Lecture 1
Chapter 1 part 1: What is interaction design?
Christine Lisetti
Human-Computer Interaction
CAP 4304 / CAP 5309

Overview
- Short introductions
- Chapter 1 What is interaction design? – part 1
  - What is human-computer interaction (HCI) and why do we need it?
  - What is interaction design (ID)?
  - What is user experience (UX)
- Course syllabus
  - Assignments
    - Discussion of Individual Homework assignment H1:
      - Website creation, Project Brainstorming, AngularJS start
      - Reading assignments for next class and for next week
    - Quiz 0
  - Note:
    - following these Lecture 1 Notes on Chapter 1 (part 1),
    - are Lecture Notes on Chapter 1 (part 2)

Short introductions
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Research interests
- Human-computer interaction with focus on
  - intelligent virtual agents and
  - affective computing
- Application areas:
  - health avatars and
  - 3D simulation for learning social skills

And now about you...
- In 15 seconds, tell us:
  - your name
  - your level: Graduate or Undergraduate

What is Human-computer interaction (HCI) and why do we need it?
Why was HCI needed?

• In the late 1970s and early 1980s, shift:
  • from
    • large computers in secured rooms
    • operated only by engineers
  • to
    • small computers
    • operated by people without a technical background
    • in homes and workplaces
• So
  • ease of use,
  • the human side,
  • user acceptance,
  all became more important!

HCI: a working definition

• A discipline “concerned
  • with the design, evaluation, and implementation of interactive computing
    systems for human use and
  • with the study of major phenomena surrounding them” (ACM SIGCHI, 1992)

Constraints of people matter

• Technology was the constraint for years
• But now it’s not
  • User needs/goals (“domain knowledge”)
  • User capabilities
  • User context (including groups)
  • User values

An HCI attitude: users first

Out of the way, hacker! A user is coming!!!

LUSERs

• Programmers versus “normal people”

This was ok-ish...

• ...when only programmers used computers
Changes in HCI research

• The main topics of HCI have shifted over time:
  • 1980s
    • Word processing and database interfaces
  • 1990s
    • Web usability, e-mail, groupware
  • 2000s
    • User-generated content, tagging, social networking
  • 2010s
    • User experience, interaction design, aesthetics, emotions, virtual agents

What is interaction design?

Dilemma

• Which is the best way to interact with a smart TV?
  • Standard remote device?
  • Apple slimline remote control?
  • Minuum’s new keyboard?

What to design

• Need to take into account:
  • who the users are
  • what activities are being carried out
  • where the interaction is taking place

• Need to optimize the interactions users have with a product
  • so that they match the users’ activities and needs

Understanding users’ needs

• Need to take into account
  • what people are good and bad at

• Consider
  • what might help people in the way they currently do things

• Think through
  • what might provide quality user experiences

• Listen to
  • what people want and get them involved

• Use
  • tried and tested user-centered methods

Domain knowledge isn’t enough
Human capabilities matter

- Physical abilities
  - Human factors
  - Perception

- Mental abilities
  - Psychology
  - Linguistics

So what is interaction design?

- “Designing interactive products to support the way people communicate and interact in their everyday and working lives.”
  - Preece, Sharp and Rogers (2015)

- “The design of spaces for human communication and interaction.”
  - Winograd (1997)

Is interaction design beyond HCI?

- Main difference between Interaction Design (ID) and Human-Computer Interaction (HCI)
  - Is one of scope
  - ID has much wider net
  - ID is concerned with
    - the theory
    - research, and
    - practice of designing user experiences for all manner of technologies, systems and products
  - HCI traditionally had a narrower focus (see definition earlier)

Goals of interaction design

- Develop usable and enjoyable products
- Usability means
  - easy to learn
  - effective to use and
  - provide an enjoyable experience
- Involve users in the design process

Which kind of design?

- Number of other terms used emphasizing what is being designed, e.g.
  - user interface design
  - software design
  - user-centered design
  - product design
  - web design
  - experience design (UX)

- Interaction design is the umbrella term covering all of these aspects
  - fundamental to all disciplines, and
  - approaches concerned with
    - researching and designing computer-based systems for people

Relationship between ID, HCI and other fields

Academic disciplines contributing to ID:
- Psychology
- Social Sciences
- Computing Sciences
- Engineering
- Ergonomics
- Informatics
Relationship between ID, HCI and other fields

Design practices contributing to ID:
- Graphic design
- Product design
- Artist design
- Industrial design
- Film industry

• Interdisciplinary fields that ‘do’ interaction design:
  - HCI
  - Ubiquitous Computing
  - Human Factors
  - Cognitive Engineering
  - Cognitive Ergonomics
  - Computer Supported Co-operative Work
  - Information Systems

Working in multidisciplinary teams

- Many people from different backgrounds involved
- Different perspectives and ways of seeing and talking about things
- Benefits
  - more ideas and designs generated
- Disadvantages
  - difficult to communicate and progress forward the designs being created

What about the user experience (UX)?

