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BODIES WITHOUT ORGANS
TACTILITY OF NETWORKED BODIES

ABSTRACT

Spaces and bodies are not what they used to be. They are no longer merely isolated and static in their physicality but extended, plastic, virtual, augmented, mixed, and networked. When physical spaces lost their accessibility during recent critical times, spatial computing technologies and SocialVR platforms have not only entered and transformed our built environments into places of remote socialization with their ability to stimulate telepresence but also afforded new online modes of experiencing spatiality and spatial production strategies which build upon the notions of telepresence, and sociability. Consequently, the socio-spatial impacts of SocialVR platforms fundamentally redefine the spaces we inhabit.

Following this, the paper introduces the mixed reality experience of Bodies Without Organs, which investigates online modes of spatial production, including physical and digital objects in the physical/virtual overlap. The project examines the notion of embodied telepresence, tactility, avatars, and sociality through assembling a series of intelligent API (Application Programming Interface) such as Pose Estimation API, Hand-Tracking API, and Passthrough API as building blocks that constitute a spatiotemporal and tactile mixed reality experience which turns the built environment into a telecommunication medium where proprioceptive bodies and spaces are streamed across a spatial network.

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KEY WORDS
VR/AR CHANGING PHYSICAL SPACE
SOCIAL DISTANCING VS PHYSICAL DISTANCING
EMBODIED TELEPRESENCE
HERE AND THERE
GAMING AS DESIGN TOOL
AVATARS AS POSTHUMAN BODIES
BECOMINGS

1. INTRODUCTION

This paper contributes to generative research and addresses a readership on the effects of new media, theory, and spatial telecommunication on architecture. In juxtaposing XR installations (e.g. IoT, API, VR, AR, Spatial Web, Motion Tracking) with spatial design, social media studies, and posthuman theory, the thesis seeks to extend the disciplinary boundaries of architecture by practising its assimilation of new media technologies.

The title of this paper, Bodies Without Organs, refers to a philosophical concept by Deleuze and Guattari. The notion of 'body without organs', or 'BwO', is hereby adopted as a philosophical point of departure while trying to demonstrate how this could open up a reading for understanding our contemporary experience of embodiment with social media technologies, a condition in which the human subject is increasingly inhabiting new spatial productions that continuously entangle online and offline materialities.

As a result of the COVID-19 pandemic outbreak and the ensuing physical limitations, isolation, and lockdown measures, our interactions with one another and our real-world and virtual environments have been significantly impacted. The migration of our social lives online has been one of the most transformative aspects, compelling us to experiment with new modes of coexistence in the digital realm. Because of this, our premise of space has been profoundly altered in a world where physical distance is the norm. In response to this, a new form of social interaction has emerged in human subjects' communication and social constructs: Social VR.

Social VR represents a fundamental shift in our perceptions of ourselves, our identities, and the architecture of our social lives. In other words, it has a significant impact on how we portray our social selves, our inhabited spaces, and how we interact with others in both physical and virtual spaces.

In this light, the paper investigates the outcomes of a social mixed reality project called Bodies Without Organs, which rigorously refers to its theoretical roots to experiment with methodologies exploring our present condition of embodied experiences in virtual space. Taking this into account, the project considers the expression 'becoming-with-avatar' as a generative mode for the social mixed reality experience, with the objective of expanding the deterritorialised human subjects' tactility, presence, and sociability caused by isolation and lockdown in a networked space through embodied telepresence with the applications of intelligent API agents.

2. THEORETICAL READING OF BWO

> *Consider a blind man with a stick. Where does the blind man's self begin? At the tip of the stick? At the handle of the stick? Or at some point halfway up the stick? These questions are nonsense because the stick is a pathway along which differences are transmitted under transformation, so to draw a delimiting line across this pathway is to cut off a part of the systemic circuit which determines the blind man's locomotion.*[1]

What is the relationship between the environment, the stick, and the blind man's perceptual apparatus? Gregory Bateson's famous thought experiment suggests that the blind man's cognitive and proprioceptive processes are not located in the brain. Instead, through the object of the stick, perceptual modes extend from the 'boundaries of self' to the environment, where the material properties of the stick, the surroundings, and the body combine in their affordances to build a new sense of corporeality.

The object of the stick, which is an extension of the human body, changes how the body and the environment are connected. In this regard, the blind man conceptualises the stick as an integral part of a larger network consisting of humans and objects. This instance of the interchangeability of human sensorium and technological objects blurs the boundaries of the human as an autonomous subject. Instead, it portrays it as a mix of human and non-human actors working together through a network.

Similarly, Deleuze believed that the traditional concept of the human body as a static and unified entity was no longer applicable in the contemporary era. He contends that our bodies are currently more akin to networks or machines, with interchangeable parts that can be rearranged or reconfigured according to our needs. Deleuze expresses the openness of the human subject assemblage by employing Antonin Artaud's philosophical concept of the body without organs, in which the subject moves from one assemblage to another via deterritorialization and reterritorialization[1]. According to Deleuze and Guattari, the philosophical concept of the body without organs is defined as a body that is not determined by specific organs or organ functions but rather as a fluid entity constantly changing due to its environment and the forces acting on it. In Chapter 6: How Do You Make Yourself a Body Without Organs? of A Thousand Plateaus, Deleuze and Guattari provide a definition of the BwO:

> *A BwO is made in such a way that it can be occupied and populated only by intensities. Only intensities pass and circulate. Still, the BwO is not a scene, a place, or even a support upon which something comes to pass. It has nothing to do with phantasy; there is nothing to interpret. The BwO causes intensities to pass; it produces and distributes them in a spatium that is itself intensive, lacking extension. It is not space, nor is it in space; it is a matter that occupies space to a given degree—to the degree corresponding to the intensities produced.*[II]

It is non-stratified, unformed, intense matter, the matrix of intensity, intensity = 0; but there is nothing negative about that zero; there are no negative or opposite intensities. Matter equals energy. Production of the real as an intensive magnitude starting at zero.

