Research on the Application of Interaction Design from the Perspective of Cyborg

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Abstract. The concept of cyborg first originated from the innovation of aerospace technology. With the development of the digital economy, the cyborg is increasingly used in many interaction design projects, which include ideological metaphors such as "cybernetics" and "feminism", drawing people's attention and reflection on the current social environment and social phenomena. Based on the cyborg perspective, this study explores its conceptual metaphors and expressions, as well as its application to interaction design. In addition to analyzing real-world instances from the three perspectives of "perception," "remodeling," and "rebirth," this study outlines their application value. Cyborg theory and metaphor may be implemented through the cross-utilization of numerous media and the interactive design of sensory experiences. This study concludes by proposing the future trend of cyborg interaction design based on the concept of post-humanism, which will garner widespread interest as the global culture and technology industry focuses on the cyborg.

Keywords: cyborg · interaction design · human-computer interaction

1 Introduction

The word "cyborg" stands for "cybernetic organism". The term was first proposed in the middle of the 20th century by two scientists, Manfred Clynes and Nathan Kline, with the purpose of investigating how astronauts could better survive in space. The point made by the two authors was that when conducting long-duration space missions, it is preferable to create controllable equipment to improve astronauts' adaptability to the external environment, rather than spend an enormous amount of manpower and material resources on creating a suitable living environment for humans. Therefore, a succinct and rigorous definition of the term "cyborg" is provided, which is "a complex of exogenous expansion and organization that functions as an integrated homeostatic system" [1].

At its inception, the concept of the cyborg was very basic and was mostly applied to aerospace technology. Not until 1985 did the renowned American postmodern feminist Donna Haraway combine this term with feminism,socialism, and materialism in her paper A Cyborg Manifesto, providing a new interpretation of the cyborg. After that, cyborgs were able to generate significant effects in the international humanities and social sciences.

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Now, with the beginning of the first year of the "metaverse" in 2021, it signifies that humans have officially entered a historical stage of virtuality integrated with reality, in which the concept of the cyborg has permeated numerous sectors of the humanities. It contains cybernetic concepts that transcend engineering technology and enter the world of organisms. As stated by Ms. Haraway, a cyborg is a cybernetic organism, a machine-organism hybrid. She even believes that modern warfare is a competition between cyborgs, influenced by the military symbol C3I (Military Command Automation System), indicating that the computer is closely linked to the command, control, communication and intelligence systems, which corresponds to the "technology control organism" theory in the cyborg concept.

2 Forms of Interaction Design in the View of Cyborg

The invention of the first electronic computer in 1946 meant that human-computer interaction was no longer centered on traditional machinery but rather on the computer. The focus of interaction design has steadily turned to humanization during the next four decades. As information technology evolved, the initial graphical user interface was replaced by a human-computer interaction design based on user experience. Based on the concept of the cyborg, interaction design has emerged in a variety of forms, the core of which focuses primarily on three forms: concretization, metaphor, and future imagination.

The first is concretization. The goal is to find out how the public can perceive the physical form of a cyborg through tangible and visible entities. This sort of interaction design typically involves the use of organic materials to build a mechanical device that is touchable and wearable. By connecting such electronic gadgets to the human body, vital indicators can be incorporated, so technologically enhancing the human body. With the advent of science and technology, biotechnology may now support interface design more effectively in combining human senses and enhancing user experience. Due to the limitations of the body, interaction design with the cyborg notion at its core has long attempted to break down barriers between organic and inorganic.

The next is a metaphor. It seeks to create a metaphorical interaction design based on the concept of cyborgs using a variety of picture elements. Common components include "female body," "genderless human," and "post-human". Among these, the "female" element is primarily influenced by "cyber feminism," which seeks to eliminate gender dualism by denying the antagonism between men and women and challenging and protesting women's traditional social standing. Its use is typically centered on visual engagement or interaction with new media to create emotional contact through information transmission, audience participation, and the integration of diverse media, such as music, film and television, computer programming, etc.

Third, imagination. It seeks to simulate future situations, formulate a hypothesis for a given interaction design not yet implemented by existing technology, and present it via visualization or new media. This form of interaction design is mostly influenced by the surrounding environment and society. The essence of the concept is the irony of social phenomena, with the concept of cyborg serving as a theoretical framework for the creation, prompting the audience to think about the microcosm of future society and reflect on the present society.

3 The Application of Interaction Design in the Field of Cyborg

In 2005, Xin Xiangyang introduced the notion of "Five Elements of Interaction Design" in his work Interaction Design: From Logic of Things to Logic of Behaviors [2]. These five elements include people, actions, tools or media, goals, and situations. If we wish to optimize the interactive experience of users, we must integrate and rationally plan the five elements to fulfill the psychological demands of mainstream users. Currently, incorporating the cyborg notion into interaction design provides inherent sensory benefits. Users can better comprehend the ideological background offered by cyborgs via multisensory experience.

