CS 684 – Spring 2008
Human Computer Interaction

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Office Location: CPS 202A (or others to be determined)
Office hours: An hour before class, after class and by appointment
Class Meetings: Monday and Wednesday, 5:30 to 7:15

Learning Objectives/Course Goals:

The goal of this course is to give students a comprehensive examination of the issues associated with the interactions between humans and machines. In our case the primary machine we will be concerned with is the computer. But, make no mistake, the interface between humans and all sorts of machines is an area of intense study and interest. Consider for a moment the layout of the control panel in your typical Boeing 737. Without careful analysis and design, this machine would be infinitely harder to control and would most certainly be more dangerous

At the end of this class, you will have studied the basic concepts associated with the design and development of useful (and terrible) computer interfaces. There are a number of theories associated with this work, which we will study. Further we will go beyond theory and actually get into the practice domain by designing our own interfaces.

Learning Outcomes:

1. The ability to evaluate the user's needs in the definition process of building an interface to a program or device.
2. The skills to formulate a model of this interaction that can be used as the foundation of further definition and testing of the proposed interface.
3. The use of experimental tools to determine which approach to building an effective interface is indeed the best
4. Be able to build mock-ups of the proposed interface design for further analysis
5. Develop code – if our project so demands
6. Run Beta testing experiments
7. Understand the legal and ethical issues associated with HCI

***Motivation*:** The students will be introduced to concepts and theories that explain the relationship of system interface to the human being. There are an almost infinite number of ways to build such an interface, most of which are wrong, so, it is the job

of the interface designer to use his/her skills to determine which interface strategy to design, test and implement. This is a non-trivial task.

***Approach*:** The course presents an overview of many of the most popular tools and approaches to designing human interfaces. But studying without implementing is possibly not a great approach to learning. To bridge this gap, you will be asked to participate in a series of assignments which will put your theory to practice.

***Concepts and topics*:** There have been a very large number of HCI projects all over the world since the computer first came on the scene. We will take an historical overview of this activity to learn what has and hasn't worked in our past. Next, we will take a brief look at future possibilities in an attempt to think before implementation of some of these exciting new tools. Finally, we will study and apply well known techniques in this most interesting domain of study and practice.

Text Book:

There is no designated textbook for this class. In my powerpoint introduction to the class I have listed a number of books that should be of value to you in this class and beyond. So, this will be a cheapie, unless you buy some of the relevant materials on your own.

There is a web site of value that you may want to bookmark for later use. It is:

http://www.hcibib.org/hci-sites/

Course Tools:

There will be programming assignments for this course. You may choose the programming package that suits you and the projects the best.

Deliverables (aka, grading):

1. **Class Participation** **(10% of course grade)**
   - I don't want to be "the sage on the stage." The learning experience goes in both directions and requires interaction during the traditional lecture times. Lectures, for my part, are really an exercise by me to elicit discussion from you. So, what does this mean? More participation means better grades. Remember the old adage, "there is no such thing as a stupid question."
   - Finally, open discussion is central to success in the workplace. Your future boss, or you when you become the boss, will rely on your comments, questions and suggestions. Start practicing now!
2. **Homework Assignments** **(15% of course grade)**

- There will be a number of short assignments during the term. These are distinguished from the major course project, which will be defined and described later.
- Some of the assignments will require short presentations in class.

3. **Midterm Exam** (in-class) **(25% of course grade)**
    - There will be a written exam at midterm. This will likely be the only traditional exam in this course as the second half of the semester will be more associated with the actual process of designing an interface.
4. **Course Project** **(50% of course grade)**

Class Attendance:

I really don't enjoy taking attendance in class, except for the first couple of sessions. At this point the process will help me match faces with names. After this initial period, I will

1. Take attendance on a random basis by circulating a sign in sheet. Based on these data:
2. Three strike rule applies
    a. Miss three classes and your grade goes down one level (ie, B+ becomes B)
    b. Miss four classes - down two levels
    c. Miss five …
    d. Miss six, and you're out!

