

# Botanic Synthesis: A Visual Exploration of Tactile Interaction with Plants

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## Abstract

This paper explores botanical aesthetics by presenting “Botanic Synthesis: A Visual Exploration of Tactile Interaction with Plants” an artwork that seeks to visualize the intricate language of tactile interaction with plants. Inspired by the works of renowned artists Guto Nobrega, Laura Beloff, and Eduardo Kac, the project aims to translate the subtle signals and emotions emitted by plants into captivating visuals. The synthesis of art and technology, drawing on Nobrega's organic forms, Beloff's interactive installations, and Kac's bioart, serves as a foundation for the creation of an immersive experience that transcends the boundaries between the botanical and the digital. Central to this exploration is the integration of Roy Ascott's pioneering concept of "Moistmedia," wherein the artist envisions a dynamic and fluid interplay between technology and the natural world. The paper discusses the theoretical underpinnings of Ascott's Moistmedia and its application in the context of visualizing plant interactions. By combining artistic vision with scientific inquiry, this project contributes to the evolving discourse on the intersection of art, technology, and ecology, offering a unique perspective on the symbiotic relationship between humans and the vegetal realm.

## Keywords

Bioart, Interspecies communication, data visualization, moistmedia, interactive installations.

## Introduction

According to Laura Beloff [1] scientific research is constantly yielding discoveries about the intricacy of plants and their amazing abilities. There is a possibility that plants may be more complex than some have assumed. And yet the idea that they could be considered to be "talking" to humans is controversial. That doesn't stop some people trying to engage them in conversation, though. They are the plant whisperers. Laura Beloff first had the idea of listening to her plants' roots after reading about experiments by Monica Gagliano and other researchers. Over the last decade or so, Gagliano, at the University of Western Australia, has published a series of papers that suggest plants can communicate, learn, and remember.

Galiano [2] argued that scientists should pay greater attention to the fact that plants can transmit and retrieve information acoustically. In a 2017 study, Gagliano and colleagues showed that plants appear to be able to sense the sound of water vibrating via their roots, which may help them to locate it underground.

Galiano and her team [2] explain that, because water is essential to life, organisms have evolved a wide range of strategies to cope with water limitations, including actively searching for their preferred moisture levels to avoid dehydration. Plants use moisture gradients to direct their roots through the soil once a water source is detected, but how they first detect the source is unknown. Galiano [2] investigated the mechanism by which roots of a plant sense and locate water and found that roots were able to locate a water source by sensing the vibrations generated by water moving inside pipes, even in the absence of substrate moisture. When both moisture and acoustic cues were available, roots preferentially used moisture in the soil over acoustic vibrations, suggesting that acoustic gradients enable roots to broadly detect a water source at a distance, while moisture gradients help them to reach their target more accurately. The results of the experiment also showed that the presence of noise affected the abilities of roots to perceive and respond correctly to the surrounding soundscape. These findings highlight the urgent need to better understand the ecological role of sound and the consequences of acoustic pollution for plant as well as animal populations.



Figure 1. "Breathing" by Guto Nobrega Image by Guto NOBrega [5].

The Brazilian artist Dr. Guto Nóbrega, under the supervision of Roy Ascott, developed the installation “Breathing” [3]- a work of art based on a hybrid creature made of a living organism (a plant) and an artificial system. In the core of that system, a plant *Jibóia* (*Epipremnum pinnatum*) has its electrophysiological signal monitored by an analogical-digital circuit to control a robotic interface. This interface is made of a servo mechanism, fiber optics, and light-emitting diodes.

The circuit that monitors the plant is made of a Galvanic Skin Response, adapted to measure electrical resistance in vegetal leaves, coupled to a microcontroller such as "Arduino".

