

Pensar na Tempestade: Analysis of the concert/performance that fuses music, wearable technology and body expression

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ABSTRACT

Pensar na tempestade was a performance concert developed by the NubeiLab group during the residency of Emerging Creators at the Pazo de Mariñán in 2022. In this article, we will analyze the convergence between the different artistic disciplines that made up representation. On the one hand, we will present the work process for the realization of the technological wearable used as costumes for part of the performance, and on the other hand, we will analyze the process of musical and sound direction and improvisation, to finally expose the result of convergence of the different arts materialized in the performance presented in the same artistic residency.

Keywords: Concert, Performance, Body expression, Wearable technology, Costumes, Music, Sound space, Musical improvisation, Interdisciplinarity.

INTRODUCTION

Pensar na Tempestade is a concert/performance that consists of several parts developed at the Residence of Emerging Creators in the Pazo de Mariñán (A Coruña, Spain) in July 2022. It is an interdisciplinary project where music, body expression and wearable technology merge.

We started from a work team made up of 4 people unknown to each other until that moment, belonging to different disciplines and whose working premise was the proposal of a project where the thematic axes of the call for the Residency "Theory and practice gives light: lóstrego, brétema, ártabro" were developed. The members were Jose Pons (musician), María Gutiérrez (costume designer), Giovanni Peixoto (performer) and Andrea Trenado (visual artist), currently forming the experimental working group NubeiLab. The purpose to be developed during the residency process was that each of the artistic expressions should merge with the others until they resulted in a common stage piece.

It is necessary at this point to differentiate between multidisciplinary and interdisciplinarity. Multidisciplinary practice refers to the integration of different disciplines in an overlapping way, that is, it is a practice where disciplines are mixed but still retain their characteristics. In interdisciplinary practice, there is a greater integration of disciplines, merging and transferring their characteristics. As Frega (2003, p.18) describes, interdisciplinarity:

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[...] It implies a willingness and commitment to develop a more general framework external to each specificity, in which each of the disciplines in contact are at the same time modified and become clearly dependent on each other. Mutual exchanges and reciprocal interactions take place between the different subjects. (Frega, 2003, p.18)

The design of our project proposal was born from the integration of the arts in an interdisciplinary way. Using different artistic procedures to develop their own creation, configuring a unified artistic dialogue between music, wearable technology and body expression. All the arts, although they have their own characteristics that define and differentiate them from each other, arise from a common space. As Berenstein (1985) quoted by Frega (2003, p.11) assures, in reference to interdisciplinary practice "The notion of integration refers minimally to the subordination of previously isolated subjects, to an idea that relates them, which erases the delimitation between them".

LOSTREGO'S DRESS

WHAT IS WEARABLE TECHNOLOGY?

In recent decades, the development of digital culture has made it possible to reformulate artistic practice, opening a path towards experimentation, creating synergies between art and new technologies that have been forged in different areas. Within this interdisciplinary universe are e-textiles or wearable technology.

Wearable technology is intelligent textile pieces that incorporate electrical components into their fabrics and are controlled by programming systems with software and hardware. This system allows garments to be provided with infinite possibilities such as the emission of light with controlled patterns, movement of fabrics by servomotors or sound responses to different stimuli through sensors.

As Ricardo O'Nascimento (2021, p.10) points out, wearable technology is a way to extend our senses and expand with the environment:

We interact with everything around us through our bodies. Our senses are used to experience the world. Thus, the idea of expanding our body with new senses and physical possibilities seems to be very appealing. And that's exactly what wearable technology can provide. (O'Nasciemento, 2021, p.10)

We understand, therefore, that the use of wearable technology in interaction with the body makes it possible to expand one's own human senses and capacities. The garment abandons its passive state, as an object, and begins to function as an expressive entity that reacts to stimuli and emits messages (visual, sound or tactile). Wearable technologies reinvent the relationship with our body, the experience with space, social interactions and self-representation (LAMONTAGNE, 2017) This makes the smart garment a tool for artistic exploration.

Within the artistic field, different proposals have been developed around wearable technology.

