



**THE IEEE GLOBAL INITIATIVE ON ETHICS OF
EXTENDED REALITY (XR) REPORT**

**WHO OWNS OUR SECOND LIVES:
VIRTUAL CLONES AND THE
RIGHT TO YOUR IDENTITY**

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WHO OWNS OUR SECOND LIVES: VIRTUAL CLONES AND THE RIGHT TO YOUR IDENTITY



ABSTRACT

This report is the result of work within the IEEE Global Initiative on Ethics of Extended Reality (XR), a multidiscipline group of industry practitioners, ethicists, academics, researchers, educators, and technology enthusiasts. It has been written to focus on a wide range of ethical issues related to XR and the ownership of second lives. This report builds on work outlined in the “Extended Reality” a chapter of the IEEE’s seminal ethics-focused publication *Ethically Aligned Design*. XR is a term used to broadly refer to a suite of immersive technologies including virtual reality, augmented reality, and spatial computing. The scope of this report is the exploration of ethics-related issues in terms of virtual clones and the right to your identity; the aim is to initiate expert-driven, multidiscipline analysis of the evolving XR Ethics requirements, with a vision to propose solutions, technologies, and standards in future updates. The set of recommendations within this report will hopefully contribute to industry conceptualization of socio-technological issues, highlight concreted recommendations, and lay the groundwork for future technical-standardization activities.

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1. INTRODUCTION

In virtual reality, and to some extent augmented reality, you as a user encounter different kind of entities. These can be apparently artificial (robots), non-human (animals), and human-like. They can be avatars (representing another user, as well as yourself) or NPCs (non-player characters, controlled by the programming of the VR application). They all have in common that they have an identity. This paper discusses different aspects and issues that arise when this identity corresponds to and overlaps with the identity of actual humans.

The arguments will mostly concern identities in virtual reality since that is where we, as researchers and developers, have the most experience and empirical data. However, most of the argument should be applicable to augmented reality applications as well.

2. WHAT IS IDENTITY?

Defining or characterizing identity is, of course, a highly complex and multi-faceted question, and several very different perspectives can be had on identity. This paper will try to focus on aspects of identity that are pragmatic and practically oriented, as well as relevant to the virtual/digital duplication/reconstruction of a person's identity. This paper will also only focus on personal identity, and not primarily group identity.

Personal identity is the characteristics, attitudes, behavior, and appearance that makes up a specific person [1]. The identity is, so to speak, the sum of all parts and what makes a person unique from the outside perspective of others. Identity is also important for the individual themselves, and this self-identity or self-image can be seen as a collection of beliefs and attitudes toward oneself. Self-identity can be seen as the answer to the question “who am I?” [2]. In a philosophical perspective on identity and self-identity, Ricoeur used the concepts *ipse identity* (“Who am I”) and *idem identity* (a third-person perspective, offering an objective outside view on a specific person) [3]. Another important distinction in philosophy of identity is the mind-body dichotomy. Persons have a continuous, physical existence [4]. Our body can lose parts (such as limbs) or gain parts (such as artificial constructs, ranging from clothes to mind-controlled robot limbs), but we have a continued physical existence [5]. Persons also have a continued immaterial existence—the mind and cognitive faculties. The mind-body problem—investigating how the physical body and the immaterial mind relate to each other—has been a major philosophical discussion for centuries [6], and virtual communities (in virtual reality or elsewhere) have complicated the situation, adding a virtual, online existence as well [7], [8]. In virtual reality, a person's avatar is an extension of both their physical identity (mediating and/or representing the posture, movement, etc., of our

physical body) and their mind (since humans phenomenologically experience themselves as being in the virtual environment, and others experience their presence and behavior in the same virtual environment).

In the following argumentation, identity will be viewed as something that can be separated from the individual having that identity, in the way that the observable aspects of a person's identity can be copied, repeated, replayed, or used in other ways. In other contexts, the term *identity theft* is used, and explained as a situation where someone else is using a person's identifying information, such as name, driver's license, passport, etc. [9]. However, in virtual reality identity theft can mean much more and can be much more profound. Therefore, the following terminology is used:

- **Original individual**—The individual human whose identity is used in different ways.
- **Virtual clone**—The virtual representation and/or mediation that has the behavior and/or appearance of the original individual, without being controlled by the original individual.
- **Avatar**—The virtual representation and mediation of the original individual, controlled by the same individual.

