SCENT OF SURVEILLANCE.
Odours as Aesthetic Means of Manipulation. Odour as a Biometric Subject.

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Abstract

The paper investigates the biopolitics of olfactory surveillance, focusing on how scent has evolved from a cultural and psychological force into a powerful instrument for biopolitical control and neuro-manipulation. Drawing on examples from literature, neuroscience, artistic practice, and contemporary technology, it critically explores the use of odors for both subtle behavioral conditioning and explicit biometric surveillance. The analysis includes historical examples such as the Stasi's scent archives, the development of electronic noses, machine olfactory startup, and artistic and design projects. The paper reflects on the ethical and political implications of a future in which olfaction becomes an interface for surveillance and algorithmic control, expanding the debate on neurorights and sensory algorithmic governance.

Palabras Clave

Olfactory Neuromanipulation, Biometric Scent Identification, Sensory Bio-Psycho politics, Algorithmic Governance, Artistic Resistance

Introduction

In 2021 in the vast Turbine Hall of Tate Modern, Anicka Yi diffused scents as temporal agents. Depending on when you visit *In Love With the World*, you may encounter marine

aromas linked to the Precambrian period, long before humans inhabited Earth,vegetation from the Cretaceous period, spices thought to have countered the Black Death in the 14th century or the coal and ozone evoking the Machine Age of the 20th century. Each day brought with it a new olfactory narrative.
Biomechanical creatures—part jellyfish, part drone—suspended above the visitors, formed a speculative biosphere governed not by sight, but by environmental chemistry.
The artist's speculative approach imagines a planetary and posthuman politics of scent, where olfactory atmospheres build stories, anticipate futures, and rewrite memories. In this way, the museum transforms into a space of atmospheric inscription, rather than visual inscription. It suggests that, in a world increasingly dominated by surveillance technologies, the power of olfactory information may one day surpass that of visual or even biometric data.

While traditional biopolitical structures have primarily focused on visual and spatial control, recent technological and scientific developments require an expansion of the concept to include smell a potent unconscious medium of influence, memory, and emotion. It's not merely about mnemonic or emotional influence, but a realm where odors and their recognition become true political and technological interfaces—powerful, invisible tools of governance. In this context, the exploration of the posthuman enhancement of the environments we inhabit—on a molecular level in our bodies and bio-chemical level in the atmosphere—intersects with the biopolitics of scent, which involves both bodily and environmental odors. Today, machine learning applied to odors opens new perspectives in biometric control of individuals. Although high-tech olfactory recognition is still in its early stages, there are fears it may become a complement to facial recognition and fingerprinting, becoming part of an increasingly sophisticated and invasive biometric landscape.

If, in the dawn of civilizations, the sense of smell was regarded as divine, today's techno-capitalist progress indeed seems to aspire to transcend human sensory limits, extending our abilities into a sort of Ballardian transcendence toward an immortal capitalization of our data, including the olfactive ones. Could our olfactory signature become a tool in the service of the control and security industries?

1. Olfactory Neuromanipulation: From Fiction to Market

Smell, the most ancient and animalistic of the senses, bypasses the neocortex and travels straight to the limbic system—our emotional and instinctive core—sidestepping cognitive resistance and installing behavioral triggers beneath conscious awareness. This neurological shortcut makes olfaction a uniquely potent tool for unconscious influence, capable of imprinting memory, shaping affect, and triggering behavior without the filter of reason. It renders the body receptive before the mind can object. What once existed as dystopian fantasy in science fiction has now become a psychopolitical strategy in marketing, surveillance, and governance.

In Aldous Huxley's *Brave New World* (1932), the narcotic soma is not merely a pill but a cloud of conformity. It functions as a form of subconscious propaganda deployed by the

World State to preempt rebellion. Designed to pacify and subdue, soma smooths the jagged edges of discontent. It operates not only as a narcotic to manage the masses but also as a personal refuge from emotional conflict, guaranteeing both social order and individual happiness. Projected as a technological substitute for spiritual consolation, soma is described as "Christianity without tears." Free will is not abolished—it is merely circumvented.

