CS 544
Human Computer Interaction (HCI)

www.cs.ubc.ca/~joanna/courses/CS544

Acknowledgement: Some of the material in these lectures is based on material prepared for similar courses by Saul Greenberg (University of Calgary), Ravin Balakrishnan (University of Toronto), James Landay (University of California at Berkeley), monica schraefel (University of Toronto), and Colin Ware (University of New Hampshire). Used with the permission of the respective original authors.

Administrivia

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  - Imager research lab

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  office hours: TBD

- TA: Barry Po (hopefully!)
Administrivia (cont’d)

- Registration status:
  - Have not registered?
  - Intend to register?
  - Thinking about registering?
- Office hours – which hours can you NOT make?
  - Mon 4:30 – 5:30 Wed 4:30 – 5:30
  - Tues 3:30 – 4:30 Tues 4:30 – 5:30
- HCI background:
  - Have taken an HCI course before?
  - Which course, where?

Who is considering doing research in HCI?
Those of you NOT in CS, please see me after class

Human-Computer Interaction (HCI)

- Human
  - the end-user of a program
  - the others in the organization
- Computer
  - the machine the program runs on
  - often split between clients & servers
- Interaction
  - the user tells the computer what they want
  - the computer communicates results
What is HCI?

*Design, Implementation and Evaluation* of interactive systems for HUMAN use.

Humans

Design

Tasks

Technology

These factors influence each other and design.
What is HCI?

These factors influence each other and design
- mice are default with new computers -> design can assume mouse as pointer?

Humans

Design

Tasks

Technology

What is HCI?

These factors influence each other and design
- People gain/change knowledge as they use technology ... they learn.
User Interfaces (UI’s)

Part of technology that allows users to
- Interact with the technology
- Carry out their task
- MUST be integral part

HCI sometimes (narrowly) thought of as the design, prototyping, evaluation, and implementation of UI’s for desktop computers

What is Usability?

- Ease of learning
  - faster the second time and so on...
- Recall
  - remember how from one session to the next
- Productivity
  - perform tasks quickly and efficiently
- Minimal error rates
  - if they occur, good feedback so user can recover
- High user satisfaction
  - confident of success
Why study HCI? Moore’s Law

Memory
Speed
Portability
Affordability

Computer Abilities

1950 1990 2030

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

Human Psychology

Computers

Human Abilities

0 A.D. 1950 1990 2030

(These slides are variations of those presented by Bill Buxton)
Why HCI? So you don’t build this:

Long intros belong in hall of SHAME!

- Doesn’t help users accomplish task
  - Why did they come to the site in the first place?
- Waste’s user’s time
  - Most just leave and never come back
  - 15 sec attention span on web!
- Entertainment value?
Do I have any choice?

What happens when you cancel a cancelled operation?
Why study HCI?

- You will be building “real” systems
  - That other people will use
- UI’s major part of most systems
  - Often over 50%
  - 50% of effort rarely on UI!
- Bad UI’s cost
  - money (your product will be a flop)
  - lives (planes crash, reactors blow up)
- Interfaces are hard to get right
  - understanding of human capabilities will help
  - understanding principles of design will help
Why study human use of computer systems?

- Business view:
  - to use humans more productively/effectively
  - the human costs now far outweigh hardware and software costs
- Personal view:
  - people view computers as appliances, and want it to perform as one
- Marketplace view:
  - everyday people using computers
    - now expect "easy to use system"
    - not tolerant of poorly designed systems
    - little vendor control of training
    - heterogeneous group
  - if product is hard to use, people will seek other products
    - eg Mac vs IBM (Microsoft Windows)

Why study human use of computer systems?

- The system view:
  - complex human
  - complex computer
  - complex interface between the two

- The human factors view:
  - humans have necessary limitations
  - errors are costly in terms of
    - loss of time
    - loss of money
    - loss of lives in critical systems
    - loss of morale
  - design can cope with such limitations!
Why study human use of computer systems?