3.1 Perception: Integration of Technology

People have long considered vision to be the major sense. According to the principle of "five senses design," there are "hearing, smell, taste, and touch" in the context of digitalization, and the demand for multisensory experiences and relevant exploration is expanding. Consider the interactive project "Incognito," conducted by Harvard University doctor Katarina Richter-Lunn in the spring of 2021. This research aims to employ an electronic bionic prosthesis to view the electrodermal activity and heart rate variations of the human body so that anxiety and stress can be displayed visually. For instance, the first in a series of prostheses (Fig. 1) is a wrist-worn wearable device that, when triggered, has an internal airbag that attempts to vocally and tactilely replicate slow inhalation and exhalation in order to enhance people's specific awareness of their current situation. It captures data using built-in scales to demonstrate the correlation between lengthy periods of low exercise and poor concentration and restlessness. This project seeks to employ bionic media to highlight the correlation between biological perception and emotional matter by displaying real-time data in a clear and comprehensible manner. The basic understanding of "Hybrid 1.0" (Cyborg 1.0) is the use of external equipment to augment a person's cognition of himself. Although there is no considerable modification of the human organs or mind, when people are in the experience mode, they become "temporary cyborgs."

3.2 Remodeling: Body Structure and Consciousness

Regarding the organic structure of the human body and the awareness of being influenced by the environment, the notion of a cyborg has been employed in several designs. Su Yang, a graduate of the Central Academy of Fine Arts, used computer software to model resin, cloth, and other materials to build a set of wearable interactive devices for his graduation project "Insect State" (Fig. 2). The design of the device was motivated by the shape of insects and resembled parts with rotating tentacles, mechanical tentacles for detecting food, neck airbags for detecting gas, and palms with fluff or spikes. This collection of bionic cyborg devices pulls individuals away from their technologically regulated bodies and back to nature. The author seeks to establish a technological link between man and nature, thus breaking down barriers between various biological entities. From natural organisms, humans can also learn and acquire beneficial survival strategies.

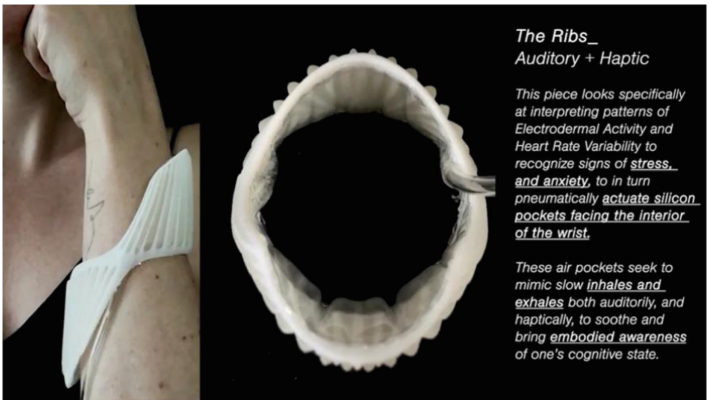

Fig. 1. Incognito Katarina Richter-Lunn (2021)

Fig. 2. Insect State Su Yang (2022)

Another example is Nella Piatek, a graduate of the London College of Communication whose graduation project "CTRL+R to Re-flesh" was completed in December 2021. It means "the Internet's rebirth." This work showcases her interactive design as experimental short films and live performances, with all of her actions projected on a television screen around her (Fig. 3). In the summary of the work, the author describes the project as a great ceremony that will take the audience from birth to death. A number of electrical devices and data cables, four laser lights surrounding them, and piles of dust are employed as tools and materials. At the beginning of the video, she embraces a heap of electronic goods and approaches the dust-encircled circle slowly. She ties the cords of her cell phone, computer, and television around her waist and turns on each device in succession. The film's narrator, "and please I ask you to stay close, don't leave me, you are the only one I need," demonstrates that electronic items have accompanied the

Fig. 3. CTRL+R to Re-flesh Nella Piatek (2021)

protagonist's life like shadows that have become a part of her existence. Towards the end of the film, when the television screen abruptly goes dark, indicating damage, the protagonist comes to comprehend that her body, which has been exploited by technology since "birth," has already become a cyborg inseparable from electronic devices. She chooses self-destruction in the end, disconnecting the data wire from her mobile phone and cutting the power line. She finally collapsed to the ground as a result of her physical "death" caused by the power loss of electrical devices. This piece exemplifies the "dissolution and blurring of all boundaries between humans and machines" described by Ms. Haraway in A Cyborg Manifesto. Presently, the α generation, which is younger than Generation Z, is characterized by having owned many electronic gadgets from birth. They typically refer to the post-10s generation, who were born in the Web 3.0 era of the 21st century and were born with smart gadgets, resulting in stricter requirements for parents.

