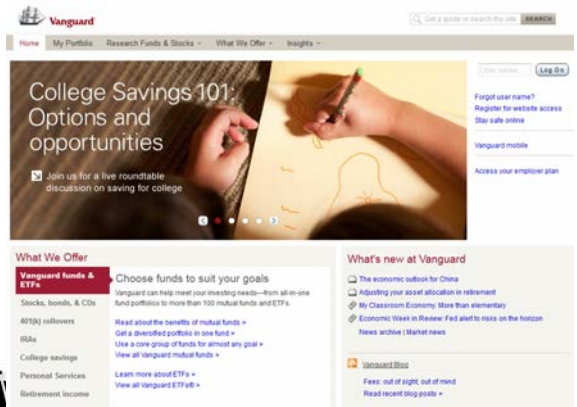


## The Undergraduate 2<sup>nd</sup> Major and Minor in HCI

Human Computer Interaction Institute  
School of Computer Science  
Carnegie Mellon University

Vincent Alevan  
Newell Simon Hall 3135  
hciibachelors@cs.cmu.edu

## Finance



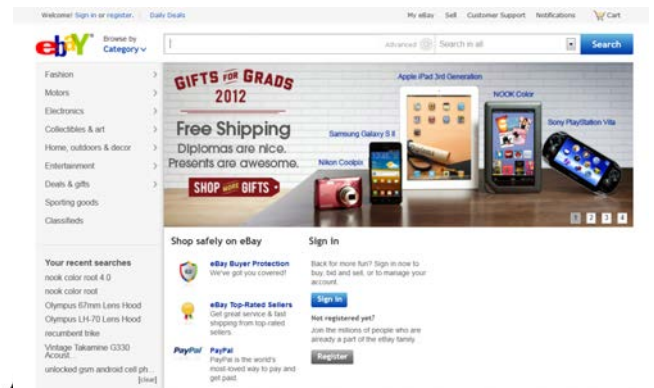
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Computer and communication technologies are increasingly integrated with our lives

## Commerce

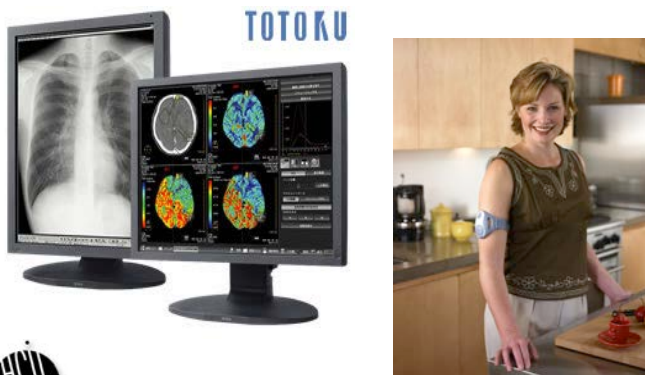


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## Healthcare



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## Transportation



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## Information

WHEN YOU'RE GONNA GO, GO LOW. Continental Airlines

# The New York Times

Friday, May 14, 2010 LAST UPDATED: 10:54 PM ET

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WORLD U.S. POLITICS N.Y. JOURNAL BUSINESS TECHNOLOGY SPORTS SCIENCE HEALTH OPINION ARTS

MOVIES MUSIC TELEVISION THEATER STYLE Dining & Wine

### Vote to Limit Debit Card Fees Is Surprising Loss for Banks

By BENJAMIN APERERBAUM 12 minutes ago

An amendment to the Senate's financial legislation that imposes price controls is a victory for retailers after years of fighting banking industry lobbyists. Consumers also could save money.

### City Seeks to Revoke Licenses of 633 Cabbies

By JAMES C. HERNANDEZ and BAO QIAN 40 minutes ago

New York City moved to revoke the cab licenses of 633 taxi drivers who it said

### A Haitian Influx Startles the North Country

By KYLE CHEN

After rumors spread that all Haitians would be welcome in the U.S., the Vermont border has proved tempting. Marjorie Villefranche, above, advises Haitians in Canada.