A comparable mechanism appears in *The Futurological Congress* (1971) by Polish science fiction writer Stanisław Lem. In his narrative, invisible airborne substances known as mascons chemically modulate thought and desire, shaping public perception. Lem literalizes the concept of olfactory propaganda: scent becomes a tool of political hallucination. Though his tone is absurdist, today's scent-marketing practices echo his vision, using ambient fragrances to nudge decisions silently.

The smell of fresh bread in supermarkets, leather in luxury car showrooms, and vanilla in retail stores are not aesthetic accidents—they are olfactory scripts embedded into space (Lindstrom, 2005; Krishna, 2012). Calming fragrances dispersed in Tokyo subway stations to ease commuter stress (Yoshida et al., 2008), or lavender and chamomile diffused in prisons and hospitals to reduce aggression and anxiety (Johnson, 2011), constitute a kind of olfactory architecture of sedation. These practices raise a critical question: are such ambient interventions acts of care—or mechanisms of control?

Often classified under the umbrella of olfactory neuromarketing, these techniques exploit scent's subliminal access to memory and emotion. Branding no longer targets just the retina or the ear; to inhale becomes to consent. Through these invisible mechanisms, corporations can "brand the brain," embedding desire at the molecular level (Herz, 2007). If olfactory stimuli can condition, manipulate, or even rewrite our perceptions and decisions, what protections remain for the sovereignty of the self? Scent evolves into a programmable ideology—one that extends far beyond conventional marketing.

This tension between scent and sovereignty is also central to Frank Herbert's *Dune* (1965). Here, the fictional drug melange—known as "the spice"—grants those who inhale or ingest it heightened perception, extended lifespan, and even precognition. Yet it is profoundly addictive, and its control forms the foundation of an interstellar political and economic system. The desert planet Arrakis, sole source of the spice, becomes a battleground for domination. *Dune* envisions a world where a single inhalable substance shapes biology, society, and planetary geopolitics—a metaphor for resource extraction, colonial control, and psychochemical governance. In this context, olfaction becomes not merely a sensory event, but a structural geopolitical force.

2. Scent and Hallucination: Olfactory Virtual Design as Political Aesthetic

Olfactory memory itself is the first virtual reality, the first olfactory hallucination. This neural mirroring between memory and smell gives scent a *false sense of truth*, a perceived authenticity that makes it particularly effective in manipulation.

In an era where the self is continuously shaped by algorithmic suggestion and techno-chemical environmental stimulation, the sense of olfaction emerges as a critical, yet often overlooked, interface of conditioning. What happens when olfaction becomes programmable? When scent itself can be generated, simulated, and targeted as a form of sensory hallucination? Artistic practices that engage and tech the olfactory system are not only speculative—they are insurgent. They expose the precariousness of perception in the age of engineered atmospheres.

In *Hypnocracy* (2025), the author Jianwei Xun describes a form of governance that no longer relies on speech, discourse, or ideology, but on *ambient hypnosis*. The artwork envisions a world in which the body is no longer convinced but conditioned. This notion of "hallucinated governance" finds an eerie echo in Zach Blas's *The Doors*, a multimedia installation that explores the intersections of psychedelia, drug culture, and artificial intelligence. Blas speculates on a future in which AI, as "The Obedient" pills —rather than LSD—becomes the new engine of psychedelic experience. But instead of expanding consciousness in the countercultural sense, AI-generated hallucinations serve a different master: optimization, efficiency, predictive control. The installation asks: what if the future could be inhaled? What if the scent of a mood, a dream, or a belief could be synthetically invoked—on demand, and at scale?

In this speculative techno-sensorium, olfactory illusion is not deception—it is prediction. A future where virtual fragrances act as signals, where algorithmically controlled scent environments anticipate and manipulate emotional states, is no longer confined to science fiction. These are technologies of mood modulation, of subtle steering, of behavioral priming. A similar vision is emerging in the domain of chemical interface design. At the Human Computer Integration Lab at the University of Chicago, Jas Brooks and colleagues have pioneered experimental interfaces that use nasal stimulation to produce virtual smells. Through low-level electrical activation of the trigeminal nerve, they are able to simulate sensations of mint, wasabi, or citrus—without any actual chemicals in the air (Brooks et al., 2021; 2022).

