

Sensor Relocation with Mobile Sensors: Design, Implementation, and Evaluation

Jie Teng, Tim Bolbrock, Guohong Cao, and Tom La Porta
University Park

Ad-Hoc network Seminar 2008-2009

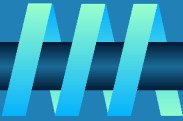
By:

Mustafa Sofean

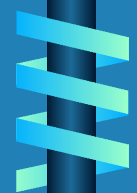
(Master student)

University of Freiburg

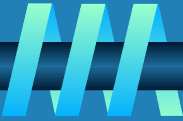
Overview



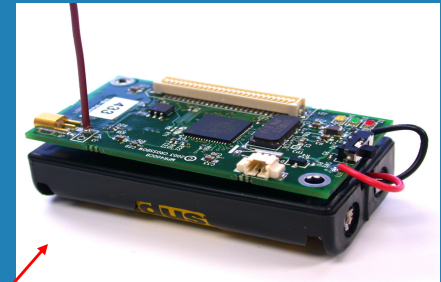
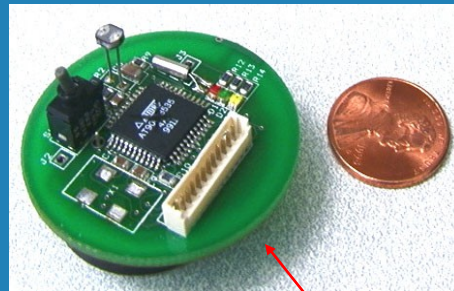
- Sensor networks
- mobile sensor
- mobile robot
- Mote
- sensor relocation



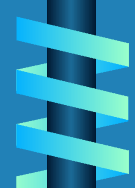
Sensor networks



- A wireless network .
- Set of sensors.
- Static



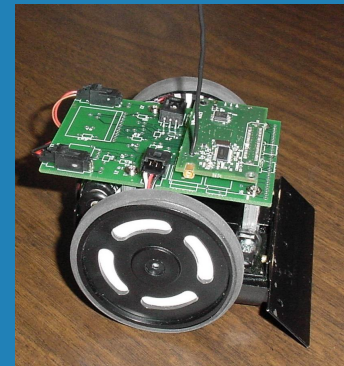
Mote



Mobile sensor networks ?



- Sensor networks
- The nodes can move under their own control or under the control of the environment



Mica2 and Mobile Robot

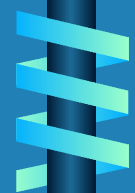
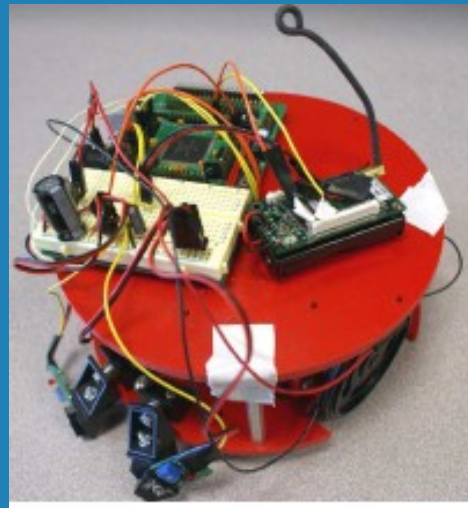


- **Mica2**

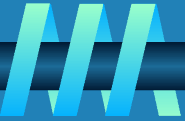
- ❖ Sensor node
- ❖ Has ability to processing, storage and sending data.

- **Mobile Robot**

An automatic machine that is capable of movement in a given environment.

