ELECTRICAL ENGINEERING DEPARTMENT Systems and Controls Laboratory - ELEN 433

Location: PBS Pinchback Engineering Building- RM. 438

Purpose of the Lab: This laboratory is used to reinforce fundamental concepts in Systems and Controls through hands-on lab experiments. This lab is used in conjunction with the Continuous Control Systems Analysis (ELEN 431) and Discrete Control Systems Analysis (ELEN 432) courses. The experiments and lab assignments cover fundamental Continuous and Discrete Control of Systems and Experimental Demonstration of Control Systems.

Equipment/Apparatus:

System and Control Laboratory contains four complete sets of Analogue and Digital Servo Systems (33-001-USB) and six complete sets of Modular Instructional Servo Systems (MS150) from Feedback Inc. Both analogue control and computerized digital control experiments can be implemented in this laboratory. Systems and Controls laboratory is the COE newest laboratory, fully developed by Dr. Zhengmao Ye using the latest version of Feedback Equipments. Servo Fundamentals Trainer 330 has been designed to be used by students to investigate the fundamental principles of servo control, both analogue and digital. Analogue principles are presented in progression from operational amplifier characteristics, through position and velocity feedback, to full PID control and closed loop frequency response investigations. Digital principles include A/D and D/A conversion, absolute and incremental encoding, position and speed control and full PID control. The MS150 Modular Servo System is a unique medium for study of the theory and practice of automatic control systems. The system comprises a base-plate and 20 units which are supplied as complete system, dc system, ac system and conversion from one system to another.

Experiment 1	Introduction and Familiarization
Experiment 2	Operation Amplifier Characteristics, Motor & Tachogenerator & Brake Characteristics
Experiment 3	Error Channel and Feedback Polarity, Influence of Gain
Experiment 4	Feedback System Following Error
Experiment 5	Unstable System Speed Control System
Experiment 6	Introduction to 3-term Control PID
Experiment 7	Application of 3-term Control (PID) Actions
Experiment 8	A/D and D/A Conversion
Experiment 9	Simple Position Control Practical
Experiment 10	Simple Speed Control Practical

Experiments:

Faculty: Zhengmao Ye, Ph.D (IEEE, ASME, SAE)

Lab Technician: Kendrick Smith

Course Manuals and Textbook:

Textbooks: Zhengmao Ye, Control Systems Lab Manual (Vol. I & Vol. II), Southern University, NOV, 2005 Reference: Katsuhiko Ogata, "Modern Control Engineering", 4/E, ISBN: 0-13-060907-2, Prentice Hall, 2002

Course Handouts - 1. Course Syllabus; 2. Lab Coversheet; 3. Lab Group Assignments