IJCSMS International Journal of Computer Science and Management Studies, Vol. 12, Issue 01, January 2012
ISSN (Online): 2231-5268
www.ijcsms.com

An Analytical Study on HCI

Vikas Chahar
Research Scholar, NIMS University, Jaipur (Rajasthan)
vikas.chahar@gmail.com

Abstract
In this paper we will discuss man–machine interaction (MMI) or computer–human interaction (CHI), methodology used for HCI, and design principal. Human-computer interaction is 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.
Keywords: *HCI, Design Principal, methodology.*

Introduction

Human–computer interaction or HCI [1-3] is the study of interaction between people (users) and computers. It is often regarded as the intersection of computer science, behavioral sciences, design and several other fields of study. Interaction between users and computers occurs at the user interface (or simply interface), which includes both software and hardware, for example, general-purpose computer peripherals and large-scale mechanical systems, such as aircraft and power plants.

Because human-computer interaction studies a human and a machine in conjunction, it draws from supporting knowledge on both the machine and the human side. On the machine side, techniques in computer graphics, operating systems, programming languages, and development environments are relevant. On the human side, communication theory, graphic and industrial design disciplines, linguistics, social sciences, cognitive psychology, and human performance are relevant. Engineering and design methods are also relevant. Due to the multidisciplinary nature of HCI, people with different backgrounds contribute to its success. However, due to the different value systems of its diverse members, the collaboration can be challenging. HCI is also sometimes referred to as man–machine interaction (MMI) or computer–human interaction (CHI).

HCI differs with human factors in that there is more of a focus on users working with *computers* rather than other kinds of machines or designed artifacts, and an additional focus on how to implement the (software and hardware) mechanisms behind computers to support human-computer interaction. HCI also differs with ergonomics in that there is less of a focus on repetitive work-oriented tasks and procedures, and much less emphasis on physical stress and the physical form or industrial design of physical aspects of the user interface, such as the physical form of keyboards and mice.

Design Principles

When evaluating a current, user interface or designing [4] a new user interface, it is important to keep in mind the following experimental design principles:

- Early focus on user(s) and task(s): Establish how many users are needed to perform the task(s) and determine who the appropriate users should be; someone that has never used the interface, and will not use the interface in the future, is most likely not a valid user. In addition, define the task(s) the users will be performing and how often the task(s) need to be performed.

- Empirical measurement: Test the interface early on with real users who come in contact with the interface on an everyday basis, respectively. Keep in mind that results may be altered if the performance level of the user is not an accurate depiction of the real human-computer interaction. Establish quantitative usability specifics such as: the number of users performing the task(s), the

time to complete the task(s), and the number of errors made during the task(s).

- Iterative design: After determining the users, tasks, and empirical measurements to include, perform the following iterative design steps:

1. Design the user interface
2. Test
3. Analyze results
4. Repeat

Design Methodologies

A number of diverse methodologies outlining techniques for human–computer interaction design [5] have emerged since the rise of the field in the 1980s. Most design methodologies stem from a model for how users, designers, and technical systems interact. Early methodologies, for example, treated users' cognitive processes as predictable and quantifiable and encouraged design practitioners to look to cognitive science results in areas such as memory and attention when designing user interfaces. Modern models tend to focus on a constant feedback and conversation between users, designers, and engineers and push for technical systems to be wrapped around the types of experiences users want to have, rather than wrapping user experience around a completed system.

- **User-centered design**: user-centered design (UCD) is a modern, widely practiced design philosophy rooted in the idea that users must take center-stage in the design of any computer system. Users, designers and technical practitioners work together to articulate the wants, needs and limitations of the user and create a system that addresses these elements. Often, user-centered design projects are informed by ethnographic studies of the environments in which users will be interacting with the system. This practice is similar, but not identical to Participatory Design, which emphasizes the possibility for end-users to contribute actively through shared design sessions and workshops.
- **Principles of User Interface Design**: these are seven principles that may be considered at any time during the design of a user interface in any order, namely Tolerance, Simplicity, Visibility, Affordance, Consistency, Structure and Feedback.

Display Design

Displays are human-made artifacts designed to support the perception of relevant system variables and to facilitate further processing of that information. Before a display is designed, the task that the display is intended to support must be defined (e.g. navigating, controlling, decision making, learning, entertaining, etc.). A user or operator must be able to process whatever information that a system generates and displays; therefore, the information must be displayed according to principles in a manner that will support perception, situation awareness, and understanding.

