CMSC 434/828s: Human Factors in Computer and Information Systems

a.k.a. - Intro to Human-Computer Interaction

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Which talk would you go to?

Evan Golub / Ben Bederson / Saul Greenberg

Which graphic tells the clearer story?

The letters A through G represent chemicals. The numbers 1 though 10 represent crops. Black = Improved White = Got worse

images: Bob Waddington
How does this door work?

Let’s vote!
Which of these images would you associate with a phone?
Moore’s Law

Computer Abilities

1950 1990 2030

(These slides are variations of those presented by Bill Buxton)

History of HCI: Input / Output devices

<table>
<thead>
<tr>
<th>Input / Output</th>
<th>Early days</th>
<th>“Modern”</th>
<th>“Bleeding Edge”</th>
</tr>
</thead>
<tbody>
<tr>
<td>connecting wires</td>
<td>paper tape &amp; punch</td>
<td>keyboard</td>
<td>computer vision</td>
</tr>
<tr>
<td>paper</td>
<td>cards</td>
<td>(different types)</td>
<td>head-mounted displays</td>
</tr>
<tr>
<td>keyboard</td>
<td>paper</td>
<td>cursor keys</td>
<td>ubiquitous computing</td>
</tr>
<tr>
<td>teletype</td>
<td></td>
<td>mouse (different</td>
<td>implanted devices</td>
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<tr>
<td></td>
<td></td>
<td>types)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>microphone</td>
<td>biometrics</td>
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</table>

If you asked someone to draw a computer, what parts would they draw?
Would the CPU be among them?
• keyboards & terminals are just artifacts of today’s technologies
• new input/output devices will change the way we interact with computers
For example, how do we create a menu?

Do we want a simple design or a complex design?

Should it be narrow and deep or should it be broad and shallow?

Some questions to ask:

- how many things can the typical user remember
  - there can be speed advantages for expert users that have learned where things are on a menu
- are there costs associated with loading a new page
  - an application such as Microsoft Word
    - how much memory does the machine have
  - a series of web pages
    - how much latency if there in the connection
Human Computer Interaction

A discipline concerned with the:
- design
- implementation
- evaluation

of interactive computing systems for human use

Why an interface design process?

63% of large software projects go over cost
• managers gave four usability-related reasons
  – users requested changes
  – designers overlooked tasks
  – users did not understand their own requirements
  – insufficient user-developer communication and understanding

Usability engineering is software engineering
• pay a little now, or pay a lot later!
• far too easy to jump into detailed design that is:
  – founded on incorrect requirements
  – has inappropriate dialogue flow
  – is not easily used
  – is never tested until it is too late
Cost to Fix a Problem

The time during development that you notice a change needs to be made

Foundations for designing interfaces

Overview
• Introduction to the course and to HCI

Understanding users and their tasks
• Task-centered system design
  – the task-centered process
  – developing task examples
  – task scenarios and walkthroughs

Designing with the user
• User centered design and prototyping
  – user centered system design
  – low fidelity prototyping methods
• Evaluating interfaces with users: qualitative methods
  – observe people using systems via various methods
  – detect inappropriate design and correct by iterative design
Foundations for designing interfaces

Designing visual interfaces
• Psychopathology/psychology of everyday things
  – what makes visual design work?
• Beyond screen design
  – representations and metaphors
• Graphical screen design
  – the placement of interface components on a screen

This is a great design!

Foundations for designing interfaces

Principles for design
• Design principles, guidelines, and usability heuristics
  – general design guidelines
  – using guidelines as heuristics to discover usability problems
• High-level models of human-computer behavior

Implementing Graphical User Interfaces (GUIs)
• Java, Visual Basic, etc.

Experimental design and HCI
• Evaluating interfaces with users: Quantitative methods
  – experimental design
  – controlled experiments
  – statistics

The past and the future
• History of HCI
• Visions of the future
Objectives

At the end of this course, you will

• know what is meant by “good design”

• know guidelines and models as well as how they can be applied to interface design

• know and have applied a variety of methods for involving the user in the design process

• have experienced building applications through various methods and systems

• know and have applied methods to evaluate interface quality

• have sufficient background to apply your training in industry and continue your education

How you will be evaluated

Homework: 17% of term grade
- There will be five homework assignments during the term. All homework are individual assignments. You may not discuss them with other students or receive outside help from anyone other than the instructor or teaching assistant.

Projects: 45% of term grade
- Projects will be done in groups of 3 or 4 students.

Exams: 30% of term grade
- There will be two exams during the term.
- The second exam might have some material that was covered earlier in the term.

Class Participation: 8% of term grade
- There will be various exercises done during class time. Participation in these exercises, along with contributions during class discussion will contribute to this portion of the grade.
- One part of this will be a Hall of Fame presentation in class.

Graduate Students: Additional details on syllabus...
### Text and additional references

**Required text**

**Recommended texts / readings**
- Will be posted to the web page and/or announced in class as the term progresses

**Course web site:**

### Readings for the week:
- Shneiderman: Designing the User Interface - Chapter 1
- Norman: The Design of Everyday Things - Chapter 1 (handout)