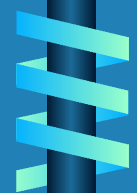
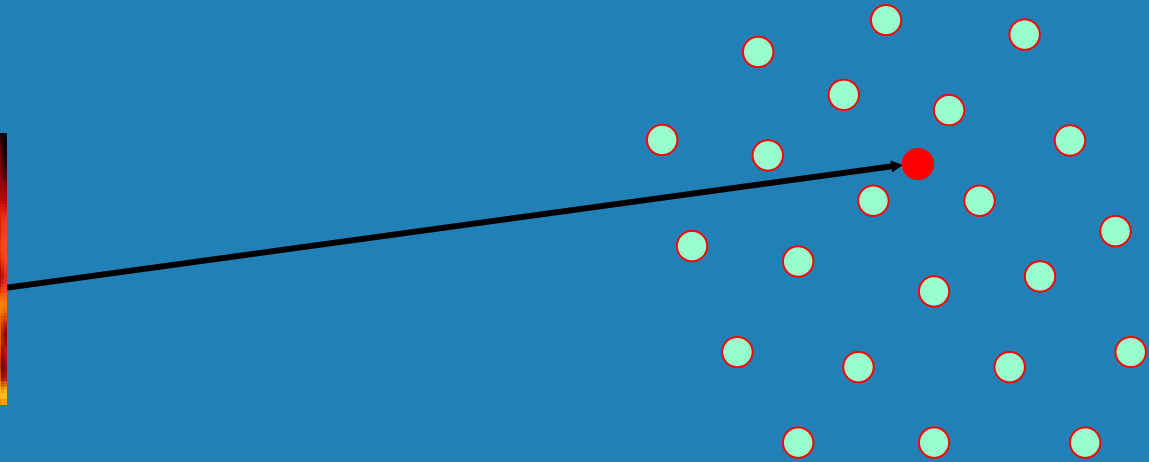
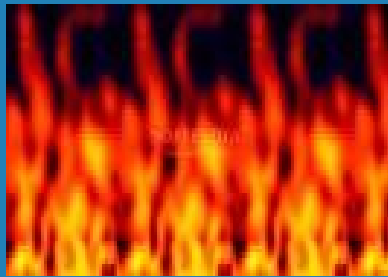


Sensor Relocation



Problem

- Having mobile sensor network in an environment.
- Something happened like fire.
- Some nodes failure and creates a hole.



Sensor Relocation

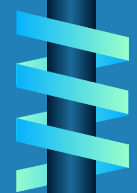
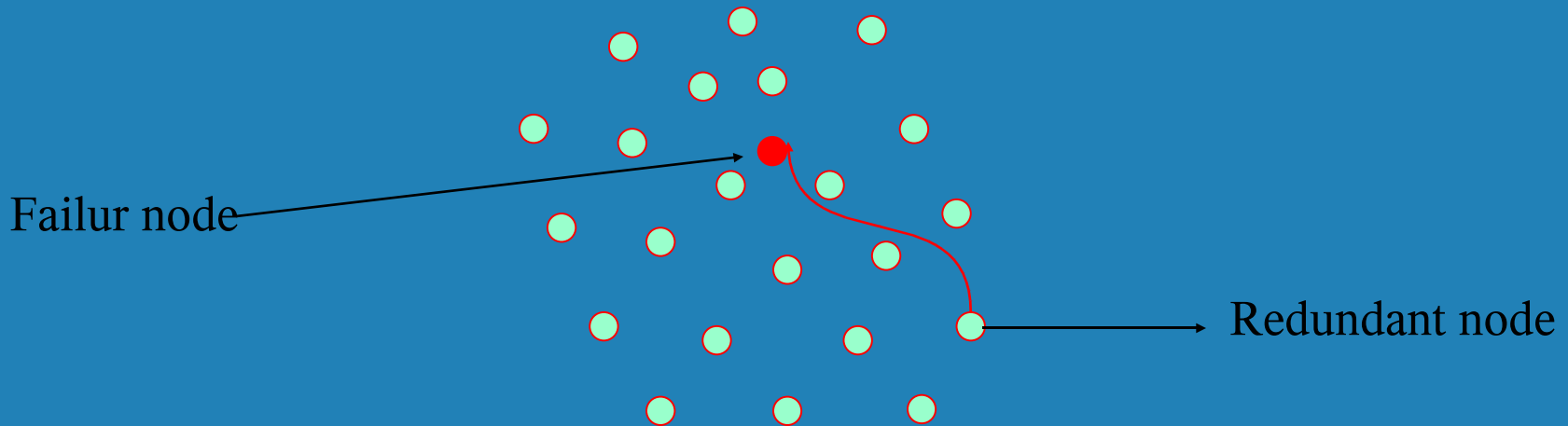


Solution

Design a algorithm to achieve the relocation

Mobile sensor node is relocated to cover the hole in:

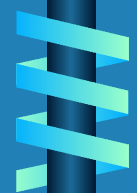
- ❖ Timely way.
- ❖ Energy-Efficient way.