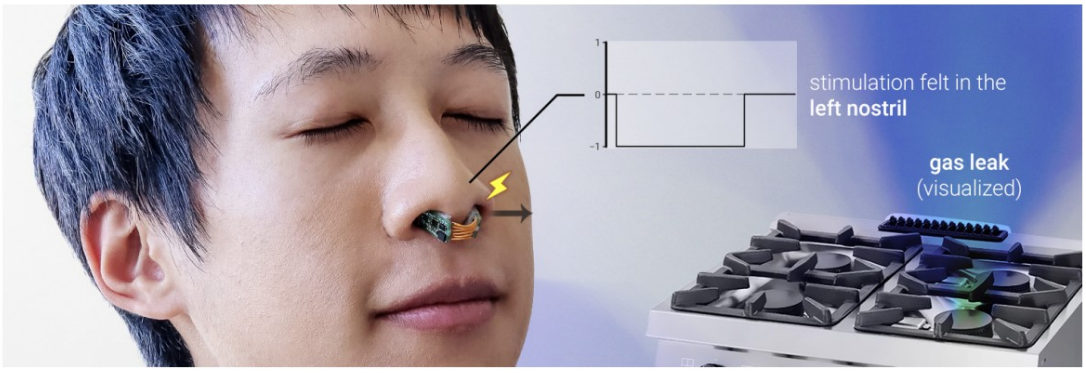


Figure 1.

Jas Brooks and his team at the Department of Computer Science at University of Chicago, Stereo-Smell via Electrical Trigeminal Stimulation.

These devices, situated at the intersection of HCI (Human-Computer Interaction) and chemesthesis, do not simply reproduce smell—they reconfigure it. By stimulating trigeminal and olfactory pathways in concert, they create perceptual illusions of scent, opening up applications that range from immersive gaming and digital dining to therapeutic and dietary interventions. In one study, scent illusions were used to enhance the flavor experience of low-calorie food, effectively reprogramming taste through olfaction (Brooks et al., 2023).

Here comes a new layer of psychopolitical concern. If a computer interface can generate your cravings, alter your emotional state, or calm your anxiety through virtual fragrance, who decides what you smell, how—and when? If the smell of emotion can be commodified, if scent becomes an extension of predictive policing or neurocapitalist branding, then the act of breathing itself becomes politicized. We are not just being watched—we are being scented.

3. Stasi and the Scent of Dissent

The olfactory archive of the Stasi stands as one of the most unsettling examples of scent-based surveillance in history. Between 1950 and 1990, East Germany's secret police systematically collected and cataloged the body odors of dissidents. They obtained these scent samples by stealing worn clothing or covertly placing absorbent cloths on chairs during interrogations. These cloths were then sealed in jars and used with trained dogs to identify individuals, circumventing the need for visual or verbal recognition.

The Stasi's methods prefigured contemporary research into olfactory biometrics, raising significant ethical concerns regarding bodily autonomy and privacy. Unlike fingerprints or retinal scans, body odor is an involuntary emission, making its use as a control mechanism particularly insidious.

In the 1970s, the Stasi employed sophisticated techniques to collect the scents of anyone expressing criticism of the communist regime. At the "Runde Ecke" Memorial Museum in Leipzing and at the Stati Museum in Berlin—visitors can view these olfactory archives alongside surveillance devices, intercepted letters, and clandestine photographs. Jars containing seemingly innocuous yellow cloths are displayed; these fabrics were used to absorb and preserve the body odors of dissidents. Methods for obtaining these scents varied: from breaking into private residences to steal dirty clothes, to placing hidden cloths under interrogation chairs. Even graffiti or pamphlets were "sampled" by leaving a cloth to absorb the suspect's scent

The collected samples were then compared, using trained dogs, to scents left at the scene of subversive activities. If the dog exhibited a conditioned response (such as sitting or lying down), it was considered a match between the "archived" scent and that of the suspect, sufficient to associate them with a concrete identity.



