Location-Aware Computing

1. Guides for cities, museums, campuses
2. Ubiquitous games
3. Graffiti systems
4. Memory/diary systems
5. Social systems

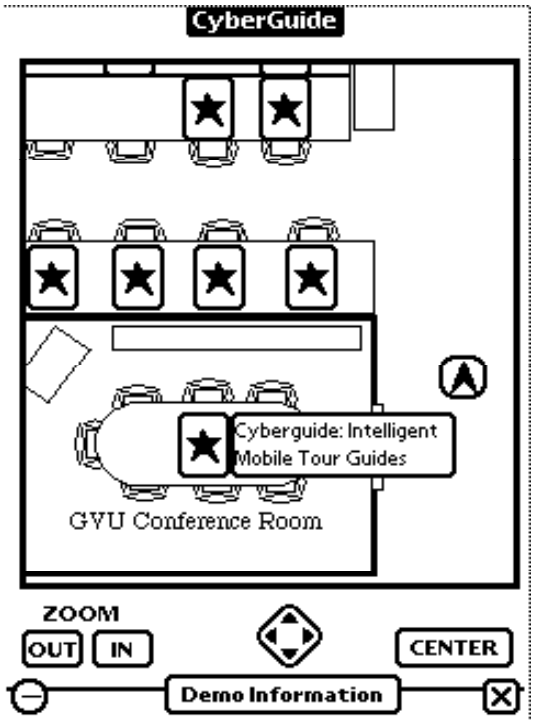
1. Location-Based Guides
Cities / Museums / Campuses

- Cyberguide
- ActiveCampus
- The guide project
- Hippie
- Websigns
- Mobile Bristol
- Savannah
- Mobile movies

CyberGuide

Georgia Institute of Technology (1996)

- A mobile hand-held context-aware tour guide
- Tracks location; orientation; usage history
- Designed as a suitable replacement for a map + information packet of the monthly open house tours
- Can use tracking logs for visitor follow-up
- http://www-static.cc.gatech.edu/fce/cyberguide/index.html



CyberGuide showed that…

- context-aware applications can be made with equipment that is readily available.
- absolute positioning information throughout an entire space is not so important.
- It is far more useful to know what someone is looking at than to know someone's exact physical position and orientation.

ActiveCampus

(UCSD, 2002-)

- An exploration of wireless location-aware computing in the university setting.
- Design Rules:
  - Infrastructure and end-user technology would build on portable standards
  - Applications serve basic HTML
  - Minimal use of client resources
  - Interfaces must be easy to grasp, even in a dynamic setting.

Active Campus Explorer

- Support location-aware IM, maps, annotations, digital graffiti.
- Make campus “transparent” – create serendipitous learning opportunities
- Support contextual and asynchronous discourse
- Geo-location by signal strengths.

The GUIDE Project

(Lancaster University, 1999)

- Designed to give tourists more flexibility
- Delivers context sensitive and dynamic Information
- Tablet PC with WiFi
- Position calculated from signal strength
- Photos used for navigation
- http://www.guide.lancs.ac.uk/

HIPPIE

(GMD, 1999)

- For use Before, During and After visit.
- Takes into account both current location and viewing history
- Provides ‘tips’ about nearby ‘tours’ that you might like.

Websigns

(HP, 2001-2003)

- Special web pages are marked with activation parameters (lat, long, range, and temporal).
- Pages are cached when user is nearby.
- GPS + direction sensed with custom hardware.

(a) (b) (c)

Figure 8. Display transition. (a) User point in a direction, sees websigns, (b) selects one websign (c) and the associated service is displayed.

