

# Avatar Construction Methods and Applications in the Metaverse

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## ABSTRACT

In 2020, mankind has entered the critical point of virtualization, and the explosion point of the meta-universe has put forward higher requirements for the construction of virtual avatar. This paper deals with the form upgrading of virtual avatar in the meta-universe and investigates its construction method by combing and analyzing the construction of virtual avatar.

**Methods:** Through literature research, the evolution of the definition and design of virtual avatar was analyzed, and the actual case was summarized. The framework and paradigm of virtual avatar construction in the meta-universe are summarized by combining the theoretical experience in the early stage with the technology provided in the later stage.

**Conclusion:** The meta-universe breaks through the limitation of dimension, and gives mankind a broader and long-term space for activities in the space-time dimension. As a media form, virtual avatar expands the sensory dimension through “entry”, “presence” and “interactive experience”. With the expansion and simulation of sensory dimension, the boundary between real and virtual begins to blur. There is still a discussion on the internal transmission route, utility evaluation and multi-sensory construction of virtual avatar.

**Keywords:** Avatars, Metaverse, Avatar identity, Flow experience, Sensory experience

## INTRODUCTION

ZhuangZi believes that the body is not only a representation of individual life, but also a practical subject connected to the world, and the pursuit of life, value and life itself are all unfolded in the sense of the body (Chen Fang XingZi, 2018). As real people, we build the perception of the real world through the five senses of the body, and form a cognitive network of things in the brain, but the limitations of time and life form a dilemma for human survival. The gap between the heavy burden of appearance, bodily functions, and abilities of the shell of reality and the infinite desires and beautiful fantasies of human beings has long blocked the consistency of body and mind, leaving body and mind in a state of opposition and unable to merge (Bai Long, 2022).

The interaction between people and the world is the interaction mediated by technology, and the interaction between technology and the world is based on the human body and the interaction of the mediation (Lian Jia, 2022), and at the moment of the development of network technology, the digital avatar customized with self-mapping psychological needs achieves the

degree of flow experience through “interaction”, forming a “remote presence”. The metaverse relies on previous research experience and current technology base to provide a more complete solution and platform for the virtual avatar architecture. Avatars serve as the first passport to the metaverse. Build another lifestyle from three aspects: “remote presence”, “avatar presence”, and “interactive presence”. The digital avatar in the metaverse becomes a symbolic agent of the physical body, replacing and expanding the value of being a body (Lian Jia, 2022). Through the process of inquiry, experience and interaction, we awaken emotions and unity in the activities of real and incarnations.

However, 2021, as the first year of the metaverse, has a relatively short development time so far. There are still many places where the perfect scheme and construction method of virtual avatars are not fully studied. Based on this, this article will focus on the following three questions through the systematic combing of literature: What is a virtual avatar relative to real people? In the singularity period of the outbreak of the metaverse, what are the benefits of technology for the form upgrade of virtual avatars and what kind of form upgrade has been formed? In the metaverse, how will virtual avatars that bridge the intermediary between the real and virtual worlds with technology change and impact our embodiment and real life?

## **DEFINITION AND DEVELOPMENT OF VIRTUAL AVATARS**

The earliest word incarnation comes from the Sanskrit word for Hinduism, referring to the embodiment of God in Hinduism, or the physical manifestation of God’s coming to earth. In the Internet era, virtual avatar refers to a digital virtual display image that relies on digital media platforms relative to the real body, that is, the identity expression of the subject in the screen. It has three characteristics: virtuality, idealization and aesthetics. This avatar is a very common way for users to present themselves in a virtual environment, and it is defined as “a perceptual digital representation whose behavior reflects those performed by specific people, usually in real time” (Bailenson, 2004).

Avatars are a product of the age of screens. From the perspective of the evolution of technological history, the external coexistence relationship between the body and technology in the empirical technology period is mainly dominated by simple “organ projection”; The relationship between the body and technology in the period of mechanical technology developed into a relationship pattern of technical manipulation of the body; In the era of intelligent technology, technology has partially or completely separated from the identity of human body tools, and the human body has become a symbol. The development of technology provides the basis for the advancement of virtual avatar representation, through deep self-mapping, user customization, stylized complex framework, to build a user image that meets the specific virtual environment. From the development of two-dimensional flat user avatars to three-dimensional realistic models, all show the progress of users in virtual avatars.

## THE PSYCHOLOGICAL LEVEL OF VIRTUAL AVATAR RESEARCH

### Maslow's Hierarchy of Needs

Maslow divided people's needs from lower to higher levels into five categories: physiological needs, safety needs, social needs, respect needs, and self-actualization needs (Maslow, 1943). With the rapid development of the material world and the popularization of the Internet, human beings can generally pursue higher spiritual needs, especially the construction of personal avatars in the Internet to achieve what reality cannot do. Through technical means, it uses the virtual world as the background and the virtual avatar as the sensory intermediary to achieve the self-realization needs of sensory cognition and intuitive awakening.