APPLICATION REQUIREMENTS



- Time response.
- Energy efficiency.
- Dynamic reconfiguration.

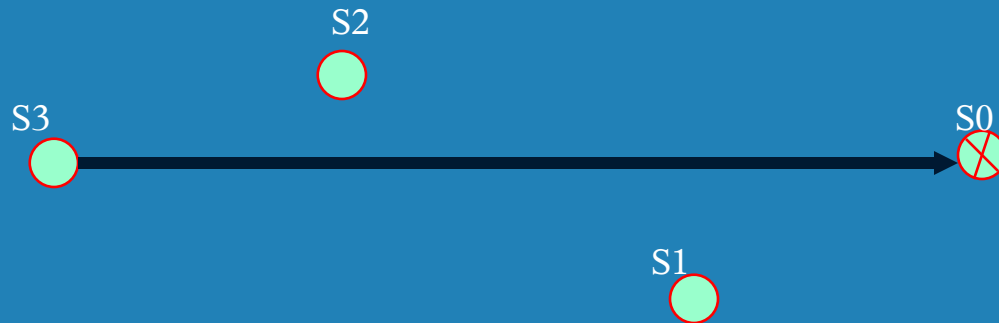


THE SENSOR RELOCATION DESIGN

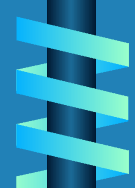
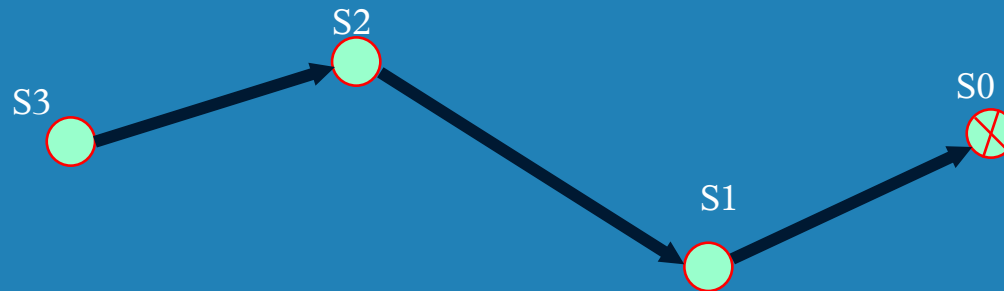


