CS345-15 Sensor Networks and Mobile Data Communications

24/25

Department
Computer Science
Level
Undergraduate Level 3
Module leader
Victor Sanchez
Credit value
15
Module duration
10 weeks
Assessment
Multiple
Study location
University of Warwick main campus, Coventry

Description

Introductory description

CS345 Sensor Networks and Mobile Data Communication.

Module aims

The aim of the module is to equip students with a fundamental understanding of sensor network and mobile ad hoc networks, including the domains in which associated technologies have been applied. The emphasis of the module is on the efficiency and practicality of protocols in sensor networks and ad hoc mobile networks.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

- Motivation and applications
- System architecture and Sensors
- Media access control protocols- TDMA, duty cycling, SMAC, XMAC, CSMA/CA, RTS/CTS

- Routing: directed diffusion, communication patterns, proactive/reactive/hybrid ad hoc routing, geographic routing
- Energy efficiency in sensor networks: duty-cycling, clustering, topology control
- Delay tolerant networks- optimistic routing, social net-based routing
- Mobility models
- WiFi Sensing, Channel state information representation, multipath propagation
- Signal enhancement and denoising, frequency analysis
- Applied Machine Learning and Pattern Recognition
- Applications: WiFi based human behaviour modelling

Learning outcomes

By the end of the module, students should be able to:

- - Understand the principles of sensor networks and mobile ad hoc networks, and their impact on protocol design.
- - Develop MAC and routing protocols for sensor and mobile networks.
- - Develop efficient routing protocols for sensor and mobile networks.
- - Understand and develop information dissemination protocols for sensor and mobile networks.
- -Understand the fundamentals and principles of WIFI sensing
- -Understand the pipeline of developing WiFi sensing systems for human behaviour modelling

Indicative reading list

(a) J. Schiller. Mobile communications (2nd Edition), Pearson, August 2003.
(b) H. Karl, A. Willing, Protocols and architectures for wireless sensors. Wiley and Sons, August 2007.
(c) C.S. Murphy, B. Manoj, Ad Hoc Wireless Networks, Prentice Hall, May 2004.

Subject specific skills

Understand current networking and transmission protocols for wireless ad hoc and sensor networks
Design new networking and transmission protocols for wireless ad hoc and sensor networks
Understand the importance of energy saving protocol in wireless sensor networks

Transferable skills

Capacity to analyse new wireless technologies
Simulation of wireless networks
Evaluation of wireless transmission protocols

Study

Study time

Type	Required
Lectures	23 sessions of 1 hour (15%)
Practical classes	7 sessions of 1 hour (5%)
Private study	120 hours (80%)
Total	150 hours

Private study description

Background reading on wireless networks.
Reading of supplemental material to reinforce the concepts covered in class.
Revision of concepts covered in class.

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Students can register for this module without taking any assessment.

Assessment group D3

	Weighting	Study time
practical project report	30%	

CS345 practical project report - Report will be 1800 - 2000 words max. This assignment is worth more than 3 CATS and is not, therefore, eligible for self-certification.

In-person Examination	70%	

CS345 Exam

- Answerbook Pink (12 page)

Assessment group R2

	Weighting	Study time
In-person Examination - Resit	100%	

	Weighting	Study time
CS345 resit examination		

- Answerbook Pink (12 page)

Feedback on assessment

Students will be provided with individual forms containing detailed feedback and comments regarding their coursework submissions.

Past exam papers for CS345

Availability

Pre-requisites

Students must have studied CS241 or be able to show that they have studied equivalent relevant content.

Courses

This module is Core for:

- Year 1 of TCSA-G5PB Postgraduate Taught Data Analytics (CUSP)

This module is Optional for:

- UCSA-G4G1 Undergraduate Discrete Mathematics
  - Year 3 of G4G1 Discrete Mathematics
  - Year 3 of G4G1 Discrete Mathematics
- Year 3 of UCSA-G4G3 Undergraduate Discrete Mathematics
- Year 4 of UCSA-G4G4 Undergraduate Discrete Mathematics (with Intercalated Year)
- Year 4 of UCSA-G4G2 Undergraduate Discrete Mathematics with Intercalated Year

This module is Option list A for:

- Year 4 of UCSA-G504 MEng Computer Science (with intercalated year)
- UCSA-G500 Undergraduate Computer Science
  - Year 3 of G500 Computer Science
  - Year 3 of G500 Computer Science
- UCSA-G502 Undergraduate Computer Science (with Intercalated Year)
  - Year 4 of G502 Computer Science with Intercalated Year
  - Year 4 of G502 Computer Science with Intercalated Year
- UCSA-G503 Undergraduate Computer Science MEng

    - Year 3 of G500 Computer Science
    - Year 3 of G503 Computer Science MEng
    - Year 3 of G503 Computer Science MEng

This module is Option list B for:

- Year 3 of UCSA-G406 Undergraduate Computer Systems Engineering
- Year 3 of UCSA-G408 Undergraduate Computer Systems Engineering
- Year 4 of UCSA-G407 Undergraduate Computer Systems Engineering (with Intercalated Year)
- Year 4 of UCSA-G409 Undergraduate Computer Systems Engineering (with Intercalated Year)

This module is Option list C for:

- USTA-G302 Undergraduate Data Science
    - Year 3 of G302 Data Science
    - Year 3 of G302 Data Science
- Year 3 of USTA-G304 Undergraduate Data Science (MSci)
- Year 4 of USTA-G303 Undergraduate Data Science (with Intercalated Year)