According to Alan N. Shapiro [4] *Teleporting an Unknown State* is defined by Eduardo Kac as a biotelematic interactive installation in which the natural biological process at the basis of the artwork is activated by a telecommunications system managed by the computer. The first realization, from 1996, has been modified in two subsequent versions, respectively from 1998 and 2001, but the basic concept has remained unvaried: light emanating from a hole in the ceiling concentrates on a single seed planted in a rectangle of earth inside a dark room; the light is emitted by a video projector behind it which diffuses the images of various skies captured and sent from all parts of the world by anonymous Internet users. In their turn, these people can, through the Internet, verify the effects that their gestures have on the plant. They can also track the overall growth for the entire online time of the installation, corresponding to the exhibit's duration at the gallery or museum that hosts it.

According to Alan N. Shapiro [4] Kac's reflection on the experience of communication is not limited to the dynamics of the process of the spreading of the message but considers the message itself and its content, conferring on them a new meaning: "The installation takes the idea of teleportation of particles (and not of matter) out of its scientific context and transposes it to the domain of social interaction enabled by the Internet. Following my previous work with telematic interactive installations and my exploration of non-semiological forms of communication with electronic media, this installation uses the remote transmission of video images not for their representational content but for their optical phenomenon as wavefronts of light. Internet videoconferencing is used to teleport light particles from several countries with the sole purpose of enabling biological (and not artificial) life and growth in the installation site." It is therefore not the figurative appearance of the image constituting the message that has value, but rather its property of being the carrier of light: the object of the communication is neither words nor forms nor sounds but photons, 'packets' of energy, the elementary particles of light. This is the most suitable language for the dialogue established by Kac between human beings and vegetables; the best message that a plant can receive is that which guarantees its survival! For the artist, communication among different forms of existing beings is not only an information transmission but a living process.

Within the language of the botanical world, artists Guto Nobrega, Laura Beloff, and Eduardo Kac have ventured into the realms of plant consciousness, weaving a tapestry of dialogues between humanity and the intricate, living artistry of plants. Guto Nobrega's "Breathing" installation, an organic symphony in itself, breathes life into the conversation with plants, inviting us to explore the tactile and rhythmic nuances of vegetal expression.

Laura Beloff, through her interactive installations, defies conventional artistic boundaries, facilitating dynamic dialogues between participants and the botanical realm.

Her creations serve as gateways into the interactive dimensions of plant existence, prompting a reevaluation of our relationship with nature through immersive and participatory experiences.

Eduardo Kac, a luminary in bioart, transcends the conventional with his biotelematic interactive installation, "Teleporting an Unknown State." In this work, the natural biological processes forming the artwork are activated through a telecommunications system managed by a computer. Kac's exploration goes beyond genetic realms, extending into the convergence of technology and biology, offering a unique perspective on the possibilities of communication with plants.

This paper endeavors to contribute to this evolving narrative by presenting an artwork that visually interprets tactile interactions with plants, drawing inspiration from Nobrega's organic symphony, Beloff's interactive ecosystems, and Kac's biotelematic explorations. Through this artistic synthesis, we seek to decode the nuanced signals and emotions emitted by plants, inviting a cross-sensory dialogue that harmonizes the creative expressions of these visionary artists while contemplating the profound implications of conversing with plants in the language of art.

## Botanic Synthesis

The proposal for the installation "Botanic Synthesis" comprises key aspects that help navigate the principles and concepts explored by Nobrega, Beloff and Kac:

1. **Sensory Integration:** The installation employs an array of sensors strategically placed on the plants to capture real-time data on tactile interactions. These sensors may include touch sensors, pressure sensors, and moisture sensors, allowing the system to register a spectrum of responses to human touch.
  2. **Data Processing Unit:** integrated via Arduino, a central computer system processes the live data collected from the sensors. Advanced algorithms are implemented to interpret the nuances of plant responses, distinguishing between gentle caresses, prolonged touches, and varied pressure intensities.
  3. **Live Data Visualization:** The processed data is translated into dynamic visual representations in real time. Visual elements could include color gradients, patterns, or virtual growth, mirroring the plant's perceived emotional states or reactions to touch.
  4. **Multimedia Projection:** The visual output is then projected onto a multimedia canvas, creating an immersive environment where participants can witness the immediate visual consequences of their tactile interactions with the plants.
1. **Symbiotic Dialogue:** The installation aims to establish a symbiotic dialogue between humans and plants, fostering an appreciation for the subtle ways in which plants respond to touch. It explores the reciprocity inherent in tactile interactions, emphasizing the bi-directional nature of the communication.

