

# CS912-15 Sensor Networks and Mobile Data Communications

**24/25**

**Department**

Computer Science

**Level**

Taught Postgraduate Level

**Module leader**

Victor Sanchez

**Credit value**

15

**Module duration**

10 weeks

**Assessment**

Multiple

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

CS912 Sensor Networks and Mobile Data Communication.

### Module aims

The aim of the module is to equip students with a fundamental understanding of sensor networks 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 such 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.

Content includes:

- 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

J. Schiller. Mobile communications (2nd Edition), Pearson, August 2003

H. Karl, A. Willing, Protocols and architectures for wireless sensors. Wiley and Sons, August 2007

C.S. Murthy, B. Manoj, Ad Hoc Wireless Networks, Prentice Hall, May 2004

J. P. Hubaux, L. Buttyan, Security and Cooperation in Wireless Networks, Cambridge University Press, November 2007

## 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 network;

## 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.

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## 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%	
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 CS912 Exam	70%	

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- Answerbook Pink (12 page)

### Assessment group R2

	Weighting	Study time
In-person Examination - Resit	100%	

CS912 resit examination

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- Answerbook Pink (12 page)

### **Feedback on assessment**

Written feedback and mark breakdown for assignment via Tabula.

[Past exam papers for CS912](#)

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### **Availability**

#### **Anti-requisite modules**

If you take this module, you cannot also take:

- CS345-15 Sensor Networks and Mobile Data Communications

### **Courses**

This module is Optional for:

- Year 1 of TCSA-G5PD Postgraduate Taught Computer Science
- GSPA MSc in Data Analytics