CMSC 434
Introduction to Human-Computer Interaction

Midterm Review Sheet
Midterm: Wednesday, March 14th, 2PM

Overview
As promised, here is a midterm review sheet. In general, you should be familiar with the content from the readings as well as that covered by the lectures. I will likely update this review sheet once more after Monday’s class.

Readings
- Vannevar Bush, As We May Think, The Atlantic, July, 1945. [link]
- Tom Kelley, “The Perfect Brainstorm” from Chapter 4 of The Art of Innovation [link]
- Jeanette Blomberg and Mark Burrel, “An Ethnographic Approach to Design” [link]
- IDEO Method Cards [link]
- Pages 9 - 28 in Don Norman’s “The Design of Everyday Things” covering affordances, visibility, mappings, and feedback [link]

Lecture Concepts
The full sixteen week semester is largely broken down into five parts:

1. Overview of design and the design process
2. User Research I: Techniques to understand users to inform design
3. Building the interface (e.g., design principles, user perception and cognition)
4. User Research II: Techniques to evaluate a design
5. Fun HCI stuff that I think is worth talking about (i.e., persuasive design, HCI history, state-of-the-art systems)

We have only covered parts 1, 2 and a portion of 3; thus the midterm will focus on those aspects. The following subsections highlight the main points from lecture that I think are most important. I do not guarantee that this list is comprehensive but knowing the following material combined with a strong grasp of the readings above should lead to a good score on the midterm. There will be no significant surprises on the exam; it will have a similar flavor to what we do in class. Know the material and you will do well.

High-Level HCI Concepts
- Be able to define HCI, its goals as a discipline and the fields that it heavily draws upon (Lecture 1)
- How does Moore’s Law relate to human abilities? How can HCI leverage Moore’s law? (Lecture 1)

**Ideation and Brainstorming**

- Be able to describe the hill climbing/simulated annealing metaphors used in class to describe the importance of brainstorming and iterative design (Lecture 3)
- Be able to describe Duncker’s (1945) “Candle Problem” experiment and the idea of functional fixedness. You don’t have to read the paper, just be familiar with the concept [link](link). The Wikipedia article is actually pretty good ([link](link)). (Lecture 3)
- Be able to describe Adamson’s (1952) follow-up experiment and the idea of preutilization. You don’t have to read the paper, just be familiar with the concept ([link](link)); see also Wikipedia link from above. (Lecture 3)
- Similar to what we did in class as a group on the whiteboard, be able to describe how IDEO nurtures a creative workplace
- Know the tenets of brainstorming (e.g., the Linus Pauling quote). You should pay special attention to rules #1, #2, #3 and #5 of the IDEO Brainstorming Rules (Lecture 3).

**Design and Design Process**

- Draw and understand design cycle diagrams (Lecture 1 and 2)
- What is iterative design? (Lecture 2)
- Be able to draw and understand the formative -> build -> evaluative cycle. (Lecture 6)
- What is the elaboration and reduction cycle in the design process? (Lecture 4)
- What is Greenberg’s 10Plus 10Method? How does this relate to the team project assignment #2? (Lecture 4)
- What are Norman’s principles of design? (Lecture 10 and 12)
- Understand and be able to describe: visibility, affordance, feedback, mapping, constraint, and consistency. (Lecture 10 and 12)
- Understand and be able to describe the four types of constraints (Lecture 13)
- Be prepared to do something similar to the design activity in Lecture 4 on the midterm.

**User Research**

- What is contextual inquiry? (Lecture 6 and 11; see also readings).
- What is the formative part of the design process? What is the evaluative part? (Lecture 6)
- Understand and be able to describe ethnography, interviews, surveys, diary studies, interaction logging and their various tradeoffs (e.g., in terms of macro vs. micro, statistical vs. interpretive) (Lecture 6)
- Be able to argue convincingly why we can’t just rely on a user’s words during the design process (Lecture 6)
- Similarly, be able to point out what users can tell you that few other techniques capture (Lecture 6)
- What is ethnographic-based design and what are four ethnographic principles? (Lecture 6)
- What is task analysis? (Lecture 11)
- What are some task analysis questions? (Lecture 11)
- How is task analysis useful to design? (Lecture 11)

**Sketching & Prototyping**

- Why sketch? (Lecture 4)
- Is drawing ability fundamental to sketching? (Lecture 4)
- What are some sketching techniques that we covered in lecture such as “manual photocopy,” “use of annotations,” “photographic composition”? Why is this important to sketching? (Lecture 4)
- What are some different levels of sketching fidelity? Why start on paper? (Lecture 4)
- What techniques can we use to sketch behaviors (i.e., image sequences, state transition diagrams, storyboards)? (Lecture 4)
- Be familiar with the Bayles and Orland “Ceramic Design Experiment” (Lecture 1)
- Know the differences between lo-fidelity and hi-fidelity prototyping including visual fidelity, functional fidelity and content fidelity. (Lecture 8)
- What are some of the benefits of evaluating paper prototypes rather than more refined versions of the interface (Lecture 4 and 8)
- Know the process that Larry Tesler and Bill Atkinson used to build the Apple Lisa UI (Lecture 8)

Mental Models

- What are mental models? What can contribute to a user’s mental model of a system? (Lecture 10)
- Be familiar with Susan Carey’s definition of a mental model. (Lecture 10)
- Be prepared to discuss an example from your own life when you (or a friend/family member) had generated an improper mental model of a system. See examples from Lecture 12.
- Be able to draw and describe Norman’s Designer -> System -> User conceptual model diagram (Lecture 10 and 12)
- How does a designer communicate with a user? (Lecture 10 and 12)
- What are affordances, constraints, mappings? (Lecture 10, 12 and 13)
- Can affordances affect behavior? (Lecture 10)
- How are affordances used in interfaces? (Lecture 10 and 12)

Representation

- What is semiotics? (Lecture 13 and 14)
- How can representation affect cognition? (Lecture 13 and 14)
- Why do so many interfaces rely on metaphors? (Lecture 13 and 14)

Perception and Visual Design

- TODO: may add content here depending on Lecture 14

Other

- What is the goal of the project this semester? (Lecture 2)
- What “IDEO Method Card” techniques did the IDEO employees use in their (re)design of the shopping cart?
- Why do we have speedometers and vehicle activated speed signs? (Lecture 13)
- Why has the Toyota Prius dashboard display been effective in allowing drivers to increase the efficiency of their driving behaviors? (Lecture 13)