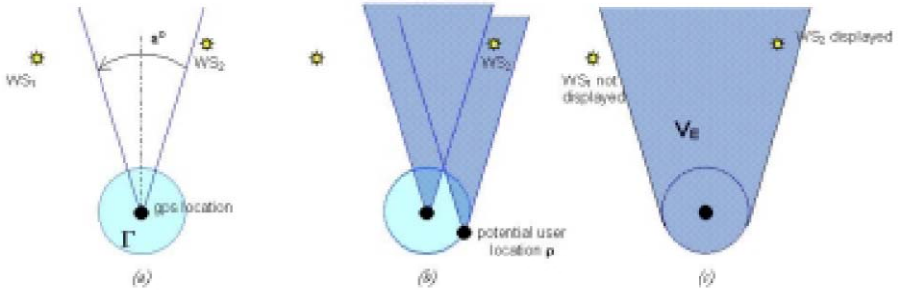


Figure 7. Extended vision. (a) Location and vision of a user as reported by gps (b) user could be anywhere in the circle of inaccuracy (c) extended vision is the union of the visions at all locations inside the circle of inaccuracy

Mobile Bristol

- Audio guide to the Bristol riot of 1831
- Visitor is guided by a desire to uncover the historical story.
- Stories are ‘logically consistent, despite ‘random’ access.
- http://www.mobilebristol.com/QueenSq.html

Figure 1: Queens Square, Bristol, England.

Figure 2: The *Riot! 1831* setup.

Savannah

(NESTA Futurelab, Mobile Bristol, BBC and MRL, 2004)

- A ‘virtual’ natural history museum

(video from website)

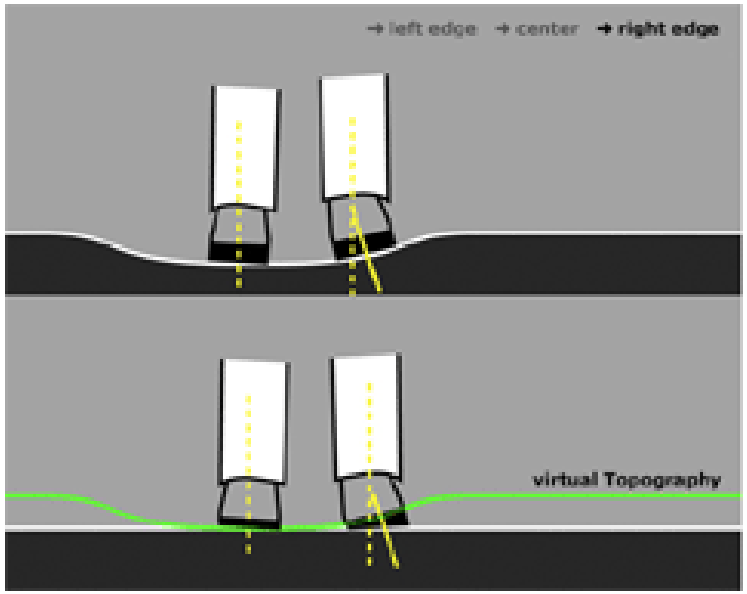
- http://www.nestafuturelab.org/showcase/savannah/savannah.htm

//MUKANA

- A wearable guide for the visually impaired.
- http://www.saumadesign.net/mukana.htm

CabBoots

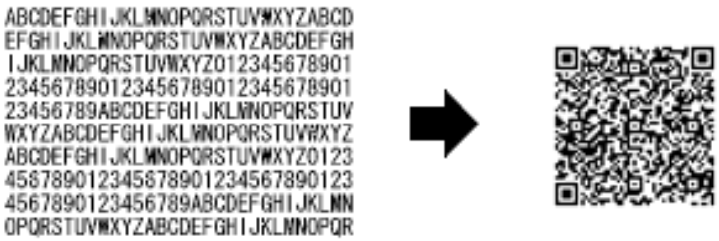
- Virtual paths can be communicated through shoes that modify their angle artificially.
- http://www.we-make-money-not-art.com/archives/007133.php



