Pen and Touch Computing Applications for the Humanities

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Evolution from WIMP to Post-WIMP/NUI

• Smart environment
  – Weiser’s Ubicomp
    o sensor-suffused, GPS, ...
    o OLEDs, pico-projectors,...
  – software agents

• Many form factors
  – tablet isn’t desktop isn’t interactive
    whiteboard (IWB) isn’t ambient room
  – bi-directional displays (RGB, I) (e.g. Sur40)

• Multi-modal interaction
  – gestures (both on-screen with pen and
    touch and in-air, e.g., Kinect, Leap Motion,
    MYO) – fine-grain vs. coarse gestures
  – speech
  – haptic, e.g., force feedback manipulation
Where do pens make sense?

• Sketching
  – preliminary & conceptual design: whiteboard brainstorming
  – artistic expression

• 2d visual languages
  – music
  – circuit diagrams
  – chemistry, ...

• Ultra mobile platforms
  – smartphones
  – small tablets, slates, pads

• Keyboardless environments such as IVR, shared surfaces
Pen computing goals

• Transparency
  – as easy and as natural to use as pencil and paper
  – but with full power of the computer for immediate or batched interpretation of input

• Leverage pre-existing 2D notations
  – to minimize keyboard-based encoding

\[ y(t) = Ae^{-\frac{b}{2m}t}\cos(\omega t) \]

mathematics

chemistry

music

diagrams
Where does touch make sense?

• Simple UIs where fine motor control is unnecessary
  – touch-and-click
  – swipe/flick
  – pinch-zoom
• Popularized by smartphones
• Younger people now expect all surfaces to be touch sensitive
• Multi-point vs. true multi-touch (full-finger ellipse)
  – points suffice for touch-and-click, swipe, and pinch-zoom
  – touch can simulate pressure, e.g., for painting, moding, ...
  – hover-state
  – phicons/props (as shown, for example, by Josh Wall)
Garibaldi Panorama – 1860’s
Garibaldi Panorama – 1860’s

- “Moving panorama” (unwound behind a cut-out)
- Tells the story of the life and times of Giuseppe Garibaldi and his role in the Risorgimento
- Scroll size – two football fields!
  - approximately 90 meters long, and 1.5 meters tall, painted on both sides in John James Story’s studio around 1860
- Medium
  - watercolor on thin paper similar to wallpaper
- Kept in a climate-controlled vault in Brown Library
  - essentially inaccessible
  - scanned at high resolution (300 dpi = 120 pixels/cm), best displayed on large touch panels for interactive viewing
LADS (Large Art Displayed on Surface)
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- Generalization of "Garibaldi on the Surface" application
- Catalog (exhibition) may contain any 2D artwork
  - designed to handle very large artworks, e.g., 2GB
- Viewing
  - select artworks with metadata filters, such as time, artist, etc.
  - include historical, artistic, and cultural context
  - MSFT’s “Deep Zoom” permits extreme closeups of brush and pencil stroke details and textures
  - touch permits physical manipulation of the artwork
  - guided tours à la Ken Burns documentaries – pan/zoom, auxiliary stuff
- Authoring
  - designed for curators with no technical background
  - creating content exhibitions and tours simple and fast – KISS design
- Runs as native app on any Windows 7 Touch platform
The AIDS Quilt and the Names Project

- Memorial to, and celebration of, the lives of people who have died of AIDS-related causes
  - more than 49,000 3’ x 6’ quilt blocks, each made by hand – largest folk-art work in the world
  - 54-ton, 1.3 million-square-foot (more than 23 acres) patchwork
- LADS was used to display and explore the quilt in Summer 2012 at the National Mall, Washington D.C., where the quilt was displayed in pieces
  - locate blocks by name
  - zoom into detail of individual blocks
- Viewers can search on names or zoom in on individual quilt blocks
Harvard’s Library Explorer (based on LADS)
TAG (Touch Art Gallery)
TAG (Touch Art Gallery)

• Generalization and refinement of LADS, stick with KISS design
  – WorkTop is the server
  – content repository is in the cloud
• Multiple exhibitions
• Viewing (LADS +)
  – multiple exhibitions may be open at same time
  – collaboration may be distributed or co-located
  – guided tours can include multiple exhibitions
    o tour player built on top ov MSR’s RIN (Rich Interactive Narratives) player
• Authoring (LADS +)
  – customizable UI without developer intervention – goal is 1hr learning time
• Leverages Windows-8 with “Touch First” Metro (Modern) UI
  – JavaScript, HTML-5; MSFT’s Deep Zoom is smooth over the net!
  – ship TAG 1.0 within next few months - free
  – later, perhaps a web app
WorkTop : Overview
Worktop: goals and features

- Support small-group workflow
  - integrated lifecycle for multi/hyper-media creation and publishing
    - browse, search, annotate, arrange, present, publish
  - multi-user repository for all work products

- Facilitate visual interaction on unbounded workspace
  - panoramic expandable layouts of heterogeneous documents
    - organizing tool for creating maps of relevant documents
  - save, browse, restore, email and edit previous workspaces
    - workspace snapshot bar
  - provide structured layouts (timelines, targeted views)

- Pen and multi-touch input

- Tagged notes and links
  - provides many views and ways of organizing documents

- Faceted search with results saved in smart folders

Extensible component-based tool kit
Brown’s Digital Scholarship Lab - Library
Brown’s Digital Scholarship Lab

• Purpose
  – experiment with new interactive modes of learning, teaching, research, and communicating

• Components
  – hardware
    o mixture of tabletop and wall displays, and large tiled projector-driven wall
  – software
    o multiple applications, interactive visualization software, and other tools
    o continue to use rapid prototyping methodology with real users
Agenda for Future Work

• Get real users and run real user studies
  – volunteers?!?

• Flesh out software functionality
  – speech coupled to gesture recognition
  – collaboration tools
    o can already mail live WorkTop for asynchronous sharing
    o synchronous collaboration at tabletops/whiteboards
    o telecollaboration that works

• Flesh out the Digital Scholarship Lab
  – add sensors, make wall interactive touch wall, ...
“To infinity and beyond...”
Attic
Evolution from WIMP to Post-WIMP/NUI (2/2)

- Augmented reality
  - Layar’s Amsterdam smartphone app
  - Google Glass
- MIT Sixth Sense and Microsoft/CMU Omnitouch
- Brain-computer interfaces, e.g., Brown’s BrainGate
Three Pen and Touch Computing Projects at Brown

Garibaldi → LADS → TAG
(Touch Art Gallery)

WorkTop, an IDE (Interactive Development Environment) for scholars

PanoramicData, gesture-driven exploration of structured data
PanoramicData
PanoramicData

• Integrated document analysis environment for structured data
  – focus + context tool suite
    o access
    o visualize
    o modify
    o save and retrieve
  – data sketching with pen and touch

• Whiteboard-oriented, but can run on tablets
  – large 2D spatial layout
  – stylus, multi-touch interaction, voice later