However, we will focus on analysing the expressive-dramatic qualities provided by the development of intelligent stage costumes in the discipline of the performing arts, specifically performance, through a case of study: the concert/performance *Pensar na Tempestade* performed by the NubeiLab collective.

In the field of performing arts where various technical and artistic disciplines converge, the inclusion of new technologies has been widely developed, especially in the field of lighting and scenography (use of projections, videomapping, motorized mobiles, etc.). The incorporation of new technologies into stage costumes is an underdeveloped field but with great potential. The scarcity of theoretical studies in this field drives the development of this article, whose main objective is the documentation and dissemination of the experimental practice carried out during the Residence of Emerging Creators at the Pazo de Mariñán in the summer of 2022.

As Lamontagne (2017, p. 4) points out in his thesis *Performative Wearable*, performance becomes the perfect framework for the convergence between wearable technology and body expression:

[...] when we identify the multiple disciplines that converge in wearables—fashion, technology, and the body—a common theoretical thread emerges: performance. Performance as a framework arises because it is one of the few theoretical avenues that can encompass the convergent aspects of wearables equally from the standpoint of the lived body, the dynamic technology, and its expressive aesthetics. (Lamontagne, 2017, p.10)

METHODOLOGY

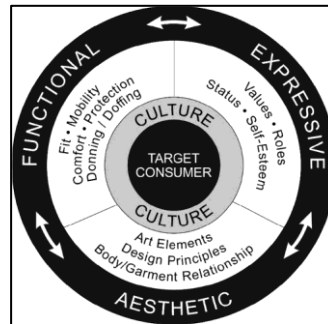
The methodology applied for the costume design is based on an in-depth investigation of wearable technology projects, the identification of key problems in relation to the performer's movement and the analysis of the concept that would materialize in the garment: the storm. The costumes would function visually as two different garments (Figure 8), on the one hand the "conventional" dress when the electronics are not working, and on the other hand, the dress illuminated by the electroluminescent wire that transforms texture and shape by interacting with sound in the dark.

Therefore, we are faced with three design paths for the same wardrobe.

- 1) Compilation of visual information about the sea under the effects of the storm for subsequent sketching and search for fabrics that provide the desired texture.
- 2) Investigation of appropriate technology techniques to insert into the garment that produce the effect of light flash in reaction to sound
- 3) Adaptation of the garment to the electronics and movements of the performer.

In this case, the FEA model of Lamb and Kallal is used. This methodological model is based on three dimensions that must be taken into account when designing a garment: the functional, the expressive and the aesthetic part. (RIIKONEN, 2020).

Figure 2: Schematic of the FEA model of lamb and Kallal



Fuente: International Journal of Technology and Design Education. Extracted of https://www.researchgate.net/figure/The-FEA-consumer-needs-model-Lamb-and-Kallal-1992_fig5_333471178

In this case, the functional dimension is related to aspects of utility and comfort of the garment. It had to allow movement with total freedom for the performer. The dimension dedicated to expressiveness refers to the symbolic and communicative aspects of the garment, this point has a greater conceptual link with the work, it refers to the degree of adequacy of the idea from which it is based (representation of lightning). Finally, the aesthetic dimension refers to issues such as shape, color, and texture.

In addition to the development of an adaptation plan for each discipline that would lead to the concert/performance, we took into account aspects in relation to the staging that would directly affect the general atmosphere in the case of Lóstrego (held in the chapel of the Pazo de Mariñán). For this specific moment where the costumes would react to the sound through light, we chose a space in darkness to be able to direct attention to the performer and appreciate the effect of the costume emulating the lightning of the storm, surrounded by the music and sounds coming from the choir area.

PRELIMINARY WORK

The costume proposal was preceded by several practices, including Prototype I, which the costume designer María Gutiérrez carried out as part of her own experimental practice to document in her thesis *"Between the body and the circuit: the intelligent dress in the framework of contemporary performing arts"*. Prototype I was an experimental practice during a trial/error phase and the result of the study of practical-theoretical procedures and techniques. It is a garment made with a circuit of LEDs that are activated by a light sensor. When any light source was brought close to the garment, the LEDs progressively turned off, reacting to the light.

