SYLLABUS

Computer Vision and Image Processing 7.5 credits R7020E

Datorseende och bildbehandling

Course syllabus admitted: Autumn 2023 Sp 1 - Present

DECISION DATE
2023-02-15

Luleå University of Technology 971 87 Luleå, Sweden
Phone: +46 (0)920 49 10 00 • Corporate Identity: 202100-2841

LULEÅ TEKNISKA UNIVERSITET

Computer Vision and Image Processing 7.5 credits R7020E

Datorseende och bildbehandling

Second cycle, R7020E

Education level	Grade scale	Subject	Subject group (SCB)
Second cycle	G U 3 4 5	Reglerteknik	Automation Technology

Entry requirements

The student should have a basic level of programming skills, e.g. corresponding to courses D0009E Introduction to Programming 7.5 credits or D0017E Introduction to programmin for engineers 7.5 credits and also basic knowledge of mathematics, corresponding to courses M0030M Linear Algebra and Calculusor 7.5 credits or M0048M Linear Algebra and Calculus 7.5 credits.

Good knowledge in English equivalent to English 6.

Selection

The selection is based on 30-285 credits

Course Aim

After completing the course, the students will be able to:

- describe both theoretical and practical aspects on computer vision and image processing including methodology and terminology
- describe basic principles of image formation and analysis
- choose and implement methods related to image filtering, image feature extraction and image segmentation
- apply the geometric relationships between 2D images and 3D world
- interpret higher level image processing tasks like object detection as well as understand the principles of related deep neural networks
- implement, analyse and evaluate simple methods in computer vision applications within the framework of service oriented architecture

Contents

This course is a first stage advanced introduction to computer vision and image processing. Topics include camera model, multi-view geometry, reconstruction, some low-level image processing (e.g. image segmentation), and high-level vision tasks (e.g. object detection). The final part of the course describes various frameworks and programming libraries towards applications. The course will introduce the mathematical aspects and intuitions of the methods in class, which will be applied in practice in various projects.

Realization

Each course occasion´s language and form is stated and appear on the course page on Luleå University of Technology's website.
The course in realized as a series of lectures, home assignments, labs, and a final project. Labs and projects are performed in groups of up to 4 students. Labs will require reports and the final project will require a report accounting for the results and the methodology.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided.

The examination will be based on a final project with a grade level of U, 3, 4, 5 and on a successful completion of all corresponding lab assignments graded in the U, 3, 4, 5 scale. For every lab assignment a report should be submitted. For the final project, a report should also be submitted summarizing the methodologies utilized, the work developed and the results. The home assignments are optional. The final grade will be based 40% on the final project and 60% on the laboratory assignments grade. The students should have a passing grade in all the lab assignments and final project to have a final grade for the course.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term “unauthorized aids” refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Course offered by

Department of Computer Science, Electrical and Space Engineering

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0001	Laboratory work	G U 3 4 5	4.5	Mandatory	A21	
0002	Project	G U 3 4 5	3	Mandatory	A21	

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Last revised

by Robert Brännström 2023-02-15

Syllabus established

by Jonny Johansson, HUL SRT 2021-02-17