

# #1 Human-Computer Interaction



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# About myself

- Name
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- Education
  - B.Sc., Computer Engineering (2014 – 2018)
    - Amirkabir University of Technology, Tehran, Iran
  - M.Sc., Computer Science (2018 - 2020)
    - Insight Lab at Western University
  - Ph.D., Computer Science (2020 - Current)
    - Insight Lab at Western University

# Some courses from our lab

- Human-computer interaction (CS, since 1999)
- Information visualization (CS & LIS)
- Interacting with digital information (CS)
- Topics in health informatics (FIMS & CS)
- Design of digital cognitive games (CS & MIT)
- Information and cognitive technologies (LIS)
- Interactive learning (CS & MIT)
- Matter of technology (MIT)
- Knowledge management (LIS)
- Organizational learning (LIS)
- Multimedia and communications (CS)

**“The important thing is not to stop questioning.”**

-- Albert Einstein

**“He who asks a question is a fool for five minutes; he who does not ask a question remains a fool forever.”**

-- Chinese Proverb

# About you and this course

- Names (in class)
- Why are you taking this course?
- What do you expect to get out of this course?
- What do you think this course is about?
  - We will talk a lot about design, principles, methodologies, frameworks, ...
  - Interdisciplinary

# Lecture Style

- Question- and discussion-based
- Generating ideas, asking questions, and sharing experiences are encouraged
- Think of yourself as a designer or innovator

# Today's Lecture

- Overview of Human-Computer Interaction
  - Why HCI is important
  - Short history of the use of computers
  - A broad description of HCI
  - Characteristics of HCI practitioners
  - Six perspectives on why studying HCI is important
- Review of the course outline
  - Details of material, assignments, etc.

# Why HCI is important



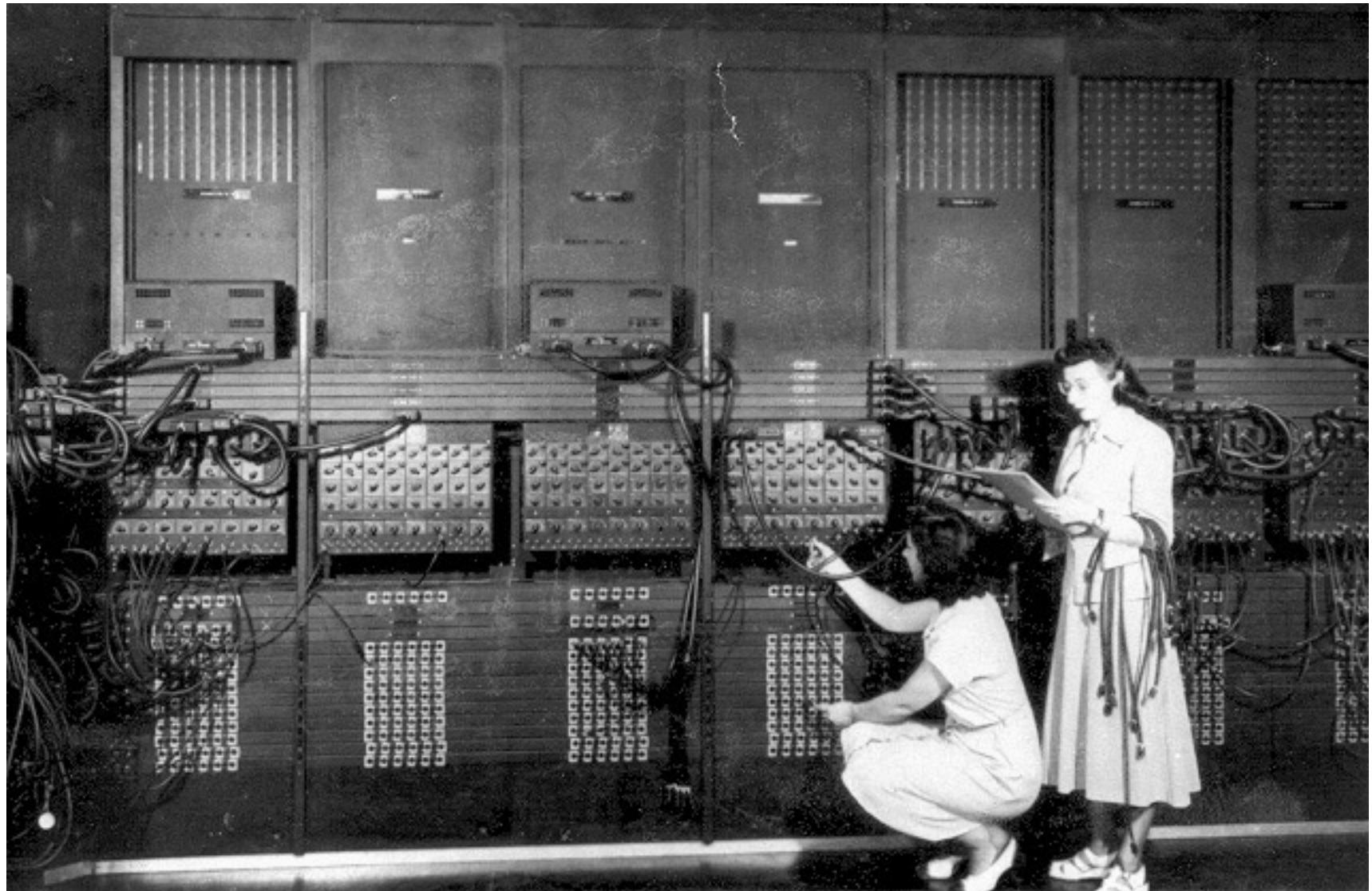
<https://www.youtube.com/watch?v=oO0yzTW62xQ>

