ESYST 112 - Industrial Robotics

Approval Date:   Effective Term:

Department: ELECTRONIC SYSTEMS TECHNOLOGY
Division: Career Technical Education
Units: 4.00
Grading Option: Letter Grade
Transferability: CSU Transferable
Course is: AA/AS Degree
Repeatability:
Contact Hours per Term:
   Lecture/Discussion: 3.00
   Lab: 3.00
Associate Degree GE Applicability: No
Recommended Class Size: 35

Discipline/Minimum Qualifications:
Electromechanical, Electronics, Industrial Technology, Robotics

Catalog Description:
Presents industrial robotics, including designing, building, operating, and programming.

Schedule Description:
Presents industrial robotics, including designing, building, operating, and programming.

Student Learning Outcome:
Lecture

   1. Compare and contrast the different types of industrial robots and propose an appropriate robot as a solution for a given scenario.

Lab

   1. Construct, interface with a controller, and program an industrial robot for a specified task and troubleshoot as required.

Course Objectives:
Lecture
1. Discuss the mechanical considerations and drive methods for robotics
2. Distinguish between different sensors used in robotic applications
3. Classify robots by control methods
4. Categorize computer hardware and software for robot systems
5. Describe robot vision
6. Compare and contrast different robot applications

Lab

1. Construct a simple industrial robot
2. Interface the robot to the controller
3. Program the robot
4. Install various sensors on the robot
5. Troubleshoot robot operations

Course Content Outline:
Lecture

1. Introduction
   1. Robot terminology
   2. Basic components
   3. Robot motion
   4. Robot technology levels
2. Robotic systems
   1. Mechanical
   2. Hydraulic
   3. Pneumatic
3. Basic features of the manipulator and manipulator arm geometry
4. Major internal components of controllers
   1. General features of controllers
   2. Characteristics of controllers
   3. Input power supply board
   4. Master control board
   5. Memory boards
   6. Servo control board
5. Basic robotic programming
   1. Features of the user's program
   2. Developing the program
   3. Flowcharting the program
   4. Machine coding the program
6. Operational aids
   1. Teach pendant
   2. Operator's panel
   3. Manual data input panel
   4. Computer control test
7. DC and AC motor operation
   1. DC motors
   2. Speed control for DC motors
   3. Stepper motors
   4. AC induction motors

8. Servo system control
   1. Closed-loop servo system
   2. Feedback components
   3. Servo amplifiers
   4. Programmed servo signals

9. Robot gears and linkages
   1. Basic concept of mechanics
   2. Gears
   3. Belts
   4. Chains

10. Interfacing
    1. Interfacing for the controller
    2. Program control of interfacing
    3. Connections for interfacing

11. Robotic sensors
    1. Types of sensors
    2. Advanced tactile sensors
    3. Sensor programming

12. Robotic applications
    1. Machine loading and unloading
    2. Die casting
    3. Welding
    4. Painting
    5. Sorting

Lab

1. Assembling a robot
2. Programming a robot
   1. Learn mode
   2. Offline
3. Installing a sensor
4. Troubleshooting robot operation

Methods of Instruction:
Lab, Lecture:

Methods of Evaluation:
Exams/Tests/Quizzes
Problem Solving
Skill Demonstrations

Exams

Typical Assignments:

**Reading:**
Technical specifications for robotic systems Schematics for electronic circuits Text Readings

**Writing, Problem Solving or Performance:**
Construct a robot Program a robot

**Other:**

Required Materials Examples:
Book 1
Author: Reza N. Jazar Publication Date: 2010 Edition: 2nd
Title: Theory of Applied Robotics: Kinematics, Dynamics, and Control Publisher: Springer

Course Preparation:
Prerequisite(s): None
Co-Requisite(s): ESYST 101
Recommended: None