# Natural User Interface- Next Mainstream Product User Interface

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*Abstract*—**The thesis made a brief summary of the development process of the user interface. through the some examples,describe the disappearance of sense of entities and the arrival of natural user interface, and focuses on the seven typical characteristics of the natural interface.**

***Keywords : natural user interface , interface evolution, characteristics***

## I. THE DISAPPEARANCE OF ENTITIES

In the digital age, all the people go into the information society, Meanwhile, various products have entered the digital age. All the previous mechanical operation of button is now gradually being replaced by the graphical interface buttons, the most typical user interface is mobile phones, from the physical button operation into a virtual software interface, with a large screen instead of the original number of button, and make full use of the phone body space,made a substantial reduction of materials used. In addition, in the living the sense of entity are disappearing. E-mail replace the original letter, easy and fast. E-book become major trend ,because it is also shared easy, Portabled conveniently. The network e-cards replace the physical card. In the physical world, every word is written, many words in the information age are typed in the computer. Web store gradually been accepted, give a serious blow to the physical stores,and some physical stores even at a loss and face bankruptcy, It is most typical that web bookstore beat the physical bookstores.Entities gradually transformed into number of digital things, the physical sense is gradually disappearing..

## II. THE EVOLUTION OF USER INTERFACE

### *A. Batch Interface*

In the early stages of computer development, the way people use the computer through a batch ,in this phase of the user interface , to use punch cards as input devices, a line printer as the output device. This is only the user interface prototype stage..

### *B. Command Line Interface*

As the ancestors of all computer interfaces, Command-line is the real beginning of human-computer interaction. 50 years in the 20th century, it is more effective way to control the the computer. A kind of interactive dialogue can be established between computer users and computer by the language understand both sides. Previously, the command usually must pass in groups of punch cards or paper tape. With the command line for telegraph transmission teletypewriter can change the order middle, almost in real time to receive feedback from the computer. Although the command language proficiency, people manipulate the computer effectively and flexibilitily , but it usually requires a great deal of language and memory, can easily lead to errors in use.

In the 20th century,mid 60s ,interactive terminals and time-sharing systems, have begun to consider how to provide convenient and practical user interface. the system provides a question and answer style dialogue, text menu or command language to interact, this period of man-machine interface called the command-line interface

### *C. Graphical User Interface*

From the 20th century, 60s, as the development of ultra large scale integrated circuits, high-resolution displays and the appearance of the mouse, human-machine interface go into a graphical user interface (Graphical User Interface, GUI) era. The main features of the graphical user interface is the desktop metaphor, WIMP technology, direct manipulation and WYSIWYG.

Desktop Metaphor: Interface metaphor refers to the real world modeled on things that already exist on the interface organization and interactive way of analogy. The knowledge of these things by people (such as skills to interact with these things) is applied to the human-machine interface, thus reducing cognitive effort be required. Interface metaphor guide user interface design and implementation of the basic idea. Desktop office desktop metaphor used as the blueprint to put the icon on the screen, the user need not type the command, just use the mouse to select the icon will bring up a menu, the user can select the desired option.

WIMP technology: WIMP interface can be regarded as the second generation after the Command Line Interface,it is based on graphical methods. WIMP interface contains language and cultural independence, and improve the efficiency of visual search through the menu, small widget and so provide a more richer form of expression.

Direct manipulation: Direct Manipulation User Interface is proposed by Schneiderman in 1983, and is characterized by object visualization, semantic grammar minimization and fast feedback. In the form of direct manipulation, user in control is commander of movement, thus the process of

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human-computer interaction and control access to full control, while the system's response to user actions are predictable.

What You See Is What You Get (WYSIWYG): also known as visual operation, so that people can get directly on the screen right about the effect of printing to paper. WYSIWYG provide the users no difference with a screen display and the results of print.

### D. *natural user interface*

The term "natural user interface" is an emerging computer interaction methodology which focuses on human abilities such as touch, vision, voice, motion and higher cognitive functions such as expression, perception and recall. A natural user interface or "NUI" seeks to harness the power of a much wider breadth of communication modalities which leverage skills people gain through traditional physical interaction.

Much in the same way the graphical user interface (GUI) was a leap forward for computer users from command line interfaces, natural user interfaces in all of their various forms will become a common way we interact with computers. The ability for computers and human beings to interact in diverse and robust ways, tailored to the abilities and needs of an individual user, will release us from the current constraints of computing allowing for complex interaction with digital objects in our physical world.

## III. THE CHARACTERISTICS OF THE NATURAL USER INTERFACE

### A. *User-centered*

To the changing needs of the user interface as a starting point, so that the user interface of the external form and internal mechanisms to meet the needs of different users, which is called user-centered design. Non-specific human continuous speech recognition technology will enable computers to understand the people's demands, is an important input interface and means. Fisheye technology observe the screen position in the vicinity of the content is enlarged, user-friendly observation. In traditional human-machine system, people are considered to be the operator, people adapt to the machine; In generalman-machine systems,people are known as the user, can dialogue with the machine, but no active control; In the virtual reality system , people are active participants, the machine will respond to various human actions.

