

## Sensornet Research Opportunities in GENI and FIND

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1

## Background

- GENI
  - **G**lobal **E**nvironment for **N**etwork **I**nnovations
  - infrastructure to enable network research
- FIND
  - **F**uture **I**nternet **D**esign
  - research program future Internet architectures

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2

### Sensornets and the Internet? (view from Internet researchers)

possibly many independent sensornets

**doesn't face how sensornets and internet could interact**

sensornet is basically a peripheral

- lambda / all optical
- overlay networks
- peer-to-peer structures
- new security arch.
- etc.

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3

### Sensornets and the Internet? (view from Sensornet researchers)

**Sensor Net Architecture**  
[Culler, Stoica, et al.]  
*innovation:* MAC-like SP as the waist of the architecture

**Tenet Architecture**  
[Govindan, Estrin, et al.]  
*innovation:* mix 32-bit nodes into 8-bit cloud

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4

### Richer Interaction Between Sensornets and The Internet

- **Internet-side** of sensornets and the Internet
- **federated** sensornets
- **wired** and hybrid sensornets

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5

## GENI and Sensornets

- goal of GENI: provide infrastructure to answer these questions
- sensornet sub-committee of GENI wireless planning group
  - D. Estrin, R. Govindan, J. Heidemann, M. Welch
  - wireless group co-chairs: M. Gerla, D. Raychauduri
- several proposed deployments
- looking for feedback on options

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6


### GENI Sensornet Deployments: trade scale, repeatability, sensing

- **testbed: like Emulab or ORBIT**
  - support repeatable experiments
- **urban mesh: available, programmable, wireless coverage**
  - support in-situ experiments
- **kits: standard platforms**
  - bring GENI into your lab
  - and your data to GENI

100s of nodes, very controlled, simulated sensing

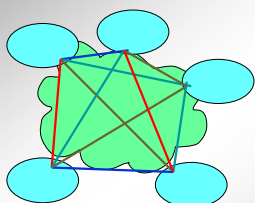
100s of nodes, less controlled, real-world sensing

fewer nodes per lab, control up to you, supports many/different sensing applications




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### FIND: New Internet Technologies and Sensornets

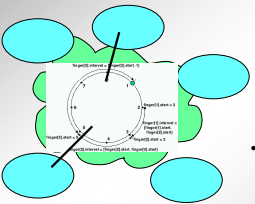


- new Internet technologies
  - ubiquitous, very high bandwidth optical
  - peer-to-peer technologies
  - overlay networks
  - new security architectures
  - delay-tolerant networks
- how do each of these interact with sensornets?




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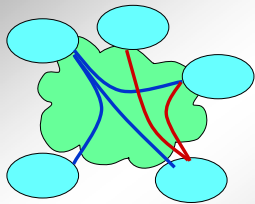


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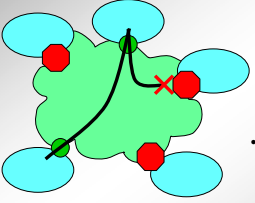


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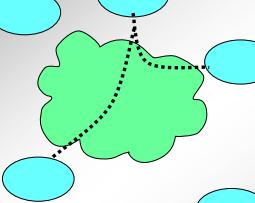


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## New Research: Sensor-Internet Sharing and Search (SISS)

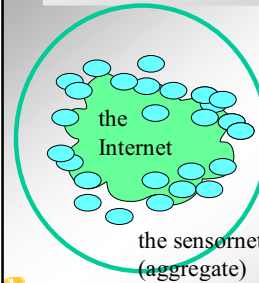
- PIs: John Heidemann (USC), Mark Hansen, Junghoo Cho (UCLA)
- goal: understand how sensornets change Internet architecture
- motivations: federated sensornets and *slogging*
  - connecting some or many sensors via the Internet



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15

## Slogging: Sensor Blogging



- what if there were *millions* of *collaborating* sensornets
    - the sensornet equivalent of blogging
    - each mini-sensor net run by a “citizen-scientist”
- [due to Mark Hansen, keynote talk at SIAM Conf. on Data Mining, 2005]



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16

## SISS Research Questions

- standard protocols to exchange sensor data?
  - both over wireless nets *and* the Internet
- sample building blocks
  - gateway software, storage sites, search engines
- manage data quality?
  - especially naïve and malicious users
- manage data privacy?
  - especially with 1000s of slogs and naïve users
- can we create a blog-like feedback loop
  - data fostering more data, self-selection and editing



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17

## More Information

- <http://www.isi.edu/ilense>
- <http://sensorbase.org>
- <http://www.geni.net>



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18