CS 464- Intro to Human-Computer Interaction

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Spring 2017

Adapted from materials originally created by Prof. Jamie Ruiz

Learning objectives:
1. Understand the focus of the class and its purpose
2. Understand instructor expectations
3. Learn topics we'll cover

GOAL: Become critical of technology and understand users must come first.

<table>
<thead>
<tr>
<th>Tech Radar</th>
<th>CNET</th>
<th>PC Magazine</th>
<th>Digital Trends</th>
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<tbody>
<tr>
<td>iPad Pro 9.7</td>
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<td>Acer Aspire</td>
<td>iPad Pro 9.7</td>
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<td>Google Pixel C</td>
<td>Google Pixel C</td>
<td>Amazon Fire HDX</td>
<td>Galaxy Tab 5</td>
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<td>Galaxy Tab S</td>
<td>iPad Mini 4</td>
<td>Asus Transformer</td>
<td>Huawei MateBook</td>
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<td>iPad Mini 4</td>
<td>MS Surface Pro 4</td>
<td>Lenovo IdeaPad</td>
<td>Galaxy Tab S28</td>
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<td>Sony Xperia Z4</td>
<td>iPad Air 2</td>
<td>MS Surface Pro 4</td>
<td>iPad Mini 4</td>
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<td>iPad Pro</td>
<td>Sony Xperia Z4</td>
<td>Nvidia Shield</td>
<td>Google Pixel C</td>
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<td>Nexus 9</td>
<td>Galaxy Tab S</td>
<td>iPad Pro 9.7</td>
<td>Dell Venue 8</td>
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<td>Sony Xperia Z3</td>
<td>Amazon Fire HDX</td>
<td>HP Pavilion</td>
<td>MS Surface Pro 4</td>
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<td>Galaxy Tab S</td>
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What do you want to do with it? 2016 shows wider price ranges, better processor/battery, thinner, lighter – all to enhance mobile experience
Replace a laptop -> MS Surface
Apps: -> Apple (100's K)
Windows (>100K touch tablet, millions desktop*)
Android (100s, some phone apps, not on 10")
Web, ebook – resolution -> iPad Pro
Weight – large ~ 1lb; can't hold well with 1 hand
WiFi/Cellular: can pair some with phone as hotspot

Very Old Computers

In the 1950s:
- 1 computer weighs as much as 10 buses
- Uses as much power as 30,000 light bulbs
- Needs its own air conditioning system
- Performs 750,000 instructions/second


Computation

- CPUs can process billions and billions of instructions every second
- Hard disks/SSDs can store lifetimes of memories
- Computation can be packaged in forms both large and small
- Networking, portability provide access to computation nearly anywhere
- Rich sensors provide new interaction possibilities

Segway
A technological marvel...
...that is still looking for the right audience
You can build great technology...
...but unless it meets a real user need, is useful, usable, and melds with the users’ culture, it won’t be adopted
The Segway is banned in England and various regions in the U.S. Why?
Cultural resistance – what is it?
does it need vehicle registration?
insurance? lights?

Without Focusing on Users...
Technology just happens...
...and it can be rather cumbersome when it “just happens”
But if You Understand Your Users...

But if you understand your users, there can be hidden costs due to the design of technology.

Example:
- Requiring users to register prior to making a purchase cost an online vendor $300 million/year in sales (Spool, 2009)

Without Focusing on Users...

The question is no longer, “Can we build it?”

The questions now are, “What are we going to build...”
“...and why?”

Designing Technology

Designing useful, usable, elegant, exciting, and desirable technology is hard.

It is critical to understand users in depth:

Their needs, motivations, desires, skills, existing knowledge, expectations, constraints, culture, and their goals.

This Course

• Will teach you skills and knowledge to develop innovative technology that meets users’ needs
• You will learn to become sensitive to people’s real needs
• Our primary units of concern will be people and their tasks
  – How can we make their lives better?
• In contrast to other CS courses, technology will take a back seat to people

Designing Technology

If you understand users’ true needs independent of technology, you stop thinking in terms of existing technological solutions to a problem

...and start thinking in terms of how to solve the actual problem

When you understand users at this deep level, truly innovative technology can result
**My Background**

**Work:** 20+ years at Hewlett Packard and Agilent in tech support, R&D, HP Labs, and Agilent Labs (including Contextual Design projects at HP).

**Education:** Biomedical Engineering from U. of New Mexico, Masters and Ph.D. from CSU.

**Research:**
- Modeling and analysis of cross-cutting system properties in complex distributed and human-adaptable systems.
- Requirements modeling techniques including adapting the psychological framework of Activity Theory to such systems.