Sensor Relocation based on Cascaded Movement

Direct



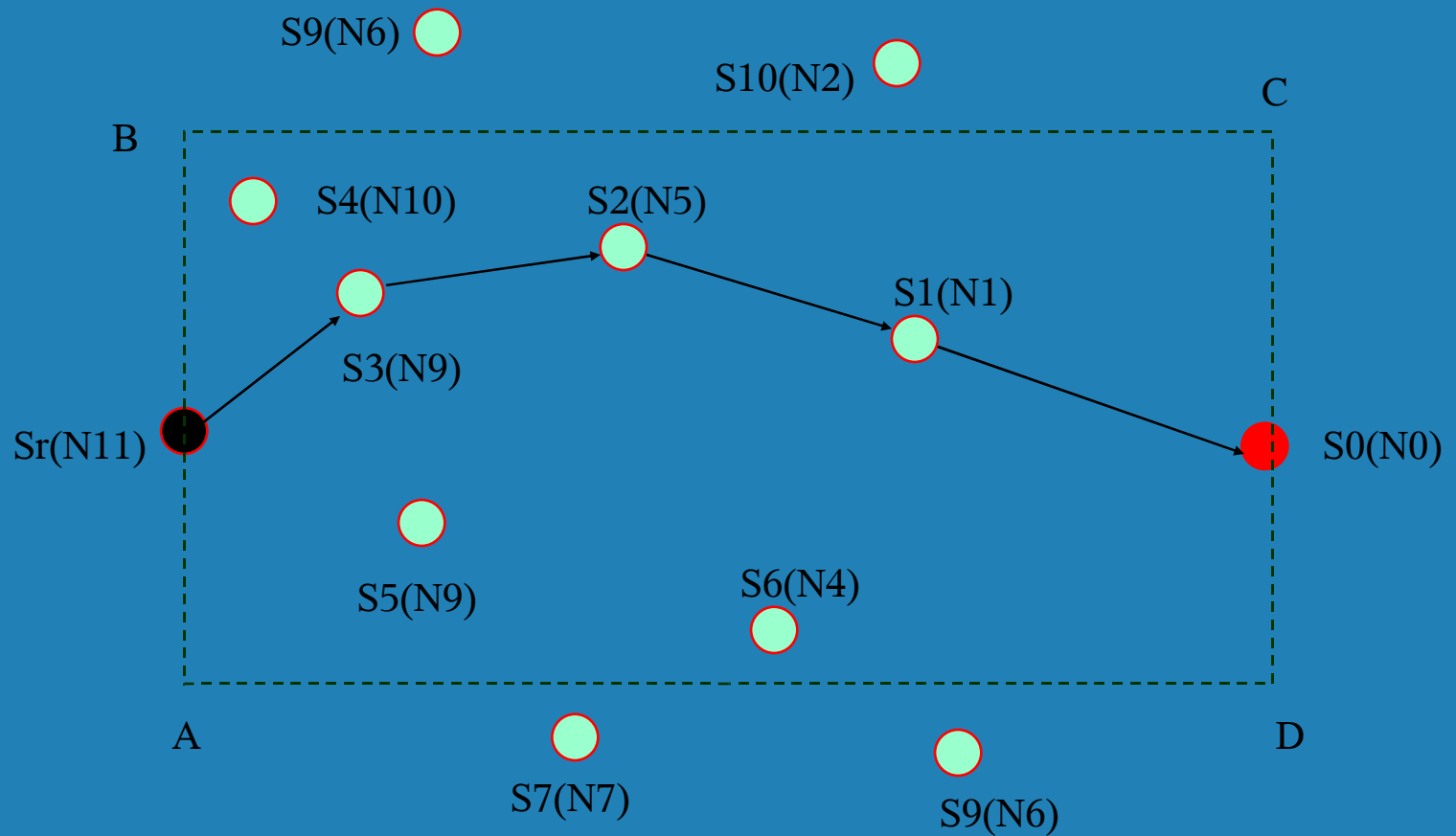
Cascaded



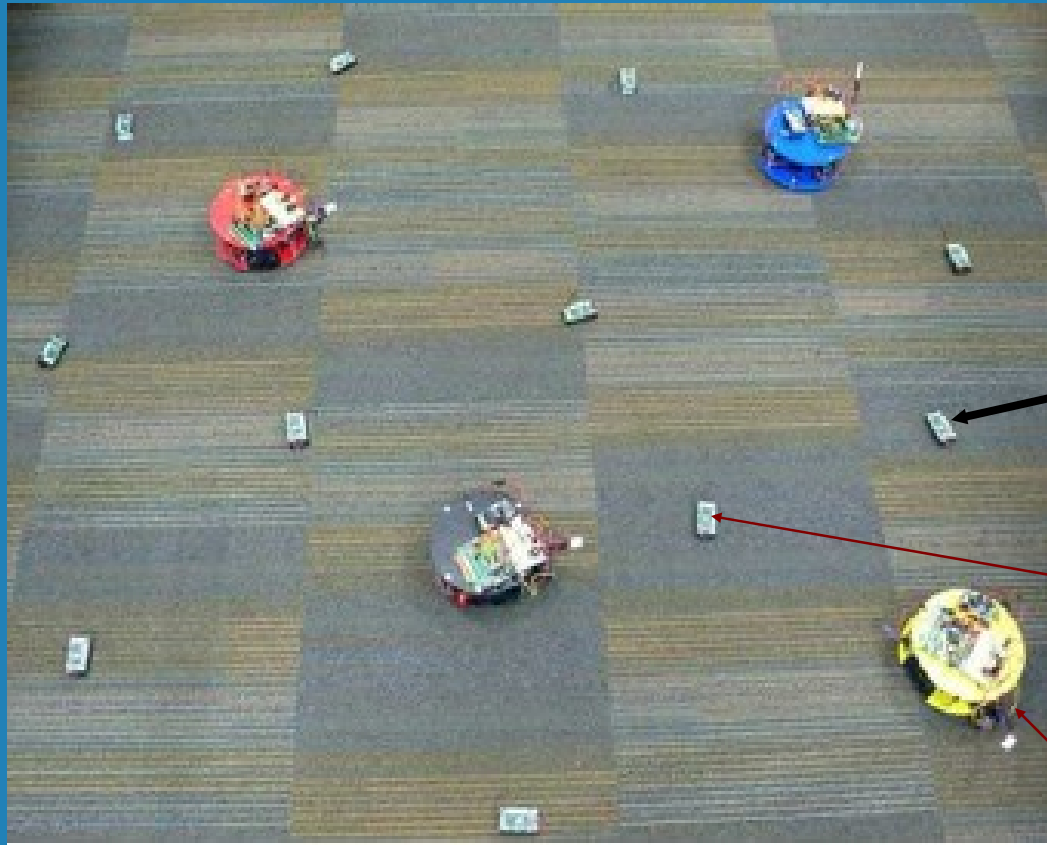
THE SENSOR RELOCATION DESIGN



Distributed Cascaded Sensor Relocation Algorithm



PROTOTYPE AND IMPLEMENTATION



Display

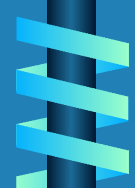


Relocation Request

Static Node

Mobile Node

The prototype



PROTOTYPE AND IMPLEMENTATION

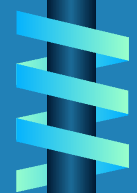
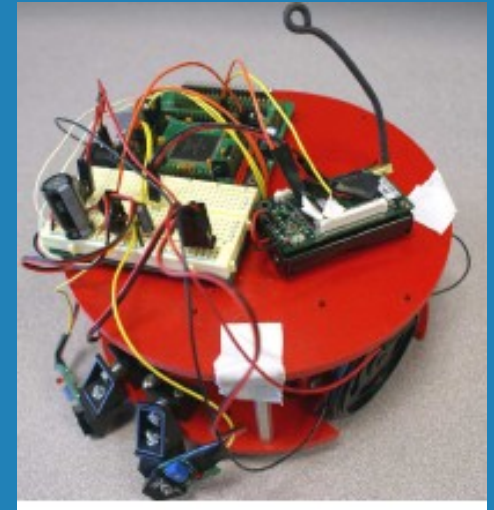


- The Hardware

- ❖ Mica2
- ❖ The hardware architecture of mobile node

- The Software

- ❖ The robot program
- ❖ The robot control program
- ❖ The sensor relocation algorithm
- ❖ Programs on the base station

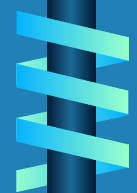


IMPLEMENTATION



To implement the sensor relocation algorithm we need two functions :-

- ❖ Neighbor Discovery
- ❖ Network Reconfiguration

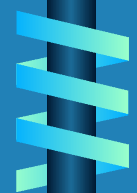


EXPERIMENTAL EVALUATIONS



Comparison of two schemes *Cascaded movement* and *Direct movement* in terms:

- ❖ moving distance.
- ❖ Energy consumption
- ❖ Recovery time.
- ❖ Message complexity.



Thank You!



Questions