The User Experience

- How a product behaves and is used by people in the real world
  - the way people feel about it and their pleasure and satisfaction
  - when using it, looking at it, holding it, and opening or closing it
  - “every product that is used by someone has a user experience:”
    - e.g. newspapers, ketchup bottles, reclining armchairs, cardigan sweaters.” (Garrett, 2010)
    - “all aspects of the end-user’s interaction with the company, its services, and its products.” (Nielsen and Norman, 2014)
  - Cannot design a user experience
    - only design for a user experience

Why was the iPod user experience such a success?

- Quality user experience from the start
  - simple
  - elegant,
  - distinct brand
  - pleasurable
  - must have fashion item, catchy names
  - cool, etc.
The User Experience

- But it’s not just the Model Human Processor
- Emotions matter

Beauty matters, flow matters

- Concept of flow (Csikszentmihalyi, 1997) refers to
  - state of intense emotional involvement
  - that comes from being completely involved in an activity (e.g., playing music)
  - and where time flies
- Instead of designing web interfaces to cater for visitors who know what they want,
- induce a state of flow,
- leading the visitor to some unexpected place,
- where they become completely absorbed

Context matters

- People have other values, things to do
  - economics
  - philosophy and critique and culture
  - programmers forget this! But they shouldn’t
Doing things... in context

Course syllabus

Course Objectives

- Upon successful completion of this course, students should be able to:
  - Describe and apply core methodologies from the field of HCI
  - Define a user-centered design process that explicitly takes account of the fact that the user is not like the developer or their acquaintances
  - Design, prototype, implement and evaluate usable and satisfying graphical interactive computer interfaces
  - Implement simple graphical user interfaces using AngularJS

My personal goal for you in the course

- In addition to content-specific objectives reflected by the topics in the course calendar, I have these personal goals for each student:
  - to get you to think deeply and carefully about the subject,
  - to help you to genuinely like the subject,
  - to provide knowledge and skill useful to you in your career following life in college,
  - to engender a deeper interest (perhaps in some of you) that can be pursued beyond this course, and
  - to have a little fun in the process.

Class time

- Class time will be split between
  - content-based lectures
    - devoted to covering course materials, sometimes highlighting or skimming through the slides.
  - in-class activities.
    - provide an initial opportunity for experience with the interaction design (ID) development lifecycle activities.
  - Outside of the classroom, you will acquire more in-depth hands-on experience in individual assignments and a term project.

Class time

- In summary, it is our goal for you to master the development activities of the ID lifecycle process.
- You are exposed to each activity in several ways.
  - So you will need to
    - first read the book before the lecture on the topic, according the schedule on the course website
    - then I will review the highlights in lectures, and you will get some initial practice via in-class exercises.
    - Finally, you will apply them in a more realistic hands-on situation through
      - individual homework assignments, and a
      - semester-long team project assignments.
Prerequisites

• Undergraduate students must have successfully completed Programming II (COP-3337).
• All students must be able to
  • program in a high-level programming language, and
  • become proficient on their own in the basics of AngularJS by the middle of the semester.

Textbooks

• Required
  • Additional reading material will be provided on the course website.

• Optional References

Grading

• Quizzes 10%
• Class participation 10%
• Individual Homework 20%
• Term project 35%
• Final Exam 25%

Reading assignments

• You will be responsible for
  • keeping up with readings in the book per the schedule given in the course calendar.
  • setting your own reading pace to keep ahead enough to be prepared for class discussions and exercises.
  • knowing where we are in our class discussions,
  • with respect to finding your place in the class lecture slides.

Quizzes

• Quizzes will cover the material of the previous and current week.
• No make-up quizzes will be given.

Class participation

• Getting full credit for the in-class exercises is easy.
• This is truly a case where showing up is half the battle.
• Just be there and be willing to participate in each in-class activity and do a good job of it.
• In assessing the "do a good job" part of this activity for each individual, I will be looking for:
  • Presence or absence of the individual
  • Preparedness, knowledge of material
  • Care and correctness in applying it
  • Intangibles (getting into role, etc.)
Homework

- Homework assignments will be individual assignments
  - available on the course website, and
  - due at the beginning of class according to the course schedule listed on the website.

