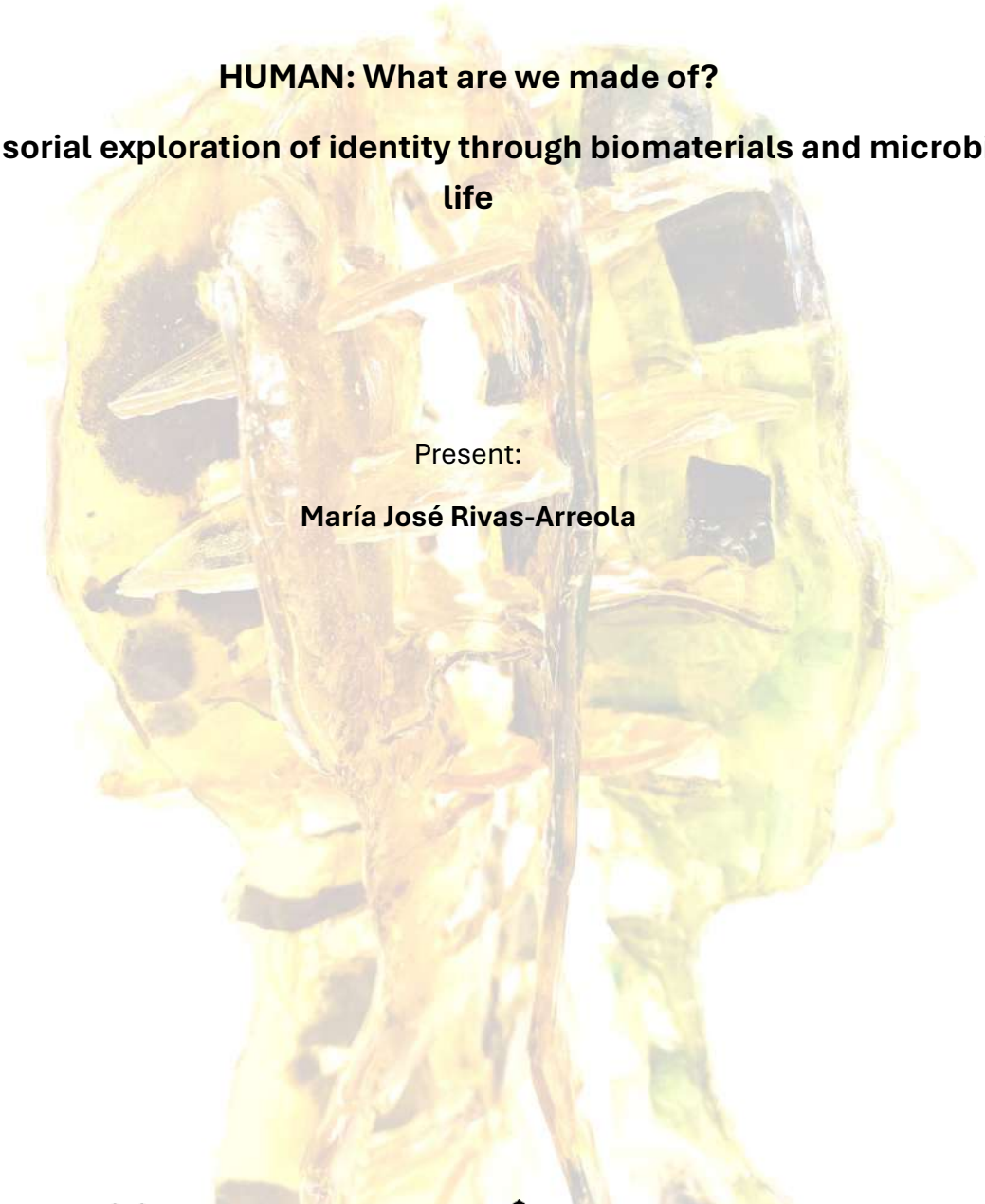
HUMAN: What are we made of?