3.3 Rebirth: The Post-human Era's Imagination

The philosophical study of the term "posthumanism" dates back to the 1960s, when Foucault wrote in the final paragraph of Words and Things, "Man is a new invention and is approaching its end… Will be erased, like a face on the sands of the sea." Foucault represents a school known as "philosophical posthumanism," which is a reflection of Renaissance humanism [3]. With the advent of cyborg discussions in the 1980s, a sub-discipline known as "transhumanism" evolved, which takes a biological constraint beyond that of humans as its focal point and centers its discussions on new biological forms. Take Dr. Margo Trushina of the Royal Academy of Arts' interactive work "Living Space," produced in 2020, as an example: it blends installation interactivity, ecology,

Fig. 4. Living Space Margo Trushina (2020)

and sound art (Fig. 4). The author uses a variety of materials to create a virtual image of the post-human world, such as metal, water, light, organic plants, etc. and explores the position of human beings in the environment in the future from the perspective of post-human beings, as well as symbolically creating the living conditions of the earth in the future. As the planet's climate changes significantly, people must develop new methods to coexist with other species immediately. In the work on-site, each plant branch has its own sound that can be activated by touching or moving it, thanks to the incorporation of interactive features on its surface. The original sound was recorded live, and the subsequent sound was magnified live by the audience. The writers completed these sound works in collaboration with Playtronica Lab, a community of artists interested in the transition from touch to sound and its capacity to generate new human relationships. Through the development of electronic equipment and software, it is possible to connect humans and plants to the same circuit. This is a process of interspecies communication that is dominated by plants. Individuals can directly perceive the metaphors displayed on plants. For instance, environmental contamination will surely endanger the lives of both humans and plants. In this instance, however, it is vital to confront the homeland on which people depend for survival. It is evident that Margo Trushina attempts to utilize a variety of media outlets to attract society's attention to the issue of contemporary environmental deterioration. In this effort, the barriers between humans and plants are once again broken through, which can be regarded as "cyborgs" interacting amicably. At this level, "human" is no longer "human" in the sense of humanism; rather, it is a plant-like organic organism that breathes.

4 The Future Trend of Interaction Design from the Perspective of Cyborg

The common denominator of the aforementioned situations is the consideration of contemporary social phenomena or future society, which stimulates the public's imagination and encourages them to consider social issues. The purpose of design is to investigate the potential of objects and reimagine the interaction between humans and reality. On the basis of the preceding explication and case study of interaction design in the field

of cyborgs, three significant future developments in cyborg interaction design can be described.

4.1 Feminist Design

Since the 1880s, the problem of femininity has sparked a growing number of societal conversations, with the goal of resisting patriarchy and achieving parity between men and women. Gender dualism, or the tight division of gender boundaries between males and females and the formation of male and female opposition, is, in general, the analytical model utilized by conventional feminist schools. Late in the 20th century, "technofeminism" evolved, which primarily investigated the relationship between women and technology in the field of technology, including branches such as cyberfeminism. Ms. Haraway's cyberfeminism aspires to overcome gender dualism and erase gender barriers in order to achieve gender equality and female liberation [4]. When individuals are in cyberspace, the virtual world fuses with the physical world and can perform a variety of functions. Gender inequalities in the workplace are no longer significant, and the status of women and men can be compared. Cyberfeminism can be presented in a tangible manner through interactive design in order to demonstrate the distinctiveness of women to the public and support the growth of women's ideals.

4.2 No Interface Design

Traditional interaction design typically places the interaction interface on web pages or other portable mobile devices, which forces users to rely on touch screens, whereas interface-free design argues that "no interface is the ideal interface," which is consistent with the cyborg concept. It attempts to eliminate the touch screen and facilitate more natural interaction with the surrounding gadgets, echoing the bounds of the machine. Unlike the standard click-and-enter behaviors of the past, more diverse interactions, such as voice recognition, tactile feedback, gesture feedback, etc., provide the audience with a more authentic experience. This revolution will fully integrate technology into life, as opposed to restricting humans with technology.

4.3 Metaverse Virtual Design

As a parallel and separate virtual universe from the real world, the metaverse offers people an immersive user experience. When people are placed within it, they experience a second existence as "cyber cyborgs" with multiple identities, statuses, and even genders. The Metaverse is the ultimate version of the Internet and has direct ties to the VR/AR sector and the digital cloud economy [5]. Although the current metaverse business is still in its infancy, it is not yet mature and stable. However, from a post-human perspective, it will be compelled by the general trend of interface design innovation, which can open up more artistic design opportunities as a new medium.

5 Conclusion

From the earliest vision of space technology to a new cultural metaphor, "cyborg" as a theoretical term has undergone continual development. It expresses the cyborg's hypothesis on social concerns by evaluating many interactive design situations related to cyborg theory. The artists made daring attempts in various media, created a visual representation of the cyborg concept, and informed the public about the cyborg concept. A fresh viewpoint on the present and the future. In the near future, it is anticipated that the expression of the cyborg metaphor will receive a new right to speak due to the expanding discussion of the notion of cyborg and the gradual attention to cyborgs in the humanities circles both domestically and internationally.

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