### G.I.'s Find Bullets Still Flying at Outpost in Iraq

By KYLE CHEN

### OPINION - THE THREAD Endangered incumbents

Early primary results have officeholders running scared. Why are voters so angry?

### MOVIES - Cannes Finds Glamour Fewer stars, but good films at the Cannes Film Festival.

By KYLE CHEN

### YOUR MONEY - Women Seeking a Palve

Women's approach to negotiations may be the cause of the

Track Your Investments, Analyst Recommendations, and More

Present now

FREE TRIAL

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Get a FREE TRIAL

GameCenter

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## Work



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## Communication



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## Play



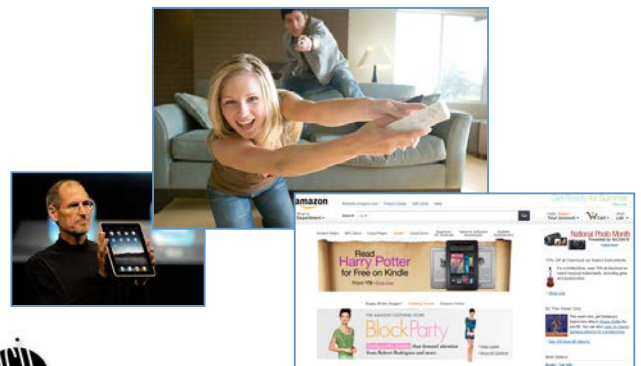
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## Education



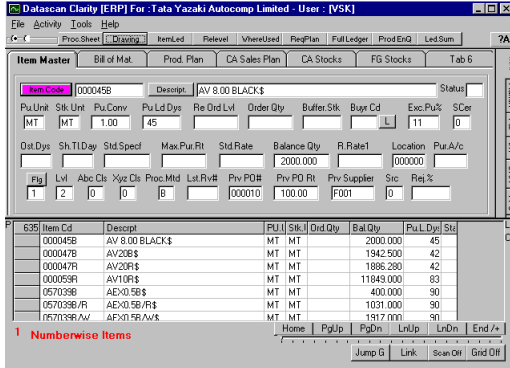
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## Interactions Can Be Successful



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## Interactions Can Also Fail



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## New Kinds of Capabilities Enable New Kinds of Interactions

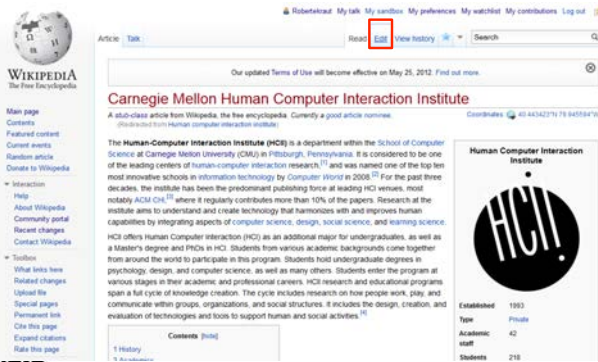


New kinds of capabilities enable new kinds of interactions.



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## Interactions Can Also Fail



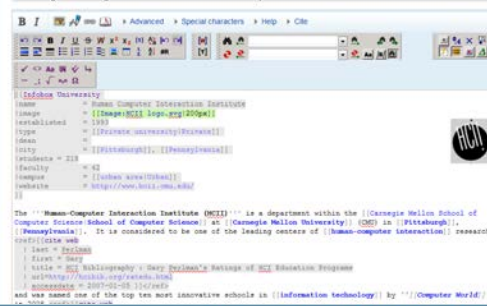
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## Ensure that Interactions are Innovative . . . and Successful

- Design the most cutting edge technology
- and ensure that humans can, will, want to interact with it
- successfully, efficiently, effectively, with pleasure
- to improve their lives

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### Editing Carnegie Mellon Human Computer Interaction Institute



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## HCII Mission Statement

- To solve the *right* problems
- with the *right* tools
- for the *right* reasons
- in order to develop artifacts, services, and systems *that improve people's lives*

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# CMU... a Computer Science Legacy

