ROBOTIC WORKSHOP
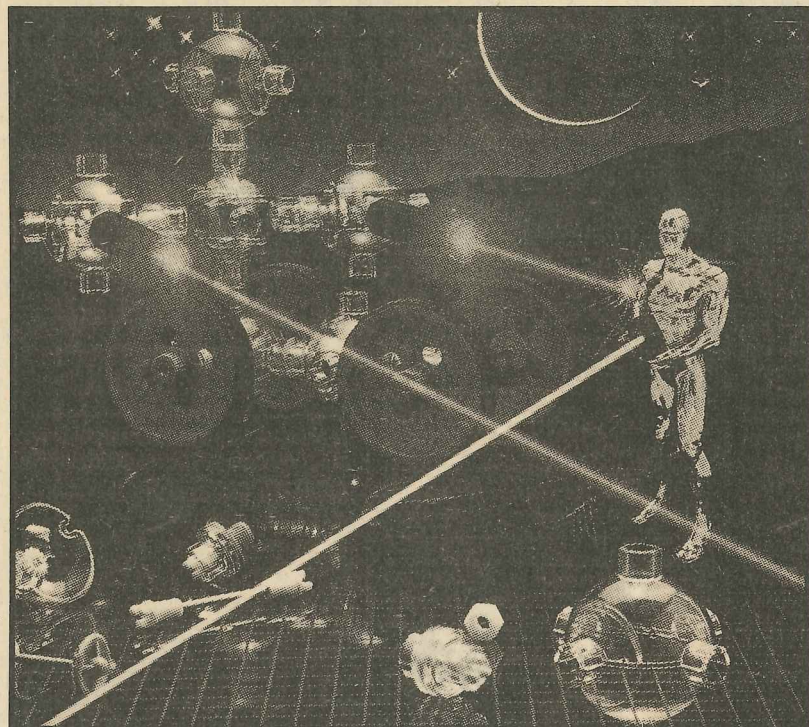Designed by Multibotics Inc.
Distributed by Access Software
Disk and hardware package
Reviewed on Apple IIe
Also available for Commodore
64/128, Atari and IBM

By SCOTT CHRISTIANSON
Special to the Tribune Extra

"The Robotic Workshop" is a package that lets you use your computer to interact with with the real world. The package includes an interface card, an interface box, a small supply of Capsela parts, and one disk.

The interface box lets the computer retrieve information from outside sources and direct the control of external devices such as motors and relays. It consists of the following inputs: Audio, IR phototransistor, Oscilloscope, and Voltmeter. It also has the following outputs: Audio, IR LED, and 3 motor leads. The interface box requires six "AA" batteries for running the motors so that your computer doesn't have to supply the power. The box also has 8 LEDs to indicate the status of the external devices.

The disk contains several sample programs. Most of them are written in BASIC and can be easily modified for your own special projects. The disk itself is not copy protected.

The most impressive program is the Oscilloscope. This program will read positive D.C. voltages in the range of 0—2.0 volts. This range can be increased by the use of a shunt resistor. The program has adjustments on Time per Division, Volts per Division, slope, trigger and trace. Waveforms may also be stored and saved for later viewing. I was stunned by the graphics of the Oscilloscope and the fast response time.

A Voltmeter program is also included, and will read in the same range of the Oscilloscope. The display of the voltmeter is both analog and digital. The response time is also exceptional on the Voltmeter. The Voltmeter may also be used to measure resistance with the addition of some extra parts (10k resistor, one 1.5 battery and wire).

The audio portion of the package will let you digitize any audio frequency signal. This can be from a mike with a preamp or a stereo output. This feature works amazingly well, with a minimum of noise. The input can be stored on a disk and played back over the computer's speaker or your stereo. The disk that comes with the package has a demo

of this feature, which had a lot less noise than I could get.

The IR LED and detector can be used to do several things, such as measuring the RPM of a motor, the speed of a baseball bat, or counting objects. The IR LED and detector can also be used to make a very simple burglar alarm.

The most exciting part of the package is, of course, the motor control. The Capsela motors (D.C. motors enclosed in plastic bubbles) are controlled through a *Robotics Operating System* (ROS). What ROS does is add about 24 commands to BASIC. These commands can be typed in directly or used in a BASIC program. For example, to turn on motor #1, I would enter *&MOTOR1,30*. This would turn on motor #1 at full speed. The speed is controlled by the second number, with a range of 1 to 30.

With these new commands and even a slight knowledge of BASIC, you will find yourself tinkering and programming for hours. The Capsela motors, gears and wheels make it very easy to set up a project. The one thing that I didn't like about the package, however, were the Capsela parts. This is because the modules are flimsy and not as accurate as I would have liked.

The workshop comes with enough parts to make many different vehicles and other motorized "gizmos." Additional parts for advanced projects may require a trip to an electronic store, but the total cost for such items should only total a few dollars. Optional add-ons are also available from Multibotics, including thermodynamics modules, robotic arms, speech enhancement, an infared remote control unit, and advanced switching/relay modules.

The manual is very well written and covers everything that you need to know. It includes 50 projects that explain what to do and how they work. It also goes into advanced programing and ROS memory locations. Sample projects include variable-speed fans, basic motors, a motor efficiency test, generators, model joysticks, a color wheel strobe, R.P.M. measuring devices and model cars.

Overall, I think "The Robotic Workshop" is exceptionally good. The concept is both practical and educational, lending itself well to classroom instruction. The manual is complete and the experiments are interesting, leading one to think of many new applications. Considering all that you get, the package is very inexpensive. "The Robotic Workshop" will provide hours of hands-on learning for both beginners and experts alike.

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