All the electronic materials used to make the internal circuit of the garment (figure 3) are products specifically created for use with textiles: Arduino LilyPad microcontroller board, LEDs and special sensors for sewing to fabrics and conductive thread. A lithium battery was also used to be a wireless part.

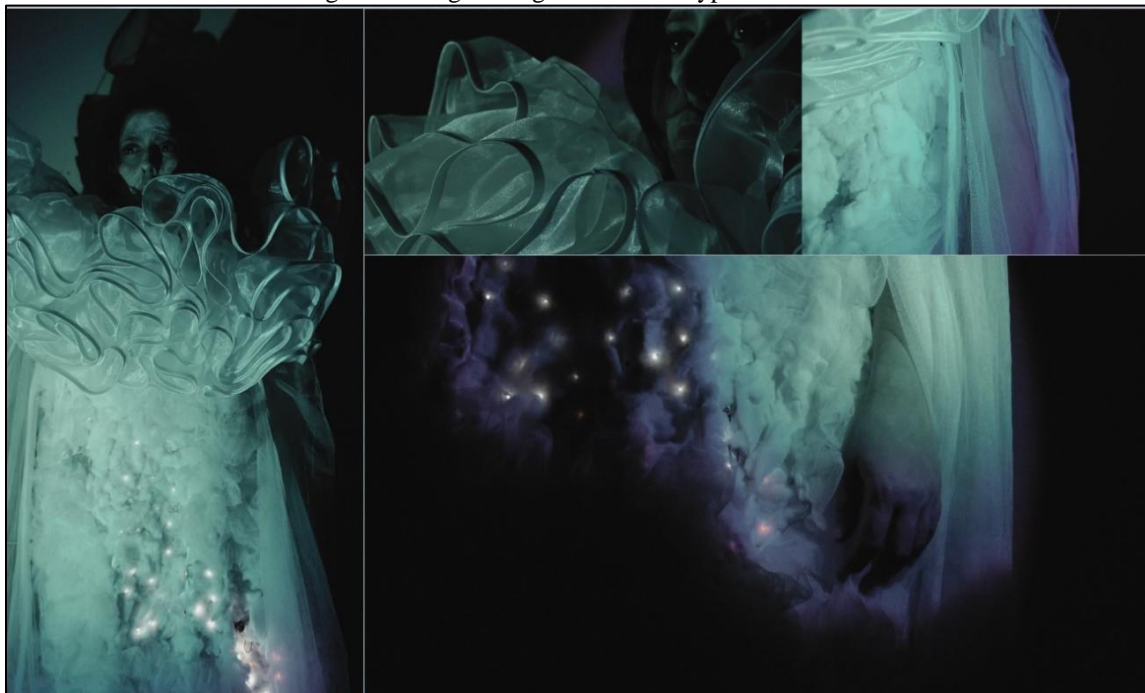
Figure 3: Internal circuit of Prototype I



Source: Own photograph.

The dress was made of chiffon, organza and cotton. The choice of fabrics was given on an experimental basis, to test the flashes of light behind the fabrics. (Figure 4)

Figure 4: Image collage of the Prototype I wearable



Source: Own photograph.

RELATED

For the realization of the dress worn by the performer Giovanni Peixoto during the Lóstrego project, there was a previous phase of research into specific projects that would combine new technologies

with stage costumes. The result of the research led to the study of a project carried out by Marina Castán and Miguel González in 2014 entitled *The Wearable Fashion Orchestra* (figure 5). It is a performance where the performers wear dresses that emit sounds depending on the movement, turning the performers into living instruments. Miguel González (2014) defines this living orchestra as follows:

[...] It is a project that combines fashion, dance and technology to establish an interaction between the wearable, a garment that incorporates technology, and the dancer, within the context of a performance. The result of this research project is a collection of five wearables that behave like a group of musical instruments, i.e. an orchestra, and that allow dancers to become musicians. Thus, the project is presented as a small collection capable of creating a musical composition through contemporary dance choreography. (cargocollective.com/mgonzalez, 2014)

Figure 5: *The Wearable Fashion Orchestra* Source: Miguel González's website



Excerpted from: <https://cargocollective.com/mgonzalez/The-Wearable-Fashion-Orchestra>

This project gave us the idea of relating sound and music to costumes. The specific proposal for that part of *Pensar na Tempestade* referred to the *Lóstrego* (lightning in Galician). The idea was to reference the ray through a play of light incorporating technology into the clothing and adapt the design of the garment in relation to the landscape of the *Ártabra* area, so the use of light was essential.

