Internet of Things

Programme course

6 credits

Sakernas internet

TNK116

Valid from: 2019 Spring semester

Determined by
Board of Studies for Industrial Engineering and Logistics

Date determined
2018-08-31

Main field of study
Electrical Engineering, Transportation Systems Engineering

Course level
Second cycle

Advancement level
A1X

Course offered for
- Communication and Transportation Engineering, M Sc in Engineering
- Master's Programme in Intelligent Transport Systems and Logistics
- Electronics Design 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
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

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