- The social view:
  - Computers contribute to critical parts of our society, and cannot be ignored
    - educate our children
    - take medical histories and provide expert advice
    - keep track of our credit worthiness
    - play(?) war games (and help form policies)
    - control air and ground traffic flow
    - book travel
    - control chemical/oil/nuclear plants
    - control space missions
    - assist humans with their everyday tasks (office automation)
    - control complex machines (aircraft, space shuttles, super tankers)
    - help control consumer equipment (cars, washing machines)
    - entertainment (games, intellectual stimulation)…

*In all these views, economics and human best interests are aligned*

Who Builds Interfaces?

- A team of specialists (ideally)
  - graphic designers
  - interaction / interface designers
  - technical writers
  - marketers
  - test engineers
  - software engineers
  - customers
Foundations for building UI’s

- Design Cycle
- Psychology of everyday things
- Understanding users and their tasks
  - Task centered design
- Design principles, usability heuristics
- Designing with the user
  - User centered design
- Rapid prototyping
- Evaluation of the interface with users
  - Qualitative & quantitative
- Iteration

Design Cycle

A discipline concerned with the design, implementation, and evaluation of interactive computing systems for human use
Task analysis and design
- Observe existing work practices
- Create examples and scenarios of actual use of artifacts
- Try out new ideas with users before building anything if possible

User Centered Design
- Know thy user!
  - Cognitive abilities
  - Physical abilities
  - Memory
  - Perception
  - Job skills
- Keep users involved throughout the system building process
Psychology of everyday things
Design Principles & Hueristics

- What makes something obvious?
- How does it work by default?
- What is the user’s immediate reaction to it?
- Principles to guide our designs before they’re built?
- Hueristics to evaluate those designs before formal evaluation?

Rapid Prototyping

- Build mockup of design
- Low fidelity prototypes
  - Paper sketches
  - Video segments
  - Steal, cut, copy, paste!
- High fidelity prototypes
  - Somewhat working models
  - HTML, Hypercard, Director, physical media
  - Fake some of it
Evaluation

- “That’s cool!”, “I love it!” is NOT good enough
  - perception not always reality
  - conscious articulation not always behaviour
- Human behaviour & performance is complex
  - sometimes beyond analysis
  - individual differences
- Objective, quantitative, measures
- Qualitative techniques

Advanced Topics in HCI

- Working with video (not really a topic)
- Featurism - software bloat
- Adaptive and adaptable interface design
- Information Visualization
- Computer Supported Cooperative Work (CSCW)
- Ubiquitous computing
- Student presentations: tangible interfaces, augmented reality, virtual reality, mobile interfaces, large screen displays, single-display groupware, Computer-Supported Collaborative Learning, media spaces, universal usability, HCI and children, 3-D interaction techniques, software visualization, programming by demonstration, learner-centered design, social interfaces, multi-modal …
Course Objectives

- Know what is meant by good design
- Have an understanding of human capabilities, design guidelines, models, and how to apply them to interface design
- Know and have applied some methods for
  - Design
  - Prototyping
  - Evaluation
- Know how to involve a user in the process
- Be familiar with a number of advanced topics in HCI
- Know how to communicate your work
- Learn to write!
- Have background to
  - Apply this to work in industry
  - Begin research in the area

How you will be evaluated (tentative)

- Peer review and class participation (10%)
  - Fellow group members assessment of your contribution to the project
  - Contribution to class discussion and activities
- Two small assignments done individually (7.5% each)
  - Assignment #1: quick usability study of a e-commerce site
  - Assignment #2: a controlled experiment
- Advanced HCI topic assignment done individually (15%)
  - Synthesis of research in topic area
  - Short written report
  - Short class presentation
  - In English
- In-class test (15%)
  - Covers readings, lectures, discussion in class, assignments
- Group project (45%)
  - Design, prototype, implement, evaluate an interface for some technological artifact
  - Class presentation during scheduled exam period
Texts and Readings

- Main text (BGBG):
  - Baecker, Grudin, Buxton, Greenberg: Readings in Human-Computer Interaction. Morgan Kaufmann.
  - Two copies available for short term loan in CS Reading Room
  - Can also buy through Chapters or Amazon
  - Arthur Louie has a copy for sale (alouie@cs.ubc.ca)

- Additional references on web site
  - Many web links
  - A small number of other texts which will also be put on short term loan in the CS Reading Room

- Check course web site for weekly readings
  - Will be posted sometime the week before

- Lecture slides will be posted on web site

For next class, read:

- Intro to BGBG (pgs 1-3)