HÖGSKOLAN I GÄVLE

Wireless Sensor Networks 7.5 cr

Trådlösa sensornätverk 7,5 hp

Set by Faculty of Engineering and Sustainable Development

Version	**Set at**	**Valid from**
	10/11/13	**HT2014**

Level	A1N
Education level	Second cycle
Course identifier	EEA001
Credits	7.5 cr
Main field of study	Electronics
Subject group	Electronics
Disciplinary domain	Technology 100.0 %

Learning outcomes

This course aims to give an overview of wireless communication technologies and M2M (machine-to-machine) wireless sensor networks. The course deals with knowledge and practical skills in sensor networks for industrial applications. Problems, technology, and theory are tools for the purpose.
After completion of the course the student shall
1. have a good overview over the basic function of wireless communication systems
2. have a good overview over wireless sensor networks consisting of many small, low power devices equipped with sensing, computing and wireless communications capabilities
3. be capable of describing and explain the function and use of sensors for industrial applications
4. understand various topologies, functions and performance of wireless sensor networks
5. have a basic overview of specific requirements for applications in wireless sensor networks regarding energy supply, memory, processing and transmission capacity
6. be able to model, simulate and evaluate communication over wireless sensor networks

Course content

Radio communication
– Radio communication basics
– System design fundamentals
– Radio propagation

Plagiarism is a form of cheating that involves imitating or copying someone else's work, such as a text, an image, or a table, and then present this as your own or without providing any reference. Self-plagiarism is also considered cheating, that is, using one's own previously submitted or published work without providing any reference.

Wireless sensor networks - basic principles
– Wireless sensor networks with low power consumption
– Applications examples
– Topologies
– Communication protocols
– Reliable communication

Time synchronization
- Problems with time synchronization
– Protocol-based transmitter/receiver synchronization
– Protocols based on receiver/receiver synchronization

Localization and positioning
– Possible approaches
– Basic mathematics
– Single-hop localization
– Positioning in multi-hop environments

Data-centric networking
– Data-centric routing
– Data aggregation
– Data storage

Interference in wireless communication systems
– Intermodulation
– Co-channel interference
– Adjacent channel interference

Teaching

Instruction consists of lectures, exercises and laboratory work/assignments. The laboratory work/assignments are normally carried out in groups of two students. Particular emphasis is placed on the student's ability to conduct and document the work. Lectures and exercises are not compulsory for the student. However, participation in laboratory work/assignments is compulsory.

Prerequisites

B.Sc. degree in Electronics, Electrical Engineering or equivalent.

Examination

Written examination and laboratory exercises.

Grade

A, B, C, D, E, Fx, F

Limitations

Each course includes a regular exam test and a second attempt.
Laboratory work and assignments require a pass mark from Lab supervisors and course coordinator respectively.
Lab reports must be submitted within two weeks after the scheduled laboratory session unless otherwise announced. Delayed reports will be dealt with next time the course is given (normally one year later). In the event that a report is rejected, it must be revised by the student in accordance with the instructions of the lab supervisor.
For assessment of assignments the deadline is communicated by the examiner.

Other regulations

Criteria for final grade will be given at the beginning of the course.

Sustainable environment

A minor part of the course content deals with sustainable development.

Module

0010	Written examination	5 cr	Grade: AF
0020	Laborations	2.5 cr	Grade: UG

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