A sensorial exploration of identity through biomaterials and microbial life



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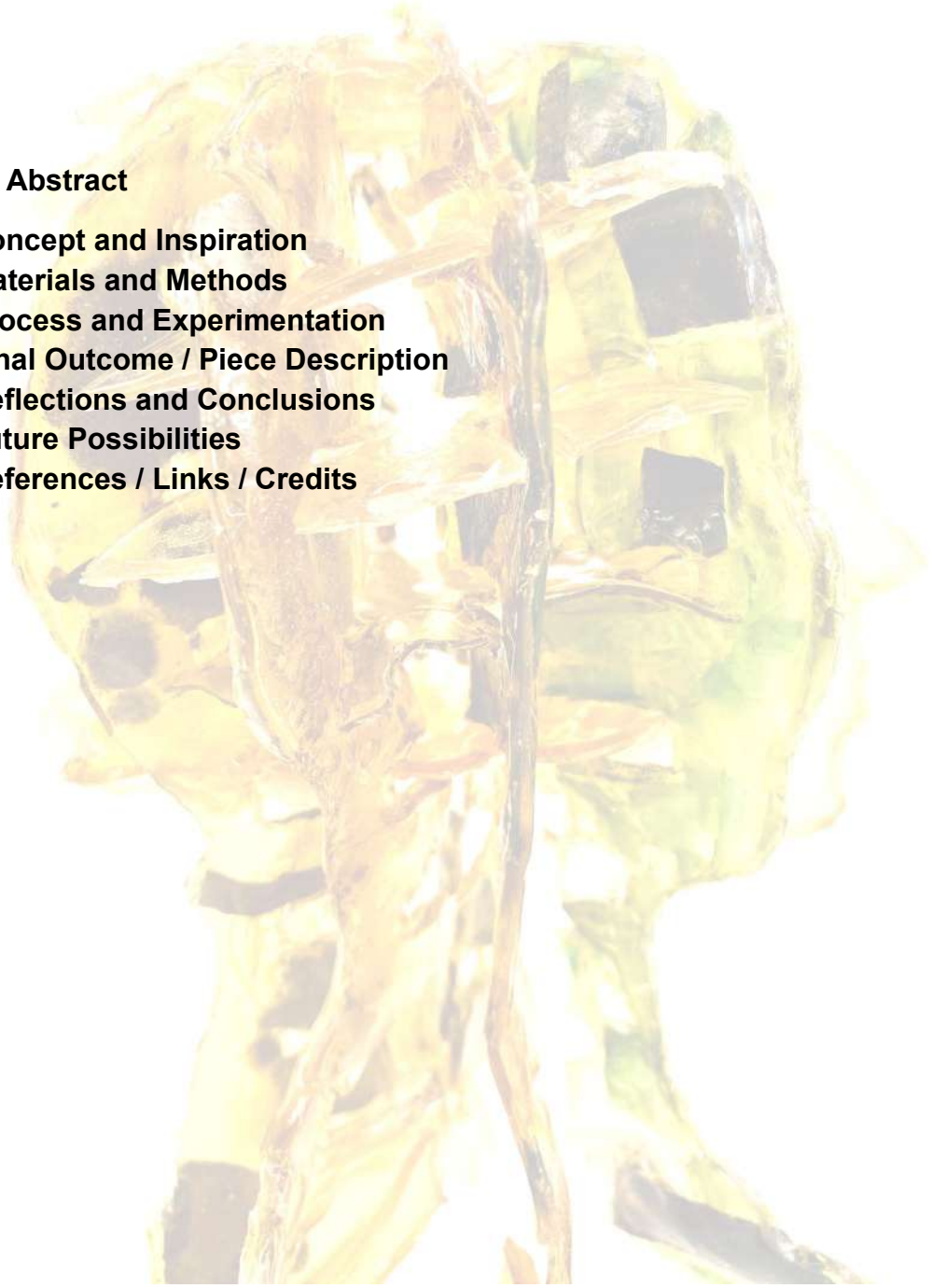
Content



