FEL3320 Applied Estimation 7.5 credits

Tillämpad estimering

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for FEL3320 valid from Autumn 2014

Grading scale

undefined

Education cycle

Third cycle

Specific prerequisites

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The overall goal of the course is to give the participants theoretical as well as practical skills and experience in estimation. The course will start from a number of concrete examples to

motivate the need for various filtering techniques such as Kalman filters and particle filters. After completing the course the participants should:

- be able to: describe the parts of a Bayesian recursive filter in terms of the underlying probabilities, compare and contrast different estimation techniques, and select and apply appropriate techniques to problems.
- have reflected on the relationship between measurement uncertainty, probability theory and estimation methods.
- have gained experience in finding information from current scientific literature including recently published journal articles. As well as presentation of results in well structured scientific reports.

Course contents

The course focuses on giving the participants practical experience in using different estimation techniques on real problems. Examples used in the course are, for example, from navigation with mobile robots.

The following will be covered in the course: Observability, the Markov assumption, data association, estimation techniques such as Kalman filter, extended Kalman filter, particle filter, Rao-Blackwellized particle filter, Unscented Kalman Filter.

Disposition

There are 12 lectures. Both theory and practice of estimation will be covered. Getting practical skills in anything requires you to get hands-on experience and as such the work between the lectures will be very important.

Two labs solved individually cover the Kalman filter and the particle filter.

For the final project, the student should work in pairs and implement an estimation method. Each student needs to write an individual report including a literature study.

Course literature

There is no official course book. Letcures notes will be made available and some complementary material will be in the form of reseach publication. The students are assumed able to research for additional material to solve the project assignment.

The recommended reading is "Probabilistic robotics" by Thrun, Burgard and Fox, The MIT Press, ISBN 0-262-20162-3 covers most of the material in the course from a robotics points of view.

Equipment

No special equipment needed, you only need access to a computer

Examination

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

The basic part of the examination in the course consists of two lab assignments (PRO1), a project (PRO2) and an exam (TEN1). These are credited as,

PRO1: 2.0hp
PRO2: 2.0hp
TEN: 3.5hp

Passing them means that the student has passed the course.

On the Exam the passing grade will be a score of 80% correct. To pass PRO2 a result corresponding to at least a B is required.

Other requirements for final grade

To get a passing grade in the course the students need to pass the labs, the mandatory part of the project assignments and the exam.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.