

## World-Sensor-Web'2006 (WSW'2006) Discussion Topics

Mobile Device Centric Sensor  
Networks and Applications

A one-day workshop at the SenSys'2006 conference

<http://www.sensorplanet.org/wsw2006/>

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Minutes taken by Deborah Estrin (UCLA)

- Architecture
  - Various models influence us: cellular, Internet, mote clouds
  - Model for Interaction between mobile and fixed/low power sensors (do motes always have dedicated GW or is it straight to any mobile device)
  - Processing model (between backend and in situ sensors)
  - Storage model
  - Administrative/Ownership boundaries: what sorts of boundaries are likely to evolve here (diff for fixed and mobile)
  - Where are the critical resources (BW? Energy? \$\$ for airtime?? Fixed sensor resources??)
  - Where is the narrow waist
  - P2P has play at application level (user interaction)
  - Client server has more play at lower levels between heterogeneous devices
  - Too early to say more about this now
- Useful driving apps
  - Characteristics: people, mobile
  - Nike shoe
  - Sensor network for identified human needs:
    - Residential and commercial management
    - health care
    - automotive apps
  - Balance between evangelism and finding apps that
  - Look for applications where there is a useful control feedback loop and adaptation that can be built upon the sensory input
  - Collect location and mobility data for mobi\*/ubi\* researchers (how does this complement what providers already have?)
- Interface transparency (Weiser's vision) and how different visions fit different application types
  - Ubicom, pervasive computing model
  - The interface issue wrt these systems...for people centric apps cant do much with clumsy interfaces...cant get started (which is why the cell phone is such an enabler)
  - Interfaces and configuration are central to both ubicom and these applications
  - But where does this fall between large, long ubicom literature

- Ubicom works hard to abstract away physical details (high level learning and control)....So perhaps we contribute most by focusing on sensing, physical applications instead of traditional ubicom apps where the goal is to abstract away
    - Nagware issue!!!!!! Can we build participatory sensing systems that will be used
- Intriguing driving technology capabilities and challenges
  - Data quality characterization for source and inferred data (see DB community)
- Things that could help dissemination
  - Regular and simple interface to the user will facilitate adoption
  - Standardize interfaces to make it easier to write applications
  - IETF IPv6 for low power devices.
  - Standardized storage, search, discovery so that people start to benefit of network effect across originally disparate applications
- Sensing (Acoustic, Image, Person-Individual sensing, Other)
  - Any sensing modality is boring in the absence of a question and motivation to measure it
  - Location
  - Fusion of in situ data with other data sources to make the in situ measurements more meaningful, information rich
- Experimental methodology questions
  - Since we use cellular infrastructure how do you get access to all the measurement data you need
  - Need data
  - Ground truth for any experiments
- Incentive issues for participation: opt-in, user hassle
  - There is a potential positive feedback effect that happens as people adopt and engage in the technology
  - Frequent flier model
- Privacy/Selective Sharing
- Authoring of applications, interaction, selective sharing
- Interaction with static sensors (powered and low power)
- Policies, Potential for misuse

- Location
- Radio/Connectivity
  - Cellular vs. low power radio technologies for personal sensing apps.

### How to make progress

- What sort of common infrastructure or common objectives would help
- Encourage more experimental data publication in academic conferences to incentive GOOD quality data collection and description. Would help us spend more time maturing systems and improve available data.
- Sharing best practices (e.g. mobility models, comparisons)
- Grand challenge: End to end measurable challenge such as measure traffic density in Manhattan to inform both cyclists
- A 1000 node scale sensing system that REAL users can program to their data needs—its probably not equivalent to a query over an existing set of sensor streams
  - What sorts of sensor samples are useful building blocks (raw images or acoustic samples? Histograms? Averages over what? Location tagged/filtered samples)
  - What tasking primitives are relevant (map mashups, triggered sensing)
  - Needs to consider the selective sharing, intermittent connectivity and other issues associated with the lack of control that the “user” has over the point data collection
  - Candidates for useful driving applications:
    - Traffic (people navigating in the presence of it....)
    - Think of N parameters that users might want to build on to create applications
    - Introduce a metric for the richness of live (relatively real time....interactive time) applications that have been built.
    - Baseline/metrics can help to keep people focused
    - Process for getting to it: Talk to urban planners???
    - Focus on inputs to processes that have a broader range of applicability and not as specific/narrow as Nike shoe
    - Talk to non technologists to
    - Focus on local applications (e.g. focus on the campus) and shorter range technologies might play.
    - Create an encouraging? (does that have to be competitive??) environment to have people showcase their ideas.
- Strategy of lots of data collection to support study