EECE 478

User Interface Design

User Interface

The way that a task is accomplished with a product.

"For the user, the interface *is* the product"

Jef Raskin, *The Humane Interface,* Addison-Wesley (2000)

User Interface Components

Multi-modal:

- Textual
  - Instructions, textual dialog, …
- Visual
  - Display, icons, …
- Auditory
  - Sound effects, spoken interaction, …
- Input methods:
  - Keyboard, Mouse, Game controller

UI Resources

- Preece, Rogers, Sharp *Interactive Design* (HCI textbook)
- Newman, Lamming *Interactive System Design*
- Schneiderman *Designing the User Interface*
- Raskin *The Humane Interface*

Basic Principles

Once product defined, design the interface *first*

- Simple tasks should be simple to do
- Common tasks should be simple to do
- Obvious decisions or non-decisions should not be presented to the user

- Design around the user's locus of attention
- Design for habitual use
- Avoid modal interfaces

Raskin's Laws

(After Asimov's Laws of Robotics)

1. The system should treat all user input as sacred
2. A computer should not harm your work, or, through inaction, allow your work to come to harm
3. A computer shall not waste your time or require you to do more work than is strictly necessary

Locus of Attention

Wherever the user's *attention* is, should be the prime focus of the interface

- Always keep track of attention
- Primary interface elements should operate at, or near, the focus of visual attention
- If you need to control attention, use multimodal cues (visual *and* auditory)
- Promote formation of *habits*

Habits

Design to promote *habitual* actions

- The same action or sequence (*gesture*) should have same effect
- Avoid changing meaning of habitual interactions in different modes
- Think of a blind person w/o visual cues to a task. If they can use a particular gesture to accomplish a task repeatedly then it is habituating

Modes

Mode: For any given gesture, the interface is in a particular *mode* if the interpretation of the gesture is constant

- If the same *gesture* has a different interpretation at different times, then the system is in different modes

Modal Interface

An interface is *modal* if:

- The current state of the interface is not the users locus of attention
- The interface will respond to the same gestures differently dependent on state

Avoiding Modal Interfaces

- Provide strong *attentional* cues for any mode change
  - Change the depiction of a character when weapon or armor changes
  - Change the basic interface display
- Use *quasimodes*

Quasimodes

Use *quasimodes*

- Mode is temporary
- Enabling quasimode is part of user's locus of attention

E.g.

- Shift, control, option, alt keys
- Embedding meaning in command sequences

Visibility

- A feature is *visible* if it is currently accessible by the senses, or it was very recently accessible
  - Must be immediately noticeable and accessible to be visible
- Visible controls are called *affordances*
- Visible feedback reduces the negative impact of modes

Basic Tools

Finite-State Machines

- States and state-transitions form the basis for building modes, qestures, and quasimodes
- Use FSMs to model interaction sequences
- Long-lasting states can be identified
- Ensure *all* sequences of actions are valid
  - Every state should have a valid transition for *every input*
- Design to avoid the existence of error states
  - Error states interrupt flow of interaction
- Very useful for documentation