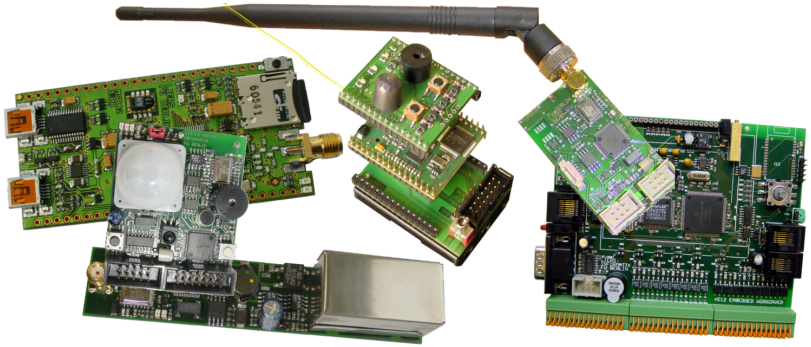

Seminar Technische Informatik WS1011

Network Organization and Protocols

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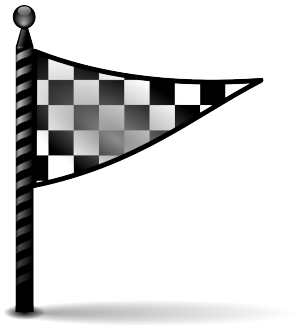
Department of Mathematics and Computer Science
Institute of Computer Science
22.10.2010

Outline

1. Seminar Goals
2. Teaching Methods
3. Topics
4. Schedule

Seminar Goals

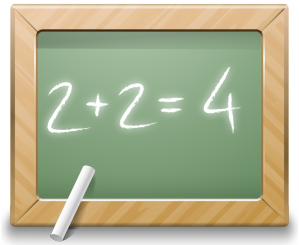
- Seminar for Diploma and Master students
- Introduction of advanced topics based on *Telematics* and *Mobile Communications* lectures
- Literature research
- Technical writing
- Critical review and discussion of publications
- Learning and practicing giving a talk
- “Schein” with 4 ECTS-Credits



Please notify us when you will not attend or finish the seminar!!!

Teaching Methods

- Seminar with weekly meetings (instead of a “block-seminar”)
- Reading group until talks begin, refer to website for mandatory reading
- 1 to 2 talks per event, 25-30min, schedule will be available on website
- Discussion after talks
- 85% attendance mandatory, including first two meetings
- Report submission in the end of lecture period, 7-8 pages, *IEEE Transactions layout*
- Talk weights 1/3 of final grade and report 2/3



Bastian Blywis

Wireless Nanosensor Networks

Wireless sensor networks (WSNs) consist of autonomous, self-configuring, and spatially distributed devices that cooperatively monitor particular environmental conditions. Detected events and data are forwarded by multi-hop wireless communication to a sink node that usually is a gateway into other networks and allows monitoring and management of the WSN. Nanotechnology is currently considered for the next generation of the devices enabling smaller sizes, cheaper prizes, and more advanced sensors.

The task of this topic is to give an overview of wireless nanosensor networks (WNSN), the advances, and novel applications. You also have to critically discuss the ideas, initially published simulations, and chances to see WNSNs in the future.

Bastian Blywis

TBRPF - The Unknown MANET Protocol

Besides AODV, DSR, and OSLR, Topology Dissemination Based on Reverse-Path Forwarding (TBRPF) is the fourth protocol ratified by the IETF MANET work group. It is surprisingly unknown and overshadowed by the others.

The task of this topic is to discuss the protocol and compare it with others. You also have to evaluate for which applications scenarios TBRPF is beneficial or should be avoided.

Felix Juraschek

Distributed Channel Assignment

Wireless mesh networks based on IEEE 802.11 recently gain more attention, because of an increase of commercial deployments that provide Internet access for city areas. This wireless technology features several non-overlapping channels. The usage of these channels promise a better network performance with higher throughput and less packet retransmission because of collisions or network congestion. This seminar topic will focus on distributed channel assignment, in which nodes measure local channel statistics and exchange these data with near-by nodes to calculate the channel assignment. In contrast to centralized approaches, in which usually a designated node (gateway) calculates the network-wide channel assignment, the calculation takes place on every node. Therefore, typical challenges such as the ripple effect and channel oscillation must be taken into account and solved.

Norman Dziengel

Influence of Data Quality in Wireless Sensor Networks comparing to Wired Networks

Data quality is influenced by a huge amount of factors like sensor fabrication, energy supply, model-design and environmental effects. It is a good idea to discriminate between four components of data quality: accuracy, consistency, timeliness and completeness. These components influence unequally the total data quality depending on the way of communication. Wireless sensor networks (WSNs) underlay restriction like limited energy supply which leads to a restricted computational power, restricted memory and lifetime. In contrast to WSNs, wired networks are exposed to rodents and suffer under reduced mobility. Analyze the influence of data quality in Wireless Sensor Networks comparing to Wired Networks by extracting main differences of both approaches concerning the task of communication and data gathering.

Norman Dziengel

Data reduction with statistical approaches to ensure data quality in WSNs
While optimizing a data stream for wireless communication by compression we reduce data quality due to an inherent loss of information. How far can the data stream be reduced to get an ideal ratio between reduction of data and its representativeness? One option to reduce data in a stream is based on histogram. For this approach we pick random data out of each histogram class and restore the original sample order afterwards. The question is now, how good will this new dataset match the original stream. Techniques for evaluating the losses vs. benefits should be found and compared with the known like Kolmogorov-Smirnov test. Are there other approaches that may leverage the possible data quality?

