

One Small (Robotic) Step

"... by the turn of the century, millions of jobs will involve laser technology and robotics."
—National Commission on Excellence in Education



Several years ago, the Southern Lehigh School District made a commitment to computer education. Children from the second through twelfth grades were educated in computer awareness, programming, and application. With the computer's increased influence, a new force entered the classroom—the robot.

In many respects, a robot is merely a mobile microprocessor that can carry out specific tasks by using arms and sensors. It was, therefore, a natural pro-

gression to add a Robotics Program to the computer curriculum.

Our students—from a county vocational-technical school and the high school gifted program—began by assembling robots from kits. They also observed demonstrations of various industrial robots at Lehigh University's Robotics Institute.

The program now proceeds through four stages.

WALT TREMER

1. In the *awareness stage* students discuss what robots are and examine the various types of robots used in industry and the capabilities of robots in such fields as space exploration, oceanography, and manufacturing. Students see

Walt Tremmer is Director of Gifted Programs, Southern Lehigh School District, Center Valley, Pennsylvania.

how robots are assembled and begin to work with them.

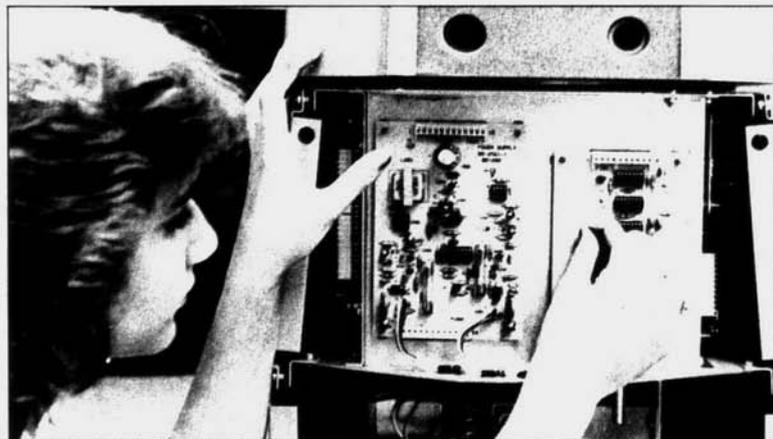
2. In the *robot functions stage*, students start to program robots in simple tasks. The robot they use has light, motion, and sound sensors, and a voice synthesizer. The students can direct the robot to solve problems by moving through mazes, picking up objects, speaking and responding to voices, and performing other simple tasks.

3. The *programming stage* gives students a chance to be creative in their use of the robot, which can be programmed to speak foreign languages, travel to different destinations, deliver objects and verbal messages, and even act as a burglar alarm by sensing movement at night and crying out, "Stop, thief!"

4. In the *application stage* students become involved in many different areas. They may create more complex programs in voice synthesis, design new appendages for the arm, redesign objects in the environment for the robot's use, and conduct research related to the robot, such as surveys of public opinion about robots and the job market.

The robotics program clearly has implications for many areas of education. Industrial arts students can design new parts; social studies classes can examine society's reaction to and use of robots; math, algebra, and geometry students can solve problems and calculate movements of the robot's arm and gripper; foreign language students can construct speech patterns in their respective languages; and computer studies students can meet new challenges in programming a microprocessor that walks, talks, and totes. Even the use of robots in special education is being explored. Teachers of students with learning problems can use robots to show patterns of movement, to model hand-eye coordination, and to exhibit problem-solving behavior. The possibilities are endless.

Southern Lehigh's Robotics Program is proving to be a valuable investment in the future. Not only is it providing students with stimulating and wide-ranging educational experiences, it is also establishing links between the school population—the high school and vocational-technical school—and the universities. Robotics is helping the children of today take one small step into the future. □



Clockwise from top: Robotics Program student Steve Arnold checks out the armature, Leeann Kravitz holds the teaching pendant as Steve checks circuitry, Leeann examines circuitry of the microprocessor, and inspects the robot's gripper.

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