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Technology Today

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Alan Pierce

Robotic Personal Assistants

SEVERAL years ago, NASA built a small robotic machine to travel to Mars at a fraction of the cost of sending astronauts. Most would agree that since July 4, 1997, the most famous small robot is the Martian Rover, *Sojourner*. This little device took all of us on a joy ride of exploration on the surface of Mars many years before we will be ready to send astronauts to this red planet. *Sojourner* was designed to withstand the Martian environment that included night temperatures that often reached -100°. As we watched it on TV, it climbed rocks and explored the surface of this alien world under the direction of its microprocessors and handlers at Mission Control.

Back on Earth, at least in the movies, robotic devices have performed all kinds of tasks, including delivering the office mail, fetching the morning paper, walking the family pet, being the family pet,

babysitting, maid service, pool cleaning, and even gardening. Robotic Personal Assistants are no longer just multi-million-dollar machines or science-fiction movie props, they now exist as consumer products.

You can purchase a robot to clean your pool, mow your lawn, vacuum your home, or even serve as your family pet. As I write this column, the Aquabot Turbo shown in the photo is crawling up and down the walls of my pool under the control of its own microprocessor. Since water and electronics don't mix, Aquaproducts Inc. of Cedar Grove, NJ, built this electronic appliance to withstand its very alien environment, water. The electronics of the machine, which include the microprocessor DC-drive motor, and step-down transformer (the transformer is not in the pool) were all vigorously tested before being approved for commercial and consumer use by Electronic Testing Laboratories.

Like an astronaut in space, this unit is

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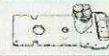
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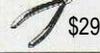
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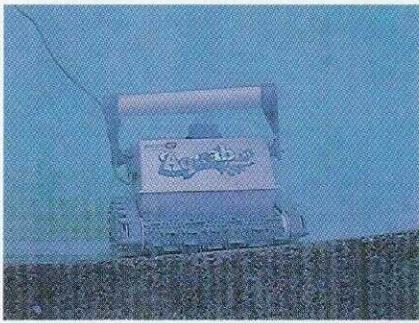
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basically weightless underwater. The electronics and DC-drive motor are protected from the water in the same way that an astronaut is protected by a space suit from the vacuum of space. The motor drives the unit's water pump, wheels, treads, rollers, and brushes. The water pump creates a vacuum that can pick up all kinds of debris from the bottom and walls of the pool. The water pressure created by this pumping action makes it possible for the Aquabot to climb pool walls with a motion reminiscent of a snail moving on the wall of a tropical fish tank.

When the unit is placed into the water and turned on, its microprocessor tells it to walk forward. When it reaches a wall, its forward motion, coupled with the thrust created by its pump, causes it to climb the wall. When it reaches an angle of 87°, a timer is engaged that will reverse its direc-

tion in one to five minutes. Once it breaks the surface of the water, the machine starts to circle the pool so its front brush can clean the tile above and below the water line.

Its handle, which is set at an angle across its body, controls the direction that the machine circles in. When you reverse the direction of this handle you change the direction in which the Aquabot will circle your pool. The unit turns itself off after seven hours of cleaning. Since pool cleaning isn't an Olympic event, you didn't have the opportunity to observe these little machines as they scurried around the swimming pools at the 1996 Centennial Olympics, 1998 Good Will, or 1999 Special Olympic World games.

You can learn more about this family of consumer swimming pool robots at www.aquaproducts.com. You can also research other robots on the internet. You can learn about Probotics' Cye—a land-based consumer robot that can fetch your drinks or vacuum your home—at www.personalrobots.com. You can learn more about a robotic lawnmower named robomow at www.robomow.com. The ultimate robotic pet awaits you at www.robotbooks.com/Sony-robot-dog.htm, and finally you can explore

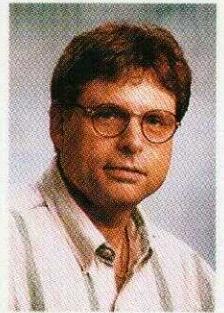
NASA's Sojourner at www.ksc.nasa.gov/mars/default.html.

The field of robotic personal assistants is about to explode with many new products produced to make our lives easier. Riches beyond belief await the future designers, engineers, and technologists who design and build the robotic machines that will handle all of our family chores in the 21st century. **TD**

Recalling the Facts

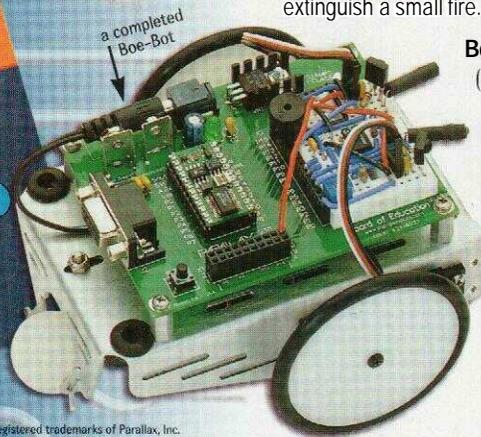
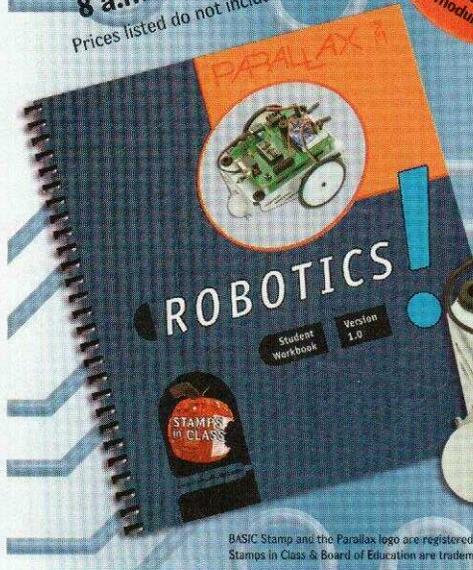
1. List 10 activities that a small consumer robot could perform.
2. Describe how the Aquabot climbs walls.
3. Describe how the Aquabot knows that it is time to reverse direction.
4. Why is the Aquabot's transformer located in a sheltered place on dry land far away from the water of the swimming pool?

Alan J. Pierce is a professor, Department of Technology, Elizabeth City State University, Elizabeth City, NC 27909.



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