

Human Computer Interaction In Computer Science: Overview

J. Fathima Kaleema

Dept of computer science
TBAK College for Women, Kilakrai
Ramanathapuram (Dt), Tamil Nadu (State), India

Abstract- Human Computer interaction is very recent discipline in computer science. In this paper we present the techniques, goals and current research of HCI. It was very useful to indentify the human psychology of computer interaction between the Human and Machine Interaction. Finally future direction for HCI recent research proposed.

Keywords- HCI Technology, ,Ubiquitous Computing, HCI Interface ,Current Research

I. INTRODUCTION

Computer have become for better or worse integral part of our lives in every respect. We use them to communicate with others, to write papers, to monitor the arrival and departure of airlines from control room and to play games to select few of their many uses. Each of uses requires us as human to interact with these machines. These interactions require a mode of communication that was generally unknown prior to the introduction of computer into our society. The term was popularized by Stuart Kcard, Thomas P Moran and Allen Newell in their book the psychology of Human Computer Interaction; author used in this term in 1980. A computer has many affordances in the user and the computer.

An important facet of HCI is the securing of user satisfaction “Because human-Computer interaction studies a human and a machine in communication, it draws from supporting knowledge on both the machine and the human side. On the machine side, techniques in computer graphics, operating system, and programming language and development environments are relevant. On the human side communication theory, graphics and industrial design discipline, linguistics, social sciences, cognitive psychology, social psychology and human factors such as computer user satisfaction are relevant and of course engineering and design methods are relevant. Due to multidisciplinary nature of HCI people with different contribute to its success. HCI is also sometimes referred to as human-machine interaction (HMI) man-machine interaction (MMI) or Computer human interaction (CHI).

II. TYPES OF INTERFACE

A. Command Line Interface(CLI)

A CLI display a prompt, the user types a command on the keyboard; the computer executes the command and provides textual output.

B. Menu Drivem Interface(MDI)

The user has a list of item to choose from and can make selection by highlighting one.

C. Graphical User Interface(GUI)

Uses windows, icons, menus and pointers (WIMP) which can be manipulated by a mouse (and often to an extent by a keyboard as well)

D. Natural Language Interface(NLI)

Can range from simple command systems to voice activated text processing. Commands are spoken in ” Normal” language.

III. EXISTING HCI TECHNOLOGIES

The existing interface differs in the degree of complexity both because of degree of functionality or usability.

The user activity has three different levels 1. Physical 2.Cognitive 3.Affective.The physical aspect determine the mechanics interface between human and computer while the cognitive aspect deals with ways that user can understand the system and interact with it. The affective aspect is a more recent issue and it tries not only to make the interaction a pleasurable for the user but also to affect the user in a way that make user continue to use the machine by changing attitudes and emotions towards the user. The existing physical technologies for HCI basically can be categorized by the relative human sense that the device is designed for. These

devices are basically relying on three human senses: vision, audition and touch[1].

Input devices that rely on vision are the most used kind and are commonly either switch-based or pointing devices [2][3]. The switch-based devices are any kind of interface that uses buttons and switches like a keyboard[4]. The pointing devices examples are mice, joysticks, touch screen panels, graphic tablets, trackballs, and pen-based

input[5]. Joysticks are the ones that have both switches and pointing abilities. The output devices can be any kind of visual display or printing device[6]. The devices that rely on audition are more advance devices that usually need some kind of speech recognition [7]. These devices aim to facilitate the interaction as much as possible and therefore, are much more difficult to build[8]. The technology is improving so fast that even the borders between these new technologies are fading away and they are getting mixed together. Few examples of these devices are: GPS navigation systems[9] military super-soldier enhancing devices (e.g. thermal vision[10]. tracking other soldier movements using GPS, and environmental scanning), radio frequency identification (RFID) products, personal digital assistants (PDA), and virtual tour for real estate business[11]. Some of these new devices upgraded and integrated previous methods of interaction. As an illustration in case, there is the solution to keyboarding that has been offered by Compaq's iPAQ which is called Canesta keyboard as shown in figure 1. This is a virtual keyboard that is made by projecting a QWERTY like pattern on a solid surface using a red light. Then device tries to track user's finger movement while typing on the surface with a motion sensor and send the keystrokes back to the device[12].



Figure 1: canesta virtual keyboard

IV. UBIQUITOUS COMPUTING

The latest research in HCI field is ubiquitous Computing. The term which often used interchangeably by ambient intelligence and pervasive computing refers to the

ultimate methods of human-computer interaction that is the deletion of a desktop and embedding of the computer in the environment so that it becomes invisible to humans while surrounding them everywhere hence the term ambient.