The definitions suggest similarities between the characteristics of BwO and human plasticity as matter that can be occupied, populated by intensities, and subsequently moved into new assemblages through the ability to exchange its parts.

According to Deleuze and Guattari, each actual body, besides its routines, has also a virtual dimension that contains a vast repository of potentials of connections, effects, and movements. Deleuze refers to this set of potentials as the BwO. To intentionally experiment with oneself in order to discover and activate these virtual potentials is to 'make a body without organs'. These potentials are mainly actualised through encounters with other bodies, or BwO, or what he calls 'becoming'.

Furthermore, for Deleuze and Guattari, a process of transformation, flight, or movement within an assemblage is called 'becoming.' The process of 'becoming' serves to accommodate for relationships between the individual parts of the assemblage rather than considering it a whole, where the specific elements are kept in place by the organization of unity. In the process of 'becoming, one element of the assemblage is drawn into the territory of another element, altering its value as an element and creating a new unity where characteristics of the individual parts are replaced by the emerging properties of the whole.[III]

Discovering what a body can accomplish and what a body may become sensitive to is part of becoming a BwO. This process involves the development and organization of new senses, forces, and problems through activating one's virtual potential. According to Rosi Braidotti, the contemporary philosopher and feminist theorist, the BwO is '*a leap forward [...] toward a creative*

reinvention of life conditions, affectivity, and figurations for the new kinds of subjects that we have already become'.[IV] The concept of BwO serves as an account for the posthuman theory, which favors the perspective of drawing attention to nonhuman entities and decentralizing the human subject in a process of uncertain and open-ended becoming.

In a similar vein, Katherine N. Hayles refers to the widespread nature of the distributed subject of the human condition as cognitive assemblages, '*in which cognitions are distributed between human and technical actors, with information, interpretations, and meanings circulating throughout the assemblage in all directions, from humans into machines, then outward from machines back to humans.*'[V]

According to Hayles, technology significantly contributes to the formation of human identity and experience. 'When the individual is seen as part of a distributed system, rather than leaving the body behind, it is necessary to extend embodied consciousness in highly specific, local, and tangible ways that are unimaginable without electronic prosthetics.'[VI] Hayles' concept of the posthuman as an assemblage is the literal merger of material and information, in which boundaries get blurred between 'material' and 'information' consisting of assembled parts and sub-parts, which dynamically change.

This decentralised image of the human condition undermines conventional ideas of the body as a single, independent entity. Instead, it considers the body a complex system of interconnected pieces that combine human and nonhuman elements to benefit the whole. In other words, for Hayles, our subjects have transformed into '*an amalgam, a collection of heterogeneous components, a material-informational entity whose boundaries undergo continuous construction and reconstruction.*'[7]

Similarly, Colomina and Wigley emphasise the mode in which human-machine assemblage constantly shapes and brings new intelligence to this synthesis. In Are We Human? they assert that the human subject is increasingly constructed as an assemblage of telecommunication networks, digital interfaces, clouds, and databases as the plastic character of human subjectivity extends into and through our prosthetic digital technologies to shape its plastic nature:

> *An array of constantly evolving algorithms—artificial neural networks and deep learning systems—monitor every gesture we make and continuously rebuild intricate statistical images of each of us. Each Internet search, post, transaction, and physical movement modifies this quantified human. The fact that you are reading this sentence may leave*

> *a trace. Self-design turns out to be an uncanny encounter between what we offer and the image of ourselves that we are offered on our little screens. The algorithm shows us what it thinks we want to see, as if in a strange kind of mirror that has become the new space of design.*[VIII]

By emphasizing that we are the only species capable of design, Colomina and Wigley challenge the logic of our self-perception. They put forth the notion of the 'plastic human', who is continually designing itself through technology, whether through a shoe that alters the structure of our feet, a cell phone that modifies the wiring in our brains, or the stick of the blind man extending its sight through tactility. They claim how people live in a world of datascapes, information, and viruses. Calculations and decisions are made by algorithms. The modern city is frightening, and possibly the real person is inside the databases rather than here.

Seeing oneself in a database and constructing oneself an online persona has become commonplace over the past decades with the increased use of digital media and social media platforms that have shown us that they can be closely integrated to mediate our subjects, allowing us to construct and distribute them. Attention, cognition, and haptic and proprioceptive interactions constantly feed into the realm of machines '*in exchange for global infrastructural services that provide each of us a fixed and formal online identity and a license to use their services.*'[IX] When we see social media and digital technologies as part of our synthetic embodiment, we see the body as a complex system of interconnected parts whose emerging qualities can't be reduced to its components any longer.

We can see how this human-machine assemblage has exposed a new spatial dimension of design territory premised on identity politics, sociability, and community in today's Internet and media technologies, which are converging on the idea of personalization and social networking.