3. ASPECTS OF IDENTITY THAT CAN BE VIRTUALLY CLONED

In the above introduction to identity, a few ways of looking at different forms of identity was summarized. But when it comes to virtual clones, the specific circumstances (the technology and affordances of virtual reality, and methods for producing virtual reality experiences) require that aspects of identity be categorized in a bit more specific way.

3.1. VISUAL FIDELITY OF PHYSICAL APPEARANCE

A virtual clone has a visual likeness to the person, for example body size and shape, face, hair, clothes, and other identity markers such as glasses. The visual fidelity of physical appearance is a continuum, ranging from fully photorealistic and indistinguishable from the original individual to highly stylized cartoon characters. It can also be partial, e.g., one individual's face on another person's body.

3.2. BEHAVIOR AND MOTION PATTERNS

Behavior means the replication of an individual's typical and common reactions to events and situations, or a person's typical initiative in certain situations. Motion patterns include movements of the body or its parts, such as gesticulation, walk pattern, facial expressions, and eye gaze. These can be generic, but everyone has their own distinct motion patterns, which can identify the person if someone knows them well. Behavior and motion patterns are combined in highly complex and subtle ways, for example how the original individual used to look when having a specific thing said to them.

3.3. DIALOG, MEMORY, AND EMOTIONAL STATE

An aspect of a person's behavior that needs to be considered separately is the person's speech and dialog patterns. This is also highly complex and subtle, covering how the person is saying things (sound of their voice, lip movements, vocal pitch), what they are saying (choice of wording and ways of expression, grammar), and what this reveals about their memory (what does the content of the dialog suggest the virtual clone "knows" or remembers).

Memories are especially crucial in the construction of a personality. When people interact with a virtual clone, then their primary way of observing the virtual clone's memory is what the virtual clone says. Therefore, speech is categorized together with memory, and not primarily together with behavior (even though speech is an aspect of behavior as well).

Emotional state is an internal state of the individual, but how it affects external behavior and dialog can be externally observable, and thus possible to replicate. This is intertwined with temperament and disposition, which in turn is intertwined with personality; what is relevant in this context is that an original individual's tendency (disposition) to enter specific emotion states, and thus exhibit specific behaviors, can be replicated. A superficial example can be how a particular individual usually reacts to stress or misconduct—does the individual remain calm, get angry, get sarcastic, and so on. These three sets of identity aspects can also be complemented with the following way of measuring and documenting human identity:

- **Biometric**—Bodily measurements, often used for authentication of identity [10]. Physiological characteristics are, for example, fingerprints and retina patterns (comparable to physical appearance); behavioral characteristics can be typing patterns, gait, etc. (comparable to motion patterns).

- **Psychometric**—This is concerned with attempting objective measurement of personality traits, skills, knowledge, attitudes, mental disorders, etc. [11]. The purpose is primarily to document, evaluate, and categorize individuals, but it partially overlaps with behavior mentioned previously. Behavior focuses more on what is observable from a third-person perspective, and thus allows for replication.

4. HOW AN IDENTITY CAN BE STOLEN AND RECONSTRUCTED AS A VIRTUAL CLONE

All aspects of identity mentioned previously can be reconstructed in different ways already or will most likely be possible to reconstruct quite soon. However, the methods and the results in terms of fidelity and production efficiency vary considerably, which is summarized in the following sections.

4.1. STILL IMAGE

The photographic reconstruction of a person's likeness (physical appearance) has been possible for a long time (since about the 1830s). Since images do not capture motion patterns or behavior, it will not fool anyone in most situations inside or outside of virtual reality; but the underlying technology is fundamental for many other production technologies. However, it is worth noting that photo editing techniques can cause harm to a person's identity, and historically, some cultures regard the taking of a portrait photograph as a breach of privacy or a danger to their identity.

4.2. VIDEO RECORDING

As with still images, the moving reconstruction of a person's likeness and behavior has been possible to capture for a long time, and it might not be relevant in virtual reality experiences. However, attitudes concerning video recordings and identity is an interesting consideration, specifically the status video has as proof of an individual's actions, both in journalism and legal situations. This trust in video still exists, even if the public, as well as experts such as journalists, know quite well that any video can be faked. Moving images depicting fully fictional events have been possible to construct manually (using 3D modeling and 3D animation) for a couple of decades, and deep fake technology has made it possible to automatically manipulate and create new versions of any footage.