# Why is HCI Important?

- Poorly designed interfaces have
  - Killed people
  - Contributed to major disasters
  - Influenced elections
  - Caused frustration and disappointment
  - Lowered productivity
  - ...
- Have you encountered any badly designed interfaces and tools? What was bad about them?

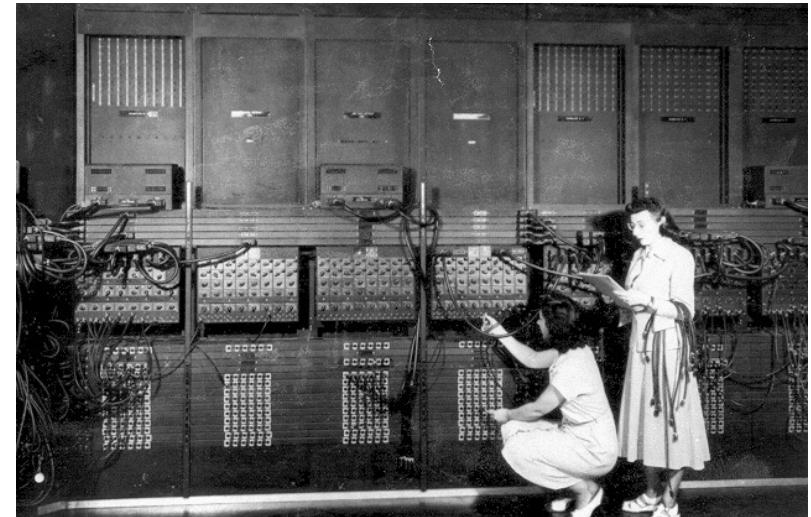
# **Brief History of Design and Use of Computers**

# Computers in the Past



# Computers in the Past

- Used by a small number of trained professionals
- Typically for engineering or commercial applications
  - Inventory databases
  - Billing systems
  - Scientific simulations

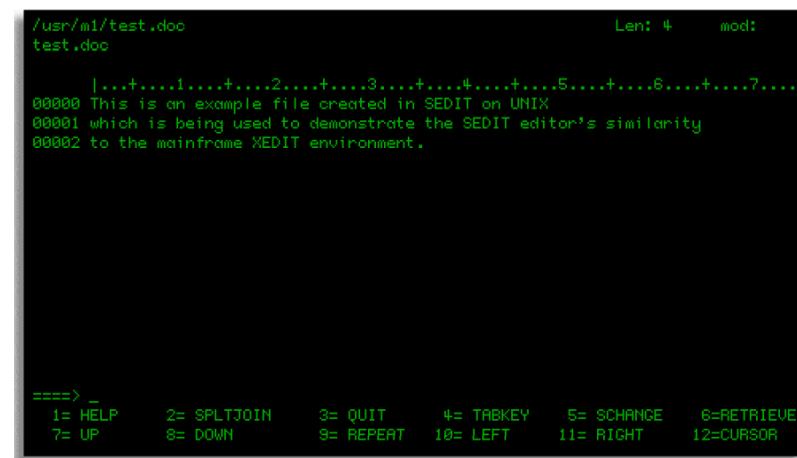


ENIAC - Electronic Numerical Integrator and Computer

# Computers in the Past

- Had rudimentary interfaces
- Users had to **adapt** to the system
  - (e.g., memorize all the commands for each system)
- What does this mean for designing such a system?  
Is it important to know how people would use it?

