short outline

Selection and Navigation of Mobile Sensor Nodes

Seminar: Mobile Ad Hoc Networks

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Overview

1. Hybrid Sensor Network
   - Motivation
   - Problem Formulation
   - Sample Applications
2. Navigation and Selection
   - Navigation
   - Selection

1. Hybrid Sensor Network

- How does it look like?
  Where can we use it?

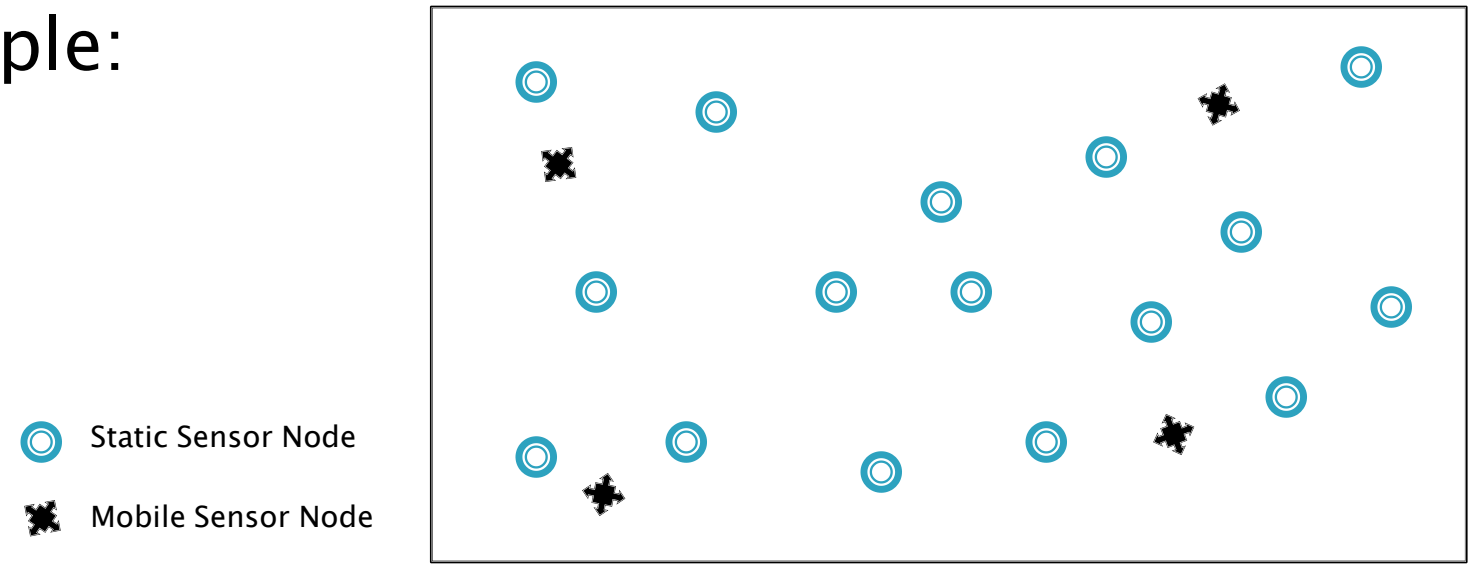
Why Hybrid Sensor Networks?

- **Static Sensor Nodes**
  - Environmental sensing, communication, coordination and navigation
  - Few resources (low power) → cheap
  - Good coverage
- **Mobile Sensor Nodes**
  - Reallocate resources (sensing, networking, computing)
  - Provide required coverage on demand
  - Collect data
  - More resources (power, sensors, computation)
- **Advantages of a mixture**
  - Reduces the costs
  - Preserve the flexibility

What are we doing?