4.3. AVATAR (3D MODEL)

A 3D model of an original individual is the first step toward a virtual clone. It creates the physical appearance of the individual and can then be used in virtual reality or augmented reality as an avatar or non-player character. Fully convincing (photorealistic and with full likeness) 3D models of humans have proved possible in digital visual effects in the last decade and have been featured in feature films such as *Blade Runner 2029* (the character Rachael 2.0). These are constructed manually and typically require considerable time (weeks or months of labor), as well a highly skilled group of artists. They also require pre-rendering and compositing. Interactive virtual humans rendered in real-time have started to mature technically, and one of the most impressive examples is BabyX, an interactive, self-learning virtual child [12]. However, these virtual humans still tend to fall into the “uncanny valley” and are still not fully convincing [13]. The automatic (AI supported) production of convincing virtual humans is gradually becoming more efficient and perfect and is expected to mature in five years. Note, however, that an avatar does not need to be perfect to enable identity theft in virtual reality, since currently no avatars in social VR platforms are fully photorealistic. From a pragmatic viewpoint, it is already now very easy in many social VR platforms (such as AltspaceVR or Engage) to construct an avatar that resembles any individual, and then put that person’s name as name tag on the avatar.

4.4. AVATAR WITH REPLICATION OF BEHAVIOR AND MOTION PATTERNS

Just as with visual appearances, replication and manipulation of behavior and motion patterns (ranging from simple walk cycles to emotional facial performances) has been successfully and convincingly created in visual effects and animated movies for a couple of decades. A range of methods are in use and often combined: manual (keyframe animation), semi-automatic (motion capture), and automatic (volumetric capture) animation. This is usually time consuming and labor intense work, but automatic production and real-time animation and rendering is maturing. Already, AI can be used to drive the remixing of recorded behavior and motion patterns (for example, the “Massive” crowd animation software and the above mentioned “BabyX”), and this is expected to reach full maturity in 10–20 years (depending on what use case is considered).

4.5. AVATAR WITH FULL HUMAN INTERACTION

What is envisioned here is a fully convincing virtual clone of an original individual, with such a high fidelity in all aspects (appearance, behavior, motion, speech, memory, emotions) that it is indistinguishable from the original

individual, even for persons that know the individual well. This is not yet possible, but it is anticipated that it will be. A faithful, high fidelity virtual clone reconstruction of a person is being experimented with, for example the already mentioned BabyX, or the Replika application (<https://replika.ai/>). The latter is a smartphone-based conversational agent that mimics dialog interaction with a kind of virtual “friend” or “love interest” [14]. Dating simulators in VR suggest what might come quite soon, for example the VR experiences “Focus on You,” “Falling in Love,” and “Summer Lesson.” So far, they are limited in different ways; for example, limited dialog tree (the conversation feels highly restricted and/or scripted) and limited visual fidelity (stylized virtual human). It is especially difficult to estimate when this vision will reach full maturity, but a reasonable assumption would be 10–20 years.

4.6. ACTUALLY SELF-AWARE VIRTUAL CLONE

This is not primarily within the scope of this paper, but since the concept is often brought up as a technological dream (both in science fiction and by some academics) it needs a brief mentioning. The avatar with full human interaction described in the previous section is assumed to be just a fanciful replication. It only mimics the original individual. It does not become a copy of the original individual—it does not have self-awareness. But could a virtual clone with actual self-awareness be created? The typical vision is the far-future ability to upload yourself to a computer, so that the virtual clone can continue to be you after your physical death [15], [7], [16], [17]. This would require a highly advanced general AI and poses highly challenging questions concerning what a human is. The idea has been thoroughly explored in science fiction (for example in the feature film *Ghost in the Shell*, the TV show *Serial Experiments Lain*, and the novel *Neuromancer*), but an actual implementation is most likely very far off in the future. Some academics [7] claim it is not possible at all, that the human mind has a uniqueness and complexity that simply cannot be copied and cannot be “run” on any other physical strata than the organic, living human brain. Additionally, even if a virtual clone could be created and claims to be self-aware, it is ontologically not possible, and maybe pointless, to try to prove whether a virtual clone is self-aware or not.

