

Context-aware Resource Sharing for People-centric Sensing

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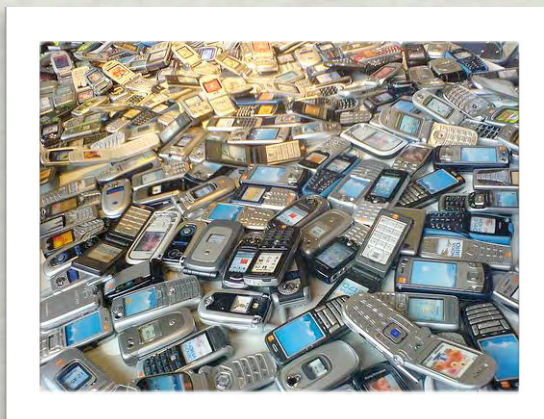
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Motivation

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 smart phones



User-generated content



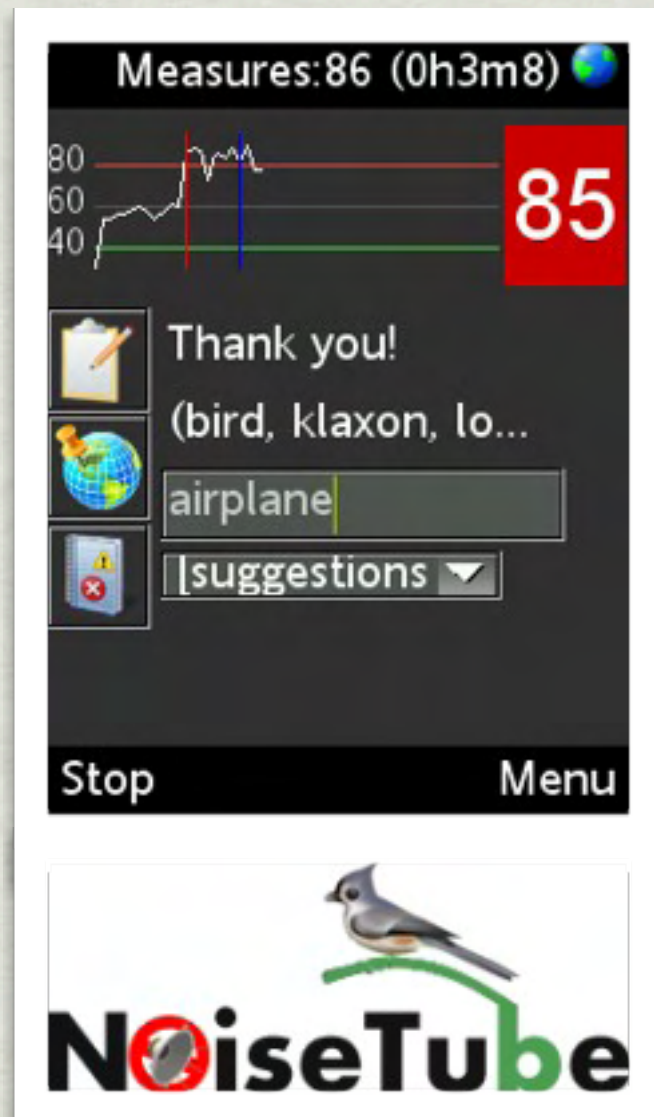
Growing interest for environmental issues

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]

