

What makes a good project?

Videos of last year's presentations

- One nearly complete (E-Play)

- One covered end-to-end solution, but didn't implement (Infinite Camera)

- One explored a critical issue (Audio visualization)

Visions of the sensor-rich, interactive environment

Technology for location sensing

Example which combines this vision of the environment with a need
Labscape (from U of Washington's Portolona "expedition")

Then let's discuss the proposals in this group and see how they are evolving...

The sensor-rich interactive environment

Paper books → interactive media players

Teenagers discard cellphones and pagers in favor of constant A/V connections for hanging out wherever they are

Note taking becomes cheap, permanent and easy
Storage is essentially free

Many aids for the driver – navigation, traffic info, collision avoidance, maintenance monitors

Products and stuff identifies itself through ID tags

All external services are speech-enabled

The Web's portals have greatly enhances search and summary aids
(The Memex is finally here)

attentive environments that recognize you and which you can query

a virtually augmented world – you can see what is behind the wall, or the path to your destination...

(these borrowed from Mitch Stein and Jim Spohrer, IEEE Computer April 2001)

are we getting there?

Dick Tracy's watch	
2way radio	1946
2way video	1966
2way datalink	1986
??????	2006

500M cellphones now in use, compared to 250M Internet users

Localization technologies

Two fundamental questions:

Where am I? (localization)

What services are available? (service discovery)

Distinctions in localization

Physical location vs symbolic or functional location

Locally computed vs location provided by the infrastructure

Absolute position vs relative position

Accuracy – distance, % of situations, object speed

Scale for which the method works

Tools:

Arrival time differences (need synch clocks)

Radio 30 m = 100 nsec

Ultrasound 0.3m = 10 usec (but effect is +- 10%)

Some examples:

Aviation

VOR system (physical, locally computed, outside)

ILS vs GCA (local vs infrastructure computing)

Collision avoidance systems (relative coordinates)

Inertial navigation (analysis of accuracy very different)

GPS, possibly augmented as in E911 systems by
cellphone infrastructure

Outside only ??

802.11-based

MS-RADAR and some products

Ultrasound-based

ATT “bats” (require ceiling receiver arrays)

Crickets

Smart floor with pressure sensors

Many presence sensors – “active badges”

For further reading,

see IEEE Computer August 2001 (and on website as Technology 5)

Expeditions and Labscape

Expeditions into the 21st century

DARPA initiative to a favored few US universities (1998-9)

Portolano -- emphasized the sensor rich environment and Pervasive Computing

Labscape – specifically addressed pervasive computing in the biotech laboratory

Three implementations to date

Mockups of sensor functions and instruments

GUI-only implementation

Put the sensors back in

See readings on the website.