4.7. OPEN QUESTIONS CONCERNING REPLICATING IDENTITY

During the work with this text, several ethical questions and issues have been brought up. It is too early to attempt to answer these now. Instead, the following questions should be further discussed and observed while the technology of virtual clones slowly matures:

- When does the replication of identity become unethical or problematic, and why at that point?
- Where lies the essence of individual human identity? The level of complexity? The amount of interactivity? The level of fidelity to the original individual?
- What is the essence of a person?
- At what level of fidelity do ethical concerns become an issue? How should level of fidelity be quantified and agreed upon?
- In what way does the construction method have any impact on the ethical concerns? Is there a difference between a volumetric capture and a manually modeled and textured avatar, like how a photograph and a drawing of a person can have different ethical relevances?
- Is there reasoning for the differentiation between public figures and members of the public when it comes to virtual clones? Comparable to how journalistic code of conduct/ethics can differ depending on whether a person is a public figure or not.

5. REASONS FOR REPLICATING A PERSON INTO A VIRTUAL CLONE

So far, this paper has discussed how an original individual can be virtually cloned. But why would anyone want to do this? The answer to the question “why” will point to some of the potential dangerous and/or unethical use cases. Why do people use technology, really?

This might sound like an unnecessary question with an obvious answer. Don’t humans use technology because it is good? But is it always good? And good for whom, and in what way? With a techno-skeptical and user-centered perspective, the question is fundamental and complex.

So, this paper suggests there are three general reasons why people use any technology, including virtual clones.

1. **Because they can**—Researchers and engineers tend to develop technology and applications without any proper reflection on whether they should, often driven by the fact that they can. One of the most important aspects of critical theory, design thinking, and user-centered design is to ask the questions why? for whom? and solving what problem? These three questions should always be asked, in any technological development, and especially concerning potentially problematic technology such as virtual clones.

2. **Misdirected benevolent reasons**—Developers and designers can be misled into unethical applications, thinking they benefit a certain group of users. For example, benefiting next of kin to dead persons by creating a virtual clone of the deceased, while thus behaving unethical toward the dead individual of whom a virtual clone is constructed.
3. **Direct malevolent reasons**—Applications developed even if unethical effects are known, for example creating virtual clones for pornography without consent from the original individual.

Looking further into the reasons for constructing virtual clones, this paper chooses to categorize this according to person perspective. This is illustrated with the following scenarios:

- **First person perspective**—The user themselves decides to use a virtual clone as their avatar. The virtual clone of an original individual is used by another user, as if putting on a mask of the other person, impersonating them. Reasons can range from illegal fraud to “cosplaying” as a celebrity.
- **Second person perspective**—The user utilizes a virtual clone to interact with, essentially “dressing up” a non-player character so that it looks like and behaves like an original individual. The user utilizes a virtual clone because they want to interact with the copy of the original. This can be functional (journalist enacting an interview with a dead person); emotional (parents meeting a dead child); relational (dating simulator where a user can enact a romantic relationship with a virtual clone against the consent of the original individual); sexual (enacting a sexual encounter with a virtual clone); or violent (enacting violent acts against a virtual clone).
- **Third person perspective**—Another user has chosen to use virtual clones as non-player characters. One example could be populating a social VR experience with virtual clones of famous people, for example. Imagine watching a movie in a virtual reality cinema with a friend (representing as an avatar), surrounded by a cinema theatre filled with virtual clones (as non-player characters) looking like well-known movie actors.

6. DEAD OR ALIVE?

There has been some work and ethical discussion concerning virtual clones of dead celebrities [18], and also the much debated example of a recreation of a deceased child in virtual reality [19]. As will be discussed in this section, the implications of virtual clones are different depending on whether the original individual is still alive or not.

Usage of a virtual clone of a living, original individual can be offensive, confusing, can be part of illegal frauds, or potentially copyright infringement (for example replicating a performance with a virtual clone). Some of these issues are already relevant when it comes to deepfake technology, and virtual clones of actors, stunt performers, or athletics used in movie and game production.

Usage of a virtual clone of a dead, original individual can be unethical specifically because the person is dead; for example, being offensive to next of kin and significant others. The dead person themselves loses control over their identity. The legal status of an advance virtual clone is unexplored. For example, who owns the performance created by a virtual clone of a performer? If a virtual clone draws a drawing, who has the copyright to the drawing? Is the answer different depending on whether the original individual is dead or alive? These questions are essentially unexplored, both legally and ethically. One use case where some precedence exists is the recreation of recently deceased actors (such as Paul Walker in the feature film *Fast & Furious 7*). The legal arrangements covering these use cases is usually not public, but there are indications that such contracts exist.