TownPocket

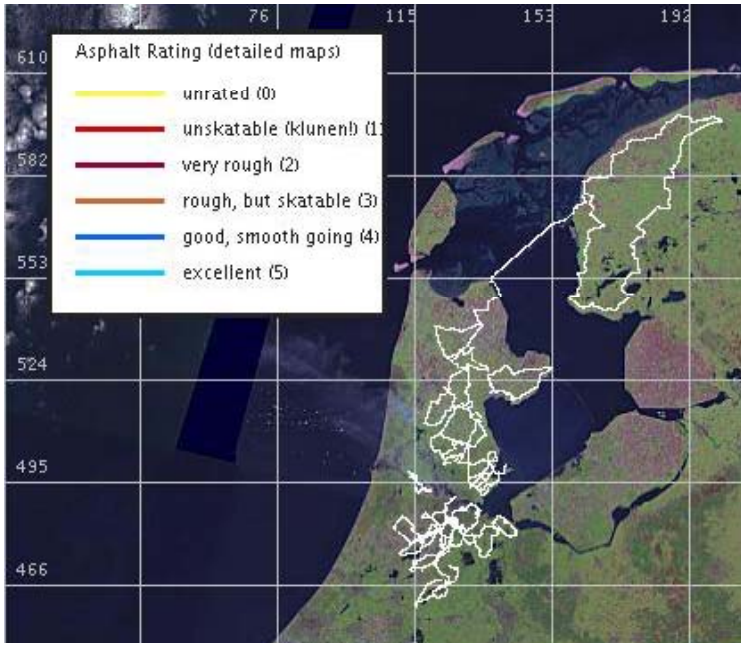
(NTT DoCoMo / TechFarm / URAHARA.ORG, 2005)

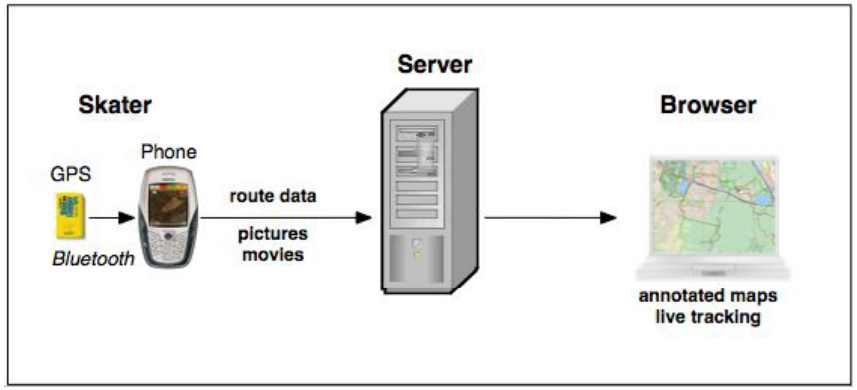
- Bookmarking of shopping locations in Harajuku, Tokyo
- Uses QR codes with cameraphones
- Customers can access info about bookmarked stores
- Stores can SMS to customers



Geoskating

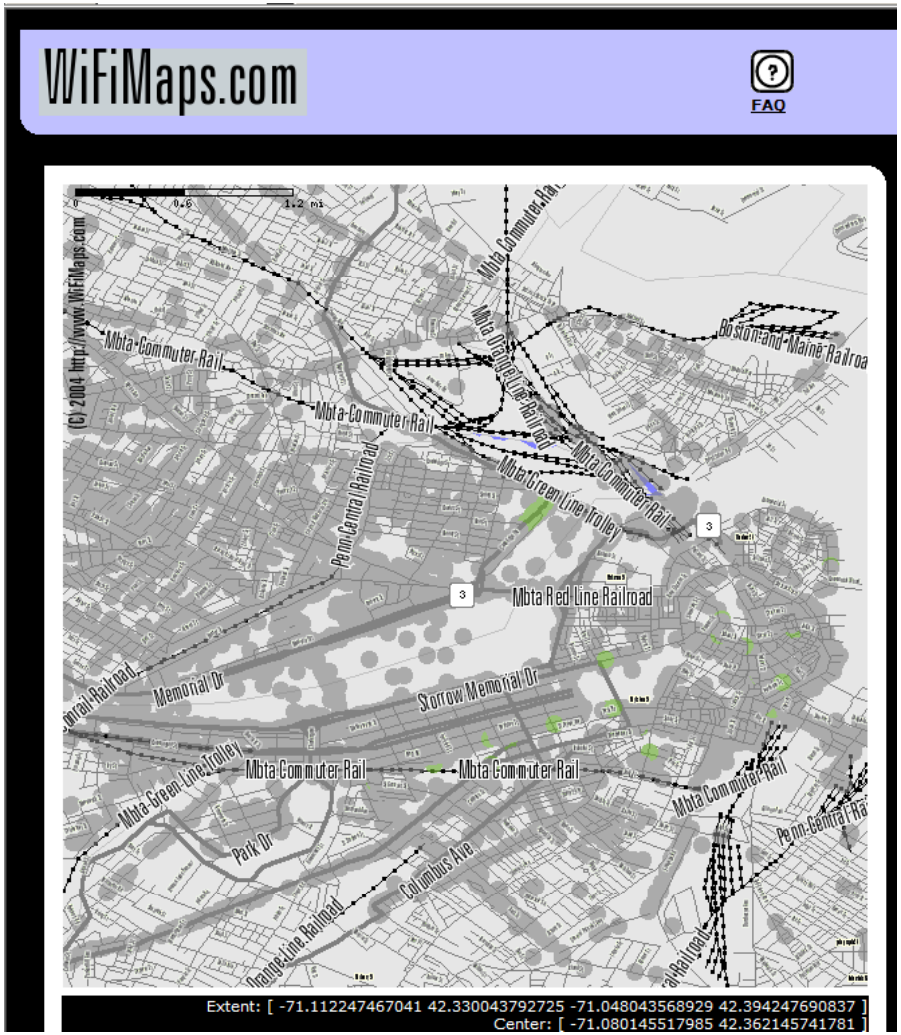
- “Ambient Authoring”
- http://www.geoskating.com/