The visual synthesis is designed to serve as a form of biofeedback, offering participants an intimate glimpse into the affective states of the plants. The aesthetics of the visuals are carefully curated to evoke emotional resonance, connecting participants on a deeper level with the vegetal entities.

In this interactive experience, participants become active agents in the creation of visual narratives, as their tactile engagements influence the evolving artwork. This interactivity emphasizes the interconnectedness between human agency and the responsiveness of the plant world. The visual exploration takes into account the temporal dynamics of plant responses, creating a narrative that unfolds in real time. This temporal element adds a layer of unpredictability, encouraging participants to engage in prolonged and varied interactions to witness the full spectrum of visual transformations. In "Botanic Synthesis," the marriage of technical precision and conceptual depth results in an immersive experience, inviting participants to contemplate the profound language of tactile interaction between humans and the living artistry of plants.

### Final Considerations

In the culmination of our exploration into the visual dialogue between humans and plants through "Botanic Synthesis," we find ourselves at the intersection of art, technology, and ecology. As we reflect on the tactile interactions visualized in real-time, drawing inspiration from the works of Guto Nobrega, Laura Beloff, and Eduardo Kac, we delve deeper into the theoretical underpinnings that justify our approach.

Roy Ascott's concept of Moistmedia, a term he coined to describe the dynamic, fluid interplay between technology and the natural world, serves as a poignant justification for our artistic endeavor. Ascott's visionary ideas emphasize the importance of embracing the "moist" qualities of nature, a metaphor for the vitality, sensuality, and interconnectedness inherent in living systems. In the context of "Botanic Synthesis," Moistmedia becomes the conceptual bridge that binds the tactile language of plants to the dynamic visual narratives created through technological mediation.

Our choice to employ live data visualization as a means to interpret and represent the tactile interactions with plants aligns seamlessly with Ascott's Moistmedia philosophy. By leveraging technology as a mediator, we not only extend our perceptual reach into the vegetal world but also facilitate a reciprocal exchange, where the moist qualities of the plant realm are translated into visually rich narratives. This approach echoes Ascott's call to move beyond static, deterministic relationships with technology and nature, embracing a more fluid and responsive engagement.

Prudence Gibson in "The Plant Contract" [6], considers that visual and performing arts can help us rediscover nature and our inner selves by altering the way we see the vegetative world. The author explores how contemporary art is mediating the effects of plant blindness, which is caused by human disassociation from the natural world. It goes into the wasteland, robotany, feminist plants, and nature rights. I

t is also a show of respect for the intelligence of plant life, as new research indicates that plants are capable of learning, communicating, remembering, making decisions, and forming associations. Art serves as a barometer for how human perception is impacted by climate change. The proposal for "Botanic Synthesis" stands as a testament to the potential of Moistmedia to deepen our understanding of the delicate language of tactile interaction with plants. By weaving together the insights of artists like Nobrega, Beloff, and Kac, and grounding our exploration in Ascott's Moistmedia, we offer a compelling narrative that transcends the boundaries of traditional art, beckoning us to reconsider our relationship with the botanical realm. In this synthesis, the moist qualities of nature and technology converge, fostering an immersive and transformative experience that invites participants to engage in a profound and reciprocal dialogue with the living artistry of plants.

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### Author Biography

Blue Yue, a student based in Shanghai, China, is immersed in the Roy Ascott Studio Advanced Program in Technoetic Arts at De-Tao, at SIVA. Her focus lies in the intersection of contemporary art and environmental consciousness. Her work serves as a poignant reminder of our interconnectedness with nature, advocating for empathy and understanding towards the vegetal world while pushing the boundaries of contemporary artistic expression.