E.N.G.R.A.M

(Environment for Nonlinear Gestural Response and Active Memory)

This proposal presents E.N.G.R.A.M. – *Environment for Nonlinear Gestural Response and Active Memory,* a new immersive device. The Project will transforms the X-Reality-Lab into a perceptual system where memory is spatially encoded, eroded, and experienced through embodied disappearance.

1. Introduction

E.N.G.R.A.M. is the immersive evolution of *Sistema de Tótems*, a modular interactive installation system designed and developed by Samuel Escudero as part of his Master's thesis in Arts and Cultural Management. The original project explored the notion of critical listening, memory, and presence through the construction of artistic "tótems"—sensorial and technological devices designed to evoke the disappearance of cultural and sonic memory in specific territories.

Each tótem functioned as a micro-archive of what has vanished or is in danger of vanishing: sounds, rituals, landscapes, species, languages. The audience did not activate content, but rather witnessed its progressive erosion as a metaphor of ecological and cultural loss. The system was designed to include analog and digital modules, with future versions integrating multisensory elements (light, smell, vibration) and potentially existing in a fully virtual/digital environment.

With E.N.G.R.A.M. this line of work enters a new stage: the immersive space itself becomes the tótem. Rather than building an object within the space, the space becomes the object. The walls, floor, and sound system of the X-Reality-Lab constitute a distributed architecture of presence and disappearance. Here, the audience inhabits the tótem from within. They are not observers but inhabitants of a sensitive environment that reacts to them not with rewards or content, but with subtle withdrawal and silence.

This inversion of interactivity challenges contemporary norms of immersive experiences, often driven by stimulation and sensory overload. Instead, it offers a counter-gesture: the more you approach, the more the system disappears. Memory does not expand; it contracts. Meaning does not emerge through action but through attenuation.

The audience moves freely through the space. As they get close to a wall, the audiovisual content on that surface fades, dissolves, or deconstructs. These fading zones shift over time, meaning that the space continually rewrites itself in response to collective presence. The environment becomes a ritual of disappearance—an embodied cartography of loss.

From a dramaturgical point of view, the piece establishes a non-linear narrative: the visitor's experience is built spatially and intuitively. There is no beginning or end, no front or back. The space is always in flux. The tótem, in this immersive version, becomes not a monument but a living system of thresholds.

This evolution from *Sistema de Tótems* to *E.N.G.R.A.M.* is not merely a change in format but a conceptual expansion. It leverages the architectural affordances of the X-Reality-Lab to implement ideas that were already embedded in the earlier project: modularity, multisensory interaction, spatial dramaturgy, real-time response, and the symbolic inversion of activation/disappearance.

This proposal, therefore, is not a speculative draft but the natural second phase of an existing and validated project, now adapted to a new technological and spatial context. It carries with it the conceptual solidity and narrative coherence of the original research, while opening new pathways through the immersive and multi-user capabilities offered by the X-Reality-Lab.

2. Art and aesthetics

The aesthetic universe of *E.N.G.R.A.M.* emerges from a deliberate tension between invisibility and presence, between the spiritual heritage of ritual spaces and the abstract formalism of contemporary digital environments. The project avoids exoticism or literal references to ancestral cultures; instead, it operates through a minimalist abstraction of memory—a memory that is fragmentary, procedural, and reactive.

2.1. Languages.

Visual Language

The visual content of the piece is governed by a core principle: it must respond to the logic of what has disappeared. This logic does not require a specific iconography. Rather, it opens up a dual aesthetic possibility. On the one hand, the projections may consist of abstract generative systems — waveforms, data streams, particle flows, topological geometries — that remain open to interpretation. On the other hand, the system allows for the insertion of concrete elements that evoke specific cultural memories, such as ornamental traces, encoded gestures, or symbolic ruins. This dual strategy allows the work to adapt its critical focus: if a particular context demands it, E.N.G.R.A.M. can visually align itself with the representation of endangered intangible heritage or environmental trauma. But in its default mode, it leans toward open abstraction, offering a deeper and more introspective kind of critique.