Human: what are we made of?
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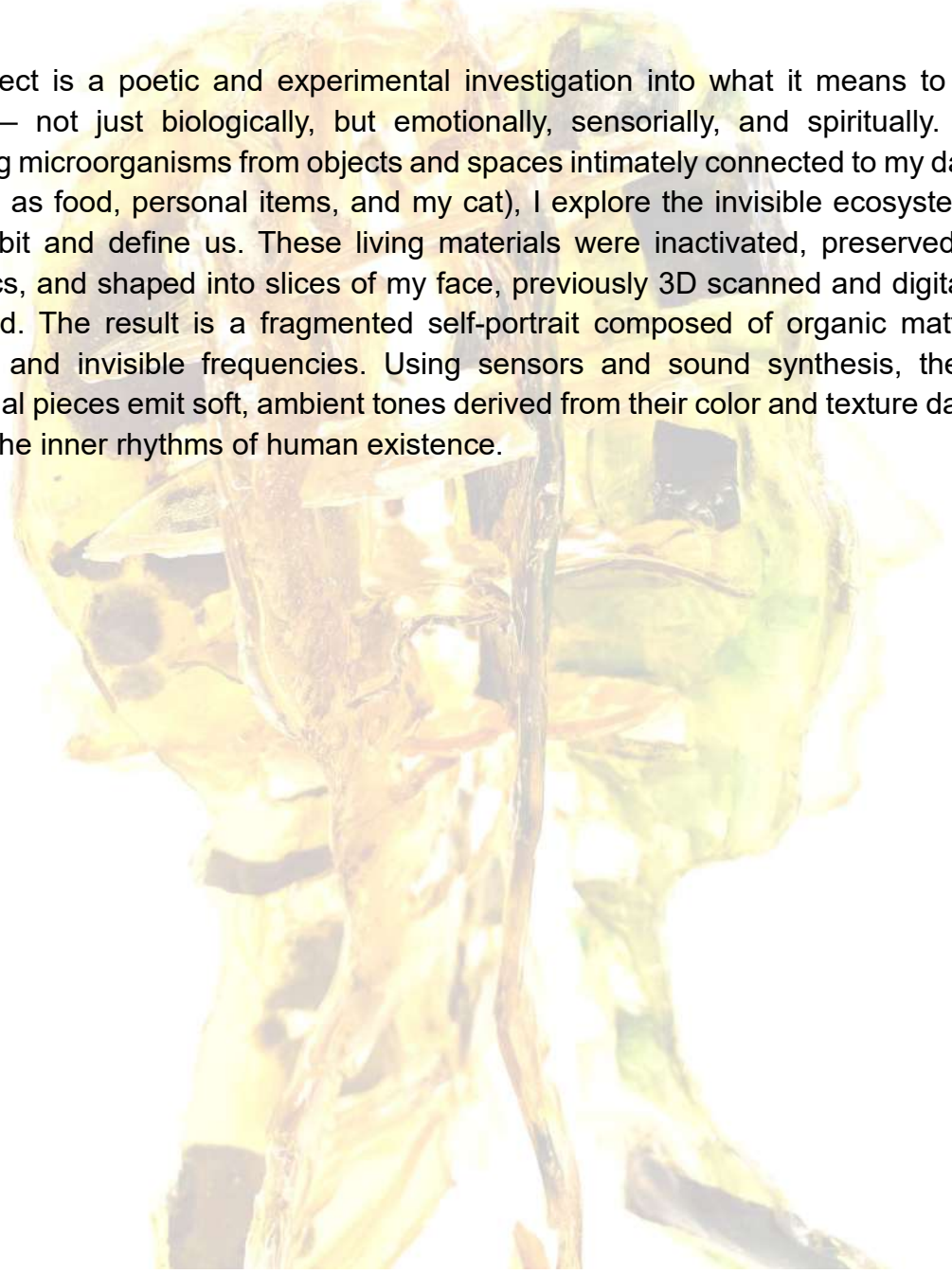
Abstract

This project is a poetic and experimental investigation into what it means to be human — not just biologically, but emotionally, sensorially, and spiritually. By cultivating microorganisms from objects and spaces intimately connected to my daily life (such as food, personal items, and my cat), I explore the invisible ecosystems that inhabit and define us. These living materials were inactivated, preserved in bioplastics, and shaped into slices of my face, previously 3D scanned and digitally processed. The result is a fragmented self-portrait composed of organic matter, textures, and invisible frequencies. Using sensors and sound synthesis, these biomaterial pieces emit soft, ambient tones derived from their color and texture data, evoking the inner rhythms of human existence.



1. Concept and Inspiration

The concept for *Human: what are we made of?* arose from a desire to explore the human condition beyond anatomy or genetics — to investigate the intersections between biology, identity, and emotion through sensory experience and living materials.

This project is deeply inspired by the idea that we are not isolated beings, but dynamic ecosystems. Works such as Mellissa Fisher's "Microbial Me" and Ed Yong's books "I Contain Multitudes" and "An Immense World" offered a profound lens through which to view the invisible companions we carry — microbes that shape our behavior, health, and evolution. These insights pushed me to consider how we are physically and symbolically entangled with other forms of life.

Philosophical and historical works like "Sapiens: A Brief History of Humankind" (Yuval Noah Harari), "The Gene: An Intimate History" (Siddhartha Mukherjee), and "Brave New World" (Aldous Huxley) challenged me to reflect on how narratives of progress, control, and the body are constructed in science and society. Meanwhile, "A New Earth" (Eckhart Tolle) helped ground this inquiry in a spiritual and emotional dimension, reminding me that identity is not fixed — it is fluid, collective, and ever-transforming.

