Admin

- HW 2 (Due next Friday), Hard copy in class (Group work)
- Check syllabus for updates
- Trip to Exelon Power Station (Clinton, IL)
  - Possible dates (Wednesday, Oct 8, 3:30 pm OR Thursday Oct 9, 3:30)
Summary points

• Different types of interactions
  – Instructing
  – Conversing
  – Manipulating
  – Exploring

What interaction type?
What interaction type?

![Diagram of a computer interface with a command line window showing the output of a command:]

```
Red Hat Linux release 7.1 (GnomeF)
Kernel 2.4.9-1imp on a 3-processor i86
Login: root
Password: ...
Welcome to the Daemix mailserver. In most cases it will be more appropriate...
To log into the host alias...
which is also reachable from outside the firewall.
```
Paradigms in HCI

- 1980s: single-user desktop applications
- 1990s: multimedia, mobile interfaces
- Now: Web 2.0, social computing

Interface types

1980s interfaces
- Command
- WIMP/GUI

1990s interfaces
- Advanced graphical (multimedia, virtual reality, information visualization)
- Web
- Speech (voice)
- Pen, gesture, and touch
- Appliance

2000s interfaces
- Mobile
- Multimodal
- Shareable
- Tangible
- Augmented and mixed reality
- Wearable
- Robotic
Command interfaces

- Commands such as abbreviations (e.g., ls, grep) typed in at the prompt to which the system responds (e.g., listing current files)
- Some are hard wired at keyboard, e.g., delete
- Efficient, precise, and fast
- Large overhead to learning set of commands

WIMP/GUI interfaces

- Xerox Star first WIMP -> rise to GUIs
- Windows
  - could be scrolled, stretched, overlapped, opened, closed, and moved around the screen using the mouse
- Icons
  - represented applications, objects, commands, and tools that were opened when clicked on
WIMP/GUI interfaces

• Menus
  – offering lists of options that could be scrolled through and selected

• Pointing device
  – a mouse controlling the cursor as a point of entry to the windows, menus, and icons on the screen

Xerox Star (1981) – first commercial GUI
Xerox Alto

Engelbart’s Mouse
GUIs

- Same basic building blocks as WIMPs but more varied
  - Color, 3D, sound, animation,
  - Many types of menus, icons, windows
- New graphical elements, e.g.,
  - Toolbars, rollovers

Windows

- Windows were invented to overcome physical constraints of a computer display, enabling more information to be viewed and tasks to be performed
- Scroll bars within windows also enable more information to be displayed
- Multiple windows can make it difficult to find desired one, so techniques used
  - Listing, iconising, shrinking
Apple’s shrinking windows

Research and design issues

• Window management
  – enabling users to move fluidly between different windows (and monitors)
• How to switch attention between them to find information needed without getting distracted
• Design principles of spacing, grouping, and simplicity should be used
Menus

• A number of menu interface styles
  – flat lists, drop-down, pop-up, contextual, and expanding ones, e.g., scrolling and cascading

iPod flat menu structure

What are the advantages and disadvantages of this interface?
Expanding menus

- Enables more options to be shown on a single screen than is possible with a single flat menu
- More flexible navigation, allowing for selection of options to be done in the same window
- Most popular are cascading ones
  - primary, secondary and even tertiary menus
  - downside is that they require precise mouse control
  - can result in overshooting or selecting wrong options

Cascading menu
Contextual menus

• Provide access to often-used commands that make sense in the context of a current task
• Appear when the user presses the Control key while clicking on an interface element
  – e.g., clicking on a photo in a website together with holding down the Control key results in options 'open it in a new window,' 'save it,' or 'copy it'
• Helps overcome some of the navigation problems associated with cascading menus

Research and design issues

• What are best names/labels/phrases to use?
• Placement in list is critical
  – Quit and save need to be far apart
• Many international guidelines exist emphasizing depth/breadth, structure and navigation
  – e.g., ISO 9241
Icon design

- Icons are assumed to be easier to learn and remember than commands.
- Can be designed to be compact and variably positioned on a screen.
- Now populate every application and operating system.
  - represent desktop objects, tools (e.g., paintbrush), applications (e.g., web browser), and operations (e.g., cut, paste, next, accept, change).

