CDS 110b: Lecture 1.1
Course Overview

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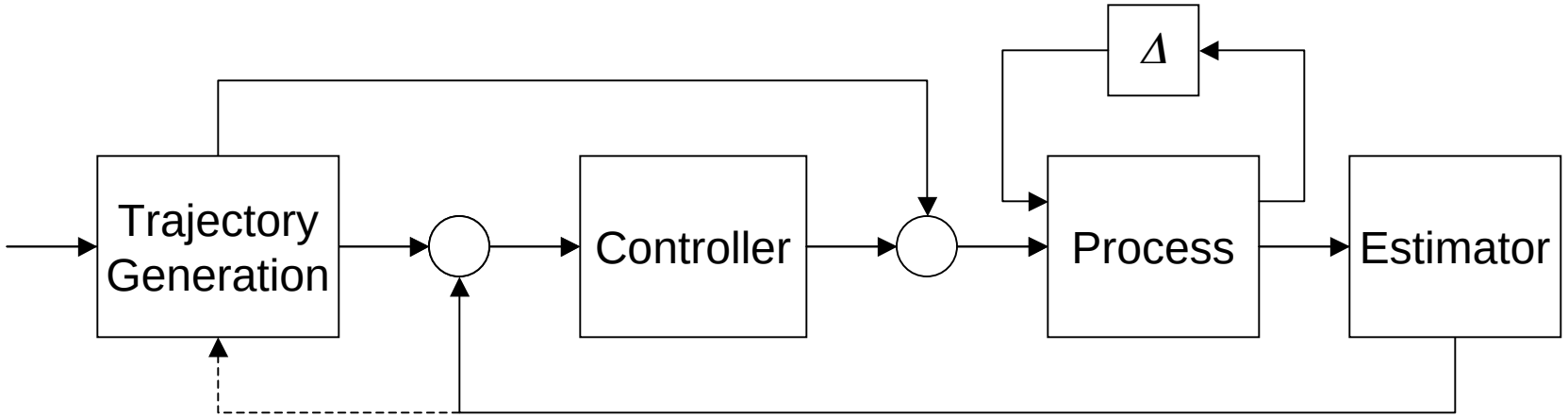
Goals:

- Provide an overview of the course contents
- Review course administration (homework, grading, collaboration, schedule)

Reading:

- Course syllabus (handout)

Modern Control System Design



Traditional Control System: controller + process

- Corresponds to “inner loop” of most control system designs

Modern Control System: optimization-based design + robust analysis

- Replace reference with reference trajectory (Weeks 1-3)
- Replace process output with estimated output (Weeks 3-6)
- Replace “inner loop” controller with robust controller (Weeks 6-10)

Course Administration

Course Texts

- B. Friedland, *Control System Design: An Introduction to State-Space Methods*, Dover, 2004. Available in bookstore or Amazon.
- J. Doyle, B. Francis, A. Tannenbaum, *Feedback Control Theory*, Macmillan, 1992. Available online.
- K. J. Astrom and R. M. Murray, *Design and Analysis of Feedback Systems*, Preprint, 2006. Available online

Grading

- Homework: 50% - weekly sets, first set out today
- Midterm: 20% - open book, will cover optimal control + random processes
- Final: 30% - open book, out the last day of class, due the last day of finals

Collaboration: encouraged!

- Write up your own solutions, *including MATLAB scripts and plots*
- No collaboration on midterm or final

Optional Course Project

Control System *Implementation*

- Course work focuses on design techniques, analysis, simulation
- Project will focus on implementation of controllers on Alice →
- SURF opportunities available building on project experience (see SURF web page)

Project administration

- Project reports (written and oral) in lieu of midterm and final
- Attend optional lectures on control system implementation (first 3 weeks)
- Total time required for implementation: about 30-40 hours (over 10 weeks)
- Selected homework problems are aligned with project schedule

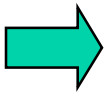
Project information meeting: Friday, 2-3 pm, 125 Steele

CDS Course Structure

CDS 110a – Analytical understanding of key concepts in control (Fall)
- Detailed description of classical control and state space concepts
- Provide knowledge to work with control engineers in a team setting

CDS 110b – Detailed design tools for control systems (Winter)
- Estimation and robust control tools for *synthesis* of control laws

CDS 111 – Implementation of control systems for engineering applications (Spring)



CS/EE/ME 75 – Intro to Multi-Disciplinary Eng'g

CDS Minor
- Undergrad: CDS 110ab, CDS 104 or 140, senior thesis
- Grad: 54 units in CDS (typically CDS 110ab, CDS 140ab, CDS 212/213)
- CDS 104 (Intro concepts in dynamical systems): offered third term
- CDS 140 (Introduction to dynamics): offered first term

Spring: CDS 270 (networked control systems), CDS 273 (frontiers in CDS)

Additional Details

TAs

- James Martin, Shaunak Sen
- Jeremy Gillula (lab TA)

Office hours

- TAs: TBD
- Instructor: Fridays, 4-5 pm, 109 Steele

Course web page

- http://www.cds.caltech.edu/~murray/cds110b

Course signup sheet

- Please fill in name and e-mail; we be used to create mailing list for course

Course scheduling sheet

- Will be used to determine office hours + possible change in lectures