With the vast amount of information and resources available online, individuals are able to create and curate their own persona or identity. Through social media platforms, blogs, and other online channels, people are able to share their thoughts, experiences, and perspectives with the world. This ability to share and connect with others has led to the development of strong online communities and networks. For many, the Internet and digital media culture have become an integral part of their lives as they provide a space for self-expression and connection with others. Therefore, it is necessary to investigate the implications of these technologies for human subjects and the architecture of our spaces of coexistence.

3. SPATIAL EMERGENCE

In this regard, the outbreak of the COVID-19 pandemic and the resulting physical restrictions, isolation, and lockdown measures have profoundly affected how we interact with each other and our physical and virtual surroundings. One of the most significant changes has been the way that social interactions have moved online, forcing us to seek alternative ways of being and living together in virtual spaces. This has had a profound effect on our understanding of spatiality, as we are now living in a time where physical distancing is the norm. In response to this, a new form of social interaction has emerged in human subjects' communication and social constructs: Social VR.

Social Virtual Reality, or SocialVR (e.g., SecondLife, RecRoom, AltSpaceVR. High Fidelity, Sansar, VRChat, etc.), is an Internet-based social interaction paradigm mediated by immersive technologies and taking place in predesigned three-dimensional virtual worlds where individuals or collectives represented by an avatar, may engage in real-time interpersonal conversation and shared activities.[X]

FIGURE 1: ./studio3 Master Your Disaster Student Exhibition at Sansar

This technology has been used for years in gaming and entertainment, but its potential for social interaction was largely untapped until recently. While SocialVR is simply another form of online communication, its implications for emerging architectural spaces are much broader. Social VR technologies are transforming our spatiality by creating new ways of experiencing the space in which we communicate through the production of digital environments that can be experienced in embodied ways.

More specifically, SocialVR allows users to interact with each other in virtual reality (VR), creating a sense of presence and telepresence[2], and co-presence even when they are physically apart.[XI]

In contrast to conventional means of telecommunication based on transmitting information over distances in the form of voice telephone calls, data, text, images or video, SocialVR is concerned with spatial and embodied telecommunication methods of the Internet that stream objects, bodies, and spaces across remote places. When compared to traditional screen-based telecommunication systems, VR-based telepresence systems applied for remote spatial socialization, allow users to more directly express their feelings and impressions through sharing their physical presence alongside voice information, spatially.

In the past years, transitioning from screen-based communication to wearable spatial computing technology such as VR and MR glasses, social VR has become an emerging way of gathering, socializing, and sharing from our homes. The ability to provide an embodied sense of telepresence—an experiential state of being fully present in a live virtual space remote from one's physical location—is what makes these technologies and their application interesting as a medium of spatial production moving towards what has become a social space of telecommunication.

SocialVR, therefore, represents a fundamental shift in how we perceive ourselves, our identities, and the architecture of our social lives. In other words, it profoundly affects the way we think about our social selves, our inhabited spaces, and how we interact with others in both physical and virtual spaces. This also brings about a new emerging condition of corporeality, which leads human subjects to question how and through which sensoriums we inhabit this world.

Legacy Russell, in her Glitch Feminism: A Manifesto, insists on dissolving the gap between the digital world and the real world, to which we are always connected. Her Manifesto offers a new ecological reading of questions such as *How do we find out who we are within this digital era? Where do we create the space to explore our identity?* She proposes our relationship with our digital personas in a provocative and meaningful slogan: '*Usurp the Body, Become Your Avatar!*'[XII] Becoming your avatar is then embracing your mediated online character. Becoming your avatar is not just a political act but also a mode in which the materiality of online culture crystallises itself AFK and affords new subjects and ideas for worlding[3] to emerge.
How then can we think of 'becoming' as a method for worlding?

What kinds of spatialities can this hybrid human subject open up? How does SocialVR transform places? What would it mean to live in different dimensions at the same time, and what implications does this have for our private and public spheres?

FIGURE 2: Bodies Without Organs Social Mixed Reality: Local Multi-User Experience

4. BODIES WITHOUT ORGANS - A SOCIAL MIXED REALITY PLATFORM[4]

In order to address these questions, the following section of this paper will explore the creation of a SocialVR project called *Bodies Without Organs*, which was designed to investigate the contemporary condition of our embodiment and our spatial practices after adopting new social behaviours during COVID-19-related critical times, such as isolation, lockdown, and social distancing, that have forced us to seek alternative modes of being together. The project refers to the socio-spatial impacts of media, investigating how new media and communication technologies could shape and transform the spatiality of our everyday lives.

Considering this, the BwO multi-user mixed reality project explores online modes of spatial production strategies that incorporate objects with both physical and digital materialities into a physical/virtual overlap: it creates a multi-user and multi-location spatial platform that transforms the inhabited space into a public space of social interactions by projecting remotely shared spatial content and embodied avatars onto the physical environment.

This embodied spatial platform focuses on an extended architectural practice called 'socio-spatial' that investigates the notions of **embodied telepresence** and **sociability**. Here, spatial computing turns the built environment into a medium of spatial telecommunication where embodied telepresence and social interactions taking place in a virtual dimension are hosted and shared across a network.