- **Goal:**
  - Static Sensor Nodes detect an event
  - Mobile Sensor Nodes are **selected** and **navigated** for support

- Example:



Hybrides Sensor Netzwerk [1]

What are we doing? (2)

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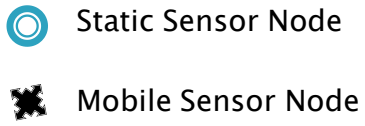

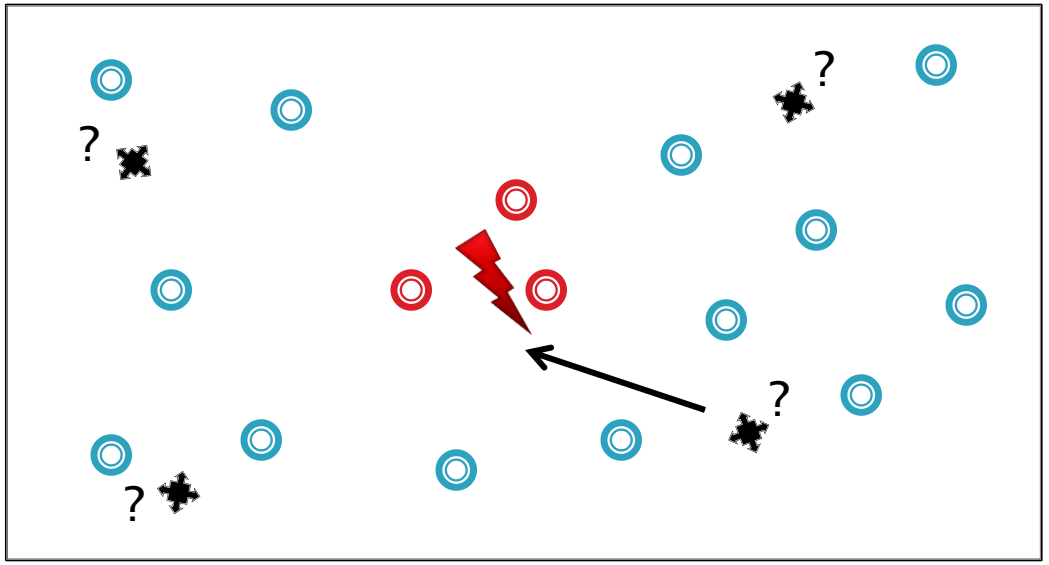

Hybrides Sensor Netzwerk [1]

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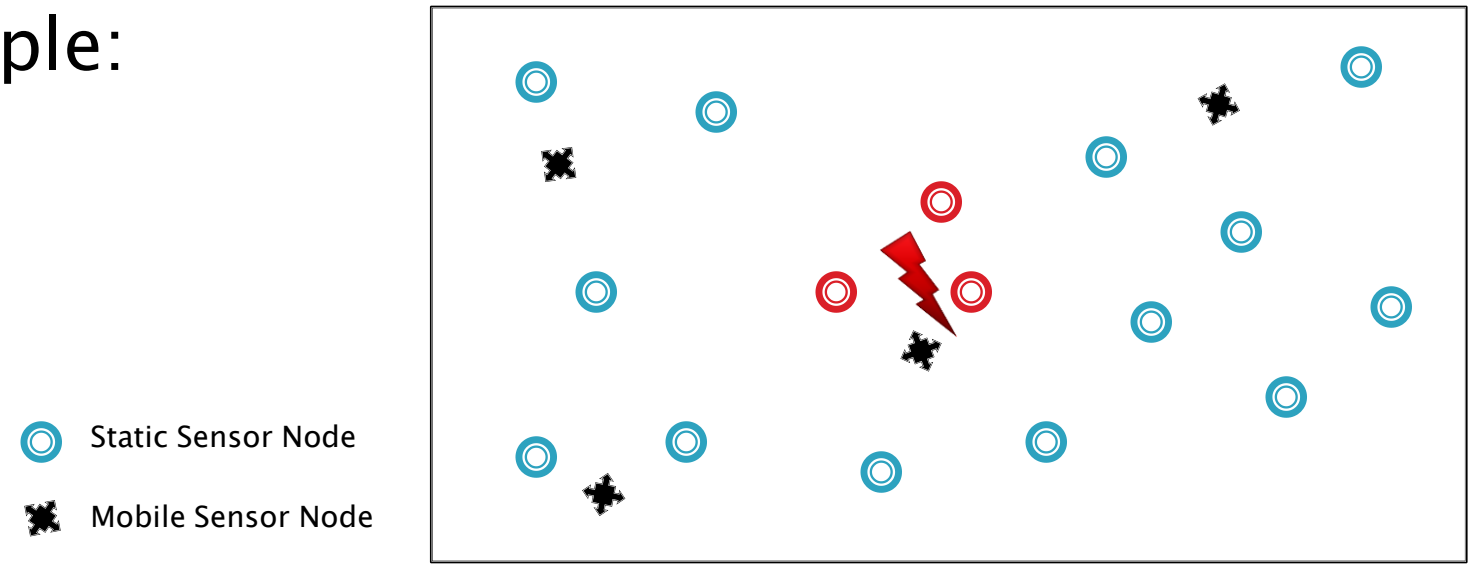


