Exercises for Lecture Course on Optimal Control and Estimation (OCE)
Albert-Ludwigs-Universität Freiburg – Summer Term 2015

Exercise 9 - Own Optimal Control Project

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The final exercise is a project. The aim is to compute optimal trajectories of a dynamic system model which interests you. The problem can either be a trajectory optimization problem, or an estimation problem.

You can choose to do a smaller project where you can get 10 points or a full project where you can get up to 30 exercise points.

Presentation Guidelines: It is recommended to send your PDF slides latest 13:30 of the presentation day to the tutor. If you want to use your own laptop, make sure that everything works and switching laptops will be fast!

Guidelines for the small projects

1. The small project can be done by one or two people.
2. On July 6, 2015 from 14-16, you should give a presentation of 5-10 minutes during the class to present the results of your project. The grade (maximum 10 points) will be given by the teachers based on the presentation.

Guidelines for the full projects

1. The full project can be done by one or two people.
2. The main result is a short written report of at least 3 pages, maximum 6 pages, as a PDF.
3. A template report will be provided on the course wiki.
4. The report must be a new and self-written document and may not contain any copy of other text or figures. Not a single one. The report must be solely written by the author(s).
5. The report should have a short interesting title, the name of the author(s), and be structured like a short report with section titles and only full sentences in the text. It should have an abstract, start with a clear introduction and conclude with a short summary and critical discussion of the results.
6. The report should contain at least one sketch or a photo of the modelled system, a mathematical description of the chosen or developed system model, possibly a plot of the measurement data and simulated system response.
7. Figures or tables shall have a short caption and be referenced in the text like e.g. “the result of this simulation is shown in Fig. 1”.
8. The report must cite all used external sources as references at the end, and other people’s contributions must be acknowledged. Using other people’s ideas and help is allowed, even encouraged. But not citing or acknowledging them properly is a crime.
9. Mathematical or physical variables shall consist of one letter only and be printed in italics. This is automatic in Latex, e.g. a_i as `$a_i$`. Physical units and sub- or superscripts that mean words are in normal roman letters (use `mathrm` when in Latex mathmode, e.g. x_{initial} as `$x_{\mathrm{initial}}$` or $\frac{\mathrm{kg}}{\mathrm{m}^3}$ as `$\frac{\mathrm{kg}}{\mathrm{m}^3}$`. Write e.g. $m = 5$ kg (and not $m = 5kg$ or m= 5kg).
10. Measurements and graphs must contain physical units and axis descriptions.
11. On July 20, 2015, from 14-16, a short presentation of 15 minutes (with maximum 10 powerpoint or PDF slides) shall be given by the author(s) to the teacher and the class. The slides can be partially based on material copied from the report, but also contain other material like movies. It is also allowed to base the presentation entirely on the PDF of the report.
12. The project grade (maximum 30 points) is based on the form and content of the report, the originality and quality of the results, the quality of the slides and the oral presentation, and the answers to the questions.
13. **Deadline** for submission of the written report (PDF) is:

July 20, 10:00, 2015, sent by email to Jonas.Koenemann@imtek.de