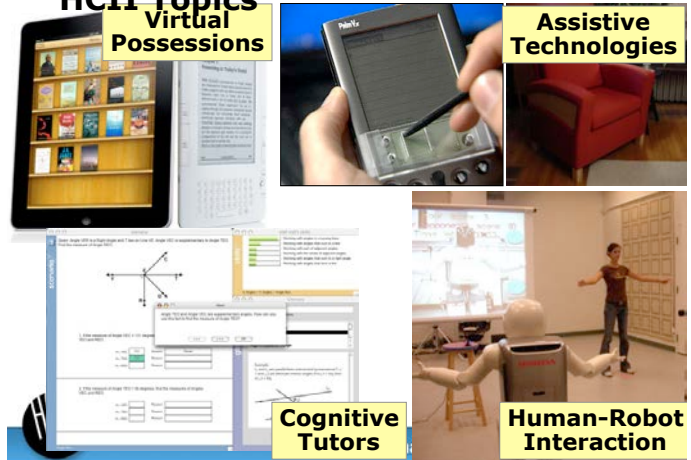
“the study of all phenomena  
surrounding computing machines”

Alan Newell & Herb Simon  
1975 Turing Award Lecture

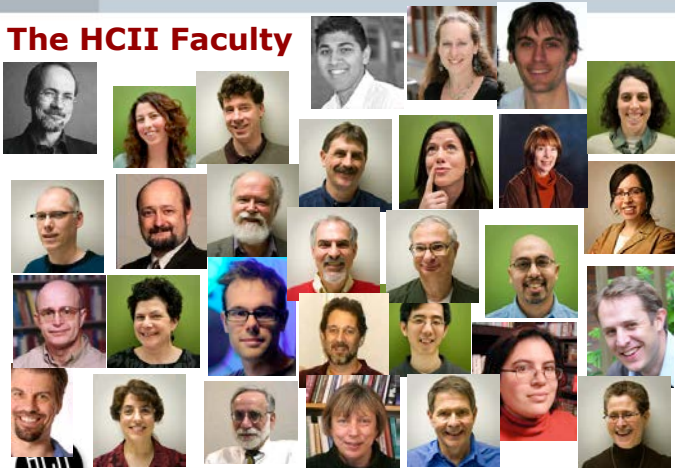


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## HCII Topics Virtual Possessions



## The HCII Faculty



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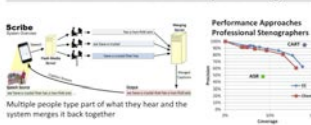
## Social Computing



## Usable Privacy and Security



## Real-Time Crowd Captioning



## Crowd-Sourcing



## Projected Interfaces in Real World

## The HCII Faculty



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## Educational programs in HCI for undergraduates

### HCI 2<sup>nd</sup> major

- Formal admissions (Spring) with ~50% admissions rate
- 11 courses, including a final project
- Guaranteed admission to core courses

### HCI Minor

- Formal admissions (Spring) with a higher acceptance rate than the HCI 2<sup>nd</sup> major
- 7 courses
- Guaranteed admission to core courses



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## The Philosophy of the HCI undergraduate programs

Take excellent students with depth in one discipline relevant to HCI and give them the educational opportunity to “walk in the shoes” of the other disciplines.

- Help the students become effective members of interdisciplinary teams in industry
- Prepare students for leadership in HCI-related industries



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## What students like about the program

- Interdisciplinary
  - Project focused
  - Flexible
- “Working with people from other disciplines”
  - “The interdisciplinary nature. I learned a lot from having courses outside my major and from working with people that have different focii”
  - “Courses were project oriented”
  - “Applying the skills I learned in classes to research projects”
  - “Without this major, I would have never discovered my enjoyment for creatively solving problems with constraints and business needs.”
  - “The professors. I was lucky because all of the core classes ... were taught by professors who were well-respected in the field and clearly knew their stuff”



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## On the Philosophy...

- Undergrad education HCI will provide students
  - Basic skills for designing and implementing user-centered software
  - Appreciation of the varied skills necessary to make useful, usable & satisfying interactive products
  - Ability to communication with specialists in other areas
- It will **not** make software developers into designers or psychologists into programmers.
- It is not a second degree.



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## Why Study HCI?