Figure 2.
Body odor collection, Stasi Museum, Berlin Germany

Maki Ueda's *If There Ever Was* (2009) revives and reimagines these disturbing historical practices through the lens of contemporary art. In an act of sensory and political archaeology, Ueda reconstructs the bodily odors of dissidents as a form of olfactory testimony. Her work does not merely represent history—it performs it. By bringing body scent into the gallery space, Ueda evokes a visceral confrontation with the mechanisms of surveillance that turn intimate, bodily emissions into tools of control. In doing so, Ueda's work becomes a critical bridge between past authoritarian methods and future techno-biopolitical realities, where the body's most ephemeral traces may no longer be private.

4. Teaching Machines to Smell: From Dogs to Data. Computerized olfactory systems

Canines possess an extraordinary olfactory system—estimated to be 10,000 to 100,000 times more sensitive than that of humans. While humans have approximately six million olfactory receptors, dogs have around 300 million. Furthermore, olfactory neurons—specialized cells responsible for transmitting odor information to the brain—range from 12 to 40 million in humans, compared to an astonishing 220 million to 2 billion in dogs. It is therefore not difficult to imagine the extraordinary olfactory capabilities of dogs, making them valuable tools for tracking and searching for missing or runaway persons (even distinguishing between

identical twins) or detecting narcotics, poisons, explosives, fire accelerants, and bugs. (Agata Kokocińska-Kusiak, 2021).



Figure 3.
Breath Odor Based Individual Authentication by an artificial olfactory sensor system and machine learning

One of the most promising developments in this field is the emergence of electronic noses—devices designed to detect and identify volatile organic compounds (VOCs) in the air, including those present in human breath. These systems are being developed in leading research centers such as Kyushu University and by private startups like Osmo.

In 2022, a team at Kyushu University introduced an "artificial nose" capable of biometrically identifying individuals based on the unique chemical signature of their breath, with an average accuracy exceeding 97%. This sensor detects VOCs and interprets them through a machine learning model that links molecular patterns to specific individuals, offering potential applications in health diagnostics and what is considered to be security and border control (Jirayupat et al., 2022).

Meanwhile, Osmo, a machine olfaction startup spun out from Google Research, is pushing the boundaries of computational smell using graph neural networks (GNNs). Unlike traditional models that rely on hand-crafted rules, Osmo's GNN-based platform can predict how a molecule smells directly from its molecular structure. Trained on a dataset of over 5,000 known odorants, the model produces descriptors for new molecules with

unprecedented accuracy. A major study published in *Science* in 2023 revealed that Osmo's AI outperformed human testers in 53% of cases, and even exhibited emergent capabilities it wasn't explicitly trained for—such as predicting odor intensity. This suggests that AI could become a powerful tool not just for mimicking smell perception, but for discovering entirely new olfactory compounds.

Osmo's broader ambition is to create a "map of odor": a predictive model capable of describing how a molecule smells—to both humans and insects—based solely on its atomic structure. This would allow for the rational design of scents with specific effects, such as attracting or repelling disease-carrying insects like mosquitoes.

In 2023, Osmo received $3.5 million in funding from the Bill & Melinda Gates Foundation, and secured an additional $60 million Series A investment led by Lux Capital and Google Ventures.

These developments not only demonstrate the potential of AI to decode the complexity of smell, but also hint at a future in which olfaction becomes programmable—opening the door to synthetic sensorial design, therapeutic aroma development, and even new forms of biometric identification. Smell-tracking, in this context, becomes pervasive and invisible surveillance.

5. Neuroscience and Neurorights: Ethical Frontiers

The sense of smell has increasingly become both an object of technological simulation and a target of control. As artificial olfaction advances, scent is no longer confined to aesthetic or emotional domains—it is now leveraged for biometric surveillance, domestic identification (could we imagine a skin-odor recognition at intercoms), security protocols in airports (where electronic "noses" detect traces of explosives), disease diagnosis, pesticide detection in agriculture, and food quality and ingestion control. These applications illustrate how olfaction is becoming an operative tool in the infrastructure of surveillance capitalism. In a context of *infocracy* (Byung-Chul, 2022), where information and control overlap, the use of olfactory technologies for identification or manipulation raises profound ethical questions. While biometric and behavioral data are increasingly protected by privacy laws, neuro-rights—including the right to mental privacy, cognitive liberty, and neural integrity—are still emergent.