### Proteus Effect

The Proteus effect means that when different roles are assigned, individuals tend to behave in a manner consistent with the characteristics of the role (BIAN Yulong, 2015). The psychological research of the Proteus effect shows that the virtual avatar, as the ideal of human beings in the virtual world, is the personal presentation of the user in the virtual world. An avatar is the self-presentation of an individual in a virtual environment, and the avatar image is the external appearance of an avatar associated with a specific stereotype (HENG Shupeng, 2017). The virtual avatar will intentionally or unintentionally reflect the real or ideal self, the perception of the real world will affect the avatar, and the cognitive experience of the virtual avatar will also affect the perceptual behavior of the real user.

### Incarnation Identity

Incarnation identity is an individual's evaluation of satisfaction based on the similarity of avatars or personalities, as well as inner needs and attractiveness, resulting in a psychological phenomenon of temporary changes in self-perception, emotions and attitudes (HENG Shupeng, 2020). Game avatar identity theory holds that the persona in the game is the player's self-incarnation (Klimmt, 2009). Through the role of avatar intermediary, users map themselves to avatars and achieve immersive effects through interactive experiences, and the result also acts on the real self to achieve the effect of empathy.

## UPGRADE OF AVATARS IN THE METAVERSE

### Avatars in the Metaverse

The post-pandemic era has accelerated the digital-for-digital transformation, making digital life the norm, and the frequency of virtual network usage has increased dramatically. With the development of XR, big data, blockchain, digital twin, artificial intelligence, SG and other emerging technologies, society has entered the tipping point of virtualization and spawned the metaverse.

‘Metaverse’ means ‘beyond the universe’. In 1992, Neal Stephenson’s science fiction novel *Snow Crash* introduced the concepts of metaverse and avatar (Neal, 1992). At present, there is no unified definition of what the metaverse is, and the “China Metaverse White Paper” defines the metaverse as a virtual world born based on the Internet, connected to the real world, and exists in parallel with the real world, which is a virtual space that can map the real world and is independent of the real world (FENG Gang, 2022).

Metaverse technology is a comprehensive application of new IT technologies, and technology provides great advantages for the upgrade of avatars, making the avatars in the metaverse rich and distinctive, close to reality, and enhancing interactive sensory experience. First of all, the metaverse has created a huge virtual online platform through digital twin and other technologies, giving virtual avatars a larger field of activity. Second, blockchain technology guarantees the unique special status of the avatar. There are richer possibilities in the creation of avatars. Third, cloud rendering and 5G technology make the image of the avatar more high-definition, high-level scanning texture and real physics simulation possible. Fourth, the promotion of motion capture and face recognition technology makes the picture movement smooth and the expression natural, in this case, the smooth operation can obtain a deeper interactive experience. It is these advantages that make the mapping relationship between the virtual avatar and the real self closer, the degree of identity of the avatar is higher, and it is easier to form the effect of resonance and flow experience.

The ‘expressiveness’ of the digital avatar expresses ‘the greatest freedom of association’, creating an image object that expresses one’s emotions in line with the theme of the image (Huang Yuanyuan, 2016). The meta-universe creates a huge activity field for network avatars, and improves the aesthetic interest and freedom of control as much as possible in the field. In this case, virtual reality technology has played a role. As an emerging art medium, the core quality of virtual reality that distinguishes it from other art media is ‘consciousness immersion’ (Xue Liang, 2020). Through the immersive experience, the real agent can easily and quickly build a direct feedback connection with the avatar, and this connection continues to increase with the degree of immersion. This direct feedback connection relies on the way XR technology provides to perceive the virtual world, deepening the connection between the virtual and the real world.

### **The Construction of Virtual Avatars in the Metaverse**

The meta-universe is a coding and labeling means to simulate our most wanted desires into digital civilization, and the identity of a single individual in the meta-universe is a new simulation. Avatars are crucial as the first passport to the metaverse. The early avatars that existed on the game platform were the game’s avatars, which were played according to the game character settings in the game. From early single symbols, pixel-style characters to three-dimensional next-generation realistic models, avatars are constantly high-definition and refined; The virtual avatar on the social platform is to make user avatars according to personal aesthetic preferences

to the greatest extent, becoming the main carrier of online social networking; In media communication, virtual avatars often exist as virtual people with background personalities and personalities. The metaverse itself is a comprehensive platform, integrating games, social networking, and media communication, where the boundary between virtual and real begins to blur.

