Course: ECE 47800 – Robotics and Automation

Type of Course: Elective for EE and CmpE Programs

Catalog Description: Introduction to robotics; motion actuators, sensors, Homogenous transformations, Forward and inverse kinematics for rigid-link robots, electric ladder diagrams, and Programmable Logic Controllers (PLCs).

Credits: 3

Contact Hours: 3

Prerequisite Courses: ECE 36200, ME 25300, MA 36300

Corequisite Courses: None

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, PLCs and electric ladder diagrams.

Course Outcomes: Students who successfully complete this course will have demonstrated:
1. Familiarity with motion actuators. (a, k)
2. Familiarity with sensors. (a, k)
3. Derive the forward and inverse kinematics for an arbitrary rigid-link robot. (a, c, e)
4. An understanding of electric ladder diagrams and their design methods. (c, k)
5. An understanding of programmable logic controllers. (a, k)

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. Programmable logic controllers (PLCs)
8. Electric ladder diagrams and program for PLCs

Computer Usage  High
Laboratory Experience  None
Design Experience  Medium
Coordinator  Yanfei Liu, Ph.D.
Date  03/02/2018