

The Body's Afterimage: Intra-Action and Biopolitics in Sensor Art

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Abstract. This paper examines how contemporary sensor-based artworks reshape the relationship between body, technology, and power through data translation and feedback. Focusing on works by Rafael Lozano-Hemmer, Shinseungback Kimyonghun, Vicente Manzano, and Coralie Vogelaar, it explores how biometric and affective signals—such as heartbeat, emotion, and neural activity—are transformed into aesthetic and perceptual experience. Drawing on Karen Barad's intra-action, Donna Haraway's cyborg theory, and Michel Foucault's biopolitics and governmentality, the paper proposes the concept of the body afterimage to describe a residual, datafied embodiment that persists within algorithmic systems. This concept highlights how the body's digital traces continue to operate as both material and political agents beyond physical presence. Through this framework, sensor art is understood as a site where the pursuit of interactivity and self-knowledge intersects with mechanisms of quantification and control. The study argues that technological mediation generates hybrid forms of visibility and agency that are simultaneously emancipatory and disciplinary, revealing that contemporary subjectivity is increasingly defined through technologically mediated traces rather than corporeal presence.

Keywords: Sensor art, Intra-action, Digital embodiment, Biopolitics, Affective computing aesthetics

1. Introduction

Just as in Philip K. Dick's emotion detectors and George Orwell's telescreens, science fiction has long reflected on a central anxiety—the fate of individual autonomy—arising from technologies that penetrate the innermost realm of the human body and mind. These speculative visions are now materializing in contemporary sensor art, exemplified by Rafael Lozano-Hemmer's works, which convert individuals' heartbeats into publicly visible light fields. Some systems designed by the creative duo Shinseungback Kimyonghun transform faces into sounds, thereby turning sensor art into an exploration of the human body as a live data interface. This extension of the body and its seemingly democratic properties expose fundamental contradictions: when our most private bodily data is captured in real time, algorithmically processed, and publicly displayed, does it enhance individual agency, or might it instead function as a mechanism of discipline in subtler, less perceptible forms?

During the entire course, there will be a slight variance between the body of the individual and the data representing them. The paper defines The Body's Afterimage as a technologically enacted, algorithmically processed bodily manifestation that appears to be real and present but also detaches itself simultaneously to withdraw. It preserves the soul-animating features of the original body — heartbeat, emotion, neural activity—but these qualities become fragmented, their integrity dissolved along with contextual reference points, reducing them to sets of quantifiable values such as standardized pulse rates, measurable emotional categories, and data visualization patterns. These traces belong to an original source entity yet do not fully possess it; instead, they are reconstituted within a collective data stream that continuously circulates within algorithmic systems of data arrays.

This raises a constellation of profound questions: how does sensor art remake boundaries among bodies, technologies, and artworks through processes of intra-action? Does the making of The Body's Afterimage create new opportunities for individuals to act upon their embodiment, or does it merely replicate systems of governance under the guise of empowerment? Adopting Karen Barad's Agential Realism as its core theoretical framework, and placing it in dialogue with Donna Haraway's Cyborg Theory and Michel Foucault's Biopolitics, this study argues that sensor art does not generate a conventional subject-object relation but instead forms an entangled phenomenon in which the human body, sensors, and installation co-constitute one another. Such entanglement, where boundaries between bodies, technologies, and data emerge through mutual constitution rather than pre-existing separation, draws on the intra-active relational practices outlined in Mauthner [1] and extends Foucault's biopolitics to sensor-mediated governance. Within this entanglement, The Body's Afterimage emerges as a configuration of agency that embodies both empowerment and discipline, echoing the paradoxes long theorized in science fiction's reflections on technological futures. These paradoxes, in turn, parallel the Foucauldian analysis in Tuset Varela [2], where sensor-like technologies extend state and corporate regulation over bodies, thereby blurring lines between empowerment and subtle control.

