

University of Arkansas - Fort Smith
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General Syllabus

ELEC 3314 Servo Motion Control Programming

Credit Hours: 4

Lecture Hours: 1

Laboratory Hours: 6

Prerequisites: Junior standing or consent of department head.

Effective Catalog: 2018-2019

I. Course Information

A. Catalog Description

Covers configuration/tuning/ programming of Mint servo drive: torque/current, speed and position PID loops. Emphasis is on the selection of servo system components and the design of servo motion programs to control typical industrial automated systems.

B. Additional Information

This course is an upper division, technical elective for Bachelor of Applied Science degree students and Organizational Leadership students with the required prerequisites. It may also be taken by working engineers/technicians to upgrade their servo motion control skills, if they meet the required prerequisites.

II. Student Learning Outcomes

A. Subject Matter

Upon successful completion of this course, the student will be able to:

1. Configure/tune/program Mint Servo Drive: Torque/current, speed and position PID loops.
2. Design program for cut-to-length and electronic CAM/gear/flying shear applications.
3. Select, wire and program Baldor MINT motion control digital/analog inputs/outputs.
4. Design multi-axis servo system for X-Y table control using linear/circular interpolation with blended moves, homing, offset from zero calibration and backlash compensation

5. Diagnose and resolve motion/system/network errors using MintMT error handling routines.
6. Configure and program PC/HMI panel for operator display/control of servo system.

B. University Learning Outcomes

This course enhances student abilities in the following areas:

Analytical Skills

Critical Thinking – Student will to solve problems and find optimal solutions from a variety of typical automated control systems.

Quantitative Reasoning – Students will scale and calculate servo motor motion profiles and to solve motion control problems. The student will calculate voltage divider ratios, encoder counts, gear ratios and scale those to match the resolution/accuracy requirements in both metric/US units. Student will write programs that generate the mathematical profile models to move the motor/load to match the acceleration/ deceleration, velocity, time and distance motion requirements for the application.

III. Major Course Topics

- A. Baldor MINT motion control/drive: digital/analog I/O configuration and wiring
- B. Configuration/tuning of Mint Servo Drive: torque/current, speed and position PID loops
- C. MintMT programming structure, memory, arrays, data types, basic motion keywords
- D. Coding repeat constructs, decision/logic, keyboard input, output display formatting
- E. Absolute/relative moves, servo motion scaling, homing, cut-to-length applications
- F. Multi-tasking machine motion for electronic CAM/gear/flying shear applications
- G. Multi-Axis servo programming: NextMove, configuration/tuning speed and position PID loops
- H. Linear/circular interpolation, backlash comp, blended moves, hold to analog
- I. Visual BASIC, ActiveX Programming for PC control of Mint Servo Systems
- J. Motion/system errors and Baldor CAN/CANopen error handling routines
- K. Interrupt events: stop switch, fast interrupt, timer, input & COMMS events programming