- Students in CAPS109 will have an additional assignment
  - to conduct a small literature review related to their term project,
  - based on selected reading material.

Term projects

- Students will work on their term project in teams,
  - formed early at the beginning of the semester.

- The term project will involve
  - designing,
  - implementing, and
  - evaluating a system in terms of the concepts and using the methodologies discussed in class.

- Students will incrementally go through the phases of the interaction design (ID) Lifecycle, including
  - requirements gathering and analysis,
  - design,
  - paper prototyping,
  - computer prototyping, and
  - several methods of usability analysis and evaluation.

- The course will also involve the implementation of simple user interfaces using AngularJS.

Final exam

- There will one exam:
  - a two-hour final exam pre-scheduled on PantherSoft during final week.
  - It is currently scheduled on Thursday 04/27/2017 9:45 am - 11:45am (I do not schedule final exams, FIU does).
  - You can already check the time and classroom on your PantherSoft account under this course.
  - No make-up exams will be given, no exception.

Course website

- Website: www.cis.fiu.edu/~lisetti/hci
  - ID:
  - Password:

Assignments

Individual Homework assignment (H1)

a. Administrative
  - Pick three different project ideas that you would be interested in working on
  - make a rough sketch of a user interface (a scanned or photographed sketch on paper is best)
  - and write a 1 paragraph proposal for each, further fleshing out the idea.
  - Create one Adobe .pdf file for each project idea (use the le name convention: hw1-idea1.pdf, hw1-idea2.pdf, hw1-idea3.pdf)
  - Post your write-ups and sketches for each idea on your web page in your order of preference
  - These will be used to help form project teams.

b. Brainstorming Assignment
  - Create a personal course web page with your name and email address at the at the top and
  - post it to a server: The School of Computing & Information Sciences (SCIS) provides students with a webserver available to host your own website (see instructions on assignment posted website).

c. AngularJS
  - Start working your way through AngularJS tutorial (angularjs.org)

Go to www.cis.fiu.edu/~lisetti/hci/homework.html for details and further instructions
Reading Assignments for next class and for next week

- Reading Assignment for next class
  - Course Syllabus handout
  - Course Schedule on our website at URL: [www.cis.fiu.edu/~lisetti/hci/schedule.html](http://www.cis.fiu.edu/~lisetti/hci/schedule.html)
  - Chapter 1 - What is interaction design
    - skim through it
  - Lecture Notes (Powerpoint slides) on Chapter 1
    - go to [www.cis.fiu.edu/~lisetti/hci/ch1slides.html](http://www.cis.fiu.edu/~lisetti/hci/ch1slides.html)
    - download the slides from the link under the first topic: "Overview of HCI and ID"

- Reading assignment for next week
  - Chapter 9 – The Process of Interaction Design (i.e. ID lifecycle)

QUIZ 0 – demographics and feedback

- Getting to know you...
- Getting some feedback from you

Lecture 2
Chapter 1 (part 2): What is interaction design?

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CAP 4104 / CAP 5109

Overview

- Discussion of Team Project Assignment 1 (P1) - Find a Project
- Interaction Design (ID) process introduction
- from Usability to User eXperience (UX)
- Design rules and principles

Discussion of Team Project Assignment 1 (P1)

- Team Project Assignment 1 (P1) - Find a Project
  - See [https://users.cs.fiu.edu/~lisetti/hci/projects.html](http://users.cs.fiu.edu/~lisetti/hci/projects.html)

Interaction Design Process introduction
What is involved in the process of interaction design?

- Establishing requirements
- Developing alternatives
- Prototyping
- Evaluating

Core characteristics of Interaction Design

- Users should be involved through the development of the project
- Specific usability and user experience goals need to be identified, clearly documented and agreed at the beginning of the project
- Iteration is needed through the core activities

Why go to this length?

- Help designers understand how to design interactive products that fit with what people want, need and may desire
- Appreciate that one size does not fit all: e.g., teenagers are very different to grown-ups, identify any incorrect assumptions they may have about particular user groups e.g., not all old people want or need big fonts
- Be aware of both people’s sensitivities and their capabilities

Are cultural differences important?

- 5/21/2015 versus 21/5/2015?
  - Which should be used for international services and online forms?
- What other cultural conventions that can be relevant in a user interface?