Norman Dziengel

Consistency driven data quality in WSNs

Wireless Sensor Networks often process and transmit data that have been collected through a varying range of sensors. Depending on the size, fabrication quality, energy supply and environmental roughness the inherent confidence should be known. One option to achieve this goal is by designing and implementing a appropriate model that is able to check the consistency of the collected data. We distinguish numerical consistency, temporal consistency and frequency consistency. Analyze the techniques concerning the usability in WSNs and find other approaches to validate the data consistency of a sensor node. Compare different sensors available at the market and evaluate their symbiotic effect to one another.

Norman Dziengel

Compare real military fence monitoring system with FU research
On construction sites and around other security relevant areas, fences are typically used to protect expensive goods. Wireless Sensor Networks may help to deliver a more flexible system to be attached at the fence itself. Different types of sensors need to be applied on an appropriate sensor board to detect possible intruders. Compare the FU research results with a real world military system that seems to cover our requirements. Research all available sources to get a deep insight into both hardware components, the technical details and the supported features of both systems. Evaluate performance, energy-consumption and state of the art.

Matthias Wählisch

Taxonomy of Autonomous Systems

The Internet backbone routing is based on the concepts of Autonomous Systems (ASes). An AS abstracts one or several IP networks and is typically controlled by one entity (i.e., ISPs, university etc.). For a better understanding of the Internet infrastructure knowledge about the AS types is important. This work should review and analyze current work about the classification of Autonomous Systems.

Matthias Wählisch

Measurement of the Current IPv6 Deployment State

The Internet protocol version 4 has been deployed since more than 25 years. The growth of the amount of Internet-based devices as well as novel demands, such as mobility and security, urge the needs of a re-designed Internet protocol. IPv6 is the successor of IPv4. This protocol has been standardized 1995. In the past, its deployment was quite limited. However, more and more service providers and website portals enable IPv6, e.g., heise.de some weeks ago. The goal of this topic is the presentation and critical discussion of measurements, which quantify the adoption of IPv6 in the Internet.

Matthias Wählisch

Distributed Event Detection in the Context of Security

Without doubt, mobile, wireless-based end devices represent a significant part of our current networks, both with respect to the number of deployed equipment, and their economic impact. Limited hardware resources and the per se unprotected transmission media air turn such devices into attractive targets for attacks. This literature survey should classify and discuss current approaches, which use distributed event detection in wireless networks to identify attacks.

Oliver Hahm

RPL - Routing Protocol for Low power and Lossy Networks

The IETF formed the workgroup ROLL (Routing Over LoW power Lossy networks) to analyze the requirements for and standardize a routing protocol for the wireless embedded internet. As the outcome of an evaluation of existing routing protocols for MANET like AODV, OLSR or DYMO it became clear that none of these would match the requirements. Therefor ROLL workgroup has specified the Routing Protocol for Low power and Lossy Networks (RPL). The design of RPL is closely related to the work of the 6LoWPAN workgroup. You will have to explain the architecture of such a RPL network, the applied metrics and the routing protocol itself.

Oliver Hahm

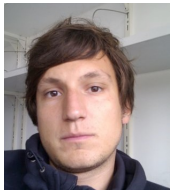
Synchronization in Wireless Sensor Networks

Time synchronization with a high precision is an important and crucial requirement for many network applications. The design and implementation of protocols for high precision time synchronization becomes even more difficult when dealing with wireless networks. For WSN another challenge is added due to the energy constraints of these systems. During the last years research has proposed a lot of highly envolved time synchronization protocols for WSN to solve this problem. Your task will be to give a survey over these protocols. Make a comparison of the most promising ones in terms of accuracy, energy consumption and complexity.

Stefan Adler

Real Life Deployments of Wireless Sensor Networks

Wireless Sensor Networks (WSN) are an popular research object in the last years. A wide range of aspects has been researched and there are theoretical solutions for a lot of WSN specific problems. Although WSNs are well known and researched there is only a little feedback about practical impacts of the research in the scientific community. The task of this work is create a survey of real life installations of Wireless Sensor Networks. The literature survey should result in an overview where WSNs are deployed and what common and specific problems occurred. To limit the time and effort of the work the selection of publications in the survey will be guided and supported by the topic adviser.



Sebastian Trapp

Attack and intrusion detection in mobile networks

With the rapid growth of wireless communication (be that sensor networks or individual mobile devices) those systems move more and more in the focus of potential attackers. Manipulating surveillance or stealing personal data are two of many possible incentives for an attack. Intrusion detection systems try to address these concerns. On wireless and mobile devices, typically powered only by batteries, special restrictions have to be considered. This work should present ways of designing a lightweight (distributed) intrusion detection system for mobile devices by analyzing existing concepts and strategies.

Schedule

Week	Date	Name	Topic
1	22.10.10	Günes	Introduction + Topics
2	29.10.10	Blywis	Related work research, plagiarism, writing a seminar report, creating a presentation, giving a talk
$3 \ldots n$		all	Reading group
$n+1 \ldots 16$		individuals	Talks

Schedule

1. Choose three topics in declining order until **24.10.2010**; send email to Bastian Blywis
2. You will receive your topic via email until **25.10.2010**
3. Meet with the topic's supervisor immediately to get primary literature and discuss content of talk
4. Show slides to supervisor before giving your talk
5. Discuss content of report with supervisor
6. Meet several times with your supervisor and show current state of report
7. Submit report as PDF to Bastian Blywis until 20.02.2011