Technical Innovation Needed

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http://www.cs.virginia.edu/wsn/medical/
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Panelists

- Jack Stankovic, UVA
- Mani Srivastava, UCLA
- Anind Dey, CMU

Discussion Questions

- What are the key open (technical) research questions for sensing, actuation, and system-integration to support aging in place?

- What are the limits of current technolgy?

True Research Partnership

- Technical solutions informed by real medical problems
- Research on two levels
- Not a service!!!!

Two Issues

- Requirements
- Realisms

Requirements

- Accuracy requirement for detecting ADLs?
- We don't know!
  - Accuracy on toilet visits to detect prostrate problems?
  - Accuracy on quality of sleep to detect insomnia and/or contribute to detection of depression?
- Current: accurate as possible

Realisms

- Humans and their behaviors are not simple
  - Example: Sleep
- Environments are not simple
  - Example: Acoustics

Realities – Sounds Encountered

Physiological: Sneezing, nose blowing, sniffling, clearing throat, hiccup, eating, burp, humming, laughter, drinking, snoring

Objects: phone vibrating or ringing, typing, mouse wheel, unwrapping food, papers rustling, clothes rustling, television, piano, moving furniture, doors opening and closing, objects dropping or moving, footsteps, pouring liquid, coffee percolation, dishwasher, cleaning sounds

Ambient: truck backing up, siren, birds chirping, passing airplane, traffic, motorized tools (lawnmower, etc)

Main Point

- Many current solutions work ONLY when humans and environments are (assumed to be) *very constrained*

Realisms

- Activity Recognition (AR) of ADLs
  - Higher accuracy required
  - Overlapped activities
  - Across room activities
  - Many realities (missing data) ….

Main Point

- Normal behavior is very complex
  - Per day
  - On Wednesdays
  - Two times per week
  - Every other month
  - In summer when condition X exists
  - Grouping of activities
  - Context dependent
  - …

Too Many False Alarms

- Semantic Anomaly Detection
  - Sensor Level Anomalies
  - Activity Level Anomalies
    - Point
    - Context
    - Collective
  - Semantics