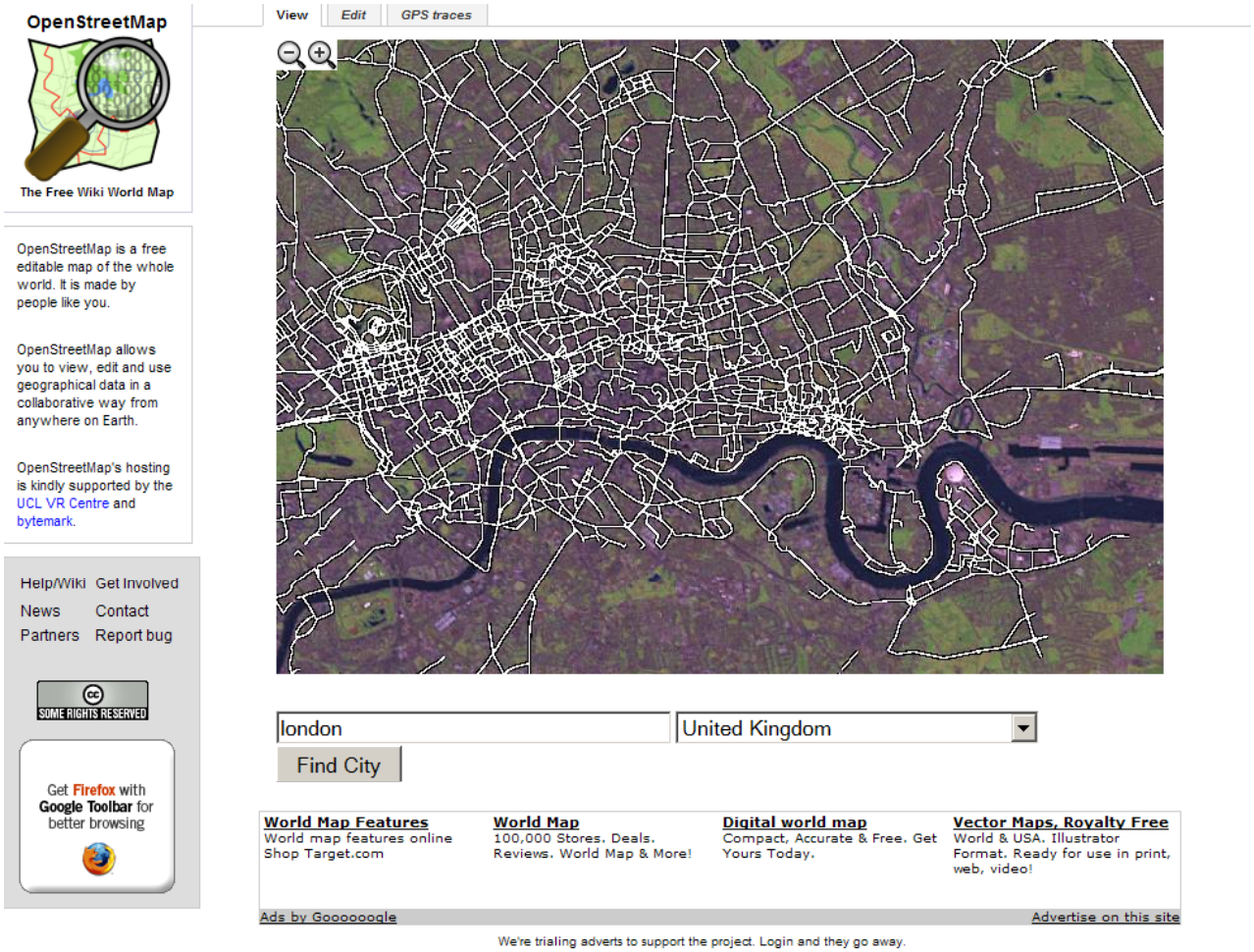
Wardriving

- Drive around the city with a GPS and a laptop.
- Automatcally logs and the wifi coverage.
- Maps created later by uploading tracking data.



Open Street Map

- Created by volunteers as they track their daily journeys
- http://www.openstreetmap.org/



Mobile Movies (Media Lab)

- http://ic.media.mit.edu/projects/M-Views/

2. Digital Graffiti Systems

- Yellow Arrow
- Semacode
- Elens
- Geonotes
- Urban Tapestries
- Parasite
- Location-based emailing

Yellow Arrow - Counts Media

- Tag a physical space using a yellow sticky arrow
- Each arrow has a code
- You can get the message associated with the arrow when you SMS the code to their service from your mobile phone.
- Video
- Yellow Arrow http://yellowarrow.net/

Semacode - Semacode Org.

- Two dimensional barcodes that encode a web address
- Mobile phone camera reads the semacodes and connects user to related web content
- Open standard
- Semacode http://semacode.org/

