Course Description:

This course is designed to teach the students the concepts of open loop and feedback, mathematical models for electrical and mechanical systems, time response and steady state error, PD, PI, and PID controllers. It teaches them to analyze the stability of digital control systems, and state space model.

Recommended Textbook(s):

1. D'azzo, "Linear Control Systems".
2. K. Ogata, "Modem Control Engineering".

Course Topics:

1. Introduction: Open loop, closed loop feedback, Laplace transform and inverse Laplace transform.
2. Mathematical models: Mathematical models for electrical and mechanical systems, simple string-dash-pot system and DC servomotor, transfer function, block diagram representation, signal flow graph and Mason's formula, time response of first order system, time response of second order system, stability, error coefficient and steady state error, PD, PI, and PID controllers.
3. Stability Analysis: Stability analysis by Ruth-Hurwitz criterion, root locus plot, frequency response method, Nyquist criterion.
4. Digital Control Systems: digital control system, Z-transform and inverse Z-transform, pulse transfer function.
5. State space model: Standard form, state space model from differential equation, solution of state equation, state transition matrix, controllability test, observability test, state feedback (pole placement) for single input single output system.

Course Outcomes

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1. Learn the concepts of open loop and feedback.
2. Learn mathematical models for electrical and mechanical systems, time response and steady state error.
3. Learn what PD, PI, and PID controllers.
4. Learn to analyze the stability of digital control systems.
5. Have knowledge of state space model.