The idea of ubiquitous computing was first introduced by mark weiser during his tenure as chief technologist at Computer Science Lab in Xerox PARC in 1998. This idea was embed computers everywhere in the environment and everyday objects so that people could interact with many computers at the same time while they are invisible to them and wirelessly communicating with each other. figure 2 show the major trends in computing

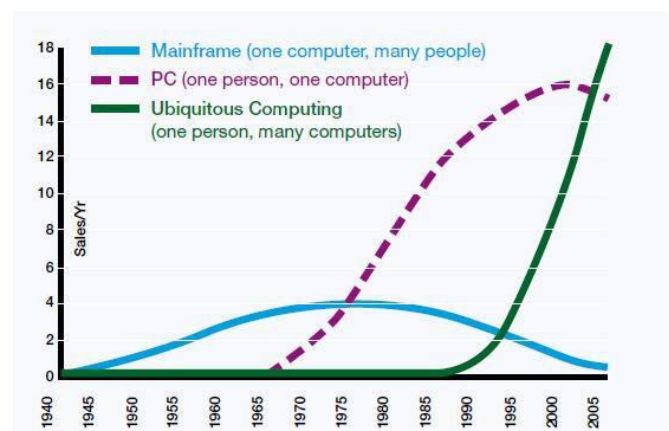


Figure 2 major trends in computing

V. HCI INTERFACE

The Human-Computer interaction can be described as the point of communication between the human and computer. The flow of information between the human and computer is defined as the loop of interaction. The loop of interaction has several aspects to it, including:

- **Task environment:** The conditions and goal set upon the user
- **Machine Environment:** The Environment that the computer is connected to e.g. a laptop in college student's dorm room.
- **Areas of the interface:** Non overlapping areas involve processes of the human and computer not pertaining to their interaction. Meanwhile; the overlapping areas only concern themselves with the processes pertaining to their interaction.
- **Input flow:** The flow of information that begins in the task environment, when the user has some task that requires using their computer.

- **Output:** The flow of information that originates in the machine environment.
- **Feedback:** Loops through the interface that evaluates, moderate and confirm processes as they pass from the human through the interface to the computer and back.
- **Fit:** This is the match between the computer design, the user and the task so as to optimize the human resources needed to accomplish the task.

VI. CURRECT RESEARCH

A. User Customization

End user development studies how ordinary users could routinely tailor applications to their own needs and use this power to invent new applications based on their understanding of their own domains. With their deeper knowledge of their own knowledge domain, users could increasingly be important source of new application at the expenses of generic systems programmers.

B. Embedded Computation

Embedded systems make the environment alive with little computations and automated processes, 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 expected 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.

C. Augmented Reality

A common staple of science fiction, augmented reality refers to the notion of layering relevant information into our vision of the world. Existing projects show real-time statistics to users performing difficult tasks, such as manufacturing. Future work might include augmenting our social interactions by providing additional information about those we converse with.

VII. CONCLUSION

Human computer interaction is an important part of system design. Quality of system depends on how it is represented and user by users. The new direction of research is to replace common regular methods of interaction with

intelligent, adaptive, natural methods. Ubiquitous computing which is called the third wave is trying to embed the technology into the environment so to make it more natural and invisible at the same time. This paper attempted to give an overview of the all issues and current research through the comprehensive reference.

VIII. ACKNOWLEDGEMENT

I would like to thank my friends

REFERENCES

- [1] D. Te'eni, J. Carey and P. Zhang, Human Computer Interaction:Developing Effective Organizational Information Systems, John Wiley & Sons, Hoboken (2007).
- [2] J.S. Greenstein, "Pointing devices", in M.G. Helander, T.K. Landauer and P. Prabhu (eds), Handbook of Human-Computer Interaction, Elsevier Science, Amsterdam (1997).
- [3] B.A. Myers, "A brief history of human-computer interaction technology", ACM interactions, 5(2), pp 44-54 (1998).
- [4] B.Shneiderman,Designing the user interface:strategies for effective human-Computer interaction(3rd edition)Addison Wesley longman,Reading(1998)
- [5] A. Murata, "An experimental evaluation of mouse, joystick, joycard, lightpen, trackball and touchscreen for Pointing - Basic Study on Human Interface Design", Proceedings of the Fourth International Conference on Human-Computer Interaction 1991, pp 123-127 (1991).
- [6] J. Nielsen, Usability Engineering, Morgan Kaufman, San Francisco (1994).
- [7] L.R. Rabiner, Fundamentals of Speech Recognition, Prentice Hall, Englewood Cliffs (1993).
- [8] C.M. Karat, J. Vergo and D. Nahamoo, "Conversational interface technologies", in J.A. Jacko and A. Sears (eds), The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies, and Emerging Application, Lawrence Erlbaum Associates, Mahwah (2003).
- [9] Global Positioning System, "Home page", <http://www.gps.gov/>, visited on 10/10/2007.
- [10] S.G. Burnay, T.L. Williams and C.H. Jones, Applications of Thermal Imaging, A. Hilger, Bristol (1988).
- [11] J. Y. Chai, P. Hong and M. X. Zhou, "A probabilistic approach to reference resolution in multimodal user interfaces", Proceedings of the 9th International Conference on Intelligent User Interfaces, Funchal, Madeira, Portugal, pp 70-77 (2004).

- [12] E.A. Bretz, “When work is fun and games”, IEEE Spectrum, 39(12), pp 50-50 (2002).
- [13] G. Riva, F. Vatalaro, F. Davide and M. Alaniz, Ambient Intelligence: The Evolution of Technology, Communication and Cognition towards the Future of HCI, IOS Press, Fairfax (2005).
- [14] www.google.com