Context-aware Resource Sharing for People-centric Sensing

Jorge Vallejos\textsuperscript{1}, Matthias Stevens\textsuperscript{1,2}, Ellie D’Hondt\textsuperscript{1}, Nicolas Maisonneuve\textsuperscript{3}, Wolfgang De Meuter\textsuperscript{1}, Theo D’Hondt\textsuperscript{1}, Luc Steels\textsuperscript{2,3}

\textsuperscript{1}Software Languages Lab, VUB
\textsuperscript{2}Artificial Intelligence Lab, VUB
\textsuperscript{3}Sony Computer Science Lab Paris
Motivation

Research into new communication paradigms that empower communities to raise awareness of environmental issues and support community action
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- Ever more popular and cheaper smartphones
- User-generated content
- Growing interest for environmental issues
People-centric Sensing

• **Higher granularity**: use of mobile technology (as opposed to fixed infrastructure)

• **People-centric exposure**: People actively involved in the pollution monitoring process

• **Added semantics**: Data qualification for improved quality and quantity
NoiseTube [Maisonneuve et al, 09]

Hands-on project for monitoring and mapping noise pollution

- Realtime loudness algorithm: mobile phones as noise sensors
- GPS-based Location
- Tagging interface to add context information to the data (e.g. time, noise source, annoyance level)
NoiseTube [Maisonneuve et al, 09]

Realtime visualisation on mobile phones (e.g. risk level) and web-based visualisation

Implemented in Java (J2ME CLDC/MIDP), mainly tested on Nokia N95 8GB smart phone. Data submission to server over GPRS/3G
Sensing constrained to local (mobile phone's) resources
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Use of environmental resources
Context-aware Resource Sharing

Sensing constrained to local (mobile phone’s) resources

Use of environmental resources

Context-aware resource sharing for people-centric sensing
Context-aware Resource Sharing

- Zero infrastructure
- Volatile connections
- Resource diversity

Use of environmental resources
Programming Languages for Context-aware Systems

- Decentralised service discovery
- Non-blocking communication to deal with network failures
- Context-dependent behavioural adaptations
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OO scripting language
Runs on J2ME/CLDC phones

Lisp dialect
Use LispWorks
MetroSense [Campbell et al, 09]

General purpose architecture for public sensing

- **Network symbiosis**: Sensor networks can use existing network resources e.g. communication, routing, security

- **Asymmetric design**: Take advantage of resource available at other nodes

- **Scoped interactions**
Why new languages?

- To minimize accidental complexity
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Essential complexity is inherent and unavoidable, accidental complexity is caused by the approach chosen to solve the problem.

Case Study

• Currently working on a case study in Brussels Region [D’Hondt, 09]

• Generalisation of NoiseTube for studying atmospheric pollution and urban microclimates
NoiseTube


Community memories for sustainable urban living


AmbientTalk


Lambic


MetroSense