


## Thecla Schiphorst: Development of wearable technology as a tool for expressive interaction

 <https://doi.org/10.56238/sevened2024.010-056>

María Gutiérrez Cedrón<sup>1</sup>

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### ABSTRACT

Thecla Schiphorst builds her work by establishing links between art, body and technology. Through her consecutive interactive installations *whisper: wearable body architecture* (2001-2003) and *exhale: (breath between bodies)* (2003-2005) she uses wearable technology as an interface between the self and the inner self; between the self and the other; between the self and the environment. In this terrain of human/computer interaction with somatic and performative methodologies.

**Keywords:** Thecla Schiphorst, Whisper, Exhale, Wearable, Interface, Interaction, Performance.

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<sup>1</sup> Doctor student in Creation and research in Contemporary Art. Faculty of Fine Arts of the University of Vigo (Uvigo).  
E-mail: gutierrezcedron@gmail.com



## INTRODUCTION

The Canadian artist Thecla Schiphorst (1955) develops in a common space originated from the art/technology alliance. Her artistic and research work is mainly based on studying new forms of body communication employing, on the one hand, new technologies and, on the other hand, somatic and *performance* practices to open a path towards self-knowledge and human relationships. This marked interdisciplinary nature of her work is forged in her background in contemporary dance and programming, highlighting her work with Merce Cunningham in the development of the LifeForms program with the SFU team and her work as a teacher and researcher member of the School of Interactive Art at Simon Fraser University in Vancouver, Canada.

We approach the interdisciplinary universe of the artist by analysing two of her interactive installations *wearable* developed consecutively between 2001 and 2005, leading the *whisper[s]* research group. *Whisper* is an acronym for "wearable / handheld / intimate / sensory / personal / expectant / response / system" (SCHIPHORST, 2005, p.167). In both correlated projects, *whisper: wearable body architecture* and *exhale: breath between bodies*, Shiphorst enters the then sterile field of wearable technology to investigate ways to delve deeper into the interior of our body and establish connection with ourselves through the use of body technological interfaces, with the aim of promoting body/mind self-regulation and the transmission of our inner self to others.

## CONTEXT: LOOKING INSIDE

Covering a study related to the design of digitally interconnected interfaces for wearable technology from Schiphorst's perspective, involves contextualizing the experimental process in the principles of somatic theory that gives meaning to artistic experience. The *wearable* garments used in both interactive art installations are the product of a research work based on the development of different practices with a group of participants, with the aim of developing models of experience and methods of union from "corporeality" to human/computer interaction.

The main objective pursued during the research process, and in the experience of the interactive *wearable* installation itself, is based on the exploration of the internal sensory world, defended in the somatic discipline, as a means of understanding our corporeal-mental states. Somatic practice invites us to listen and feel our inner self to establish an intra/extracorporeal link and develop attention to our internal organic patterns, so that we can become more aware of our body state. Thomas Hanna, one of those responsible for the dissemination of the discipline, refers to somatic awareness as an attitude of listening to oneself, of internal attention, which develops as the individual actively participates in the continuous interaction between the organic processes of the body, the environment and intentions, constituting an essential component of the formation of a cohesive sense of self (CASTRO and URIBE, 2010, p.33).



The garments worn in both installations measure participants' internal body data, such as heartbeat or breathing, and then transform that digital data into responses by actuating actuators according to the patterns collected. In this way, an expressive visual (projections, LEDs), tactile (vibrators, fans) and sound (speakers) response is produced. Thus, from the somatic perspective, the participant of the installation enters into his or her own bodily state. Shiphorst (2006, p.178) based on the reflections of the neurologist Antonio Damasio on bodily states suggests that:

these 'feeling' body-states are an interconnected set of feeling, thought, emotion and physiological functioning: each of these being present and affecting the other. He asserts that the induction of a body-state can be brought about through attention to any one of the interconnected patterns: so that attention to physiological patterning (for example breath) can induce a body state, or conversely, attention to other associated patterns, such as the occurrence of certain thought patterns can also induce the body state.

Shiphorst focuses on internal organic patterns (breathing, heartbeat) as a primordial phenomenon for technological interaction. Those patterns captured by sensors and converted into data can also be shared among participants in the interactive installations. Starting from the idea of interconnection defended by Damascus, the potential of the act of paying attention to internal patterns is highlighted, arguing that such patterns can be understood as part of an interconnected universe of feelings, thought and emotion, which together constitute a bodily state and that, therefore, one's own consciousness directed towards, for example, the rhythm of breathing, has the power to self-induce or self-regulate mental/bodily systems.

