Urban deployment of Bluetooth

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Joint Master’s in HCI
4 new faculty to drive the collaboration
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Make Madeira the best HCI lab in Europe
Overview

- Motivation
- Deployment of Bluetooth
- Findings
- Facebook
Motivation
Design for the Desktop

- Memory
- Attention
- Recognition
- Motor skills
- Fitt’s law, GOMS, +/-5 items, etc.
What’s different

- People move => mobility
- People interact => sociability
Aim

• Design tools, methods, principles for pervasive computing

• Taking a *systemic* view of the city

• People, spaces, technology
Approach

- Establish the “ground truth” about cities
- Passive observation and monitoring
- Develop systemic measures
  - mobility & sociability
- Relate to design
Outline

- Data capturing
- Juicy Lucy
- Bluetooth CSI
- Social nets & viruses
- Facebook
Data capturing
Bluetooth & Graffiti
a.k.a. “Juicy Lucie”
Han waz ere '06.

Rosie was ere '06.

A groovy wa

Sixty Rocky

George's

Laura was ere '06.
Do you ever send stuff?
(Bluetooth honeypots)

- Bluetooth honeypot
- Various names
- Various device classes

- Are you the girl in the corner! :o)
Do you receive stuff? (BlueSpamming)

- Hypothesis: name of sender affects recipient’s reaction
- Issues in automating this process
- Protocol behaviour, user prompts
What is your Bluetooth name?

- Name-changing patterns
- Data is too noisy
- Intentional categories
  - Sexual, greeting, invitation, insult
- Lexical categories
  - Default, custom,
  - Identifiers, associations, t-shirt, graffiti
Early morning, November 29, 2006

TEENAGER FIGHTS FOR LIFE AFTER FALL

11:16 - 30 November 2006

Detectives have launched an investigation after a teenager fell from the top of a four-storey city centre building. The 18-year-old was last night fighting for his life in hospital after he apparently fell from the roof of Caffe Nero in the High Street.

Policemen were called at 1am yesterday following reports that a man had plunged from the roof.

The student was taken to the Royal United Hospital in Bath with serious head injuries.

His condition was described as critical but stable.

Detectives are now investigating the circumstances surrounding the fall.

Another 18-year-old man, who is also believed to be a student, has been arrested in connection with the incident and was yesterday in custody at Bath Police Station.

Staff arriving at Caffe Nero to open up yesterday morning found it sealed off with police officers and firefighters inside.

The front of the shop remained sealed off until 1pm yesterday, but it remained open for business as customers were able to enter through a side door.

Anyone who witnessed the incident or has any information is urged to call Bath CID on 0845 4657000 or Crimestoppers anonymously on 0800 555111.
Results

- Identify “suspects”
- Taxi driver
- Cleaner/security guard
- One-off visitor
- Return to the scene of the crime
Searching for patterns
Pattern 1: usage
Gatecounts
Bluetooth visibility

• Around 7.5% of observed pedestrians had discoverable Bluetooth devices
Pattern 2: flow
Gatecount timelines
Pattern 3: temporal
Dynamic properties

- Our data is not static
- 3D structure
- Chain of events
$y = x^a$
Chain of events

- John, Mary,  14:20:30
- John, Paul,  14:20:32
- Mary, Nick,  14:20:33
- ...
Emulation

- Class "device"
- Class "virus"
- During encounter, virus is transmitted
- Device recovers (SIS) or dies (SIR)
Pattern 4: spatial
Power laws and exponential decays
People with Bluetooth devices bumping into each other (shopping, school, work)

Cityware nodes record & upload data

Cityware servers analyse data

Facebook application presents data

Users' social network grows
Cityware for Facebook

- US
  - MIT
  - Stanford
  - Boston
  - Urbana-Champaign
  - Michigan
  - Portland
  - Oklahoma
  - New York
  - Ohio
- UK
  - Cambridge
- Oxford
- Cambridge
- Oxford
- Nottingham
- Lancaster
- Warwick
- Bristol
- Manchester
- Melbourne
- Bremen
- Cairo
- Iceland
Conclusion

- Establish a *systemic* view of ubiquitous systems (people, space, technology)
- Identify “ground truth”, patterns
  - Usage, flows, temporal, spatial
- Ongoing work: relate patterns to design
Thank you

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http :// www. cityware. org. uk
Physical phishing

In-situ Wifi phishing. How can we induce trust in users of wifi hotspots?
Little bird

Mobile phone detects nearby people. Looks up their Facebook profiles and notifies the user of upcoming events, wall posts, etc.
A common activity between people who just met is the establishment of common ground: identifying people they know in common, or memberships they have in common. We built an application to enhance this process.

Using NFC-enabled Nokia phones, our system notifies users of common acquaintances simply by touching each other’s phone.
Tilt the maze

Good design principles suggest that feedback should be given at the point of interaction. Does this apply to tangible interfaces?

We explored different feedback mechanisms with a “tilt the maze” game. Using a tablet pc and tilt sensor we tested a tilt-board maze game using a plasma display (top), mouse (bottom left), and tangible interface (bottom right).
Is information feedback enough to enhance performance? How can a system motivate its users?

Jester is a system that helps weight lifters achieve correct posture by using tilt sensors, and motivates users by using text-to-speech.
While users take many photographs with digital cameras, few of these pictures are actually shared. Using NFC technology, we developed a system to enhance the sharing of photographs by letting users associate physical objects with friends. Thus, when a user is viewing a picture on their phone, they can touch the phone with any augmented object to send the picture to the respective recipient.

Send me a picture!
Given the options of a phonecall, SMS, or a website, which service will users prefer in order to get location-based information? We ran a treasure hunt game, where users could choose any of the three types of services to get clues. To access the services, users utilised 2D visual barcodes attached to physical artifacts.

Physical hyperlinks