Engineering Tripos Part IIA Project, GF1: Control Systems, 2023-24

Leader

F Forni [1]

Timing and Structure

Fridays 11-1pm, Tuesdays 9-11am plus afternoons

Prerequisites

3F1 & 3F2 useful

Aims

The aims of the course are to:

- The project will involve the modelling and control of an 'evaporator', which is a process used in many industries (eg. dairy products, chemicals).
- As a first step a simulation model will be built and tested.
- Then a control system will be designed for the process, and its performance checked by simulating its operation with the evaporator.
- Modern simulation and analysis software will be used throughout.

Objectives

As specific objectives, by the end of the course students should be able to:

- To take students through the simulate/analyse/design/test cycle for an industrial control system (unfortunately omitting implementation).
- To expose students to state-of-the-art software for control engineering.
- To give students experience of simulating dynamic systems.

Content

For the first three weeks students will work in pairs, with all pairs producing similar simulation models. For the final week, students will work in groups of 4, with each group having the option of using a different methodology for designing the final control system.

Week 1

Familiarisation with *Simulink* simulation and *Matlab* software. Familiarisation with description and mathematical model of evaporator. Construction and test of *Simulink* model of the evaporator.

Week 2

Completion of testing *Simulink* model of the evaporator. Refining the model. Closing one control loop. First interim report.

Week 3

Initial control design for the whole model. Investigation of performance when model behaviour changes. Investigation of integrator wind-up. Second interim report.

Week 4

Group Activity. Choice of further control system design project. Final report.

Coursework

Coursework	Due date	Marks
Interim report 1	Friday 17 May 2024 (4pm)	20
Interim report 2	Friday 24 May 2024 (4pm)	20
Final report	Friday 7 June 2024 (4pm)	40 (of which 20 are group w

Examination Guidelines

Please refer to Form & conduct of the examinations [2].

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Links
[1] mailto:f.forni@eng.cam.ac.uk
[2] https://teaching.eng.cam.ac.uk/content/form-conduct-examinations