II2302 Sensor Based Systems 7.5 credits

Sensor-baserade system

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 II2302 valid from Autumn 2023

Decision to discontinue this course

The course will be discontinued at the end of Spring 2025 according to the head of the school's decision: J-2023-3202.Decision date: 2023-12-08The course was given for the last time in Spring 2022. The last opportunity for examination in the course is given in Spring 2025.The exam is offered during the re-examination period in June. Contact the examiner to be examined on the project.

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

Language of instruction

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

Intended learning outcomes

This course is an introduction to sensor enabled systems, with an emphasis on embedded platforms. Areas covered include broad sensor technologies, the physical properties they measure, and how they are used in embedded designs. Data fusion methods and algorithms, especially for heterogeneous sensor networks and systems are discussed, and how these methods enable new applications and services, especially those in context awareness. The roles of mediated communications, connectivity and network topology choices in sensor networks are also covered. Technologies and methods discussed in the class will be tied to emerging application areas in several areas such as machine intelligence, security, entertainment, and business processes. •
To know how to select sensors based on physical measurement requirements and application specifications.• To know how to deploy data fusion principles to combine sensor data to satisfy a measurement goal.• To know how security can be protected with respect to sensors and the data they generate. Also to know the limitation of security methods used with respect to robustness, computation requirements and cost.• To know how to design a network topology for communicating sensor nodes that satisfies stated requirements of robustness, security, performance and cost.• To be able to use sensor based architectures to design advanced applications that use context awareness, personalization, augmented and virtual spaces.

Course contents

**• How sensors optimize ICT from a user, business and technical perspective• Personalization, dynamic Persona, logistics reduction, context measurement.• Physics of sensors. Signals, measurement techniques, noise and algorithms.• Higher level sensing, biometrics, location• Multiple sensor arrays, homogeneous and heterogeneous-
• Data fusion models and algorithms• Higher level fusion, aggregation• Mediated communication, sensor network topologies-
• Sensors and data security• Advanced applications, augmented reality and virtual spaces**

Examination

- PRO1 - Project, 4.5 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F

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.

Passed written exam TEN1: 3 hp, Grade A-FProject PRO1: 4,5 hp, Grade A-FThe grade for the course is calculated as a weighted average where the grade E-A are given a value of 1-5. Roundhalfs up.

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.