The inspiration for the abstract mode comes from data visualization, glitch aesthetics, and procedural image generation. The visual system reacts to user proximity: textures fade, particles dissolve, and visual density decreases, enacting the concept of erasure

through interaction. When more figurative content is used, these same mechanics apply: the closer we get to something meaningful, the faster it vanishes.

Sonic Architecture

The sound environment mirrors this visual logic. It can include either non-referential textures — synthetic drones, algorithmic murmurs, ambient grains — or culturally coded sonic fragments, such as voice samples, field recordings, or archival ghosts. These elements are treated equally by the system: they disappear, distort, or retreat in response to proximity. Thus, the aesthetic design does not impose a fixed interpretation. It builds a framework where presence triggers disappearance, and where meaning is suspended between memory and its erasure. The more explicit the referent, the more immediate the loss. The more abstract the signal, the more open the reflection.

Light and Atmosphere

The projections themselves are the only source of light in the space. The environment is intentionally low-lit, with the goal of creating a meditative and introspective ambience. Visual elements are not attention-demanding but immersive and peripheral. Visitors are enveloped in an environment that is perceptually ambiguous: there is no clear center, no frontal orientation, no hierarchy. The use of dust-like particles, slow flickers, and sonic fog contributes to a diffuse sensory field where the body becomes the interface. Movement through this field is not incentivized but felt. The piece does not guide the audience — it responds to them, quietly and conditionally.

Human Interaction

E.N.G.R.A.M. choreographs behavior through negation. As users move and realize that their presence causes the audiovisual field to dissolve, they begin to slow down, to hesitate, to become aware of their own impact. The system thus stages a performative paradox: to perceive more, one must act less. To preserve, one must not touch. This aesthetic logic — both visual and sonic — enacts the central poetics of the piece: we are surrounded by things that disappear precisely because we approach them. The audience moves freely. There is no stage, no object, no instruction. The interaction model is invisible yet legible: people gradually notice that the space responds inversely to their presence. This realization is experiential, not didactic. Over time, the audience slows down, fragments, disperses. The installation, thus, choreographs behavior without controlling it.

This movement strategy mirrors the dramaturgy of memory: the more we seek, the more it eludes us. The space is not pedagogical—it is ritualistic, procedural, and affective.

2.2. Conceptual and Artistic References.

The title E.N.G.R.A.M., referencing both a neurobiological trace of memory and a custom acronym (Environment for Nonlinear Gestural Response and Active Memory), encapsulates the dual nature of the work: scientific and poetic, procedural and ritual.

E.N.G.R.A.M. is grounded in a rich theoretical and artistic lineage that informs its conceptual foundations, experiential logic, and structural design. The project is not conceived as an isolated gesture, but as the evolution of an in-depth investigation initiated with *Sistema de Tótems*, a transdisciplinary research and artistic creation developed within the framework of a Master's thesis in Cultural Management and Digital Arts.

This foundational project addressed the symbolic, technological, and ecological dimensions of disappearance, proposing a critical reflection on how sonic and cultural memories are archived, erased, or ritualized through spatial devices. That inquiry now expands into a fully immersive, XR-based spatial ecology. Below is a condensed overview of the conceptual lines and artistic references that support this work.

2.2.1. Disappearance as Medium

One of the central ideas of *Sistema de Tótems* is that disappearance is not merely a theme, but a medium—a structural logic through which the work operates. Instead of presenting content for the audience to explore or consume, the system reveals its memory only to let it vanish. This approach inverts the paradigm of interactivity as additive stimulation and instead proposes a subtractive dramaturgy. Philosophically, this draws on the concept of "presencing" (Ingold, 2000) and the aesthetics of withdrawal (Gumbrecht, 2004), where meaning emerges not from exposure but from elusiveness. The immersive version of the project intensifies this logic: the room itself becomes the medium of erasure, and the audience inhabits its unfolding.