- We're surrounded by computers – therefore, good HCI is about what is happening now!
- If your business is developing interactive software, then good HCI gives you a great competitive edge
- Same for if your business depends on a great web presence
- If your business is an innovator in service design, then HCI is indispensable



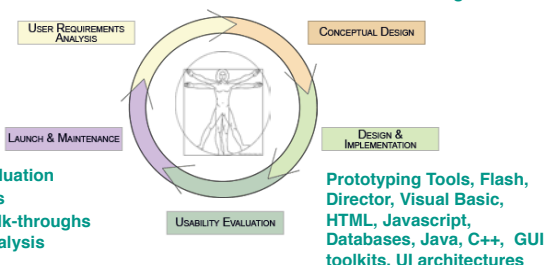
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## Human-Centered Design The User is Not Like Me

Human Factors  
Cognitive Psychology  
Motivation  
Group behavior

Color  
Layout  
Graphic Design  
Interaction Design

Interviews  
Surveys  
Experiments  
Think alouds  
Heuristic evaluation  
Focus groups  
Cognitive walk-throughs  
Statistical analysis



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## Why study HCI?

- Web services and mobile apps are the hottest start-ups in the world and HCI is in the middle of that
- HCI is *the* central topic in computing – the best way to build up some computer skills and credibility
- HCI is a good path towards being a project manager
- Agile development to understand user needs helps to create innovative products – in HCI *and* in business



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## Other reasons for getting an HCI 2nd major / minor

- Interesting problems to work on
- Lots of interaction with stakeholders
- Creative expression
- Working on the parts of computers that everyone sees
- Fame
- Personal interest
- Career security, etc.



## HCI Second Major Curriculum

4 Pre-requisites



3 Core courses + 4 Electives



Senior project

## Companies Where B/MHCI Alumni Work

- APT
- Accenture
- Adobe
- Amazon
- Amazon.com
- Apple Inc.
- Applied Predictive Technologies
- Athena Health
- Bank of America Global Markets Technology
- Boeing
- Brulant/Rosetta
- CGI
- Cengage Aplia
- Deloitte
- Democratic National Committee
- Deutsche Bank
- Digg
- Discovery Engine
- Dobby
- Endeca
- Epic Systems
- Extractable
- Facebook
- Fluid Inc.
- General Electric Co.
- Goldman Sachs
- Google
- Green Hills Software
- HPTI
- IBM
- Intuit
- JPMorgan Chase
- Johnson & Johnson
- Kaiser Permanente
- LearningBop
- Lockheed Martin
- LotterShelly
- Manhattan Associates, Atlanta
- McKinsey
- Merrill Lynch
- Microsoft
- Moment Design
- NASA
- New York Times
- NextJump
- Oracle
- OutSystems
- PNC Bank
- Palantir Technologies
- Precor
- PwC
- R/GARtheon
- Ready at Dawn Studios
- Riberbed
- Rosetta Stone
- Round Arch
- RoundArch
- RoundArch
- Salesforce.com
- Schematic
- Schoolnet
- Shiny Entertainment
- Speaker Text
- Tagged
- Teach for America
- Team Detroit
- Thermo Fisher Scientific
- Thomson Reuters
- TripAdvisor
- UBS Investment Bank
- Union pacific railroad
- University of Michigan
- VMware
- Vanguard
- Vistaprint
- Wizard Media
- WorldEvolved Services
- Yadsair
- Yahoo
- Yinzcam
- Zazzle

Plus ~15% have started their own companies



## HCI Second Major Senior Capstone Project Course Goals

- Apply HCI skills on a semester-long project
- Work in interdisciplinary teams (3-5 people)
- Work with clients
- Integrate skills gathered over the curriculum
- Learn to write reports & give presentations



## Careers In HCI

- Undergraduates get good jobs & job offers (AY 2011/2012 data)