It is interesting to note that historically, there have been quite different views on the relation between the dead and the living. In some cultures, the dead have been preserved as mummies, or are prayed to. Even in present time some people believe they can communicate with the dead. One philosophically challenging question is what right someone has to the recreation of a memory of someone. It could be argued that “I don’t have the right to exploit a virtual clone of another person, but to what extent can I have a right to exploit my own memory of another person?” Where does the line go between the other person and my memory of the other person? A thought experiment on a future potential scenario can illustrate the question. Imagine a future technology that can capture and (in mixed reality) replay events from someone’s life. In this autobiographical experience the user might choose to insert fictional events, for example diverging from the path their life actually took. Let’s say that they never dared to ask their teenage love interest out for a date. They can recreate that part of their life including the love interest through XR and the interactive narrative of the VR experience lets them have a successful date with the virtual clone. This scenario could be called a “speculative reality” or “speculative-immersive-dynamic (SID) fiction,” and it is novel and unique because it is only possible through several technological systems. At what point would such a recreation be unethical toward the love interest (if they would object to it)? Would the answer be different depending on whether the love interest is dead or alive?

7. RISK ASSESSMENT

This section covers the different risk assessments, which are noted and put into different time perspectives.

7.1. PRESENT DAY

Already today, superficial likenesses of a person can be created with technologies such as volumetric capture, 3D scans, and deep fakes. There is minimal risk of these being mistaken for the original individual, but in the wrong context they could nevertheless be used in offensive ways. Dialog systems are still quite primitive, and so far, there are very few examples of unethical or offensive usage of dialog systems. In computer games, feature films, and TV shows digital visual effects have created highly convincing virtual clones. So far this has been done within the constraints of legal agreements with the involved performer and/or in an ethically aware manner.

7.2. TOMORROW (10–20 YEARS)

Within the time span of 10–20 years it is likely that virtual clones with full fidelity (indistinguishable from the original individual) can be created, resulting in many of the ethical risks outlined in this section. It will probably be resource intensive to create virtual clones of this quality, but it seems also likely that the creation of simpler virtual clones will become so low cost that fringe entertainment could see a profit in using virtual clones in large scale. One way to summarize the risk is that *everyone will be able to (virtually) do anything to anyone*. This must be taken into serious consideration.

7.3. FAR FUTURE

In the long run, it might be possible to create self-aware virtual clones. However, this is so far off into the future that this paper suggests this should be kept out of the scope of these current ethical considerations. Also, if the possibility ever arises, a bigger set of ethical considerations will be needed.

8. RECOMMENDATIONS

Recommendation #1 Let's talk about it	<p>This may not be as obvious as it seems. As emphasized by the many unanswered questions in this paper, the development of virtual clones is only in its early phase, and it can be anticipated that the technology will develop and mature considerably over a 20-year period. Therefore, many ethical lines cannot be drawn; the boundaries for what is considered right and wrong is still blurred. This means that definite ethical guidelines cannot be given, and therefore, the first ethical guideline is: <i>everyone involved in design, development, implementation, or use of virtual clones should discuss actual and potential ethical problems with each other and with external parties such as researchers, journalists, decision, and policy makers.</i></p> <p>It is especially important to highlight the complicating factor that problematic use of virtual clones could potentially concern two topics people are usually not comfortable discussing in depth: death and sex. Even if these aspects of virtual clones might be embarrassing, frightening, or seem farfetched they need to be included in discussion.</p>
Recommendation #2 Establish a "bodyright"	<p>The capability for (original) individuals to claim the right to their identity and achieve control over the use of their virtual clones needs to be strengthened. It is beneficial to formulate this right in a familiar way. This will make it easier to explain and discuss. Therefore, it is suggested <i>that a person right law is formulated based on copyright.</i> Such a law could mimic the two-part structure of copyright, so that there is an "economic right" controlling who can use the identity and a "moral right" controlling the original individuals right to be connected to the virtual clone. Until such a law is internationally put in place, developers of mixed reality experiences should use the concept as a guiding principle. Note that an alternative term would be <i>bodyright</i>. The advantage would be that as a word, it is closer to copyright and thus intuitively easier to understand. Such an aspect is not irrelevant when considering the need for a mainstream adoption of such a concept. However, a disadvantage with bodyright is that it suggests a focus on only physical appearance, missing a focus on other aspects of identity such as behavior and memory. However, it is also important to consider</p>

