Data-Centric Active Querying in Sensor Networks: The ACQUIRE Project

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NOSS PI Meeting, October 18, 2004
Motivation

- Querying is a fundamental operation in wireless sensor networks (WSN)
- Project Goal: develop techniques for query resolution and efficient information discovery in WSN
Active Querying

• Basic Idea: query entities which move efficiently through the network actively “hunting” for the desired information.

• Research Issues:
  – Framework and algorithms
  – query guidance
  – performance analysis and parameter optimization
  – adaptation and multi-threading
  – validation and testing
Preliminary Work: ACQUIRE

- An active query forwarding mechanism that provides a look-ahead parameter $d$ to tune between the extremes of flooding and trajectory-based querying. Caching is allowed at the intermediate steps.

\[ E_{\text{avg}} \approx \frac{\hat{\sigma}}{f(d)}(c(f(d) + g(d)) + 2d) \]

Preliminary Work: RUGGED

- Technique for routing based on fingerprint gradients in sensor networks, i.e. using information about spatial pattern of physical phenomena.

- Single and multi-path probabilistic forwarding

Expected Contributions

- Development of network primitives for active querying that can serve as “building blocks” for a wide range of applications

- Insights into performance and design tradeoffs through a combination of mathematical analysis, simulation and experiments