Semacode Ubiquity game (90s)

QuickTime™ and a
Sorenson Video 3 decompressor
are needed to see this picture.

Elens - MIT MediaLab

- Video: http://mobile.mit.edu/elens/

Geo-Notes

- Location tagged messages from PDA
- Write the notes (user driven)
- Search through the notes using content based and social filtering
- The idea is to connect to other users through Geo-Notes
- GeoNotes http://geonotes.sics.se/

Geo-Notes video (7m 19s)

QuickTime™ and a
YUV420 codec decompressor
are needed to see this picture.

Urban Tapestries - Proboscis

- Accessing and publishing location specific content wirelessly
  - Integrated WiFi, GPRS, GPS, Bluetooth
- Creating sound maps of environments and journeys
- Ephemeral content creation
  - Cooperative and accretive
- Urban tapestries http://urbantapestries.net/

Urban Tapestries video (5m 47s)

QuickTime™ and a
decompressor
are needed to see this picture.

(5 m 47 s)

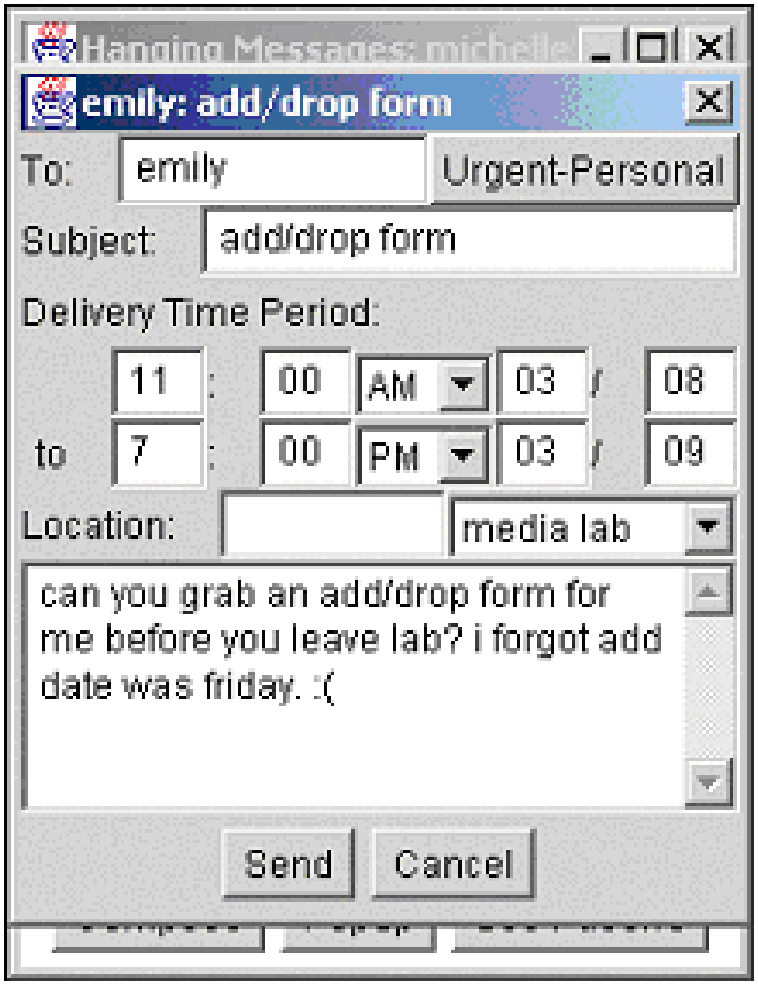
Parasite Video - G. Green (2m 58s)