Grading Criteria:

A grade (4.0) Work of superior quality; unquestionably of highest level. Top honor. Excellent exams. Excellent projects and homeworks, which meet all objectives or excellent laboratory exercise results. Class attendance, fully prepared and willingness to contribute to class discussions. Participating in class discussions with well thought out comments. [A 93 – 100%; A- 90 – 92%]

B grade (3.0) Work is well above average; thoroughly competent, but not exceptional. Good exams. Good project analysis, which meet project objectives or good laboratory exercise results. Good class participation and student contribution. [B+ 87 – 89%; B 83 – 86%; B- 80 – 82%]

C grade (2.0) Work of average quality, meeting, but not exceeding, expected standards. Fair exams. Fair project analysis, which meet project objectives or fair laboratory exercise results. Fair class participation and student contribution.. [C+ 77 – 79%; C 73 – 76%; C- 70 – 72%]

D grade (1.0) Work shows some comprehension of the subject, but falls below expected standards. Student work is below that outlined for a C grade. Some work turned in which meets objectives. [D+ 67 – 69%; D 63 – 66%; D- 60 – 62%]

F grade (0.0) Work below minimum standards. Substantial non-submittal of assigned work and/or lack of evidence of sufficient work on assignments. [F 60% or less]

I grade (Incomplete) If the student has a valid reason for not submitting assigned material that is due the last day of class, the student will receive a grade of Incomplete (I), which is required to be made up, after the course has finished, by turning in acceptable required material at a later date, to be determined by agreement between the student and the instructor.

W grade (Withdraw) Student officially withdraws from the class.

Plagiarism Statement:

Whenever you quote from, make references to, or use ideas attributable to others in your writing, you must identify these sources in citations or bibliography, or both. If you do not, whether deliberately or accidentally, you have committed plagiarism. Plagiarism, defined as the act of stealing or using as one's own the ideas or writing of another, is not permitted in college or university work or in any published writing. "Plagiarism involves two kinds of wrongs. Using another person's ideas, information, or expressions without acknowledging that person's work constitutes intellectual theft. Passing off another person's ideas, information, or expressions as your own to get a better grade or gain some other advantage constitutes fraud" (MLA Handbook for Writers of Research Papers, 6th edition, New York: Modern Language Association of America, 2003, p. 66). To avoid plagiarism, students must acknowledge, cite, and reference any material that is not original or common knowledge. Repeating common knowledge (e.g., "John F. Kennedy was elected president in 1960") is not plagiarism. But what is common knowledge may not be universally agreed upon. Plagiarism can be inadvertent, rather than deliberate, resulting from not knowing the rules or being careless. However, lack of intention is not an excuse. A good rule-of-thumb to use in order to avoid plagiarism is "when in doubt, cite."
Sanctions for academic dishonesty range from reprimands and counseling to expulsion from the University. Depending on the seriousness and frequency of the behavior, instructors will normally assign an "F" for the assignment or the course and administrators may decide on further sanctions up to and including expulsion. If a student wishes to appeal a sanction related to academic honesty, s/he should obtain information on the appeals process from the Office of the Dean.

Disabilities Statement:

If you have, or believe you have, a disability, you may wish to self-identify. You can do so by providing documentation to the Student Disability Services. Appropriate accommodations can then be provided for you. Remember, the Americans with Disabilities Act of 1990 mandates reasonable accommodation. For more information you can contact Student Disability Services at the following phone/fax/TDD numbers.

Phone: 415-422-2613
Fax: 415-422-5906
TDD: 415-422-5834

Please read the USF FogCutter for more information concerning the university's policies and procedures, students rights and responsibilities and the like. Either pick up a hard copy of the FogCuter or visit the following web site.

http://www.usfca.edu/fogcutter/

Special Course Emphasis:

Human Computer Interaction is an issue of general interest and great debate. There are those who would say that we have done a generally terrible job at creating meaningful and well-designed computer interfaces. I would generally agree with this statement when applied to the old standby interfaces such as Windows, Mac OS X and the plethora of Unix/Linix GUIs. They all seem to stem from some common root and have basically not changed over the years. The vast majority of us have followed the 1930 Chicago World Exposition motto and have conformed to what was offered to, or should I say foisted on, us.

We generally complain about our HCIs but, in the end, we conform. There are those that can't conform, either through moral and personal objection, or through physical inability to do so. It is this second group that is of increasing interest to society – the disabled. And, accept the fact, if you live long enough, you will become part of this group.

While we have had several landmark pieces of legislation over the years to help ease the problems of the disabled, the solutions are still a long way off. The disabled have to conform to HCIs that are difficult for the able-bodied, and designed for the able-bodied (albeit badly designed). A good case in point is the visually impaired community.

