Procedural Methods for Images

Programme course

6 credits

Procedurella metoder för bilder

TNM084

Valid from: 2017 Spring semester

Determined by
Board of Studies for Computer Science
and Media Technology

Date determined
2017-01-25

Main field of study
Media Technology and Engineering

Course level
Second cycle

Advancement level
A1X

Course offered for
- Media Technology and Engineering, M Sc in Engineering
- Computer Science, Master's programme

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Calculus, multivariate calculus, linear algebra. Basic computer graphics. Technical aspects of 3D modeling and animation. Programming plus Object Oriented Programming, Data Structures and Algorithms. Knowledge in image processing and image analysis is desirable and useful as a prerequisite, but not required.

Intended learning outcomes
Procedural generation of images is a versatile and often used tool in modern computer graphics. The course aims at giving a deep and general knowledge of classic and modern methods for procedural generation of images, particularly textures meant to emulate complex and visually detailed phenomena in nature. After the course, students should be able to use general and special-purpose programming languages to generate images, and be able to describe and implement a selection of classic methods for procedural pattern synthesis. Starting from a real world problem described in terms of the desired visual result, students should be able to choose, motivate, execute, describe and to some extent evaluate a solution of their own based on existing, published methods.

Course content

The principle behind procedural images, their use, advantages and shortcomings in texturing. Textures in 2, 3 and 4 dimensions. Regular and irregular patterns. "Perlin noise" and its relatives (lattice noises). Multifractal synthesis and simulation of turbulence. Methods for animated images. Direct Fourier synthesis. Programming in general programming languages for procedural images. RenderMan shading language and other shading languages. Functions for texture synthesis in modern graphics hardware.

Teaching and working methods

Lectures (some in seminar form), programming-oriented practicals and a project assignment. The project assignment, which is chosen relatively freely under supervision of the examiner, is to be performed individually and independently by the student with some supervision, and a written report should be presented to the examiner for assessment and distribution to other participants in the course.

Examination

LAB1	Laboratory work	3 credits	U, G
UPG1	Project	3 credits	U, 3, 4, 5

Grades

Four-grade scale, LiU, U, 3, 4, 5

Department

Institutionen för teknik och naturvetenskap

Director of Studies or equivalent

Camilla Forsell

Examiner

Stefan Gustavson

Course website and other links

http://www.itn.liu.se/~stegu

Education components

Preliminary scheduled hours: 44 h
Recommended self-study hours: 116 h

Course literature

Additional literature

Books

Texturing and Modeling: a Procedural Approach Third edition Morgan Kaufmann publishers
ISBN: ISBN 1-55860-848-6

Other

Additional web-based material will be announced during the progress of the course.

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.