

Overview: Human-Computer Interaction an Globally Used Technique in Society

Nidhi Manchanda, Sanatan Jha
B.Tech, Computer Science
& Engineering
Dronacharya College
of Engineering, Gurgaon, India
Email: {nidhi.17092, sanatan.17127}
@ggnindia.dronacharya.info

Sarita
Assistant Professor,
Computer Science & Engineering
Dronacharya College of
Engineering
Gurgaon, India
Email: sarita10103@gmail.com

Dr. Saurabh Mukherjee
Computer Science,
Associate Prof.
Banasthali University
Rajasthan, India
Email: mukherjee.saurabh
@rediffmail.com

Abstract—This paper discussed about the basic terms related to human computer interaction which will help us to gather a detail knowledge and review on terms, existing technologies and latest coming technology of the subject which include different configurations. Use of computer always has a question that how to interact with it, if used properly then can help humans to work very efficiently and faster. A brief outline of HCI is displayed. Particular cases of research in the ranges of symbols and menus are then surveyed.

Study of topics in it covered HCI framework, Existing technologies, Issues, application and trends in HCI.

Index Terms—Indian sign Language (ISL), Human Computer Interaction (HCI), Graphical user Interface (GUI)

I. INTRODUCTION

HCI (Human-Computer Interaction) is a technique which defines the ways that how humans interact with computers and how humans can use them efficiently. In simple words, interaction between human and computer defines the term HCI. The term HCI (Human-Computer Interaction) was introduced in one of the book of 1983, *The Psychology of Human-Computer Interaction* which is based upon a research by Stewart K.Card and Allen Newell of Carnegie University. The term HCI (Human-Computer Interface) is a study that provides the different methods of evaluation, interaction and design for computing systems. HCI is itself a very wide scope and include disciplines like psychology, sociology, anthropology, cognitive science, computer science, and linguistic. In todays, modern world invention of speech interaction with computers is also a part of HCI.

HCI is the term with many alternative terms and also be called as Human-Machine Interaction (HMI), which means the interaction of humans with computers, codes and algorithms are designed by humans which are followed by computers to complete the task in the particular manner they need to follow. Secondly it is referred as Man-Machine Interaction (MMI), which also means the communication of man or human with computer machine to execute different programs formed by man. There is no difference of the meaning if it is referred as Computer-Human Interaction

(CHI) too, which indicates the interaction of computer which is a machine with human. The names are given to the term according to its functionality.

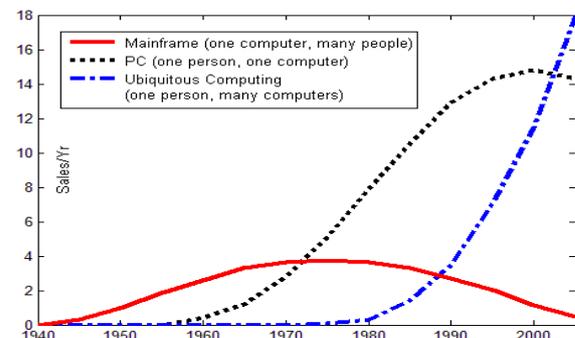


Fig 1: Major trends in computing

This Figure deals with the growth of computer and human interaction. The graph shows us how the computers have increased the role in the human life and influence human life. Now days each one of us use computer to complete there day to day work more easily and efficiently. There is an increase in the graph showing the increased number of computer per Human Being.

II. GOALS OF HCI

In the beginning, there were humans. ‘Computers’ came in 1940s and the term **HCI** came in 1980s. What about the time interval 1940-1980. In those days computers were too complicated and to simply that compilation is the man goal of HCI.

A. HCI (HUMAN-Computer Interaction): Terminologies

uman-Computer Interaction is a strong area of research and results into emerging of new technologies, which increase scope of interaction of human with machine. It defines the communication method with which user and computer interact with each other. Loop of interaction can

be known on the basis of flow of information between user and computer.