The project considers the aforementioned 'assemblage thinking' as a methodological approach towards understanding how complex social, technical, and cultural spaces are established and maintained by a multitude of heterogeneous entities to constitute presently human subjects. Thoroughly tied to notions of fluidity, complexity, and exchangeability, 'assemblage thinking' offers a practical and theoretical foundation which allows the project to investigate the mediated emerging spaces of human sociability.
This social mixed reality experience, which interweaves bodies, the Internet, and new media technologies with architectural space, requires a more detailed explanation.

5. METHODOLOGY: ASSEMBLING INTELLIGENT API AGENTS OR HOW TO MAKE YOURSELF A BODY WITHOUT ORGANS?[5]

How does coupling the virtual avatar with the human body extend the bodily and spatial affordances within the physical/virtual overlap?

As stated in the introduction, '*making oneself a body without organs*' entails experimenting with the virtual potentials of the human body and is always already a process of becoming where one piece of the assemblage is drawn into the territory of another piece, exchanging its value as an element and bringing about a new unity. The project uses the notion of becoming as a methodological concept for creating interactive virtual avatars in which many nonhuman things participate as subjects, in reference to Haraway's statement that '*to be one is always to become with many.*'[XIII]

Considering this, the project takes into account the expression 'becoming-with-avatar' as a generative mode for the social mixed reality experience aiming to expand the deterritorialised human subjects' tactility, presence, and sociability caused by isolation and lockdown in a networked space through embodied telepresence.
The term embodied presence refers to the sense of being physically present within a space or environment.[XIV] However, achieving such embodiment through mediated communication channels such as video conferencing

platforms presents challenges due to limited sensory feedback. In contrast, Mixed Reality provides opportunities for more profound immersion into digitally reconstructed worlds where interaction feels natural; thus creating higher levels of physical presence than previous media forms could offer.

Embodiment increases social connectedness because feeling "present" in one's surroundings enhances interpersonal interactions' perceived realism.[XV] Consequently, improving users' experience of presence by increasing their ability to communicate naturally via non-verbal cues like gestures, which are critical components when conveying emotional messages during conversations.

The importance of embodying avatars to evoke the sense of telepresence in virtual environments has been widely discussed by Taylor, for whom presence is a key feature of immersive virtual worlds. It gets down to the core of what it means for an experience to have the 'genuine' quality that tells us, 'I am here.'[XVI]

For Taylor, the primary aspect of presence in digital spaces is how it manifests as an embodied activity. One becomes rooted in the virtual environment through a performance of the body, in this case, through the avatar.[XVII] However, the key to evoking the sense of presence is the social interactions that situate it in a social scenario. Subsequently, its consideration of 'presence' is the sense of being with other people in a shared virtual environment or, equivalently, the sense of togetherness.

Therefore, the project is concerned with the creation of a virtual avatar for embodied telepresence that manifests its properties in human cognition, perception, tactility, and proprioception.[6] In order to achieve this human-avatar synthesis, the project will assemble API agents in the Unity Game Engine.

FIGURE 3: Bodies Without Organs Social Mixed Reality: Spatial Telecommunication through Embodied Telepresence

API is the acronym for Application Programming Interface, a software intermediary that allows two or more applications to talk to each other. [XVIII] Today, most social media companies offer APIs so third-party developers can build new applications on top of their platforms. Different APIs have the ability to connect different pieces of software to create new and innovative applications. An API is often used to refer to web APIs, which allow communication between computers that are joined by the internet.[XIX] As protocological[7] objects, APIs allow interested parties to access the data and functionality of online services in a very controlled manner.[XX] Also, developers and researchers can access the API to retrieve, store, and manipulate digital traces left by the users for further empirical studies.[XXI]

In the context of this project, the human body is perceived as BwO, an open and plastic territory—the place upon which discrete API agents' transmission of digital information can be inscribed and actualise their potential. When they implant themselves upon the BwO, the BwO assumes a form, and this form is conducive to the specifics of the API agents that have imposed themselves upon it. In other words, APIs as discrete agents need the BwO as a site of production that hosts and nourishes them. They '*attach themselves to the body without organs as so many points of disjunction between which an entire network of new syntheses is now woven, marking the surface off into coordinates, like a grid.*'[XXII] This is what Deleuze conceives of the human body as a machine: an assemblage of parts of different organs with many connections.

When API agents are considered in terms of their sociomateriality, they are seen as constituent actors who play a big part in establishing the social and physical relationships between bodies. [XXIII]

The notion of sociomateriality proposed by Orlikowski[XXIV] and Orlikowski and Scott[XXV] is founded on the agential realist philosophy developed by Barad. [XXVI, XXVII,XXVIII] It aims to comprehend the constitutive entanglement of the social and the material in everyday organizational life and is based on the intersection of technology, work, and organization.[XXIX] It is the outcome of thinking about how language, interaction, and organizing practices are intertwined with human bodies, spatial configurations, physical objects, and technologies. Instead of assuming that entities, people, and technologies have inherently determinate boundaries and properties, they are seen as relational effects, continuously performed in a web of relations. Barad[XXX] defines agency as the '*enactment of iterative modifications to particular practices through the dynamics of intra-activity*' as opposed to placing agency in humans or in technologies.

In that regard, the project promotes APIs (application programming interfaces) as discrete digital communication agents with their own agential meanings and conceives their interactions as constituting the whole socio-spatial experience of BwO. In this regard, the main application of APIs focuses on two features to produce a distinctive avatar that evokes the sense of embodied telepresence—its presence in the real world and its social interactions in the virtual world.

