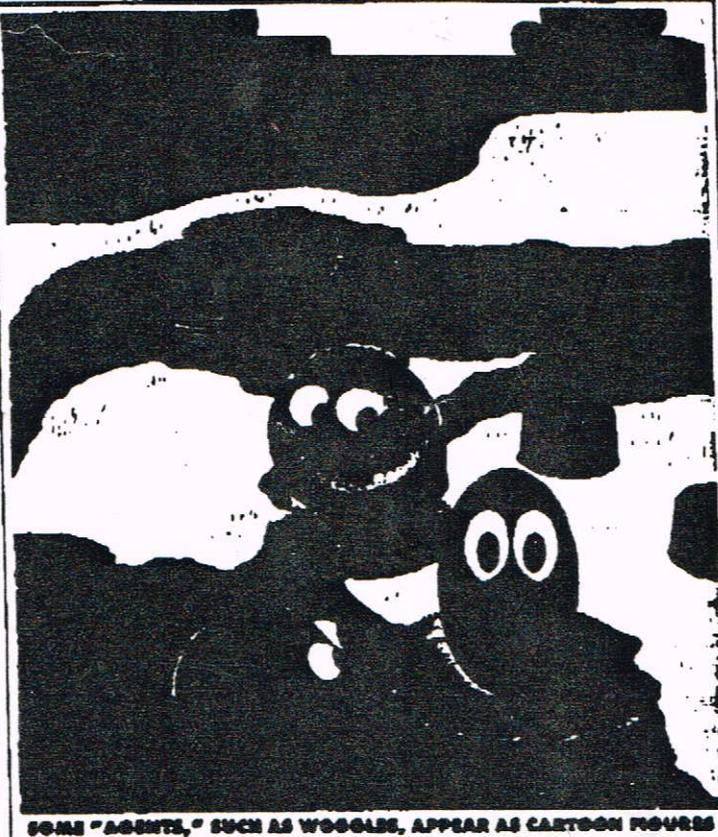
SOME "AGENTS," SUCH AS WOGGLES, APPEAR AS CARTOON FIGURES

Now, the agent repeats the entire process, but this time it includes proposed salary changes supplied by management for each employee. Managers can approve the changes or alter them simply by phoning the PC and keying in new data in response to the Edify agent's synthesized voice prompts.

An entire menagerie of software agents is starting to debut—some sophisticated, some simple, some quite visible, others programmed to work strictly behind the scenes. Ideally, they will mimic just what an intelligent human would do, except with greater stamina and accuracy. This might be the only way that mere mortals will be able to cope with the widely hailed Information Superhighway and its cornucopia of services and machine-gener-

ated messages demanding immediate attention.

The windows-icon-mouse interface that Alan Kay and other computer scientists developed at Xerox Corp. in the 1970s isn't keeping up with the complexity of networks. Unassisted, people can keep track of only so many graphical icons, for instance. "You'll be connected to millions or billions of different resources," predicts Kay, now a research fellow at Apple Computer Inc. "One of the biggest problems is to find information. We don't believe you can browse for it." To find what you need, he says, the computer "has to be flexible enough to take on many of your goals. You either tell it or teach it what you're interested in, and dispatch agents. The agents will find things and screen them."

PLAUSIBLE LIES. To make that happen, agent developers are building on the past decade's research in artificial intelligence (AI). Agents are incorporating techniques for understanding human language and learning their masters' wishes by observing how they search for information. Says Ted Selker, a researcher at IBM and professor at Stanford University: "We want to create a tight feedback loop between the user and his computer assistant." That way, an agent might scour a large network of data banks to answer a difficult question, such as "How's the Asian retail market doing compared with Europe's?"

Until recently, even simple agents weren't practical, although AI researchers had sketched out the concept in the late 1960s. "The way you do research is to make up lies that are plausible—then invent the technology to make them true," Kay quips. Now the technology is in place: sprawling networks of powerful computers that are capable of running complex software. In the next few years, everything from personal digital assistants (PDAs) to desktop PCs and supercomputers will likely run some form of agent software. Just how big a market it will be is hard to estimate: The term "agent," like AI 10 years ago, is being applied to new products quite sloppily—in this case, to just about any program that works on your behalf.

In the tradition of those wise-crack-