Hall of Fame or Hall of Shame?

• Windows Mobile home screen
• What will I use this phone before other than as a phone?

Hall of Shame!

• Too many clicks to do anything
• Calendar
  – Start
  – Scroll through icons to find the one I want
  – Maybe less if used recently (then at top, but still several clicks)

Outline

• Review
• History of miniaturization & mobility
• Palm Pilot
• iPhone
• Animating user interfaces
• TabletPC handout

Action Analysis & Automated Evaluation Review

• GOMS?
  – goals, operators, methods, selection rules
  – only gives ? for ? behavior
    • performance for expert, error-free behavior
  – hard to create model, but easier than user testing
• Automated usability
  – advantages
    • faster than traditional techniques
    • can involve more participants  convincing data
    • easier to do comparisons across sites
  – disadvantages
    • lose observational data
In 1954 Harold S. Osborne, the recently retired chief engineer for AT&T, made the following prediction (quoted in Conly 1984, p. 88):

Let us say that in the ultimate, whenever a baby is born anywhere is the world he [sic] is given at birth a number that will be his telephone number for life. As soon as he can talk, he is given a watchlike device with 10 little buttons on one side and a screen on the other (see Figure 8.1). Thus equipped, at any time when he wishes to talk with anyone in the world, he will pull out the device and punch on the keys the number of his friend. Then, turning the device over, he will hear the voice of his friend and see his face on the screen, in color and in three dimensions. If he does not see him and hear him, he will know that the friend is dead.
There was the Newton ...

The Newton had problems

Design Issues
- Recognition
  - relied on it too much, didn’t work well enough
- Physical size
  - too big
- Connectivity
  - not much

The Palm Pilot Improved...

Design Wins
- Recognition: simple graffiti
- Physical size: fits in the front pocket
- Connectivity: easy sync

Prototyping the Palm

hardware, form factor, software
Technology Trends

Display Resolution

Technology Trends

Size of pockets

Technology Trends

Unaided human abilities

What will we do with Mobile?

• The same applications?
• Different ones?

1/20/2009
Malaysia

**Integrated Compass. Why?**

![Cell phone image]

Grameen Telecom

**Village Phone**

![Woman holding a phone image]

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**What makes mobile design exciting?**

- Many Design Choices
  - Think different from GUI/Web
  - Swiss army vs. dedicated
  - Pen/speech/gesture modalities
  - Integrate with other tasks
  - Social apps
  - Always in your pocket

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**What makes mobile design difficult?**

- Design constraints
  - Limited attention/Interactions bursty
  - Screen size small
  - Form factor
  - Limited network connectivity
  - Speech / pen / multimodal

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**Mobilize ≠ Miniaturize**

- Mobile device always with user & on
- Use gives clues to context...
  - Calendar
  - Job order...
- Location gives many contextual cues
- Simple activity inference gives context
  - Driving? Adapt how?

---

**Mobile Usage Context**

- Mobile device always with user & on
- Use gives clues to context...
  - Calendar
  - Job order...
- Location gives many contextual cues
- Simple activity inference gives context
  - Driving? Adapt how?
Limited Attention & Input Interaction

- Minimize keystrokes
- Provide overview + detail
- Understandable interface at a glance
- Design with tasklets
- Minimum set of functions

Example approach: Nokia Navi-Key

Reducing number of buttons

Mobile Input: Lots of Research

Disambiguation w/ Dictionary

- Dictionary based (such as T9, Pocket PC)
  - e.g., 2-2-5-3
  - able 2-2-5-3-0
  - cake 2-2-5-3-N-0
  - bald 2-2-5-3-N-N-0
  - call 2-2-5-3-N-N-N-0
- Lots of “N” = Next

Disambiguation w/ Predictive

- Predictive (such as Letterwise)
  - e.g., t-h
  - e A%
  - i B%
  - o C%
  - u D%
  - ...
Case Study: iPhone Input

Design distinctions
- Multi-touch Input
- Disambiguation of input
- Animations

iPhone Typing Algorithm

- Model where a user touched on the screen
- Model the layout of keys and what keys surround the touch
- If word not in dictionary (or if an extremely unlikely word), present alternative
- While user types, dynamically adjust (invisible) target sizes of keys
- User can accept by simply tapping ‘Space’

State of the Art: Shapewriter

The Future: Sensor Networks

- A 2002 study calculated there were around 4.2 million CCTV cameras in the UK - one for every 14 people.
- “If you go forward 50 years, you are probably talking about one million forms of sensor per person in the UK,” he said.
- This was a conservative estimate, he said. “More aggressive” calculations suggest there could be 20m sensors per person.

The Future: Mobile Everywhere

Source: UC Berkeley, Smart Dust Program, Largest Tiny Network Yet, http://webs.cs.berkeley.edu/800demo/
Source: BBC, “Sensor rise powers life recorders”

There could be one million sensors per UK resident by 2057
Information Appliances

- Mobile devices with dedicated purpose

Further Reading on Mobile

- Studio 7.5, Designing for Small Screens
- Mizuko Ito, Personal, Portable, Pedestrian
- Rich Ling, the Mobile Connection
- Christian Lindholm, Mobile Usability
- Matt Jones, Mobile Interaction Design

How would a teacher animate this?

\[
\begin{align*}
\text{Zn}^{2+} & \quad \text{(Zinc) anode} \\
\text{SO}_4^{2-} & \quad \text{(Sulfate)} \\
\text{Cu}^{2+} & \quad \text{(Copper) cathode} \\
\text{cell} \quad \text{membrane} \quad \text{cell}
\end{align*}
\]

Need Quick + Easy Animation!

Students & Educators
Learn complex concepts
Need to animate fast before or during class

Amateur Artists
Play in new medium
Need a simple way to get started

Professionals
Share dynamic ideas
Need tool expressive enough for variety of tasks

K-SKETCH DEMO
Interface Optimization

- Visualize simplicity/expressivity tradeoff
- Two step process
  - code library of scenarios
  - compute minimal sets of animation ops

Optimization results

- Supported Animations (Expressivity →)
- # Animation Operations (Simplicity →)

Diminishing Returns