Icon forms

- The mapping between the representation and underlying referent can be:
  - similar (e.g., a picture of a file to represent the object file),
  - analogical (e.g., a picture of a pair of scissors to represent ‘cut’)
  - arbitrary (e.g., the use of an X to represent ‘delete’).
Early icons

(a)

(b)

(c)

(d)

Newer icons
### Simple icons plus labels

<table>
<thead>
<tr>
<th>Action</th>
<th>Icon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delete</td>
<td><img src="delete-icon.png" alt="Delete" /></td>
</tr>
<tr>
<td>Redo</td>
<td><img src="redo-icon.png" alt="Redo" /></td>
</tr>
<tr>
<td>Undo</td>
<td><img src="undo-icon.png" alt="Undo" /></td>
</tr>
<tr>
<td>Properties</td>
<td><img src="properties-icon.png" alt="Properties" /></td>
</tr>
<tr>
<td>Cut</td>
<td><img src="cut-icon.png" alt="Cut" /></td>
</tr>
<tr>
<td>Copy</td>
<td><img src="copy-icon.png" alt="Copy" /></td>
</tr>
<tr>
<td>Paste</td>
<td><img src="paste-icon.png" alt="Paste" /></td>
</tr>
<tr>
<td>Folder Options</td>
<td><img src="folder-options-icon.png" alt="Folder Options" /></td>
</tr>
<tr>
<td>Views</td>
<td><img src="views-icon.png" alt="Views" /></td>
</tr>
<tr>
<td>Back</td>
<td><img src="back-icon.png" alt="Back" /></td>
</tr>
<tr>
<td>Forward</td>
<td><img src="forward-icon.png" alt="Forward" /></td>
</tr>
<tr>
<td>Stop</td>
<td><img src="stop-icon.png" alt="Stop" /></td>
</tr>
<tr>
<td>Refresh</td>
<td><img src="refresh-icon.png" alt="Refresh" /></td>
</tr>
<tr>
<td>Home</td>
<td><img src="home-icon.png" alt="Home" /></td>
</tr>
<tr>
<td>Search</td>
<td><img src="search-icon.png" alt="Search" /></td>
</tr>
<tr>
<td>Favorites</td>
<td><img src="favorites-icon.png" alt="Favorites" /></td>
</tr>
<tr>
<td>History</td>
<td><img src="history-icon.png" alt="History" /></td>
</tr>
<tr>
<td>Mail</td>
<td><img src="mail-icon.png" alt="Mail" /></td>
</tr>
<tr>
<td>Up</td>
<td><img src="up-icon.png" alt="Up" /></td>
</tr>
<tr>
<td>Move To</td>
<td><img src="move-to-icon.png" alt="Move To" /></td>
</tr>
<tr>
<td>Copy To</td>
<td><img src="copy-to-icon.png" alt="Copy To" /></td>
</tr>
<tr>
<td>Folders</td>
<td><img src="folders-icon.png" alt="Folders" /></td>
</tr>
<tr>
<td>Open</td>
<td><img src="open-icon.png" alt="Open" /></td>
</tr>
<tr>
<td>Save</td>
<td><img src="save-icon.png" alt="Save" /></td>
</tr>
<tr>
<td>Print</td>
<td><img src="print-icon.png" alt="Print" /></td>
</tr>
<tr>
<td>New</td>
<td><img src="new-icon.png" alt="New" /></td>
</tr>
<tr>
<td>Print Preview</td>
<td><img src="print-preview-icon.png" alt="Print Preview" /></td>
</tr>
</tbody>
</table>

### Activity

- Sketch simple icons to represent the operations to appear on a digital camera LCD screen:
  - Delete last picture taken
  - Delete all pictures stored
  - Format memory card
Research and design issues

- There is a wealth of resources now so you do not have to draw or invent icons from scratch
  - guidelines, style guides, icon builders, libraries
- Text labels can be used alongside icons to help identification for small icon sets
- For large icon sets (e.g., photo editing or word processing), use rollovers

Ubiquitous computing (Ubicomp)

- Would radically change the way people think about and interact with computers
- Computers would be designed to be embedded in the environment
- Major rethink of what HCI is in this context
Mobile interfaces

- Handheld devices intended to be used while on the move, e.g., PDAs, cell phones
- Applications running on handhelds have greatly expanded, e.g.,
  - used in restaurants to take orders
  - car rentals to check in car returns
  - supermarkets for checking stock
  - in the streets for multi-user gaming
  - in education to support life-long learning

Mobile challenges

- Small screens, small number of keys, and restricted number of controls
- Innovative designs including:
  - roller wheels, rocker dials, up/down ‘lips’ on the face of phones, 2-way and 4-way directional keypads, softkeys, silk-screened buttons
- Usability and preference for these control devices varies
  - depends on the dexterity and commitment of the user
Simple or complex phone for you and your grandmother?

A smartboard
DiamondTouch Tabletop

http://youtube.com/watch?v=LXAqdh4-hcw

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
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.

Research and design issues

- Comfort
- Hygiene
- Ease of wear
- Usability
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

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