

CS 160: Lecture 26

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Where is HCI going?

- What do you think?

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Some History

- The **Dynabook** (laptop computer) was conceived in 1968, well ahead of its time.
- As an interim step, Alan Kay and others developed the Xerox Alto, a computer intended for "ordinary people."
- Kay was also working on "Smalltalk" at that time – a language for children.
- Smalltalk was guided quite closely by Piaget's principles.
- The Alto had a mouse and windows but it was mostly a "text" machine.
- It also lacked a real use context and appropriate applications.

Xerox Alto



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The Star (Xerox Office Systems)

- The Star (1981 and begun in 1975) in particular was a very advanced machine. It had most of the "WIMP" elements we know today.
- The Star was the result of a special group created by Xerox to develop "Office" systems.
- The Star was the result of extensive user testing, and its design has stood the test of time.
- Many design features were better than its successors (e.g. object-oriented editing features)



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The Star's design process

- The Star design team developed a new methodology for system design:
 - Task analysis
 - Wide range of users
 - Usage scenarios
 - Decomposition of design:
 - * Display and control interface
 - * User's conceptual model
 - Many prototyping cycles
 - Desktop metaphor, direct manipulation, WYSIWYG



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Where are computers now?

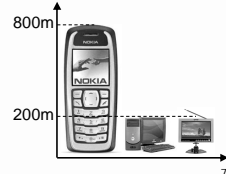
- Intel's breakdown:
 - * Office systems
 - * Home
 - * Mobile
 - * Health care
- And in non-traditional computers:
 - * Cell phones
 - * Game consoles
 - * Cable boxes / smart TVs, other smart appliances
 - * Automobiles

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Cell phones

- There are 6.5 billion people on earth
- only about 1.2 billion in "developed" countries
- They will buy 800 million mobile phones this year
- one person in eight on the planet
- That's 4x PC or TV unit sales
- Fraction of smartphones
should reach 40% by 2009
- most common "computer"

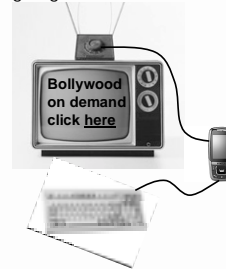


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Cell phones

- Cell phones can perform as low-end PCs, especially
for developing regions. Also for distributed
displays...



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Cell phones

- But cell phones are also mobile **sensor + multimedia**
+ **communications** platforms:
- Location sensing (GPS)
- Camera for still or video
- Audio capture or sensing
- Bluetooth (as sensor or sensor connection)

They can "know" about their surroundings, they can
learn their user's preferences, and they can
capture and share memories.

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Mobile I nterface Challenges

Did you ever try to find a neighborhood restaurant using
a mobile browser...

and find it while you were in the same neighborhood?

In a car you might end up in the next county...

Luckily a house stopped this
driver before they got into serious
trouble.



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Context-Awareness

Context-awareness is widely regarded as the holy grail for
next generation mobile applications:

- Location (e.g., video store) heavily shapes
the user's likely actions.
- The system can present streamlined
choices - "here are your top-10 video
suggestions with clickable previews".
- For users this is very convenient.
- Also for vendors...



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Context aware example

Knowledge of user background and context provide great opportunities for pro-active services:

☞ "It's 7pm and you're in San Francisco, would you like me to find a nearby restaurant?"



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Context aware example

Knowledge of user background and context provide great opportunities for pro-active services:

☞ "It's 7pm and you're in San Francisco, there is a table available two blocks away at Aqua restaurant, would you like me to book it?"



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Context aware example

Knowledge of user background and context provide great opportunities for pro-active services:

☞ "It's 7pm and you're in San Francisco, there is a table available two blocks away at Aqua restaurant, and they have a special on Salmon in parchment, would you like me to book it?"

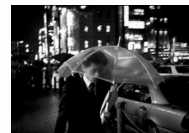


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Context aware example

How much do you think the restaurant might be willing to pay me to receive that message?



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Speech recognition example

Consider now a speech recognizing version of this application:

☞ "It's 7pm and you're in San Francisco, there is a table available two blocks away at Aqua, and they have a special on Salmon in parchment for \$28. Would you like me to book a table, and order the special?"

User: Yes or No



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So what is context?

Much of the work on context-awareness considers only "immediate context":

- ☞ Information that can be sensed or is available where the user is, e.g.
 - * Time
 - * Location
 - * Who is the user, who else is there
 - * What is the user doing

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So what is context?

A deeper notion is all the information that allows a system to **perform an action the user would want**.

In other words to predict a desired outcome from available information. The full scope of that information is:

- ▣ **Immediate** context
- ▣ **Activity** context (roughly the user's history)
- ▣ **Situational** context (what other users do under similar circumstances).

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So what is context?

- ▣ **Immediate context** is what an observer might see in the situation, but without interpreting it.
- ▣ **Activity context** is the history of what that person (or people) have done in similar situations.
- ▣ **Situational context** is the set of things that most people (but strangers) might do in that situation.

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Perceptual Interfaces

▣ Perceptual interfaces make high-level interpretations of sensor data:

- * Computer Vision
- * Speech recognition
- * Bluetooth, location sensing

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Face recognition



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Face Recognition

▣ Face recognition is very useful on phones because:

- * It allows you to index the people in your photographs for later retrieval.
- * It allows you to immediately share photos with friends over the network.

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Context-aware Face Recognition

- Context data (time, place, contact list) improves face recognition significantly, in fact:

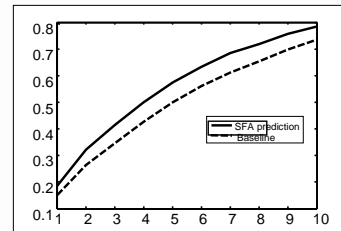
Recognition method	Accuracy:
Image analysis alone	30%
Context analysis alone	55%
Context+Content analysis	67%

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Context-aware Face Recognition

You can also use context data to predict who users will want to share their photos with, apart from those in the photo.



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Computer Vision for mouse input

TinyMotion performs image analysis on successive frames captured from the phone's camera to detect motion of the background. This provides real-time mouse input.



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Perceptual Interfaces - Speech

Speech recognition technology has improved steadily in the last ten years, particularly in noisy environments. Speech was never a good match for office environments.



But the **mobile playing field is completely different**. Mobile users often **need their eyes and hands free**, and the phone always has a voice channel for telephony.

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Speech on cell phones

Restricted speech recognition is available on many phones. Large-vocabulary recognition just appeared on cell phones last year (Samsung P207). It's a huge step. It enables the next generation of mobile speech-based apps:

- Message dictation
- Web search
- Address/business lookup
- Natural command forms (no need to learn them)...



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Speech in developing regions

Speech is an even more important tool in developing regions. Literacy is low, and iconic (GUI) interfaces can be hard to use.

Unfortunately, IT cannot help most of these people because they lack even more basic skills - fluency in a widely-spoken language like English or Mandarin.

Speech-based phones are ideal for this.



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What about the home?

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What about health care?

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Coming Soon

Special issue of ACM Queue magazine on context-aware and perceptual interfaces (summer 06)
JFC guest Ed.



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