The loop of interaction between user and computer depends upon many aspects. The basic aspect is task environment, it affect whole interaction process of machine with user depending upon what user want to execute using any algorithm, other are Areas of the Interface on which user want to work with machine, Input flows which user give to the machine, Output which user receive from the computer after providing input, Feedback of the machine depending on the demands of the user and Fit [2].

The most basic terms involve in it are: Functionality and Usability. With the designing of any system the first thing come in mind is what will be its function? What is the use of it? Set of services and actions that are provided to the users are called as functionality of the system. Functionality can only be valued and visible when it is properly used by user. Some functionality by which a system is used is the measure of degree by which a system [3].

Term HCI was first used in 1980 and also was known in 1975. Humans or users get interact with computer majorly due to desktop applications. The limited icons space at desktop tends the user to communicate or interact with computer. The further interaction starts due to trend of internet browsers and handheld computers.

B. The interfaces between humans and computers:

1. GUI (Graphical User Interface)
2. VUI (Voice User Interface)

GUI deals with all graphical interfaces between users and computers, icons, desktops, images all these are dealt through it.

If user wants any kind of speech recognition and systems synthesizing between him and computer then he can use VUI (Voice User Interface) technology [4].

WIMP (Windows, icons, Menus and Pointing devices) interface (Desktop Metaphor of GUI) is also a standard interface between machine (computer) and man.

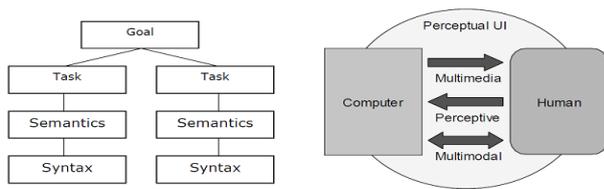


Fig 2: Flowchart of Overview in HCI

This Figure deals with the overview of Human Computer interaction which helps to know how to communicate and share videos, data, and information and exchange various multimedia with the computer. This provides a basic view of Human Computer Interaction.

C. Overview on HCI

In 1970's, information technology professionals and dedicated hobbyists were the only humans who communicate with computer machine. In later 1970's, emergence of personal computing changed the scenario disruptively and include personal computer and personal software resulting increase in potential of computer user and also highlighted the limitations of computer compared to its usability for the users who want them as tools[5].

Computer plays a crucial role in everybody's life and had changed the way people live over the last two decades. HCI technology is becoming so important and changing the lives of humans that in near future no task or ambition can be fulfilled without computing technology.

The module removes highlight from hand picture for signal acknowledgment and extricated elements will be food as info for acknowledgment process. The state of the form is a vital property that can be utilized to recognize hand motions. Forms of hand picture are extricated as highlight. These shapes are put away as form layouts which will be utilized for motion acknowledgment.



Fig 3: Extraction (Indian sign Language) of Information from Gestures.

The extraction suggests highlight vector of isolated picture which can be isolated in different strategies for application. Investigator portrayal of highlight extraction and a couple of methodology rely on upon frame and range based shape representation.

4. EXISTING TECHNOLOGIES OF HCI:

The main aspect to be considered is human behaviour and needs to be useful. The focus of this paper is mostly on the advances in physical aspects of interaction can be obtained (Multi –Modal Interaction) and how each method can be improved in performance (Intelligent Interaction) to provide a better and easy interface for the user. The existing physical technologies of 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 [7].

The input devices that rely are either switch-based or pointing devices. The output devices can be any kind of visual display or printing device. Architecture of HCI showcases these inputs and outputs it generates. Some developing configurations and designs on which interfaces today are based:

1. Unimodal Interaction Systems
 - 1.1. Audio Based HCI
 - 1.2. Visual Based HCI
 - 1.3. Sensor Based HCI
2. Multimodal Interaction Systems [8].



Fig 4: Canesta virtual keyboard

5. A glimpse on HCI Issues :

This topic is not considered much but Eason (1991) proposed a three level model for it.

