Self-Organizing Wireless Sensor Networks

Jan Beutel, Matthias Dyer
Lothar Thiele
Trends in Information and Communication

Centralized Systems

Networked Systems

Large-scale Distributed systems

New Applications and System Paradigms
Large-scale Distributed Systems

Processors, sensors, and wireless communication devices will be very cheap, small, and ubiquitous.

Deployed in the environment. Integrated into everyday objects. Networked.
Application Visions

- Forest Fires
- Maintenance
- Factory Automation
- Natural Hazards
- Animal Habitat
Application Visions

Building Automation

Precision Agriculture

Health Care

Logistics

Security Systems
Challenges

- Mastering complexity without central control?
- “Global” wireless connectivity?
- Capacity limitations?
- Paradigm change in information theory!
- Organization of a massive amount of nodes?
- And all that with extremely low energy budget...
Project – Environmental Monitoring
Project – Alpine Permafrost Monitoring
Project – Fire Alarm Monitoring

Safety Critical Sensor Networks for Building

KTI Project with Siemens Building Technologies (Zug)
BTnode – Education in Embedded Systems

Annual Lab Courses in
- Sensor Networks (30 Students)
- Embedded Systems (120 Students)

40+ completed Term and Master Thesis Projects
DEMO

Wireless ad-hoc networks

- Principles (live demo)
- Status and Trends (cacti live demo, video over 2 months)

Environmental Sensors – Networked Data Acquisition

- Tmote Sky – Temperature
- BTnode – Audible Sound, Light

Testbed Infrastructure @ TIK

WSN Teaching – BTnode Developer Kit