CENS Center for Embedded Networked Sensing

PARTISAN

Towards an Architecture for Participatory Sensing

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Introduction

What is participatory sensing?

- **'Human-in-the-loop' distributed data collection that leverages the installed base of mobile devices and wireless infrastructure.**
- **Considers bottom-up, grassroots experimental design, data gathering, analysis and publishing of results.**
- **Operates at personal, social, and urban scales.**
  - Applications draw on sensed information about people, objects, and physical spaces.

How is Partisan different?

- **Network support for these decentralized apps**
  - Sensors are typically not controlled by a central authority. Instead they are owned by users or groups.
  - Network architecture contributes credibility, privacy protection, and services to support decentralized approach.
- **Leverages deployed base of multi-use devices**
  - Consider cell phones, wireless cameras, etc. in lieu of motes
  - Different sensing emphasis: Location, video, and audio are vital because of device types and application requirements.

Themes and Challenges

Challenges with Partisan

- How do you find sensors?
- How do components interact?
- How do we increase the credibility of data?
- Can quality and quantity of data be managed?
- How do you store and search gathered data?
- What tools are needed for authoring and development?
- How can analysis and visualization of information occur?

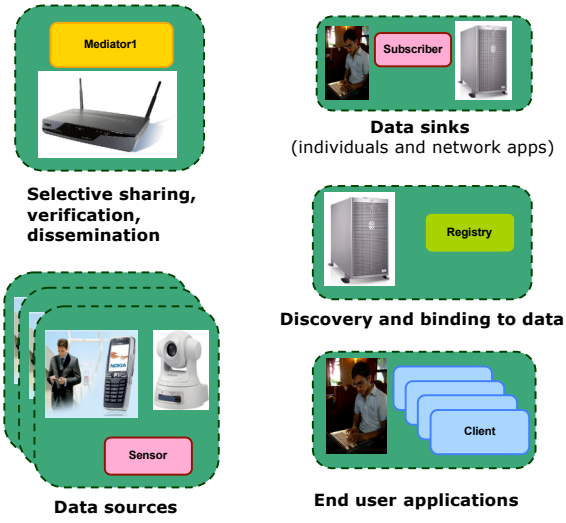
… and how do you do all of this with multipurpose mobile devices and the widest possible cross-section of users?

Themes draw from sensornets and internets.

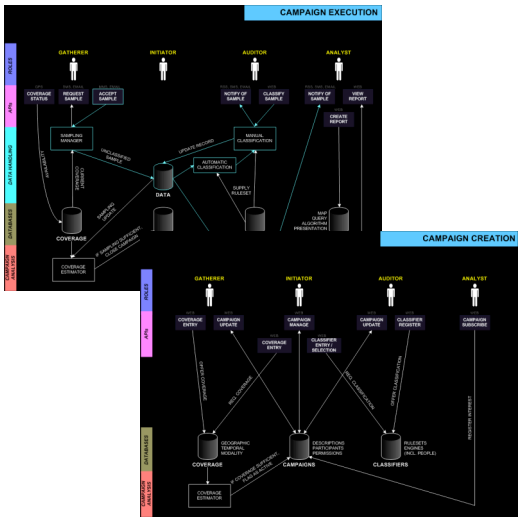
- **System needs and opportunities**
  - **Multiscale** sensing and actuation … to achieve **Coverage**
  - **In-network processing** … to support **Privacy, Credibility**.
  - **Analysis and Visualization** … to enable **Discovery**.
- **Architectural elements and interfaces**
  - **Sensor** : Observe, capture, forward.
  - **Network**: Name, verify, tag with context.
  - **Fabric**: Filter, search, store, disseminate.
  - **Application**: Explore, task, re-present.

Solutions, Designs, and Applications

Partisan Architecture Components



Campaign Application Model



Application Opportunities

- **Urban Planning**
  - Grand Intervention, "Urban Planning Requires Direct Civic Engagement by Diverse and Disparate Communities"
- **Natural Resource Management**
  - ecoPDA, "Fallen Fruit", CBNRM
- **Public Health**
  - Body Sensor Networks
  - Community Health Initiatives
- **Cultural Identity and Creative Expression**
  - Mapping LA, Murmur Project