- Includes perceptual principles,
- I. Legible displays
 - II. Top-down processing
 - III. Avoidance of absolute judgment limits
 - IV. Redundancy gain

V. Similarity causes confusion

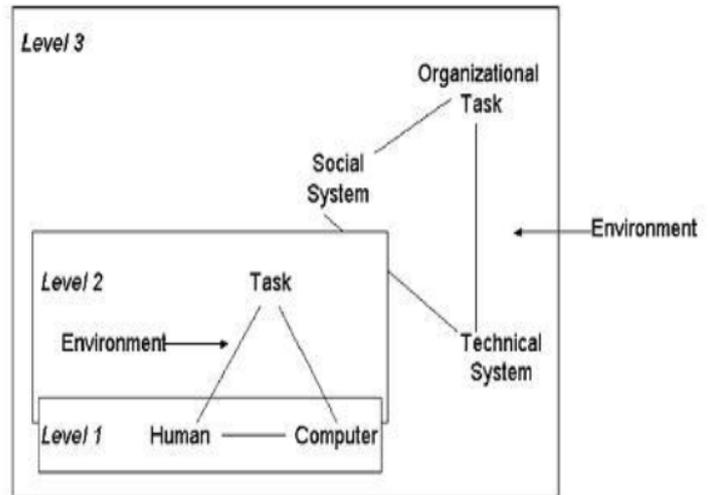


Fig 5: A Three level model of HCI

Level 1 consists of two participants’ information processing i.e. direct interaction between human-computer. Level 2 shows their interaction with environment to perform different tasks. Level 3 shows effects of these interactions on world.

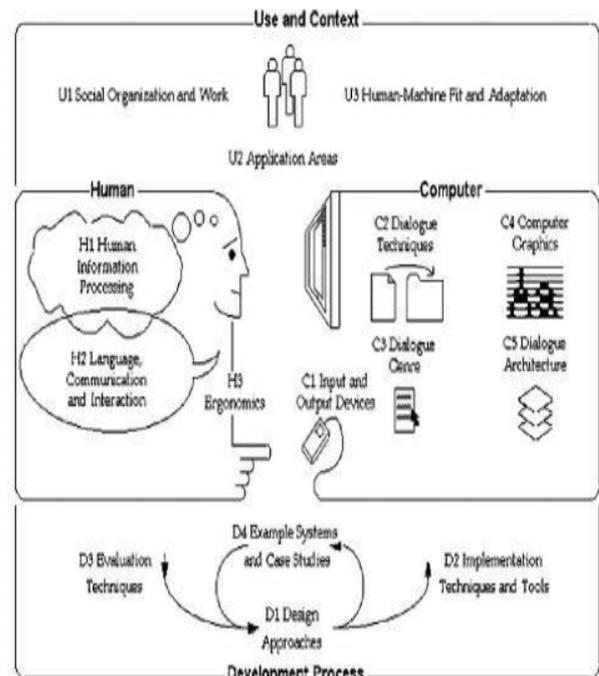


Fig 6: ACM SIGCHI curricula for HCI

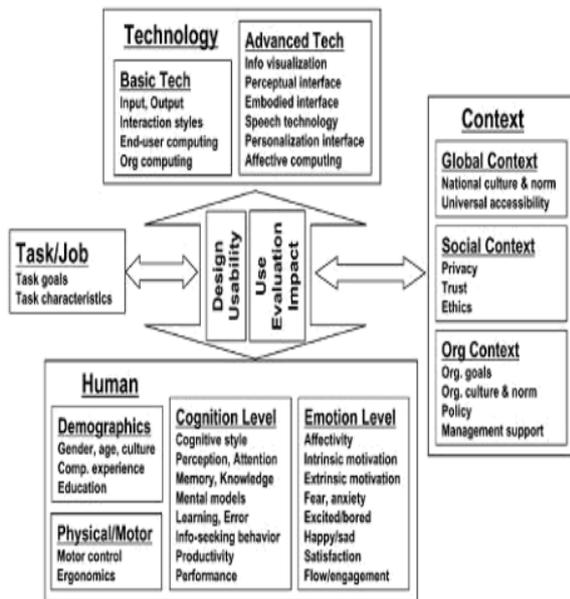


Fig 7: A framework of broad HCI issues and concerns.

