Chapter 3: Mobile HCI

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- *tilt-to-scroll* and *Rock 'n' Scroll* to include the use of gestures to issue commands.

VIDEO

Text input on mobile device - Why does it matter?

- In 2003 there have been 16 billion SMS per month in Europe.
- Mobile internet is on the rise – with new technologies (UMTS) it may become one important way to access the internet
Text Input Methods

Poika Isokoski, at NIT2001, 12.2.2001
Unistroke

- Explored in the PARCTab Experiment
- Each letter is written in a single stroke
- Lifting the pen indicates a new letter
- Solves the separation problem

Graffiti
Unistroke used in PalmOS
EdgeWrite

Cirrin - (the CIRculaR INput device)

- VIDEO
- http://www.cs.cmu.edu/~edgewrite/

- A word-level unistroke keyboard is a soft keyboard allowing a user to go from any key to any other key without lifting the pen or entering unwanted keys
Quikwriting

- [http://mrl.nyu.edu/projects/quikwriting/](http://mrl.nyu.edu/projects/quikwriting/)
- Authors claim “Quikwriting is significantly faster and less stressful to use than Graffiti”

Dasher

- Dasher is a data entry interface incorporating language modelling and driven by continuous two-dimensional gestures.
- “Tests have shown that, after an hour of practice, novice users reach a writing speed of about 20 words per minute while taking dictation. Experienced users achieve writing speeds of about 34 words per minute, compared with typical ten-finger keyboard typing of 40-60 words per minute.”

- [http://www.inference.phy.cam.ac.uk/djw30/dasher/](http://www.inference.phy.cam.ac.uk/djw30/dasher/)
Mobile Phone Text Input

- fewer keys than letters!
- Approaches
  - Multitap
  - Dictionary based disambiguation
  - Prefix-based disambiguation
  - multiple simultaneous key presses
- Metrics
  - Complexity
  - Visibility
  - Keystrokes per character (KSPC)

Multi-Tap

- A key has more than one letter assigned
- Pressing the key once gives the first, twice the second, and so on
- After a period of time or when changing to another button the letter is selected
- Advantage
  - You can see what you write
  - Easy to understand
- Problem
  - High number of average key presses per letter
- About 2 KSPC
Predictive Text Input
Dictionary based disambiguation

- Example T9
- Input is compared to a dictionary
- Input is matched to existing words
- If non-ambiguous a single word is offered
- If multiple words are possible the one with the highest probability is offered and a mechanism to select the others

**Advantage**
- Very fast input mechanism for words in the dictionary

**Problems**
- Slow for words that are not in the dictionary
- The word that is actually typed is not always visible

For words in the dictionary KSPC is close to 1

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Basis for predictive input

- Word frequency
- Letter frequency
- Frequency of letter groups
- Frequency of word groups

- [http://deafandblind.com/word_frequency.htm](http://deafandblind.com/word_frequency.htm)

(show examples)
Prefix-based disambiguation

- EATONI
  - LetterWise
  - WordWise
  - [http://www.eatoni.com/](http://www.eatoni.com/)

- Language is analyses and probabilities for letter sequences is calculated
  - \( P("a")=\ldots \quad P("b")=\ldots \quad P("y")=\ldots \quad P("z")=\ldots \)
  - \( P("aa")=\ldots \quad P("ab")=\ldots \quad P("zy")=\ldots \quad P("zz")=\ldots \)
  - \( P("aaa")=\ldots \quad P("aab")=\ldots \quad P("zzy")=\ldots \quad P("zzz")=\ldots \)

- Probabilities are used to chose next character that is displayed


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multiple simultaneous key presses

- Frogpad
  - Mini-keyboard
  - Static arrangement of letters based on frequency in the language text corpus
  - Pressing two keys provides the second option

- Cord keyboard
  - Twiddler
Fasttap

[Fasttap's keypad may look small, but the buttons work and feel a lot like the keys on your computer keyboard.]

Letters are raised and number keys are lowered so that your finger will probably touch letter keys when you strike a number - but that's okay.

That's how Fasttap technology works, you don't need to be careful!

- Different keys for numbers and letters
- Different height

Predictive Input

- Example: POBox - An Efficient Text Input Method for Handheld and Ubiquitous Computers, Toshiyuki Masui. HUC99
Output
What to present?

- Text
- Non-speech Audio
- Music
- Speech
- Images
- Video

- Tactile feedback (e.g. vibra alarm)
Screens

- Resolution
- Color/Monochrome
- Touch sensitive
- Size

Head-up Displays

- Images in front of the eye
- Appears free floating
- See through

http://www.microopticalcorp.com
Haptic feedback
Application in Pedestrian guidance

Fig. 1. (a) GentleGuide control unit and wrist devices (b) GentleGuide worn by a participant


References

- Poika Isokoski, at NIT2001, 12.2.2001
- The Dynabook Revisited - A Conversation with Alan Kay
  http://www.honco.net/os/kay.html
- Quikwriting http://mrl.nyu.edu/projects/quikwriting/
- Dasher http://www.inference.phy.cam.ac.uk/djw30/dasher/
- POBox - An Efficient Text Input Method for Handheld and Ubiquitous Computers. Toshiyuki Masui. HUC99
Prototyping mobile UIs

- Paper prototyping
- HTML
- Flash lite
- Python

Paper prototyping

- Example: Mobile interaction with public displays
- Early and cheap (time, money) evaluation of ideas / UIs
Paper prototyping

HTML – prototype / mock-up

- Prototype: static HTML pages stored on the mobile phone
  - Prototype looks like a real application
  - Easy to develop
  - Just predefined aspects can be tested (static HTML pages)
- Example: automatic form filling on mobile phones
  - A pre-filled HTML form (with errors)
  - An empty HTML form
  - User study

| Table 4. Average input times over all users, user were asked to perform several runs |
|---------------------------------|-----------------|-----------------|
| 1. run                          | Empty forms     | Pre-filled forms |
|                                 | 240 seconds     | 60 seconds      |
| 2. run                          | 170 seconds     | 19 seconds      |
| 3. run                          | 115 seconds     | 13 seconds      |
Python for Series 60 Phones

Demo

- 4. Series 60 SDK documentation and Python for Series 60 developer discussion board http://discussion.forum.nokia.com/

Flash - Lite

- Player Flash Lite 2
  - Based on Flash Player 7
  - pre-installed (Asia, Flash for i-mode) / download (e.g. Nokia Series 60)
  - Features:
    - Loading and parsing of XML
    - Persistent data
    - Media handling (images, sound, video, SWF, etc.)
    - Action Script 2.0 Support
- Authoring tool: Flash Professional 8
- Used for: games, graphics, ring tones
Flash – Lite: Flash Professional 8

Flash – lite: Architecture