First, let's step back a generation or two in the history of human computer interaction to the days of the command line interface. Remember those, MSDos, CPM, Unix and others. We all hated them. They were so geeky. But the visually impaired actually resonated to these interaction methods. Why? No graphics, no windows, no drag-down or pop-up menus, and the plethora of other gimmicks that are now commonplace in our interfaces. Enter the GUI, exit many disabled users.

But, in a broader scope the computer has fallen short in delivering important functionality to the disabled. My major concern is that the computer can be used to jump beyond just computing to offer special tools to the disabled that just might empower them in essential domains like communications, independent living and naturally in education.

For approximately twenty years, I have been working on building tools to help the severely visually impaired (blind) to use the modern computer regardless of the GUI running on it. But, this set of tools must also be the product of HCI design and testing

techniques. Therefore, we will look in some detail into the design and testing of the HCI for what is called an assistive technology. There will be discussions and handouts in the near future concerning this activity.

General Topic Outline – Very General

The topic outline below is a general approximation of what will be covered during the term. As we are not using any specific textbook, the actual order of presentation will depend, in some measure, on how we progress and in which direction

1. Opening lecture and welcome
    a. An introduction to HCI and useful resources
    b. Assignment of first homework – see "First Class Assignment" Below
    c. The history of HCI
2. We're now into it
    a. Student presentations of first homework
    b. More history of HCI
        i. Englebart video
        ii. Apple 1984 Mac advert
    c. The Human portion of HCI
    d. The Computer portion of HCI
    e. The Interaction portion of HCI
    f. Assignment of second homework
3. The Design Process
    a. Interaction Design Basics
    b. Basic rules
    c. Examples
    d. Evaluation Techniques
    e. Universal Design
4. We're past the basics
    a. Discussion of possible term projects
        i. There is a partial list of possible projects
        ii. Setting date for final project selection
    b. Techniques for understanding complex interactions
        i. Cognitive science and it's impact
        ii. A case study of the AutOMathic Blocks and MathGenie projects
            1. What was the problem
            2. Discovery of possible solutions
            3. Some experimentation in class
5. Other media
    a. Games
    b. The Web

    c. Ubiquitous computing
    d. Future technologies
        i. The Fog Screen
        ii. Wearable computing
        iii. Etc…
6. Social and ethical issues
7. Final Projects due – this depends on how man teams we will have. Each team will be required to give a comprehensive report at the end of the term, and we will therefore require several class periods to hear all of the reports
8. Final exam (if required)
9. Final Project Information

The final project for this course will be discussed in class in great detail. It will require a good amount of work over the term. I have no problems with group projects but they must be limited to teams of no more than two people. This limitation is a function of the time it takes to manage larer group projects compared with the amount of work required of such an effort

The Actual Lectures Presented

During the semester we will cover the following specific topics. The notes will be made available to you through the USF Blackboard system.

01 Course Intro
01 The Human
02 HCI History
03 The Human
04 The Computer
05 HCI More Rules
05 Interaction
06 Graphic Design
07 Design Rules Narative
08 Design Rules a bit More
09 Know the User
10 Design Basics
11 The Design Process
12 Evaluation Without Users
13 Think Aloud
14 Think Aloud Experiment
15 MathGenie Results (2)
16 Prototyping
17 Prototypes and MockUps

18 Heuristics
19 Usability Testing
20 More on Testing
21 Social Rules
22 New Devices
23 Smart Houses
24 What Next
666 Dialogs From Hell
98 Some Voyages
99 Stump the Chump

First Class Assignment

1. Due date: Second class meeting
2. Type of assignment: class presentation
3. Length of presentation: about 10 minutes with time for a couple of questions
4. Presentation Format: Powerpoint
5. Theme: a first analysis of some sophisticated home appliance which might include
    a. A TV set
    b. A stereo system
    c. A Telephone
    d. A Washing machine or dish washer
    e. The remote control for any of the above
    f. The heating/cooling controls of your car
    g. Your cell phone
    h. Etc…
6. What to report
    a. General description of how the device works
    b. The actual controls associated with the device
    c. The strengths of the controls, i.e., are the controls logically defined and placed on the device
    d. The weaknesses of the controls
    e. What you would do to make the device more useful by the user