PEOPLE AND MULTIMEDIA

- I. Perceptive User Interfaces
- II. Multimodal User Interfaces
- III. Multimedia User Interfaces

In order to endow computers with similar capabilities, we need significant progress in several technologies, including:

- Speech and sound recognition
- Natural language understanding
- Computer vision
- Dialog management/planning
- Learning
- User modeling
- Haptic

The motions which are required must be characterized ahead of time. For instance on the off chance that we are utilizing a communication via gestures, the vocabulary should be characterized. Portray every single motion as far as HMM. The structures of the move capacity yield likelihood thickness capacity are assessed in this progression. Preprocessing the information includes transient Fourier change and vector quantization. Here the information is gathered and signal is characterized through preparing information. Hence this information should be spoken to in a brief structure. At that point the estimation procedure is utilized utilizing some calculation for ex. Bacum-Welch calculation. This calculation is utilized

to locate the obscure parameters of Hidden Markov Model. After this, the acknowledgment of signal is done utilizing calculation Viterbi calculation (say). This calculation is utilized to locate the no doubt succession of the HMM. It is all the more entirely helpful for utilizing this calculation for the yield.

6. LATEST TECHNOLOGIES OF HCI:

The advancement in technologies of HCI involves recent directions and advances of research in HCI, namely intelligent and adaptive interfaces and ubiquitous computing are presented. These interfaces involve different levels of user activity: physical, cognitive, and affection [9]. Menu designing is the major topic of research under HCI.

Sensor-Based Technologies

It has wide range of applications with at least one physical sensor between user and machine.

1. Pen-Based Interaction
2. Mouse & Keyboard
3. Joysticks
4. Motion Tracking Sensors and Digitizers
5. Haptic Sensors
6. Pressure Sensors
7. Taste/Smell Sensors

AUDIO-BASED HCI

This part of acquiring information deals with different audio signals.

- Speech Recognition
- Speaker Recognition
- Auditory Emotion Analysis
- Human-Made Noise/Sign Detections (Gasp, Sigh, Laugh, Cry, etc.)
- Musical Interaction

Visual-Based HCI

This area deals with facial expressions.

1. Facial Expression Analysis
2. Body Movement Tracking (Large-scale)
3. Gesture Recognition
4. Gaze Detection (Eyes Movement Tracking)

VII. HCI RESEARCH:

Research under HCI concerns that, how people will simplify their task using GUI versus a text-based command-line interface? Second thing is Latency, its presence occur with internet connection. How human will do their task with internet in easier way. It needs to be more concerned about societies and human values.

VIII. CONCLUSION:

Human-Computer Interaction is the term which is required where computer system is used; they fulfill need of system design, interface of system with user. HCI gives birth to virtual reality. In the near future, VR with HCI will form the common interface to interact with user. It will take the world to its new horizons including intelligence, innovation and interaction techniques. We tried our best to provide the complete overview through this paper.

IX. TRENDS IN HUMAN COMPUTER INTERACTION :

Human-PC association is a multidisciplinary investigates range concentrated on cooperation modalities amongst people and PCs; once in a while, the more broad term human-machine interface (HMI) is utilized to allude to the UI in an assembling or process-control framework. At the end of the day, the HCI teach the ways to handle the issues related to the interface and framework between user and computer. The main aim of Human-Computer Interaction intrinsically involve different controls over software engineering, the term enhance can be identified with a few angles, including instinct of utilization and interface heartiness. An instinctive, normal, proficient, powerful, and adaptable interface can incredibly diminish the hole across user intelligence modal and the working method of any PC, system, computer, or any robot. In spite of the fact that

learns about HCI go back to 1975; late innovative advances in shopper hardware have opened energizing new situations: motions, hand and body postures, discourse, and look are only a couple of normal collaboration modes that can be utilized to outline moderate common UIs (NUIs).

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