QuickTime™ and a
Sorenson Video 3 decompressor
are needed to see this picture.

- http://www.gunnargreen.de

Location based emailing

Example: Hanging Messages (Chang, Medialab)



Using PDA + GPS, users can leave or receive location-based messages

3. Reminder/Memory Systems

- Forget me not
- Wearable remembrance agent
- ComMotion

Forget me Not (EuroParc)

- www.lamming.com/mik/Papers/fmn.pdf

Wearable Remembrance Agent (MIT Media Lab)

Context-specific reminders of previous notes taken (based on location, day, time of day, other people present, conversation topics, …)

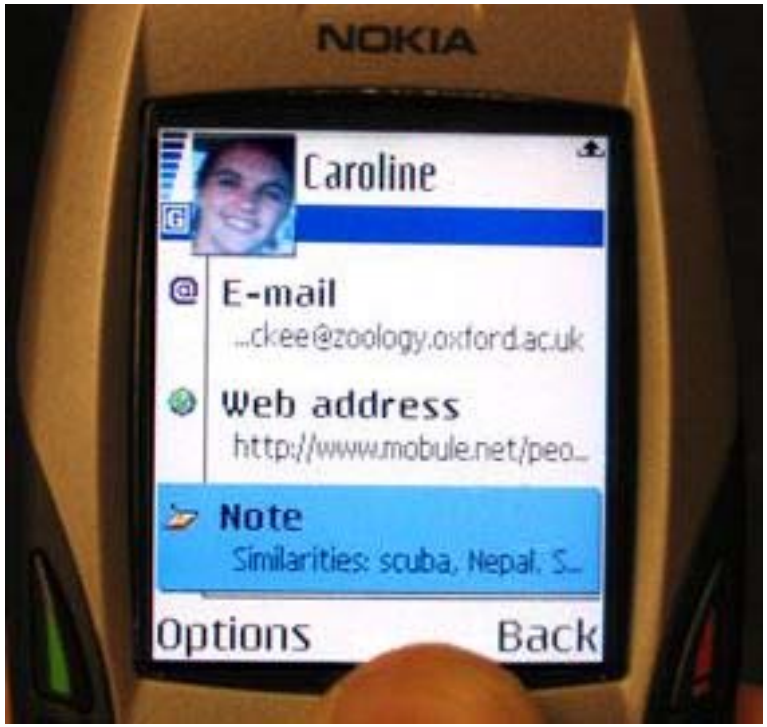
ComMotion (MIT Media Lab)

- GPS tracking
- Learns salient locations
- Reminders can be delivered at these locations

Social Systems

- Buddy location tracking -> now commercial
- Lovegetty
- Serendipity

Serendipity (Mit Media Lab)



- http://reality.media.mit.edu/serendipity.php
- Proximity & interest based introductions (conferences, dating, enterprise)

Conclusions

- Location based guiding is still a young field
- Standards and content seem to be barriers
- Content creation can be location based

- Might people be willing to give up some privacy for personal and public benefit?
  - e.g. tracking data creating street maps.