Another project we used as inspiration was *(No)Here(Now)There* (Figure 6) by Yin Gao. In this work, the Chinese-Canadian designer invites reflection and active participation from the viewer. The project consists of two interactive dresses that respond to the presence and gaze of the spectators. These dresses are made with glow-in-the-dark photoluminescent yarn and super-light organza. The dresses are integrated with eye-tracking technology that makes the dresses move when someone looks at them.

(SIBEL DEREN et al., 2018).

Figure 6: One of the garments from Yin Gao's (No)Here (Now)There project Source: Yin Gao's website



Extraído de: <http://yinggao.ca/interactifs/nowhere-nowhere/>

Yin Gao's project, apart from being a visual reference in what we wanted to achieve with our costumes, is a piece that interacts with the viewer and that served as inspiration for the design of the costume's mechanism. The dress would react to sound by flashing light (in reference to lightning) and that technology would also be used to interact with the spectators (the light would react to clapping, screaming, stomping..)

The previous work with LED circuits and sensors, added to the study of the references and the premise of lightning, led to tests with sound sensors that also react with light. To do this, we began to experiment with El WIRE electroluminescent cable and different sensors until we found the right one. For the design of the garment, organza was used, the premise was to refer to the rough seas caused by the storm.

In the design, the movement of the performer also had to be taken into account, so the wearable had to be light and with the ability to move. The electronic part should be perfectly fastened without the possibility of falling, for which it is

They made a cotton underdress where electronic devices and batteries would be hidden in pockets.
(Figure 7)

Finally, to achieve the effect of light as a reaction to sound, several meters of EL WIRE electroluminescent cable were used and placed on the hems at the edge of the organza steering wheels, current inverters with sound input responsible for collecting the information (sound) and transmitting it to the electroluminescent cable and low voltage batteries as a power source. (Figure 8)

Figure 7: Lining of the Lóstrego wearable to which the pockets for batteries and innervants were sewn.



Source: Own photography

Figure 8: Collage of the wearable Lóstrego in its two forms.



Source: Own photography

FREE MUSICAL IMPROVISATION

For the integration of music in the performance, it was decided to use free musical improvisation.



Free improvisation began to take shape in the mid-twentieth century when composers began to include randomness and indeterminacy in their pieces. Composers such as Charles Ives, John Cage or Earle Brown are some of the many who incorporated these practices into their works.

The ethnomusicologist Josep Lluís Galiana in his book "Free improvisation. The great game of sound drift" mentions that:

[...] The musical origin of free improvisation focuses on the confluence of two strong musical currents: free jazz and contemporary classical music. This musical pluralism generated a totum revolutum in the sound panorama that, together with the happening, musical theater or sound performance, reactivated the use of improvisation as a means of creating and expressing oneself musically. (Galiana, 2017, p.49)

The definition of free improvisation is complex, and as Bailey (2010) defines "its main characteristic is diversity. It does not adhere to any style or language. It doesn't have to get any particular kind of sound" (BAILEY, 2010, p.164).

