Challenges for Sensornet Programming

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Zhao-Guibas taxonomy

Sensornet software design methodologies & platforms

- Node-level platforms
  - TinyOS
  - nesC
  - TinyGALS
  - Maté
  - VM*
  - SNACK
  - Gratis
  - Simulators
    - TOSSIM
    - Prowler
    - RMASE

- State-centric platforms / collaboration group
  - Geographically constrained
    - Geocasting
    - GEAR
    - EnviroTrack
  - Topology-based
    - Hood
    - Abstract region
  - Publish-subscribe
    - Directed diffusion
    - Agilla
  - Acquaintance
    - RoamHBA (coordinating mobile agents)
Zhao-Guibas taxonomy ++

Sensornet software design methodologies & platforms

Node-level platforms

State-centric platforms / collaboration group

Macroprogramming

- TinyDB
- Cougar
- Regiment
- Kairos
Observations

• Time and location information are important for sensor network applications, but identities of nodes that generate data are not
• Significant progress has been made in sensornet programming, especially for some applications (e.g., querying sensors for data)
• Apparent tradeoffs among abstraction level, expressiveness, and efficiency of programming platforms
• → domain-specific programming platforms?
Challenges

• Scalability
  – How well does the program perform for a large (say 10k-node) sensor net?
  – Support for heterogeneous sensor net

• Dynamics of sensor networks
  – Nodes that “come and go”
  – How to develop robust programs?

• Tradeoffs among resource usage, reliability, system lifetime, security, costs, ...
  – TinyDB (adjusting sampling frequency based on system lifetime) and abstract region (accuracy vs resource usage)

• Quality of service