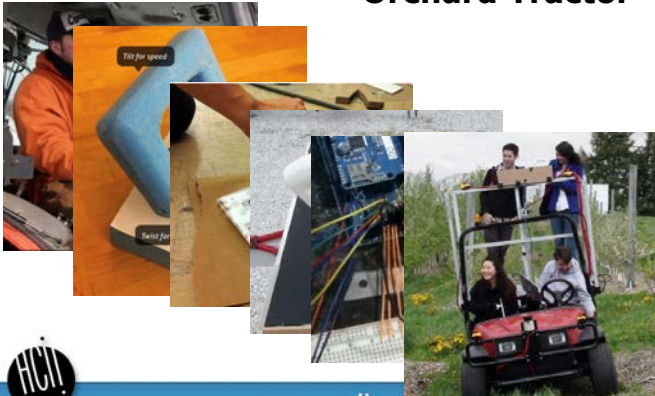
Degree	Median salary offer
Bachelors, HCI	\$79,500
Computer science	\$95,000
Psychology	\$45,000
Information Systems	\$67,000
Communication Design	\$60,000
Masters, HCI	\$85,000



## Mattress Factory: Interactive Archive of Past Installations



## Controls for a Semi-Autonomous Orchard Tractor

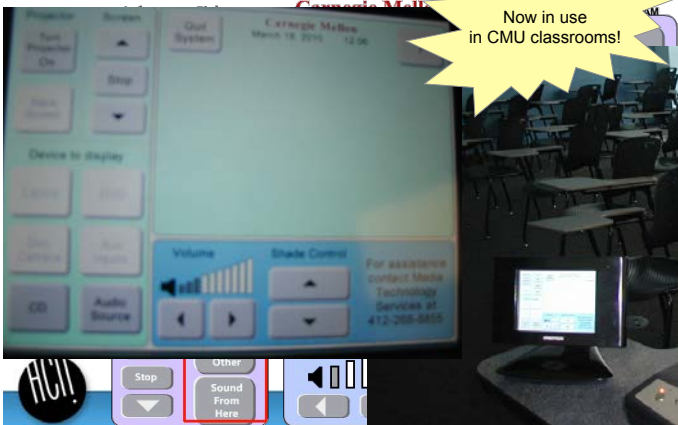


## Quote by a student about the capstone project

“I had the chance to use HCI methods and understand the basis for them. We had to constantly test and change things based on the very specific needs of our users. Things that seemed so simple to us were like a foreign language to them. It really helped drive the entire point of HCI home to me.”



## Classroom Controls

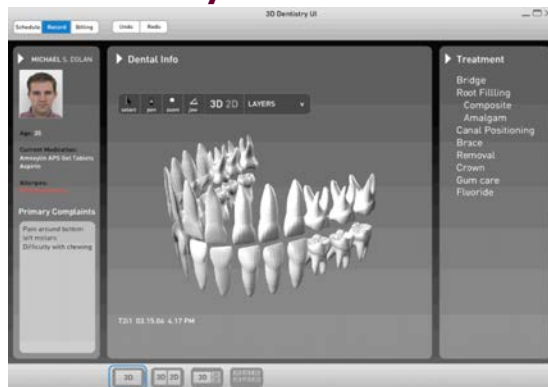


## HCI Minor

<b>Prerequisites</b>	<ul style="list-style-type: none"> <li>Freshman-level programming (51-257 or 15-110 or 15-112 or 15-121 or 15-123)</li> </ul>
<b>Core Courses</b>	<ul style="list-style-type: none"> <li>Interaction Design Overview (IDO) (05-392)</li> <li>Designing Human Centered Systems (DHCS) (05-391)</li> </ul>
<b>Electives</b>	4 electives (from defined list or approval from Program Director)
<b>Double Counting</b>	2 courses with primary major



## 3D Dentistry



## How can you explore whether HCI is for you?

- Enroll in one of the core courses
  - Designing Human-Centered Systems is a great course
- Enroll in an elective
- Pick a course you can double count
- Become involved in HCI research (internship or independent study with HCI professor)



**Skills:** How to build interactive devices (AKA: “GADGETS!”)

– Add to your toolbox of techniques: Prototyping simple  $\mu$ controller-based electronic devices

**Concepts:**

What can be done with them from an HCI perspective



05-833 Applied **GADGETS** Sensors and Activity Recognition in HCI

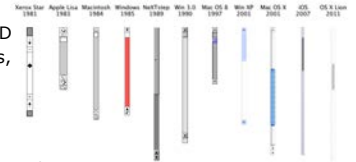
Join the struggle: build something for the user!