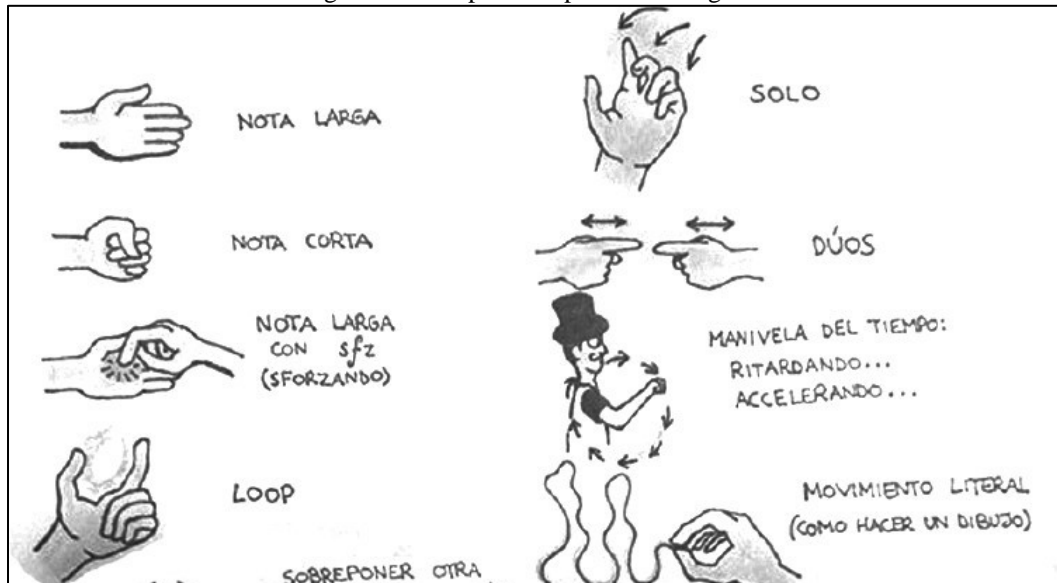
Using this aesthetic of expression allowed us to include in the project musicians who participated in the same residency but in different projects, creating a group of six musicians with different instruments such as percussion, violin, singing or trumpet.

Since none of the musicians had practiced free improvisation and the short space of time we had, we decided to carry out a guided improvisation. Chefa Alonso (2014) defines guided direction as one where "the driver uses a series of signals that indicate certain musical parameters" (ALONSO, 2014, p. 21). The absence of scores and predetermined structures in the practice of free improvisation makes it necessary to establish basic guidelines of organization and a framework where everyone is accepted and has absolute freedom of expression. To do this, we resort to and use the numerous examples of direction signs proposed by Chefa Alonso in her publication "Teaching and learning of free improvisation" (2014).

METHODOLOGY

First, we carried out tests to establish which signs were going to be used in the performance. We start with the simplest and most direct signs such as short/long sound, soft/loud sound until we reach broader signs or abstract, such as the solo sign (where the musician improvises a melody or musical structure leading the rest of the musicians) or signs of evocations such as rain or wind (where musicians try to suggest, with unconventional techniques, the sounds of the proposed soundscapes).

Figure 9: Example of improvisation signals.



Source: Own image.

Likewise, different expressive and musical activities were carried out with the group of musicians such as structured pieces of echo, sound expression, musical mime, imitation and contrast. All these activities were intended to make the musicians, all of them neophytes in free improvisation, feel comfortable and experience the possibilities of free improvisation.

After doing the musical practices, we carried out several tests with the performance Giovanni Peixoto to experiment with him the different sound proposals that we had prepared and see which of them best suited the objective we had set: to emanate the sounds of a storm through music, dance and lights.

The place where the performance took place was in an old deconsecrated chapel. In this context, and after several tests, we agreed to place the musicians in the choir area (upper part of the chapel) for several reasons: to leave space for the audience, to provide more range of movement for the dancer Giovanni Peixoto, to have eye contact at all times with the dancer and, finally, because the sound was the best.

Another of the decisions taken in the tests and rehearsals carried out was to have very little luminosity in the performance space to accentuate the light contrasts of María Gutiérrez's dress.

CONCLUSIONS

CONCERT/PERFORMANCE

The performance *Pensar na Tempestade* was performed in the chapel of the Pazo de Mariñán on June 30, 2022. It was conceived by the artists as an improvisation piece with the prominence of sound, movement and light. The objective was to make a representation of the storm through the different artistic disciplines so that they could complement and merge.