2. Redefining artistic interaction: the shift from representation to intra-action

Traditional art theory has long assumed an ontological distinction between the viewer and the artwork, treating them as separate, interacting entities. However, in the context of sensor art, this distinction becomes increasingly irrelevant. From the perspective of agential realism, the world is not composed of pre-existing, independent entities but rather these entities and phenomena are generated through relational practices. "A phenomenon is a specific intra-action of an 'object'; and the 'measuring agencies'; the object and the measuring agencies emerge from, rather than precede, the intra-action that produces them" [3]. Building on this, intra-action renders artistic boundaries as 'intra-active becoming' rather than fixed, where viewer, sensor, and artwork dynamically emerge together, as elaborated in Mauthner's application of Barad to relational practices [1]. In Rafael Lozano-Hemmer's Pulse Room, the relationship between the viewer and the artwork is not a simple interaction, but rather, through the material-technological process of capturing a heartbeat, boundaries such as "participant," "heart-rate data," and "light rhythm" are co-constituted. This co-constitution exemplifies Barad's argument that phenomena emerge through intra-actions, rejecting dualisms such as nature/culture and revealing boundaries as performative enactments rather than pre-existing [3]. Therefore, artworks are no longer seen as independent objects, but as phenomena co-generated through interactions with the viewer.

In agential realism, agency is not an attribute exclusive to individuals or humans, but is generated through intra-actions. Agency is an enactment, manifested in doing/being in its intra-activity.

"Crucially, agency is a matter of intra-acting; it is an enactment, not something that someone or something has. Agency is doing/being in its intra-activity" [3]. In Pulse Topology, agency arises not only from the human participant providing the heartbeat but also from the sensor's "decision" on which physiological signals to capture, the algorithm's "choice" of how to process and sequence the data, and the installation's "response" in translating the data into a three-dimensional light field. This shows that agency is the co-produced result of the entire network of material configurations. As stated, agency is not something an individual possesses, but is co-generated by all involved components.

Furthermore, Barad highlights that the material-discursive boundary-making practices do not only define "objects" and "subjects," but also produce these differences through continuously changing relationality. In sensor art, this relationality challenges dualisms like natural/social, where material-discursive practices co-produce boundaries beyond human agency alone, as discussed in Mauthner [1]. "Agential cuts do not mark some absolute separation but a cutting together/apart – 'holding together' of the disparate itself" [4]. This process of agential cutting is especially significant in sensor art, where the presentation of the artwork, the viewer's emotional responses, and the technological feedback are all co-constituted.

This understanding provides a new perspective for sensor art, where the boundaries between the viewer, artwork, and technology are seen as continuously generated and reshaped through intra-actions. "Researching phenomena, then, is a methodological practice of continuously questioning the effects of the way we research, on the knowledges we produce. This unfolds itself as an ethico-onto-epistemology of knowing in being" [3]. Therefore, sensor art is no longer a static interaction between the artwork and the viewer, but a dynamic, ever-changing relational process where the artwork, the viewer, and technology co-create new artistic experiences and meanings.

3. Tracing the body's afterimage — vital data, affective systems, and neural feedback

In recent decades sensor-based art has reconstituted the body as a site for the extraction and aesthetic translation of sensorimotor signals, the body being subsumed as part of the functionalized entity subject to algorithmic manipulation. The body's physicality can still be detected through the corporeal afterimage that results from the sedimentation of the signal as it passes through the transducer, moving through a connective device and finding itself at another site, translated onto another register and preserved in the circuit. Sensor-based art feeds into this tension between presence and abstraction, monitoring and modulating. What makes for afterimages in multiple contemporary installations are different forms of physiological translations, such as heartbeat, emotion, neural activity and self-regulation. Every instance of databased vitalities involves its partaking in a larger political frame surrounding the politics of perceiving and ruling lives.

Rafael Lozano-Hemmer's Pulse Room brings us an exemplary portrayal of such metamorphosis. Through this work, people's heartbeats detected by sensors serve as generators of ambient luminescence, ultimately culminating in visually striking formations of twinkling lights. Although each participant contributes an individual rhythm, the resulting constellation melds all the pulsing voices of participants together to create a generalized, ubiquitous luster. The work embodies an individual experiencing personal vitality and projecting its moments of alternating intensities into an undifferentiated spectacle open to being experienced in equal measure by countless viewers. The placing of a finger on the device beckons us to become involved with a personal display—only for it to flood our awareness with the low-tech symbolics of massed activity.



