Course syllabus

Servicerobotik
Service Robotics

TNSN01, 7,5 credits, A (Second Cycle)

Valid for: 2023/24
Faculty: Faculty of Engineering, LTH
Decided by: PLED ID
Date of Decision: 2023-03-16

General Information

Elective for: C4, D4-mai, E4, M4-me, MD4
Language of instruction: The course will be given in English on demand

Aim

The aim of the course is to give knowledge in service robotics and illustrate this with experimental work which shows the different parts and applications in mobile robotics, e.g. autonomous search and rescue robots in climate-related natural disasters or sensor technology for increased traffic safety. The course also trains the ability to solve complex problems in groups where different skills are required.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- be able to understand the characteristic features of mobile robots and importance in different settings
- be able to explain and use methods for modelling and control of mobile robots in a few typical cases
- be able to model, perform experiments, build and validate mobile robot systems which include sensor interaction

Competences and skills
For a passing grade the student must

- be able to design and present suggested solutions on mobile robot systems
- be able to, through experimental work, create control programs and mechanical parts which solve the given task

- be able to present orally and in writing as well as demonstrate results on given tasks

Judgement and approach
For a passing grade the student must

be able to evaluate the design choices for the topic of the project, taking into account the application domain an the system interaction with the outside world.

Contents

The course consists of a part with a practically oriented project assignment and a theoretical part.

The students choose in groups a service robotics topic to study and present this orally to the other students. The theoretical part is deepened at a literature seminar where scientific articles are discussed. Examples of service robotics topics are: different service robotics applications, human-robot interaction, levels of robot autonomy, navigation of mobile robots, SLAM (simultaneous localization and mapping), maze-solving algorithms, line-following algorithms, wheeled locomotion, odometry, anthropomorphic robots, robot ethics or a service robotics topics of the students' own choice.

The practical part consists of a project in one or more of the above-mentioned areas which is carried out in groups of usually four students. A functioning service robot is developed by integrating an Arduino controller, servos, sensors and mechanical components produced by for example laser cutting or 3D printing. The project applies knowledge in mechanics, electronics and programming.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Oral presentation of a selected service robotics topic. Literature seminar on a selected scientific article on service robotics. Service robotics project that is presented with a practical demonstration of a produced service robot and a written report. The project is carried out in groups of usually four students. The grade is a weighting of the results from the practical demonstration and the written report. Re-examination takes place in consultation with the course leader through supplementary work.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Admission

Assumed prior knowledge: Approved first course in at least two of the subjects Programming, Automatic control, Electronics/electrical engineering, Engineering mechanics.
The number of participants is limited to: 64
Selection: A maximum of 10 places are given to exchange students. Among LTH programme students, selection is based on number of completed university credits within the programme. Priority is given to students enrolled on programmes that include the course in their curriculum.
The course overlaps following course/s: MMKN30

Reading list

- Scientific articles on various topics about service robotics that the students themselves look up. Technical support documents for the project available in the learning platform Canvas.

Contact and other information

Course coordinator: Håkan Eftring, universitetslektor, tekn dr, hakan.eftring@certec.lth.se
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