taught by Scott Hudson

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**05-499A ♦ 05-899A: Interaction Techniques**  
NSH 1305 – Mon/Wed 1:30pm – 2:50pm, 12-Units, by: Brad Myers

- For B-HCI, Minor in HCI, M-HCI, PhD
- How people interact with computers, smartphones, game consoles, appliances and other technologies
- From historical to future designs
- Students will learn:
  - Articulate design issues regarding interaction techniques
  - Design a new interaction technique
  - Evaluate interaction techniques using the appropriate tests for performance and usability
  - Describe the historical progression of interaction techniques
- Prerequisites: some HCI course



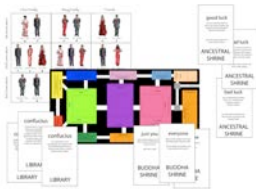
<http://www.cs.cmu.edu/~bam/ucourse/2014inter/>

2/11/15

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**Design of Educational Games**

05-418/05-818 HCII – Vincent Aleven



The potential of digital games to improve education is enormous. However, it is a significant challenge to create a game that is both fun and educational. In this course, students learn to meet this challenge by combining principles and processes from game design and instructional design.



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**The Role of Technology in Learning in the 21st Century**

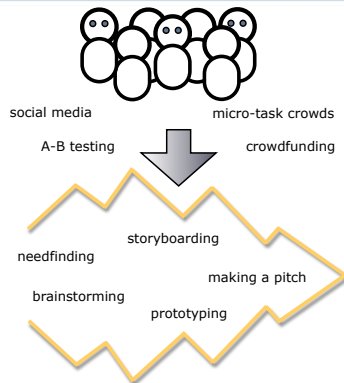
Design an educational initiative that uses technology to change the face of education in both the developing and industrialized world.



**Steven Dow**  
ASSISTANT PROFESSOR



EMAIL: [spdown@cs.cmu.edu](mailto:spdown@cs.cmu.edu)  
WEB: [www.cs.cmu.edu/~spdown](http://www.cs.cmu.edu/~spdown)



**Crowd-Driven Innovation**

Human-Computer Interaction Institute



**Interested in finding a better solution to the password problem?**

5-436 / 5-836 / 8-534 / 8-734  
**Usable Privacy and Security**

Offered Spring 2014  
Tuesdays and Thursdays  
3:00 – 4:20 pm  
Instructor: Lorrie Cranor



- Learn about usability issues related to security and privacy
  - Learn how to design for security/privacy AND usability
  - Get hands-on experience doing usability studies related to security and privacy
- <http://cups.cs.cmu.edu/courses/ups.html>



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# THE DATA PIPELINE

DON'T GET WASHED AWAY:  
LEARN TO FILTER,  
INTERPRET, AND INTERACT  
WITH YOUR **Data**

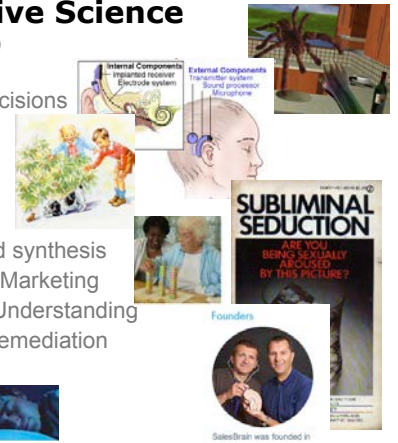
DATA.CMUBI.ORG



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## Applied Cognitive Science 05-395 (R. Klatzky)

Virtual Reality  
Perceptually Based Decisions  
Eyewitness Testimony  
Cognitive Tutoring  
Learning To Read  
Spatial Thinking  
Speech recognition and synthesis  
Rational vs. Emotional Marketing  
Automated Language Understanding  
Neural Plasticity and Remediation  
Expertise & Sport  
Sleep Learning



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## Crowd Programming

Build the intelligent interactive systems of your dreams by injecting a little bit of on-demand human intelligence.