In 2019, Columbia University launched the NeuroRights Initiative, a project proposing a new set of fundamental rights to protect individuals from the misuse of neurotechnologies. These rights include:

- Right to mental privacy: preventing unauthorized access to an individual's brain data.
- Right to personal identity: safeguarding the integrity of one's identity against alterations by neural technologies.
- Right to free will: ensuring the ability to make autonomous decisions.
- Right to equitable access to cognitive enhancement: ensuring that the benefits of neurotechnology are distributed fairly.
- Right to protection from algorithmic bias: preventing discrimination caused by distorted algorithms.



Figure 4. Theater of Thought by Werner Herzog , movie, 2022.

This emerging debate around neurorights has recently entered public discourse through the film *Theater of Thought* (2022), directed by Werner Herzog in collaboration with the NeuroRights Foundation. The film brings together leading scientists, ethicists, and philosophers to explore the future of neurotechnology and its implications for human freedom and identity. Among the featured interviewees is Prof. Richard Axel (Department of Neuroscience, Columbia University), a molecular biologist who was awarded the 2004 Nobel Prize in Physiology or Medicine for his pioneering research on decoding the sense of smell. Axel provides a broad and compelling vision of the future of neuroscience, underscoring how sensory perception—including olfaction—will be increasingly subject to technological modulation and political regulation. Scent, invisible and often subliminal, can influence emotions and decisions without the subject being aware, blurring the lines between persuasion and coercion.

6. The Scent of Fear: Identity, Stress, and Surveillance in the Work of Sissel Tolaas

Recent studies have begun to unravel the complex relationship between human scent, genetics, and emotional states—fundamentally challenging the notion of body odor as a fixed and uniquely identifiable trait.

Each individual possesses a "primary odor signature" influenced by genetic factors such as the major histocompatibility complex (MHC). This scent, unaffected by external agents like diet or cosmetics, functions almost like a molecular fingerprint—singular, stable, and potentially as distinctive as DNA. However, this olfactory identity is not entirely immutable. In extreme emotional states—particularly fear—our primary scent can shift. Research reveals that high-stress conditions alter the chemical composition of sweat, especially in individuals

carrying the short allele variant of the serotonin transporter gene (5-HTTLPR), which is associated with anxiety and neuroticism. These changes can be profound enough to mislead sniffer dogs or disrupt biometric systems that rely on scent recognition. Fear, then, operates as a kind of *olfactory hacker*—able to temporarily scramble our molecular self and confound mechanisms of surveillance. (Rendine et al., 2020)

This volatility finds a striking artistic expression in Sissel Tolaas's project *The Smell of Fear* (2005), where she chemically reconstructed and diffused sweat samples collected from men during moments of acute fear. Her scent-based installation transformed invisible emotional data into immersive atmospheres, turning the gallery into a space where trauma became breathable.

Tolaas began the project by equipping twenty men with customized devices designed to collect sweat samples whenever they experienced a fear response. These portable units were placed under the armpit during episodes of anxiety or panic, capturing the scent molecules of real-time emotional distress. The samples were then sent to Tolaas's Re_searchLab in Berlin, where she used nanotechnology to chemically reconstruct the smell of fear. Through a process of micro-encapsulation, the recreated molecules were embedded in neutral binders and applied directly onto gallery walls in scent-activated zones.

These walls, seemingly blank and innocuous, became interactive scent surfaces: only when touched would they release the reconstructed smell of fear. The result was a space charged with affective residue, where visitors unwittingly inhaled the emotional byproducts of someone else's trauma. As Tolaas describes it, the air itself became a medium of social transmission—fear was no longer an internal sensation, but an atmosphere, a collective and inhalable phenomenon.

Through this work, Tolaas exposes the sensory politics of contemporary life, asking: How are we governed through what we emit? And how do institutions—whether legal, technological, or artistic—make use of what we cannot see but always carry? What rights do we have over our molecular presence and who owns it?