**Not essential to understand design or human issues!**



The screenshot shows a terminal window for the SEDIT editor. The file path is /usr/m1/test.doc. The status bar indicates Len: 4 and mod:. The text in the editor is:  
00000 This is an example file created in SEDIT on UNIX  
00001 which is being used to demonstrate the SEDIT editor's similarity  
00002 to the mainframe XEDIT environment.  
At the bottom, there is a command line with a prompt ==> and a series of numbered keys with their corresponding functions:

1= HELP	2= SPLTJOIN	3= QUIT	4= TABKEY	5= SCHANGE	6=RETRIEVE
7= UP	8= DOWN	9= REPEAT	10= LEFT	11= RIGHT	12=CURSOR

# Common Problem with Programmers

- Trained to think as developers and problem solvers
- **Not** trained to think like users!
- Too much focus on technology and programming languages
- Not enough focus on the needs and limitations of users

IT TOOK A LOT OF WORK, BUT THIS LATEST LINUX PATCH ENABLES SUPPORT FOR MACHINES WITH 4,096 CPUs, UP FROM THE OLD LIMIT OF 1,024.



<http://xkcd.com/619/>

# Question

Why is being just a programmer  
not good enough for designing  
usable interactive systems?

# Computers of today and tomorrow

- How are computers different today?
  - Computer applications used by millions
    - Regular and expert users
    - For all kinds of contexts (work, play, traveling, etc.)
    - Many do not seem like computers at all (cars, phones)
  - The interface is extremely important
    - Graphical interfaces are common
    - The Web is almost entirely an interface
    - Users care about the interface, not the code
  - Not enough for software to simply work without error, it also needs to be usable and enjoyable

# **What is HCI?**

# **What are HCI practitioners like?**

# Defining HCI

- Not easy to define
- “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
- Any interaction with computers by humans
  - as developers or users
  - as individuals or groups
- Design of tools that extend human capabilities

# Broad Concerns of HCI

- **Joint, coordinated** performance of tasks by computers and humans
- Structure of communication between human and machine
- Human capabilities to use machines
- Process of conceptualization, specification, design, and implementation of computational tools
- Design trade-offs

# HCI is multidisciplinary

- What disciplines do you think contribute to HCI?
  - Why and how do they contribute?
- Computer Science
- Engineering
- Psychology
- Design
- Human Factors / Ergonomics
- Semiotics
- Anthropology
- Physiology
- Artificial Intelligence
- Sociology
- Information Science
- Philosophy
- Linguistics
- Art

# Related Terms

- Information Design
- Information Architecture
- Interaction Design
- User Interface Design
- Usability Engineering
- User Experience Design
- Visual Design
- Cognitive Engineering
- Graphic Design
- ...

# HCI Professionals

- What skills do you think are necessary for HCI professionals?
  - Communication skills
  - Articulation
  - Abstract conceptualization
  - Complex, open-ended problem solving
  - Creativity and imagination

# HCI Professionals

"sensitive observers and incisive analysts; good conceptual thinkers and sophisticated theory builders; creative, imaginative, and elegant designers; and skilled, adept implementers.

They should be familiar with a wide variety of relevant disciplines: the psychology of perception, cognitive science, software engineering, user interface management systems, graphic design, industrial design, organization theory, experimental design.

They must be able to communicate with users, managers, programmers, psychologists, and graphic designers. They must have a deep commitment to and empathy with the problems of

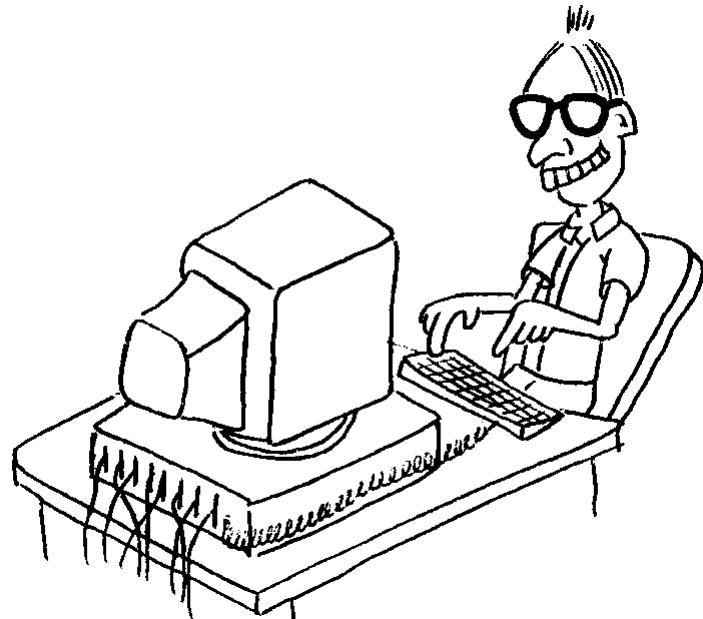
the computer user."  
- Association of Computing Machinery