Figure 1. Pulse Room (2006) - Rafael Lozano-Hemmer - Plataforma, Fábrica La Constanca, Puebla, México

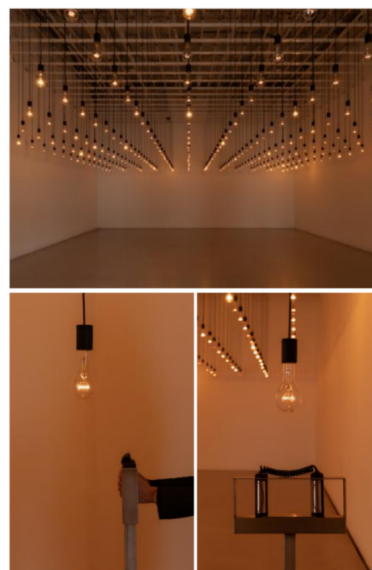


Figure 2. Pulse Room (2025) - Collection Exhibition 3, 21st Century Museum of Contemporary Art, Kanazawa, Japan

Pulse Room is more than merely a picture of the body; it also conducts negotiations of matter and power among humans and machines, with heartbeats emerging as the latest event arising from the connection of skin, sensor, and circuitry. It presents the image of the body as a flicker that shines yet fades into nonexistence, while simultaneously identifying the alive body that dilutes and disappears. By exposing the body and physically securing its sensory experience, the artwork reveals technology's performativity, even as it presents the simultaneous amplification and abstraction of life through unique visualization. The pulse, which is as individual and personal as it can be—usually left tucked away under one's shirt—becomes, paradoxically, a part of a collective data field wherein such data pertain to everything people are able to perceive about each other. This collective data field, in which personal vitality transforms into regulated, mass-scale phenomena, reflects the biopolitical tools of AI/sensor systems for predicting and managing behaviors, as explored in Tuset Varela [2].

If Pulse Room externalizes the interior rhythm of the body, Mind, the interactive installation by the artist group Shinseungback Kimyonghun, extends this process into the affective domain. A camera at the center of the exhibition space continuously tracks visitors' faces, with emotion-

recognition software interpreting expressions and translating them into sonic modulation. The ocean drum in the installation responds to the average emotional tone of the last hundred faces, altering the intensity of wave sounds according to this aggregated mood. Emotion, in this configuration, becomes a dynamic variable within a feedback system—detached from individual context, processed through algorithmic reasoning, and materialized as environmental sound.

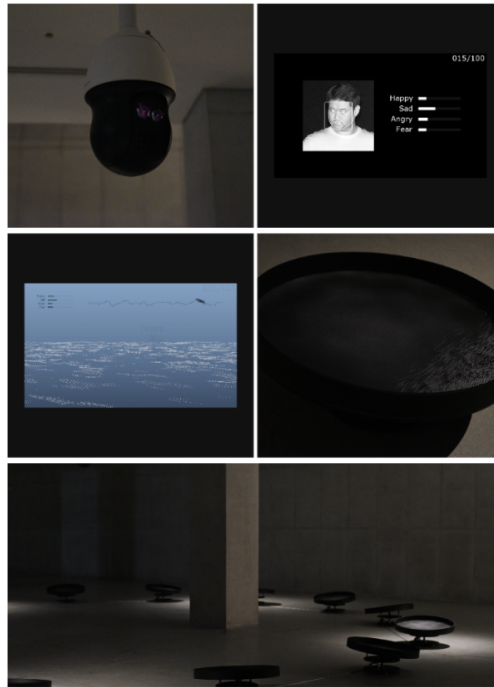


Figure 3. Mind (2019) - Shinseungback Kimyonghun

The affective circulation at work in *Mind* exemplifies what Karen Barad calls intra-action: the ongoing material co-constitution of human and technological agencies. Here, emotion is neither a pre-existing inner state nor a transparent expression, but an emergent phenomenon generated within the entanglement of facial recognition software, algorithmic interpretation, and acoustic output. However, this process of translation is not ideologically neutral. The system’s capacity to “recognize” emotion relies on datasets that carry the biases of their creators—racialized, gendered, and culturally specific assumptions about how emotion appears. The statistical averaging of affect erases individuality, replacing lived emotional complexity with an abstracted mean value. This abstraction, where opaque algorithms amplify inequalities in surveillance and erode individual agency in sensor art, mirrors biases in AI systems as examined in Tuset Varela [2]. What results is a soundscape of standardized feeling: the ocean waves rise and fall not with the nuances of human affect but with its algorithmic reduction. The body’s afterimage, in this case, is an affective residue flattened by computation—a collective emotional echo that reveals the subtle violence embedded in systems of emotional quantification.

