

- HOME
- ▶ JOB MARKET
- ▶ REAL ESTATE
- ▶ AUTOS **NEW**
- NEWS
 - International
 - National
 - Washington
 - Business
 - Technology
 - Circuits
 - Columns
 - Science
 - Health
 - Sports
 - New York Region
 - Education
 - Weather
 - Obituaries
 - NYT Front Page
 - Corrections
- OPINION
 - Editorials/Op-Ed
 - Readers' Opinions
- FEATURES
 - Arts
 - Books
 - Movies
 - Travel
 - NYC Guide
 - Dining & Wine
 - Home & Garden
 - Fashion & Style
 - Crossword/Games
 - Cartoons
 - Magazine
 - Week in Review
 - Multimedia/Photos
 - Learning Network
- SERVICES
 - Archive
 - Classifieds
 - College
 - Book a Trip
 - Personals
 - Theater Tickets
 - NYT Store
 - NYT Mobile
 - About NYTDigital
 - Jobs at NYTDigital
 - Online Media Kit
 - Our Advertisers
- MEMBER CENTER
 - Your Profile
 - E-Mail Preferences
 - News Tracker

SEARCH [Go to Advanced Search/Archive](#)

GO TO **MEMBER CENTER** LOG OUT
Welcome, [githomas](#)

Making Robots More Like Us

By YUDHIJIT BHATTACHARJEE

CALL it crazy, but Monica Nicolescu has taken a robot under her wing. At a robotics laboratory at the University of Southern California, she puts the two-wheeled machine through its paces, leading it through a maze of short plastic pillars to an orange box on the floor. It follows her around the lab, observing and reproducing her every step.

Advertisement

Through this high-tech game of monkey-see, monkey-do, Ms. Nicolescu and her colleagues train robots to perform simple jobs like picking up the box. But their goal, and that of other robotics researchers, is to build robots that will be capable of doing not only tasks they have been programmed for, but new and more complicated ones as well.

Despite advances in artificial intelligence, sensors and mechanical devices, researchers are still a long way from realizing the guiding vision of robotics: machines that can move and work like humans, learn new tasks with little or no training, and react with sensitivity to the changing moods of their mortal masters.

Instead, most robots remain human-dependent machines that can perform only specialized tasks, like welding parts in a factory, searching through the rubble of a collapsed building or vacuuming a living room. Few display what could be considered sensitivity to people, and those that do tend to be toys, like [Sony's Aibo](#) pet, that serve only to entertain.

Robotics researchers are realizing that the journey to more autonomous, adaptable robots will require more than just improvements in mechanical, sensory and computing capabilities. Equally important, they say, is improving the way people and robots interact: after all, they say, that may be

- E-Mail This Article
- Printer-Friendly Format
- Most E-Mailed Articles
- Reprints
- Single-Page Format

ARTICLE TOOLS SPONSORED BY **STARBUCKS.COM**



Getty Images

GREETINGS - A robot at Honda's Tokyo headquarters named Asimo can escort guests, recognize voices and provide news and weather updates.

NEWSLETTERS

Subscribe to
Circuits

Sign up to receive a free weekly Circuits newsletter by e-mail, with technology news and tips and exclusive commentary by David Pogue, the State of the Art columnist.



[Premium Account](#)
[Site Help](#)
[Privacy Policy](#)

NEWSPAPER

[Home Delivery](#)
[Customer Service](#)
[Electronic Edition](#)
[Media Kit](#)
[Community Affairs](#)

[Text Version](#)

Advertiser Links:
[The IBM e-business on demand is here.](#)

[Get 25 commission-free trades from Ameritrade.](#)

In your hand.

It's a Tablet PC.

You could win a Tablet PC.



how robots will learn, and to be truly useful, robots must be acceptable to people.

"Now that robots are beginning to come into our world, it's time to look beyond engineering and ask how people are going to react to them," said Arvin Agah, a robotics researcher at the University of Kansas.

Not all researchers believe that an all-purpose humanoid robot is a realistic goal, at least in the short term.

"I don't doubt that we will see more special-purpose machines such as robotic lawn mowers and car washers," said George Beckey, another robotics researcher at U.S.C. "But I do not expect

the same robot to be able to vacuum the home and make coffee and take the dog for a walk."

Nonetheless, researchers at robotics labs around the world are studying the way people and robots interact. If people are to teach machines, they ask, what would be the best way? And if machines are to serve people, washing dishes and sending faxes, what kind of robotic behavior will people be comfortable with? How should the robots appear?

Some scientists believe that making robots seem human will smooth interaction. Shuji Hashimoto, a robotics engineer at Waseda University in Tokyo, envisions a world in which humans and humanoid robots will interact seamlessly, teaming up to carry out domestic and office tasks.

"Since personal robots will have to operate in environments designed for humans, they will be better off functionally with a form like the human body," Dr. Hashimoto said. "And they will need to communicate with users using natural language, gestures and facial expressions."

The question for Ms. Nicolescu, a graduate student, and her adviser, Maja Mataric, isn't what the robots should look like but how they should relate as students to their human teachers. The machine in their experiments is programmed with basic skills like picking up and dropping an object, and is programmed to follow the trainer and to map each action in a demonstration of its abilities. It can then repeat the task by generating a corresponding string of actions.

But in its training, the robot moves beyond simple imitation. Once the robot has learned a task, it is able to perform it even under different circumstances.

"In a task that involves making photocopies, the robot can get to the copy machine even if there's a stack of boxes in the way, or if the door to the copy room is closed," Ms. Nicolescu said.

The training of robots could require the kind of patience that adults reserve for infants. But while babies can elicit pleasant emotions, making interaction with them rewarding, robots generally do not.

Some researchers suggest that if robots were more like babies, people would want

TIMES NEWS TRACKER

Topics	Alerts
Robots	
Computers and The Internet	
Create Your Own Manage Alerts Take a Tour	
Sign Up for Newsletters	

[Enlarge This Image](#)



Stephanie Diani for The New York Times
 Monica Nicolescu, a graduate student at the University of Southern California, and her adviser, Maja Mataric, teach a robot to perform simple tasks



Nicholas Pitt for The New York Times
 Kerstin S. Eklundh, at the Royal Institute of Technology in Sweden, with a prototype of a robot that can accomplish office tasks.

SHOP NYT STORE

to care for them, which would allow for spontaneous, parent-like training.

Continued
1 | 2 | [Next>>](#)

SEARCH RESULTS FROM THE ARCHIVE

[Technology Briefing | Hardware: Medical Patent Case Decided](#) (August 22, 2002)

[NEWS WATCH: ROBOTS; With a Tray of Drinks, Jeeves Rolls Out to the Terrace](#) (June 13, 2002) \$

[Technology Briefing | Software: Training For Robotic Pets](#) (May 8, 2002)

[WHAT'S NEXT; Designers Take Robots Out of Human Hands](#) (February 28, 2002) \$

Find more results for [Robots](#) and [Computers and The Internet](#) .

Doing research? Search the archive for more than 500,000 articles:

-  [E-Mail This Article](#)
-  [Printer-Friendly Format](#)
-  [Most E-Mailed Articles](#)
-  [Reprints](#)
-  [Single-Page Format](#)

ARTICLE TOOLS
SPONSORED BY **STARBUCKS.COM**



Expect the World every morning with home delivery of The New York Times newspaper.

[Click Here](#) for 50% off.

[Home](#) | [Back to Technology](#) | [Search](#) | [Corrections](#) | [Help](#) | [Back to Top](#)



It's a Tablet PC.

You could win a Tablet PC. 

Microsoft

Copyright 2003 The New York Times Company | [Privacy Policy](#)

Photo: An early computer, the "mechanical mind" developed at MIT, 1927.



Price: \$195. [Learn More.](#)

REAL ESTATE

[Sign up for E-Mail Alerts!](#)

Receive the latest property listings in your inbox...

[Sell or Rent Your Home](#)

Post a property listing on NYTimes.com...

[Find a Mover](#)

Get instant quotes for full-service, self-service and last-minute moves...

[Get Mortgage Quotes](#)

Get instant mortgage quotes and calculate payments...