

IN4181 – Wireless Sensor Networks

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Abstract

Advances in digital circuitry have brought us small computers (nodes) equipped with sensors, a microcontroller, a radio, and a power supply (battery). By networking the nodes a multitude of (monitoring & control) applications can be created. Realizing such wireless sensor networks, however, requires new protocols to manage and overcome the limited resources of individual nodes. In this course we will study the basics of wireless communications and power management, as well as advanced topics appearing in recent research papers.

1 Introduction

The objective of this MSc course is that participants acquire knowledge and understanding of Wireless Sensor Networks (WSNs), in particular, of how the inherent need for energy-efficient operation requires a new approach to distributed computing. Since the research area of WSNs is relatively young, the course adopts a seminar format in which participants have to familiarize themselves with a specific topic and present the state-of-the-art to other participants. As such, a participant is expected to read several papers published in recent conference proceedings and journals, prepare a presentation, and write a short paper documenting his findings and analysis of the selected works and incorporating any feedback from the audience. Anticipating that most MSc students in computer science have a limited background in wireless communication, the course starts off with two standard lectures in which the instructors will highlight the essentials needed for understanding basic WSN research problems and solutions.

2 Schedule

The course consists of seven lectures, featuring the following topics:

Lecture	Topic	Type	Teacher
1	Introduction Wireless Networking	Class	Koen Langendoen
2	Introduction Sensor Networks	Class	Koen Langendoen
3	Medium Access Control	Seminar	Gertjan Halkes
4	Localization	Seminar	Aline Baggio
5	Routing	Seminar	Muneeb Ali
6	Data Processing	Seminar	Tom Parker
7	Prototyping and Deployments	Seminar	Koen Langendoen

See Blackboard for the exact schedule (time, place, location).

3 Requirements

In order to pass the course:

- Students must be present at all seminar-style lectures (3-7), and are expected to contribute to the discussions following each presentation;
- Students must familiarize themselves with each topic by reading one or two classic articles (see Blackboard for the exact reading list), and hand in a brief, written summary (300-500 words) at the start of each seminar lecture;
- Students must select, or will be assigned, a special topic for in-depth treatment. It is the student's task to propose a recent, technical paper that he likes to present in class (please coordinate with other students participating in the same seminar lecture). After the teacher has approved the paper, the student will prepare a Powerpoint presentation (20 min.) conveying the key innovation with respect to the classic works. The slides need to be discussed with the teacher, who will make recommendations for improving the presentation. Then the student will present the paper in class, and lead the discussion following it;
- Students must hand in a final report about their special topic. The report (2000-2500 words) should contain the knowledge acquired from reading the state-of-the-art literature. At a minimum the report should cover all papers discussed at the specific seminar (summarizing a single paper is not enough), demonstrating the student's ability to put his discussed work into a broader perspective. (Figures and tables illustrating commonalities and differences are highly appreciated.)

All writing must be in English, and documents must be handed in as PDF files.

4 Deadlines

The presentation must be approved – at the latest – two days before the seminar; please agree upon a preparation schedule with your teacher well before that date.

Topic	Teacher	e-mail
Medium Access Control	Gertjan Halkes	g.p.halkes@tudelft.nl
Localization	Aline Baggio	a.g.baggio@tudelft.nl
Routing	Muneeb Ali	m.ali@tudelft.nl
Data Processing	Tom Parker	t.e.v.parker@tudelft.nl
Prototyping and Deployments	Koen Langendoen	k.g.langendoen@tudelft.nl

The final report must be handed in two weeks after your presentation.

5 Grading

Handing in the weekly summaries of the classic papers on the reading list is mandatory to pass this course. The grade is based on the presentation/discussion (30%) and the final report (70%).