AI Robotics

Programme course

6 credits

AI-robotik

TDDE05

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
Computer Science and Engineering, Computer Science

Course level
Second cycle

Advancement level
A1X

Course offered for
- Computer Science and Engineering, M Sc in Engineering
- Information Technology, M Sc in Engineering
- Computer Science and Software Engineering, M Sc in Engineering

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
An introductory AI course, Object-oriented programming (preferably in C++ or Python.)

Intended learning outcomes
The aim of this course is to give an overview of the use of Artificial Intelligence (AI) techniques for robotic systems, through the use of simulated robot, actual hardware and widely used software packages, such as the Robot Operating System (ROS). The main focus of the course is for student to learn how the different components that constitute a robot: perception, control and deliberation interact with each other to form an autonomous system, the course will have an emphasis on how such a system take decision to accomplish its goals.
After the course, the student will be able to:

- to list and explain important problems and techniques in the area of AI robotics,
- to use existing frameworks to develop an autonomous robot, and
- to design, implement and evaluate the algorithms needed to provide autonomous functionality to a robot in a simulated environment, and
- to transpose simulated tests to actual hardware, and
- to make written and oral presentations of their work.

Course content

Perception and Scene Interpretation. Navigation: Localisation and path planning Autonomy and Levels of autonomy. Control and Decision-Making. Behavior-based robotics. Robotic Programming. Reactive, Deliberative and Hybrid robot architectures. Human-Robot Interraction

Teaching and working methods

Through a serie of labs (~1 month), the students develop/integrate basic robotic functionality, so that in the end, it is a system that can move, avoid obstacle and take basic decision. The system will be improved during the project phase. Each student pick a topic related to AI Robotic (among a selected list of topics), implement and evaluate the algorithm, and write a report, with a description of the algorithm. Students are expected to present their individual work during a seminar and during a group seminar they will present their robotic system. During a lab session, they should demonstrate to the assistant the functionalities of their robot. Students work in group of 5-6.
The course runs over the entire spring semester.

Examination

PRA1	Project assignment	4 credits	U, 3, 4, 5
LAB1	Laboratory work	2 credits	U, G

Grades

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

Other information

Supplementary courses:
Automated Planning, Sensor fusion, Computer Vision, Control Theory, Multi-Agents.

Department

Institutionen för datavetenskap

Director of Studies or equivalent

Peter Dalenius

Examiner

Cyrille Berger

Education components

Preliminary scheduled hours: 0 h
Recommended self-study hours: 160 h