Vicente Manzano’s *Neurocosm* takes this down to the last unit—the neural basis of consciousness—by transforming one’s brainwave patterns through EEG sensors alongside one’s heartbeat into a live visual representation of one’s thought processes; like a moving landscape of light and color transforming themselves every second—the so-called neuro-aesthetics of a person’s conscious experience. On the one hand, it represents the beauty that exists in the movement of thought within

oneself; but on the other, the fact that one's most intimate of actions have become readable, writable, and potentially, controllable also fills them with unease.



Figure 4. Neurocosm (2024) - Vicente Manzano (Alma digital studio)

This translation of neural signal into aesthetic form raises profound ethical and ontological questions. When cognitive activity becomes artistic material, where does self-expression end and surveillance begin? The promise of transparency—of seeing the mind made visible—carries with it a new mode of exposure, in which even the most private dimension of subjectivity becomes data. The body's afterimage here is no longer merely a reflection of the organism's vitality but a visualization of thought itself, stripped of its opacity and rendered accessible to machinic vision. What appears as empowerment—the ability to project one's consciousness into the aesthetic field—may simultaneously enact a subtle form of biopolitical control. The human subject becomes transparent not to itself, but to the technological systems that process its signals.

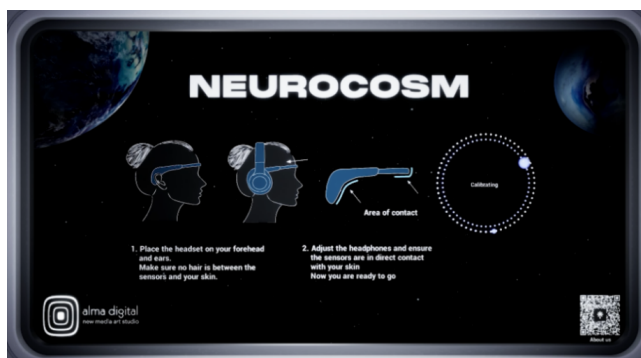


Figure 5. Instruction of Neurocosm

In contrast, Coralie Vogelaar's Cardiac Biofeedback Measurement changes the focal point away from group or neural input toward individual self-regulation. As each user interacts, the visitor's own heart rate and breathings are projected onto the virtual installation. Thus, with repeated interactions, the visitors become attuned to stabilizing their physiological response in order to create harmony, acting within an intimate feedback loop between body and image. From one perspective, it seems to offer a very personal form of active engagement with an artwork that is sensitive to the rhythms of one's own body. However, behind what appears on the surface to be an intimate and direct form of interface is a behavioral conditioning machine.

According to Vogelaar's work embodies the type of power known as governmentality, put forward by Michel Foucault, it means a kind of power which employs the means of self-regulation made voluntarily through individuals rather than employing exterior constraints. Foucault describes

this as disciplinary surveillance, operating via normalizing judgment and examination to manage populations through perpetual observation [5]. Under the instruction of participating person, they adjust their own bodily functions due to stimulation produced by instruments. This piece of art installation thus transforms itself into a training machine for the self-managed participants, leading the sensory satisfaction of the observer towards the discipline of a performance of biopolitical rationality. In such way, after-image of one's body gets recycled as an index of the conductance and equilibrium of the governor Neoliberal subject's individual control conducted on a visible screen.

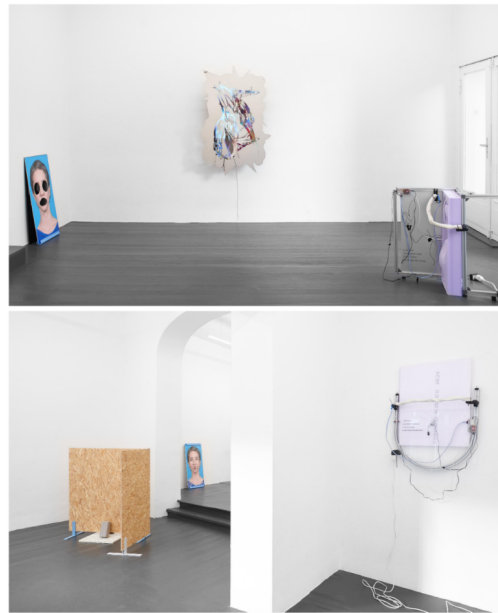


Figure 6. Cardiac Biofeedback Measurement (2022) - Coralie Vogelaar - Tanja Wagner Gallery, Berlin