7. The Scented Self: The Politics of Smell in the Age of Surveillance

In the landscape of contemporary art, the world-renowned Brazilian artist Eduardo Kac stands not only as a pioneer of bioart and transgenic experimentation but as a cartographer of new sensorial terrains. His work dances at the edges of body, language, and technology, challenging the rigid binaries of natural and artificial, visible and invisible, human and machine. With his 2014 project *Osmoboxes*, turns away from the dominion of sight and offers something radical: art that breathes and beholder that sniff. These interactive sculptures, each embedded with proximity sensors, do not project an image but exhale a scent when a body comes closed. Approach one, and it responds—not with light or sound, but with a fragrance carefully chosen to stir memory, desire, or disorientation. Here, the viewer becomes the smeller—a term Kac himself coins to mark a shift in perception: immersive, uncontrollable, profoundly intimate. Yet Osmoboxes it is a subtle, unsettling critique of how even smell—our most elusive sense—is increasingly subject to systems of control. In military labs and airport

checkpoints, technologies already sniff out identities. The air we exhale becomes a password. Our scent, a profile.
Within this climate, Kac's machines behave like speculative devices of sensory surveillance. They mimic the logic of biometric reactivity—not to identify, but to unsettle. Instead of cataloguing the body, they confuse it, disrupt it, reconnecting smell to a poetic dimension beyond algorithmic grasp. They generate poetry, not prediction.

From this fragrant space of resistance, we travel to the speculative terrains of Where Dogs Run, a Russian art collective weaving complex ecosystems where humans, machines, and microbes co-evolve. Their installation *Faces of Smell* (2012) translates scent into image. When a person steps near, sensors capture their unique olfactory print, converting volatile molecules into abstract facial portraits—flickering, ever-shifting, like memories you can't quite place.



Figure 5.
Eduardo Kac, Osmoboxes, 2014. Wood, electronics, artist-created scent, 21" x 14.17" x 5.11" (53.5cm x 36cm x 13cm) each.

This bizarre, brilliant work interrogates a future where even our most ephemeral emissions might be mapped and stored. It toys with the idea of scent as surveillance—your smell as signature, your presence as data. Can we trust a world where even our chemical trace becomes a biometric key?

Yet, beneath the playfulness lies a serious question: how far will we go in rendering the body readable, knowable, ownable? In translating our innermost materialities—like scent—into currency for control?

Another step into their world, and we find ourselves amid *Kerosine Chronicles. Fungus* (2021), where four semi-autonomous robots navigate a shared environment, each powered by fuel tanks infected with a peculiar fungus: Amorphotheca resinae. This extremophile consumes kerosene, altering its chemical—and olfactory—composition. The robots respond not through code or command, but through atmospheric chemistry, sniffing out gradients of altered fumes. Their behavior—seeking, sharing, fleeing—is guided not by algorithms but by biochemistry. The olfactory becomes a language, a mode of machine communication rooted in volatility and decay. It is a world where smell mediates not just life, but cooperation, ethics, relation. Yet, even in this speculative ecology, the human nose retains its ambiguity, its memory, its refusal to be reduced.