Future Developments in HCI

The means by which humans interact with computers continues to evolve rapidly. Human-computer interaction [6] is affected by the forces shaping the nature of future computing. These forces include:

- Decreasing hardware costs leading to larger memories and faster systems
- Miniaturization of hardware leading to portability
- Reduction in power requirements leading to portability
- New display technologies leading to the packaging of computational devices in new forms
- Specialized hardware leading to new functions
- Increased development of network communication and distributed computing
- Increasingly widespread use of computers, especially by people who are outside of the computing profession

- Increasing innovation in input techniques (i.e., voice, gesture, pen), combined with lowering cost, leading to rapid computerization by people previously left out of the "computer revolution."

- Wider social concerns leading to improved access to computers by currently disadvantaged groups

The future for HCI is expected to include the following characteristics:

Ubiquitous communication Computers will communicate through high speed local networks, nationally over wide-area networks, and portably via infrared, ultrasonic, cellular, and other technologies. Data and computational services will be portably accessible from many if not most locations to which a user travels.

High functionality systems will have large numbers of functions associated with them. There will be so many systems that most users, technical or non-technical, will not have time to learn them in the traditional way (e.g., through thick manuals).

Mass availability of computer graphics Computer graphics capabilities such as image processing, graphics transformations, rendering, and interactive animation will become widespread as inexpensive chips become available for inclusion in general workstations.

Mixed media Systems will handle images, voice, sounds, video, text, and formatted data. These will be exchangeable over communication links among users. The separate worlds of consumer electronics (e.g., stereo sets, VCRs, televisions) and computers will partially merge. Computer and print worlds will continue to cross assimilate each other.

High-bandwidth interaction the rate at which humans and machines interact will increase substantially due to the changes in speed, computer graphics, new media, and new input/output devices. This will lead to some qualitatively different interfaces, such as virtual reality or computational video.

Large and thin displays New display technologies will finally mature enabling very large displays and also displays that are thin, light weight, and have low power consumption. This will have large effects on portability and will enable the development of paper-like, pen-based computer interaction systems very different in feel from desktop workstations of the present.

Embedded computation will pass beyond desktop computers into every object for which uses can be found. The environment will be alive with little computations from computerized cooking appliances to lighting and plumbing fixtures to window blinds to automobile braking systems to greeting cards. To some extent, this development is already taking place. The difference in the future is the addition of networked communications that will allow many of these embedded computations to coordinate with each other and with the user. Human interfaces to these embedded devices will in many cases be very different from those appropriate to workstations.

Goals

A basic goal of HCI is to improve the interactions between users and computers by making computers more usable and receptive to the user's needs. Specifically, HCI is concerned with:

- methodologies and processes for designing interfaces (i.e., given a task and a class of users, design the best possible interface within given constraints, optimizing for a desired property such as learn ability or efficiency of use)

- methods for implementing interfaces (e.g. software toolkits and libraries; efficient algorithms)

- techniques for evaluating and comparing interfaces

- developing new interfaces and interaction techniques

- developing descriptive and predictive models and theories of interaction

A long term goal of HCI is to design systems that minimize the barrier between the human's cognitive model of what they want to accomplish and the computer's understanding of the user's task.

Professional practitioners in HCI are usually designers concerned with the practical application of

design methodologies to real-world problems. Their work often revolves around designing graphical user interfaces and web interfaces.

Researchers in HCI are interested in developing new design methodologies, experimenting with new hardware devices, prototyping new software systems, exploring new paradigms for interaction, and developing models and theories of interaction.

References

[1] ACM SIGCHI Curricula for Human-Computer Interaction.
[2] Bartneck, C., & Rauterberg, M. (2007). HCI Reality – An 'Unreal Tournament'? International Journal of Human Computer Studies, 65(8), 737–743 | DOI: 10.1016/j.ijhcs.2007.03.003 | view html version
[3] Green, Paul (2008). Iterative Design. Lecture presented in Industrial and Operations Engineering 436 (Human Factors in Computer Systems, University of Michigan, Ann Arbor, MI, February 4, 2008.
[4] Brown, C. Marlin. Human-Computer Interface Design Guidelines. Intellect Books, 1998. 2–3.
[5] Jef Raskin: Intuitive Equals Familiar. In: Communications of the ACM, vol. 37, no 9, September 1994, pp. 17–18,
[6] Bartneck, C. (2008). What Is Good? – A Comparison between the Quality Criteria Used In Design and Science. Proceedings of the Conference on Human Factors in Computing Systems (CHI2008), Florence pp. 2485–2492. DOI: 10.1145/1358628.1358705