The body does not seem to be fixed in the work; it's more like the change that is happening when a heartbeat becomes light, or an emotion translates into sound, or a neural signal conveys an image, or physiological feedback results in actions. All those bodily changes then are transductions that generate another layer of the body's leftover image, revealing how technologies convert interiority into representations of the outside world. What these artworks have in common is that they explore, on the territory of life—the biological, emotional and cognitive system that comprise humanity—how sensorial devices, codes and display screens transform and translate the body for seeing, for identifying with and for governing. The sensor, the algorithm, and the interface work together to produce a new apparatus of mediation via which the body is revealed, governed, and replicated as data.

In this way, the body's afterimage is no longer a figure of speech but rather a term used as a theoretical model with which we understand contemporary sensor-based art—it pinpoints the zone of vitalization and refashioning where the organic turns computational and the present becomes enregistered—and how sensor-based art illuminates aesthetic contradictions of our mediated existence: one's yearning for self-knowledge in tandem with quantification, or one's desire to participate, entangled with overt and covert ways to manipulate thought. The afterimage is thus an endurance of embodiment rendered ephemeral while resonating between body and code, manifest as a continually pulsating, feel, thinking element which continuously circles around in the tech infused world.

4. The tension of agency and the reconfiguration of body politics

These cases demonstrate how sensor art plays an integral role in exploring tensions between subject agency and bodily politics, along with the concomitant dynamics of empowerment and governance. They reveal these elements as neither mutually exclusive binary opposites nor standalone pairs; rather, they form a symbiotic process of intra-action, where true freedom cannot be achieved by simple liberation, as one is never fully outside the web of digital governance and connected action. Sensor technologies thus serve both as tools for emancipation and mechanisms of discipline—a strategy akin to Foucault's biopolitics—where governance does not merely restrict or alter conduct but permeates all dimensions of life through techniques and technologies, reshaping behavioral routines and social order. Sensorial arts, in this way, endow the individual with an ephemeral impression of freedom and power, even as they remain shackled by the constraints of technological tyranny. This framework aligns with Foucault's extension to biopower, which regulates life processes collectively, complementing discipline by managing populations' health and reproduction beyond individual control [5].

Meanwhile, this kind of individuals in those works is not decomposed into a series of pure individuals; rather, it is a kind of new subject that emerges as a distribution and also as a kind of liquid subject based on the data feedback within technological networks. No longer are individuals, either in terms of online practices or face-to-face encounter with others, isolated and independent subject positions, but they consist of the flows between oneself and others coupled with continuous connections among technical devices. As Barad's agential realism emphasizes, subjectivity is not an inherent, independent existence, but something that emerges through interactions with material, technology, and other entities. In this way, subjectivity is constantly unfolding, mirroring the dynamic relationship of the individual with the world. The reconstruction of individuals and their collectivization, therefore, exemplifies a posthumanist conception of bodily politics. In this context, the human body ceases to be a closed, natural entity and becomes an open, connectable interface, taking on the form of the cyborg as Haraway described: "The cyborg is a genderless and raceless mode of being imagined to find a way towards equality by eliminating all sorts of problematic dualisms like that of self/other, culture/nature, male/female, civilized/primitive, right/wrong, truth/illusion, total/partial, God/man" [6].

In fact, this framework is not focused on going back to a "pure" body, but on how people maintain their critical agency in their permanent cyborgization. And it's also noteworthy that cyborgization may possibly lead to new domains of power as well instead of liberation. Importantly, in contrast to Foucault's notion of governmentality, which views governance as the exercise of rule upon an obedient population controlling individual behavior is something everyone does; however, it also involves certain self-managed improvements with technology [7]. The individual navigation between autonomy and external command is a process of self-regulation and control involving continuous power, bodies and individuals in accordance with constantly reformed technology and power structures. This practice can liberate as well as be used to control, illustrating the complex entanglement of technology and power.