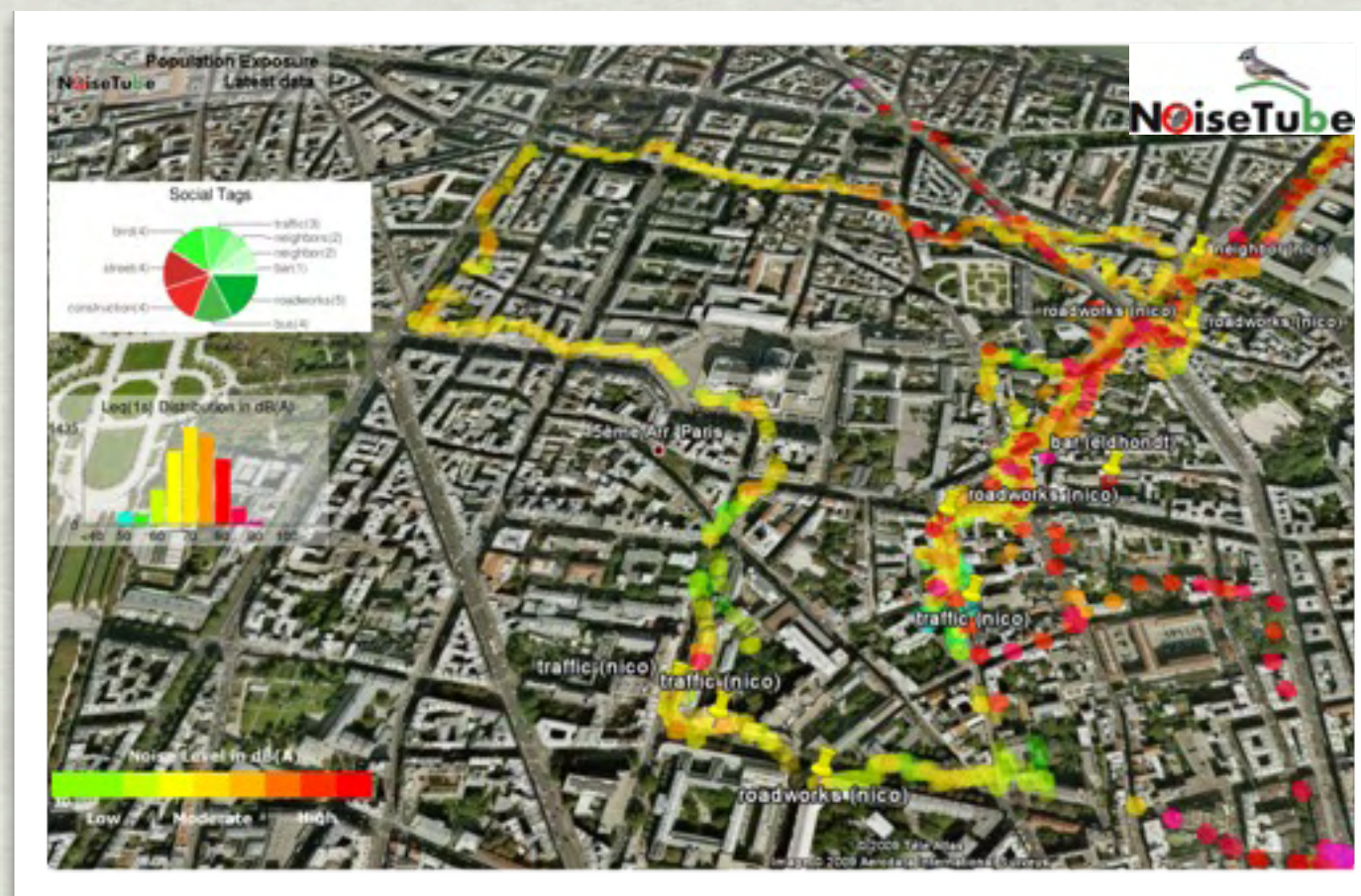
Hands-on project for monitoring and mapping noise pollution



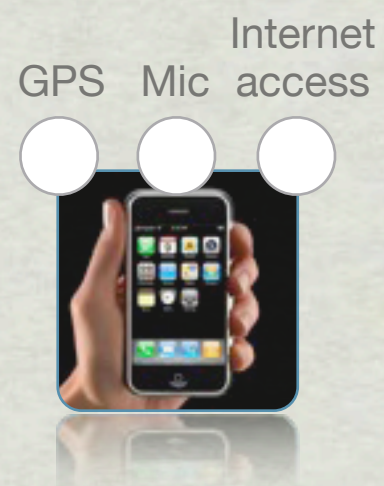
- Realtime loudness algorithm: mobile phones as **noise** sensors
- GPS-based **Location**
- **Tagging** interface to add context information to the data (e.g. time, noise source, annoyance level)

NoiseTube [Maisonneuve et al, 09]

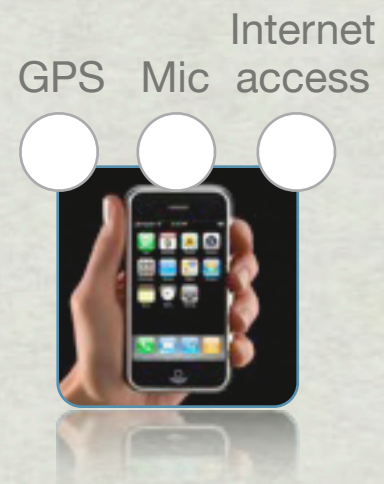
Realtime visualisation on mobile phones (e.g. risk level) and web-based visualisation