- write crowd programs with Amazon Mechanical Turk, oDesk, Facebook...
- apply usability principles to elicit high-quality responses
- use statistical methods to improve the quality of crowd work
- build interactive systems powered by real-time crowd labor



[bit.ly/crowdprogramming](http://bit.ly/crowdprogramming)

Jeffrey P. Bigham  
[jbigham@cs.cmu.edu](mailto:jbigham@cs.cmu.edu)  
[www.jeffreybigham.com](http://www.jeffreybigham.com)  
@jeffbigham



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## Personalized Online Learning

05-432 Vincent Aleven



- Learners are different and personalized learning is far more effective than one-size-fits-all approaches. This course covers a number of proven personalization techniques used in advanced learning technologies.
- One of the techniques is the use of cognitive modeling to personalize practice of complex cognitive skills in intelligent tutoring systems. This approach, developed at CMU, may well be *the* most significant application of cognitive science in education and is commercially successful.



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## Mobile Service Innovation



Room 172, 300 S. Craig  
05-899 and 05-499 T/Th 3:30-4:00 PM  
Jim Morris & Steven Dow

- Open to all disciplines
  - No Pre-requisites
  - Team Projects
- Topics
- Need-finding, interviewing, analyzing social media
  - Divergent thinking, brainstorming
  - Synthesis techniques and problem framing
  - Storytelling, storyboarding, and video production
  - Value proposition, business models
  - Prototyping/blueprinting
  - Crowdsourcing, web analytics, A-B testing

[innovation.cs.cmu.edu](http://innovation.cs.cmu.edu)



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## 1. E-Learning Design Principles

This course is about e-learning design principles, the evidence and theory behind them, and **how to apply these principles to develop effective educational technologies**. It is organized around the book "e-Learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning" with further readings drawn from cognitive science, educational psychology, and human-computer interaction. You will learn design principles 1) for combining words, audio, and graphics in **multimedia instruction**, 2) for combining examples, explanations, practice and feedback in online **support for learning by doing**, and 3) for balancing learner versus system control and **supporting student metacognition**. You will read about the experiments that support these design principles, see examples of how to design such experiments, and practice applying the principles in educational technology development.



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## 05-540 Rapid Prototyping of Computer Systems

Dan Siewiorek and Asim Smailagic

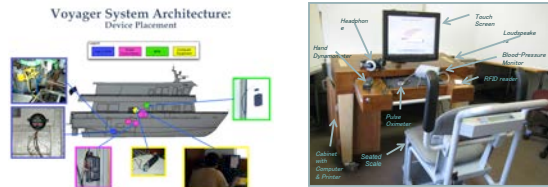
{dps, asim}@cs.cmu.edu

Spring 2014

Single Major Design Project --- Multidisciplinary Teams

The students must develop a system to support an end user client through observing current practice, envisioning how technology insertion will improve the state of the art, deriving requirements, brainstorming solutions, developing an architecture, and assembling technology that realizes the functionally capability to satisfy the requirements.

### Spring 2012 - iPhone Version 20



Human-Computer Interaction Institute

## More Information

Director's Office  
hciibachelors@cs.cmu.edu

Vincent Alevan  
Director of Undergraduate Program  
3531 NSH

Indra Szegedy  
Program Coordinator  
3526 NSH

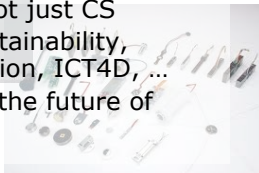


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## Ubiquitous Computing 05-437 Anind Dey



- Interested in sensors, mobile computing (smartphones, tablets, Glass, ...), and off-the-desktop computing in general?
- Seminar-style course with a project
  - Read, present and discuss the latest in ubiquitous computing
- All students wanted: not just CS
- Domains of health, sustainability, economics, transportation, ICT4D, ...
- Come and help design the future of interactive computing!



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## Questions?



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## Independent Study

- Many students do an independent study to explore a particular area in depth
- Personalized, a negotiation between the student and a professor
  - Often grows out of personal contacts after taking class with an instructor
  - I send out announcements at beginning of semester; also listed on HCII website



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