# How is this course different?

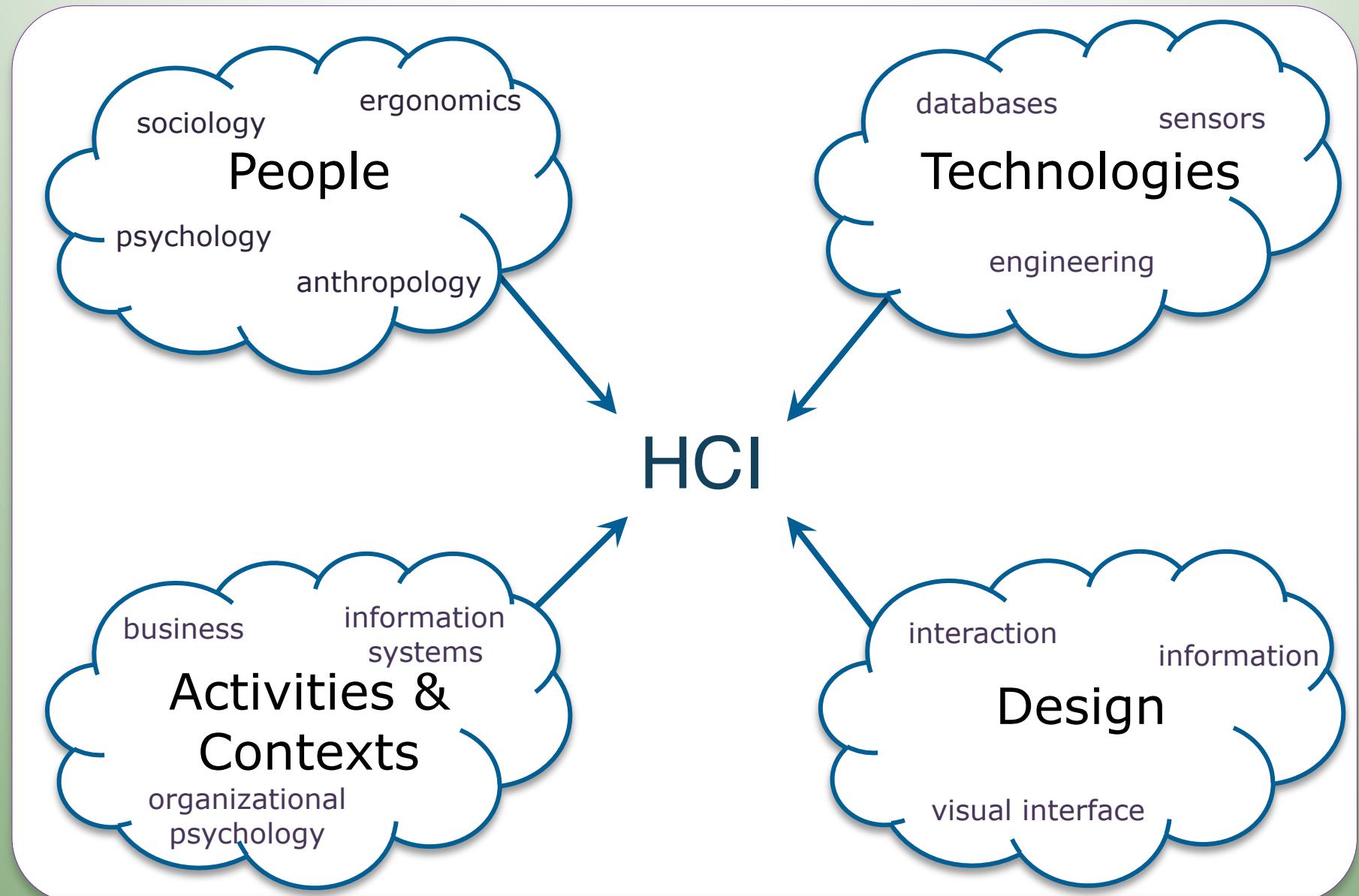
- To do well in this course you will need to:
  - Think deeply and in a multi-faceted fashion
  - Understand important concepts and prevalent theories
  - Draw upon a repertoire of principles
  - Structure your thinking with frameworks
  - Make use of appropriate methodologies
  - Develop the ability to apply these effectively for design
- Memorizing formulas or steps will not be sufficient

