

FÖRSLAG TILL PROGRAMNÄMND INFÖR ÅR 2012

NÄMND/NÄMNDER:

Förslagsställare (Namn, funktion, Inst/Enhet)

Qin-Zhong Ye, Kursansvarig, ITN

FÖRSLAGET GÄLLER:

a) EXISTERANDE KURS (Ange kurskod och kursnamn)

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b) NY KURS (Ange kursnamn, årskurs, önskad läsperiod, schemablocksplacering. Bifoga utkast till kursplan.)

Course Name: Wireless Sensor Networks

Grade: 2nd year International master students and 4th grade ED students.

Study Period: 1 period (6pt)

Schemablocksplacering:

c) ÄNDRING I EXISTERANDE PROFIL/INRIKTNING (Ange Program och Profil/Inriktning. Bifoga beskrivning över vad förslaget går ut på.)

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d) NY PROFIL/INRIKTNING (Ange Program och Profilnamn. Bifoga utkast till Profilbeskrivning.)

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e) ÖVRIGT (Bifoga beskrivning över vad förslaget går ut på.)

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PROGRAMNÄMNDENS BESKED:

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FÖRSLAGET I DETALJ:

This course introduces the wireless sensor network design from hardware and software point of view. The course contains 7 lectures. It starts from discussion of the wireless sensor network applications and how to make a system that fits the application requirements. This course teaches student the wireless sensor network from the single hardware device to the whole wireless network system. The course also contains 3 lessons, 3 labs and one final project. The score for each student is the evaluation from the final project.

Course lecture and lab description:

Lectures:

Lecture1: Introduction of Wireless Sensor Network

- > Course introduction
- > Wireless sensor network applications and scenarios
- > Wireless sensor network design requirements: System requirements, device requirements etc...
- > Introduction of the existing wireless sensor network protocols

Lecture 2: Wireless Sensor Network Design – Hardware

- > Wireless device radio design: antenna, filter, balun, power amplifier and low-noise amplifier
- > Performance definitions and measurements
- > Introduction of spectrum analyzer

Lecture 3: Wireless Sensor Network Design – Software

- > Generic wireless sensor network design: A generic system for remote monitoring and control
- > Client – Server module
- > Basic state machine
- > Top level introduction of ZigBee – A wireless sensor network standard

Lecture 4: IEEE standard for wireless sensor network – IEEE 802.15.4 MAC layer

- > IEEE 802.15.4 General description: architecture, topology and function overview
- > IEEE 802.15.4 Specification: service, message and command frame, function description

Lecture 5: ZigBee Application Layer

- > ZigBee standard architecture
- > ZigBee profile and cluster
- > Standard ZigBee command frame and function
- > Introduction of ZigBee standard software stack

Lecture 6: ZigBee application layer management – ZigBee Device Object (ZDO)

- > ZDO function description and frame format
- > Network discovery and service discovery in ZDO
- > Power consumption and output power tuning

Lecture 7: ZigBee network layer - Ad hoc On-Demand Distance Vector (AODV) Routing Algorithm

- > ZigBee network function specification
- > ZigBee network management from the application layer
- > ZigBee message routing algorithm – AODV (RFC3561)
- > Final project introduction

Labs:

Lab1: Getting familiar with the development environment and development kit. Test functions presented in IEEE 802.15.4.

Lab2: Implementation of a standard ZigBee endpoint using Z-Stack.

Lab 3: Enabling the network discovery and service discovery in ZigBee network. Power consumption measurement of the sleep mode enabled sensor device.

* Lab 4 – Lab6 are reserved for the final project

Lessens:

* 3 lessons are reserved for project meetings and project presentations

Projects:

Students can work with various projects to implemnet different applications or functions of different layers in Zigbee wireless sensor network standard.