Hybrides Sensor Netzwerk [1]

Where can we use it?

- Environment observation
  - Weather
  - Water level
  - Movement
- Habitat monitoring
  - Fire
  - Temperature
  - Health
- Military applications
  - Battlefield surveillance
  - Reconnaissance
  - Enemy tracking

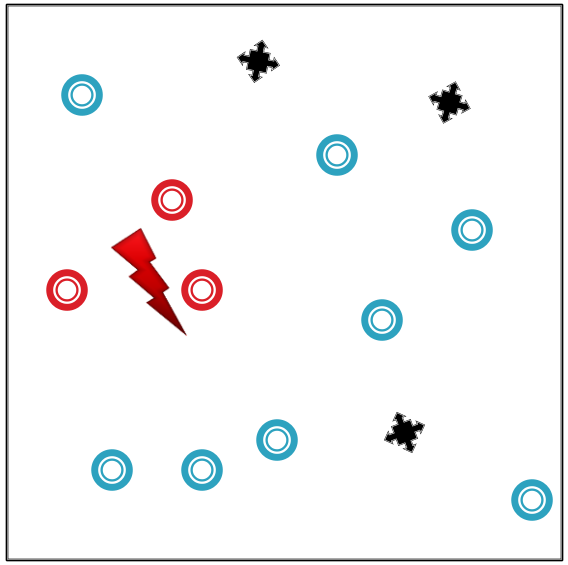
2. Navigation and Selection

- How to guide a mobile node to an event? Which mobile node should be selected?

Navigating a mobile sensor node

- No prior map of environment available
- Location of Mobile Sensor Nodes (MSN) not known

- **Idea:**
  - Select leader from sensors which detect the event
  - Leader broadcasts a request
  - While forwarding broadcast requests a magic navigation field is build up
  - Selected MSNs use the navigation field to reach the event



Hybrides Sensor Netzwerk [1]

Selecting a mobile sensor node

- **Idea:**
  - Computation only by MSN not by static sensor nodes
- **Three metrics are evaluated:**
  - Provided coverage area by MSN → voronoi area
  - Power of the MSN → battery lifetime
  - Dinstance between MSN and event → # hops

On February

- Building up the Navigation Field
- Mobile Sensor Navigation
- Evaluating the three metrics for Selection of a Mobile Sensor Node

Thanks for your attention

» Any questions?

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   - Motivation
   - Problem Formulation
   - Sample Applications
2. Navigation and Selection
   - Navigation
   - Selection

Sources

- [1] Selection and Navigation of Mobile Sensor Nodes Using a Sensor Network,
  - Atul Verma, Hemjit Sawant and Jindong Tan,
  - in the proceeding of IEEE Percom 2005.