SCORBOT-ER 4u
The Versatile Training Robot

The SCORBOT-ER 4u robot is a versatile and reliable system for educational use.

The robot arm can be mounted on a tabletop, pedestal or linear slidebase. The robot's speed and repeatability make it highly suited for both stand-alone operations and integrated use in automated workcell applications such as robotic welding, machine vision, CNC machine tending and other FMS operations.

The robot is supported by **RoboCell** 3D graphic software that lets students design, create and control simulated industrial workcells. RoboCell is fully integrated with **SCORBASE** robotics programming and control software and provides dynamic simulation of the robot and workcell devices during position teaching and program execution.

The SCORBOT-ER 4u is a powerful tool for teaching science and technology in the classroom or lab. Many teachers have already discovered its potential in subjects such as:

- **Mathematics:** Use the robot to demonstrate 3-dimensional space and coordinate systems.

- **Physics:** Combine the robot with motion sensors and tracking software to measure and test physical properties such as speed, velocity and acceleration. Take advantage of the robot's open structure to observe and study the principles of power transmission.

- **Computer Science:** Program complex conditional statements to solve logic problems such as the Hanoi Tower and have the robot execute the manipulation task.

- **Technology:** Use the robot controller's digital and analog input/output capabilities to create and monitor systems controlled by physical properties such as light, temperature or sound.

With extensive curriculum and a wide range of accessories, the SCORBOT-ER 4u is the ultimate resource tool for robotics and technology training.

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SCORBOT-ER 4u Specifications

Mechanical Arm

Mechanical Structure	Vertically articulated; open frame
Degrees of Freedom	5 rotational axes and gripper
Payload Capacity	2.1 kg (4.6 lb)
Axis Range	
Axis 1: Base rotation	310°
Axis 2: Shoulder rotation	+130° / -35°
Axis 3: Elbow rotation	+130°
Axis 4: Wrist pitch	+130°
Axis 5: Wrist roll	±570°
Reach	610 mm (24") with gripper
Speed	700 mm/sec (27.6"/sec)
Repeatability	± 0.18 mm (0.007")
Position Feedback	Incremental optical encoders
Homing	Microswitch on each axis
Actuators	12 V dc servo motor on each axis
Gripper	DC servo motor, 2-finger parallel
Gripper Jaw Opening	0-65/75 mm (2.6"/3") with/without pads
Transmission	Gears, timing belts, lead screw
Weight	10.8 kg (23.8 lb)

Controller

Communication	USB type A cable connection to PC; Plug and play without rebooting
Inputs/Outputs	8 digital inputs; 4 analog inputs; 8 digital outputs (4 relay, 4 open collector); 2 analog outputs
Microcontroller	Full featured, NEC V853 RISC 32-bit microcontroller
Axis Servo Control	Real-time; PID; PWM
Servo Axes	8 (robot arm, gripper and 2 peripheral devices)
User Memory	Unlimited programs, program lines and variables, positions.
Position Definition	Absolute, Relative, Cartesian, Joints, Encoders
Trajectory Control	Joint, Linear, Circular
Speed Definition (software)	10 speed settings; travel time definition
Control Parameters	160 user-accessible parameters
Safety Features	Emergency switch; short-circuit protection; automatic shut-down upon detection of impact, overheating, PC failure or communication error.

Software

- **SCORBASE** robotic programming and operation software.
- **RoboCell** 3D graphic simulation software (optional), enables offline design and simulation of virtual robotic cell and online graphic tracking of actual cell.

Accessories *(optional)*

Teach pendant, linear belt conveyor, rotary index table, linear slidebases, XY positioning table, parts feeders, sensors, I/O experiment table, pneumatic grippers, end effectors, machine vision system, workbenches, coordinate grid.

Manuals and Curriculum

User guides for all system components and software.

Activity Books and Teacher Guides:

- Robotics and Materials Handling (2 units)
- Automated Welding
- Flexible Manufacturing Systems
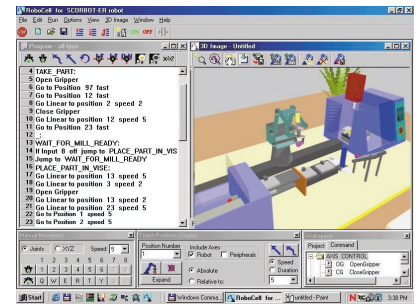
Students utilize the offline capabilities of **RoboCell 3D graphic simulation software** to design, program and execute an unlimited number of simulated industrial applications and gain maximum hands-on training experience.
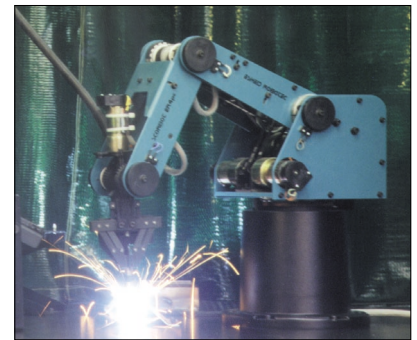
Students program and practice welding techniques in simulation and then execute automated welding applications online using the **automated welding** workcell.
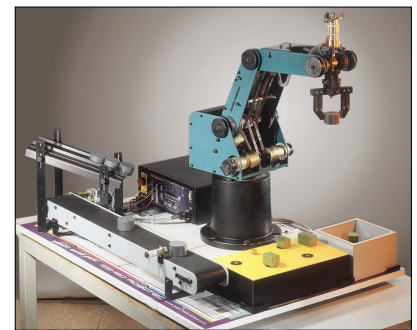
Students learn to program and operate the SCORBOT-ER 4u and auxiliary servo and I/O devices using both actual and simulated **robotics and materials handling** workcells.

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