### **The Application of Avatars in the Metaverse**

The world's major general companies are actively engaged in the development of metaverse platforms in an effort to seize market opportunities. In the United States, Roblox, as the world's largest multiplayer online game platform, is a typical UGC-type community, and is also the first company to write the "meta-universe" into the prospectus, which has linked with Nike and produced a dedicated Nike virtual showroom on it. Epicgames produced the phenomenal game Fortnite, working with music producers to create highly immersive virtual concerts; Decentraland is a decentralized virtual reality platform that can be traded with NFTs. In Japan, it mainly uses its Japanese comic cultural influence to carry out a series of online linkages, and has created the first Japanese metaverse platform Mechaverse; South Korea attaches great importance to the government and supports the construction of the metaverse. The ZEPTO platform has become an important marketing channel in cooperation with popular idols and municipalities. South Korea's idol culture is deeply integrated with the metaverse, on the one hand, entertainment companies such as JYP, YG, HYBE have launched virtual idols such as YGApoki and aespa doppelgangers, on the other hand, Samsung, LG and game companies such as Netmarble and Neptune have entered the metaverse virtual idol market.

In China, Internet and game companies are actively engaged in the construction of the metaverse, such as ByteDance's research and development of Pixsoul, Baidu's launch of "Xi Long", Alibaba's launch of the Yunyou brand "Cloudland", and major universities are also actively responding to catch the trend of the times, for example, due to the epidemic, many colleges and universities are building campus metaverses and launching online graduation ceremonies. In addition, China's virtual human technology has continued to improve, launching super virtual stars such as Ling and Liu Yexi.

### **The Presentation and Driving Mode of Virtual Avatars in the Metaverse**

The appearance of the avatar in the meta-universe depends on the user's personal choice, and the hair, facial features, clothing, etc. of the avatar can be set and matched, and face pinching in the meta-universe has become an emerging profession dedicated to serving the appearance of the avatar. One of the most prominent is the use of 3D scanning technology to build a digital twin avatar, making the virtual and real images highly similar.

The three-dimensional model shapes the flesh and blood of the avatar, and the action drive based on motion capture and face recognition technology creates the muscles and bones of the avatar. Motion capture and face recognition allow the physical behavior of real people to be mapped to virtual bodies. Due to the iteration of image recognition technology and algorithms, the driving method of the virtual avatar can only use the form of a camera to reduce

the field limitation and cost problems, which can be better disseminated and promoted.

Therefore, the virtual avatar in the metaverse is a self-mapping image customized under a specific aesthetic style in the platform, which interacts with the virtual world through a certain form of motion capture to obtain a sense of substitution.

## **THE IMPACT OF AVATARS ON SENSORY DIMENSIONS IN THE METAVERSE**

In the Buddhist scriptures, it is said that a person perceives the world by relying on his eyes, ears, nose, tongue, body, color, sound, fragrance, and taste, that is, what he feels through his physical senses. The same is true of virtual avatars in the metaverse, which obtain the perception of the virtual world through the experience of the sensory dimension, and this perception is obtained by the virtual situation created by integrating human senses with technology.

People's five senses include sight, hearing, smell, taste, and touch. Through virtual reality technology, you can get more immersive visual effects, and various algorithms and technologies also make artistic style possible; Through radio and post-synthesis technology, a super listening feast can be produced. At present, compared with audiovisual language, touch, smell, and taste can all obtain corresponding perceptual feedback in specific fields or activities, but their production costs are higher and the degree of feedback is relatively low.

Nevertheless, this technological "perception" replaces some of the human senses (Ma Xiaoxiao, 2021). It makes the perception of the virtual world more profound, and the high immersion experience brings the risk of addiction and the digital Narcissus effect. This is due to the phenomenon of focusing too much on doppelgängers, and unable to distinguish between digital illusions and real society. This is also a kind of virtual survival that the metaverse has an impact on the ontological meaning.

## **CONCLUSION**

The virtual avatar is a virtual world identity carrier with special meaning and style characteristics created by users through certain personalization and idealization, and a huge virtual social network is built between the virtual avatars. Among them, metaverse technology provides many benefits for the upgrade of virtual avatars. Blockchain and digital twin technology make its avatar unique and unique, and can simulate the real world for real restoration; XR technology and artificial intelligence allow avatars to create interactions with a high degree of freedom, increase immersion through multi-sensory experiences, and promote avatar identity to enhance emotional resonance. In the future, "migration" to the virtual world through virtual avatars has become a general trend. However, with the advancement of technology, based on the upgrading of sensory dimensions, the boundary between virtual and real began to blur; Due to the cognitive illusion of the transparent

presentation of the interface and the body, the identity crisis of the virtual avatar and multiple doppelgangers, the empathy mechanism and the emotional barriers of the body, it is very easy to produce body identity anxiety under the mimic reality in the metaverse Chen Xiaoyan, (2022).

The concept of the metaverse has not been proposed for a long time, and the relevant research on it has not yet been clarified, and the technological development has not yet been perfected. Many practices are still taking shape, and have not brought disruptive results and promotion. In the face of legal issues such as property rights and ethics caused by the upgrade of virtual avatars, and social problems such as privacy and addiction risks, the response measures have not yet been perfected. However, this paper aims to upgrade and apply the form of avatars in the metaverse, and research on the legal system, specific identity transmission channels, and emotional feedback utility of avatars in the metaverse has not yet been carried out. The author believes that there is still a wide range of research space in these directions and propositions in the future.

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