**Teaching interests:** Software engineering and design (CS 314, 517), application of active learning and flipped classroom techniques in applied classes.

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**Class Topics**

- HCI (and this course) draws upon a number of disciplines
- Anthropology
- Psychology
- Design disciplines
- ...and Computer Science
- You will learn and apply methods from each
Course Expectations

- This class will use **active learning techniques and learner-centered instruction** such as flipped classroom to provide opportunities for increased student engagement and application of critical thinking skills in the learning process.
- Learning objectives are stated at the beginning of each class; class participation is designed to help you achieve them.
- Proper preparation and class participation will be critical to your success in this class.

Class participation is 12% of your final grade in CS 464.

Course Expectations

- You will attend all classes, arrive on time, and focus on the discussion, not on other assignments or anything else.
- You will be challenged in this class; the project and in-class activities require the same skills as those you will need in your job. You need to apply critical thinking to master these and related skills.
- You are juniors and seniors; we expect you to take the initiative and leadership in your education.

Course Materials

- Webpage: [http://www.cs.colostate.edu/~cs464](http://www.cs.colostate.edu/~cs464)
  - Home page (News)
  - Progress page
    - Topics and the order in which we will cover them
    - Readings required for topic discussions, in-class activities, and quizzes**
    - Assignment postings and due dates
    - Project deliverable due dates
  - Syllabus
- iClicker – bring to every class!
- Required Text: Contextual Design (2 copies on 2-hr Reserve at the library)
- Additional Readings on Electronic Reserve or available from Canvas
- Piazza

** YOU are responsible for coming to class having done any necessary reading or other work required to participate in class. We will NOT cover everything for which you are responsible in lectures. Why? We want to give you as many opportunities to practice the skills you are learning and master them while we are available to help you.

Grading

<table>
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<th>Activity</th>
<th>Weight</th>
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<tr>
<td>Class Participation (Quizzes/in-class activities/discussions)</td>
<td>12%</td>
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<tr>
<td>Assignments (3)</td>
<td>8%</td>
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<tr>
<td>Test 1</td>
<td>20%</td>
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<tr>
<td>Test 2</td>
<td>20%</td>
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<tr>
<td>Term Project (proposal and 3 parts, in-class presentations for each part, individual in-depth evaluation of another team’s submissions for the first 2 parts)</td>
<td>40%</td>
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IN ORDER TO PASS THE COURSE WITH A ‘C OR BETTER’, YOU MUST HAVE A ‘C’ OR ABOVE AVERAGE ON EXAMS AND HAVE SUCCESSFULLY COMPLETED ETHICS TRAINING (Assignment 2). NO EXCEPTIONS!

There are no make up exams, quizzes, or in-class activities/discussions. If you have a University-sponsored event that conflicts with class, you must let me know at least a week in advance and I will work with you.
Class Participation
Quizzes & In-class Activities/Discussions
Short unannounced quizzes (usually iClicker) will be given in class throughout the semester.
- The intent is to review material covered in reading assignments or earlier lectures and/or motivate material to be covered in class.
In-class activities are designed to practice skills and give quick feedback on student work. Credit will be based on team results and on individual self-evaluations done at the end of class.
In-class discussions will be used to share ideas and experiences and to increase understanding of discussion topics.
Receiving credit in this category will require you to read and prepare beforehand. Arriving late or unprepared will result in no credit and/or you being asked to leave.

Micro-surveys
- Given at the end of each class; used to provide us feedback; we will use them for future lectures.
  - On days with class activities when we have self-evaluations you can include the micro-survey as part of the self-evaluation, or turn it in anonymously separately.
  - You will provide a list of:
    - 3 concepts that you understood well, based on the learning objectives of the day.
    - 3 concepts that you don’t understand well.
    - Every class, bring paper to write your lists:
      - As class progresses, add to your lists.
  - For guest lectures:
    - 3 concepts you understood well.
    - 3 things you’d like to hear more about.
- Additional micro-survey on Ethics (see Assignment 2).