# What is this all about then?

users are engaged in an activity that is mediated by a computer



# HCI Framework



# Bill Verplank on Interaction Design



<https://www.youtube.com/watch?v=Gk6XAmALOWI>

# **Why is HCI important to study?**

# Why HCI is important: Personal view

- People view computers as appliances and want to use them as such
- People want a **positive experience** and do not want to be intimidated
- Can you think of any examples?



# Why HCI is important: Business view

- To use humans more productively/effectively
- Human costs far outweigh software or hardware costs
- Substantial evidence that employing HCI principles and techniques can dramatically reduce costs and increase productivity

# Why HCI is important: Marketplace view

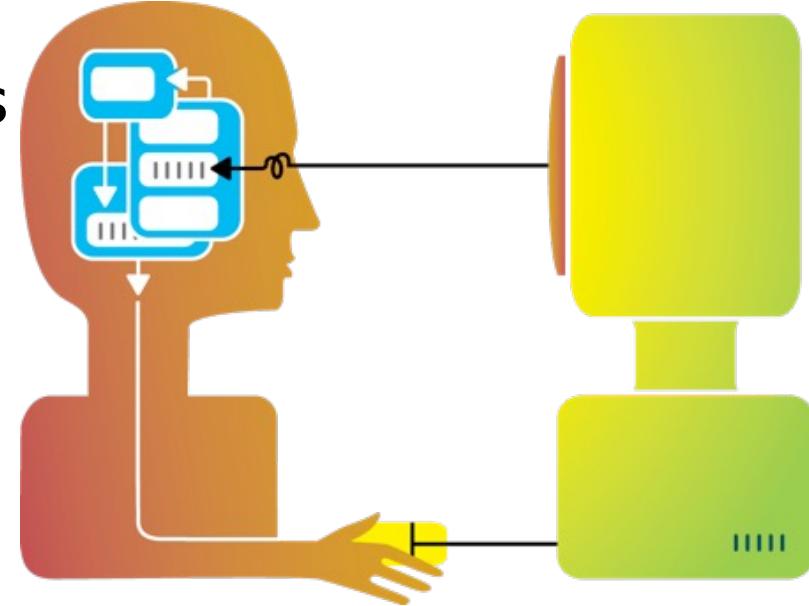
- Everyone is using computers nowadays
  - Expect easy-to-use products
  - Not tolerant of poorly designed systems
  - Vendors have little control over user training
- If a product is hard to use, people will buy other products!
- Have you done this? Can you think of any examples?

# Why HCI is important: Human-factors view

- Humans have limitations
  - Behavioral
  - Cognitive
  - Perceptual
- Humans make errors
  - Especially when products are not designed with human limitations in mind!
  - Errors are very costly in terms of time, money, morale ... even life!

# Why HCI is important: Systems view

- Complexity & relationships
  - human
  - computer
  - interface between the two
  - we form a joint system



- Much of our communication, work, entertainment, healthcare, etc. is done through computers
  - This affects us at a deep level: cognitively, emotionally, ...

# Why HCI is important: Social view

- Computers (and interaction with them) are a critical part of our society
  - Social relations
  - Healthcare
  - Education
  - Entertainment
  - Financial analysis
  - Transportation
  - ...

# Why is HCI important: A former student

- A student who took this type of course with me sent me this email:
- “I ended up taking a job offer with Google to be a Product Manager and wanted to let you know how important it was in the interview process it was to know about product design and design principles :) thank you!!”

# Activity

- Let's watch a video about interaction, interface, and experience design
- Take notes of concepts, observations, principles, etc. that you think are important for HCI professionals and are relevant to this course
- We will share our ideas after the video

# Trends in UI, Interaction, & Experience Design



<https://www.youtube.com/watch?v=IciYKwVLTuk>

# Activity

- Interesting notes:
  - Behavior is designed
  - By implication, thinking can be designed too
  - Working with 'living' systems
  - 'Setting a stage' for other people to perform
  - Human is at the centre of the [ecosystem, product, etc.]
  - Interactive devices are everywhere
  - ...