2.2.2. Totemic Space and Digital Animism

The totem is reimagined here not as a figurative artifact but as a distributed, procedural architecture. In *Sistema de Tótems*, this was manifested in modular objects containing environmental data, sensors, and sonic archives. In the current iteration, the totemic logic is reconfigured: the space becomes the totem—a perceptive environment that reacts to presence with affective and symbolic responses.

This conception is aligned with notions of digital animism (Parikka, 2010; Hertz, 2015), where technological systems are treated as entities capable of autonomous or emergent behavior. The projection surfaces and sound fields are not just tools—they are ritual agents, responsive surfaces that collapse the boundary between code and affect.

2.2.3. Critical Listening and Sound as Disappearance

At the core of the project lies a theory of critical listening (Voegelin, 2010), understood as an active, embodied, and ethical form of attention. In *Sistema de Tótems*, sound was both the object and the agent of memory: each module stored the sonic remnants of vanishing ecologies, languages, or gestures. The immersive version radicalizes this idea by linking spatial audio with presence-based mutability. Visitors entering a sonic zone deactivate it. The disappearance is not symbolic—it is sonic, literal, and perceptible. Thus, listening becomes a mode of loss, a performative act of destabilization.

2.2.4. Ritual Interfaces and Procedural Dramaturgy

The project explores how technological systems can become ritual interfaces—non-instructive, symbolic systems that generate transformative experiences through repetition, ambiguity, and presence. Rather than gamifying interaction, the system invites slowness, observation, and restraint. The goal is not expression, but reception. Not feedback, but entropy.

This draws on dramaturgical strategies from expanded scenography, performance-installation, and experimental theatre, particularly in the works of La Monte Young (sound as temporal architecture), Janet Cardiff (soundwalks), and Anne Teresa De Keersmaeker (movement as compositional field). The immersive space becomes a spatial ritual engine, continuously writing and erasing its own logic in response to the audience's trajectory.

2.3. Artistic and Formal Influences

Artistically, the work resonates with and reconfigures the approaches of:

- Ryoji Ikeda: for his systemic minimalism, architectural sound design, and use of data as material.
- Refik Anadol: for his explorations of memory and machine learning, though *Tótem* resists spectacularization and remains intentionally opaque.
- Semiconductor: for their visualization of invisible geophysical forces.
- Tania Candiani and Camille Norment: for their work on sound as cultural memory and poetic dissonance.
- James Turrell and Olafur Eliasson: for their treatment of perception and immersive light environments as sensory thresholds.

These references do not operate as stylistic models, but as critical scaffolding for a practice situated at the intersection of immersive media, sonic art, ritual design, and cultural critique.

2.4. Toward a Poetics of Withdrawal

Ultimately, the aesthetic, technical, and conceptual elements of *E.N.G.R.A.M.* converge into a poetics of withdrawal. In an age defined by overexposure and data saturation, this work offers a counter-gesture: a space where meaning is withdrawn in the act of attention, where memory is performed through absence, and where technology enables a choreography of loss rather than accumulation.

This phase of the project does not abandon the original *Sistema de Tótems*—it internalizes and expands it, proposing that the very room we inhabit can behave like a memory organism, constantly reacting, remembering, and forgetting us in return.

3. Technical Description

E.N.G.R.A.M. is conceived from the outset as a project specifically designed to exploit and explore the unique infrastructure of the X-Reality-Lab. Rather than adapting an existing piece, this proposal is architected around the technical components, affordances, and limitations of the Lab itself—understood not as a tool but as an active co-author of the experience.

The implementation of the piece requires coordinated development in real-time 3D rendering (TouchDesigner and Unreal Engine), spatialized sound design, motion tracking integration, and OSC-based audiovisual synchronization, all within the open-source framework mozXR.

3.1 Rendering and Projection System (mozXR + nDisplay)

- The installation will use TouchDesigner and / or Unreal Engine 5.5.x as its core development environment, employing the mozXR Open Source Framework for multi-projection XR development.
- Using nDisplay, the system will be rendered across the full projection setup: five walls + floor, in synchronized stereoscopic 3D.
- Multiple nDisplay config files will be prepared for different stages (simulation, preview, final installation).
- The visuals will consist of real-time generative content, created through Niagara systems, material shaders, and blueprint-controlled events.