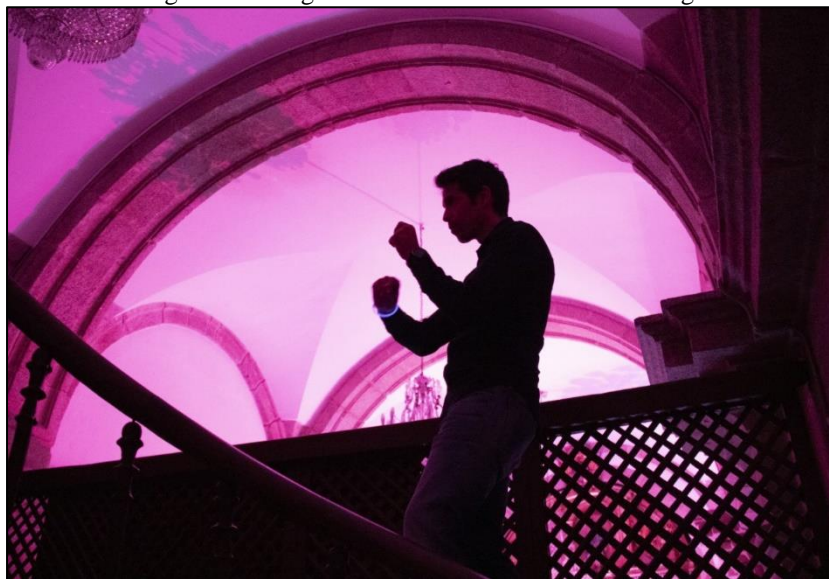
The musical direction of the concert was carried out by the musician José Pons, who was the one who prepared the group and agreed on the different signals, structure and sound effects that were used in the performance.

The decision to use free improvisation techniques was very appropriate because it was perfectly adapted to the needs of the performance allowing a direct interaction of the music with the movement of the dancer and vice versa. The lack of score, inherent in free improvisation, allowed the musicians direct contact with the performance in order to be able to follow and respond to its movements immediately.

The participating musicians stated that they found the experience highly rewarding. Some for the sensation of freedom and musical expressiveness they experienced and others for the sound possibilities that were achieved.

Under the direction of José Pons, the group of improvising musicians developed a unique musical atmosphere, far from conventional harmonies, emulating the sounds of the storm, the heartbreaking sounds of lightning or the stillness of the sea after the storm. Starting from these improvised harmonies, the dancer Giovanni Peixoto developed an expressive and energetic body score. He moved through the space integrating the sounds and flashes of light from the costumes and interacting with the audience.

Figure 10: Image of musician Jose Pons conducting.



Source: Own image

DESIGN RESULTS

As for the design, making of the costumes and assembly with the electronics following the FEA model of Lam and Kakal, an optimal result was achieved in terms of the balance between functionality, expressiveness and aesthetics, complying with each of the aspects:

Functionality. The design of the dress open, leaving arms and legs free, allowed any type of

movement by the performer. The pockets hidden and sewn to the inner lining of the dress functioned as a hold and protection of the 3 batteries and 3 current inverters. The solution of using the hem of the organza steering wheels to accommodate the meters of electroluminescent EL WIRE cable strip was very appropriate both to protect the cable and to give greater volatility and volume to the steering wheels.

Expressiveness. The concept of lightning as part of a storm was achieved by getting the dress to react to sound with flashes of light thanks to the technology used. By using little lighting in the chapel where Lostrego was presented, the illuminated cable of the moving dress stood out giving the sensation of lightning. The performer interacted during this part of the concert performance with the audience. So the audience intervened in the performance making different kind of noises to get the reaction on the garment.

Aesthetics. The design of the costumes in its shape and silhouette was based on the waves of the rough sea, so organza, a light and volatile fabric and the color white were chosen. Creating a composition of volumes appropriate to the original idea.

Figure 11: Image of the Lóstrego concert/performance



Source: Photograph courtesy of Fernando Agrasar.

Figure 12: Image taken from video of Giovanni Peixoto during the concert/performance Lóstrego



Source: Own video. Extracted from: <https://www.youtube.com/@MariaGutierrez-ic6ht/videos>

Figure 13: The performer Giovanni Peixoto dressed in the wearable



Source: Own image.

Figure 14: NubeiLab Group exhibiting their project during the Mariñán Emerging Artists Residency 2022.



Source: Own image



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