Review for the Final

Final

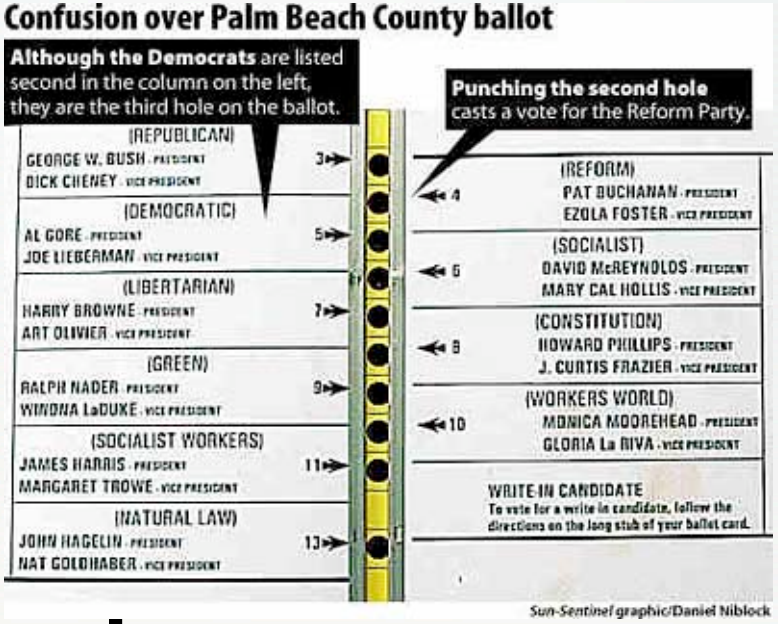
- Style
  - Short answer
  - Essay: apply a concept
- Length
  - 90 minutes

Learning Goals

- Express yourself in executable form
- Basics of what is hard and easy to rapidly prototype
- Terminology and approaches used by programmers, so you can work with them
- Experience pain of programming
- Design and conduct informal user tests

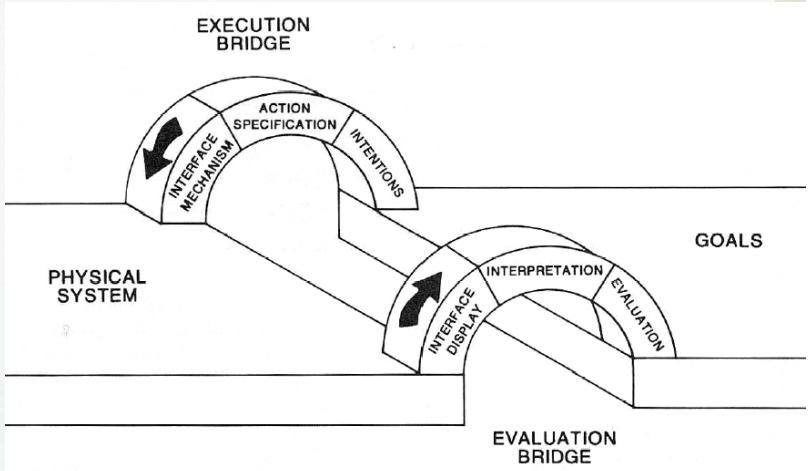
User Interfaces Introduction

- Terms: Users, user interfaces, usability
- Why are interfaces important?
- Why are interfaces hard to design?
- Why are interfaces hard to implement?



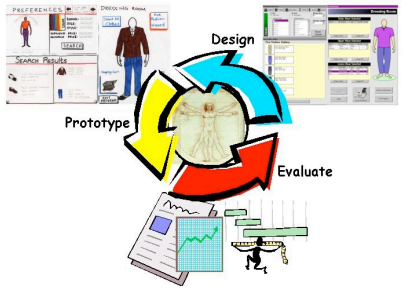
What is Design?