In this piece, I use bacteria cultivated from everyday objects and spaces — my cat's fur, a ballet studio floor, my cellphone, and food scraps — as living mirrors of my daily existence. These colonies were inactivated, preserved in bioresin, and arranged as fragmented slices of my face, digitally scanned and sliced, forming a non-verbal, textural self-portrait.

Through this process, I ask: *Where does the self begin and end? Can matter speak of memory, sensation, and love?* Passion — as a vital, emotional force — became the thread tying each choice together, from material to sound.

2. Materials and Methods

- **Materials and equipment**

  MDF plates, laser cutter, 3D printer, fabric sublimator, plotter, gelatin, glycerin, LB culture medium, agar, petri dishes, stirring and heating grills, beakers (1L), magnetic stirrers, incubators, flammable fluid hood, microscope, ethanol,

- **Development**

1. **Biomaterial Cultivation**

   I prepared agar and nutrient-rich media to cultivate microorganisms from personal samples. Once grown, the colonies were inactivated, dried, and encapsulated in bioresin to preserve their organic textures.

2. **3D Scan & Processing**

   I used a 3D scan of my face, sliced digitally using the software *Slice*, to generate cross-sectional silhouettes which would act as molds or templates for the bioresin pieces.

3. **Sound Translation**

   Images of the microorganisms were analyzed using a mobile app to extract frequency patterns from their color and shape. These were then transformed into soft tones using a synthesizer, creating a meditative soundscape.

4. **Interactive Sensor Design**

   With an Adafruit Circuit Playground, I measured light and temperature changes in the biomaterial surfaces and programmed them to trigger ambient sounds (Tibetan bowls and piano tones), making the installation responsive to the environment.

3. Process and experimentation

The project unfolded through a process that blended digital design, microbiology, biomaterials, participatory research, and sound experimentation. I began by scanning my face using a 3D scanner *Polyacm app* and slicing the model into layers with the *Slice* program. These slices served as templates to build physical pieces using a range of biomaterials, each carrying symbolic meaning and material sensitivity.

To bring the concept of the microbial self to life, I cultivated microorganisms from personal environments — including my cat's fur, the floor of a ballet studio, my running shoes, and food remains. These were grown on culture media and agar plates, then inactivated, dried, and embedded in bioresin to preserve their textures and colors. Each preserved piece became part of a mosaic — a physical reconstruction of my face built from living memories.

In parallel, I explored how material qualities could be translated into sound. I used a color and texture analysis application to extract frequency data from the microbial images. This data was then mapped into soft soundscapes using a synthesizer, translating visual diversity into gentle, layered tones. Later, I integrated an *Adafruit Circuit Playground* to measure the frequency of the biomaterials in real-time and convert them into sounds inspired by Tibetan bowls and piano notes.

Another meaningful layer of the project was a participatory experiment using *Mentimeter*, where I asked people from different parts of the world a simple but profound question: **"What does being human mean to you?"** The responses, collected as a growing word cloud, reflected a beautiful diversity of thought — from love, curiosity, and vulnerability to memory, movement, and connection. These collective answers not only inspired me, but also became part of the emotional foundation of the work, reminding me that humanity is not only in our cells, but in the stories we share.

I also experimented with wearables in an earlier phase, creating simple LED circuits sewn into a ballet doll's dress. The lights activated through touch-sensitive conductive thread, illustrating the poetic potential of soft circuitry and its emotional resonance in textile design.

This iterative process of scanning, growing, listening, and asking helped me construct a multidimensional portrait — not only of myself, but of how I relate to my environment, to others, and to the organisms that silently accompany me. Every material choice, every word, and every sound was a way of asking: *What are we made of, and how can we feel it?*

4. Final Outcome / Piece Description

"*Human: What Are We Made Of?*" is a multi-sensory, modular self-portrait that invites viewers to reflect on the complex, layered, and interconnected nature of humanity. The final piece is composed of biomaterial fragments shaped from 3D scans of my face. Each slice represents different elements of what makes us human — biologically, emotionally, socially, and spiritually.

The layers include:

- Biomaterials infused with food waste pigments, offering a commentary on sustainability and circularity.
- Encapsulated microorganisms that represent the invisible yet essential presence of other life forms that live within and around us.
- Interactive sounds generated from microbial textures and biosensor readings, translating invisible biological data into audible experience.
- Digital scans and analog crafts interwoven into the same piece, reflecting the dialogue between tradition and technology.
- Fragments of textile and wearable elements, including conductive threads and LED responses, suggesting the sensitivity of the human condition and the energy exchange between self and environment.