5.1 Creation of the emobdied telepresence

This chapter explains how the project was developed into a mixed reality prototype application built on sociability and embodied telepresence by connecting multiple API agents such as the Pose Estimation API and the Hand Tracking API to track the user's movements, proprioceptive mechanisms, and gestures. Also, the Passthrough API was used to create a seamless integration between the virtual and real environments. Finally, the Networking API is used to enable sharing of experiences between multiple users. All of this together results in a social mixed reality environment that delivers the experience of embodied telepresence. It transforms the body into a collection of ubiquitous media objects distributed and situated in clouds for remote communication, dissolving the hardware and software on the body: "*The body as a frame becomes a 'coprocessor' of digital information.*"[xxxi]

Pose Estimation API and Hand Tracking API are two technologies that can be used to achieve this goal. Pose Estimation API uses computer vision algorithms to estimate the position and orientation of a user's body in real time, while the Hand Tracking API tracks the movement of the user's hands.

5.1.1 ***Pose Estimation API:*** The Pose Estimation API uses computer vision algorithms to estimate the position and orientation of a user's body in real-time. In the context of virtual reality (VR), pose estimation is used to track the movements of the user's body and translate them into corresponding movements in the virtual environment. It typically involves algorithms to detect and track key points on the user's body, such as hands, head, and feet. These key points are then used to calculate the user's pose in real-time.

A popular third-party add-on for pose estimation in Unity is RootMotion's VR IK tool. VR IK is an inverse kinematics (IK) system that can be used to accurately track the user's movements. VR IK is particularly useful for VR applications involving physical interaction with the virtual environment, such as allowing visitors to take advantage of the physical body's capabilities, which is inextricably linked to personal expression, kinesthetic and proprioceptive embodiment, and spatial knowledge.

5.1.2 ***Hand Tracking API:*** Hand Tracking API is a feature provided by the Oculus Integration SDK. It is a software interface that allows developers to track and recognize hand movements and gestures in real-time. The Hand Tracking API uses machine learning algorithms to detect and track the position and movement of the user's hands. It detects the orientation of the hand and the position of each finger, as well as the user's hand gestures, such as pinching, grasping, and releasing. This API provides detailed information about the user's hand movements that can be used to control virtual objects in the application.

The hand-tracking API is a critical component of a mixed reality environment created with a passthrough API that overlays physical and virtual spatial experiences in real time.

5.1.3 ***Passthrough API:*** The Passthrough API is a feature provided by the Oculus SDK that allows developers to create mixed-reality applications in Unity. It allows developers to access the world around the user in real-time and display it as an overlay on top of the virtual environment created by the application. This creates a unique experience where the user can see and interact with both the physical and virtual worlds simultaneously.

The Passthrough API uses the cameras on the Oculus Quest2 headset to capture the real world and transmit it to the application in Unity. The captured images are then processed by the Passthrough API to align with the virtual environment and displayed as an overlay in real-time.
When the Hand Tracking API is used in conjunction with the Passthrough API, the user can use their hands to interact with the physical and virtual worlds simultaneously. The Hand Tracking API detects the user's hand movements, and the Passthrough API overlays the virtual objects on the physical environment, giving the impression that the virtual objects are physically present in the real world, making it easier for the user to interact with the virtual objects in a more natural way by using their hands instead of a controller or other input device.

5.1.4 ***Networking API:*** Networking APIs are essential for creating an embodied telepresence experience shared by multiple users in a mixed-reality environment. By using Networking API, the system can synchronize data between devices and enable communication between users.

In an embodied social mixed reality experience, where multiple users are present in the same virtual space at the same time, it is vital to establish a social environment where they can interact with each other. This interactivity requires real-time synchronization of their movements and actions, as well as the ability to communicate via voice or text chat.

A network API such as the Normcore add-on for Unity enabled the synchronous exchange of information across different devices connected to the network. It ensured that all participants had access to current scene details, such as the positions of people or objects, in real time. It also enabled interactions by synchronizing user input (e.g., hand gestures), creating a synchronized experience for those sharing this platform from remote locations.

By incorporating the Networking API into our proposed approach, along with the Pose Estimation and Hand Tracking API, in conjunction with the Passthrough API, the BwO platform provides seamless spatial multi-user communication that offers opportunities for peer-to-peer collaboration beyond the capabilities of traditional video calls or conventional digital media platforms.

6. FINDINGS: ARRIVING AT EMBODIED TELEPRESENCE

When people enter the multi-user room-scale experience of the BwO platform, they are both 'here' in the physical space and 'there' in the virtual with the real-time representation of their proprioceptive selves 'acting-in-distance'. However, inside this experience, there is no distance between the 'here' body and the 'there' body.

The 'here' body, the physically grounded body, and the 'there' body, the virtual body, continuously entangle with one another through the proprioceptive mechanisms of the human body and the proprioceptive abilities of the virtual body. The user inhabits an avatar's body without ever losing connection with their own, sees the surrounding world through the gaze of the digital body, and recognises its basic arrangement from the well-known physical space - avatar and user become one, actualizing the sense of embodied telepresence.

In addition to the possibility of communicating in the physical (physical-virtual) presence of another person, the ability to use hands to express oneself with gestures and interact with the surroundings significantly enhances the sense of presence within mixed reality.[XXXII] The sense of touch plays a uniquely important role in human interaction. It is related to notions of closeness and intimacy and, as our language shows, is often used as a metaphor for emotional impact.

Moreover, the virtual avatar enables users to use their hands to grab, pick, and manipulate virtual objects' positions in the world, creating a social and tangible environment in which the human subject is fully present in its bodily

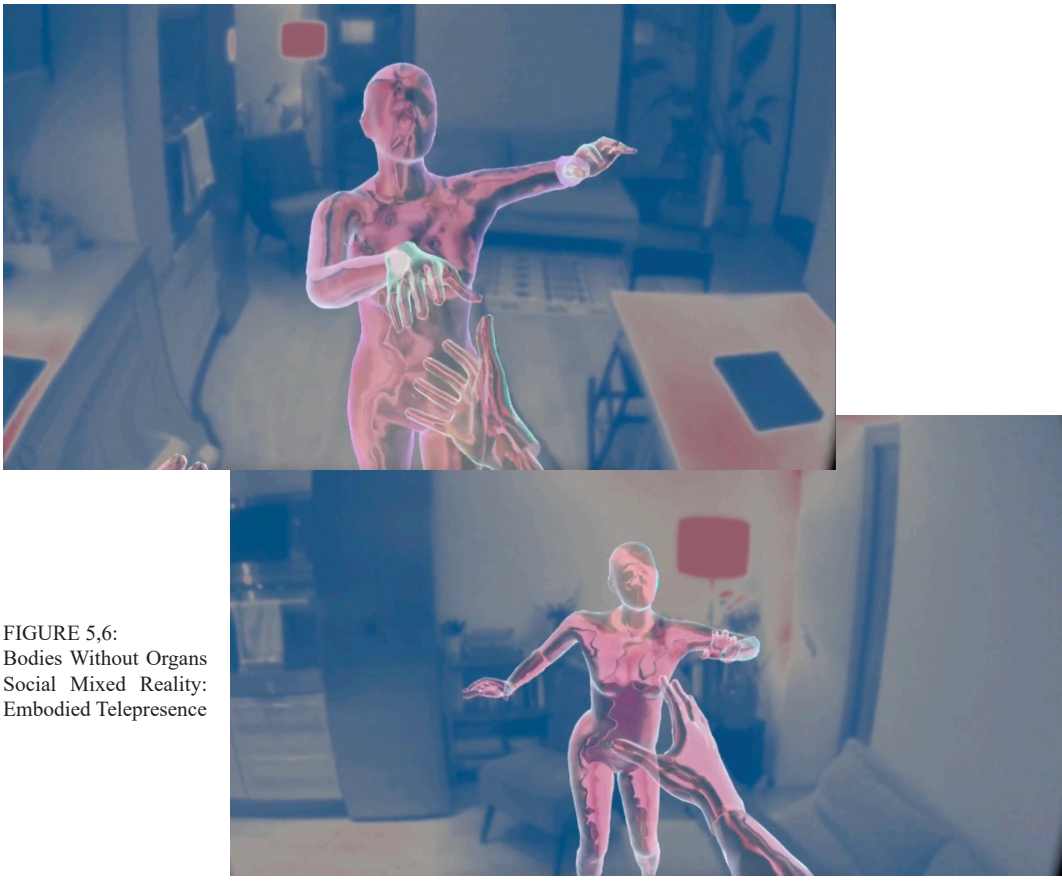

FIGURE 5,6:
Bodies Without Organs Social Mixed Reality: Embodied Telepresence

actions and interacts with both physical and digital worlds simultaneously in a ‘natural’ way.

In the age of the Internet and digital media, human subjectivity is widely distributed, embodied beyond the human frame and situated in networks and remote places. There is a certain tentacularity, an extended sensorium, in the act of touching and sensing distances through one’s digital avatar, immersed in synthetic, embodied, and organic relationships simultaneously. This vast network gives rise to a complex form of distributed embodiment and to new senses of self, cognition, and proprioception through the body’s digital mediation.

7. A USER TRAJECTORY INSIDE THE MIXED REALITY EXPERIENCE

In this small chapter, the paper further elaborates on the mixed reality experience of the BwO, from users' trajectory. Firstly, it is important to notice that this multi-location and multi-user social mixed reality project was used by a small group of people located in different countries for a period of time during the lockdown and was used for long-distance communication, particularly to meet for work sessions, talk, and socialise.

Within the experience, we see full-body virtual avatars of remote participants, housed in the virtual dimension and seamlessly embedded in the physical room setup. This physical/virtual overlap space enables users to maintain their relationship with their physical room activities while expanding their social interactions inside the virtual space.

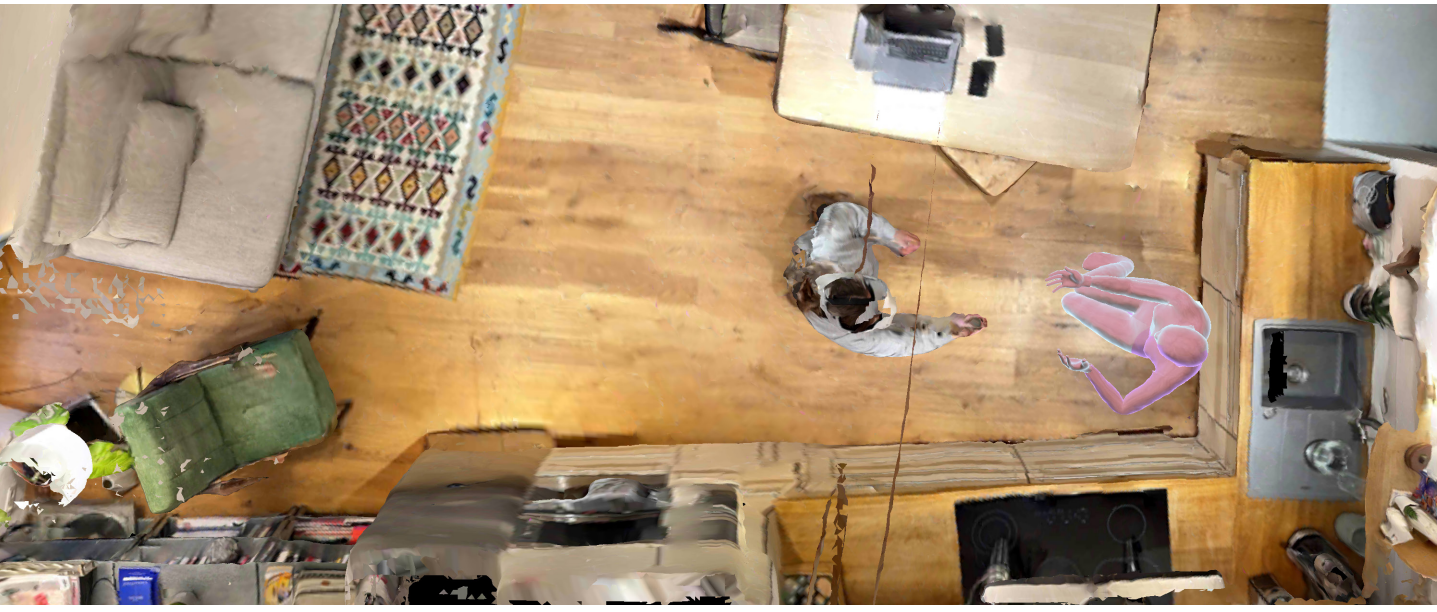

FIGURE 7: Bodies Without Organs Social Mixed Reality: Entering Remote Spaces with Embodied Telepresence

The physical room envelops the contents of the virtual space, thus allowing users to use the physical space as their main reference for navigation. Consequently, the ability of visitors to navigate within the virtual space is limited by the size of the physical room.

This does not mean that a remote visitor cannot suddenly emerge from your kitchen or that a pair of hands cannot mysteriously emerge from your closet. Because of the overlap of physical rooms in a shared virtual space, virtual avatars can be near or far, depending on the size and the obstacles present in their physical space.

8. DISCUSSION: PRIVACY CONCERNS RELATED TO PERSONAL AND SPATIAL DATA

The human body and its plastic matter have become an extreme territory of inexhaustible data extraction of behavioural patterns through social media platforms, haptic graphic user interfaces, wearable devices, and algorithmic intelligence feeding their intangible information back to humans to construct a personalised reality in tangible ways. Especially with the advent of spatialization of the web, the media objects that populate the Internet are no longer 2D and tangible only through screen-based communication technologies, but rather 3D media objects that include the real-time movements of our bodies, objects, and architectural spaces. This means there is an emerging online spatial dimension to our everyday practices through social media technologies.

However, this is not to congratulate the discourse of enterprise tech giants on establishing their market growth around the mediated identity of human subjects using their social media services; it is rather to emphasise and rigorously study the emerging spatiality around this assembled subject.

Therefore, in the context of this research, besides considering API agents' capacities to offer online modes of embodied spatial telecommunication, APIs are seen critically as protocological objects, allowing in these vast social networks communication and connectivity between peers, and between databases and users to take place. More and more, APIs become tools for accessing personal data related to biometric variables, spatial organization, spanning from physical characteristics and movements of a person to voice interactions, from room dimensions of a user to the visited contents, which creates a doubtful environment around this platform regarding sharing personal data that is no longer peer-to-peer, but mediated through corporate companies' servers, collected, processed, stored, and governed. Additionally, it is important to mention that the social mixed reality project of *Bodies without Organs* has not collected or stored any personal data related to the participants to constitute the embodied telepresence and the spatial telecommunication.

9. CONCLUSION: SOCIO-SPATIALITY: A PHYSICAL-VIRTUAL OVERLAP

Today, the internet, telecommunication technologies, and the architecture of how we live together are undergoing radical changes with the introduction of spatial computing and increased use of social media platforms.

The fact that networked virtual spaces (SocialVR) can be accessed from anywhere with embodied avatars has opened up new spatial design territories where social activities, online culture, and embodied practices merge on the cultural horizon of media technologies and become a locus for the growing culture of global connectivity & sociability. However, in contrast to conventional means of telecommunication based on transmitting information over distances in the form of voice telephone calls, data, text, images, or video, Bodies without Organs Social Mixed Reality Experience is concerned with spatial and embodied modes of online telecommunication that stream objects, bodies, and spaces across remote places.

BwO Installation investigates the emerging spatiality around the subject as machinic assembly, using a theoretical and practical approach exemplified in a social mixed reality project to demonstrate how the human body and its identity are pushed into the plastic territory of exchangeability, self-representation and spatial organization, tied to the Internet's materiality. As a result, in the context of this research, virtual avatars are considered in their sociomateriality and regarded as critical mediators between organic and inorganic, physical and virtual, for an online mode of embodiment and spatial production. Thus, their social, material, and spatial implications are discussed in a broader context.

Through the embodied telepresence – that is made possible via interactive full body and networked avatars, the social mixed reality experience of BwO makes the subject a ubiquitous being, blurring the boundaries between subject and object, local and global, human and nonhuman. This augmented condition of the human subject inevitably brings about new spatial affordances. As one is grounded in the proprioceptive mechanisms of the physical body navigating the physical space while simultaneously inhabiting the virtual dimension. Consequently, the augmentation of the spatial capacities of physical space through spatial computing technologies produces temporal assemblages of spatial instances with new affordances that entangle online and offline materialities.

When the physical space hosts the virtual spatial content at its 1:1 scale and becomes the envelope for the online virtual content, they combine in their affordances to unite for a new intelligence of space where physically limited spaces expand with virtual materiality and construct a mixed-reality experience. This kind of spatiality in which physical and digital materialities constantly inform each other defines the ‘mixed reality’ experience and opens up a shared virtual spatiotemporal dimension allowing the users to ‘act at a distance’ through the medium of spatial and embodied data transmission occurring within the inhabited hybrid dimension.

This 1:1 overlapping physical and virtual space profoundly impacts our spatial perception. First and foremost, it provides a brand-new understanding of how expanding physical spaces with the capabilities of virtual overlay content can offer a variety of architectural programs, ranging from social gatherings to globally relevant data flowing into the virtual space that can be navigated with the practice of the body. Second, it allows us to consider how physical spaces are no longer static and isolated in their materiality but are instead hybridised, linked, and affected by online materials. All of this enables remote and temporal access to portions of users’ private and non-private spatial content from anywhere enabling the remote integration of events and social activities into the places we inhabit every day.

NOTES

1 In critical theory, deterritorialization is the process by which a social relation, called a territory, has its current organization and context altered, mutated or destroyed. The components then constitute a new territory, which is the process of reterritorialization. (Deterritorialization, 2022.)

Wikipedia contributors, "Deterritorialization," Wikipedia, August 5, 2022, https://en.wikipedia.org/wiki/Deterritorialization.

2 One definition of telepresence is 'one's sense of being present in the mediated environment rather than the local physical surroundings' (Steuer, 1992). The user's perception of the environment and space in the mediated world is closely related to this aspect of presence. A person's 'virtual self is experienced as the actual self' to a greater or lesser degree when engaging in self-presence, as opposed to telepresence. This aspect of presence is distinct from telepresence because it has nothing to do with sensory realism but rather with the extent to which one may empathise with and feel like an extension of one's virtual body, emotions, or identity (Ratan & Hasler, 2009). Last but not least, 'social presence', also known as 'co-presence', is the 'feeling of being with another' (Biocca et al., 2003) and is based on how easily one perceives to have 'access to the intelligence, intentions, and sensory impressions of another' (Biocca, 1997).

3 Worlding is a particular blending of the material and the semiotic that removes the boundaries between subject and environment, or perhaps between persona and topos. Worlding affords the opportunity for the cessation of habitual temporalities and modes of being.

4 The project BwO installation was developed at ./studio3 Institute for Experimental Architecture as a part of a Generative PhD supervised by Univ. Prof. DI Kathrin Aste. The ./studio3, a unit of the Faculty of Architecture at the University of Innsbruck, researches and teaches at the interface of experimental architecture, contemporary art and culture, investigating both the correlation between architectural design and the artistic process of creation and their significance for real and virtual space. In interaction with art, culture, media, and technology, a transdisciplinary approach is pursued that understands design as an experimental epistemic practice, as a process that both scientifically explores and artistically discovers architecture in order to creatively meet the complex challenges of our time. By combining assemblage as a compositional, articulated, and tectonic design principle with bricolage as a material, resource-saving, and even compromising implementation strategy, studio3 situates its practice and teaching of architecture that is both artistic and socially and environmentally aware.

5 In their book A Thousand Plateaus (1980), Gilles Deleuze and Félix Guattari pose a very specific query: 'How Do You Make Yourself a Body Without Organs?' It may be essential to notice that Deleuze himself does not provide a substantial answer to this issue. This puzzle is addressed in detail in the Plateaus article of the same name, in which the Body without Organs (BwO) is defined along with its role within Deleuze's apparatus of desire and several examples of bodies that appear to satisfy the BwO's stated criteria are provided.

6 The term 'proprioception' describes a person's awareness of their body as a unified whole through their own efforts at movement. The inability to sense one's own body might lead to disorientation. One of the most convincing ways to externalise and (re)present proprioception's data is to reproduce its structure and artificially enhance it with technology. Spatial computing allows for the seamless translation of bodily motions into augmented virtual bodies that can heighten the sense of presence they provide. (Fedorova, 2013)

7 Fedorova, Ksenia. "Mechanisms of Augmentation in Proprioceptive Media Art." M/C Journal 16, no. 6 2013. https://doi.org/10.5204/mcj.744

8 For Galloway (2004), 'Protocol is that machine, that massive control apparatus that guides distributed networks, creates cultural objects, and engenders life forms', 'Protocol is a system of distributed management that facilitates peer-to-peer relationships between autonomous entities.'

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