Internet of Things

Programme course

6 credits

Sakernas internet

TNK116

Valid from: 2021 Spring semester

Determined by
Board of Studies for Industrial
Engineering and Logistics

Date determined
2020-09-29

Main field of study

Electrical Engineering, Transportation Systems Engineering

Course level

Second cycle

Advancement level

A1X

Course offered for

- Master's Programme in Intelligent Transport Systems and Logistics
- Electronics Design Engineering, M Sc in Engineering
- Communications, Transport and Infrastructure, M Sc in Engineering

Prerequisites

The course labs and project will deal with IoT devices programming, thus programming/developing skills (especially in C/Java) are necessary.

Intended learning outcomes

After the course the student should be able to:

- Discuss major machine-to-machine (M2M) communication characteristics and analyse them
- Identify and analyse the requirements for network layer support for an Internet of Things (IoT) infrastructure
- Design solutions for integrating smart objects into IoT frameworks
- Design IoT architectures and services
- Evaluate the performance of IoT systems based on identified key performance indicators

Course content

This course introduces the design principles of the Internet of Things (IoT), their device and infrastructure-related architectures, technologies and protocol frameworks towards enabling the formation of highly distributed and ubiquitous networks with seamlessly connected heterogeneous objects. The student will learn to design and analyze such networks and architectures to support the development of intelligent services, with different performance requirements, in a variety of application domains.

Specifically, students will be exposed to architectures and methodological paradigms for the Internet of Things, and protocols at the different levels of the IoT stack. They will also learn to map those concepts on an access layer (including sensor, vehicular and cellular networks for machine-to-machine communication) and network layer (with particular emphasis on IPv6-based solutions), and analyze their performance. The course will also introduce technologies and protocols at the service and application layers, which enable the integration of embedded devices in web-based, distributed applications.

Teaching and working methods

The course comprises lectures, programming assignments, and an implementation project.

Examination

| LAB1 | Laboratory Work | 4 credits | U, 3, 4, 5 |
| UPG1 | Assignments | 2 credits | U, 3, 4, 5 |

The final grade is weighted by the distribution of credits of the partial examinations.

Grades

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

Other information

About teaching and examination language

The teaching language is presented in the Overview tab for each course. The examination language relates to the teaching language as follows:

- If teaching language is Swedish, the course as a whole or in large parts, is taught in Swedish. Please note that although teaching language is Swedish, parts of the course could be given in English. Examination language is Swedish.
- If teaching language is Swedish/English, the course as a whole will be taught in English if students without prior knowledge of the Swedish language participate. Examination language is Swedish or English (depending on teaching language).
- If teaching language is English, the course as a whole is taught in English. Examination language is English.

Other

The course is conducted in a manner where both men's and women's experience and knowledge are made visible and developed.

The planning and implementation of a course should correspond to the course syllabus. The course evaluation should therefore be conducted with the course syllabus as a starting point.

Department

Institutionen för teknik och naturvetenskap

Director of Studies or equivalent

Erik Bergfeldt

Examiner

Vangelis Angelakis

Education components

Preliminary scheduled hours: 48 h
Recommended self-study hours: 112 h

Course literature

Other

- Enabling Things to Talk, Designing IoT solutions with the IoT Architectural Reference Model, Springer, ISBN: 978-3-642-40403-0
- Designing the Internet of Things, Adrian McEwen, Hakim Cassimally, ISBN: 978-1-118-43062-0
- Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, Vermesan, O. & Friess, P. Editors. ISBN: 8792982735
- The Internet of Things. Greengard, S. (2015) ISBN: 0262527731
- A list of recent/seminal research papers will also complement the course literature