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Human Computer Interaction: Simple Design and Principles

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Abstract— Human-Computer Interaction explored the outline and use of computer technology, engaged on interface between people and the computers. This interface begins with the interaction between computers and human intends to show the powerful benefits of an user oriented approach to design the modern computer system. When the concept of interface begins to come into sight, it is universally understood as the hardware and software through which a human and computer can communicate. The interface can be taken as distinct or tangible, that developer can plan describe design, implement and append to the existing functions. Furthermore it balances, the technical and cognitive issues required for understanding the delicate interplay between people and computers, specifically in emerging fields like multimedia, virtual environment and computer supported cooperative work. Recent advancements in various signal processing technology such as speech, vision based gesture recognition, eye tracking, etc. are nowadays, successfully embedded to the systems. Still researches are going on to and needed for interpreting and fusing multiple sensing modalities in the context of HCI. Human-Computer Interaction (HCI) is a discipline concerned with the design, analysis, and executes of interactive computing system, along with appropriate theoretical methods and models is described here. The basic design and its principles of HCI are discussed.

Keywords—Human Computer Interaction,Cognitive psychology

I. INTRODUCTION

Human-computer interaction (HCI) is one of the novel emerging divisions of computer science. It is the combination of computer science and cognitive psychology. This deals with both the research of human and computer, over and beyond by their mutual influence. Moreover, HCI is a subject related to the design, evaluation and implementation of the computer-based systems. So, these systems can be commonly and effortlessly used by humans. It is an interdisciplinary field, involving many of the current popular computer technology, like software engineering, artificial intelligence, cognitive science, natural language processing, multimedia systems, etc. But also it absorbed the study results of linguistics, ergonomics and sociologic. It is an intercross of marginal and wide-ranging subject; therefore, HCI recognized the data transmission between people and systems. It is designed to familiarize the serviceability in the design process, to develop usable, effective and satisfying interactive products from the actual end user's viewpoint.

The Cognitive psychology explores people's psychological activity that primarily includes cognitive process, such as attention, perception, representation, memory, thinking and language, etc. Cognitive subject can instantaneously process multi-information, but its processing capacity is limited.

Simply speaking, interface is composed of control panel consisting of display and controller, touch screen incorporated by controlling and displaying, software interface and many kinds of interfaces which may be used in some complicated products or systems.

As the rapidly growing usage and popularity of micro-computer, and laptops, the user interface design attracts the people's attention. Moreover, the growing field of computer applications, the majority of software developers and computer users have become more urgent need to a simple, friendly human-computer interface. Also the computer users are rapidly expanded from the experts to the general ordinary users without any special training. Computer users have changed, and non-computer professional ordinary users become the main body of the user. This major change makes the computer availability problem become gradually renowned, thus the importance of the human-computer interface development on the increase of the computer system overall performance has begun to get people's attention. The importance of the human-computer interface refers to that it can greatly affect the use of end-user, affect the promotion and application of computers, so that affect people's work and life

Nowadays HCI has developed into fourth generation; multi-modes interaction is the main feature and development

direction of fourth generation HCI. The process of HCI is actually a process of inputting and outputting information. Section I contains the introduction about Human-Computer Interface, Section II contains about HCI's Design Theory and Principles, Section III contains system Design of HCI, Section IV explains about its applications, finally Section V with Conclusion.

II. HCI : DESIGN THEORY AND PRINCIPLES

According to different application gadgets, the users can be categorized as: by the consistency and frequency of computer usage, they can be further divided into routine users, occasional users and periodic users.

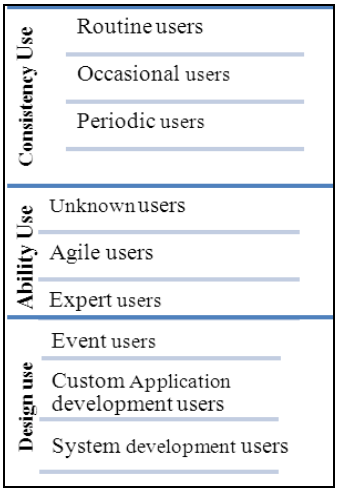

Figure.1 User Types

By the proficiency and ability of computer usage, they can be also divided into unknown users, agile users and expert users.

