User Experience Design I (Interaction Design)

Day 9 (July 5th, 2018, 9am-12pm): Interaction Beyond the Desktop
This lecture is focusing on four types of interaction “beyond the desktop”:

• (1) Shareable interfaces
• (2) Tangible interfaces
• (3) Wearable interfaces
• (4) Robotic interfaces
• …

Tangible, Embedded and Embodied Interaction (TEI)
(1) Shareable interfaces

• Shareable interfaces are designed for more than one person to use
  • provide multiple inputs and sometimes allow simultaneous input by co-located groups
  • large wall displays where people use their own pens or gestures
  • interactive tabletops where small groups interact with information using their fingertips, e.g., Mitsubishi’s DiamondTouch and Sony’s Smartskin

source: [8]
A smartboard

Summary

- Divided into 6 regions
- Costs calculated for
  - new buildings
    - 49% of total
  - additions
    - 31% of total
  - renovations
    - 20% of total
DiamondTouch Tabletop

source: [8]
Advantages

• Provide a large interactional space that can support flexible group working
• Can be used by multiple users
  • can point to and touch information being displayed
  • simultaneously view the interactions and have same shared point of reference as others
• Can support more equitable participation compared with groups using single PC

source: [8]
Research and design issues

- More fluid and direct styles of interaction involving freehand and pen-based gestures
- Core design concerns include whether size, orientation, and shape of the display have an effect on collaboration
- Horizontal surfaces compared with vertical ones support more turn-taking and collaborative working in co-located groups
- Providing larger-sized tabletops does not improve group working but encourages more division of labor

source: [8]
(2) Tangible interfaces (TUI)

• Type of sensor-based interaction, where physical objects, e.g., bricks, are coupled with digital representations
• When a person manipulates the physical object/s it causes a digital effect to occur, e.g. an animation
• Digital effects can take place in a number of media and places or can be embedded in the physical object

source: [8]
Examples

• **Chromarium cubes**
  • when turned over digital animations of color are mixed on an adjacent wall
  • facilitates creativity and collaborative exploration

• **Tangible Video Editor**
  • depict video clips embedded in the blocks
  • vary depending on how they are connected together

• **Urp**
  • physical models of buildings moved around on tabletop
  • used in combination with tokens for wind and shadows -> digital shadows surrounding them to change over time

source: [8]
Urp (1999)
Chromarium cubes (2003)
Tangible Video Editor (2007)
Reactable

https://www.youtube.com/watch?v=Mgy1S8qymx0
Benefits

- Can be held in both hands and combined and manipulated in ways not possible using other interfaces
  - allows for more than one person to explore the interface together
  - objects can be placed on top of each other, beside each other, and inside each other
  - encourages different ways of representing and exploring a problem space
- People are able to see and understand situations differently
  - can lead to greater insight, learning, and problem-solving than with other kinds of interfaces
  - can facilitate creativity and reflection

source: [8]
Research and design issues

• Develop new conceptual frameworks that identify novel and specific features

• The kind of coupling to use between the physical action and digital effect
  • If it is to support learning then an explicit mapping between action and effect is critical
  • If it is for entertainment then can be better to design it to be more implicit and unexpected

• What kind of physical artefact to use
  • Bricks, cubes, and other component sets are most commonly used because of flexibility and simplicity
  • Stickies and cardboard tokens can also be used for placing material onto a surface

source: [8]
(3) Wearable interfaces

- First developments was head- and eyewear-mounted cameras that enabled user to record what seen and to access digital information
- Since, jewellery, head-mounted caps, smart fabrics, glasses, shoes, and jackets have all been used
  - provide the user with a means of interacting with digital information while on the move
- Applications include automatic diaries and tour guides

source: [8]
"If history is any indication, we should assume that any technology that is going to have a significant impact over the next 10 years is already 10 years old!"

Bill Buxton
Steve Mann - pioneer of wearables

Steve Mann’s “wearable computer” and “reality mediator” inventions of the 1970s have evolved into what looks like ordinary eyeglasses.

source: [8]
Research and design issues

• **Comfort**
  • needs to be light, small, not get in the way, fashionable, and preferably hidden in the clothing

• **Hygiene**
  • is it possible to wash or clean the clothing once worn?

• **Ease of wear**
  • how easy is it to remove the electronic gadgetry and replace it?

• **Usability**
  • how does the user control the devices that are embedded in the clothing?

source: [8]
Skinput 2010

https://www.youtube.com/watch?v=g3XPUdW9Ryg
Skintrack 2016

https://www.youtube.com/watch?v=9hu8MNuvCHE
(4) Robotic interfaces

Four types

• remote robots used in hazardous settings
• domestic robots helping around the house
• pet robots as human companions
• sociable robots that work collaboratively with humans, and communicate and socialize with them – as if they were our peers

source: [8]
Advantages

• Pet robots have therapeutic qualities, being able to reduce stress and loneliness

• Remote robots can be controlled to investigate bombs and other dangerous materials

source: [8]
Research and design issues

- How do humans react to physical robots designed to exhibit behaviours (e.g., making facial expressions) compared with virtual ones?
- Should robots be designed to be human-like or look like and behave like robots that serve a clearly defined purpose?
- Should the interaction be designed to enable people to interact with the robot as if it was another human being or more human-computer-like (e.g., pressing buttons to issue commands)?
Summary: Which interface?

• Is multimedia better than tangible interfaces for learning?
• Is speech as effective as a command-based interface?
• Is a multimodal interface more effective than a monomodal interface?
• Will wearable interfaces be better than mobile interfaces for helping people find information in foreign cities?
• Are virtual environments the ultimate interface for playing games?
• Will shareable interfaces be better at supporting communication and collaboration compared with using networked desktop PCs?

source: [8]
Summary: Which interface?

- Will depend on task, users, context, cost, robustness, etc.
- Much system development will continue for the PC platform, using advanced GUIs, in the form of multimedia, web-based interfaces, and virtual 3D environments
  - Mobile interfaces have come of age
  - Increasing number of applications and software toolkits available
  - Speech interfaces also being used much more for a variety of commercial services
  - Appliance and vehicle interfaces becoming more important
- Shareable and tangible interfaces entering our homes, schools, public places, and workplaces

source: [8]
General Summary

• Many innovative interfaces have emerged post the WIMP/GUI era, including speech, wearable, mobile, VR/AR and tangible UI’s
• Many new design and research questions need to be considered to decide which one to use
• Web interfaces are becoming more like multimedia-based interfaces
• An important concern that underlies the design of any kind of interface is **how information is represented to the user** so they can carry out ongoing activity or task

source: [8]
References: