SPATIAL MATERIALITY IN THE PRACTICES OF SCANLAB PROJECTS AND MARSHMALLOW LASER FEAST

MATERIALIDAD ESPACIAL EN LAS PRÁCTICAS DE SCANLAB PROJECTS Y MARSHMALLOW LASER FEAST

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ABSTRACT
The dilemma raised by this issue on artificial intelligence recalls science fiction narratives where machines gain autonomy and threaten human primacy. Yet this anthropocentric vision now endangers systemic balance and sustainability. This article examines the risks and opportunities of AI and how its models reproduce biases that obscure both human and non-human vulnerability. It explores the role of vision, simulation, and digital representation technologies in artistic-architectural narratives that raise awareness of contemporary challenges. Drawing on Jane Bennett's vital materialism, it argues that AI, in convergence with other technologies, can expand perception of previously hidden phenomena. The methodology combines comparative analysis of case studies with the production of drawings and analytical cartographies, highlighting the need to recognize human–non-human interdependence and foster more sustainable technological practices.

Keywords
Digital architecture, artificial intelligence, human–non-human interdependence, post-anthropocentric materiality, immersive narratives

RESUMEN
El dilema que plantea este número acerca de la inteligencia artificial remite a los relatos de ciencia ficción donde las máquinas adquieren autonomía y amenazan la primacía humana. Sin embargo, es esa visión antropocéntrica la que hoy compromete el equilibrio de los sistemas y su sostenibilidad. Este artículo analiza los riesgos y oportunidades de la IA y cómo sus modelos reproducen sesgos que invisibilizan la vulnerabilidad humana y no-humana. Se examina el papel de tecnologías de visión, simulación y representación digital en narrativas artístico-arquitectónicas que sensibilizan frente a problemáticas contemporáneas. A partir del materialismo vital de Jane Bennett, se argumenta que la IA, en convergencia con otras tecnologías, puede ampliar la percepción de fenómenos ocultos. La metodología combina análisis comparado de casos de estudio con la producción de dibujos y cartografías analíticas, evidenciando la necesidad de reconocer la interdependencia humano–no-humano y promover prácticas tecnológicas sostenibles.

PALABRAS CLAVE
Arquitectura digital, inteligencia artificial, interdependencia humano–no-humano, materialidad posantropocéntrica, narrativas inmersivas

INTRODUCTION

The emergence of artificial intelligence (AI) in architecture and urban planning raises an ambiguity: is it a tool that enhances our creative and analytical capabilities or does it threaten the human dimension of the discipline? (Floridi, 2020). This question requires a critical and interdisciplinary approach. Just as computer-aided design transformed the ways of designing and representing in previous decades, AI is now reopening the debate on the disciplinary boundaries of architecture and its relationship with technological agency.

Consequently, we examine its weaknesses and risks, especially the anthropocentric biases of machine learning algorithms, which obscure the vulnerability of both humans and non-human agents. Inspired by authors such as Latour (1991), Palmini & Cugurullo (2024), Haraway (1988), Barad (2007), Bennett (2010), Deleuze & Guattari (2015), we adopt a vital materialism approach that conceives matter as a carrier of vitality and agency, unfolding in non-human objects, bodies, and processes. This perspective dissolves the nature/culture dichotomy and reframes the relationship between humans and non-humans as a distributed network of co-agency, offering an ethical-political horizon where matter actively participates in the production of the world (Bennett, 2010).

On the other hand, we analyse the opportunities and strengths that emerge from the convergence of AI with other technologies, which nourish it to transcend their own limitations and help enhance our cognitive abilities, increasing our sensitivity. Thus, what was previously veiled from our perception can now unfold with greater clarity, echoing Bruno Latour's (1991) own reflection on the inseparability of human and non-human *actants* and the need to recognise our interdependence with the world around us. According to Bennett (2010, p. 29), "an *actant* is any entity—human, non-human, or material—that has the capacity to affect and be affected in a network of relations."

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In this context, we link these reflections to situated case studies (Haraway, 1988) in which the transmission of knowledge, awareness and contemporary communication around art-architectural speculation explore how to make the invisible visible: the relationships and affections of non-human agents, using digital tools of computational convergence (Punt, 2025). The analysis focuses on two case studies from ScanLAB Projects[1] and Marshmallow Laser Feast[2] which, although they address similar post-anthropocentric themes—the human is no longer at the centre—differ in their way of spatially materialising these relationships, allowing us to examine how visualisation and simulation technologies influence the production of new modes of coexistence and shared sensitivity.

Ultimately, this work asks how contemporary practices operating at the intersection of art, architecture, urbanism, and technological convergence are reconfiguring the notion of spatial materiality in a post-anthropocentric scenario, and how AI is participating in this transformation (Işık, 2024). We start from the hypothesis that AI and three-dimensional volumetric scanning technologies not only expand human perceptual capacities, but also operate as agents that redistribute material agency between humans and non-humans, generating hybrid forms of sensitive spatiality.

THEORETICAL FRAMEWORK

Recent critical literature has highlighted biases and inequalities in the algorithmic systems that underpin artificial intelligence. Kate Crawford (2021), in *Atlas of AI*, shows how large technology corporations depend on networks of resource extraction and precarious human labour to sustain digital infrastructure, while increasing energy consumption and amplifying environmental impact (Pasquinelli & Joler, 2021). In addition, recent studies analyse how algorithmic models and automation reproduce inequalities, reinforce mechanisms of social exclusion, and create racial bias in facial recognition systems (Buolamwini, 2020; Eubanks, 2018).

Along these lines, the concept of biopolitics (Esposito, 2006) allows us to understand how surveillance and control have been transformed in the digital age: it is now algorithmic infrastructure that regulates, predicts, and classifies social life at superhuman speeds. Added to this are warnings from figures in the technology industry, who are promoting manifestos to slow down the rapid development of AI in view of its potential risks (Future of Life Institute [FLI], 2023). Actors such as OpenAI reveal the network of economic, political and scientific interests driving this revolution, whose social impact transcends borders and poses urgent challenges on a global scale.

[1] SCANLAB PROJECTS. Official website. https://scanlabprojects.co.uk/
[2] MARSHMALLOW LASER FEAST. Official website. https://marshmallowlaserfeast.com/

AI in architecture and urban planning: as an independent agent, not just a tool

The fear aroused by the use of artificial intelligence in architecture and urban planning is linked to complex phenomena such as the climate crisis, intercultural coexistence, human-non-human interaction and technological deployment in multiple fields. These circumstances demand profound transformations, driving increasingly necessary transdisciplinary approaches and forms of interartisticity. In this context, the poetic dimension of architecture, understood as a communicative and dialogical discipline (Muntañola-Thornberg, 1981), becomes relevant when situated at the intersection with other artistic and cultural practices. The mediation of AI in architectural perception opens up new dialogues with art, visual narrative and sensory experience, reinforcing the need for a sensitive and communicative design practice (Dimcic, 2017). Thus, alongside the threats and vulnerabilities inherent in any technological disruption, opportunities also emerge that enable other scenarios.

AI is no longer understood solely as a technical tool, but has become an autonomous agent with decision-making capabilities. This change represents a qualitative leap forward from previous technologies: while traditional machines amplified the physical or cognitive strength of their users, today's algorithmic systems operate with their own logic and produce results that are beyond human predictability. The emergence of AI models in recent years is due to three key factors: advances in algorithm development, advanced computing power, and the widespread availability of data. According to Jordan and Mitchell (2015), "machine learning addresses the question of how to build computers that improve automatically through experience, lying at the intersection of computer science and statistics, and at the core of artificial intelligence" (p. 255).

The origins of artificial intelligence date back to 1950, when Alan Turing, mathematician and computer science pioneer, published his influential article "Computing Machinery and Intelligence" in *Mind* (Turing, 1950). In it, he posed the famous question 'Can machines think?' and proposed the 'imitation game', later known as the Turing test. His scientific legacy, reinforced by his work in decoding the Enigma machine during World War II—a complex electromechanical encryption device used by Nazi Germany, whose deciphering marked a turning point in the conflict—paved the way for modern computing and reflection on non-human intelligence (Parisi, 2021). However, it was not until 1956 that John McCarthy coined the term 'artificial intelligence' in order to consolidate a field of research dedicated to exploring this possibility.

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But before delving into the specific implications of AI for architecture and urban planning, it is worth briefly contextualising its presence in public debate. The general perception tends to focus on generative applications—text, image, video—but the horizon of AI is much broader. Artificial general intelligence (AGI) and technological singularity anticipate scenarios in which machines would not only equal but could consistently surpass human intelligence (Kurzweil, 2024). Two historical concepts help us understand this development: Moore's Law (1965), which describes the exponential growth of computing power every 18-24 months, and the aforementioned Turing test (1950). Moore's Law, although a key driver of the digital revolution, now faces physical limitations: the extreme miniaturisation of transistors on a nanometric scale causes problems of heat dissipation, energy consumption and quantum phenomena such as electron leakage, which slow down its validity and force us to explore new computational architectures.

For its part, the Turing test, a thought experiment that asks whether a machine can think in a way that is indistinguishable from a human being, continues to mark the symbolic threshold of artificial cognition: if a judge cannot differentiate between the machine and the person, AI is considered to have reached a level of thinking comparable to that of a human being. Currently, AI can be classified into four levels according to its cognitive capacity and scope (Table 1).

Table 1
Turing test level/status matrix

AI Level	**Cognitive Capacity**	**Does it pass the Turing test?**	**Type of tasks**
Narrow AI	Limited and specific	Partial	Specific tasks
Generative AI	Simulative and average	Partial, , with nuances	Creative production, dialogue
General AI (AGI)	Flexible and high	Yes, consistently	Any cognitive task
Superintelligent AI (Singularity)	Far superior to humans	Yes, transcends it	Improvement over humans in everything

Note. Prepared by the authors based on Kurzweil (2024).

Understanding these categories and the current state of AI is essential for transferring these reflections to fields such as architecture and urban planning. Limiting the discussion solely to generative AI—the predominant level today—restricts the debate and obscures how advances in computing power and machine learning can have a more profound influence on design practice and the configuration of urban environments. To contextualise this reflection, it is useful to examine the evolution of information as a driver of technological progress.

According to Kurzweil (2024), information-based consciousness can be understood through six eras stretching back to the origin of the universe. The first corresponds to the emergence of physics and chemistry, which enabled the formation of complex molecules and, with carbon, the beginning of biological life. In the second, the evolution of DNA enabled the reproduction and diversification of organisms. The third focuses on the development of the brain, capable of storing and processing information. In the fourth, humans transformed their cognitive abilities into recording technologies, from papyrus to cloud computing. The fifth epoch projects the fusion of biological cognition and digital systems, expanding the neocortex through brain-computer interfaces. Finally, the sixth imagines intelligence on a cosmic scale, capable of transforming matter into *computronium*, a substrate optimised for maximum information processing (Lloyd, 2006; Margolus & Toffoli, 1991).

In architecture and urban planning, this shift implies recognising that professional practice increasingly depends on non-human infrastructures that mediate access to information, design processes, and collective decision-making. The action of AI cannot be understood in isolation, but rather as part of a network of global communication networks, data platforms, and ubiquitous distribution environments that amplify its impact. Its integration with cloud computing, big data, and advanced mapping technologies has radically transformed the capacity for analysis, prediction, and operation of architectural, urban, and autonomous systems.

We call this multifactorial technological combination computational convergence, which enhances the autonomy and spatial accuracy of devices by integrating SLAM (Simultaneous Localisation and Mapping) with sensors such as LiDAR (Light Detection And Ranging) and stereoscopic cameras (Matellon, 2024; Sobczak, 2021; Wang et al., 2020). This ability to map and position oneself in unfamiliar environments is essential in projects by ScanLAB Projects (SLP) or Marshmallow Laser Feast (MLF), where technology becomes a means of creative and representational exploration.

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Beyond its technical capabilities (Alaimo et al., 2021)—such as adaptation through learning algorithms, resource optimisation, and interaction security—what is relevant is how these qualities are articulated in creative practices. In SLP's work, real-time capture and processing enable spatial reconstructions that speculate on materiality, point clouds, and memory. In contrast, MLF explores immersive narratives that convert environmental data into sensory experiences, expanding our perception of space and the non-human. In this sense, both projects demonstrate that technical efficiency needs to become narrative, expanding architectural and artistic practice towards speculative scenarios that anticipate possible futures and multiply the ways of interpreting space (Moldovan et al., 2025) (Figure 1).

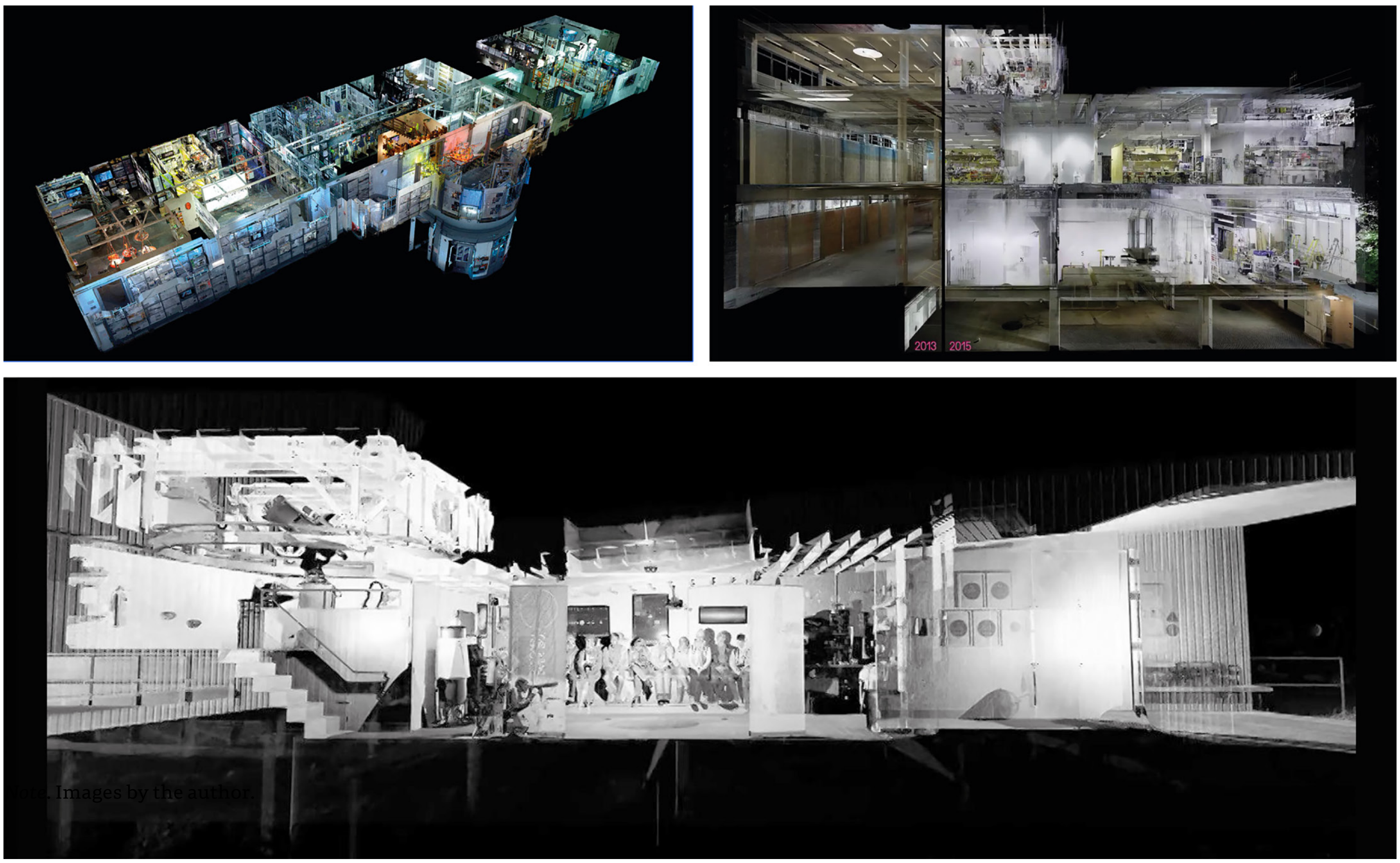
Figure 1
Where the city can't see, Liam Young (2016)

Note. Stills from the film made with images obtained using LiDAR technology from autonomous vehicles. Young, 2016. https://artcollection.salford.ac.uk/liam-young-where-the-city-cant-see/

The integration of these technologies has optimised processes in multiple sectors, but what is significant here is how, in the cultural and artistic sphere, they generate high-fidelity three-dimensional models that reveal dimensions invisible to the human eye. This digitisation not only translates the physical environment, but also raises new forms of spatial experience and mediation, where the digital and the physical are intertwined in a shared narrative.

As Sanguinetti (2023, p. 8) points out, "artificial intelligence will remain incomplete until it is overlaid with a narrative and aesthetic design that gives it meaning and inserts it into our culture"; technical efficiency alone is not enough. This integration is key in computational convergence applied to architecture and urban planning, where AI can act as a creative agent or 'actant', recognising 'vital materialism' in professional practice. Speculatively, it allows the generation of forms and narratives that transcend traditional human capabilities, anticipating possible futures and articulating an aesthetic that incorporates uncertainty and multiple interpretations (Ortega, 2024).

Figure 2
Bartlett Summer Show, ScanLAB Projects (2015). LiDAR point clouds of the architecture school



Note. This digital representation transforms the educational space into a cloud of informational matter, anticipating how AI and scanning technologies are redefining the notion of architectural materiality. Metalocus, 2015. https://www.metalocus.es/es/noticias/la-bartlett-summer-show-2015-con-lo-ultimo-en-tecnologia-de-escaneo

In this regard, the research examines the relationship between physical space and its digital representation through case studies that explore how visualisation using 3D scanning tools of physical reality impacts user perception. It is not just a technical or sensory evaluation of three-dimensional visualisation, but also an attempt to understand how these models transform our symbolic and cognitive relationship with the represented space, challenging the notion of a purely objectual and tangible architecture in favour of an elusive and intangible one.

A sensitive, meaningful, and affective approach that seeks, through a new materiality, to re-engage us emotionally with generic, hyper-regulated and codified architecture—and cities—that have been continuously produced and replicated in recent decades (Figure 2).

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Architecture as vibrant matter

Digital-intangible architecture manifests itself in models such as the ones generated by point clouds, volumetric scan projections, augmented realities, or virtual environments. This shift also redefines the role of the architect. As Hans Hollein anticipated in his manifesto *Everything is Architecture* (1968), architecture is no longer reduced to walls and ceilings, but can be expressed as a sensory pill, a projection of light, a mental image. The architect becomes a creator of atmospheres, a spatial dramaturge, or even a curator of memories. As evoked in episodes such as "San Junipero" or "Eulogy" from the dystopian television series *Black Mirror*, the architectural space of the future could be an emotional archive, a digital extension of consciousness, a capsule of affections. All of leading us towards a reconceptualisation of materiality in architecture (Figure 3).

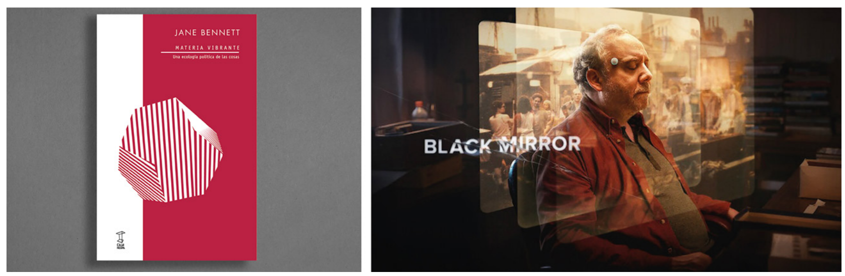
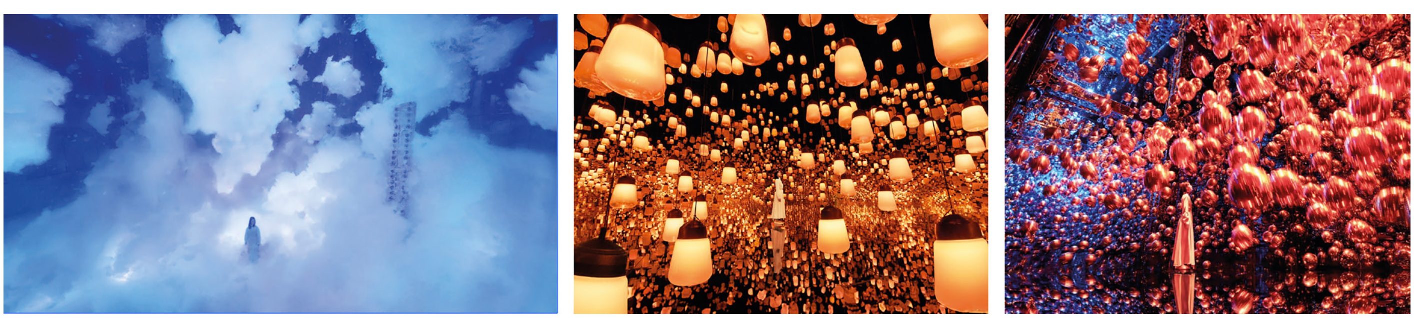


Figure 3
Architecture as vibrant, elusive matter that evokes memory

Note. Left: cover of the book *Vibrant Matter*, Jane Bennett (2010). https://cajanegraeditora.com.ar/libros/materia-vibrante/ Right: still from "Eulogy", *Black Mirror* (2025). Reality is transformed into memory: through immersive AI technology, Paul Giamatti relives his memories and discovers details that were previously invisible to him. Hatchett, 2025. https://www.netflix.com/tudum/articles/black-mirror-eulogy-ending-explained

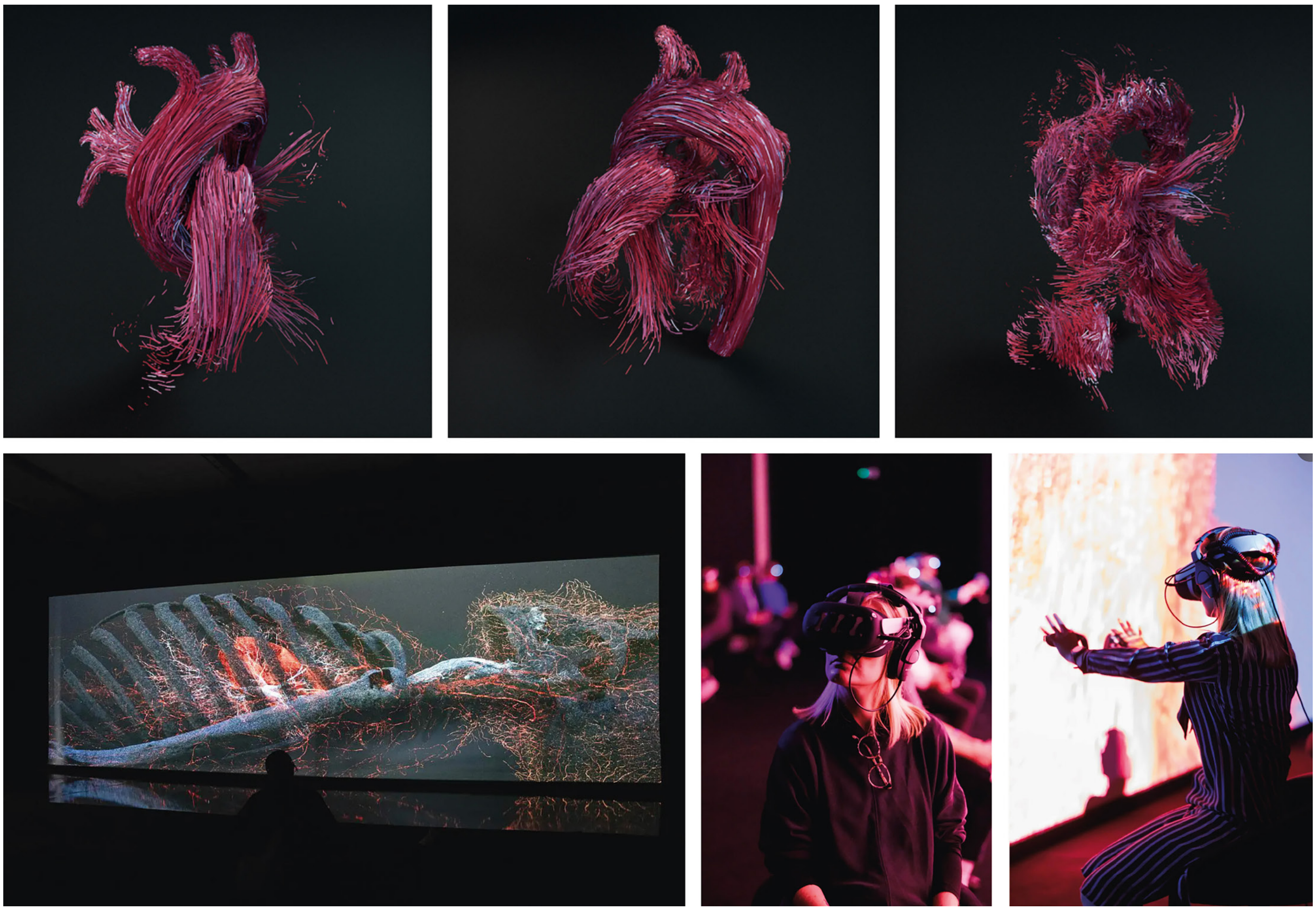
In contrast to the classical view of matter as inert, passive, and separate from the subject (e.g., concrete, steel, or wood), authors such as Bennett and Karen Barad (2007) propose concepts such as 'vibrant matter' (Everth & Gurney, 2022; Højme, 2024). Here, matter will not simply 'be, but 'become' through *intra-actions*; it is actant. It is neither stable nor autonomous, but rather a vibrant energy—a cloud of points—traversed by affects, contingencies, and potentialities between human and non-human bodies that generate *intra-action* between subjects and objects, endowing both with meaning. This conception of matter opens up fertile ground for rethinking architecture from an artificial intelligence that does not operate on the given, but is constructed in relation to the environment and its present bodies (Figure 4).

Figure 4
Biovortex Kyoto Museum, TeamLab (2025). Performative spaces proposed for the Kyoto museum



Note. TeamLab, 2025. https://www.teamlab.art/e/kyoto/

Figure 5
The Beauty of Blood Flow, The Tides within Us & Evolver, Marshmallow Laser Feast



Note. 360° images designed for virtual reality. Above: simulation created using real data on blood flow from a human heartbeat. © Marshmallow Laser Feast (s. f.) https://www.mevis.fraunhofer.de/en/r-and-d-engagement-and-science-communication/the-tides-within-us.html
Below: immersive experience that introduces the audience to the interior of the human body's systems. These works shift the gaze of computer vision to the interior of the body, where scientific visualisation is transformed into an aesthetic experience. Thus, the biological and the digital merge into a single perceptual ecology (Yang et al., 2025). © Marshmallow Laser Feast (2022) https://marshmallowlaserfeast.com/project/evolver/

In this context, the proliferation of tools such as 3D scanning, spatial reconstruction with AI, the generation of immersive environments, and atmospheric simulation have given rise to forms of 'architecture of the intangible' that shift attention from the built to the vibrant and the lived, from the architectural object to immateriality and perceptual experience. These practices reconfigure architecture not as a mere production of physical structures, but as an art of presence, evocation, and the construction of haptic worlds, implementing computational convergence technology to build immersive narratives that make the invisible visible (Figure 5).

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It is interesting to analyse and compare the approaches of SLP and MLF, which use point cloud mapping of the physical environment to show how the intersection of AI, 3D scanning, computer vision and artistic narratives can reveal hidden dimensions of reality, acting as a 'remedy' for the limitations of ordinary perception.

METHODOLOGY

The research adopts a qualitative case study methodology, focusing on the comparative analysis of two projects developed by SLP and MLF, which are particularly relevant for exploring conceptual approaches, redefined here under the term 'techno-vibrant matter'. The approach combines the use of graphic material with theoretical and critical documentation, observing how spatial technologies are used to construct digital representations of complex contexts with the potential to show the environment from a new, deeper sensory perspective. Seeing and imagining beyond our biological senses situates the research at the crossroads between architecture, urbanism, and computing. In the words of William Trossell (co-founder of SLP) in *The world in a billion points* (2023), an interview published by the Society for Social Studies of Science: "we are offering a previously unseen perspective through the eyes of the laser scanner, allowing all audiences to see in ways they couldn't before. I'd liken it to giving them a pair of binoculars, broadening their visual horizon" (Önal, 2023, n.p.).

The selected projects are presented as a paradigm of scientific research in which aesthetic and performative positioning has a direct impact on audiences. Among their productions, those that address knowledge in the face of contemporary challenges in architecture and urban planning stand out: the coexistence of human and non-human agents in a post-anthropocentric era marked by the climate crisis, as well as the deployment of computer vision-based AI. One work from each team is compared, combining the corporeal (physical elements) and the ethereal (digital elements) to articulate a narrative through the immersive space where each experience is exhibited.

Specifically, we analyse: 1) *Framerate: Pulse of the Earth* (SLP); and 2) *In the Eyes of the Animal* (MLF), with the aim of identifying and classifying the Spatial Strategies and Workflows [SS&WF] employed, paying attention to how each one articulates the relationship between technique, perception, and affect. The procedure is structured in three phases: documentary review and audiovisual review of both projects; visual and narrative coding of spatial and technological elements according to their perceptual function; and comparative classification of [SS&WF] in interpretative matrices that reveal the links between technical processes and experiential effects on the audience. The testimonies included come from interviews and assessments carried out by the curatorial teams with attendees during the exhibitions and are available in catalogues, press releases, or audiovisual material for each project, analysed here thematically to recognise perceptual transformations in their relationship with the non-human.

Through this new materiality—techno-vibrant matter—made possible by the computational convergence of the contemporary technologies implemented, phenomena traditionally invisible to human experience become perceptible. In both cases, experiences linked to non-human actors are addressed with the aim of affecting the perception and sensitivity of viewers. The fragments of these testimonies selected show how not only are the limits of our perception expanded, but a new regime of sensitivity is established, the analysis of which is the central objective of the research. Finally, the identification and classification of [SS&WF] reveals how these artistic-architectural processes activate a channel of communication and awareness accessible to non-specialised audiences. The results are represented through drawings and analytical cartographies that facilitate their understanding (Cano-Ciborro, 2023; Trafí-Prats & De Freitas, 2024).

RESULTS

The comparative analysis of the Spatial Strategies and Workflows [SS&WF] of ScanLAB Projects (SLP) and Marshmallow Laser Feast (MLF) reveals two complementary approaches to digital mediation. In the case of SLP, priority is given to the accurate recreation of intimate environments using point clouds, lighting control and sensory adjustments that generate immersive experiences based on spatial fidelity. Its *pipeline* combines LiDAR capture and 3D scanners, data processing in specialised software, visualisation through projections or VR, and optional integration with digital manufacturing.

A *pipeline*, understood in terms of work, is an organised sequence of stages or processes in which the output of each phase serves as input for the next. This structure seeks to optimise time, ensure quality and facilitate coordination in complex projects.

In contrast, MLF deploys immersive experiences of a poetic and trans-scalar nature, where reality is not reproduced but transformed into hyper-realistic simulations. Its strategies focus on the dramatic use of light, colour and particles, together with viewer interactivity, even ‘placing’ them in the natural environment. Its technical flow articulates volumetric capture, digital twin simulation, real-time rendering, and integration into physical or virtual immersive spaces.

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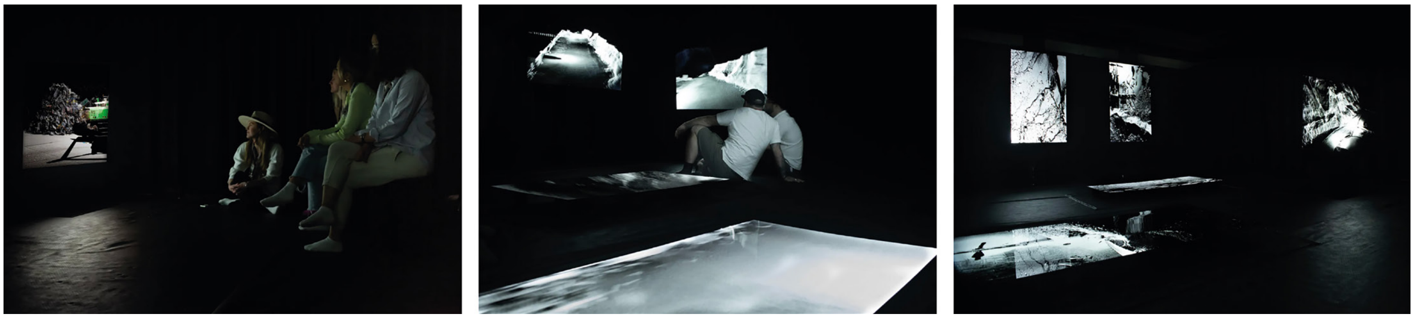
Figure 6
Framerate: Pulse of the Earth, ScanLAB Projects (2022). 79th Venice International Film Festival



Note. Using temporal data (*timelapse-scanning* technique) captured by computer vision, the work transforms technical measurement into a narrative about the planet's breathing, where algorithms act as co-authors of environmental perception. ScanLAB Projects, 2022. https://coolhunting.com/culture/scanlab-projects-framerate-pulse-of-the-earth-immersive-installation/

ScanLAB Projects and Marshmallow Laser Feast
ScanLAB, founded by two architects (London, 2010)—Matthew Shaw and William Trossell—is distinguished by its innovative use of large-scale 3D scanning. Its interdisciplinary practice combines art, architecture, and digital media to generate detailed digital replicas of buildings, landscapes, and events, which oscillate between the ethereal and the corporeal and offer new ways of narrating the visible and the absent.

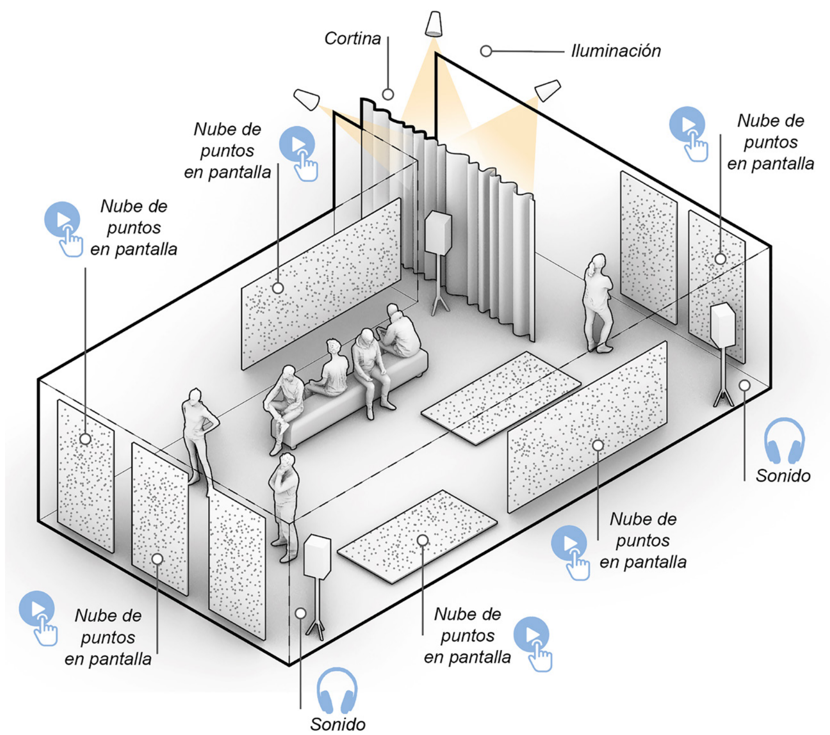
For its part, Marshmallow Laser Feast, an artistic collective (London, 2011) that explores immersive art through VR, LiDAR and particle systems technologies. Their works, poetic and sensory in nature, seek to make the invisible visible by recreating hidden ecologies and non-human perspectives, generating critical experiences about the interdependence between species and environments.

Spatial Strategies and Workflows [SS&WF] by SLP and MLF
[SS&WF] by ScanLAB Projects
Among their main spatial strategies, we find small, intimate spaces [SS-SLP.1]. In projects such as *Felix's Room* (Servando-Carrillo & Cano-Ciborro, 2025), they work with small-scale domestic spaces, allowing visitors to perceive minute details and generating a very direct immersive experience. Precise recreation of physical reality [SS-SLP.2], where spatial fidelity is a priority; point clouds are used to capture the exact geometry and textures of the environment. Manipulation of perception through scale adjustments, colour projection and superimposition of scanned data to create tension between the real and the digital [SS-SLP.3]. Controlled lighting conditions, minimising ambient light to highlight projected elements and point cloud details [SS-SLP.4]. Sensory integration, through the combination of specific sound effects with the space, reinforcing the narrative and immersion [SS-SLP.5] (Figure 6).

Their technical workflow includes spatial capture with LiDAR, terrestrial 3D scanners and/or outdoor drones [WF-SLP.1]. Data processing is done using specific software to clean, filter, and prepare point clouds [WF-SLP.2]. Visualisation is achieved through spatial mapping projections, screens or VR/AR for immersive navigation [WF-SLP.3]; and, on occasion, digital fabrication (3D printing, CNC or laser cutting) to construct complementary physical elements [WF-SLP.4].

The approximate *pipeline* is usually: 1) spatial capture with LiDAR or photogrammetry; 2) point cloud processing (filtering, alignment, registration); 3) geometry reconstruction and digital texturing; 4) integration with projection systems, VR/AR or displays; 5) sensory adjustments (light, sound, interaction); and 6) digital fabrication of physical components (Figure 7).

Figure 7
Framerate: Pulse of the Earth, ScanLAB Projects (2022)



Note. Diagram and mapping of scenic elements used by ScanLAB as a spatial strategy implemented in this installation. Authors own.

Audience testimonials

> I was walking along the seaside promenade without any clear expectations, but I felt a revitalising energy around me. People had gathered together, their silhouettes shifting against the sky as the waves broke somewhere beyond sight. For a moment, I was transported back to school trips: that childlike excitement, not that of what you're told is important, but that of discovering it for yourself (Subject 1).

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> The installation allows you to see the evolution of moving landscapes from different perspectives, highlighting the work's ability to show the passage of time in a way that is impossible to see with the naked eye or through the lens of a traditional camera (Subject 2).

[SS&WF] by Marshmallow Laser Feast

For its part, its main spatial strategies focus on immersive sensory experiences, combining visual, auditory, and tactile effects [EE-MLF.1]; using transformed spaces of variable scale, not limiting itself to reproducing reality, but transforming it to create hyper-realistic sensations [EE-MLF.2]; employing dramatic use of light and colour through laser projections, volumetric lights, and digital particles that generate depth, volume, and movement [EE-MLF.3]; and using interactivity and guided flow, as visitors are often an active part of the space, and their movement can alter the visualisation or sound effects [EE-MLF.4] (Figure 8).

Figure 8
In the Eyes of the Animal, Marshmallow Laser Feast (2015). Abandon Normal Devices Festival Grizedale, UK

Note. Computer vision technology allows the audience to delve into the perception of non-human agents within their own natural environment. © Marshmallow Laser Feast, 2015. https://marshmallowlaserfeast.com/project/in-the-eyes-of-the-animal/

Audience testimonials

> It's an experience that allows you to see the world through the eyes of a mosquito, a dragonfly or an owl, something completely new and disruptive. (Subject 3)
>
> The experience made me see the world from new perspectives: I felt what another being might perceive and how their senses interact with the environment. It was surprising and moving, as if I could understand fragments of the lives of other species in a direct and totally new way. (Subject 4)

Among their technical workflow, we find data capture with LiDAR, photogrammetry, and particle clouds to record the environment or natural phenomena (e.g., simulation of blood flow or oxygen circulation in the respiratory system) [FT-MLF.1]; simulation and visualisation, using specific software (dynamic particle systems and processed or real-time rendering) [FT-MLF.2]; projection and VR/AR with immersive screens, domes, and devices for total interaction [FT-MLF.3]; and digital manufacturing, when physical scenery is required, using 3D printing, CNC or laser cutting for support structures [FT-MLF.4].

In terms of the approximate *pipeline*: 1) environment capture (LiDAR, photogrammetry, sensors); 2) data processing and cleaning to convert it into geometry or particles; 3) digital simulation (particle system); 4) processed or real-time rendering and interaction adjustment; 5) integration with physical space (projection, VR/AR, sound, lighting); and 6) physical construction of structures or supports (Figure 9).

DISCUSSION

Based on the theoretical frameworks presented and the comparative methodology applied, the results of the analysis allow us to establish three main dimensions of technological mediation in the selected practices. These dimensions relate to the way in which the convergence of computer vision, three-dimensional volumetric capture, and artificial intelligence transform the relationships between perception, matter, and environment, shaping new ways of inhabiting and representing reality.

The comparative analysis of *Framerate: Pulse of the Earth* (ScanLAB Projects) and *In the Eyes of the Animal* (Marshmallow Laser Feast) allows us to identify two complementary modes of relationship between technology, perception, and the environment. While the former proposes a macro-temporal view, where