### B. *Multi-channel*

Multi-channel interface intended to make full use of one or more of the sensory and motor channels to capture the complementary characteristics of the user's intention to enhance the naturalness of human-computer interaction. Human sensory modalities are vision, hearing, touch, smell and balance; human motion channel has hands, mouth, eyes, head, feet and body and so on. Now, computer operations, human eyes and hands are very tired, and efficiency is not high. If we listen to, say, and hand-eye coordination and other actions, multi-channel, natural way of interaction, can achieve efficient human-machine communication as well as by people or machines to choose the best response channel, so the burden does not make a channel overweight.

### C. *Inexact*

Precise interactive technology is a technology that can be used to fully explain the purpose of user interaction, the user keyboard and mouse are required to accurately input. But the people's actions or thoughts are not very accurate, the computer should understand the people's request , even to correct people's mistakes, intelligent interface is an important orientation.

### D. *high bandwidth*

Now the output contents of the computer has a fast, continuous display of color images, and the very large amount of information. But people are still using the keyboard input by one after another hit, so, the computer's input bandwidth is very low. Natural user interface should support high input bandwidth, fast import large quantities of information. The input and understanding of Voice, image , the posture is orientation of development in future.

### E. *Voice-based interaction*

Language has long been recognized as the most natural flow, convenient and efficient way of information-sharing. In daily life, human communication about 75% accomplished by voice. The results show that there are many advantages of auditory channels, such as auditory signal detection is faster than the speed of visual signal detection; person of sound changes with time is extremely sensitive; auditory information and visual information can also provide access to more people the existence of a strong sense of and realism, etc.. Therefore, the auditory channel is the most important information interactive channel between a computer and other information devices.

Voice interaction is an interact with computer technology to study how people interact through natural voice or machine synthesized voice. It involves multidisciplinary, such as linguistics, psychology, ergonomics and computer technology; at the same time, it is also a forward-looking style guide to the future of voice interactive product development and design. Voice interactive research not only on speech recognition and speech synthesis, but also on the voice channel in the interaction under the mechanism of behavior such as in-depth study. The combination of Voice recognition and voice synthesis constitute a "man-machine communication system."

Voice interactive systems typically take two approaches: one is based on voice recognition and understanding technology, mainly depend on the audio system to interact; the other is the use of voice technology and systems combined with other ways to interact with the system interact . In this way the voice is no longer dominant, it is only part of the interactive system.

At present, the computer mainly used in offices, laboratories or home, people operate the computer face the screen, this mode of operation limits the application of computer. Although the remote controll instead of part of the

action, but the distance is not convenient to see the screen, while the use of voice to input and output, or other computer vision technology, it can not restrict to place.

### *F. Image-bases interaction*

Scientific research shows that human transmission of information, mainly through three channels :language, text and images. Moreover, information the human obtained from outside more than 80% from the visual system, which is obtained from the image. Therefore, research of the image interaction and explore have significance, also have guide to the innovative product design. Image unprecedented extensive interactive applications, such as facial image recognition, handwriting interface, digital ink.

Image interaction, simply, is the computer based on human behavior, to understand the image, and then react. The inside, let the computer with the visual perception is the primary problem. At present,the machine vision system can be divided into three levels: image processing (lowest level) ,Image Recognition (higher level) ,image perception (the highest level). The so-called image processing, mainly to improve the various visual effect by image processing , is process from the image input to the image output.The so-called pattern recognition, mainly interested in image target detection and measurement, to obtain objective information,in order to establish their description of the image. Essentially is a process from image to the data . The so-called image perception, focus on further study the image of target nature and their mutual relations on the basis of image recognition, and come to understand the meaning of the image content and interpretation of the original objective scene,Image perception, the input is an image, the output is the interpretation of the image.

### *G. behavior-based Interaction*

In the exchange process, in addition to using voice interaction, People also often by means of body language, that is, movement through the body to express the attitude and meaning, this is the behavior of human interaction. The method of human action interaction can not only enhance the language skills, but also can play the role of interaction what voice can not, such as fashion shows, stage performances. Human-computer behavior interaction is computer recognise human behavior through the positioning, tracking, movement and expression characteristics of human body parts to

understand human action and behavior, and respond to the intelligence feedback process

Behavioral interactions will bring a new way of interaction. User behavior can be predicted by the computer，meet the needs of users. Such as: computer track people's attention, you can determine the user's intent, to visit the website or need to call, etc.; when the user entered the room, computer with "blue eyes" respond, such as the tips of new received an e-mail, if the user shakes his head, the computer consider that the user does not want to read the message, so turn out the same day scheduling.

## IV. CONCLUSION

This thesis make a brief summary of the interface development process .the disappearance of entity being described through some examples and the arrival of natural user interface.Human-computer interaction reveals the inner relationship with the man-machine interface:"natural human-computer interaction is carried out by use of the day to day skills ", emphasized without special training or training, focuse on the typical characteristics of the seven natural interface

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