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

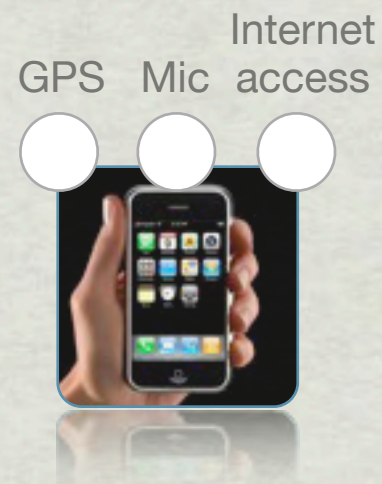


Sensing constrained to local
(mobile phone's) resources



Use of environmental resources

Context-aware Resource Sharing



Sensing constrained to local
(mobile phone's) resources



Use of environmental resources

Context-aware Resource Sharing

- Zero infrastructure
- Volatile connections
- Resource diversity



Use of environmental resources

Programming Languages for Context-aware Systems

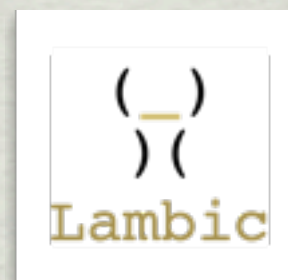
- Decentralised service discovery
- Non-blocking communication to deal with network failures
- Context-dependent behavioural adaptations

Programming Languages for Context-aware Systems

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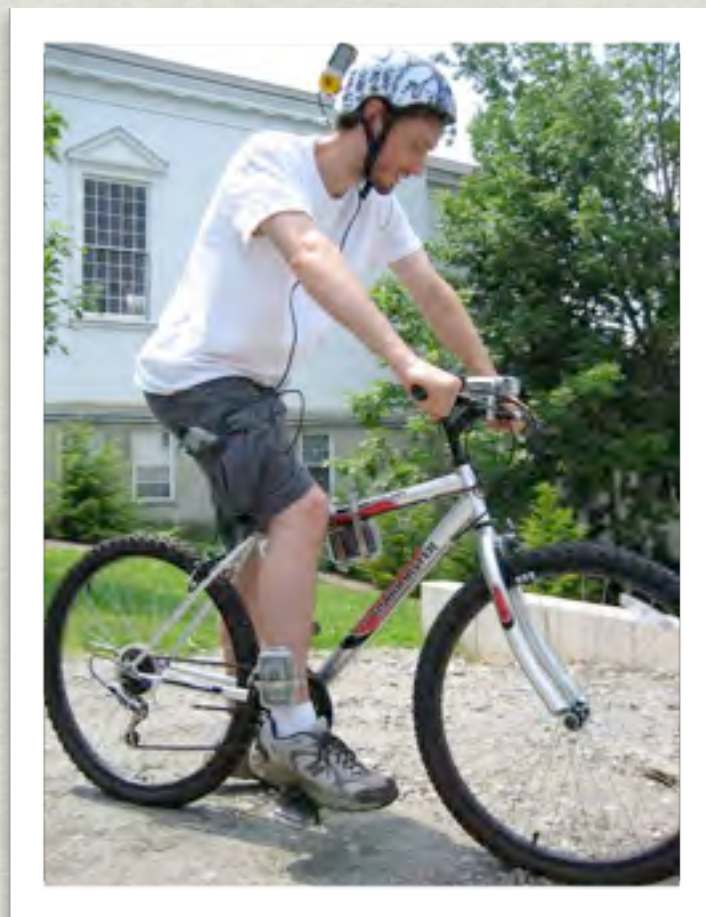
OO scripting language
Runs on J2ME/CLDC
phones



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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- To minimize accidental complexity



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

“No Silver Bullet - Essence and Accidents of Software Engineering”
(F. Brooks, 1986)

Case Study

- Currently working on a case study in **Brussels Region**^[D'Hondt, 09]
- Generalisation of NoiseTube for studying atmospheric pollution and urban microclimates



References

NoiseTube

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MetroSense

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