	<p>other persons right to their memory of another person, like how people today don't have the right to some one's likeness but have a right to take photographs or video recordings of them, for example (within certain constraints). As a complement to this bodyright, a license form to share bodyright within certain constraints can be devised, similar to how Creative Commons work.</p>
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<p>Recommendation</p> <p>#3</p> <p>Establish an identity donor card</p>	<p>As an additional enabler of control over identity, an <i>identity donor card</i> is suggested, similar to how an organ donor card works. The reason for the similarity with organ donors is similar to the argument concerning copyright and person right; the similarity makes the adoption of the solution quicker and easier. Also, an important aspect is that donor cards are relevant after the death of the person, and in a similar way an identity donor card would be of specific importance after the death of the original individual. With such an identity donor card, people can give away different aspects off their likeness to different users and situations. Not having an identity donor card should be interpreted as opting out.</p>
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9. REFERENCES

The following list of sources either has been referenced within this paper or may be useful for additional reading:

- [1] P. Covington, *Success in sociology: AS student book AQA*. Folens Limited, 2008.
- [2] D. G. Myers and S. M. Smith, *Exploring social psychology*. The McGraw-Hill Companies, New York, 2012.
- [3] P. Ricoeur, *Oneself as another*. University of Chicago Press, 1994.
- [4] E. T. Olson, *The human animal: Personal identity without psychology*. Oxford University Press, 1999.
- [5] M. Erickson and A. Clark, "Natural-Born Cyborgs: Minds, Technologies, and the Future of Human Intelligence," *Can. J. Sociol. / Cah. Can. Sociol.*, 2004, doi: 10.2307/3654679.
- [6] H. Dreyfus, "Telepistemology: Descartes's last stand," in *The robot in the garden: Telerobotics and telepistemology in the age of the internet*, 2000.
- [7] N. K. Hayles, "How we became posthuman: Virtual bodies in cybernetics, literature, and informatics." IOP Publishing, 2000.
- [8] S. Turkle, *Life on the Screen: Identity in the Age of the Internet*. 1995.
- [9] C. J. Hoofnagle, "Identity theft: Making the known unknowns known," *Harvard J. Law Technol.*, 2007.
- [10] A. K. Jain, R. Bolle, and S. Pankanti, *Biometrics: personal identification in networked society*, vol. 479. Springer Science & Business Media, 2006.
- [11] R. M. Kaplan and D. P. Saccuzzo, *Psychological testing: Principles, applications, and issues*. Cengage Learning, 2017.
- [12] M. SEYMOUR, "Avatars and Agents: BabyX," *fxguide.com*, 2017. <https://www.fxguide.com/xf/featured/avatars-and-agents-babyx/?cn> (accessed Sep. 15, 2021).
- [13] M. Seymour, K. Riemer, and J. Kay, "Interactive realistic digital avatars - Revisiting the uncanny valley," 2017, doi: 10.24251/hicss.2017.067.
- [14] T. Eriksson, "Design fiction exploration of romantic virtual humans for virtual reality," *Annu. Congr. Love Sex with Robot. online*, 2020.
- [15] N. K. Hayles, "Virtual Bodies and Flickering Signifiers," *October*, 1993, doi: 10.2307/778755.
- [16] W. J. Mitchell, "Antitectonics: The Poetics of Virtuality," in *The Virtual Dimension: Architecture, Representation, and Crash Culture*, 1998.
- [17] "The pearly gates of cyberspace: a history of space from Dante to the Internet," *Choice Rev. Online*, 1999, doi: 10.5860/choice.37-0982.
- [18] G. Withalm, "Recycling Dorothy, Dinosaurs, and Dead Actors. Digi-Textuality in the TV-Commercials of the 1990s," *Semiot. Berichte*, vol. 27, no. 1, p. 4.
- [19] S. Hayden, "Mother Meets Recreation of Her Deceased Child in VR," *Road to VR*, 2020. <https://www.roadtovr.com/mother-meets-recreation-of-deceased-child-in-vr/> (accessed Sep. 15, 2021).

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