Assignments
Due in Canvas by 5:00 pm unless otherwise stated
1: Getting to know you
  - DUE in class Mon Jan 23
2: Ethics in human subject research
  --- REQUIRED TO PASS CS 464
  - DUE Fri Jan 27
3: User Experience critique: Autonomous Vehicles
  - DUE Fri Mar 24

Exams
Given in 2 parts:
- Team portion for the team to work on and answer during class the Monday of the exam week, following the review.
- Individual portion of the exam to be taken in class the Wednesday of the exam week.
- Team portion of the exam is open book.
- Individual portion of the exam is closed book, closed notes EXCEPT for one 8.5” x 11” paper containing any notes the student wants to bring to the exam
Project: Overview

• Project groups – DUE in CLASS WED Jan 25, also in CANVAS
• Project proposal – DUE in CANVAS FRI Feb 3
• 3 primary phases:
  – Field studies (observations and interviews) & Analysis
  – Design
  – Evaluation and re-design
• You will need to work with real users for each phase of the project so you must coordinate with people outside your project.
  – Finding users to study is hard. Start thinking now. A great user group can lead to highly innovative, valuable projects.
  – Don’t underestimate time needed to work with others…
• Project has a very aggressive pace at the beginning, including readings in the Contextual Design textbook to get you past these challenges to get to the “good stuff” faster.

Carefully read ALL the project webpages ASAP!

Project: Deliverables

• Each phase marked by a group presentation and a written report. Phase 2 requires 3-min video, and Phase 3 requires a more in-depth video walk-through of your final high-fidelity prototype.
• You will present your current results as an e-poster and receive feedback from others during class.
  – Extremely helpful in honing your project.
• You will receive peer evaluation feedback covering the data collection/analysis and evaluation phases of your project.
  – Feedback should be incorporated into your work!

Project: Users

• The project focus is on creating useful, usable, and effective computational designs that demonstrably meet real-world needs.
• You will study real people with a specialty.
  – Start thinking about who you could interview and observe as they work.
• Your study of their practices will generate needs, then designs.
• Ideal User Groups:
  – People with a profession you know nothing about:
    • Wet lab scientists
    • Chemists
    • Physicists
    • Accountants
  – Choose people with whom you can interact throughout the term.
  – The more different they are from you, the easier your job will be.

Project: Scope

• Fully functional systems are not necessary.
• High-fidelity prototype must demonstrate full interaction design of your system.
• You have extreme latitude in the final forms the computational system can take.
  – Mobile devices, wall-based devices, computation embedded in the environment.
  – Whatever form factor best meets identified user needs.
• However, no “magical” systems. Must be demonstrably feasible using current technology.
Project: Examples

Jump: Tangible user interface to support architectural technologists
(University of Waterloo, 2007)

Project: Examples

Scripting support for Microbiology research using large data sets and non-streamlined bioinformatics methodologies (CS464, 2016)

What it takes to succeed in CS 464

- You are required to work at least 12 hours per week outside of class.
  - Required readings, field interviews and team meetings to create, analyze, and use collected data in design will likely increase this number.
- Work on assignments and the current part of the project every day.
  - You cannot succeed if you wait for inspiration to strike.
- Reflect about how to improve the way you work and how you work as a team during and when you finish each part of the project.

How to fail CS 464

- Believe that this class will be easy and that you can learn by only coming to class or memorizing facts.
  - Anyone can look up facts on Google. To be able to truly contribute and make a difference you must demonstrate mastery and critical judgement skills over what you learn.
- Missing classes.
  - You cannot make up missed class work.
- Not coming to class prepared.
  - You will not be able to contribute to discussions/activities, you will not receive credit for class participation, and you may be asked to leave.
- Procrastinating.
  - Every part of the project requires substantial meeting time with end users; these meetings can be hard to schedule.
  - Your team must work together to analyze data, create models, design interactions, analyze evaluation data, and etc. While the CS 464 lab hour exists for this purpose, you may need more time. Your team also has to agree on this time.
Other pitfalls

• Poor course management.
  – Understand the commitments needed for each of your courses, carefully plan when you take them - give yourself the opportunity to succeed.
• Not working on critical items, but rather working on minor topics.
  – Spend your time wisely.

Laptops, cell phones, tablets, and other electronic devices in class

Unless directed specifically for an in-class activity:

• Only use a laptop/tablet/other electronic device to take notes.
  – Turn off wireless.
• Laptop/tablet users:
  – Sit in the back row starting from the corners.
• Put away your cell phone!
  Disregarding any of these policies may result in being asked to leave.

Help us help you

• End of class micro-surveys:
  – Problem areas for the majority of the class will be discussed in the next class.
  – Additional problem areas may be addressed using Piazza, email, or some other means.

Getting help

• You can have discussions with the me, Guru, and your peers.
• Take advantage of Piazza.
• Sometimes issues may come up:
  – We can help you initially to figure out how to solve the problem. If you need help, please ask.
  – You should then proceed to solve the problem yourself.