

ECE 47800 – Robotics and Automation

Type of Course

Elective for CmpE and EE Programs

Catalog Description

Introduction to robotics; motion actuators, sensors, Homogenous transformations, Forward and inverse kinematics for rigid-link robots, programing with an industrial manipulator.

Credits

3

Contact Hours

3

Prerequisite Courses

ECE 36200, MA 36300, PHYS 15200

Prerequisites by Topics

Programming experience in C/C++. Have a good understanding of linear algebra and differential equations.

Textbook

TBD

Course Objectives

This course provides an introduction to mechatronics, industrial automation, and robotics. The material covered in this course provides the students a broad knowledge of fundamental topics in electrical and mechanical engineering disciplines including motion actuators and sensors, homogenous transformations, forward and inverse kinematics for rigid-link robots. Students will also learn to program with an industrial manipulator.

Course Outcomes

Students who successfully complete this course will have demonstrated

1. An understanding of various types of motion actuators (1)
2. An ability to analyze a mechatronic system and select commercially - available electric actuators that would function in that system (2)
3. An understanding of various types of sensors. (1)
4. An ability to interface various types of sensors with a microcontroller/Robot Controller/PLC. (1)
5. An understanding of rigid motion and homogeneous transformation. (1)

6. An ability to analyze and derive the forward kinematics for a rigid-link industrial manipulators. (1)
7. An ability to program an industrial manipulator to accomplish given tasks. (6)

Lecture Topics

1. Introduction
2. Motion actuators
3. Mechanism for motion transmission
4. Sensors
5. Rigid motions and homogeneous transformations
6. Forward and inverse kinematics for rigid-link robots
7. Programming with an industrial manipulator to perform various independent functions such as assembly and material handling processes.

Computer Usage

High

Laboratory Experience

None

Design Experience

Medium

Coordinator

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Date

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