# Brief Summary

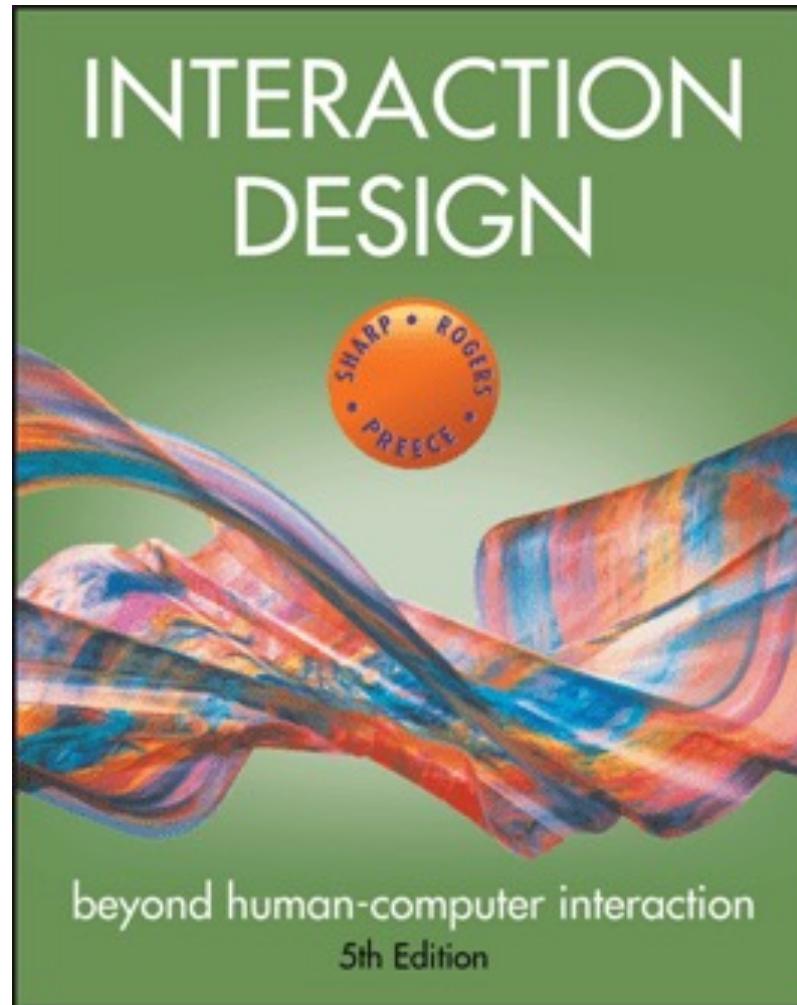
- Brief history of design/use of computers
  - To see how design has become more important
- Definition of HCI
  - Characteristics of HCI professionals
  - HCI Framework
- Why HCI is important—6 perspectives

# **Course Overview**

# Course overview: Website

- Punctuality is important
- Course Website is on OWL ([owl.uwo.ca](http://owl.uwo.ca))
  - Announcements and such will be there
  - All submissions will happen there
  - To submit chapter summaries, please use the “Dropbox” feature of OWL
- Office hours: Fridays 1 to 3 PM

# Textbook



# Course overview: Projects

- Small and manageable
- Based on an existing design
- Your project is a **re-design** of an existing tool
- Could be
  - A video game
  - Digital library app
  - Productivity tool or app
  - **NO NAVIGATIONAL WEBSITE (e.g. book) REDESIGNS**
- Some examples of software to re-design:
  - <http://illuminations.nctm.org/Games-Puzzles.aspx>
  - <https://www.education.com/games/>
  - <http://more.starfall.com/?t=251308364&y=1>
  - <https://elearningindustry.com/18-free-digital-storytelling-tools-for-teachers-and-students>
  - Others that you can find and like

# Course overview: Projects

- Consider all the features of the tool that make it useful, usable, enjoyable, effective, ...
- Consider all interface elements
- Look at existing tools
  - Explore how they violate design principles we will discuss
- Some existing tools have minimal functionality
  - If you use those, expand the functionality
- Read the outline carefully

# Finally

- Watch this video about the interaction design of the iPhone
- <https://www.youtube.com/watch?v=ab3RGM5oiwE>