The Tablet PC: Designing Pen-based Applications Part II

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(slides based on Rob Jarrett's slides)

Back to the Tablet
Pen vs. mouse

- The mouse is better
  - Targeting more accurate
  - Easy to leave in fixed position
  - Integrates well with buttons
  - Cursor positioning is accurate
  - Does not require digitizer
- The pen is better
  - Superior continuous control
  - Natural device
  - Direct manipulation on screen
  - Does not require auxiliary surface
  - More info than just x-y

Pen as mouse: Targeting

- Pen motion while hovering
  - Positioning
  - Targeting may require pen to be stationary for a period of time
- Pushing buttons cause pen tip to move
- Surface of tablet may be slippery
  - Pressing on screen causes pen to move
- Tablet may not be stationary

Pen as mouse: Clicking

- Clicking with a pen is tough
  - Legacy applications typically assume during a click the mouse doesn't move
  - Pen taps are more like little strokes or stabs because of pen skidding and high-precision digitizers
  - Detecting the difference between tap and a drag is an interesting problem!
- Double-clicking is even tougher
  - Quick motion means sloppier result

Pen as mouse: Pen positioning

- Pen positioning can be arduous work if UI requires targeting all over the display
  - Mouse can move the cursor far without much arm/hand movement, but the pen requires a lot of arm/hand movement
  - Menus and toolbars are typically at the top of a window; editing often occurs mid-way or toward the bottom
    - Lots of physical arm/hand movement results – a real pain for users
    - More local UI is desirable (e.g. context menus)

Pen as mouse: Targeting guidelines

- Cursor feedback
- Bigger, easily-targeted controls
- Generous tap, double-click, and hover tolerances
- Keep related objects in proximity

Pen as mouse: Right-clicking

- Need to be able to right-click with the pen
  - While not used by majority of Windows users, still an important capability for backwards compatibility and contextual UI
  - Solutions: "Press-and-hold" and pen barrel-button invocation
    - P & H was fairly controversial because some felt it got in the way

Digital ink realism

- Ink should look smooth
  - No "jaggies" -> antialiased
  - No straight lines -> curve-fitted
- Use pen pressure information
  - Vary stroke width (more pressure means wider stroke)
- Support pen tips
  - Round/ballpoint vs. rectangular/ highlighter

Digital ink performance

- Writing requires uninterrupted inking
  - Users have difficulty with delays in ink appearance
  - Users are frustrated with delays in inking
- Guideline
  - Ensure fast efficacy
  - Is it as fast as writing on paper?

Pen modes & cursors

- Explicit vs. implicit input modes
  - A.k.a. *Modal* vs. *modeless*
- How to allow things to be efficient but not confuse users
  - Select mode uses "right-mouse button" for implicit mode as well as utilizing an explicit mode
  - Erase mode uses pen's eraser tip (if available) for implicit mode as well as utilizing an explicit mode

Pen modes & cursors

- Need feedback as to the mode of the pen
  - Indicates actions available to the user
- Guideline
  - Develop a set of cursor feedback to indicate the different modes of the pen
  - Careful attention to cursor design
    - Either symmetric or use handedness setting

Gestures

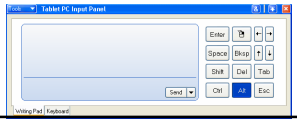
- Commands delivered with key strokes
- Examples
  - Scratch out
  - Keyboard
  - Question
  - Next page
  - Previous page

Pen gestures

- Gestures need precise tuning
  - Trade-off between accidental activation vs. not getting when wanted
  - False activations are annoying and distracting to the task!
- Guideline
  - Use gestures guardedly
  - Error on the side of having "zero" incidence of false activation
  - Non-destructive consequences are better

Writing location

- Users have an initial expectation that they can write digital ink anywhere
- Guideline
  - Communicate clearly where users can ink
  - Ink enabled controls should be self-evident



Ink selection

- Traditional rectangular selection tools are inadequate
- "Lasso" selection is much more natural
  - Percentage-based stroke tolerances
  - Employ word-based selection
  - Visual feedback is essential, real-time is much better than static

Recognition expectations

- Handwriting recognition is highly variable by person
  - Errors are expected
  - Perceived good or bad handwriting effects expectation of accuracy
- Guideline
  - Be realistic about recognition accuracy rate, don't rely heavily on it for authoring

Text input

- Direct writing with reco
- Text input area with reco
- Writing buffer, text buffer, application
- Special forms of input
  - Stylized letters
  - Gestures (quikwriting)
- Stylus controlled keyboard
- Connect a real keyboard

My observations of TPC use

- Freecell / spider work great
- Minesweeper fails (difficulty of right click for marking bombs)
- Inkball is okay
- Very satisfied with airplane and meeting use

Observations (cont.)

- Handwriting reco is adequate for text input for short, sentence based input
  - Powerpoint slides
  - Answering email
- Painful for forms entry and longer documents
  - Hard to enter text outside of dictionary

Observations (cont.)

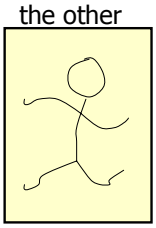
- I make extensive use of journal
  - See CSE 490ra Winter website for example of Journal notes
  - Useful as a brainstorming / note taking tool
  - I have never converted Journal Notes to text, other than for demo purposes
  - I make frequent misspellings in journal (more than on paper?)
    - Rely on scratch out gesture, not eraser

Observations (cont.)

- Journal
  - Lasso for selection works well
  - Color/pen selection could be improved
  - Scroll bar is problematic – on HP, I use the page toggle on side
- Office Tablet PC Pack controls are not very good
  - Pen selection in PPT

Key Frame Animation

- Given two ink figures, construct a continuous transformation from one to the other



Visualization steering

- Given a large diagram, how do you control a visualization
  - Static manipulation on multiple scales
  - Time series visualization
  - Strict pen manipulation
- Domain elevators
  - Large buildings (Sears towers)
  - Time series visualization

Natural UI for Work list

- Keep track of set of tasks
- Support control of tasks, annotation, import / export
- Service technicians application
- Possible approaches
  - Develop natural metaphor – piles of cards?
    - Direct manipulation interface
  - Pen based NL / diagram interface