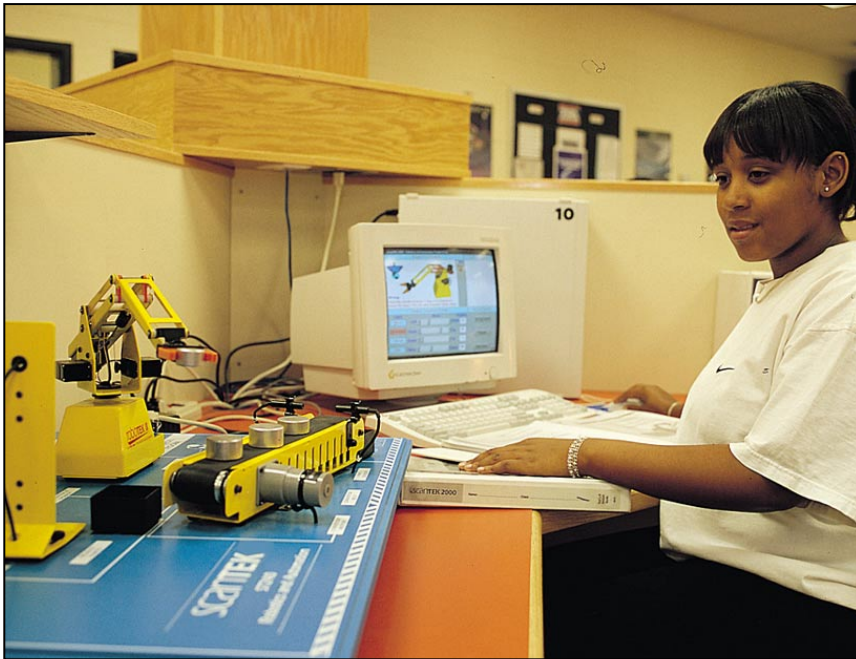


Robotics and Automation (40-assignment)



This is an integrated instructional module designed specifically to operate within the LJ ScanTEK Modular Technology Program environment. It includes a 10-assignment exploratory curriculum and a further 30-assignment in-depth curriculum. The exploratory curriculum and the in-depth curriculum are each split into two parts. Each part includes a pre-test and post test. The module includes hardware, software and curriculum materials sufficient to provide a complete learning experience.

The curriculum incorporates continuous assessment through questions. When used in conjunction with a ClassAct networked management system, this provides instant feedback of student performance. The assessments begin with a comprehensive pre-test. This quiz includes questions for each subsequent assignment, together with questions that will specifically test math and reading ability.

Every assignment starts with a series of questions designed to track inventory. These ensure that any missing items are located before they are needed.

Each assignment is divided into a series of tasks. Hands-on tasks form the core of the student work. Where appropriate, these are accompanied by research tasks based upon software applications. Assessment questions are incorporated into each task.

Typical 10-assignment topic areas include:

- Basic robot controls
- Joints of a robot
- Manual control of a robot arm
- Work spaces and work envelopes
- Computer control of a robot arm
- Commands of a control program
- Sensors and drives
- Storage and replay of a program sequence
- Assembly

Typical 10-assignment activities include:

- Look at robot types, the names of the joints and how a robot is controlled.
- Become the controller for a model robot.
- Carry out a sequence of instructions to guide a robot through a task.
- Look at how robots are controlled in industry.
- Design a control program.
- Listen to a different control program to complete a task without looking.
- Use a computer to give instructions to a model robot.
- Set up the interface between the computer and the robot.
- Control elements of the robot using a mouse and computer keys.
- Sketch work spaces and work envelopes of two different robots.
- Use flow diagrams to simplify complicated control sequences.
- Investigate how computers communicate with automated systems.
- Write and store a sequence of instructions for a robot to follow.
- Replay the sequence to simulate an automated system.
- Add sensors and mechanisms to a robot to make a complete work-cell.
- Look at different types of sensors in common use today.

Typical 10-assignment activities include (continued):

- Use sensors to feed back information to the controller of a work-cell.
- Complete a program to utilize a work-cell to assemble parts.

Typical 30-assignment topic areas include:

- Manufacturing automation
- Robot actuators
- Control systems
- BASIC programming
- Automation components
- Flowchart conventions
- Diagram interpretation
- Sensors
- Servos and joints
- Command sequences
- Sensor range, error and repeatability
- Analog and digital controllers
- Open and closed loop control systems
- Program control of a robot workcell
- Robot architecture
- BASIC programming
- Industrial applications of robots
- Hydraulic, pneumatic and electrical power sources
- Computer integrated manufacturing

Typical 30-assignment activities include:

- State the reasons for automating a manufacturing system.
- Write a program using a high-level control language.
- Use flowcharts to design control programs.
- Write a control program using a flowchart as a guide.
- Describe what a sensor is and where they are used.
- Write and save a program to automate robotek.
- Describe the mechanisms controlling robotek.
- Write a control program using loops.
- Fault find on control programs and write a program to carry out a task a set number of times.
- Describe an industrial sensor and its operating parameters.
- Use the conveyor and the robot as a system.
- Describe the function of a controller in a system.
- Describe and use open and closed loop systems.
- Recognize different types of robot actuators and describe their use.
- Write a program that will run the robotek workcell without human interference.
- State the advantages and disadvantages of robots and recognize the forms they take.
- Write a program to output 2 numbers – highest first.
- Write a program to output 3 numbers – highest first.

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Typical 30-assignment activities include (continued):

- Write a program that will only do the tasks that an operator specifies.
- State the uses of a robot in the nuclear industry.
- Know how a digital computer can control actuators powered by various supplies.
- Write a program to simulate an interactive pick and place routine.
- Know what a complete robot must consist of.
- Simulate a nuclear fuel rod cycle program.
- Describe the components that make up an automated workcell.
- Write a program to simulate a simple calculator.
- Write a program to count events.
- Carry out a problem solving exercise.
- Know when and how a manufacturer will automate a system.
- Describe a safe system.

Each assignment is designed around a list of performance objectives. These lists include academic, technical and occupational objectives. The assignments are written in such a way as to enable a student to attain the performance objectives, with the assessment questions linked to these in order to provide a measure of true competency.

The performance objectives are used by the ClassAct management system to generate a comprehensive portfolio of student competency reports. Default reports supplied with this module include:

- Entry report
- Technical/Occupational Exit report
- Basic Skills report based upon the federal SCAN's report.

The items supplied with this instructional module include:

- 10-assignment On-Screen Student Assignment Guide CD
- 10-assignment Student Assignment Guide
- 10-assignment Student Workbook
- 10-assignment Instructor's Guide
- 30-assignment Student Assignment Guide
- 30-assignment Student Workbook
- 30-assignment Instructor's Guide
- Computer Aided Instruction Software
- RoboTEK II robot
- RoboTEK II parts workcell
- RoboTEK II nuclear workcell
- RoboTEK II program

Additional items required:

- Computer

Module Facts

For Technology Program, order as:
ST240/40 Robotics and Automation

	No.	Average time
Assignments	40	45 minutes
Extension Activities	4	45 minutes
Total		33 hours



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