The installation can be touched, heard, and visually explored — encouraging a deeper awareness of our fragile yet powerful composition. It does not aim to define what it means to be human, but to ask the question from multiple dimensions: physical, emotional, microbial, digital, and spiritual.

Ultimately, *"Human: What Are We Made Of?"* is a poetic inquiry into connection: between cells and soil, between emotion and energy, between the self and the unseen networks that support our existence.

5. Reflections and Future Development

Working on *“Human: What Are We Made Of?”* has been one of the most profound experiences of my creative and scientific journey. This project allowed me to merge disciplines that are often seen as distant — biomaterials, microbiology, emotional inquiry, sound design, and textile arts — into a cohesive narrative that speaks to the complexity of being human.

Throughout the process, I was reminded of the importance of curiosity, patience, and letting go of perfection. Microorganisms did not always behave the way I expected, materials changed their texture with time and humidity, and the translation of frequencies into sound revealed unexpected poetry. These uncertainties became part of the piece itself — an echo of the unpredictable, dynamic nature of life.

I was deeply moved by the responses I gathered through the Mentimeter survey, where people from different backgrounds and countries shared their reflections on what it means to be human. Their answers became a silent chorus that accompanied my work, reinforcing the universality and diversity of the question at the heart of this project.

Looking ahead, I am eager to continue developing this project:

- Expand the sensory interactions to include smell and temperature, exploring thermochromic and olfactory-responsive materials.
- Work on a larger-scale installation, where the human body is represented in motion or in dialogue with other bodies and environments.
- Collaborate with musicians and sound artists to create live performances where the biosignals of the materials generate ambient soundscapes in real time.
- Present the piece in educational and public spaces, where visitors can engage with the themes of identity, interconnectedness, sustainability, and technology in a tangible way.

This project has reaffirmed my belief that art, science, and technology are not separate paths, but converging rivers that can lead us to deeper questions — and sometimes, beautiful new answers.

6. Future Possibilities

“Human: What Are We Made Of?” opens up a wide horizon of future explorations that merge science, technology, art, and emotional inquiry. The questions raised during the creation of this piece—about identity, invisibility, connection, and transformation—are far from answered. Instead, they serve as seeds for further experimentation.

In future iterations, I envision:

- Site-specific installations where biomaterials interact with environmental conditions such as light, temperature, or humidity, allowing the piece to "breathe" and evolve in real time.
- Collaborations with neuroscientists or philosophers of mind to deepen the inquiry into consciousness, drawing links between microbial behavior, sensory perception, and awareness.
- Workshops and co-creation labs where participants can contribute their own microorganisms, stories, and materials, transforming the piece into a collective human tapestry.
- Bio-sonic performances using real-time sensors to translate microbial or human biosignals into immersive soundscapes, exploring how biological data can become an artistic language.
- Educational and outreach programs for students and communities to explore the intersection of biomaterials, sustainability, and self-inquiry — encouraging them to ask not just what we are made of, but what we are made for.

Ultimately, this project can become a platform for conversation: between disciplines, between people, between life forms. It invites us to reimagine the boundaries of our bodies and to embrace the invisible threads — microbial, emotional, sonic — that make us human.

7. References / Links / Credits

Books and Theoretical Inspiration

1. Yong, Ed. *An Immense World: How Animal Senses Reveal the Hidden Realms Around Us*
2. Yong, Ed. *I Contain Multitudes: The Microbes Within Us and a Grander View of Life*
3. Harari, Yuval Noah. *Sapiens: A Brief History of Humankind*
4. Mukherjee, Siddhartha. *The Gene: An Intimate History*
5. Huxley, Aldous. *Brave New World*
6. Tolle, Eckhart. *A New Earth: Awakening to Your Life's Purpose*

Artistic and Scientific Influences

1. Fisher, Mellissa. *Microbial Me*
2. Primo, Matías. *Sound Frequencies of Living Materials*
3. Anicka Yi's work on microbial art and scent-based installations
4. Suzanne Anker's bioart installations

Video Documentation

- Project Trailer on YouTube

Special Thanks

- To all the people who participated in the Mentimeter survey and shared their thoughts on humanity.
- My cat (whose fur contributed to microbial diversity!).
- The Fabricademy Puebla node and local mentors.
- Fellow artists, students, and scientists who inspired and supported the process.