Moreover, by the purpose and design of computer usage systems, they can be similarly divided into Event users, custom application development users and traditional system development users. The classifications of user types are as shown in Figure 1

1. HCI DESIGN THEORY

In interactive system design process, to give full attention of human visual features is very prime. The main elements strikes on graphical interface vision are color, fonts and icons. These three elements controlled into the software interface appearance, which is the first impression the computer software presented to people, also an important meter of the software evaluation. It is intended in the light of psychology and sensory organs of the users based on structural design. Here are principles of visual design:

- With clear and intelligible interface and also allow uses to customize the contents of interface.
- To enhance computer's function of memorizing and reduces the user's burden of short-term memory.
- To provide more functions as default, undo and redo
- To provide more interface shortcuts.
- Icon design should reverence the historical using experience of users.
- To enrich visual inspire of graphic symbols through the use of colors
- To advance the transparency of visual symbols and make the pictures, layout of words and metaphors easy to understand and identify.
- Make the whole color of interface within five color systems and minimize the use of red and green. Similar colors should be used in icons on behalf of similar meanings.

2. HCI SYSTEM DESIGN PRINCIPLES

The design principles of HCI should follow the following:

- **User control principle**: It allow the users to always feel like controller of their own computer, instead of being computer-controlled.
- **Intuitive principle:** It expresses the behavior results in the form of easy to understand by human beings. These shorten the distance between the user and the computer system, so that it is directly to prompt steps of sound and graphics. Thus users can have an easy understanding.
- **Visibility Principle:** The Extensive use of visual technology and compare, analogy approach can decrease the problems of using computer.
- **Easy to use principle**: The users do not need to learn in advance many computer based knowledge and regulations to use the system, but can operate in accordance with the display prompts. It needs to provide timely help to users and it should prepare voice and text description for each option. when a user come across difficulties it should quickly answer.
- **Timely response principle**: It responds the users an operation sensitively as soon as possible within specific time limits.
- **Consistency principle**: The consistency enables end-users to renovate existing knowledge to the new tasks, and more quickly learn new knowledge.

III. HCI SYSTEM DESIGN

The user interface designed by the HCI control system will be divided into two categories: graphical user interface and Web interface. The interfaces further goes for Data processing and analysis which goes to the internet through proper network communication channel. The HCI system architecture structure is as shown in Figure 2.

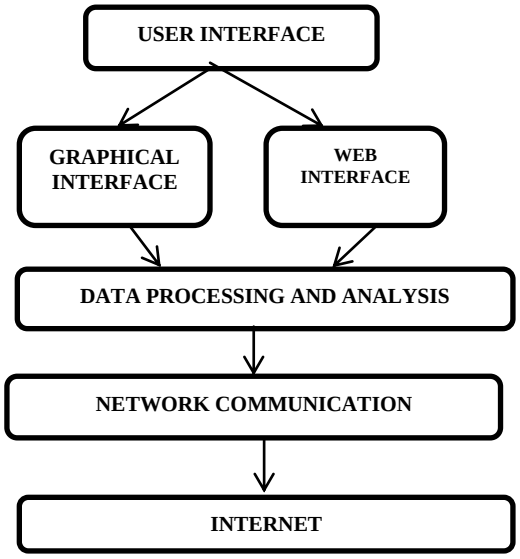

Figure.2 HCI System Design

IV. APPLICATIONS

Some of the specific applications used under HCI

1. Mobile/wearable

The recent droplet in budgets of hardware has led to an outburst in the convenience of mobile computing devices. One of the foremost challenges is that while devices such as PDAs and mobile phones have become smaller and more powerful, there has been little progress in developing effective interface to access the increased the act of computational and media resources existing in such devices. Mobile devices, as well as wearable devices, constitute a very important area of opportunity for research in HCI because natural interaction with such devices can be crucial in overcoming the limitations of current interfaces.

2. Virtual environments

Virtual reality has been a very active research area at the traverse the computer graphics and computer vision in Human Computer Interaction. One of the major difficulties of VR systems is the HCI component is to enhance the user experience. The one reason HCI is very attractive in VR environments is that it helps to translate the communication between end-users and the machine or gadgets. The integration of speech and gesture recognition for interaction provides a fascinating environment.

3. Users with disabilities

People with disabilities can benefit greatly from multimodal HCI technologies. The proposed HCI component is based smart wheel chair system and discusses the other approaches that integrate various types of sensors including not only vision. For example, the computer vision is used to interpret facial gestures for wheel chair navigation. The existing HCI can be used for interaction even using only eye blinks and eye brow movements. Some of the approaches in other application areas could also be beneficial for people with disabilities. MMHCI has great potential in making computers and other resources accessible to people with disabilities.

V. CONCLUSION

This paper simply presented some of the key features of the HCI design theory principles and its appropriate system design. There are still many functions and spontaneous interface that meets the requirements of the end-users and principles of human computer interaction design**.** Moreover the usage and application of HCI is just hosted in it

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