EECE 462L: Industrial Control Laboratory

Catalog description:
A laboratory that addresses topics related to industrial automation and process control. Experiments include Programmable Logic Controllers (PLC), Supervisory Control and Data Acquisition (SCADA), Human Machine Interface (HMI), Industrial Networks, Machine Vision and Motion Control Applications.

Credit hours: 1 credit

Required or elective:
Elective for CCE students
Elective for ECE students

Prerequisites:
By course: EECE460 Control Systems
By topic: Analysis and design of various types of compensators, including Proportional-Integral-Derivative (PID) controllers, Lag-Lead compensators, etc.

Textbook(s) and/or required materials
Lab manuals provided by the instructor

References:

Course Objectives
1. An applied understanding of industrial controllers
2. A hands-on experience in PLC programming
3. A hands-on experience in the design of SCADA and HMI systems
4. A hands-on experience with various types of analog and digital industrial sensors
5. A hands-on experience motion control application
6. A hands-on experience in commonly used industrial network protocols

Laboratory Experiments
1. Industrial Drawings and Standards
2. Introduction to Programmable Logic Controllers (PLC)
3. PLC Timers and Counters
4. PLC Data Manipulation and Digital Sensor Connection
5. Analog Input - Analog Output Manipulation of PLC Using Analog Sensors and Actuators
6. Design of Human –Machine Interfaces (HMI)
7. Variable Speed Drives
8. Servo Motors and Drives
9. Supervisory Control and Data Acquisition (SCADA)
10. Industrial Networks

Course Learning Outcomes
1. Analyze and design industrial automation panels (Layout and Schematics)
2. Interconnect and program PLCs for various industrial applications using ladder logic
3. Design and operate SCADA and HMI systems for industrial applications
4. Control variable speed drives using PLCs for industrial applications
5. Implement motion control applications using servo drives
6. Design, program and implement machine vision systems using PLCs for industrial applications
7. Use various network protocols for industrial applications

Class/laboratory schedule
a- One 3-hour session per week
b- Use of laboratory equipment and computers is needed for working on the experiments

Resources of the course
Textbook, references, and Moodle.

Computer usage
Programming in ladder logic and Windows
Evaluation methods
1- In-lab work (40%)
2- Quizzes (30%)
3- Final Exam (30%)

Professional component
Engineering topics: 100%
General education: 0%
Mathematics and basic sciences: 0%

Person(s) who prepared this description and date of preparation
Deeb G., Gurunian M., Joujou M.K., Mrad F., August 2009

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