- The visual architecture will be modular: each wall and the floor will host distinct but synchronized systems, capable of reacting independently to presence.

Innovative Use of Infrastructure:

- Each projection surface will behave like a separate organ in a larger living entity.
- The logic of disappearance will be mapped per surface, with visual states tied to presence, distance, and group dynamics.

3.2 Tracking Systems (Pharus + OptiTrack)

Pharus (LiDAR-based 2D floor tracking):

- Six floor-mounted LiDAR sensors will track real-time X/Y positions of visitors.
- This data will be used to determine proximity to each wall zone.
- A custom middleware will convert this tracking data to OSC messages routed to:
    - 3D Engine (to deactivate/dissolve projections)
    - Sound Matrix (to spatially modulate sound or trigger attenuation)
- Pharus will be used as the main interaction driver—a continuous presence-based modulation system.

OptiTrack (3D optical tracking with markers):

- 12 ceiling-mounted Primex 120W cameras allow for full-body tracking.
- OptiTrack will be used in a secondary layer of interaction, specifically for:
    - Gesture recognition (stillness, raised arms, specific pathing)
    - Event triggers (e.g., if a user stands still for 20 seconds, the space temporarily reactivates)
- This 3D layer adds a poetic "ritual" capacity: the user's gesture and slowness can override the disappearance logic in exceptional cases.

3.3 Audio System and OSC Integration

- The sound architecture is built in a distributed model:
    - All spatial information is processed in 3d Engine (TouchDesigner and /or Unreal Engine).

    - Sound is rendered via OSC messages sent to an external DAW, most likely Ableton Live or a generative audio system built in TD, depending on resource availability.
- The DAW will host a matrix of pre-designed sound layers (drones, textures, voices, impulses).
- OSC will control:
    - Volume and mute states (per zone)
    - Spatial panning and routing to the 60+ loudspeakers
    - Real-time modulation of effects (granular delay, reverb, spectral filtering)
- This system allows for a fluid sonic organism, responsive to proximity but also capable of collective modulation.
- Each visitor can "mute" a sonic area by entering it; but if multiple people interact at once, the system can respond in a meta-layer—by changing global tonal color or introducing a new harmonic.

3.4 System Synchronization and Simulation

- Development will begin using local simulation via nDisplay preview, allowing most of the audiovisual logic to be prototyped remotely before entering the Lab.
- Unreal's Switchboard and OSC Monitor will be used to simulate live data flow from tracking to sound systems.
- The artist will use a remote development pipeline, testing in iterative loops with collaborators before the on-site residency.
- The flexible template structure of mozXR allows for modular testing of each interaction layer, minimizing integration risk.

3.5 Content Modularity and Resilience

- All audiovisual systems will be built as modular, decoupled components.
- If a tracking system becomes temporarily unavailable (e.g., OptiTrack offline), Pharus alone can support the essential interaction logic.
- Visual patches will be versioned in layers:
    - Baseline visuals (idle state)
    - Active dissolution patches (based on Pharus)
    - Rare event transitions (based on OptiTrack gesture triggers)
- The sound system is similarly resilient: fallback spatial mixes will be available in case of data dropouts.

3.6 Technological Conceptuality

The technical decisions are not just functional—they are **aesthetic and symbolic**. The choice to use OSC rather than MIDI or direct audio triggering reflects a desire for fluid, inter-networked behavior. The multi-source tracking is not for precision gamification but for ambiguity and nuance. The rendering pipeline is not fixed, but reactive.

This piece is a **system of interdependencies**: visual erosion, sonic disappearance, and bodily presence are all synchronized in a fragile choreography. The technology is not hidden, but neither is it spectacularized. It exists as a transparent protocol of interaction—one that enables the ritual logic of *The Remembering Space* to unfold.

Annex 3. Sketches & Visual Moodboard.

https://youtu.be/sKSel_9bJr4