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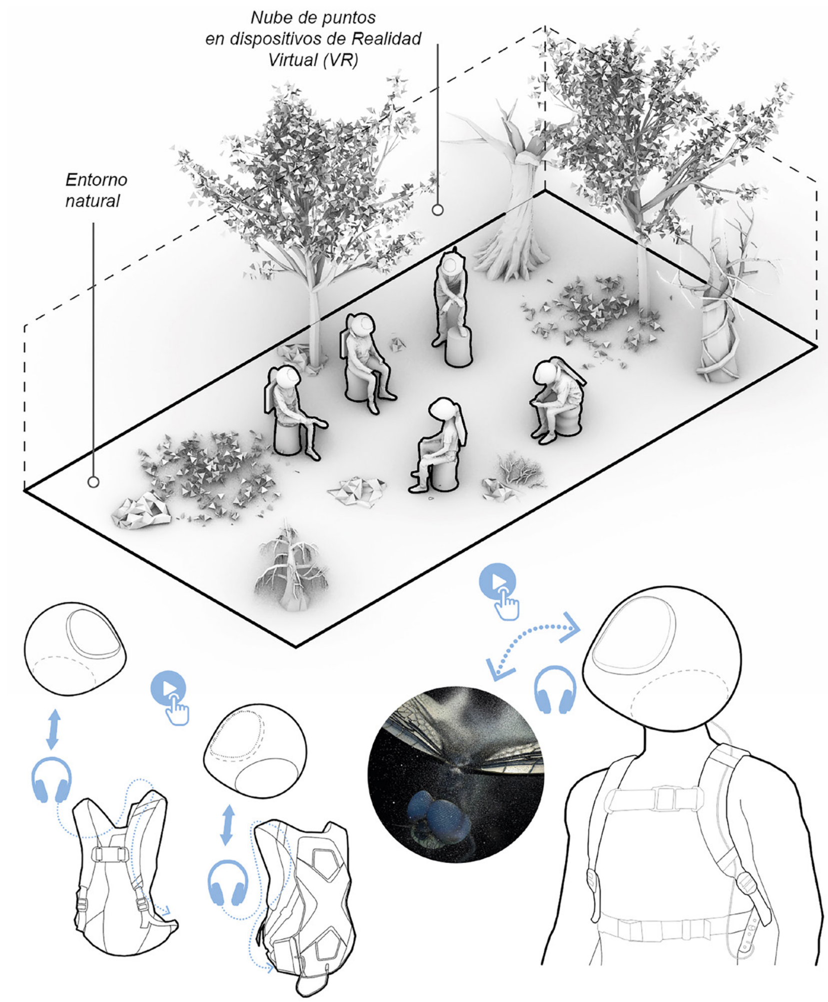
Figure 9
In the Eyes of the Animal, Marshmallow Laser Feast (2016)



Note. Diagram and mapping of scenic elements used by Marshmallow as a spatial strategy implemented in this installation. Own elaboration.

technology reveals the slow transformation of the planet and its ecological metabolism, the latter shifts human perception towards microscopic and non-human scales, multiplying the possible sensibilities within the same ecosystem. In the first case, architecture appears as a dynamic archive of time—a way of constructing planetary memory through data—; in the second, as a sensory interface that translates the experience of other species, expanding the notion of inhabiting beyond the human.

This comparison allows us to think of architecture and urbanism not only as spatial disciplines, but as systems of perceptual mediation. The spatial strategies and workflows identified in both case studies show that the convergence of computer vision, 3D volumetric capture, and artificial intelligence are not neutral tools, but epistemological devices capable of redefining what we understand by reality and the built environment.

In this sense, techno-vibrant matter is not limited to being a metaphor, but emerges as a contemporary condition of architectural practice: an architectural becoming of data, atmospheres, and vibrations that continuously reconfigures the experience of space and its cultural and ecological agency (Leith, 2025).

From this perspective, the projects of ScanLAB Projects and Marshmallow Laser Feast anticipate profound transformations in the way the discipline designs, records, and communicates. While the former highlights the need to think of territory as a temporarily active and measurable system, the latter reminds us that all representation involves a politics of perception, a way of including or excluding sensibilities. Both approaches invite us to reconsider architectural practice as a relational space where the human and the non-human coexist and affect each other, thus suggesting an expansion of the disciplinary field towards an ecology of perception and data.

Beyond the visual and auditory dimensions explored by both practices, contemporary research in architectural computing is beginning to integrate haptic, olfactory, and biometric stimuli into the configuration of space. Recent proposals demonstrate how the incorporation of biodata and multisensory response systems allows for the conception of environments that react to the emotional and physiological states of their occupants (Manoudaki et al., 2025). This hypersensory expansion redefines the notion of immersive experience and opens up a horizon in which architecture acts as a sensitive interface, mediating between body, technology, and environment.

CONCLUSION

The case studies show how algorithmic mediation transforms ‘what we see’ into ‘what we can imagine’. Through spatial strategies that combine LiDAR scanning, computer vision, and immersive modelling, these SLP and MLF practices materialise a computational convergence where data becomes atmosphere, image, and perceptible vibration. In *Framerate*, the temporal accumulation of scans reveals the passing of the seasons, plant growth, and geological erosion as slow choreographies that reveal the planet’s breath. In *In the Eyes of the Animal*, vision is reconfigured through other species—mosquitoes, dragonflies, owls—to immerse us in a sensory ecosystem where human perception is decentralised and expanded towards the non-human.

Both works demonstrate the power of AI and digital infrastructures to reveal invisible dynamics of nature and shift the human gaze towards interdependent sensibilities. However, for this power to translate into transformative architectural practices and effective public awareness, immersion must be conceived from a truly

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hypersensory perspective: one that is not limited to visualisation, but incorporates the haptic, the olfactory, and the biometric as vectors of environmental knowledge. This multisensory approach not only broadens the perceptual experience, but also promotes a more empathetic and ecological understanding of our relationship with the environment.

In the field of architecture and urban planning, such a shift suggests an ethical and aesthetic reorientation: from control and representation towards listening, collaboration, and co-sensitisation with the environment. Integrating hypersensory strategies into urban installations and projects can increase the effectiveness of immersive experiences as tools for raising public awareness about the anthropocentrism of many current AI premises, by making shared interdependencies and vulnerabilities perceptible. Ultimately, designing the future will not consist of mastering matter, but rather learning to interpret its pulses, to see through other eyes, and to collaborate with its vibrations in order to imagine a truly post-anthropocentric era (Verboom et al., 2025; Zhang et al., 2023).

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

AUTHORSHIP STATEMENT

Rubén Servando-Carrillo: Conceptualization, Research, Methodology, Project Management, Supervision, Validation, Visualization, Writing.

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STATEMENT ON THE USE OF AI

In the course of developing this work, the authors used ChatGPT to perform grammatical reviews. After using this tool, the authors carefully reviewed and modified the content and assume full responsibility for the contents of the publication.

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