Accessibility

- Degree to which a product is usable and accessible by as many people as possible
- Focus on disability: have a mental or physical impairment, this has an adverse affect on their everyday lives, it is long term

Anna, IKEA online sales agent

- Designed to be different for UK and US customers
- What are the differences and which is which?
- What other differences could you envision would help improve the UI, and why do you think so?
Why worry about UX?

- Ubiquitous interaction
- Usage by very young to really old
- Rise of demand for usability
- Evolving concept of usability to richer concept of user experience

From Usability to UX

- **Usability** (also known as usability engineering) has always been about
  - making usage easy for everyone
  - making everyone productive in usage

Six (6) usability goals

1. Effective to use
2. Efficient to use
3. Safe to use
4. Have good utility
5. Easy to learn
6. Easy to remember how to use

- We will learn later on in the course, methodologies to assess usability

Interaction Design and User Experience

- Progression of a maturing discipline
  - from
    - narrow focus on task performance
  - to
    - overarching characteristics of entire user experience
    - for which emotions and feelings are key

- More recently, user experience goals concerned with
  - explicating the nature of the user experience
  - e.g. to be aesthetically pleasing, emotionally pleasing

Changing concept of computing

- More recently, user experience goals concerned with
  - explicating the nature of the user experience
  - e.g. to be aesthetically pleasing, emotionally pleasing
Changing concept of interaction

"The world is not a desktop" — Tscheligi, 2005 (paraphrasing Mark Weiser)

From very young to really old

- Age of youngest effective computer user?
- Age of oldest computer users?

User experience goals

- Cover a range of emotions and felt experiences
  
  Desirable aspects: satisfying, enjoyable, pleasurable, exciting, entertaining
  
  Undesirable aspects: boring, frustrating, making one feel guilty, annoying, childish

  Affective: helpful, motivating, enhancing sociability, supporting creativity, cognitively stimulating
  
  Fun: fun, provocative, surprising, rewarding, emotionally fulfilling

Rising importance of UX

- From having to cost-justify usability
- To having UX drive the industry

- The past years have seen:
  
  • explosion of UX case studies
  • increased intolerance for bad design
  • upsurge of interest in design
  • awareness and demand from marketing
  • industry adoption of need for design for UX
  • rich and fast expanding research areas

Usability and user experience goals

- Selecting terms to convey a person’s feelings, emotions, etc.,
  
  Can help designers understand the multifaceted nature of the user experience

- How do usability goals differ from user experience goals?

- Are there trade-offs between the two kinds of goals?
  
  • e.g. can a product be both fun and safe?

- How easy is it to measure
  
  • usability goals
  • user experience goals?

How is User Experience more than Usability?

- User experience is the totality of effects felt by user
  
  • as result of interaction with system, device, or product
  • within usage context

- User experience does not replace usability
  
  • usability still essential
  • now usability is part of user experience
  • usability is pragmatic component

- Components of UX
  
  • usability
  • usefulness
  • emotional impact
from Usability to User eXperience - Example

• The progression of thinking about usability
• An example:
  • User to zoom in on map image
  • Old days
    • command language input

from Usability to User eXperience - Example

• Command via pull-down menu

from Usability to User eXperience - Example

• Direct manipulation, click on “+” or “-” icon

from Usability to User eXperience - Example

• Embodied,
  • finger gesture
  • multi-touch
• Makes you realize that
  • direct manipulation with a mouse
  • is not so direct

Branding is part of UX

• Icons, logos, brands
• Can mean much more than just the product they represent

Design Principles
Design Principles

- Design principles are
  - generalizable abstractions for thinking about different aspects of design
  - do's and don'ts of interaction design
- Derived from a mix of
  - theory-based knowledge
  - experience and
  - common-sense

Golden rules and Heuristics

- "Broad brush" design rules
- Useful check list for good design
- Better design using these than using nothing!
- Different collections e.g.
  - Nielsen’s ten Heuristics (see Preece’s Chapter 9)
  - Shneiderman’s eight (8) Golden Rules
  - Norman’s seven (7) Principles

Visibility

- Try to ensure that things are visible so that people can see
  - what functions are available and
  - what the system is currently doing
- This is an important part of the psychological principle that
  - it is easier to recognize things than to have to recall them
- If it is not possible to make it visible
  - make it observable
- Consider making things ‘visible’
  - through the use of sound and touch

Visibility example in Screen design

- Screen design is a key issue in such environments
- Attention needs to be paid to the layout of objects on a screen
- Avoiding clutter will help to ensure visibility
- Attention needs to be paid to the use of
  - appropriate, non-clashing colors and
  - careful layout of information using tables, graphs or text
- However on mobile windows applications visibility is very difficult to achieve

Visibility

- This is a control panel for an elevator
- How does it work?
  - Push a button for the floor you want?
    - Nothing happens
  - Push any other button?
    - Still nothing
- What do you need to do?
  - It is not visible as to what to do!
Visibility

...You need to insert your room card in the slot by the buttons to get the elevator to work!