Ultimately, sensor arts represent not only the ways technology can expand our bodies and sensory capacities, but also what kinds of subjectivities they give rise to that we might be living and creating through. Sensor arts offer much more than a superficial sense of freedom; people are made all the more fully embedded within complex systems and their intersections of overlapping governance and regulating apparatuses as a result of technological interventions. As such, then, technologies reconstitute each one of our various roles or subjects—not all forms—and do so in terms of

collectivizations, divisions and inequalities. But even as this sets some of us against others along lines of abstraction, technologies still may offer an impetus towards further individuation.

5. Conclusion

Sensor art presents itself as a technological and cultural mirror in the contemporary era, providing an experimental arena through which to understand the political body of the present. This study examines *The Body's Afterimage* through the theoretical lens of Karen Barad, interpreting it not only as an artwork but also as a central concern within contemporary technological discourse. It is neither a replication of the physical body nor a mere technological illusion; rather, it constitutes a mode of existence produced through a specific material–discursive configuration.

In response to the coexistence of empowerment and governance, we must adopt a critically participatory stance—neither passively seduced by the forms of empowerment these technologies may promise, nor yielding to technological pessimism. It is crucial to recognize that *The Body's Afterimage* is not passively determined by technology but instead emerges from the ways in which human actors become deeply entangled in intra-actions, operating collaboratively as participant agents. This critical stance, which urges ethical inquiry into posthuman agency through performative boundary-drawing in sensor entanglements, draws on Mauthner's diffractive genealogy method [1].

As science fiction once reminded us, the trajectory of technological development is shaped not by technology itself. Sensor art translates this warning into an embodied experience, enabling audiences to perceive their own data traces directly. By blurring the boundaries between the individual and the collective, such traces may represent the first step toward rethinking the very definition of humanity, questioning and unsettling previously unexamined assumptions. Between one's physical body and its trace, there exists a hybrid quality. In this way, we may begin to reconcile ourselves with technology, provided we remain vigilant toward its potential. Ultimately, the true value of sensorial art lies not only in its capacity to present novel aesthetics but, more importantly, in its potential to provoke critical inquiry: how do we learn to live alongside our “afterimage”? And, most crucially, how do we ensure that this “afterimage” does not become a tragic marker of a fragmented self, but rather the foundation upon which to envision a future grounded in active and consubstantial agency?

Declaration

This article adopts AI tools to polish the expressions as well as refine the overall structure without sacrificing the author's words and thoughts.

All the images used in the text come from the artist's official website.

References

- [1] Mauthner, Natasha S. 2021. “Karen Barad's Posthumanist Relational Ontology: An Intra-Active Approach to Theorising and Studying Family Practices.” *Families, Relationships and Societies*, ahead of print, January 1. <https://doi.org/10.1332/204674321X16111601839112>.
- [2] Varela, Damián Tuset. 2024. “Artificial Intelligence Law through the Lens of Michel Foucault: Biopower, Surveillance, and the Reconfiguration of Legal Normativity.” *Open Journal of Social Sciences* 12 (12): 189–201. <https://doi.org/10.4236/jss.2024.1212012>.
- [3] Barad, Karen. 2007. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Duke University Press. <https://zlib.by/book/1184257/c0b07f/meeting-the-universe-halfway-quantum-physics-and-the-entanglement-of-matter-and-meaning.html>.

- [4] Barad, Karen. 2012. "What Is the Measure of Nothingness? Infinity, Virtuality, Justice." Infrasonica. Last accessed on 20 September 2025, <https://www.infrasonica.org/en/wave-1/what-is-the-measure-of-nothingness>.
- [5] Foucault, Michel. 1977. *Discipline and Punish: the Birth of the Prison*. London: Allen Lane.
- [6] Haraway, Donna. 1990. "A Cyborg Manifesto: Science, Technology and Socialist-Feminism in the Late Twentieth Century," *Simians, Cyborgs, and Women: The Revolution of Nature*, 149-181.
- [7] Foucault, Michel. 1991. "Governmentality." In: *The Foucault Effect: Studies in Governmentality*, ed. G. Burchell, C. Gordon and P. Miller, 87-104. Hemel Hempstead: Harvester Wheatsheaf.