Applied Advanced Control Systems

Syllabus

Course Outline

- 1. Introduction
 - Configuration of typical system with embedded processor
 - Pulse amplitude or pulse-width modulation
 - Sensors and actuators
 - Analysis and design tools:
 - Simulink
 - Control toolbox
 - Symbolic toolbox
 - Instrument control toolbox
 - Coding for embedded processor
- 2. Characterization of discrete time systems
 - Choice of sampling period
 - Notation
 - State-space and "frequency" domain
 - Z-transform definition
 - Z-transform properties
 - Input/output relations
 - Stability
 - Computer tools
- 3. Control of discrete time systems
 - Digitize continuous-time design
 - DT "PID"
 - State variable feedback
 - DT Observer-based design
- 4. Special considerations
- 5. Sensors and actuators for control with embedded processors.
- 6. Project

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Mode of presentation

Course presentation will comprise a set of pre-recorded lectures based on Powerpoint slides, annotated and narrated during recording. Students are not expected to be present during recording sessions. Links to recordings will be available in Canvas to students for viewing at their convenience.

Class "meetings" will be held, approximately weekly, by means of WebEx. Zoom, or other medium.

Homework

Homework will be assigned in coordination with lectures and may entail discussion, analysis, and Matlab/Simulink.

The homework should be submitted via Microsoft One Note, as follows:

- Download and install One Note on your computer.
- Start a NEW notebook with the title: ECE664 <your name>. Make notebook shareable and send me an email with the link to your notebook. Do not divide this notebook into sections.
- First entry should be a line: Homework 1. Then insert your homework by any convenient method of methods (paste PDF, paste pictures, draw directly, etc)
- At end of assignment, draw a line across the page
- Next assignment, enter line: Homework 2.
- Etc.

I plan to visit your notebook weekly and review and annotate your work (and assign a grade). If you wish, you can update your submission.

Exams: TBD

Grading: TBD

Project: TBD.

Student preferences to be considered.

References

Recommended: B. Friedland, Advanced Control System Design, Prentice Hall, 1996, ISBN 0-13-010653-4, Chapters 8 and 9.

Other references may be added.