- Terms: design, affordances, user conceptual model, constraints, natural mappings, feedback
- Good and bad examples
- Norman's 7 stages
- Gulf of evaluation and gulf of execution
- Tradeoffs/issues
- Design support
- How designers work



Usability Engineering Design Process

- Terms: waterfall model, iterative process
- 10 steps of process,issues
  1. Study the users and their tasks
  2. Study the competition
  3. Set usability goals
  4. Participatory Design
  5. Coordinating the Total Interface for Consistency
     - Include documentation, help, etc.
  6. Guidelines and Heuristic Evaluation
     - Evaluate your interface according to the guidelines.
  7. Make prototypes of the system early and quickly
     - Actually is faster to prototype first
  8. Empirical testing
  9. Iterative design
  10. Collect feedback from field use
- Obstacles/warnings



Prototyping

- Terms: prototype, lo-fi, medium-fi, high-fi
- What, why, who, when, how
- Types of prototypes
- Types of prototyping
- Trade-offs
- Testing
- Support tools
- Paper prototyping exercise/lessons

UI Software Organization

- Terms: separation of concerns, windows system, windows manager, toolkit, UIDE
- UI flow
- Models
  - Model-View-Controller
  - Object-oriented
- Layers of UI software
- Window System: input and output model
- Window Manager
- Toolkit and High-Level Tools

Debugging

- Terms: bug, debugging
- Why debug?
- Why is it hard?
- Types of bugs, how to fix
- Debugging steps and approach
- Debugging strategies
- Tools

Output Styles

- Terms: metaphors, styles
- Issues with interaction styles
  - How do you choose?
- Interaction styles: pros/cons
  1. Question and answer,
  2. Single character commands and/or function keys,
  3. Command Language,
  4. Menus
  5. Forms/Dialogue Boxes
  6. Direct Manipulation
  7. WYSIWYG
     -- really is a subclass of DM, not another style
  8. Gestures
  9. Natural Language
  10. Natural Behavior

Output Graphics

- Terms: anti-aliasing
- Models: stroke, pixel, region, color, FRAME BUFFER
- Coordinate systems
- Drawing Objects: Lines, Bezier Curves, Fonts, FontMetrics, Images,
- Transformations

Input Devices

- Why harder than output?
- Devices: keyboard, buttons, valuators, locators,
- Absolute, relative, clutched absolute locators

Input Models

- Terms: events
- Logical devices, events, sampling
- Unified model of events
- What does an event consist of?
- Extending events
- Synchronizing problem
- Dispatching and handling events

Interaction Techniques

- Relation to interaction styles and widget libraries
- Macintosh 7
- Features for design/selection
  - Affordance, feedback, performance (feel, Fitt's Law)
  - Guidelines
- Advantages/disadvantages of widget libraries
- Choosing a technique

Finite State Machines

- What are they, what do they do?
- Relation to interaction techniques
- Why do we need them?
- Notation: enough to draw a very simple FSM, or explain FSM
- Relation of FSM to event loops
- Why don’t they scale?
- General technique on how to combine 2 independent finite state machines

Properties of People

- What are mental models: difference between system designer's and end user's
- Good UI: convenient access to functionality to complete task efficiently & user's mental model accurately predicts interface action
  - Only one is a property of people
  - Affect with feedback, affordances

Properties of People

- UI Guidelines
  - System designer can't pretend to be a user
  - Explicitly design conceptual model and use feedback and affordance to reinforce
  - Premature optimization is bad
  - Errors are not exceptional events --> help form mental model

Properties of People

- **Performance**:
  - How long physical motion takes: **Fitt's Law**
  - How much can people remember: **short term, long term memory**, **recognition** vs. **recall**
  - How fast do people perceive: STM decay, bad response time, expectations, consistency

Animation

- What value do they serve?
- Challenges in prototyping: animation
- **Animation**: visual continuity enhancing perception (change); draws attention
- 3 principles:
  - **Solidity**: objects appear solid
  - **Exaggeration**: exaggerate physical actions to enhance perception
  - **Reinforcements**: effects to drive home feeling of reality

Animation

- Solidity:
  - Motion blur
  - Squash and stretch (mass and shape)
  - Follow through: objects don't stop
- Exaggeration: tweak perception
  - Anticipation, squash and stretch, follow through
- Reinforcement:
  - Slow-in/slow-out, move in arcs
- 3 parts of motion: anticipation, motion, follow through

Internationalization

- What is it, why important, how support
- Interface designed for different cultures
- Internationalization vs. localization
- How icons come to have meaning
  - Arbitrary, reference, resemblance
  - What to avoid
- Care in wording, numbers
- Implications for design:
  - Space, layout, content, decide what to translate, pictures vs. text

Context awareness

- Give examples of smart spaces
- Give brief summary of issues relating to
  - Privacy
  - Feedback
  - Affordances

- **Questions?**