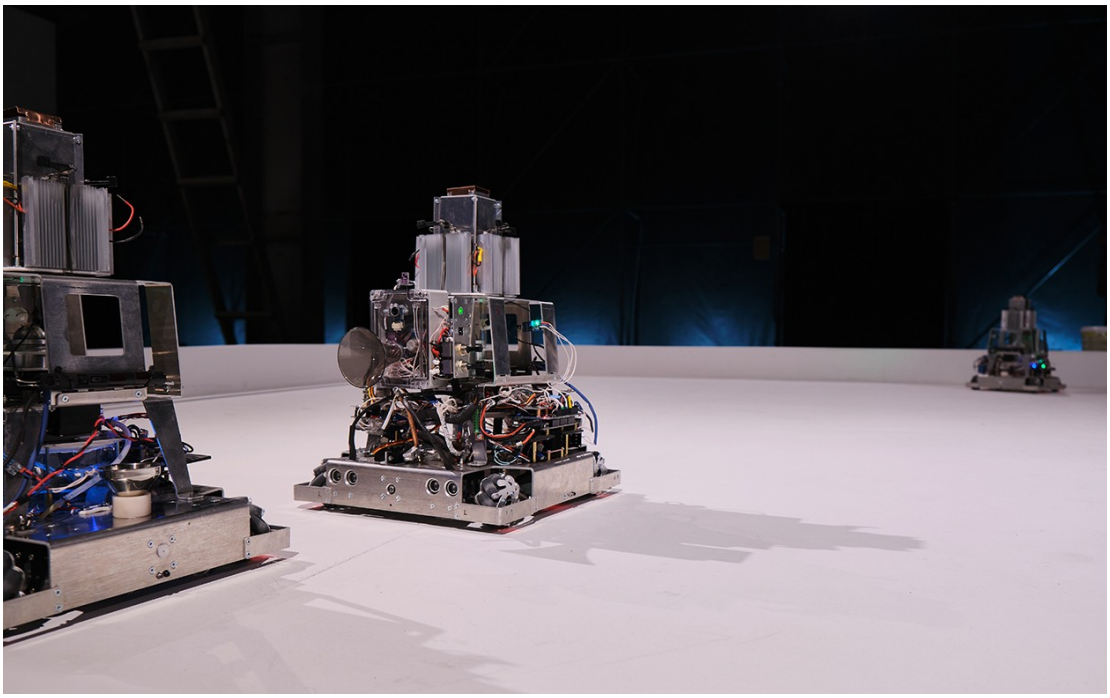


Figure 6.
Where Dogs Run, Kerosine chronicles. Fungus, 2021. Generative installation.
4 robots, metal, plastic, synthetic resin, electronic components, electronic mechanical components, computer, glass, gas analyzers, sensors, engines, kerosene burners, kerosene, Amorphotheca resinae, thermogenerators.

Where data seeks order, smell introduces noise. It contaminates. It connects. And perhaps, Where Dogs Run suggests, this very messiness makes olfaction a final frontier of resistance in the algorithmic age.

In this sensorial dialogue between organism and machine, Polish artist Martynka Wawrzyniak places her body at the center with *Smell Me* (2012). Created in collaboration with

biochemists, the work captures her own bodily emissions—sweat, tears, hair—and distills them into a custom fragrance diffused in a sealed sensory chamber.
This is no metaphor. It is her, molecularly. A portrait not drawn or photographed, but smelled. Smell Me pushes back against a culture that sanitizes and erases the organic, the excessive, the leaky. It's an act of radical exposure—one that cannot be scrubbed clean or filtered through a lens. Unlike systems that reduce scent to forensic code, Wawrzyniak's odor refuses to behave. It lingers. It unsettles. It insists on being felt rather than measured.

Like Kac's Osmoboxes, *Smell Me* repositions the olfactory as a space of subjectivity, as a threshold beyond which the digital cannot fully pass. It suggests that perhaps, in this age of surveillance, to smell is to resist. To emit, to take up space with the volatile trace of our being, is an act of political intimacy.
These works—Kac's poetic machines, Where Dogs Run's robotic symbioses, Wawrzyniak's olfactory self-portrait—each bend our understanding of art, body, and power. They expose the quiet violences of biometric desire: the urge to render everything measurable, identifiable, ownable. But they also offer sensorial sanctuaries, spaces where the invisible—what we breathe, what we carry in our skin—might still escape.
In the end, what they give us is not just critique, but breath. A space to inhale. To remember. To imagine futures where our most intimate selves—our scent, our sweat, our fungal kinships—cannot be coded, only felt.

Conclusion: Smell as Soft Biopower

Situated between toxic compounds and biometric technologies, the manipulation of scent opens urgent debates at the crossroads of biopolitics, environmental justice, and data governance. Odor has become a new vector of control—intangible yet deeply personal—through which bodies and behaviors are subtly regulated. From emotional engineering in advertising to the atmospheric management of public spaces, smell is increasingly woven into strategies of normalization and influence.
As artificial olfactory systems advance, they compel a reassessment of ethical and legal paradigms. Like facial recognition or brain scans, scent-tracking technologies raise profound concerns around consent, privacy ambiguity and data security. While olfactory surveillance technologies are advancing, the legal frameworks governing their use are still catching up. Entities involved in the collection or processing of scent-based data should stay informed about evolving laws and ensure compliance with existing biometric data regulations. Defending our sensory autonomy—especially amid ambient surveillance—means confronting the atmospheric and political toxicity of our present, and challenging the often-invisible systems that shape our environments, identities, and freedoms.

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