## **METHODOLOGY: DESIGN OF EXPERIENCES**

The *interactive wearable installations* *whisper* and *exhale* are the result of a succession of explorative procedures used to guide the different design phases that converge in interdisciplinary creation. It is designed for the user based on the analysis of practices in the first person through a set of guided experiences. These *workshops* or preliminary projects, outline the different paths to follow to finalize the production of the interactive experience of wearable technology, they are the prelude to the design of the garments, to the technology involved in the processes of interaction/expression and to the experiential journey itself given in both facilities.

The premise that moves both projects is the awareness of our internal states, the attention to our organic rhythms that can be attended, and that are intended to be heard, observed and shared through technological tools. Therefore, the previous exercise is based on somatic-based research by applying internal listening practices as well as activities derived from dance, theatre and performance methodologies such as non-verbal interaction or body improvisation. Physical objects, modified garments and first prototypes of wearable technology are also used in these workshops to facilitate the final sketching work and the design of interaction experiences.



<*between bodies*> is the name of the five practices that precede the interactive public installation *Whisper: Wearable Body Architecture*. Throughout the development of the workshops, methods are used that derive from the notion of "deep listening" that Pauline Oliveros and Augusto Boal use as exercises in their process of creating performance practices; such as the emphasis of some senses over others using blindfolds and earplugs in the participants, that must pass in silence through space. Practices derived from Butoh dance methodologies are also used, such as making movements as slowly as possible, while silently trying to transmit a mental image, exploring the development of non-verbal interactions. As Shiphorst puts it, "this technique is utilized to enable the body to shift its attention to an immersive state in relation to its environment" (Schiphorst, 2009:150). In reference to the use of somatic practices in the course of the workshops, the artist states that "it includes practices such as Laban Effort-Shape Analysis, Feldenkrais and Alexander technique. From the Somatics perspective, knowledge is constructed through the experience of the body" (SHIPHORST, 2004, p.3)

In order to promote internal data exchanges in an analogue way and to investigate the body gesture in relation to the object, during the development of the workshops, stethoscopes are provided to users so that, in pairs, they can experiment on listening to their body and that of their companion through the object. It is an interaction game that allows predicting responses and stimuli of the participants.

In the last phases of <*between bodies*> garments specifically designed to work on interaction and body extension are used, such as oversized shirts sewn in different areas between the participants (Figure 1), shirts with long sleeves joined in a group network and a first *wearable* prototype where one of the participants has a pair of sensors incorporated and his partner a red LED that reacts to the stimuli captured. The objective is to analyze the way in which the participants develop using clothing as an object of interaction.

*Heart[h]* is a set of three *workshops* that precede *Exhale: (Breath Between Bodies)*, which brings together the practice and experience developed in <*Between Bodies*> and *Whisper*, and adds an interest in incorporating new methods of expression. Focused on breathing in *heart[h]*, the methodology applied in previous workshops is repeated, incorporating digital breathing bands connected to sound software in users, working in greater depth from the wearable technological interaction resulting from the experience in previous practices.

All these previous practices were documented through recordings, interviews and forms with the participants, serving as fundamental preliminary research work for the creation of the final wearable prototypes and the experience design itself that culminate in the facilities.

Figure 1: . <between bodies>



Source: Thecla Schiphorst website  
Available in: <https://whisper.iat.sfu.ca/process.html>

## DRESSING YOURSELF

Thecla Schiphorst calls the wearable technology creations used *whisper* and *exhale a-wearables*, incorporating the "a" at the beginning of the word in reference to the "attention" one takes of oneself when wearing one of these garments. *A-wearables* function as an interface for interaction between the participant's external and internal worlds. Metaphorically, the technology used activates a biofeedback loop working synchronously with internal physiological processes. The sensors incorporated in the garments record the organic data, which is interpreted and transformed into digital data on the wearable plates, which in turn send this data to different actuators generating sound, visual and tactile responses. This expressive interaction that occurs between the self and the inner self is also shared with the other, generating a network of body communication. By bringing technology closer to our body, by dressing our data, we become observers and directors of our physical patterns, but it also gives us the possibility of communicating and feeling the intimate spaces of others.

