CS 6650: HUMAN ISSUES IN COMPUTING

Course Description

Behavioral aspects of computing, including topics such as programming style, language features, computer-aided instruction, computer science expertise, training, computing for universal access. Usability engineering. Research methodology. Prerequisite: Admission to MS in CS program, or consent of department.

Course Syllabus

Course Content and Goals:
The purpose of human computer interaction (HCI) research and practice is to maximize the safety and "healthiness" of computer work environments and work practices, and to ensure the usability of tools, devices and artefacts in general. A priority is consideration of users' physical, behavioral and information processing characteristics and requirements. Experience has shown that failure to deal with such characteristics can lead to wasted functionality, user frustration, inefficient practices, discomfort and error-prone activity. HCI studies are aimed at evaluating particular computer-related tasks and environments, a more general aim is to develop principles about how people interact with their environment and how that interaction affects their behavior. These principles can be used to derive performance predictions for the development of design guidelines and legally enforceable standards. HCI is closely associated with ergonomics, and involves multidisciplinary research, including input from engineering, cognitive psychology, organizational/occupational psychology, anthropology, sociology, social psychology, linguistics, and mathematics. It is concerned with legal, psychological, organizational and occupational considerations.
The purpose of this course is to introduce issues related to behavioral/human aspects of computing and to provide students with some (reading) knowledge of behavioral research methodology and demonstrate its relevance to computing endeavors.

Course Content:

Topics include methodology and theoretical background; user interface design topics such as I/O devices, usability and evaluation of user interfaces, documentation and designing for diverse users; other areas such as psychology of programming, design and specification, computer training, etc.

A sample outline is:

1. Discovering Human Factors
2. This part of the course will introduce some of the issues which concern human factors practitioners. The objective is to underline why consideration of the human operator in context is of paramount importance to the design of useful artefacts. Some consideration will be given to the design process itself, in order to locate the human factors expert within it.

4. Why do we need Human Factors? What happens when things go wrong: The concept of "error". Designing failures in; latent failure, initiating actions and the "sharp end". Consideration of the difficulties in accounting for or predicting the outcomes of human actions; Critical incident analysis: Hindsight and foresight.

5. User relevant characteristics for design. Anthropometrics, behavioral issues, cognitive and social issues. Summary of Part one of the course.

6. Information processing characteristics of the human operator

7. This part of the course is concerned with the psychology of the human operator, detailing important operator characteristics, cognitively, socially and psychologically.

8. Sensory and perceptual issues, with a focus on vision and hearing. An introduction to the visual system and the auditory system: implications for the design of interfaces, the design of VR systems, the design of alarms will be briefly considered.

9. Cognitive issues: Problem solving, learning, memory. An introduction to memory (short term and long term stores, representations of knowledge in semantic nets and procedures), attention (filter theories, cocktail party effect, etc.) and learning (rote learning, proceduralisation, practice, concept acquisition). The implications for the design of menus, of walk up and use systems, of experts versus novice users, recognition based memory, knowing what you know. Implicit, tacit and explicit knowledge and being able to communicate what you know will be raised in preparation for Lecture 6.

10. Language, social and organizational issues. Communication and CSCW, social factors which determine how we interact. Summary of aims of Part 2 of the course and points raised. Some consideration of the derivation of principles and guidelines from psychological research.

11. Design and Evaluation methods in Human Factors

12. This part of the course will detail some evaluation methods. This will complement the first part of the course in the context of the operator characteristics raised in part two of the course. This section of the course is intended to: (1) introduce you to some methods for analyzing tasks, (2) introduce some methods for evaluating proposed and implemented designs, and (3) introduce some integrated cognitive frameworks, models and guidelines.

13. When to apply Human Factors knowledge; The design cycle. What is evaluation and why do we need to do it? Qualitative and quantitative measures; analytic and empirical methods of evaluation; formal and semi-formal methods for design evaluation.


Empirical methods: experimental methods, observation, ethnography, questionnaires, surveys and case studies.

Course Requirements

This class requires a lot of reading. Not everything that students will be asked to read will be discussed in class. Students will be expected to incorporate the material and be able to answer questions about it on the tests. Students will also be expected to be able to write papers which integrate the concepts of the course.