• How would you make this action more visible?
  • make the card reader more obvious
  • provide an auditory message, that says what to do (optional language)
  • provide a big label next to the card reader that flashes when someone enters
  • make relevant parts visible
  • make what has to be done obvious

What do I do if I am wearing black?

• Invisible automatic controls can
  • make it more difficult to use

Feedback

• Sending information back to the user about what has been done

• Includes
  • sound
  • highlighting
  • animation and
  • combinations of these
    • e.g. when screen button clicked on, provides sound or red highlight feedback

Constraints

• Restricting the possible actions that can be performed
  • e.g. greying out items on a menu that are not relevant at a particular point

  • Helps prevent user from selecting incorrect options

• Physical objects can be designed to constrain things
  • e.g. only one way you can insert a key into a lock

Logical or ambiguous design?

• Where do you plug the mouse?

• Where do you plug the keyboard?

• Top or bottom connector?

• Do the colour coded icons help?

How to design them more logically

• Design A
  • provides direct adjacent mapping between icon and connector

• Design B
  • provides colour coding to associate the connectors with the labels
Consistency

• Design interfaces to
  • have similar operations and
  • use similar elements for similar tasks
    - e.g. always use ctrl key plus first initial of the command for an operation
      - e.g. ctrl+C, ctrl+S, ctrl+O
  • Main benefit is consistent interfaces are easier to learn and use

When consistency breaks down

• What happens if there is more than one command starting with the same letter?
  - e.g. save, spelling, select, style

• Have to find other initials or combinations of keys, thereby breaking the consistency rule
  - e.g. ctrl+S, ctrl+Sp, ctrl+shift+L

• Increases learning burden on user, making them more prone to errors

Internal and external consistency

• Internal consistency refers to
  • designing operations to behave the same within an application
  • difficult to achieve with complex interfaces

• External consistency refers to
  • designing operations, interfaces, etc., to be the same across applications and devices
  • very rarely the case, based on different designer’s preference

A case of external inconsistency

• Keypad numbers layout

(a) phones, remote controls

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(b) calculators, computer keypads

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Affordances: to give a clue

• Refers to an attribute of an object that allows people to know how to use it, e.g.
  • a door handle affords pulling
  • chairs afford sitting on
  • post-it notes afford writing a message on and sticking next to something else
  • a mouse button invites pushing; make buttons look like buttons so people will press them

• Affordances are culturally determined

• In interaction design how to design interface objects, e.g.
  • scrollbars to afford moving up and down
  • icons to afford clicking on

What does ‘affordance’ have to offer interaction design?

• Interfaces
  • are virtual and
  • do not have affordances like physical objects
  • Norman argues it does not make sense to talk about interfaces in terms of ‘real’ affordances
  • Instead interfaces are better conceptualized as ‘perceived’ affordances
  • Learned conventions of arbitrary mappings between action and effect at the interface
  • Some mappings are better than others
Virtual affordances

• How do the following screen objects afford?
• What if you were a novice user?
• Would you know what to do with them?

Summary of design rules

Principles for usability

• repeatable design for usability relies on
• maximizing benefit of one good design
• by abstracting out the general properties which can direct purposeful design
• success of designing for usability requires both
• creative insight (new paradigms) and
• purposeful principled practice

Using design rules

• standards and guidelines to direct design activity

Key points

• Interaction design is concerned with
  • designing interactive products
  • to support the way people communicate and interact in their everyday and working lives
• It is concerned with how to create quality user experiences
• It requires taking into account a number of interdependent factors, including
  • context of use
  • type of activities
  • cultural differences and
  • user groups
• It is multidisciplinary
  • involving many inputs from wide-reaching disciplines and fields

Credits: some of the slides in this lecture were borrowed from Dr. Cosley’s HCI course.

Assignments

Assignments for next class

• Reading assignments
  • Chapter 1 [skim only]
  • Lecture notes on Chapter 1 [read fully]
  • Chapter 9 – Process of Interaction Design

• Quiz 1
  • if you have Chapter 9 to read for next week,
  • Quiz 1 will be solely on the content of these Lecture Notes on Chapter 1 (part 1 and 2)
  • i.e. it will not be material from the book on Chapter 1, that is not in this set of Lecture Note slides