## WHISPER: WEARABLE BODY ARCHITECTURE

The interactive public installation *whisper: wearable body architecture* was made between 2001 and 2003, a period of time that spans from the procedural phase of five workshops <between bodies> together with *V2\_lab* and in collaboration with Susan Kozel, to the premiere of the



installation at DEAF03 (Dutch Electronic Arts Festival) in Rotterdam in February 2003. The purpose of the installation is to generate a network of intra and extracorporeal interaction through wearable technology.

Based on premises that emerge from somatic practice, Schiphorst uses physiological patterns, namely heart rate and breath flow, as a representation of the body system. This physiological data is collected and translated into digital data to be replicated and "materialized" in sound and images. Schiphorst focuses his research on the knowledge of our inner being, creating the necessary technology for the user participating in the installation to discover visual and sound compositions generated by his own organism, his own self.

The interface that connects the breathing data to the visual and audible actuators is a garment whose pattern is reminiscent of a kimono (Figure 2). Each *a-wearable* has a series of sensors that monitor the breathing data and heartbeat of each participant, as well as several microcontroller boards that map and translate the data sent via a Bluetooth wireless network to the actuators. Through a programming system, the digital data sent can be translated into expressive responses with patterns generated from the physiological data of the participants.

The visuals offered in response to the physiological data obtained from the participants are projected on the floor of the installation space (Figure 3). These projections draw a unique composition that is created and fluctuates based on the data received, providing the possibility of altering those visual patterns according to one's own body state or, using that external source of information as a means of controlling or monitoring oneself.

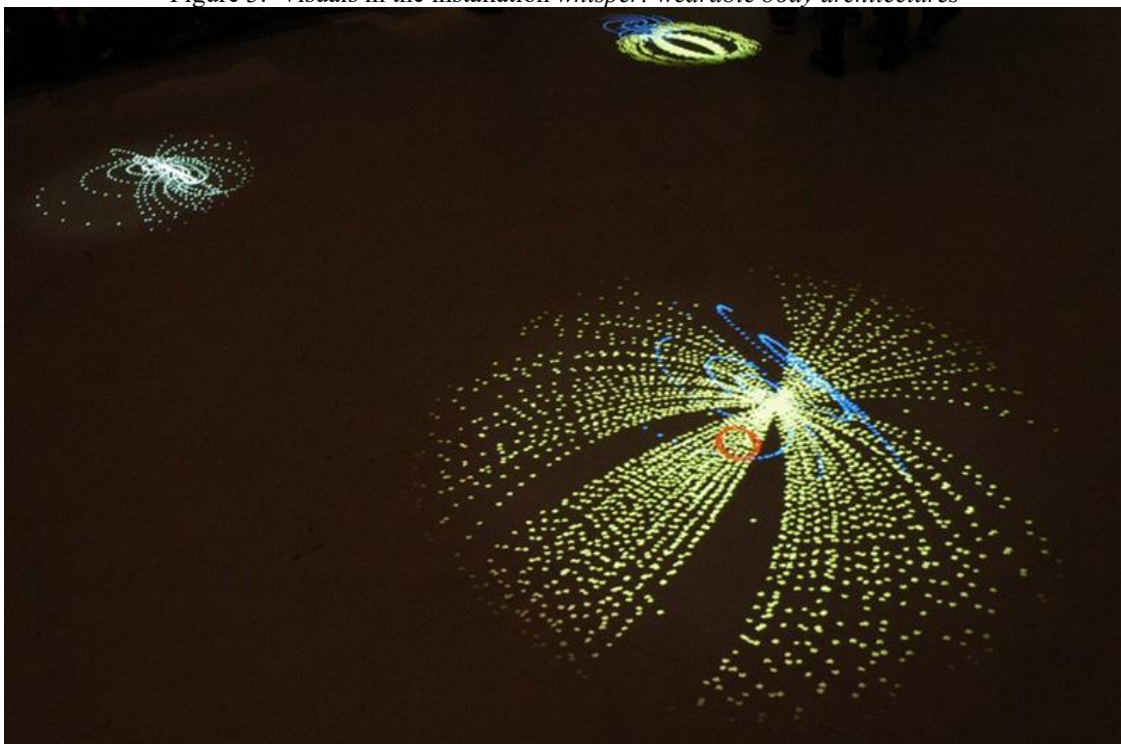
In *whisper: wearable body architecture*, the user has the possibility of sharing and exchanging their data through the use of their *a-wearable*, so that they become an observer of their body system and *a voyeur* of that of others. Each garment has a series of interconnection points so that each user can connect to another participant's *a-wearable*. By performing this gestural interaction, the digital responses merge, generating hybrid visual and sound models (Figure 4).

Figure 2: Detail of one of the wearables used in the whisper installation : wearable body architectures



Source: Thecla Schiphorst website  
Available in: <https://whisper.iat.sfu.ca/process.html>

Figure 3: Visuals in the installation *whisper: wearable body architectures*



Source: V2\_Lab website  
Available in: <https://v2.nl/events/whisper>

Figure 4: Whisper installation : *wearable body architectures*



Source: V2\_Lab website  
 Available in: <https://v2.nl/archive/works/whisper>

### EXHALE: (BREATH BETWEEN BODIES)

The interactive public installation *exhale: (breath between bodies)* culminates the research processes given in *whisper: wearable body architectures* and in the previous experimentation workshops *heart[h]*. In *exhale*, the invisible is started towards the invisible, a cycle is undertaken from the user's breathing rhythm until its translation into the activation of different devices in contact with the participants. The *a-wearables* created for *exhale* focus on the flow of the breath as a mode





of expression and interaction, each participant can send their internal data to the other users but, unlike the previous installation, this data is not manifested externally but the response effect is produced through the sense of touch.

The system of interaction between the self and the inner self, the self and the other, the self and the group is produced on *the exhale* through skirts in whose linings there is a network of devices that form a communication mechanism formed by sensors, microcontroller boards and small actuators that react from the users' breathing data (Figure 5). This data can be exchanged and, secretly, each user can feel the internal body system of their partner. The breathing rhythm of the users of the facility is recorded by bands with sensors that wrap around the rib cage of the participants. Inside the skirt linings, response generating devices are integrated, these are small fans and vibrators that are activated forming patterns from the rhythm of breathing. People who wear these *a-wearables* will receive through touch the translation of their respiratory flow or that of other participants. The flow of air driven by the fans and the vibration produced inside the skirts works as an expressive medium of the body system, allowing the consciousness of the organism to be activated, to feel it and to exchange it.

Users of the installation can choose, select and change the mode of interaction through touch by activating small fabric panels sewn on the sides of the skirts. These panels have motion-sensitive tactile recognition sensors, so the interaction of the self with the other occurs when a participant is willing to share their data with another person by activating the motion sensors through gestural interaction with their *a-wearable* (Figure 6).

Group interaction in *exhale* occurs when the rhythm of breathing coincides between several users of the facility. Each skirt has a built-in external LED circuit that varies its intensity depending on the group's breathing rhythm, so in this case the synchronized breathing patterns would work as a *dimmer* that regulates the intensity of the light in a collective interaction network.

Figure 5: , Detail of one of the wearable skirts used in the installation exhale: (breath between bodies)



Source: ACMSIGGRAPH website

Available in: <https://digitalartarchive.siggraph.org/artwork/thecla-schiphorst-exhale-breath-between-bodies/>

Figura 6: : (breath between bodies)



Source: ACMSIGGRAPH website

Available in: <https://digitalartarchive.siggraph.org/artwork/thecla-schiphorst-exhale-breath-between-bodies/>



## CONCLUSION

Thecla Schiphorst's work since its inception has been nourished by the union of several disciplines as disparate as programming, somatic practice, body expression, new technologies or fashion design. Through the two case studies previously analyzed, we observe the artist's interest in exploring the hidden of the human being using new technologies as a tool. Almost two decades after the development of these wearable interactive installations, currently most artistic projects derive from interdisciplinary/multidisciplinary collaborations whose development revolves around collaborations with the field of science/technology. We could consider Thecla Schiphorst a benchmark not only in the field of development of projects that combine art and science, but also in its attraction towards the development of corporeal interfaces focusing on the interior of the human being and its interaction with the environment. Shiphorst intervenes in these two facilities in the production of wearable prototypes exploring inside our bodies, opening a path to continue researching and evolving as technology allows, currently dealing with the development of wearable prototypes that not only interact with us, but are integrated into our being.



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